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Brownfield site developments

A case study of Kävlinge municipality

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Abstract

Today, several cities stand before the challenge to transform and redevelop discontinued industrial areas that many times occupies a central part of the locality. The adaptation to these policies is among others a result of attempts to embrace and promote sustainable development, as the transformation of brownfield sites can with the right conditions and strategies provide positive change on the environment, economic development and quality of life in a community. Kävlinge is a municipality whose industrial activity has had a noticeable significance to the urban development, and has ambitions to regenerate some of the discontinued brownfield sites into sustainable neighbourhoods.

The aim of this study is to examine how brownfield sites could be transformed and developed into sustainable and successful areas and in what ways Kävlinge municipality's future efforts concerning brownfield development are aligned with sustainable development. To examine this, ten factors have been drawn based on different theoretical concepts and texts. The factors have been used as a framework to analyse the brownfield development in Kävlinge. Two areas in the municipality have been investigated: Scan, a closed down abattoir industry located in the central parts of Kävlinge, and Barsebäck, a decommissioned nuclear power plant that is located by the coast in the periphery of the municipality, remote from the main towns.

The study addresses a deepening of the concept of sustainable development and the strategy of brownfield development that is commonly used to promote sustainability in today's urban development, different selected factors that may implicate a successful and sustainable brownfield development, and a analysis of how Kävlinge municipality's plans and visions relate to these factors. It is found that there are several factors affecting a sustainable brownfield development, among them the location and extent of the brownfield, environmental aspects and extent of remediation, the cooperation between the different stakeholders, the landowner and the municipality. The results also indicate that the brownfield of Scan is a suitable area to develop in view of sustainability, whilst the planned development of Barsebäck is more conflicting with the concept.

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1. Introduction

1.1 The rise, fall and transformation of the industrial society

The industrial revolution had its prelude in the United Kingdom in the 1700's and then continued to spread over Europe. It gave rise to an improved efficiency of methods and tools when producing and shipping different merchandises. The invention of new machines such as the steam engine enhanced the textile production and made it possible to construct steam locomotive. This in turn enabled the expansion of a railway network, which had a massive impact on the transportation feasibilities. Characteristic for Sweden was that the industrialism and urban growth took place rather late, not reaching the country until the 1800's. Railroads were mainly planned and built before the cities started expanding which gave the old city stations an excellent and central location (Region Skåne et al. 2010:2). The industrialization that took place in the countryside underpinned the emergence and growth of industrial communities, who were dependent of, and formed around the industries (Björk et al. 2008:33). During the 1900's, several of these communities came to grow into larger urban areas. The rapid industrial evolution made the urbanization accelerate and major shifts in the cities gradually improved the living standards. As the need for employees grew in the industrialized cities, many people emigrated from the rural areas, which eventually increased the urban population.

During the industrial revolution, Sweden evolved from being one of the poorest countries in Europe, into one of the wealthiest. Buildings like hotels, textile mills, shoe factories, breweries and mechanical workshops had become increasingly common elements in the townscape. However, as structural changes occurred, industries that previously was a characteristic feature in the central parts of the cities gradually closed down or moved out to new and modern facilities (Björk et al. 2008:33). This resulted in that work moved away from the noisy and polluted industrial environments to clean and calm residential and office locations. As Sweden gradually shifted into a service-oriented and knowledge-based society, many areas that once functioned as a centre for industrial production, integrated as a catalyst in the community were left abandoned, empty and unused. This process of partial de-industrialization and structural changes left many cities struggling with serious economic and social difficulties (Isacson 2001:109-110).

During the last decade, an interest of the industrial society's cultural heritage has grown and even though the changed industrial environments long has been seen as problematic, brownfields are more frequently identified as recourses in local and regional development efforts. Restrictions towards exploiting agricultural land and the idea of a compact city that will increase public transport use have resulted in development limitations where expanding outward generally no longer is a viable option. In the search to find available land located in urban areas that are appropriate for new construction, the approach to make use and transform the abandoned industrial

environments have become increasingly common. The adaption to these urban compaction policies amongst the planning systems of western countries is primarily a result of attempts to embrace and promote sustainable development (Breheny 1997:209). Sustainable development is a concept that evolved when the environmental impacts of the industrial era came to sense. The concept encompasses the social, economic and ecological dimensions in society and seeks to uphold a development process that protects the environment simultaneously as a positive, equal and balanced social development and stable economic growth is maintained. This approach has today become entrenched as a universal and well-used guidance in urban development (Drexhage & Murphy 2010:8-9).

Kävlinge, a municipality located in the western part of Skåne, has in recent years experienced a positive population growth, which has increased the need for new housing. The municipality has, like many other cities that expanded considerably during the industrialization, unutilized industrial areas occupying attractive locations. In line with the promotion of sustainable development, Kävlinge intends to take advantage of this land by transforming some brownfield sites into attractive and sustainable residential areas (Kävlinge 2010:6, 35). However, densification is more complex than decentralization and urban sprawl. There are more wills, interests and difficulties that must be weighed which creates a need for a well thought out strategy that adds new urban values while preserving existing qualities. The fact that there are already existing industrial buildings on the site makes the densification process even more complicated, raising questions concerning finance, time perspective, cultural values preservation, identity, and the risks of contaminated land.

1.2 Purpose and research question

The aim of this study is to investigate and evaluate in what way Kävlinge's visions concerning regeneration of brownfield sites in the municipality are aligning with sustainable development and how brownfield sites could be transformed and developed into sustainable urban areas. Two brownfield areas will be examined, one centrally located and one located by the coast in the periphery of the municipality, remote from the main town. On this basis, the following research questions have been formulated:

Which factors are important when transforming brownfields into integrated and sustainable urban environments?

In what ways do Kävlinge's visions and plans regarding brownfield development contribute to or counteract sustainable development?

1.3 Disposition

The first two chapters will present the thesis background and purpose as well as explicate what kind of methods and material that has been used in the study. From there,

the study's initial phase has been carried out in four steps; (1) from theoretical texts and empirical reports, a deepening of the concept of sustainable development and the strategies that are most commonly used to promote the concept in today's urban development has been conducted, (2) from theoretical texts and significant previous research on how to develop brownfield sites has been depicted and different selected factors that may implicate such a development has been drafted, (3) from empirical material and interviews, Kävlinge's historical and current situations has been presented, tapering to a description of the areas of investigation, their plans and visions, (4) the empirical material has then been discussed in relation to the previously introduced literature and theories with the aim to investigate how Kävlinge's visions relate to sustainable development.

2. Method and research approach

2.1 Research approach

The initial approach of the study was carried out in an inductive nature, mainly due to that it commenced without a clear formulated theory or hypothesis. After conducting a phase of theoretical reflection over a set of data, looking through literature and previous research, the research contribution resulted in different theoretical assumptions that set the basis for the analytical framework used in the proceeded investigation. In a more deductive nature, the theoretical assumptions, which formed an analytical scheme, was then applied and analysed empirically (Bryman 2011:27-29).

The research procedure in this thesis can in some perspectives be considered reflecting a pragmatic approach. Pragmatism is a philosophical tradition that is focused on detecting connections between practice and theory (Creswell 2007:22-24). The approach emphasises the significance of the question asked instead of the methods, as well as allowing multiple methods of data collection inform the issues that are being researched. This enables the use of methods and procedures most suitable for the nature of the study and generates an approach that has its focus on applications and problem solving. One characteristic of the pragmatic approach is that it searches for the 'what' and 'how'. It practices a pluralistic approach to understand a problem, which means that instead of using a single method, a multiplicity of conceptions and viewpoints can be used to interpret a research problem. As a mixed use of methods and both qualitative and quantitative data collection is possible, it allows a combination of the deductive and inductive way of thinking (Creswell 2007:23-27).

2.2 Case study and choice of geographical study area

The choice of geographical study area is mainly based on a collaboration with Kävlinge municipality. After a semester of internship at Kävlinge municipality's strategic department it became rather evident that one of the major struggles for Kävlinge's future urban development is how the urban areas in the municipality can be built and developed without claiming valuable agricultural land. The chosen brownfield sites represent an opportunity to maintain a relatively similar urban spatial structure but simultaneously grow considerably in new housing and population. The idea from the municipality's direction was initially to conduct an investigation that would result in a proposal strategy in how to transform an industrial area. I however chose to focus the study on brownfield transformation in a slightly more broad perspective and found it appropriate to put it in the context of sustainable development. There are mainly three brownfield areas in Kävlinge municipality that are identified as potential future redevelopment ventures. The focus in this study lies on two of these areas, Scan and Barsebäck. Why these have been selected is particularly due to that the envisioning and planning of the areas have been further progressed and formulated which facilitates the

performance of the analysis, but also due to that the selected areas hold quite different conditions, something that adds an interesting divergence and comparative angle to the study. By evaluating two of the three current on going brownfield areas makes it possible to draw certain conclusions regarding how the municipality's development appears to be in relation to sustainable development.

In order to distinguish among the numerous research strategies that exists, it is important to identify which type of research question that are posed. For instance, case studies are a common approach when wanting to answer questions like 'how' and 'why' (Yin 1990:19). Asking the question *how Kävlinge's* visions can contribute to a sustainable development entails that the outcome of the regeneration process is dependent of the area, its preconditions and its context. This distinctive form of empirical inquiry enables a diversity of evidence including documents, objects, interviews and observations, thus allowing the application of both qualitative and quantitative methods (Yin 1990:20-21, Bryman 2011:74).

However, criticism can be raised towards the approach of studying a specific case, as it could be considered difficult to allow a single case to be representative and give a result that could be applied in a more general matter. It could moreover be problematic to find a textbook case that solely can be used to represent an entire assembly of objects; therefore the outcome should not be generalized (Bryman 2011:76-77, Yin 1990:21). Though in this study there are mainly normative factors and principles that guide, which means that the more general model that is presented could be possible to implement in other brownfields.

2.3 Literature studies

To cover a broad field of focus, it has been necessary to rely on others' previous research within the field of brownfield regeneration, which has been selected and adapted to fit the frame of this study. The literature studies has been conducted in three different steps, with the aim to

- (1) define sustainable development in an urban context,
- (2) define sustainable brownfield development and investigate main factors of implication,
- (3) examine Kävlinge's industrial past, its present, and how the municipality relate to the concept of sustainable development in future ventures, as well as investigate the plans and visions for the study's selected brownfield areas.

In order to do this, different material including printed books, published articles, documents and reports have been selected and studied in a systematic way to find key concepts and themes that are relevant in the framework of this study. However, it is important to have in mind that the choice of theory reflects the results of the study. There might be overlooked aspects that would have been equally or even more

appropriate to examine in this specific context. Also, the empirical data's physical preconditions are not always consistent with the physical preconditions of the theory, something that can weaken the study's validity. For instance, the theory many times portrays conditions from an urban or metropolitan perspective, which raises the question of how urban is defined and whether the locations of the case studies are qualified to meet that definition.

When defining the concept of sustainable development (1) Drexhage and Murphy's article *Sustainable Development: From Brundtland to Rio 2012* (2010), has been the main literature treated. It clarifies the background and definition of the concept. By examining reports from public bodies like SKL (The Swedish Association of Local Authorities and Regions), Boverket (The Swedish National Board of Housing, Building and Planning), Region Skåne and the European Commission, the concept has been described in a more urban context as well as its practical incorporation. To investigate theoretical standpoints of what is considered being a 'sustainable urban development', Lousie Nyström's contribution "1800-talets industriarv ger rum för 2000-talets europeiska stadsliv" in the book *Industrilandskapet – kulturmiljö och resurs för stadens framtid* (2001), has been suitable as it stresses the key aspects to a more sustainable urban development. The argument of which spatial structure that is a more sustainable and thus favourable prospect is moreover communicated through a plurality of researchers, some who has been referred to in this study. For instance, the book *The Principles of Green Urbanism – Transforming the City for Sustainability* (2010), authored by Steffen Lehmann, addresses green urbanism based on ecological principles, and has a practical approach to describe which aspects that are important for a city to be sustainable. The choice of the literature and reports in this step is based on creating an understanding of urban sustainable development, but also with a historical emphasis to recognize which development trends that have existed and how the industrial and spatial development of the city has affected its sustainability.

Defining the concept of sustainable brownfield development (2) was mainly conducted by searching for literature within the field of brownfield development. The purpose was to get a broader perspective of its implications as well as uncovering the central concepts. To find relevant published scientific articles, the search system at Lund University Libraries was used, searching for keywords involving "Sustainable brownfield development", "Brownfield transformation", and "Successful brownfield development". There are primarily four articles that have been central in this step. Tim Dixon's article, *Integrating Sustainability into Brownfield Regeneration: Rhetoric or Reality? – An Analysis of the UK Development* (2006) focuses on the concept of 'sustainable brownfield regeneration', investigating the industry's development connected to attitudes regarding important aspects of sustainable development and the transformation of industrial areas. As the article connects brownfield regeneration with sustainable development, highlighting the emergence between the two agendas, it has been a valuable piece in this study. In the article *Brownfield dilemmas in the transformation of post-communist cities: A case study of Ostrava, Czech Republic*

(2013), the writers Barbora Duží and Jiří Jakubínský analyses and explores the procedures and dilemmas of urban brownfield solutions, which, among other things, results in an accounting of different key factors that have a central impact on selected brownfield transformations. The Deborah Lange and Sue McNeil's article, *Clean it and They Will Come? Defining Successful Brownfield Development* (2004), describes the result of a statistical analysis of data collection from two nationwide surveys in the UK, pointing out the main factors that are believed to influence the success of a brownfield redevelopment. The article *Urban history and cultural resources in urban regeneration: a case of creative waterfront renewal* (2013), by Marichela Sepe, seek to demonstrate the leading factors of which condition creativity in cities, such as creative regeneration. Among others, Sepe presents 10 principles for sustainable urban waterfronts development which were drafted based on the most successful regeneration of waterfronts and set out during the World Conference of the United Nations Urban 21 held in Berlin in 2000 (Sepe 2013:600-601). These three articles constituted the primary material when determining the factors of what might implicate a brownfield development. Steffen Lehmann's book has again been used as a valuable tool when looking for sustainable strategies engaging in the renewal of industrial areas. The book shows various architectural and design strategies and methods in how to transform and future-proof the post-industrial city in a sustainable way. Mainly through this literature, the knowledge concerning brownfield development has been strengthened and various factors that are important to a sustainable and successful transformation were drafted.

In the next step (3), Kävlinge's comprehensive plan (2010) has been studied with the purpose to describe Kävlinge's history and identity, prevailing conditions and overall strategies for future development, as well as the municipality's approach to the concept of sustainable development. In addition to the comprehensive plan, different documents have been used to study each individual brownfield area, including sections in Kävlinge's detailed comprehensive plan for the coastal zone (2014) that are being finalized and a planning and implementation description of Scan (2014), as well as related public documents. These documents have been examined combining a component analysis and comprehensive analysis. By reading the documents, an overall understanding and a general impression of the brownfield vision have been recognised. In order to convey and reinforce this impression and to more thoroughly investigate what Kävlinge municipality wants to achieve with the regenerations, some key concepts have been identified. In this way, a recurrent structure or theme could be read (Halvorsen 1992:131-132). Complementary, various newspaper articles have also been used, mainly to investigate how the two brownfield projects have progressed and what possible difficulties that have been encountered along the way. There proved to be considerable media material available just by searching for the areas on the Internet.

2.4 Interviews

Supplementing the literature studies, two interviews have been conducted with a selection based on the ambition to broaden and deepen the empirical data. One

interview was performed with an interested party in Kävlinge's visions regarding the different brownfield transformations, and one with a person who has knowledge about Kävlinge's historical development and industrial past. The interviews were conducted with a semi-structured approach, meaning that the questions give the possibility to ask follow-up questions and receive open responses thus allowing the interview to become more flexible and expressive (Bryman 2011:206). Thorough notes were taken during the interviews, material that then has served as a basis and support throughout the process of interpretation and analysis of the interviews (Halvorsen 1992).

The first person interviewed was Cecilia Hägglund, educated art historian and ethnologist, who has worked at Kävlinge municipality as an archivist for around 30 years. The respondent has researched in Kävlinges history and has co-written books about the municipality and its industrial past. The main purpose of the interview was to get a deeper understanding of Kävlinges emergence and development as an industrial community and how it has changed over the last decades. The interview took place the 27th of July 2014 in the private residence of the respondent and lasted for about one hour. The second respondent was Fredric Palm, strategic planning manager at Kävlinge municipality. The department is responsible for questions related to urban development, comprehensive and regional planning, public transport as well as land and development issues. The aim with the interview was to receive more knowledge regarding the municipality's intention with the plans, to find out how they have proceeded so far, and what impact the plans are believed to have on the community. The interview took place the 18th of August 2014 over the phone, and lasted for about half an hour. Prior to both interviews, templates with about ten to fifteen questions had been constructed and were used as a guide throughout the interviews.

2.5 Observations

As part of the empirical data, observations were conducted with the purpose to get an enhanced overview of Kävlinge's existing brownfield areas. An observation is usually made when studying a phenomenon in its natural context where the observer's senses are used in a more disciplined and thoughtful way than usual (Halvorsen 1992:83). The intention of the observations was to receive a better perception of the brownfield areas, as well as to understand their contexts with the surroundings. Due to Scans central location close to the station, the area was frequently observed during a semester of internship in Kävlinge municipality, although more thoroughly at the dates of 2013-10-07 and 2013-10-14. The Barsebäck plant was visited on the date of 2014-07-30. As both areas, particularly the plant, are enclosed with barbed wire fencing and high security, it was only possible to gain a limited, but still valuable insight, which made it possible to assess different advantages and disadvantages, qualities and characteristics of the buildings and areas. Photographs were taken as documentation and are used in the study to portray the areas.

3. Sustainability and Brownfield development – a conceptual framework

Throughout the industrial revolution, the development occurred with little knowledge and consideration to how the utilization of natural resource and industry production would affect the environment. It was not until much later that the damage of the industry's emissions and extensive resource extraction had to the environment, the climate and to human health was recognised and acknowledged. In the 1980's, the UN assembled countries to address these issues by constituting the Brundtland Commission. The commission released the report *Our Common Future* in 1987, which established and defined the meaning of the term "Sustainable Development" (Drexhage & Murphy 2010:7). One of the most common definitions of sustainable development was then presented as development that "*meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Drexhage & Murphy 2010:8).

The general aspect of the concept sustainable development is to limit and reduce the consumption of our natural resources. Sustainable development does however not only concern environmental questions but consists of three main pillars; economic growth, environmental protection and social equality. The pillars are in many ways connected and interact with each other, together contributing to an overall idea of sustainability. This is often referred as the 'triple bottom line' approach to sustainable development (Dixon 2006:239) and means that the environment should be preserved simultaneously as a positive, equal and balanced social development and stable economic growth should be maintained.

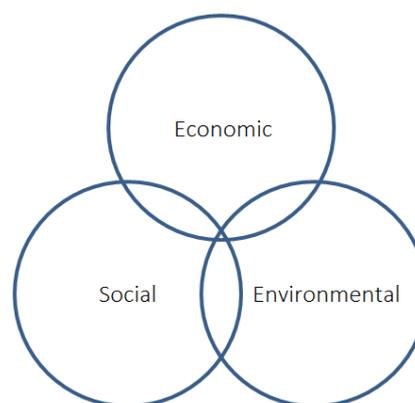


Figure 1 The three pillar model; economic, social and environmental sustainability.

Reconciling the different dimensions could however be a complex task, as they do not always have joined aims. For example, what is most cost efficient is not always the most environmentally friendly, and what is socially desirable is not necessarily what is good for resource management (Nyström 2003:150). This means that the concept have a tendency to induce conflicts of interest where the different dimensions could end up as each other's counter poles (Drexhage & Murphy 2010:12).

One advantage of sustainable development, which has contributed to its widespread acceptance and endorsement as a guiding principle, is its flexibility that allows stakeholders to adapt the concept to their own purposes. Unfortunately, this does also become its weakness as various interpretations have led to confusion and difficulties when implementing it in practice (Drexhage & Murphy 2010:9). Due to this, the

concept has been contested, argued being too vague in meaning or too difficult to operationalize (Dixon 2006:239).

3.1 Sustainable urban development

Sweden has always been a sparsely populated country and even though many cities were founded during the 1600's Swedish empire, it was not until the 1800's, in conjunction with the industrialization, that the large urban growth commenced. The majority of the population moved to urban areas after the Second World War, something that required a rapid expansion in the cities and brought a substantial change in the living environment (Björk et al. 2008:11-12). As more than 80 percent of the Swedish population live in cities and agglomerations today, there is an increasing pressure on the sustainability of urban areas. Cities have long been an important issue within the sustainability discourse as they are accountable for a large part of the emissions and energy consumption, something that places high demands on their future development (SKL 2010:7). Buildings are for instance responsible for 40 to 45 percent of the world's energy use (Lehmann 2010:124) and the emissions from traffic accounts for a large proportion of the daily air pollutions. According to research presented by the European Commission, densely populated areas often experience a combination of problems including different types of crime, pollution and noise two to three times more than in other areas. People living in cities also have a tendency to show a high level of dissatisfaction with the air quality and lower levels of safety and trust (European Commission 2010:16).

In line with sustainable development, the urban environment's importance for human well-being has been increasingly emphasized, like the identity and attractiveness of a place and the connections between the built environment, human health and safety. It is important to provide an attractive, equal, healthy and available living environment to the individual people, the business life and the civil society. For this to happen, it requires cooperation and interaction between different sectors of society, businesses and stakeholders (SKL 2010:1-2). The challenges of a sustainable urban development are multiple. They include creating a strong economic growth, improving habitats in urban areas, foster cultural values, building a good social cohesion across the country and protecting and maintaining nature with balance between city and countryside (Boverket & Naturvårdsverket 2000:8, 39). The municipal and regional authorities have great responsibilities to create opportunities and prerequisites for people to live a good life. The municipalities in Sweden have planning monopoly, meaning that they decide how the land within their own municipality should be used and built. The planning monopoly is important when doing local political considerations and to solve conflicts of interests in the development of sustainable cities (SKL 2010:3). By working with the objectives to improve the resource management, decrease the emissions and to achieve a better habitat, both environmentally, socially and economically, many municipalities are attempting to incorporate sustainability into planning practice. It has however

proven to be a complex issue as there are many methods and theories that conflict in how to apply and implement sustainable development in an urban context.

One current issue in the sustainability debate has been the question of an urban area's spatial structure and its availability of public transportation. A common belief appears to be that densification and a mixed function of housing and business should replace the urban resolution and functional separation that has been prevailing the urban development in recent decades (Nyström 2001:125-126).

3.2 Urban spatial structures

Even though the industrial revolution boosted cities and the urbanization process, there have been subsequent periods experiencing demographic changes where urban residents have moved out of the cities to newly build suburban villa districts and the idyllic landscape (Nyström 2001:119-120). The increasing distances created a vast transportation need with the car as a prerequisite. The development caused the urban spatial structure to become more fragmented and dispersed than before, in some places creating functional divided edge cities. As the car dependency grew, the urban environment was gradually adapted for motor vehicles (Hedskog 1982:15). This spatial structure is known as urban sprawl, a phenomena that can be defined as a specific form of urban development with low-density, car dependency, dispersed, and with significant associated social and environmental costs. It has been particularly dominant in the United States, where the extreme expansion of development at the expense of open space and natural resource land has induced worldwide debates about the issues of the phenomena (Hasse & Lathrop 2003:160, 173).

The disadvantages of sprawl and the disconnect between urban and rural has demanded new solutions concerning the urban development. As cities no longer can grow at the expense of its surrounding landscape, the challenge has become to accomplish a new relationship between the urban and nature where both can co-exist in symbiosis (Lehmann 2010:179). As a reaction against the dispersed functionalistic urban planning approach, theories and strategies regarding compaction and densification have been developed. The compact spatial structure is an urban form that is argued being more able to accommodate growth by decreasing travel distance and preserving land (Echenique et al. 2012:121). The idea of compaction is designed to meet the primary sustainability aims by having all future development taking place within the boundaries of the existing urban areas. Some typical measures to achieve this is to limit the development in rural areas, higher population densities, renew and revitalize urban areas and city centres, promote public transportation as well as focusing on developing the areas around public transportation nodes. This can have a positive effect on the environment, helping to reduce the use of private cars and its emissions as well as protecting the countryside (Breheny 1997:209).

Densification has become a customary course of action to promote the compact city and refers to any type of construction within an existing urban area. The new buildings can take place on different types of land such as green areas, industrial sites, and parking lots. It may also take the form of extensions, as building an additional floor on an already existing house. Substantial research has supported the connections between density and a low use of private vehicles. It has also proven that a low use of private vehicles is connected to good public transportation. Therefore the intensification of land use does raise additional demands to handle traffic (Nyström 2001:126). To further promote the use of public transportation, the city should not only be compact and densely built, but also be perceived as compact when moving around and travelling in and between cities. Mobility has become a central need in today's society and as labour regions are expanding, the commuting increases. To reduce car dependency, the demand for efficient and available public transportation systems, both in a local and regional level, is crucial. With the aim to benefit of existing infrastructure and to concentrate development around public transport investments, densification is intended to be prioritized in transit-oriented locations. A transit-oriented location is according to Region Skåne an area that is situated within a radius of 600 to 1000 meters from a station. The concept is based on the observation that many of Skåne's agglomerations and cities have station areas that to a large part consists of industrial or undeveloped land. By concentrating new housing around existing stations, the ecological dimension of sustainability is promoted since the agricultural land is saved while the use of cars and carbon dioxide emissions can be reduced in pace with the increasing public travelling. The economic dimension is boosted as regional expansion creates a larger labour market, something that can be seen as a mean to strengthen the region, its job opportunities and its attractiveness. The social dimension is strengthened as people receive an increased accessibility to public transportation. The ambition is also to concentrate activities and businesses in proximity to the station, which allows an improved accessibility to the station as local meeting and destination point (Region Skåne et al. 2010:8, 18).

An integration of functions with a diversity of service and business mixed with housing does not only favour public transportation use. By creating proximity to daily errands and services it encourages people to walk or cycle instead of taking the car, thus promoting a more environmentally sound urban traffic. Its opposite, the functional divided city, involves a city where functions are separated into different zones which increases the residents distances to service and business, hence contributing to a higher use of private motor vehicles (Boverket & Naturvårdsverket 2000:28). The mixed and diverse city is not only beneficial in an environmental perspective as it is also argued favouring a socially sustainable city. Based on Jane Jacobs book *The Death and Life of Great American Cities* (1961), diversity, both in functions and in urban design, is a contributing factor to creating street-life in public spaces, which can lead to social interactions and street-level observation that set the stage for a safer urban space (Jacobs 2004:54-59).

According to Lehmann, the fact that a densified city district with a mix of uses on a neighbourhood scale is the way to deliver a more sustainable city form is a conclusion that has been reached by many prominent urban planning theorists. Referring to it as the ‘*The Low-to-No-Carbon City*’, Lehmann has summarised some of the benefits that a compact city with five to seven stories would have, such as (Lehmann 2010:710);

- better conditions for walking and cycling
- less greenhouse gas emissions
- reduced need to travel
- a higher use of public transportation
- improved energy efficiencies
- reduced social segregation
- better job opportunities for the lower skilled
- improved access to facilities
- increased possibilities for social interaction and contacts, and
- lower death rate from mental illness and depression

The encouragement of the compact city as a leading policy strategy for land use in today’s urban development can clearly be discerned in various policy documents, both in a global, national and local level. Due to its claimed environmental advantages the European Commission promotes the compact city over the sprawling ones, stating that highly compact cities tend to reduce the average length of journeys and make public transport more efficient, thus reducing energy consumption and greenhouse gas emissions. Land use should also be improved and utilized more efficiently in many cities, particularly on sites that are abandoned such as different types of old industrial environments (European Commission 2010:134-135). At a more local level Region Skåne presents the report “*Multiple-cores in Skåne*” (*Flerkärnighet i Skåne*), with the aim of being an inspiring tool for municipalities to strategically work and develop their agglomerations and spatial structure in urban planning. The report expresses that the region should improve accessibility through actively working with regional densification, as well as developing efficient and green solutions in infrastructure and transportation systems (Region Skåne et al. 2010:69).

3.3 Sustainable urban transformation - promoting sustainability in the transformation of brownfield sites

Brownfield regeneration has become a common approach to foster the sustainable compact city, both improving urban environments and easing the development pressure in rural areas (Dixon 2006:237). A brownfield is often described as a piece of land that has been previously used but is now decommissioned or only partially used. Typical of the site is that it is unutilized, worn down and at the risk of being contaminated such as industrial areas where the industry has relocated or old harbours that are no longer used for their original purpose (Lehmann 2010:25). Duží and Jakubínský stresses the following definition as an intelligible and transparent interpretation of the concept:

“A brownfield site is any land or premises which has been previously used or developed

and is not currently fully in use, although it may be partially occupied or utilized. It may also be vacant, derelict or contaminated. Therefore a brownfield site is not available for immediate use without intervention.” (Duží & Jakubinský 2013:55).

The idea of transforming brownfield sites started to be expressed in the 1980's in Sweden. Reports voiced that the abandoned industrial areas were an untapped resource that should be taken into consideration in relation to building economy, urban planning and environmental sustainability. The full potential of regeneration came to be better understood as it was realized that industrial buildings could be used for a wide range of purposes in addition to the expected reuse like different industrial branches or smaller handcraft enterprises. Another conclusion was that it is usually cheaper and faster to reuse a building than to demolish it and replace it with a new construction. Many industrial sites that formerly were located in the city's periphery had also, due to the increasing urbanization, gradually grown into having a quite central location (Hedskog 1982:20-21). As transportation was an important prerequisite for the industries' placement they were often built in proximity to a transportation node, which provided good prerequisites for a transport-oriented regeneration development (Region Skåne et al. 2010:2). The abandoned industries that had been established close to the water because of the transportation possibilities by sea has also developed into conventional subject to regeneration. As waterfront housing was increasingly considered being an attractive way to live, locations involving seashores, harbours riverbanks or banks have been acknowledged as desirable locations (Sepe 2013:596). Because of the qualities that many industrial buildings has, both location, aesthetically and user-wise, planners and architects eventually recognized the industrial sites as a possible resource in urban development (Hedskog 1982:19-21). A process that many times has become an urban redevelopment strategy adopted with the ambition to strengthen and boost the city's competitiveness and growth (Sepe 2013:600).

The concept of 'sustainable brownfield regeneration' is a result of the emergence of sustainable development and the process of reusing brownfield sites, founded on the three pillars model of sustainable development (Dixon 2006:244). The RESCUE (2003) presents a definition of sustainable brownfield regeneration that, according to Dixon, represents a EU-wide description of the concept:

... "the management, rehabilitation and return to beneficial use of brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context." (Dixon 2006:244).

The central objectives for promoting brownfield development is that it will create an economic and social regeneration of the surrounding areas, that there will be environmental improvements of the sites themselves, and that it will reduce the development pressure on green areas and unexploited land (Dixon 2006:241). To show

the benefits of brownfield regeneration and how it favours a sustainable development, Dixon displays a table (see Table 1) in which the main advantages are outlined.

Table 1 Main benefits of sustainable brownfield developments (Dixon 2006:242).

Economic	Social	Environmental
Creation and retention of employment opportunities	Improved quality of life in neighbourhoods	Reduced urban sprawl pressures on greenfield sites
Increased competitiveness for cities	Removal of threats to human health and safety	Restoration of environmental Quality
Increased export potential for clean-up technologies	Access to affordable housing	Improved air quality and reduced greenhouse gas emissions
Increased tax base		

As brownfield transformations appears to be a sustainable approach in urban planning, the redevelopment also provides an opportunity to utilize several green concepts, integrating sustainable and green building principles into the regeneration of brownfield sites. This means that in addition to regenerate contaminated properties back into useful space, the sites also enables the possibility to display sustainable principles in both their remediation and the redevelopment. Thus, urban brownfield projects are often encouraged to establish different environmental measures such as retaining and managing storm water, conserving energy and water as well as installing more efficient insulation (Edwards 2009:861, 881). This also means that there are potential of a partial re-greening process where the industrial areas within the city give the possibilities to accommodate new parks and green corridors (Duží & Jakubínský 2013:55). The approach is commonly connected to marketing strategies where cities are posing as an example of sustainable neighbourhoods in order to reinforce their image and attract new citizens (Sepe 2013:600). One example of this is Western Harbour in Malmö, Sweden. Western Harbour is built on a large piece of land that earlier has been used as port, shipyard and industrial area. The new city district is built according to guiding lines that will create a sustainable energy use, green structure, waste solutions and a healthy indoor environment, with the vision that all energy should be locally self-sufficient and renewable. The project of Western Harbour is seen as a national representative of sustainable urban development and has become an attraction for field trips and tourists to visit and learn more about smart sustainable solutions (Malmö municipality).



Figure 2 Western Harbour in Malmö (Malmö municipality).

3.4 Factors influencing the success of sustainable brownfield developments

It is not clear how to define a successful brownfield development, but the general intent is for it to generate positive impacts on the environment, the economic development, and the quality of life in the community (Lange & McNeil 2004:101). There are different solutions and development strategies when it comes to brownfield transformation. Depending on the condition of the object it could be used for purposes such as industrial, residential, commercial, green space or cultural, it could be demolished and newly constructed, restored and converted, preserved and reused etc. (Duží & Jakubínský 2013:55-60).

Approaches that have been applied as a framework for some celebrated examples of renewal, particularly regarding waterfront development, can according to Lehmann be summarized in the following guiding principles: mobility, cultural heritage, economic impact, natural environment, urban ecology, enhancement of the area as a place for people and character of civic space. The waterfront district should “*extend the experience of their urban core to the water’s edge*”. This means that the urban qualities should be connected to the area, and feel like and function as an extension of the existing urban environment. It should be a vibrant mixed-use area with quality public space, interlinked with the urban core, with the possibility to accommodate activities and public events, as well as be properly integrated into its surroundings and have a positive impact on existing businesses (Lehmann 2010:114-115, Lange & McNeil 2004:108, Sepe 2013:600-6001).

Some challenges with industrial reuse and transformation could be to determine the city’s identity, to find a suitable relation between the old and the new and decide which direction the future development should approach (Duží & Jakubínský 2013:53). Consequently, the development of brownfield sites commonly raises the question of heritage and how preservation, renewal and change of the cultural environment should be handled. The cultural aspect is important in the social dimension of the sustainability concept as the physical environment in which people live is considered being a valuable identity creator. Cizler describe that “*due to its architectural, social, historical and technological significance, industrial heritage is a recognised factor of the identity of many cities today and is often associated with interests of the local community*” (Cizler 2012:223). Even though an industry has lost its initial function, the area could remain serving as an identification point with the past, thus preserving the historical memory (Duží & Jakubínský 2013:60). The buildings technical standards, economical and functional aspects, qualities and architectural features, as well as societal regards should therefore be evaluated to assess the possibility of preservation (Hedskog 1982:66-67). In the discourse of sustainable development this could for instance mean that even if an older building have a higher energy consumption than a new one, the overall material flows of demolishing and reconstructing could make preservation a more sustainable alternative in the long-term. Lehmann state that “*the most sustainable building is the*

one that already exists”, referring to that life-cycle analysis, green retrofits and adoptive reuse of existing buildings constantly outperforms the alternative to construct new ones (Lehmann 2010:120). Preserving industrial objects can sometimes also be beneficial from an economical point of view. If the industrial use can continue, the clean-up and remediation standards and costs will be lower than it would for residential purposes. However, if the industrial buildings are in a deteriorated condition or if the contamination level risks constituting environmental or health hazards, the solution to demolish might be the preferred option. The process of remediation, demolition and rebuilding is financially expensive and holds the disadvantage that it could be difficult to make the new development correspond with the existing environment. On the other hand, the demolition solution may allow possibilities for a broad scale of new redevelopment of the area (Duží & Jakubínský 2013:60).

Additionally, preserving parts of the industrial heritage in the regeneration process is by some considered to be a significant precondition to a more successful project. Isacson means that besides the obvious conditions like what kind of industrial business that has been conducted, when it was discontinued, the buildings quality and location, the demand for facilities in the local community and the property owners ambitions and competence determining how successful a venture on a brownfield development will be, it is important to consider the time markers and the historical depth of the industrial environment. With knowledge about the buildings qualities and the industrial history, about the context and processes, the possibilities to renew brownfield sites and still maintain the historical depth that explains the industrial area’s special character are more beneficial (Isacson 2001:113-114).

The intensification of land use requires that the land change result in an improved urban quality to affordable costs. The renewal should give alternatives that are seemingly better and cheaper than to live or start a business somewhere else. If the buildings are expensive, which new construction have a tendency to be, there are risks that companies may not afford the premises which in turn could hamper a mixed city district. The regeneration of industrial environments generally also give the possibilities to integrate accommodations with business to a great extent as the old buildings provides a more diverse variety of premises that could be used for different purposes (Nyström 2001:127). Furthermore, it could be beneficial if the diversification of activities are integrated into urban life cycles. This means that if the area accommodates public buildings such as a university or museums it allows its constant use and a more complete integration into the city (Sepe 2013:609).

Duží and Jakubínský have constructed a list of factors that might influence a brownfield redevelopment. The list (see Table 2) is primarily related to brownfields in Ostrava, Czech Republic, but has been modified by me (added references are visible in the scheme), which allows it to be applied in other scenarios (Duží & Jakubínský 2013:58).

Table 2 Modified list of factors that might influence brownfield transformation (Duží & Jakubínský 2013:58).

Factor	Implication for the brownfield solution
Owner/Developer	The owners' courage and will to invest in the area is important. Conflicts between different owners and owners/municipality could obstruct a successful and fast solution. While the community wishes to be convinced that the development is according to the economic and social needs of the residents, the developer wants to be convinced of a return on investment that is according to the anticipations of the stakeholders (Lange & McNeil 2004:107). Collaborations between public and private in planning are therefore beneficial to accelerate the process. The municipality plays an important and coordinating role having responsibilities to help with the remediation and preparation, as well as policy measures and managing projects. The private actors should be included early in the project, ensuring market knowledge and speedup of development (Sepe 2013:600, Duží & Jakubínský 2013).
Location and extent	The location and the size of an area generally have a considerable influence on the intended brownfield use and financial situation. A site is for instance considered more attractive for potential investors and developers if it is located in proximity to the urban centre or in a waterfront location.
Environmental factors	The extent and level of environmental issues are important in evaluating risks to the environment, to health and to establish main concerns for remediation (Duží & Jakubínský 2013:58). The remediation process and clean-up levels has to consider the current financial and technical possibilities and be adapted to the future use of the property (Lange & McNeil 2004:108).
Social-economic factors	The decision making process among possible investors and developers is many times affected by socioeconomic cost estimates. Different economic perspectives should be linked with the development of social conditions and prospects in employments (Duží & Jakubínský 2013:58). The residential areas should be socially mixed with high quality and accessible public spaces, and bring improvements in living and environmental standards (Sepe 2013:600). Factors like total development costs, availability of financial incentives, the contribution that the renewal generate to the local tax base and number of jobs to be created are important aspects that can affect the project's outcome (Lange & McNeil 2004:108).
International experiences	Inspiration from international experiences with related projects and regenerations could help the urban area to avoid previous oversights and adopt ideas from successful practice examples (Duží & Jakubínský 2013:58). As the development of these kinds of projects often is complex tasks, an exchange of knowledge in an international network of contacts may be beneficial for the projects (Sepe 2013:601).
Stakeholders, community	Different stakeholders and experts, both within the private and public sectors, are usually engaged throughout the development process. The

support and participation	degree of involvement and consideration of the public, non-governmental organizations, educational institutions and residents in the executive procedures is an issue that should be considered. (Duží & Jakubinský 2013:58). In these long-term projects it is significant to avoid that economic cycles or short-term interests affect the intentions of developing an area whose potential should be benefited by the whole city. Since promoting public participation is a vital part of sustainability, the community should be informed and involved in an early stage of the process (Sepe 2013:600-601). It also facilitates if the community is supportive of the planned development (Lange & McNeil 2004:108), an aspect that could be affected by the area's place in the local culture and how well the venture is anchored locally (Isacson 2001:113-114).
Vision	Through visions, the view of the locality's future development can be understood and clarified. It contributes to showing the orientation of current interests, such as how the prospect of economic redevelopment is, if there are any natural potential, what kind of possibilities there are when it comes to the industrial heritage, and if and how to integrate and interconnect them.
Time	The remediation and redevelopment process usually takes a considerable time, often years and sometimes even decades. The lengthy time frame can be useful as it sometimes enable the views and attitudes towards the brownfield issue to undergo a shift (Duží & Jakubinský 2013:58). It could however be economically beneficial to minimize the time to occupancy as well as the time required to get the site back into production reuse (Lange & McNeil 2004:108).
Quality of existing brownfield and preservation	The aesthetics, functional possibilities and conditions of the buildings on the site effects decisions concerning preservation, use and how attractive the outcome will be. The condition of existing infrastructure and transportation systems determines traffic and transportation costs. A successful and sustainable site should have a good transportation network adjacent to the property (Lange & McNeil 2004:107). To preserve parts of the existing environment is usually seen as beneficial, ensuring sustainability in its threefold meaning (Sepe 2013:600).
Land use	The land use should be consistent with the master plan, including how the space will be utilized, also with consideration for green space, if the area will accommodate commercial, industrial and office space, as well as how the future development will be integrated into the old area (Lange & McNeil 2004:107, Sepe 2013:600). It is for instance of great value if the renewed area accommodates a mixed use in functions and a variety of cultural, commercial and housing functions (Sepe 2013:600). New urban plans should be adjusted to the latest conditions of industry conversion and novel trends in urban planning.

3.5 Criticism of the compact city

Even if a more compact city has become a universal ambition in urban planning, densification and a mixed use of function are still in some respects counteracted by prevailing tendencies within the economic development. For instance, the deeply rooted accommodation ideals with own villa and garden outside the city (Breheny 1997:211,213), high construction costs in central locations that small businesses often can't manage, and sub-urbanization, meaning that businesses emigrate to the periphery because of concentration and rationalisation processes, are factors that continues to complicate a denser urban development (Nyström 2001:126).

Doubts has been raised regarding the economic prospects of delivering compaction, believing that its logic is defying the market by reversing a well established and integrated process of urban decentralisation that basically has developed through allowing the market for supply and demand of land to operate uncontrolled (Echenique et al. 2012:121, Breheny 1997:215-216). Turning around this economic geography and the existing urban development trends that is the base of the demographic characteristics is considered neither feasible nor desirable. The technical aspects of compaction has also been questioned, which is related to the achievement of urban revival and the difficulties to further use brownfield sites. Regenerating brownfield areas have been successive the last decade but could become more challenging as sites become increasingly expensive and complicated to develop (Breheny 1997:215-216).

In addition, there are uncertainties concerning the environmental affects that compaction is alleged to have. The promotion of growing levels of compaction on the basis of decreasing energy consumption is by some alleged to have socioeconomic consequences of less selection of housing, crowding and congestion to a gain of a modest carbon dioxide reduction (Echenique et al. 2012:136). Lehmann recognizes that poorly planned and badly managed density may cause problems such as a lack of affordable housing and a loss of green spaces in urban areas. He therefore stresses that the approach demands innovative design solutions that are adapted to dense housing, creating sufficient living space and privacy, as well as integrating green space and good public space (Lehmann 2010:710).

4. Kävlinge

4.1 Kävlinge municipality today

Kävlinge municipality is situated in the western part of Skåne, between the cities of Landskrona and Lund. The municipality is a part of the Öresund-region, a major area of growth that belongs to one of Europe's most expansive regions. Kävlinge has always been an important communication node. The railway and the highway that crosses through the municipality provide a great accessibility to the region and good connections to its surrounding cities. The municipality has for a long period of time had a rather consistent positive population growth and reached over 29 600 inhabitants in the year of 2013. In recent years, Kävlinge has had one of the highest population growths in Sweden and been among the municipalities whose population proportionally has increased the most in Skåne. Some of the municipality's larger towns are Kävlinge, which is the main town with over 9000 inhabitants, Löddeköpinge, Furulund, Barsebäck and Dösjebro (Kävlinge municipality 2010:6-7).

The landscape of Kävlinge is characterized by agriculture and plains, which constitutes about 70% of the total municipal land area. Agriculture is therefore an important part of Kävlinge and within the central and eastern areas of the municipality are lands that belong to the country's best agricultural soil. The fragmentation in parts of the landscape is however increasing as a result of urban and infrastructural development. Kävlingeån, one of Skåne's largest rivers, runs through the municipality and is an important natural and recreational area for both residents and visitors. The municipality also has a two kilometre long coastal zone that accommodates valuable natural environments and is a very attractive part of the coast of Skåne, both for housing, tourism and recreation purposes (Kävlinge municipality 2010:6).

The proximity to water and communications has led to that Kävlinge has far reaching traditions as a well-known place for trade. Today, it is foremost Center Syd, a shopping centre in Löddeköpinge that form the largest business area in the municipality. The shopping centre is an important employer for a large percentage of the local residents. Otherwise the employments mainly exist in the public sector within the municipality, such as school, health and social care (Kävlinge municipality 2010:6-7). Kävlinge is classified as a commuting municipality, meaning that over 40 % of the population commutes to workplaces located outside the municipality's boundaries (Kävlinge municipality 2010:10). In the past, parts of the municipality permeated of industrial activity but due to structural changes in the economy the business has altered into being dominated by several small companies rather than few large. Even though the large-scale industries still characterize the localities, the municipality is today first and foremost a place of residence (Kävlinge municipality 2010:10, Hägglund 2014). Barsebäck nuclear power plant, which is one of Sweden's most famous building silhouettes, is still a dominant feature in the coastal landscape (Kävlinge municipality 2010:7).

4.2 The industry's role in Kävlinge

Kävlinge municipality have a rich cultural history from its days as an industrial society, a history that is partially preserved in today's Kävlinge. It was primarily the urban areas of Kävlinge and Furulund in the municipality that came to revolve around industrial activities. This was mainly due to the railroad, whose establishment in the late 1800's became the prelude to both Kävlinges and Furulunds development towards industrial towns. Kävlinge became an important railway junction with lines connecting the town with large parts of Skåne. Most of the major industries that established were related to food and manufacturing and located by the river as good water quality was important for the business. Other industries were more dependent of transportation facilities and sought place near the railroad (Hägglund, 1988:17–19). The industrial complexes were the first major brick buildings in the locality. The functional demands often determined their design with large brick wall surfaces and sized window openings for natural light (Billing et al. 1983:42).

The industries that established in Kävlinge generally had no local anchoring. The market was open for private exploiters and residential and business buildings began to expand in the central parts. The industrial business created job opportunities and to accommodate the new population who immigrated and to attract or to maintain competent workforce, housing was built in connection to the industrial facilities. The population growth that followed contributed to that various functions like schools, grocery stores and infirmary was built and different social activities, associations and traditions were created over time. As the population increased rapidly, the expectations were high and Kävlinge developed into a town with ambitions to become a city. In two decades, Kävlinge had transformed from a small village into an industrial centre (Billing et al. 1983:18-25, Hägglund 2014).

In time, the industries that once flourished gradually reduced or closed down, although some were operating up until the early 2000's. Today, a share of the abandoned factories have been completely demolished and replaced by new residential areas, while a few still characterize the urban environment. Replacing the industrial buildings has become a natural development process as urbanization has made the locations that used to be outside the centre more attractive. A few old industrial facilities have been preserved and reused by giving them new purposes. Kävlinge Glacé-leather factory, built in the early 1900's, has for instance been spared and are today adapted for smaller businesses like a gym, postal services and offices (see figure 3) (Kävlinge municipality 2012:23-24, 30).



Figure 3 The Glacé-leather factory in Kävlings is today reused and accommodates smaller businesses.

Some of the industrial buildings that have been maintained in Kävlings intersect the otherwise low building height and form distinctive landmarks in the town's silhouette. Big factory areas are dominant in the townscape as they consist of large complexes and are located adjacent to the main roads. Several buildings have esthetical qualities even though they might be simple and anonymous in their design and expression. The existing industrial buildings also contribute to a more mixed and diversified urban environment where buildings with different functions and age periods become important elements of the community (Kävlings municipality 2012:21-23).

The socio-historical value is rooted in that the industry buildings, where many local residents have worked, reminiscent of and reflect a time when the community was founded. There is also an evident connection between the industries expansion and the emergence of the major residential neighbourhoods. Although the majority of the industries are no longer active, the image of Kävlings remains characterized by the tall brick buildings and the industrial feel. The cultural program expresses that as the industries are being demolished, a great part of the town's identity will be lost. Street names and new silhouettes in similar colours and design cannot replace characteristic buildings or existing cultural environments (Kävlings municipality 2012:58, Hägglund 2014).



Figure 4 Kävlinge Linen factory has been torn down and replaced.



Figure 5 Residential housing replacing the linen factory.

4.3 Kävlinge's objectives in future development

In Kävlinge's comprehensive plan (Kävlinge municipality 2010), it is assessed that the future municipal planning should be based on an average population growth of 1, 5 percent each year. This means that 3 400 new housing needs to be built during the period of 2010-2025. The municipality emphasizes that this development should be done in a sustainable way so that a transition to a long-term sustainable society, both in an ecological, economic and social sense, could be carried through. To achieve this objective, Kävlinge plans for a sustainable building structure, an energy efficient building development and a developed green structure (Kävlinge municipality 2010:30-31).

The municipality will attain a sustainable building by encouraging that half of the total new housing construction should be built by densification or reuse of land and 80 percent should be located in proximity to good public transportation. In this way it is possible to limit the use of high-quality agricultural land. Building in transit-oriented locations also make the use of public transportation more available which can reduce the use of cars and contribute to a lower energy use and less emissions ((Kävlinge municipality 2010:31-32, Palm 2014). Ensuring new houses to be more energy efficient could also reduce the energy use. To build in a socially sustainable manner is also an important factor to the idea of a sustainable society. One way is to build areas with mixed functions such as business, service and different housing types to increase the possibilities for life and movement during larger parts of the day, which in turn can create a safer environment (Kävlinge municipality 2010:31-32).

In the comprehensive plan a map displays the municipality's current and future land use. Three brownfield sites are identified to be of interest in a future land use change, two of which have been selected to study closer (see figure 6). Scan, an old abattoir located in the urban area of Kävlinge, is labelled as a development area. Barsebäck nuclear power plant is located by the western coast and is labelled as an investigation area for housing.

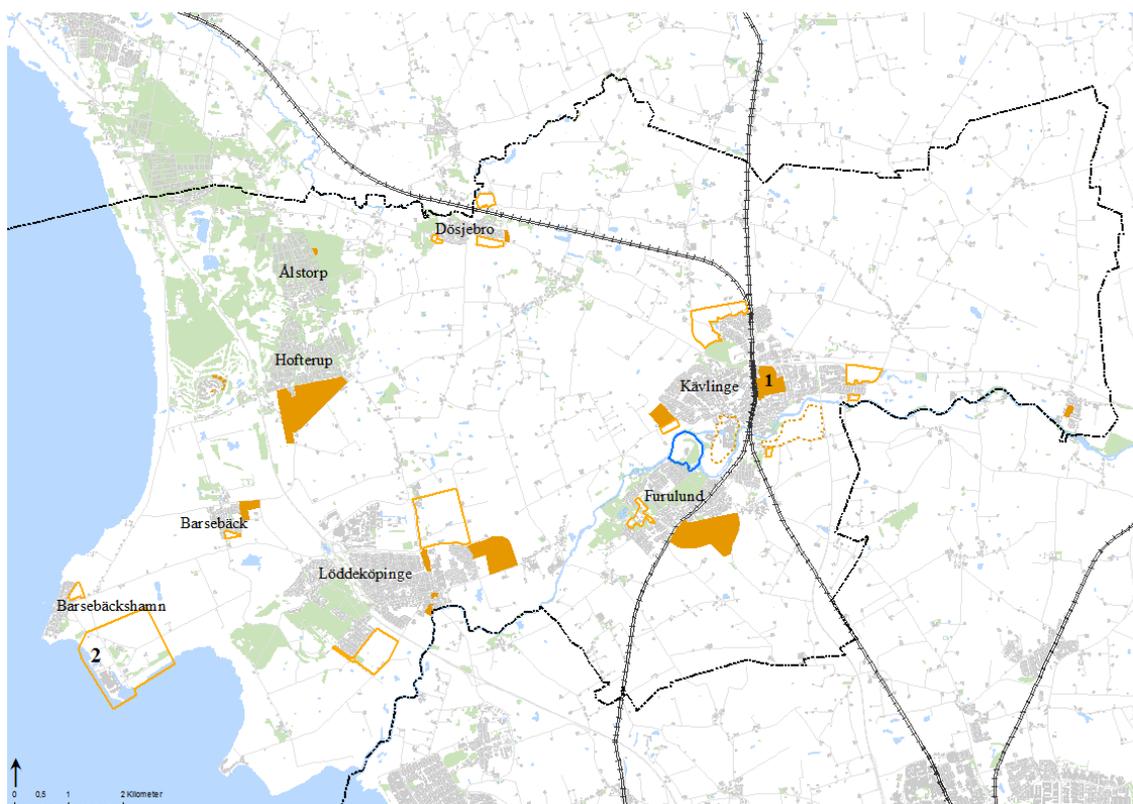


Figure 6 Modified version of the land use map applied in Kävlinge Comprehensive Plan 2010. Number 1 is the location of Scan and number 2 the location of the Barsebäck plant (Kävlinge municipality 2010:35).

4.4 Scan – Eastern Centre

Something that came to be Kävlinge largest industry was the abattoir business. In the early 1900's, the South-western Skåne share slaughterhouse compound built a facility in eastern Kävlinge, as the location by the railroad station was favourable. Over the coming decades the labour force gradually increased as the factory expanded. The slaughterhouse became the largest local employer and had at most around 1 100 employees (Hillåker 1984:82-86). Scan, which had influenced Kävlinge ever since it was built in 1917, was shut down in the early 2000's and eventually bought by the construction company Midroc. Today, the large abandoned industrial area of 23 acres, equal to 22 soccer fields (Thomasson 2009), is enclosed with high barbed-wire fencing and occupies a central place in Kävlinge right by the railroad station and in close reach to the city centre (see figure 9). The area forms an interconnected production environment with large-scale, low-rise, red brick-buildings and is an example of industry that has been gradually extended and expanded over time, hence its varied design. In addition, the planning area contains a builders' merchant, a former mechanical engineering industry and the east station area. There is also a green silo that could be identified as a landmark seeing that it is a very prominent building in the townscape as it is significantly higher than the surrounding buildings and has a distinctive design and colour (Kävlinge municipality 2012:22-23).

During the forthcoming ten-year period, the plan is to demolish the industrial buildings and transform the area of Scan to a residential neighbourhood with approximately 1300 dwellings, solely in the form of apartment buildings (see figure 10). The area should also consist of offices, shops, cafés, as well as other public buildings. The design of the housing is meant to seek variety through buildings with different expressions, materials and detailing. The renewal is expected to affect large parts of the community, especially given that the location is directly adjacent to the station and close to Kävlinge centre which enables a revival of the urban centre and requires improved access and connections across the railroad (Kävlinge municipality 2010:35, Kävlinge municipality 2014:2).



Figure 7 The green silo located next to Scan.



Figure 8 Scan seen from the train station.

The municipality aims to transform the area to an attractive part of central Kävlinge through a dense mixed structure with housing coupled with service, commerce, business and parks. The east station area is intended to be enhanced with a square surface and commuter car parks. A cultural and historical investigation has been made and the plan indicates that some elements from the existing environment will be preserved, for instance the abattoirs gatekeeper will be transformed into a kiosk as a part of the new square that will serve as the entrance to the area. Something called green space factor, a method that specifies which level of greenery that should be applied to promote a green environment, will be used in the area. This for instance means that there will be a local disposal of storm water by creating green areas that can absorb and delay storm water and that there will be green roofs and green facades on the buildings (Kävlinge municipality 2014:2-3).

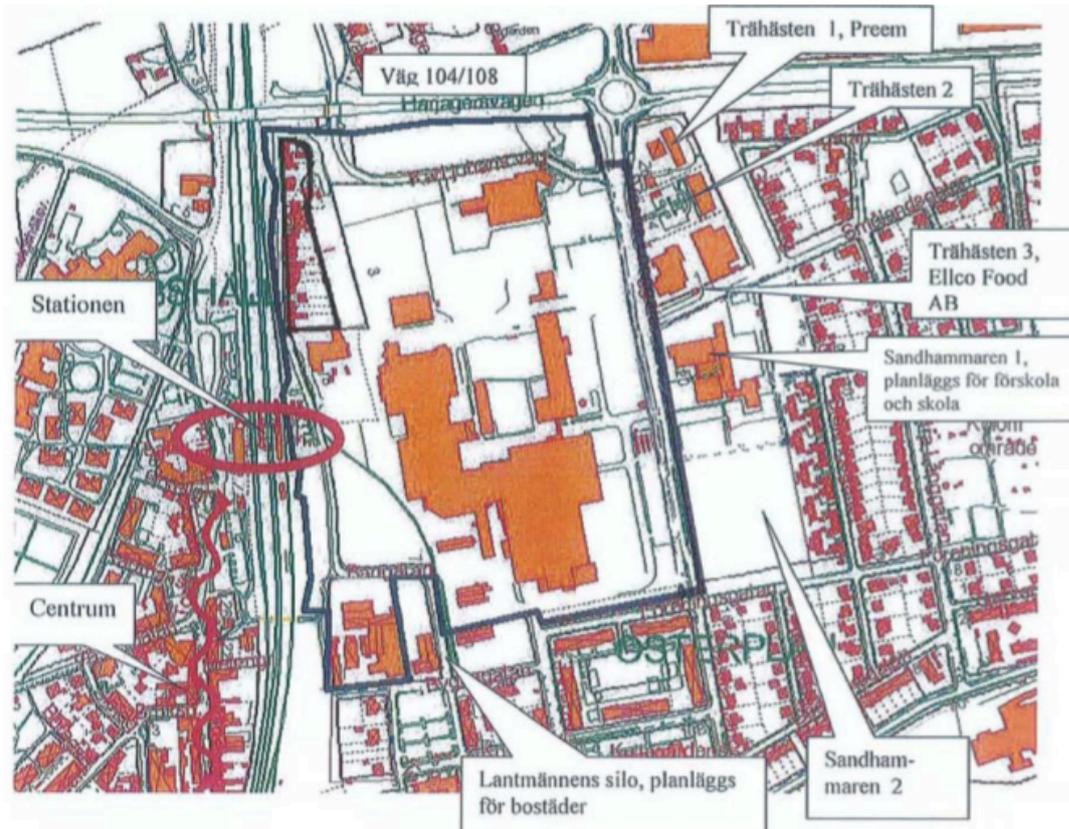


Figure 9 The planning area of Scan today (Kävlinge municipality 2014:1).



Figure 10 Detailed plan of the new area Eastern Centre (Kävlinge municipality 2014:5).

4.5 Barsebäck nuclear power plant - Barsebäck seaside town

One of Kävlinge municipality's most famous and debated industries is the nuclear power plant Barsebäckverket. The plant, with associated buildings and offices, is located in a large area of 50 hectares right by the water at the coast of Barsebäck. The planning of the plant began in 1965 and in 1977 both reactors were active. The area was considered being a suitable place to build a nuclear plant as relatively few people lived within a five kilometre radius and the location close to the water was good for cooling purposes. Due to the environmental disadvantages of nuclear power, the construction and start-up of the plant evoked debates and major demonstrations, something that contributed in making Kävlinge a known municipality all over the country (Hägglund 2014). The reactors were finally decommissioned in 1999 respective 2005, which was a result of a referendum that took place in 1980 where it was decided that all nuclear power in Sweden should aim to be dismantled until the year of 2010. Today, the plant is in service operation with a few employees, operated by Barsebäck Kraft AB, and is sometimes used for guided tours (Kävlinge municipality 2013:30). It also serves as a distinct landmark with its two large building complexes and chimneys that can be visible from afar, symbolizing the once important source of power for the Swedish development, as well as a threat to the environment. The Barsebäck plant has in recent years been highlighted as a symbol of the Swedish industrial heritage. It is determined that the plant will be torn down, and the clean-up work is expected to begin after the year 2020 (Kävlinge municipality 2010:48). Demolishing a nuclear power plant has never been executed in Sweden, which makes it important to adopt appropriate methods, as well as the right competence and knowledge. There will be major waste problems as the radioactivity needs to be decayed or the scrap decontaminated during the work, which is believed to become considerably costly. Kävlinge municipality has however expressed wishes that the demolition of the plant should begin sooner than decided so that the land can be released for unrestricted use to build housing.



Figure 11 The Barsebäck plant.



Figure 12 The Barsebäck plant.

The detailed comprehensive plan expresses a vision called “Barsebäck Seaside Town” (Barsebäck Sjöstad) which is expected to be initiated during the planning period 2025. The seaside town is meant to provide a possibility to live in proximity to nature and

water in a mixed town with high-quality attractive housing, businesses, public spaces and a marina (see figure 13 and 14). The housing should be dense and characterized by highly set demands on a sustainable planning and architecture. The area is intended to be an international example from a climate perspective by having urban energy production and urban disposal of storm-water. Public transportation will be available in form of bus services to Löddeköpinge as well as Malmö, Lund and Kävlinge. The new area should be secured from future climate impacts such as sea level rise and erosion. New buildings, which mainly will be three to five stories high, should be located with a floor level of at least three meters above sea level. The expansion is planned to take place in stages, beginning with a five years phase where approximately 1000 new housing will be built out of the total 3000 housing that is expected to be accommodated in the area (Kävlinge municipality 2013:30-35).



Figure 13 The proposed development area of Barsebäck (Kävlinge municipality 2014:31).



Figure 14 The vision of Barsebäck seaside town (Kävling municipality 2013:35).

5. Brownfields and Sustainability – an analysis of Kävlinges development

In the following section, the list of factors that was described in chapter 3 will be used as a framework when analysing Kävlinge's visions and plans in relation to sustainable brownfield development.

5.1 Owner/developer

In the area of Scan, there is an owner who has ventured to buy the land and have a desire to build and develop the area. Nonetheless, the owner/developer factor has been a problem in the development of Scan, contributing to that the initiation of the project has been prolonged. There have been conflicts between the private actor and the municipality concerning aspects such as financing of public spaces and roads, which has made it difficult to agree on the development contract (Sundberg 2014, Palm 2014) and which subsequently could influence the result of the transformation. The unstable market has also affected the owner to protract the demolition and rebuilt. From an economic perspective, this is most likely an inconvenience, also affecting the possibility to reach fast solutions.

Barsebäck is owned by Barsebäck Kraft Aktiebolag, where the electricity and energy company E.ON is the main holders. The landowner does not oppose the municipality's plans, but is not directly behind them either (Palm 2014). They also find the procedure of the planned remediation problematic. This has resulted in major difficulties between the owner and the municipality agreeing on the terms of the demolition and storage of radioactive material, a conflict that has become a lengthy process recently ending in the Land and Environmental Court of Appeal (Persson 2014). This type of problems impedes an efficient and fast clean-up and regeneration process.

The fact that the municipality do not own the properties of the two brownfield sites means that they do not have all the tools needed to control planning situations, and limits their possibility to regulate and to sell land pieces to developers. This demands good cooperation between the two, which sometimes can be difficult when there are different willpowers and costs to be shared. For this reason there is a great value to the municipality to own the property themselves (Palm 2014).

5.2 Location and extent

Scans location and size makes it a suitable and attractive area to redevelop. The fact that it is in a transit-oriented location, which is a fundamental requirement in the compact city policy and is an important step to decrease car dependency, contributes to generate a sustainable development. It is also aligned with the municipality's statement to attain

a sustainable building structure, where 80 percent of the new housing should be located in proximity of good public transportation.

The Barsebäck plant also encompasses a large area but has a more remote location, as it is not situated in an urban area. This is contrary to the fundamental idea of densification under which the development should take place within the boundaries of, or immediately adjacent to, an existing urban area. The County Administrative Board of Skåne also emphasises that it is not allowed to build new urban areas along the coastline in Skåne and that municipalities rather should try to divert development from the coastal area (Sundberg 2014). However, because of Barsebäck's attractive waterfront location, the redevelopment strategy could benefit Kävlinge from an economic perspective, boosting and strengthening the municipality's competitiveness and growth.

5.3 Environmental factors

Both brownfield areas are intended for residential purposes, which means that the remediation and clean-up level needs to be high, something that in time will improve and restore the environmental qualities in the areas. Barsebäck is a complex area to remediate as it entails environmental issues that has not been dealt with to this extent before. Building residential housing in a location where there has been a nuclear power plant is an internationally untested approach. The area will probably be remediated in full, providing radiological clearance to the land, before being utilized for housing (Kävlinge municipality 2014a). This has caused difficulties and disputes concerning how the demolition and storage should proceed and in what time frame. What can be concluded is nonetheless that the demolition and remediation will become an expensive and time-consuming process (Moberg 2014), but it could also increase the knowledge and experience regarding clean-up technologies. Moreover, the municipality is not responsible to finance the demolition and remediation of the plant (Kävlinge municipality 2014a). Because of the scale of the project and that it is controlled by national interests, the service and running operation, shut down and plan for the actual demolition is subsidised by the state (Moberg 2014). Scan's industry is not as extensive and complicated to remediate, and will probably take up to one year to demolish and excavate before it is possible to initiate the construction (Sundberg 2014).

There are aspects regarding the development of Barsebäck that could affect the environmental dimension of sustainability in a negative way. According to the County Administrative Board of Skåne, the development of Barsebäck seaside town will partly take place within the shoreline protection. This is questioned since the municipality's coastal zone is a valuable natural and cultural landscape surrounded by national interests for cultural heritage conservation (Kävlinge municipality 2010:140, Länsstyrelsen 2014:1-2). Additionally, to be able to build at the proposed site, the municipality is obliged to raise the current ground level due to the risk of rises in sea level and erosion (Kävlinge municipality 2014a). According to the municipality, a strong argument to why the seaside town should be built is that the development avoids

the exploitation of valuable agricultural land (Kävlinge municipality 2014b). Though it is said that one of the consequences when building the seaside town is that a part of the technical infrastructure will be sited on agricultural land outside of Löddeköpinge, which conflict with the objective to only utilizing already developed land (Kävlinge municipality 2014a, Palm 2014). Furthermore, the Barsebäck plant is not situated in a transport oriented location and has to develop new transportation ventures to have any available public transport. To build in such a peripheral location contributes to a more dispersed spatial structure and creates an inaccessible urban area. This indicates that car dependency could become a problem to the future residents who most likely will commute to surrounding larger cities for work. The consequences of increased traffic may affect Kävlinge but also neighbouring municipalities in the form of deteriorated environmental quality standards with increased carbon dioxide, emissions and congestion (Kävlinge municipality 2010:139-140). The municipality agrees on that the area has a lack of public transportation, but does however maintain that the major venture will generate a basis for developing a new and effective public transport (Palm 2014).

As for Scan, the municipality need to take particular consideration to the risks and disturbances of which the railroad provides, including noise and the danger of hazardous cargo, to obtain a healthy living environment (Kävlinge municipality 2010:6).

5.4 Social-economic factors

Brownfield transformation can bring different social consequences. There are sometimes concerns that the redevelopment of already existing buildings could result in gentrification or raised property values (Storm 2008). As the main parts of the areas of Scan are unused and run-down facilities that constitute a barrier in its urban context, the development will most likely provide a positive social impact, reviving the neighbourhood, creating more meeting places, opening it up to the public and increasing the accessibility to its surroundings.

Barsebäck however is not located in a populated area, which suggests that a redevelopment will not affect the existing quality of life in the area or in its neighbouring setting, although it will create prerequisites to a good future habitat. The municipality is using city districts that are profiled as rather expensive and upscale areas as examples of how Barsebäck should evolve. Building exclusive and costly neighbourhoods or city districts can have segregating and polarizing effects, increasing socio-economic disparities between different areas. Because of this, Dixon's statement that sustainable brownfield regeneration will result in access to affordable housing could be questioned. Rather, due to that industry have become increasingly fashionable, the heritage of the industrial environments has more frequently turned into a tool for promotion of a certain image and used as marketing to sell places under higher prices (Cizler 2012:233). This means that urban infill have a tendency to lead to up-market

developments, which in turn may contribute to a more segregated city (Lehmann 2010:710) and opposes the thought of that residential areas should be socially mixed (Sepe 2013:600).

Another thing that can be inferred is that the two sites will provide both condominiums and rental apartments, allowing a diverse population in the neighbourhoods. Though new construction tends to generate higher rents and more expensive housing prices than preserved properties (Nyström 2001:127). The strategy to not solely build residential in both areas, but also make room for offices and commerce, enables employment opportunities to be created. The new residents moving to the areas will furthermore result in an increased tax base of the municipality.

5.5 International experiences

The vision of Barsebäck pronounces that they have drawn inspiration from the Swedish city districts Western Harbour and Lomma Harbour, areas that are equivalent in size and location by the water. Even if the projects have been successful on many levels, they have for instance been criticized on some aspects such as too pricey residential, seeking to attract a wealthy population (Baeten 2012:23). Western Harbour has also received a lot of attention being profiled as a sustainable city district, something that Kävlinge has incorporated in their vision of Barsebäck. This is a good strategy towards generating a sustainable development. Furthermore, Barsebäck could benefit from studying international experiences regarding the demolition of nuclear power plants, as there are no similar local situations to compare with. Scan might also benefit from looking at examples of similar projects, something that is not clearly pronounced in the planning material.

5.6 Stakeholders, community support and participation

As a part of the planning process, planning programs becomes released for consultation, meaning that everyone involved, from the closest neighbours to different government agencies, is allowed to have their say on the program. Large areas like Scan and Barsebäck include many stakeholders and requirements in the process, usually cooperating prior to the consultation phase. The cultural, social and technical committee of the municipality, the County Administrative Board of Skåne, the National Road Administration, and other directly affected by the development is usually involved and may provide comments related to the plans. By taking part of stakeholders' knowledge and experience, the consultation can provide a better basis for decision. It is then up to the municipality to assess which comments to consider in the continued planning work. This is the standard procedure of involving the public in the planning process, meaning that no participatory approach beyond the consultation is required.

Local analyses have been conducted in two nearby villages to Barsebäck, which are included in the costal zone. There, workshops with residents have been performed,

allowing them to speak their mind regarding how the localities should develop. The information has then been used as basis for the detailed comprehensive plan for the coastal zone (2013), in which the vision of Barsebäck Seaside town is expressed and described. This means that some level of information and citizen participation has been used in the planning process, which is an important part of sustainability (Sepe 2013:600). However, in the consultation prior to the adoption of detailed comprehensive plan, it was conveyed that the municipality has lived up to all views expressed in the held dialogue meetings, aside from views concerning the Seaside town (Kävlinge municipality 2014a). Based on this information it is possible to question how much consideration that has been given to the residents' opinions regarding the development of Barsebäck Seaside town, as it is ultimately the municipality's assessment to make. No similar process has been performed concerning the area of Scan or the town of Kävlinge, and there is no current detailed comprehensive plan of the area (see table 3). That step has been disregarded, which could inhibit public involvement in an early stage of the planning process.

Table 3 Opportunities for consultation and for the public to express their views on the plans.

Opportunity for consultation/ citizen participation	Plans that include Scan	Plans that include the Barsebäck plant
Comprehensive plan	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Local analysis	-	<input checked="" type="checkbox"/>
Detailed comprehensive plan	-	<input checked="" type="checkbox"/>
Detailed plan	<input checked="" type="checkbox"/>	-

In addition to the ordinary consultation of Scan, Midroc has held workshops with groups consisting of officials, politicians and external experts to, through the use of SWOT- method, enhance the understanding of Kävlinges assets, weaknesses and development possibilities. The process that preceded the planning program of Scan is described as a good example of how different actors have the possibility to contribute early in the planning stage (Kävlinge municipality 2010:6). To include many stakeholders can however sometimes be challenging and problematic. The numerous involved in the area of Scan have brought many issues and wishes from different instances to the table and is said to be one of the reasons why the redevelopment process has been delayed (Ziegerer 2011). The future development of Barsebäck may also receive problems with this. For instance, to dismantle the Barsebäck plant is challenging, as there are various stakeholders who must agree and collaborate and different organization that is responsible for different parts of the demolition and storage process (Moberg 2014). There are also diverse opinions among politicians concerning how the area should be used in the future, where one party rather would see a research facility for energy on the site (Sydsvenskan 2014). This could potentially complicate implementing the plans, especially if it becomes an electoral issue.

The redevelopment of Scan has attracted media attention, which may be because of the area's historical significance, or possibly because the project has been postponed many times. Also Barsebäck has received attention in a medial context, presumably due to that the plant is a well-known building and that the plan to redevelop it to a residential area is a quite controversial project. It is generally beneficial if the project is intelligible, noticed in the media and talked about, as it can create a local involvement and commitment, which usually facilitates the implementation of the plans and helps the venture to become locally anchored (Isacson 2001:113-114).

5.7 Vision

There are pronounced visions regarding both the areas, which contribute to a more clear view on the future development of the locality and shows which direction the projects are moving towards. Barsebäck seaside town is envisioned as a grand sustainable waterfront town that will serve as an international model showing how the conversion from nuclear power plant to a self-sufficient attractive urban environment could be accomplished (Kävlinge municipality 2013:30). The vision of Scan is more a question of increasing the quality of life in the community and to strengthen the image of Kävlinge by creating an attractive urban neighbourhood with a wide range of public spaces, activities and meeting places that can be consumed by all residents of Kävlinge (Kävlinge municipality 2014).

5.8 Time

To develop Scan has been under discussion ever since it closed down, and the postponement seems to have caused dissatisfaction both among politicians and the residents. The initial ambition was to have completed the first residential block of Eastern Centre around the turn of the year 2013/2014 (Skånskan 2011), but different reasons such as difficulties in agreeing and the economic downturn has caused the remediation of Scan to just recently commence. A new neighbourhood in the extent of Scan takes time, both in planning process and execution (Palm 2014). Since Scan occupies such a large area in a central location, letting it decay affects the surrounding environment, making it look neglected and unsafe. The decay process could also complicate the preservation of existing buildings with possible values. For instance, the planning proposal of Scan (2012) describes how the characteristic arched hall, where farmers kept cattle auctions back in the day, will be renovated and remodelled to accommodate a cultural centre. However, as time has passed the hall is now in such bad condition that the intention has been revised (Skånskan 2014, Sundberg 2014). It is now said being technically impossible to implement the ambition and the building will instead be demolished and replaced with apartments (Kävlinge municipality 2014c:9). Furthermore, to wait could be a disadvantage from an economic perspective seeing that it is expensive to maintain such a property. From a public perspective, the delay of Eastern Centre combined with poor communication from the municipality's behalf has caused the municipality to lose credibility with the public (Palm 2014).

The transformation of Barsebäck is a complex case with many external factors that could slow down the project. The dismantling will probably take considerable time, as it is such an unknown territory and radioactive material that needs to subside. The fact that it is such a major building project that will be carried out in stages will also affect the timeframe.

5.9 Quality of existing brownfield and preservation

The existing industrial environment at Scan and Barsebäck might not be in the preferred condition or design to accommodate housing. Both Scan and Barsebäck mainly consist of large-scale buildings which can make it difficult to find a suitable and profitable function for reuse. Seeing that architecture and cities are to such a great extent dependent on and led by market tools, it is difficult to manage the preservation of heritage for the local people (Cizler 2012:233). This has resulted in that most of the premises will be demolished. However, as the industrial environments in Kävlinge reflect a past that had a substantial impact on the urbanization and people's lifestyles, the areas could be of great significance to the local residents and their cultural heritage, which might diminish following the demolition. The literature also suggests that preserving the industrial feel often result in a more attractive and successful redevelopment. Furthermore, Lehmann states that in a long-term perspective it is basically always a more sustainable alternative to preserve or adoptively reuse an existing building than to demolish and construct a new one (Lehmann 2010:120), and many times financially beneficial as it reduces high remediation and demolition costs (Duží & Jakubínský 2013:60). This means that the demolition and reconstruction could make the developments of Scan and Barsebäck more financially demanding than if it would be preserved. However, since it might be difficult finding a profitable function for the premises the economical benefit could be greater if building new rather than conserving. New premises and houses also have the advantage that they can be built with the intention of being sustainable and energy-efficient, like in the case of Barsebäck seaside town.

Even though the architectural and esthetical features of the two brownfields might not be considered as advantages because of its simplicity and anonymity in their design and expression, they still have esthetical qualities of socio-historical value and landmarks, as well as contributing to a more mixed and diverse urban environment (Kävlinge municipality 2012). Therefore it is important to properly evaluate industrial buildings in regard with their possible heritage qualities. The planning proposal of Scan claims to have taken particular account to that the industrial environment has been an integral part of the locality, which has brought forth that some building elements will be conserved and incorporated in the new environment. If implemented, this will help maintain the memory of the significant meaning that the industry once had, as well as giving a different and diverse aesthetic to the urban environment.

5.10 Land use

The regeneration of brownfield sites generally means that no further land outside the existing industrial environments should be utilized, which is basically the case in both Scan and Barsebäck. This provides an opportunity for a reduced building pressure on agricultural land. It is also consistent with the municipality's objective to establish a sustainable building structure by encouraging that half of the total new housing construction should be built by densification or reuse of land. Furthermore, the municipality is planning to build relatively dense apartment buildings and not single-family houses. In this way the land is being used in a more efficient way, accommodating a higher density of people.

The planning proposal also pronounces that in addition to housing, the land is going to accommodate a mixed use in functions with features of commercial and culture, offices and park-area. This mixture is usually beneficial both from an environmental and social perspective, including contributing to create a safer, more accessible and traffic reduced urban environment. The integration of the new development into the old neighbourhood is not relevant in the case of Barsebäck, as there is no existing built environment. It is however an important aspect in the development of Scan. The planning proposal puts great emphasis on that the development of Scan will be integrated and help revitalize the existing town centre and station area.

The development of Scan is consistent with the current comprehensive plan that was adopted in 2010. However, County Administrative Board of Skåne argue that the entire detailed comprehensive plan, where the vision of Barsebäck seaside town is presented and described, should be abandoned in its entirety as it contravenes the comprehensive plan that was adopted in 2010 (Sundberg 2014, Länsstyrelsen Skåne 2014:1). Also, to use the land of Barsebäck for residential purposes might be possible to contest, recalling that the Barsebäck plant and its acceding infrastructure could relate a national interest in regards to energy production and distribution. As the dismantling work is believed to be a lengthy process, the Board mean that there is time to develop future scenarios of its use where a possible outcome could be renewable energy (Kävlinge municipality 2010:139, Länsstyrelsen Skåne 2014:1).

6. Kävlinge's visions in relation to sustainable development – a summary

To clarify the achieved results, Dixon's table is used once more, but now the two cases are placed in the framework. As seen in the table below (table 4), there are many benefits with the development strategies of the two brownfield areas. However, there are also a few contradicting aspects that can be deduced by the scheme. Even though the schedule might not cover the broad spectrum of what the concept of sustainability entails, it gives an overall interpretation of the possible main benefits that sustainable brownfield development can bring.

Table 4 Using Dixon's analytical schedule on the cases of Scan and Barsebäck, thus showing main benefits of sustainable brownfield developments in relation to selected brownfields (Dixon 2006:242).

Benefits	Scan	Barsebäck
Economic		
Creation and retention of employment opportunities	☑	☑
Increased competitiveness for cities	☑	☑
Increased export potential for clean-up technologies	☑	☑
Increased tax base	☑	☑
Social		
Improved quality of life in neighbourhoods	☑	-
Removal of threats to human health and safety	☑	☑
Access to affordable housing	Unclear	Probably not
Environmental		
Reduced urban sprawl pressures on greenfield sites	☑	☑
Restoration of environmental quality	☑	☑
Improved air quality and reduced greenhouse gas emissions	☑	Probably not

6.1 Economic implications

From an economic perspective, the two brownfields looks to be a good investment. With the intent to accommodate offices and commercial business, they both have the prerequisites to create new employment opportunities. Particularly Barsebäck will have the possibility to increase export potential for clean-up technologies, as it is such a complex and different brownfield. In Sweden, the industry of nuclear power is intended

to be phased out over time, which means that it is a useful and up to date knowledge that will be developed during the demolition, allowing Barsebäck to become pioneers within the field. Both areas are large in size and will therefore be able to accommodate extensive new housing and bring a great amount of new residents to the municipality, which will generate in an increased tax base. Scan is seen as an opportunity to revive the urban centre of Kävlinge, with the ambition to increase the attractiveness, awareness and competitiveness of the area and the entire town. Barsebäck seaside town is seen as a means to further connect the municipality's image with the attractive coastal zone, which also could increase Kävlinges competitiveness to attract new residents. There are however some economical disadvantages, as that both projects have been prolonged for different reasons, generating costly maintenance of the properties. Also, the remediation of the Barsebäck plant will be considerably expensive, although it is not the municipality who will bear the cost.

6.2 Social implications

Barsebäck seaside town will probably not provide affordable housing as it is promoted along the lines of other expensive residential areas, which means that it will be limited to a certain group of people in the society, thus contributing to a more segregated community. It is difficult to say whether the development of Scan will create housing at reasonable prices, though new construction generally is more expensive. A social benefit with Scan is however that the development will contribute to an enhanced quality of life in the area, as well as throughout the town, since it in the current situation consist of a rundown and fenced industrial environment that is in the need for change and attendance. With the development, threats to human health will be removed, and the neglected and insecure environment will provide the opportunity to create safe public spaces. The cultural aspect is important in the social dimension of sustainability and especially Scan has shown to hold a significant connection with the locality, its identity and heritage. The planning proposal indicate that the majority of the industrial buildings will be demolished, which means that a part of the cultural heritage that potentially holds a special memory in many residents' lives will be lost.

6.3 Environmental implications

Both projects take place on already developed land, which means that the exploitation of high-quality agricultural land is minimized. This also increases the chance to contribute to an overall reduced urban sprawl pressure on agricultural land and greenfield sites. Though constructing the seaside town will most likely require the utilization of agricultural land on the behalf of associated technical infrastructure, which means that it is not entirely without damage. As both of the brownfields will be used for residential purposes the environmental requirements are high, and thus also the level of remediation. This implies that the environmental quality of the areas basically will be completely restored.

Both Scan and Barsebäck are already discontinued industries, suggesting that their current affect on the air quality is small. The main negative aspect of Barsebäck seen from an environmental perspective is that it will most likely support an increase in motor vehicle use, which means that it might not meet the sustainability factor of that the conversion should result in improved air quality and reduced greenhouse gas emissions. The fact that Barsebäck is not located in an urban context is problematic, and the lack of public transportation speaks for that the area is not appropriate to develop (Kävlinge municipality 2010:137, 139). Other environmental disadvantages and problems are also stressed with Barsebäck, such as an exceeded shoreline protection, erosion and disapproval against building at a distance from existing urban areas. Scan on the other hand is located right next to the train station in an urban area. In spite the municipality's need to take consideration to potential risks and disturbances of the railroad, the development would create excellent opportunities for densification and for future residents to travel by public transportation.

7. Conclusions

The aim of this study has been to investigate Kävlinge's efforts concerning sustainable regeneration of brownfield sites in the municipality and to examine how brownfield sites can be transformed and developed into sustainable urban areas.

The industrial activity has had a noticeable significance to the development of Kävlinge and has left its marks in some parts of the municipality. The industrial sites that have been chosen for this study possess different conditions and do therefore hold different development possibilities. Visions and strategies have briefly been expressed to both sites, which tells what kind of development that is sought. The process of regenerating brownfields is a cycle of restoring something that has contributed to environmental degradation, and both brownfield sites will experience a major environmental restoration with the development. This means that the municipality's overall strategy to make the most out of the already exploited land by developing brownfield sites is an important approach to provide a sustainable urban development. Kävlinge's comprehensive urban development policy intends to ensure that the future development should be carried out in a sustainable manner, so that a transition to a long-term sustainable society, both in an ecological, economic and social sense, could be obtained.

Based on previous research involving different theoretical concepts and texts, some of the most important factors of promoting sustainable urban development in the transformation of brownfield sites have been highlighted and selected, seeking to confirm the respect of sustainability in its threefold meaning and to stress what constitutes a successful regeneration. It is found that there are several factors that influence, both independently and interconnected, how a brownfield development will result. The ten main factors that have been formulated involve the role of the owner/developer, the brownfield location an extent, environmental factors and extent of remediation, social-economical factors, international experiences, the involvement of stakeholders, community support and public participation, clear visions, time perspectives, the quality of existing brownfield and extent of preservation as well as how the proposed land will be used. Although the factors presented might differ from case to case, the general transformation of urban brownfields involves an integrated coordination of stakeholders, actors, norms, processes and plans, as well as an important time management. Additionally, this should be supplemented with a comprehensible, clear, and in particular shared, vision and identity of the city and the actual site. The qualities of the industrial buildings, both aesthetically, technically, economically and user-wise, possible cultural-historical values and societal respects, are also central aspects. One thing that so far seems to have been a main issue in both areas is for the stakeholders to agree on the future development and the terms of the remediation. This implies that the procedure of exploring the range of the problem and identifying the situation together in an early stage could be beneficial.

Given the results and with regards to sustainable development, Scan seems to be a more suitable area to redevelop than Barsebäck. Due to its location, the development will make much greater use to the community as well as creating good prerequisites for public transportation, be less expensive and time-consuming to remediate and have sounder effects on the environment. Although the area of Barsebäck have its advantages, such as its attractive position by the coast and the intended sustainable construction and design of the seaside town, the location and prerequisite of the development has its inconsistencies. It indicates a friction between the three pillars of sustainability, where the supposed economical gains of the project is conflicting with the possible environmental disadvantages the venture may bring as well as with the fact that the development might contribute to a socially segregated area. This means that on some levels, the vision of Barsebäck seaside town rather contradict than contribute to the idea of sustainable brownfield development. It is however important to consider that the comprehensive detailed plan, in which the vision is portrayed, is still a work in progress and is not yet legally binding. This means that the municipality still is capable of reflecting and perhaps adjusting some statements and visions, although they might not share the view on all criticism.

The study has contributed to further investigating and, on few occasions, questioning the general concepts of compaction and brownfield development in relation to sustainable development. As the fact that brownfield development usually results in an increased access to affordable housing, something that in Kävlinge's case is doubtful, which makes it possible to problematize the alleged fact in general.

When reflecting on Kävlinge's possibilities for future urban development it is difficult to imagine that it merely should be based on the requirements of sustainable development. Kävlinge is a municipality whose land mainly consists of agricultural land, which makes it challenging to grow and build in an environmentally sustainable manner. It is interesting to reflect on what will happen when the existing urban areas have reached their maximum density, if that implies that their growth will be forced to cease. What nonetheless become evident is that it is important to take care and benefit from the existing built environment, and that the alternative of regenerating brownfields is a good sustainable solution for as long as it is possible, even if it many times is a challenging process to adopt. For future studies, it would be interesting to re-examine the two brownfield sites after they have been completed, to see how they have developed, how sustainable the areas have become in practice and to study which factors that ended up having the most central impact on their developments.

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