# Green Neighbourhood Streetscapes: assessing the challenges and opportunities of implementing Green Infrastructure in neighbourhood streetscapes using the cases of Nordhavnen & Västra Hamnen


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# Abstract

Green infrastructure has been widely recognised for its multifunctionality and ability to cope with a variety of environmental and societal challenges. The use of green infrastructure in neighbourhoods streetscapes is believed to have an positive impact on local communities, in terms of environmental, social and economic benefits. Because of this green infrastructure has received increased attention and priority in policy making at both international and local levels. The process of going from policy or strategy to practice is however often found be challenging, and there are still actors who do not know how to approach GI in urban development projects. This can again influence the process of green infrastructure implementation at the local level, such as in neighbourhoods. In this project the opportunities and challenges of implementing green infrastructure in neighbourhood streetscapes has been investigated. The influence of municipal green infrastructure strategies and tools, on the process of GI implementation in neighbourhood streetscapes has also been assessed. The two neighbourhoods Nordhavnen in Copenhagen and Västra Hamnen in Malmö was used as cases to explore this topic.

By using the analytical framework «The Expanded Process Model» to analyse data from interviews with stakeholders in streetscape planning as well as urban development strategies and local plans, opportunities and challenges of GI planning in neighbourhood streetscapes was identified. Opportunities such as visions implemented on the city scale, branding, promotion of recreational and ecological values was some of the prominent findings. By looking at the challenges of implementing GI, it was found that the battle of space in the streetscape, different perceptions and understandings of GI between stakeholders was functioning as constraining conditions. Institutional challenges such as lack of opportunities for participation also functioned as a constraining or challenging condition. By assessing the impact of municipal tools and strategies aimed at supporting green infrastructure, it was found that there are limited strategies available that address GI at the neighbourhood scale. GI tools used to address projects at the neighbourhood scale was found to have a narrow focus that only address one aspect of GI, which often is the ecological aspect. It was also found that the tools and strategies often address the interests of the municipality and offers limited opportunities for social inclusion and economic evaluation. As a results of these findings there has been developed some recommendations for planners and urban practitioners on how to facilitate for GI in neighbourhood streetscapes.

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# List of Abbreviations

GI - Green infrastrucre

BGI - Blue and green infrastructre

NBS - Nature based solutions

SUDS - sustainable urban drainage systems

NGO - Non governmental organisation

# 1. Introduction

## 1. Introduction

Cities and urban areas are facing societal challenges due to climate change and increased urbanization (EU commission 2015). One of these challenges is the conflict between high building density in urban areas and the decreasing space allocated for vegetation and nature (Delshammar 2014). This challenge makes it necessary to look at alternative approaches of introducing urban nature, such as creating less space intensive green environments that operates as integrated parts of the built environment.

Green infrastructure offers dynamic and forward thinking solutions to cope with competing and diverse land management issues (European commission 2013). GI have the opportunity to support urban sustainability by facilitating for a variety of functions and ecosystem services, including environmental, social and economic benefits (Newell et al. 2013). GI is an important contribution to biodiversity, climate change adaptation and mitigation (Lennon & Scott 2014, European commission 2013). Because of this, green infrastructure and ecosystem services is also addressed in several of the EU Sustainable Development Goals. Green infrastructure is especially relevant for goal 11: sustainable cities and communities, and goal 13: climate action (European Commission 2019).

Another important aspect of GI is the ability to operate on different spatial scales (EU commission 2013). By taking advantage of the urban fabric, green infrastructure can become an integrated part of the neighbourhood streetscape. GI can be implemented in public spaces of a neighbourhood such as streets, but also in private courtyards and on building facades. Both the private and public areas have important functions in creating the total experience and perception of the streetscape (De Vries et al. 2013). The implementation of GI on the neighbourhood scale is a way of providing access to green features in local communities without taking up large areas of space, e.g. by introducing green roofs, vegetated surfaces, community gardens and green streets (Matthews et al. 2015). GI is also important in reflecting the neighbourhood as a part of an ecosystem rather than separate from it, by addressing topics such as sustainability and resilience (Church 2015). Street greenery is also found to be a significant indicator of walkability and activity, which is an important part of creating good neighbourhood streetscapes (Lu et al. 2018). GI is often embedded in the streetscape design as a solution to the urban heat island effect and to create a more comfortable urban environment (Derkzen et al. 2017). Green streets creates a continuous source of green exposure, as opposed to parks that are often functioning as «islands of green» (Lu et al. 2018). This makes green neighbourhood streetscapes an important topic in the discussion of how to cope with the challenges imposed on cities and urban areas by densification and climate change.

### 1.1 Problem Area

Green infrastructure is considered to be a well-established topic in the fields of planning, landscaping and ecology, and has been proven to be an holistic approach to urban development (Mell 2017, European commission 2013). In recent years green infrastructure has also received increased attention from governments and international institutions such as the EU through green infrastructure and biodiversity strategies (Raymond et al. 2017). However, many decision makers, planners and developers are still unaware on how to approach and operationalise GI in urban development projects. Especially the transition from policy and strategy to practice is found to be challenging (Mell 2017). This can be linked to the level of political, social and financial support as well as understanding from the environmental sector and local governments (Mell 2017). The challenge of institutionalising GI as a part of urban planning practices is also related to path dependency (Matthews et al. 2015).

Densification and climate change are challenges imposed on cites and urban areas that makes it necessary to develop efficient approaches and methods on how to implement GI and urban nature as an integrated part of urban development projects. In order to mainstream GI in urban planning practices, it is important to assess and understand the opportunities, drivers and challenges of implementing GI from different perspectives, and at different spatial scales. It is also important to understand what influence GI strategies and tools implemented by cities have on the implementation and facilitation for green infrastructure at the neighbourhood scale.

### 1.2 Project Aim

This project will look at the opportunities and challenges of implementing green infrastructure in neighbourhood streetscapes using the examples of two masterplanned neighbourhoods, Västra Hamnen in Malmö (Sweden) and Nordhavnen in Copenhagen (Denmark). The aim of the project is to identify opportunities and challenges of implementing green infrastructure in neighbourhood streetscapes and assess what impact citywide strategies and tools can have on the implementation of green infrastructure at the neighbourhood scale. These findings will be used to discuss how urban planners and practitioners can support and facilitate the implementation of green infrastructure in neighbourhood streetscapes. The research objective have been used to formulate the following research questions.

### 1.3 Research Questions

*Using the examples of Västra Hamen (Malmö) and Nordhavnen (Copenhagen), what are the opportunities and challenges of implementing Green Infrastructure in neighbourhood streetscapes?*

*What tools and strategies address green infrastructure at the neighbourhood scale, and how can these tools and strategies influence the implementation of Green Infrastructure in neighbourhood streetscapes?*

*What recommendations can be given to planners and urban practitioners on how to facilitate the implementation of Green Infrastructure in neighbourhood streetscapes?*

The first research question is aimed at identifying the supporting and constraining conditions that influence the implementation of green infrastructure in neighbourhood streetscapes. This will be assessed by using the two masterplanned neighbourhoods Västra Hamnen in Malmö and Nordhavnen in Copenhagen. The analytical framework «The Expanded Process model» will be used to identify and analyse factors that have an impact on the process of implementation. The focus will be on the motivations, problems, drivers, challenges and enabling conditions that stakeholders in streetscape- and GI planning experience. This also includes looking at how the concept of green infrastructure is perceived by different stakeholders, as well as who are making the decisions and investments when it comes to implementing GI. In order to asses this topic from different perspectives it has been conducted interviews with developers, planners, architects and other relevant stakeholders. A review of local plans and urban development strategies regarding the planning of green infrastructure in the two neighbourhoods have also be conducted.

The second research question will look at what tools and strategies are available that address planning and implementation of green infrastructure at the neighbourhood scale. It will also be assessed in what ways these tools and strategies can influence the implementation of GI, specifically by identifying what aspects of GI these tools and strategies are focusing on and how they facilitate for stakeholder participation. Municipal strategy papers and descriptions of GI tools has been reviewed.

The third research questions aims at providing some recommendations for planners and urban practitioners on how to support and facilitate the process of GI implementation in neighbourhood streetscapes. It will also be discussed how tools and strategies can be designed to support this process. The discussion will be based on findings and learnings from the two cases as well as findings from the literature.

### 1.4 Scientific Justification

Exposure to green environments is believed to be an important contribution to health and social interaction, but most studies on this topic focus on parks and larger green areas (Lu et al. 2018). However, as streetscapes are the most popular places for physical activity, there is need for a redirection of attention from planners and designers, focusing more on greenness in neighbourhood streetscapes (Lu et al. 2018). More research on green streetscapes can also help decision makers, planners, architects and designers to develop design codes that can be used for streetscape policy making (Harvey & Aultman-Hall 2015).

According to Kabisch et al. (2014) the design and implementation of nature based solutions such as green infrastructure is largely understudied, especially concerning questions on how to ensure effectiveness in implementation, and according to what criteria. The role of institutions and organisations in shaping and supporting the implementation of green infrastructure is also a topic that requires further research (Kabisch et al. 2014). As a respond to this gap, this project will attempt to contribut to this field of research by looking at opportunities and challenges of implementing GI in neighbourhood streetscapes.

Another scientific contribution of this report is the use of the analytical framework «The Expanded Process Model» to assess the implementation of green infrastructure at the neighbourhood scale. The expanded process model is a tool used to identify and analyse factors and conditions that influence the implementation of green infrastructure or other types of nature based solutions (Marks et al. 2015). Previously this process model has been used to assess GI on the macro-scale. In order for this framework to be further developed for use in complex urban planning challenges, it has to be tested and applied to cases in different contexts and spatial scales.

### 1.5 Introduction to the cases

The two neighbourhoods Västra Hamnen in Malmö (Sweden) and Nordhavnen in Copenhagen (Denmark) was chosen as cases for investigating the implementation of GI in neighbourhood streetscapes. The two neighbourhoods share some similarities, such as being waterfront regeneration projects and having a goal of being international role models for sustainable urban development. Before providing a brief introduction to the two neighbourhoods, the term masterplanned neighbourhood will be clarified.

### 1.5.1 Masterplanned Neighbourhoods

A residential masterplan can be described as a planning control for a project site and is characterized by a vision for the complete development (Gwyther 2005). The idea of masterplanned communities is based on the Garden City concept developed by Ebenezer Howard in the 1880s, which was based on the principles of social, economic and environmental sustainability (Gwyther 2005). The contemporary masterplanned community can be described as a form of strategic planning and social infrastructure that according to Gwyther (2005, p.58) *«...encourage marketable ideas of community and the good life»*. Masterplanned neighbourhoods are often marketed for their focus on building community feeling, which is operationalised through the development of open spaces and common areas that can be used by all residents. These are characteristics that are believed to have positive impact on the social life of the area (Alidoust et al. 2018). The reason for choosing to look at masterplanned neighbourhoods was because of the integrated idea of sustainability and community feeling which is believed to have an impact on the design of the neighbourhood, and possibly on the use of GI in the streetscape.

### 1.5.2 Case 1: Nordhavnen (the northern harbour) Copenhagen, Denmark

The Nordhavnen district is located 4 km from the city centre of Copenhagen and is currently one of the most extensive urban development project in Scandinavia. The planning of the inner Nordhavnen started in 2009 with an international design competition (By&Havn 2012). The area will be finished within the next 30 to 40 years and will house approximately 40 000 people, and become the workplace for another 40 000 people (By&Havn 2009). By&Havn (Copenhagen City and Port Development) is in charge of developing and managing the area. By&Havn is owned 55% by the city of Copenhagen, and 45% by the ministry of Transport (By&Havn 2012). The Århusgade quarter located in the inner part of Nordhavnen is the first part of the area to be developed, and will be the main area discussed in this project. The Århusgade quarter can house 3000 residents, and be the workplace for 6000-7000 people (By&Havn 2012).

The developers, By&Havn describes the district as a diverse and mixed city with room for everyone (By&Havn 2009). The new district is aiming at both improving climatic conditions and being a rolemodel for other cities, e.g. by demonstrating how to reverse climate change without losing quality of life and welfare (By&Havn 2009). This is reflected in the overall vision for the district, which is to be a sustainable city of the future. To achieve this vision the developers made a urban strategy in 2009. The strategy has six themes: islets and canals, CO2 a friendly city, a five-minute city, intelligent grid, identity and history and finally a blue and green city (By&Havn 2009, p.9). As the focus of this project is green infrastructure in neighbourhood streetscapes, the theme «blue and green city» will be the main topic discussed.


*Figure 1: map showing the inner Nordhavnen (Muncipality of Copenhagen 2012).*

### 1.5.3 Case 2: Västra Hamnen (the western harbour) Malmö, Sweden

The planning of the Västra Hamnen area started in 1997 (Malmö City Planning office 2008). The construction started in 2000 and the first phase was completed in 2001 with the housing expo Bo01. The development of the area is still ongoing, and the last projected is estimated to be finished in 2035 (Malmö City Planning Office 2015). When finished the area is expected to house 10 000 residents and provide workspace for 20 000 people (Foletta 2011). As the development of the area have continued after Bo01 was finished, a number of city planning principle have been applied to the area. Many of these strategies was never written down, but the municipality of Malmö have in later years tried to compile this «silent knowledge» in different publications (Malmö City Planning office 2008). The initial goals of the new urban district was to demonstrate innovative planning processes (Delshammar 2014), and to become a leading example of a densely built urban district with focus on environmental adaptation (Foletta 2011). There has also been developed 10 goals for the urban development in the area, with accompanying indicators that makes it possible to measure the progress (Malmö Stad, 2013). Especially two of these focus on streetscape planning and use of GI, e.g. goal nr. 2: *«Västra Hamnen is a mixed district with lively streetscapes»*, and goal nr. 6: *«In Västra Hamen green and blue features are a part of the nearby surroundings»* (Malmö Stad 2013, p.12). The Bo01 development has been recognised for its focus on sustainability and use of urban nature (Malmö Stad, 2003), and will for that reason be the main area in Västra Hamnen discussed in this project.

*Figure 2: map showing the Västra Hamnen area (Malmö City Planning office, 2008).*

## 1.6 Structure of the Report

Following the theoretical framework will be presented. The theoretical framework is based on state of the art literature on the concept of green infrastructure, including both physical aspects of GI and different types of approaches to GI planning. The research design will then be presented, including the methods used to obtain data, and the analytical frameworks used. After this the findings from the two cases will be presented. Following the discussion will discuss the research questions using the findings from the two cases and relate them in to the theories and concepts presented. Some recommendations to planner and urban practitioners on how to support and facilitate the implementation of GI in neighbourhood streetscapes will also be presented, as well as some reflections and limitations of the project. Finally a conclusion will be given, summarising the key findings.

# 2. Theoretical Framework

## 2.Introduction to the Theoretical Framework

In the following chapter, state of the are literature on the concept of green infrastructure will be presented. As green infrastructure is the main topic discussed in this project, it is also serves as the basis for the theoretical framework. An introduction to the concept of green infrastructure will first be presented, followed by a presentation of potential ecosystem services provided by GI. Further there will be an introduction to green infrastructure in neighbourhood streetscapes. Some core principles in GI planning such as multifunctionality, connectivity and transdiciplinarity will be presented. Different approaches to GI planning, such as co-creation will also be discussed. Finally, some critical views on GI will be presented.

### 2.1 The concept of Green Infrastructure

The theory and application of green infrastructure can be traced back to practices and theories from the past century as it first emerged in Western planning and New Town development (Newell et al. 2013). Both the theory and application of GI has received increased attention in recent years and is being used in spatial planning to enhance ecosystem services (Lennon & Scott 2014, Newell et al. 2013). In the EU Biodiversity Strategy (EU commission 2011, p.12) it is stated that *«by 2020, ecosystems and their services are maintained and enhances by establishing Green Infrastructure and restoring at least 15% of degraded ecosystems»*. This demonstrates that GI is a topic that is receiving attention and priority in political decision making at the international and national level, which again can have an impact on plans and strategies on the regional and local level.

There is a variety of interpretations of the term Green Infrastructure. The European Commission (2013, p.7) defines GI as *«a strategically planned network of high quality natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services...».*

Matthews et al. (2015. p.156) defines Green Infrastructure as *«an interconnected network of multifunctional green-spaces that are strategically planned and managed to provide a range of ecological, social and economic benefits».*

It is clear from these definitions and from the GI literature, that the term GI can be interpreted in multiple ways depending on what meanings different disciplines attach to the concept (Matthews et al. 2015). From these definitions it is also clear that GI does not necessarily have to be reduced to only include green elements such as vegetation. Nature based solutions (NBS) is often used as an umbrella term that brings together a variety of ecosystem based approaches, such as BGI (blue and green infrastructure) and SUDS (sustainable urban drainage systems) (Raymond et al. 2017). NBS and GI are similar in that they both recognise the importance of nature, as well as helping people to understand how the functions of ecosystems can support us when approaching environmental challenges (The European Commission 2015). While NBS is the overall concept representing the goal and outcomes of using nature to cope with urban planning challenges, GI can be understood as one of the planning approaches used to reach these goals (Haase 2017).

## 2.2 Ecosystem services provided by Green Infrastructure

The concept of  ecosystem services describes the functions provided by ecosystems and the relation to human welfare (Fisher et al. 2009). In other words, ecosystem services looks at GI and the functions and services it provides from a society or human focused perspective (Haase 2017). This means that it is the conditions, processes and functions of ecosystems that generate services, and that the ecosystem themselves are not services. Services are always co-produces by nature and humans (Basnou et al. 2015). One of the most widely used classifications of ecosystem services in the literature includes supporting, regulating, provisioning and cultural services (Fisher et al. 2009, Grunewald & Bastian 2015, pp. 45). From an ecological perspective, these services can contribute to increased landscape connectivity for wildlife movement and support biodiversity conservation, e.g. by creating zones of biodiversity to sustain flora and fauna (Wouters et al. 2016). From a economic perspectives GI can increase land and property values, as well as attract industry (Newell et al. 2013). Increased property prices in neighbourhoods near green areas is an indication that green features are positively perceived by people, and can be related to both the recreational and the visual attractiveness of GI (Madureira & Andersen 2014). Research has also shown that there is a positive connection between the amount of GI and self-reported health in residential areas (Van Dillen et al. 2012). Potential mechanisms that cause these benefits can be related to the fact that green spaces can promote active modes of transportation such as walking, and encourage people to use outdoor spaces for recreational purposes (Van Dillen et al. 2012). Green infrastructure can also facilitate ecosystem services such as social interaction and resilience, by contributing to a stronger sense of community (Newell et al. 2013). GI can also offer opportunities to enhance and strengthen community feeling by facilitating for interactions between people and their communities (Frantzeskaki 2019).

## 2.3 Green Infrastructure in Neighbourhood Streetscapes

It is possible to divide green infrastructure into different spatial levels. Individual elements, means features such as a tree or a flowerbed. Networks of GI means linkages between elements such as parks, or green streets. Interlinked networks of GI indicates larger areas of nature (Lennon & Scott 2014). As this project will look at GI in the neighbourhood streetscape, the focus will be on green elements and smaller networks of GI. Examples can be green roofs or green facades, street trees, urban gardens, community gardens and pocket parks. Following GI will be discussed in relation to the impact it has on neighbourhood streetscapes.

The connections between the urban landscape and quality of life has been documented in several studies. Gehl (2011) and Jacobs (1961) are examples of researchers who has explored this field. Their studies have shown that design of shared urban environments such as neighbourhood streetscapes have an impact on how people interact with each other, as well as on the economic and social vitality of the place (Bereischaft 2018).

The term streetscape is often used to describe the natural and built environment of the street, especially focusing on the design qualities (Rehan 2013). The streetscape includes the street surface, buildings, and all elements that facilitates use of the street. This can amongst other things include plants, vegetation, street furniture, lighting and signage (Rehan 2013).

According to Rehan (2013) a sustainable streetscape should aim to improve environmental quality e.g. by reducing the urban heat island effect and improving the air quality. The streetscape should also facilitate for and encourage recreational activities and walking within the community, which again can improve the public health and social wellbeing in the area. The neighbourhood streetscape is a part of a broader urban context and should not only function as movement corridors, but also support communities by creating lively spaces where people can meet and interact (Rehan 2013).

Micro-scale elements in the streetscape is an important contributor to the experience of an area (De Vries et al. 2013). Such micro-scale elements can include green infrastructure. Plants and vegetation add texture and colour to the streetscape and can also function as efficient buffer between pedestrians and moving vehicles (Rehan 2013). Visually interesting and attractive streetscapes contributes to the experience of the urban environment, and also provides comfort and other services that can make the streetscape more pleasant and enjoyable (Weber et al. 2014). This emphasises the importance of visible GI solutions in the streetscape. The visibility of the greenery from a pedestrian perspective is often referred to as eye-level street greenery (Lu et al. 2018). When discussing streetscape aesthetics it is also important to acknowledge the significance of personal preferences. Green elements can be perceived as both positive and negative, e.g. trees can provide shade, which is helpful in summer and in hot climates, but vegetation can also obstruct the line of vision which again can decrease the sense of safety (Sugiyama et al. 2008). More research assessing the quality of neighbourhood streetscapes is necessary in order to understand how e.g. green features influence the experience of the streetscape (Ewing et al. 2016).

Neighbourhood aesthetics has also been found to play an important role in encouraging walking and other types of physical activity. Lu et al. (2018) found that smaller green spaces in neighbourhoods, such as pocket parks and green streets are positively related to activity. It was also found indications that street-level greenery is potentially a superior predictor of walkability than parks (Lu et al. 2018). Streets in neighbourhoods serves as the setting for both recreational walking and walking for transport, parks differentiates from this because they primarily promote recreational walking (Lu et al. 2018). Green streets are found to promote walking and activity through 1) making the street aesthetically pleasant and by doing so promoting walking for transport and 2) making the neighbourhood environment more attractive which facilitates for recreational walking (Lu et al. 2018). Van Dillen et al. (2012) also found that the quality and quantity of streetscape greenery is associated with health more so than the quality and quantity of nearby green areas.

High quality streetscapes is also believed to promote neighbourhood relationships and encourage residents to take ownership of the street beyond their individual properties (Van Dillen et al. 2012). As mentioned, research has also found evidence that green features in neighbourhoods can enhance the sense of community and social ties (Sugiyama et al. 2008).

## 2.4 Planning and Governance of Green Infrastructure

Clabby (2016) describes a GI approach as a proactive approach actively managing and inviting in green resources in order to maintain flows of ecosystem services that are vital to the society. GI planning approaches look at how GI functions can provide ecosystem services that can be beneficial to the society (Lennon & Scott 2014). GI planning approaches are considered to be especially suited for urban areas because of the strong and dynamic interplay between social and ecological systems (Lennon & Scott 2014). According to Mussinelli et al. (2018) GI planning approaches are important tools in increasing urban resilience.

There are different phases or stages of GI planning. Lennon & Scott (2014) have categorised GI planning in the following four stages. 1. Conception, 2. Design. 3. Implementation and 4. Maintenance. In order for GI to be successful there is need for a collaborative approach throughout all these phases (Lennon & Scott 2014). According to Hansen & Pauleit (2014) GI planning can be explained through a selection of principles. These principles can be divided into principles addressing the green structure meaning the physical features of GI, and the approaches addressing the governance processes related to GI. This can also be explained as biophysical and socio-political factors (Matthews et al. 2015). For the green structures, principles mentioned are multifunctionality, integration, connectivity, multi-scale and multi-objectivity. Approaches addressing the governance perspectives of GI are social inclusion and transdisciplinarity (Hansen & Pauleit 2014). Following some of these principles will be explored.

### 2.4.1 Multifunctionality

Multifunctionality can be described as the ability to provide several benefits or ecosystem services to the same spatial area (Madureira & Andersen 2014), or as a solution aiming at addressing the needs of different actors (Fratini et al. 2012). Multifunctionality can also be understood as economic, social and ecological functions that should be accounted for when planning for GI. By doing so the functions provided by GI will not become a «product of chance» (Hansen & Pauleit 2014). Economic functions are referring to production oriented services, ecological functions are associated with regulatory services, and social functions are referring to aesthetic, recreational, psychological and cultural services (Wolf & Meyer 2010). Multifunctionality is however not a direct result of GI. When implementing GI in neighbourhoods it is essential to first assess the potentials of the GI in that specific location, only that way is it possible to increase the overall benefits of GI (Hansen & Pauleit 2014). The best use of GI and other types of NBS starts by identifying the different values provided by the solution discussed. This including the technical, ecological, social and economic aspects (Mussinelli et al. 2018). The reason for this is that benefits and services from GI is derived from overlapping functions (Lennon & Scott 2014). Droste et al. (2017) uses a neighbourhood urban garden as an example. In addition to the aesthetic value, the urban garden have the potential of providing opportunities for recreation for residents and at the same time support biodiversity. It can have cooling effects, reduce heat stress and it can relieve public sewerage infrastructure. It can also reduce noise and contribute to carbon sequestration (Droste et al. 2017). It is also important that the social aspects of GI solutions are planned for and informed, in order to avoid unintentional effects that can have an impact on environmental justice, e.g by contributing to gentrification (Hansen & Pauleit 2014).

### 2.4.2 Connectivity

Connectivity is another core component of green infrastructure (Newell et al. 2013). Connectivity specifically looks at the functional and physical connections of green infrastructure, by assessing it from different scales and perspectives (Hansen & Pauleit 2014). In other words connectivity in this context can be understood as the spatial distribution of GI as well as the distribution of the benefits it provides (Hansen & Pauleit 2014).

### 2.4.3 Transdisciplinarity

Frantzeskaki (2019) looked at how NBS such as GI requires a multiple discipline approach to be successfully implemented. Transdisciplinarity in the context of GI means that planning is based on knowledge from different disciplines such as urban planning, landscape ecology and landscape architecture (Hansen & Pauleit 2014). In relation to this, the need for collaboration between various stakeholders and authorities is also essential (Mussinelli et al. 2018). The so-called «silo mentality» is a big challenge in GI planning. GI approaches calls for horizontal integration, but also vertical integration, meaning communication and collaboration between different levels in the planning hierarchy (Mussinelli et al. 2018). Collaboration between stakeholders and partners demands willingness to listen, willingness to see things from a new perspective as well as long-term commitment (Mussinelli et al. 2018). Creating a common and inclusive narrative across different departments can work as an integration tool that seeks consensus and attracts supporters for GI and NBS (Frantzeskaki 2019).

### 2.4.4 Collaborative planning practices - Social inclusion and Co-creation

According to Basnou et al. (2015) involvement of the local population in urban greening processes can increase the social resilience of the community by supporting self-organization. From looking at various experiments and cases using NBS Frantzeskaki (2019) found that in order for these solutions to become an integrated part of the urban environment, they have to be appealing to citizens and residents. This also means that in order for NBS and GI to be successfully implemented, it is important to have open, inclusive and co-creative governance modes (Frantzeskaki 2019). Co-creation refers to the active involvement of users such as citizens and residents in different stages of a planning process (Voorberg et al. 2015). Co-creation is a more specific concept then participation, which can also refer to more passive forms of involvement where the users are informed but not included or partaking in the planning (Voorberg et al. 2015). When it comes to design, collaboration and communication between designers and architects is especially important, but the involvement of citizens is also essential to understand the recreational use and value of different locations (Frantzeskaki 2019). Assuming that communities are actively engaging and being included in the process of implementing NBS and GI, this can be considered an opportunity to transform the «sense of place» in a neighbourhood (Frantzeskaki 2019).

By involving different stakeholders and disciplines through co-creation and inclusive participation it is also possible to discover new ways of coping with the uncertainty and complexity that GI often presents (Frantzeskaki 2019). When addressing the topic of social innovation and participation it is important to include as many as possible, and reach out to a range of societal groups (Frantzeskaki 2019). According to the EU commission (2016) the role of urban planners in this process is to promote the flexibility of services and spaces, and to stimulate change through innovation and adaptability. This also includes exploring new forms of stakeholder engagement and citizens participation (EU Commission 2016).

### 2.5 Critical views and Challenges in GI planning

Matthews et al. (2015) identified three main challenges that planners face regarding green infrastructure. The first one is problems in conceptualising green infrastructure. Ambiguity in defining GI can be challenging for planners trying to integrate GI as a part of a project (Matthews et al. 2015). A clearly defined and common understanding will make it possible to be realistic about the expectations from GI in the given context. The second challenge is related to path dependency and the challenges of institutionalising GI as a part of urban planning practices (Matthews et al. 2015). The third challenge is adopting green infrastructure for climate change adaptation. This is challenging due to the risk management and uncertainty related to anthropogenic activities (Matthews et al. 2015).

GI is usually presented as a holistic approach that produces a range of functions and services, and by doing so improving the urban life. However, by doing so urban societies are also presented as undifferentiated considering the power realtions and social structures within a city (Haase 2017). It is problematic that there is little reflection on what impact these green solutions have on the urban life, depending on socio-economic differences in the city. In the literature these benefits are often generalised in a way that do not consider the spatial and institutional context (Madureira & Andersen 2014). This also means that GI is often presumed to be beneficial for all inhabitants (Haase 2017). It is difficult to say if GI will lead to societal benefits such as social cohesion without taking the specific urban context into consideration. Different places have different socio-economic and socio-spatial conditions, meaning that the implementation of GI will lead to different trade-offs (Haase 2017). There is a need for local assessments that can inform about the effectiveness and relevance of the functions and services that green infrastructures can contribute to in the given location (Madureira & Andersen 2014). This also stresses the importance of locally defined visions for GI (Madureira & Andersen 2014). Innovative planning approaches that address this topic should also be explored to further strengthen decision making processes regarding the implementation of GI (Madureira & Andersen 2014).

According to Haase (2017) there are too many promises made regarding the social ecosystem services provided by GI. It is also pointed out that the social aspect is often missing in assessment of the impacts from GI. GI is not inherently socially inclusive, It is the processes and facilitation for participation and involvement that makes greening strategies and green developments using GI and NBS support social justice and social cohesion (Haase 2017). There are also some concerns that GI and NBS is being increasingly incorporated in private developments, leading to a privatisation of urban green spaces which again can lead to spatial exclusion. Enhancing urban spaces by greening them can contribute to a «nature led» urban regeneration, with the consequences being increased property prices and gentrification (Haase 2017).

Criticism has also been directed at programs meant to support and promote GI. Some of the critiques regarding these program is that the focus is too narrow, and not including opportunities for multifunctionality, as well as not focusing on development of private spaces and including the owners in these areas (Basnou et al. 2015). GI programs have also been criticised for limited success in institutionalising GI (Basnou et al. 2015).

# 3. Research Design

## 3.Research Design

This project is taking use of a case study approach, using the two cases of Nordhavnen in Copenhagen and Västra Hamnen in Malmö for discussing the implementation of green infrastructure in neighbourhood streetscapes. The two cases was researched using a mixed methodology. Semi-Structured interviews was conducted with people who are involved in the streetscape- and GI planning process in the two areas, or has great knowledge of this topic. To supplement the interviews there was conducted a review of local plans and urban development strategies in the two cases. Finally there was conducted a review of municipal GI strategy papers and GI tool descriptions relevant to GI implementation at the neighbourhood scale. The analytical framework, «The Expanded Process Model» was used to identify and analyse the challenges and opportunities of implementing GI in neighbourhood streetscapes. The interviews and the local plans and urban strategies was used for this. The municipal tools and strategy papers was analysed by conducting a content analysis based on the two GI-planning principles multifunctionality and stakeholder inclusion.

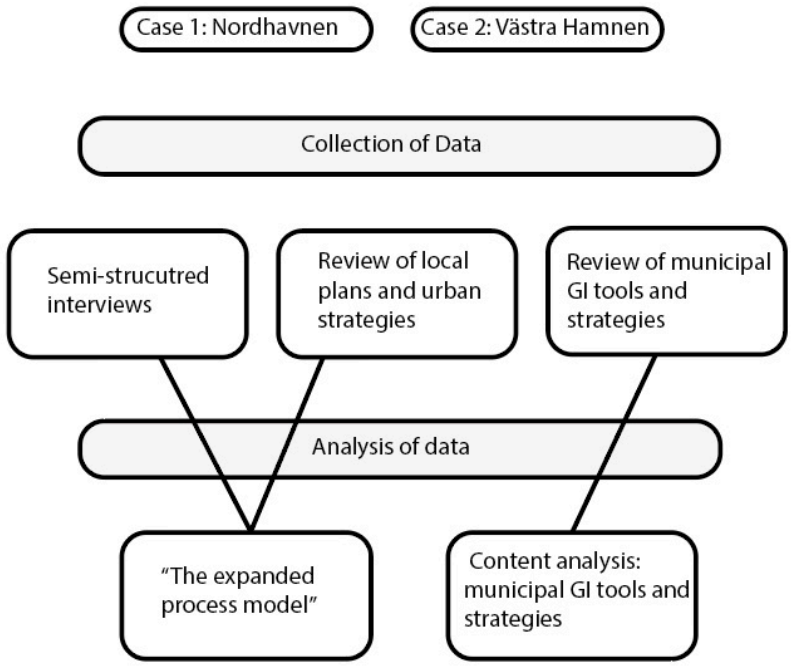



*Figure 3: Research Design*

### 3.1 Case study approach

A case study can be described as a way of generating a multifaceted and in-depth understanding of an issue or topic in a real-life context (Crowe et al. 2011). The case study approach is a good way of presenting the complexity, diversity and sometimes conflicting sides of a case by including the views of different actors (Flyvbjerg 2006). Case studies are often criticised for providing data that cannot be generalised, however a case study can still be an important contribution to knowledge accumulation and scientific innovation without attempting to generalise the findings (Flyvbjerg 2006). In this project it was chosen to do a collective case study. Crowe et al. (2011) describes a collective case study as an approach that assesses multiple cases at the same time in order to create a broader appreciation of a specific topic or issue.

It was decided to look at two cases because this made it possible to assess the topic of GI implementation in streetscapes in different contexts, which is important when trying to create a nuanced and informed presentation of the topic. The two cases will not be compared to each other but be assessed separately and then discussed together to see what can be learned from each of them. The selection of the two cases was based on the following criteria:

*The cases assessed had to be masterplanned neighbourhoods because of their focus on community feeling and provision of places for interaction*

*The cases assessed had to be neighbourhoods focusing on sustainability, preferably including the use of green infrastructure as a part of this vision*

Nordhavnen and Västra Hamene met these two criteria and was found interesting because of their similarities of being masterplanned neighbourhoods both aiming at being role models for urban sustainable development. The difference in location, meaning that the two cases are subject to different planning systems was also found to be interesting in relation to what impact this can have on GI implementation at the neighbourhood scale.

## 3.2 Collection of data

The main method used to obtain empirical data to answer the research questions was qualitative semi-structured interviews with stakeholders involved in the planning of the green infrastructure in the two neighbourhoods. The interviews provided an understanding of the factors and conditions that influence the implementation of GI, as well as an understanding of what role green infrastructure plays in the planning of the neighbourhoods.

There was also conducted a review of local plans and urban development strategies, especially focusing on green infrastructure and planning of streetscapes. Finally there was conducted a review of municipal GI strategies and tools addressing GI at the neighborhood scale.

### 3.2.1 Interviews

The main method used to answer the research questions was semi-structured qualitative interviews. Semi-structured interviews is characterised by a unique ability to be flexible and at the same time structured (Galletta 2013, pp. 2). This form of interview can address specific dimensions of a research question and also allow for different narratives to be explored (Galletta 2013, pp. 2). In this context, trying to understand the societal, political and physical aspects of a complex urban planning challenge, it was important that the informants got the opportunity to explore different ideas and thoughts on the topic. The interview questions was inspired by the analytical framework used in this project, and then further adapted to the specific context of the cases. The analytical framework will be presented later in this chapter (3.3). The interview questions were aimed at identifying the motivations, problems, drivers, challenges and opportunities of implementing GI in the neighbourhood streetscapes. In order to cover different perspectives, a variety of stakeholders was addressed.

The aim was to get in contact with informants who could represent the municipalities, developers, architects/planners and NGOs that are involved in the GI planning in the two neighbourhoods. There was also conducted one expert interview regarding the implementation of GI in neighbourhood streetscapes. The questions asked in this interview was focusing on providing a more general understanding of different governance perspectives regarding GI, and how this affects the implementation of GI at the neighbourhood scale.

A total of 29 people were contacted for the two cases. Several of these worked within the same company or organisation. In the end there was conducted 6 interviews. The remaining 23 people declined the interview request, never answered or answered after the data collection process was ended. Because the Västra Hamnen area is an older project compared to the Nordhavnen project it was somewhat challenging to get in contact with people who was involved in the planning of GI in this area at the time the local plans were made.

There was conducted 3 in person interviews, and 3 interviews was conducted over phone/Skype. The interviews lasted between 15 to 40 minutes. A list of the interviewees and their position is provided in the tables below. Interview guides and transcribed interviews can be found in the appendix (Appendix I, Appendix II).

*Table 1: Interviewees in Nordhavnen (Copenhagen)*

| Stakeholder | Organisation | Person and role in GI planning |
|---|---|---|
| Architects & physical planners | COBE Architects | Rune Boserup, Project manager Nordhavnen |
| Developers | By&Havn | 1.Jane Hegner Mortensen, Project manager in «livable cites» department at By&Havn<br><br>2. Lise, Project manager in the planning department at By&Havn |
| NGO | Miljøpunktet | Sabine Sørensen - Project leader Miljøpunktet |

*Table 2: Interviewees in Västra Hamnen (Malmö)*

| Stakeholder | Organisation | Person and role in GI planning |
|---|---|---|
| Municipality | Municipality of Malmö | Ewa Sundström, landscape architect at the department of planning (Fastighets- och gatukontoret) |

*Table 3: Interview with Green Infrastructure expert*

| Person and role in GI planning |
| --- |
| Natalie Marie Gulsrud, assistant professor in the section for Landscape architecture and Planning at the department of Geoscience and Natural Resource Management at University of Copenhagen. Expert in governance of urban green infrastructure. |

### 3.2.2 Review of urban development strategies and local plans

As a supplement to the interviews it was decided to do a review of urban development strategies and local plans related to the two neighbourhoods. These written sources of information provided insight on motivations, reasons and drivers for implementing GI in the neighbourhoods. These documnets was found to be an important and objective source of information when trying to get a comprehensive understanding of the factors that influence the implementation of GI in neighbourhood streetscapes. The following documents was reviewed.

*Table 4: documents reviewed for the Nordhavnen case*

| Nordhavnen |
| --- |
| Nordhavnen, Sustainable city - The Copenhagen way. Urban strategy November 2009. By&Havn 2009. |
| Nordhavnen, From idea to project - Inner Nordhavn Århusgade kvarteret August 2012. By&Havn 2012. |
| Århusgadekvarteret i Nordhavn, lokalplan nr. 463 med tilæg nr. 1, 2 og 3. Municipality of Copenhagen, 2012. |

*Table 5: documents reviewed for the Västra Hamnen case*

| Västra Hamnen |
| --- |
| Västra Hamnen, 2013 ett hållbart och gott liv för alla - oppdatering av vision, mål och strategier juli 2013. Malmö stad 2013. |

### 3.2.3 Review of municipal green infrastructure tools and strategies

In order to answer the second part of the research question, there was conduced a review of municipal GI strategies and tools that was believed to have the most significant impact on the implementation of GI at the neighbourhood scale. The review was used to identify what local tools and strategies are available to support GI, and how these contribute or constrain the implementation of GI at the neighbourhood scale. The selection of strategies and tools do not imply that other policies, strategies or tools on the local, regional or national level are not relevant to the process of GI implementation. The choice of strategies and tools was based on the following criteria:

- *The tool or strategy had to be implemented by a planning authority*
- *The tool or strategy had to address GI independently (not as a part of a broader strategy)*
- *The tool or strategy had to address GI on the neighbourhood scale*

The tools and strategies was identified through the interviews and by conducting research e.g. on the  websites of the municipalities. The following tools and strategies was identified.

*Table 6:  Municipal tools and strategies reviewed (both cases)*

| | Copenhagen | Malmö |
|---|---|---|
| Tools: | The green factor tool | Green space factor |
| | | Green point system |
| Strategies: | Urban nature in Copenhagen 2015-2025 (Bynatur i Købnehavn) | |

### 3.3 Analytical Frameworks

#### 3.3.1 «The Expanded Process Model»

To analyse the interviews and the urban development strategies and local plans, a process model called «the Expanded Process Model» was used. This model was developed by James Wescoat (Marks et al. 2015) in collaboration with Rambøll, as a part of a lager research project on blue-green infrastructure in urban areas (Rambøll, 2016). This framework was chosen because it is has previously been used in cases investigating the implementation of BGI in larger urban areas and cities, and because it was found to be an interesting appraoch to identifying and analysing drivers and challenges from different perspectives. This process model is based on four steps of implementation: initial conditions, drivers of change, constraining conditions and enabling conditions (Marks et al. 2015).


*Figure 4: "The expanded process model" adapted after Rambøll (2016).*

The model is used to assess what conditions needs to be in place in order for GI to be successfully implemented, as well as to point at factors and conditions that are making the implementation of GI more challenging. The model is based on a adaptation and application of the problem solving process presented in John Dewey's Logic: *The Theory of Inquiry* (1938). The Theory of Inquiry is based on a philosophy of inquiry and action (Marks et al. 2015). According to Dewey inquiry starts with a «problematic situation», this situations can for example be a environmental challenge. To overcome this challange the response is to begin to inquire, meaning that we identify components of the problem (Marks et al. 2015). Further we start organising these components, in alternative ways and orders until we have a relatively solid understanding of the situation.

Next we decide on a course of action and continuously assess and modify this path until the situation is transformed (Marks et al. 2015). Based on this philosophical basis there has been developed a model for identifying and analysing different components that influence the implementation of blue and green infrastructure in urban areas (Marks et al. 2015). The model has been presented somewhat differently in the few cases it has been used in. The order of the different stages of the model are sometimes arranged differently, and additional stages are added in some cases. Previously this method has been used to describe implementation of BGI (Blue-green infrastructure) on the macro-level (Marks et al. 2015, Klein-Rosenthal et al. 2015). For the purpose of this project, the model has been adapted to only include the four fundamental steps of the analysis. These steps are the ones found most important and relevant when assessing the implementation of green infrastructure at the neighbourhood scale. Following the four stages will be presented.

*Stages of «The Expanded Process Model»*

Stage one is called «initial conditions» and is looking at the opportunities and/or problems that motivates the implementation of GI. For this project that includes assessing the origins or motivations for implementing GI in the two neighbourhoods. This can be a combination of inspiring opportunities or problematic situations. Both inspiration and problematic situations can arise from several sources, and be perceived differently by the stakeholders involved (Marks et al. 2015). Identifying the targets of implementing GI is also a part of this stage, targets are connected to what results or outcomes are expected from the GI.

Stage two is called «drivers of change». This stage identifies the agents that take initiative for implementing GI. This can be a person, social groups, movements, or it can be institutions. It can also include political support in the form of schemes and campaigns. The driving forces of implementing GI can also help explain the initial steps taken to address the situation (Marks et al. 2015).

Stage three is named «constraining conditions» and are the agents that works against the implementation of GI. This can e.g. be technical challenges, design standards, policy programs or institutions (Rambøll, 2016).

The final stage is called «enabling conditions». This stage includes technical tools, political will, social awareness, regulations and strategies. Key conditions mentioned by Marks et al. (2015) are professional experience, institutional capacity and financial support. What differentiates this step from drivers of change is that the enabling conditions are the agents that supports the implementation of GI and not the reason or cause for the implementation. These conditions typically have a secondary effect in GI implementation (Marks et al. 2015).

*Justification for choice of Analytical Framework*

«The Expanded Process Model» makes it possible to address both technical and socio-political challenges of GI implementation. The model was found to be a practical approach to the research question as the four stages of the model can be connected to challenges and opportunities of GI implementation. The literature available on this analytical framework is limited, and as of known, the model has not been applied to cases at the neighbourhood scale. This was also one of the reasons for choosing this approach. It is necessary to use the model in different contexts to further develop the analytical framework to become a tool in complex urban planning challenges, such as the implementation of GI and other nature based solutions.

### 3.3.2 Coding

After the interviews were conducted they were transcribed and coded. The most relevant extracts was identified and used in the analysis (see transcribed and coded interviews in appendix II). According to Hedlund-de Witt (2013) coding is a way of searching for consistency and patterns that can be grouped together in categories based on similarity or commonality. In qualitative inquiry, a code will often be a word or a short phrase that assigns a summative or essence-capturing attribute to a portion of data (Hedlund-de Witt 2013).

It was found most suitable to use descriptive codes for analysing the interviews. Descriptive codes provide labels to the data by summarising the content of the data in a word or a phrase (Hedlund-de Witt 2013). The codes were predetermined and based on the four stages of «The Expanded Process Model» (Marks et al. 2015). The four stages of the process model functioned as the themes for the codes. Table 5 gives an overview of the codes used.

*Table 7: description of the codes used*

| Theme | Descriptive code |
|---|---|
| Initial conditions | Reasons and/or motivations for implementing green infrastructure |
| Drivers of change | Agents that take initiative for implementing GI |
| Constraining conditions | Agents working against the GI implementation |
| Enabling conditions | Factors that support and enable the GI implementation |

### 3.3.3 Content analysis - Municipal Green Infrastructure tools and strategies

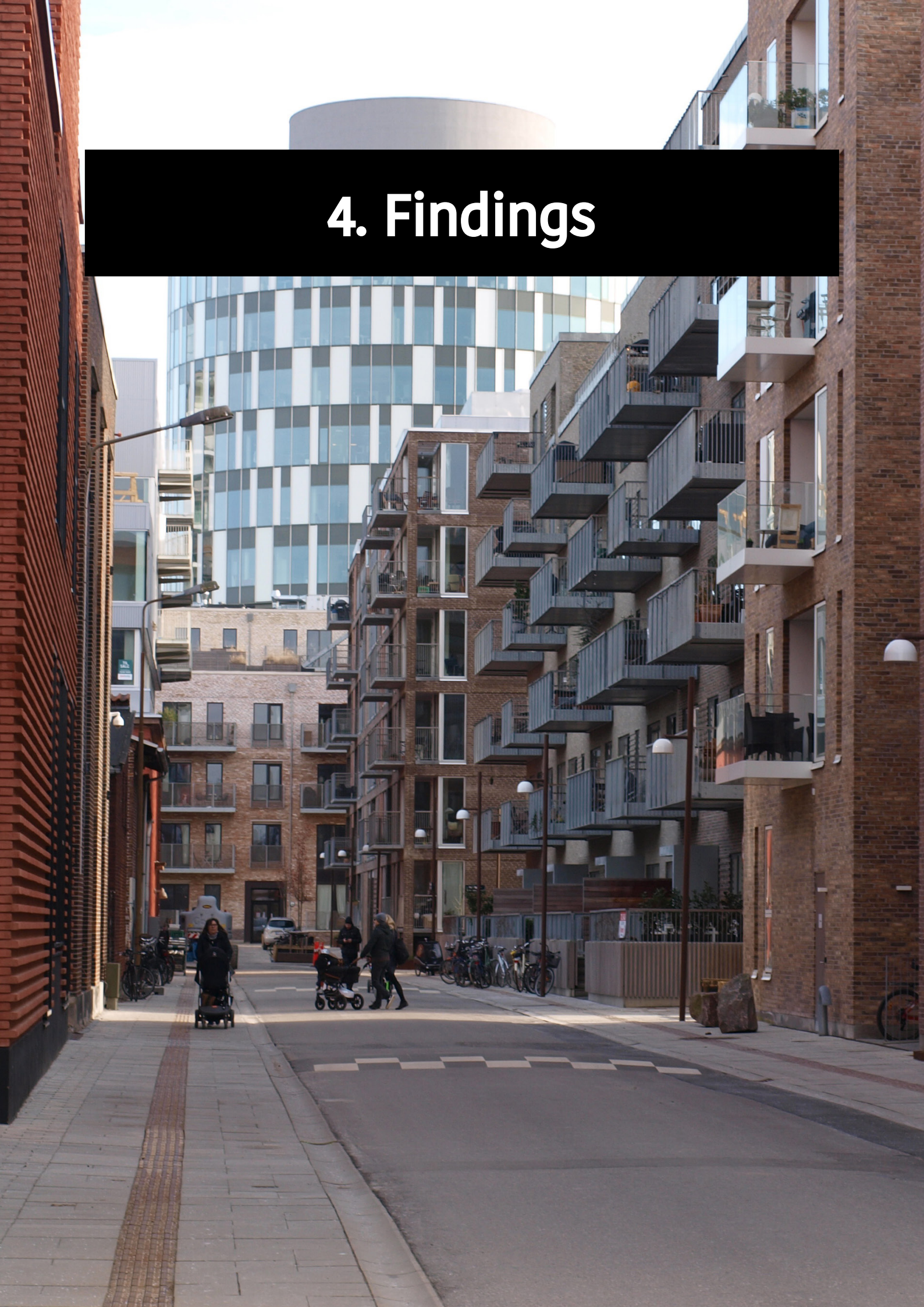
To answer the second research question it was conducted a review of municipal strategies and tools aimed at supporting GI. To assess these tools and strategies it was decided to do a content analysis of the strategy papers and tool descriptions according to some of the GI-planning principles identified and explained in the theoretical framework.

The justification for this approach was that in order to understand how local tools and strategies can support the implementation of GI on the neighbourhood scale, it is necessary to understand what aspects of GI these initiatives are focusing on and prioritising, as well as identifying who the tools are addressing.

As described in the theoretical framework, programs aimed at supporting GI are often criticised for having a too narrow focus and not including or facilitating for the opportunities of multifunctionality. These programs or measures are also criticised for not including affected stakeholders (Basnou et al. 2015). For that reason it was decided to investigate how these tools and strategies support multifunctionality and stakeholder inclusion. Multifunctionality is defined as economic, social and ecological functions that should be accounted for and considered when planning for GI (Hansen & Pauleit 2014, Mussinelli et al. 2018). By the inclusion of affected stakeholders it is in this context meant to what degree stakeholders also including residents and users of the streetscape is involved and able to participate in the different stages of GI planning.

1. Multi-functionality - social, economic and ecological aspects of GI
2. Stakeholder inclusion - opportunities for participation

# 4. Findings



## 4. Findings

In the following chapter the findings from the two cases will be presented, the Nordhavnen case will be presented first followed by the Västra Hamnen case.

### 4.1 Case 1: Nordhavnen

In the urban strategy for Nordhavnen the district is presented as a green and blue neighbourhood (By&Havn 2009). The proximity to the water is a big focus as the area is surrounded by water on three sides, but also the green features are being emphasised *«there is always a green area just around the corner: from local pocket parks, promenades and green urban spaces to open coastal expanses...»* (By&Havn 2009, p.32). From the urban strategy, the structure plan and the local plan, it is evident that the use of green infrastructure is an important part of the development and an important step in becoming a sustainable urban district (By&Havn 2009, By&Havn 2012, Municipality of Copenhagen 2012).


*Figure 5: Visualisation of green spaces in Århusgade kvarteret (By&Havn 2012).*

In the developers description of the Århusgade quarter in inner Nordhavnen, the neighbourhood is presented as a green district, including pocket parks, groups of trees in the open squares as well as green plant beds and green facades (By&Havn 2012). Because inner Nordhavnen is a densely built area, the use of green infrastructure is depending on efficient utilisation of the available space. In the description of the area it is stated that there will be used vertical gardens, green balconies, and plants growing on facades. The area will also have green roofs and roof gardens (By&Havn 2012). Alleys and promenades are described as highly visible including trees that can cope with the salty and windy climate, and more sensitive species will be used in the inner urban spaces (By&Havn 2012). Pocket parks and urban gardens will provide room for trees and recreational activities, and will function as green spots with various types of plants and vegetation (By&Havn 2012).


*Figure 6: Visualisation of green features in Århusgade kvarteret (By&Havn 2012).*

The municipality of Copenhagen made an assessment of the greenness in the inner Nordhavnen area in 2011 (Municipality of Copenhagen 2011). The municipality used a self-developed sustainability tool to assess the neighbourhood on different types of sustainability. The tool gives scores from 1 to 5 (1 being the least favourable and 5 the most favourable) to assess social, environmental and economic sustainability factors. In this tool, green and blue spaces are placed under the category of social sustainability. In the case of the inner harbour, the area received the score 3. This score equals a «standard» and means that the necessary requirements made by the municipality have been met. The score five is given for innovative and optimal solutions (Municipality of Copenhagen 2011). The justification for the score 3 was that there is not added any new nature to the area, and that the green areas do not have any recreational value (Municipality of Copenhagen 2011).

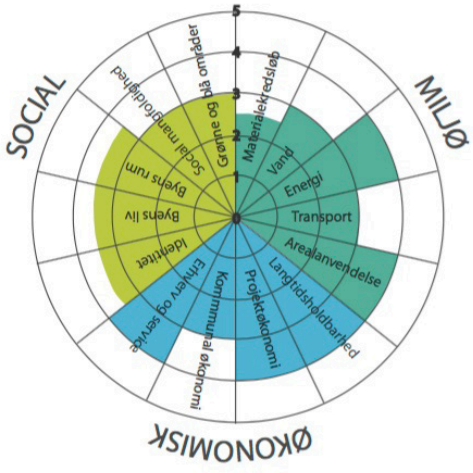



*Figure 7: sustainability assessment of inner Nordhavnen (Municipality of Copenhagen 2011).*

4.1.1 Findings from the Process analysis

Following the findings from the process analysis will be presented. The findings will be presented according to the 4 themes, initial conditions, drivers of change, constraining conditions and enabling conditions. The findings are summarised in main topics that are presented in the figure below. A complete and detailed table of the process analysis, including all findings and quotes from the stakeholders can be found in the appendix (Appendix III).

# Nordhavnen

## Initial Conditions

Copenhagen becoming CO2 neutral

Priorities integrated in the local plan

Branding and symbolic value

Recreation

Climate adaption

Biodiversity

## Drivers of change

Residents and citizens showing interest in GI

Interest from designers, architects and landscape architects

General tendency in city planning - focus on GI

Municipality of Copenhagen investing in climate adaptation

## Constraining Conditions

Battle for space in the streetscape
Lack of technical knowledge - changing climatic conditions
Lack of legal frameworks
Outdated plans- change in demand for GI
Lack of incentives for private developers
Costs and focus on quick turnover
Timeline in political decision making
Different understandings of GI
Lack of citizens involvement

## Enabling Conditions

Legal frameworks, e.g. local plans requiring green roofs and street trees

Regulations set by the developers

Urban nature strategy

NGO/volunteers working for more GI

Involvement of citizens and residents

Initial conditions - the initial conditions for implementing GI depends on the perspective of the stakeholder asked. With regards to implementing GI in neighbourhood streetscapes, the main stakeholders are the municipality who have the legislative power of local plans, and the developers who are responsible for the execution of these plans. However, architects also have an important role as they function as advisors on how to distribute the GI, and as designers of the streetscape.

From the perspective of the municipality, climate adaptation and the goal of becoming CO2 neutral is an important priority that is reflected in different strategies and policies implemented on the city scale. This was found to have an impact on the developers in Nordhavnen, who mentioned regulations in the local plans and overarching goals from the municipality, as one of the main reasons for implementing GI. The aspect of branding and symbolic value was also mentioned as motivation from the developers perspective *«It (GI) is important as branding, one cannot call it a sustainable urban development and not have green roofs»* (Palm, By&Havn). From the architects perspective it was also mentioned climate adaptation and biodiversity.

Drivers of change - Interest and initiative shown by citizens and residents was the driver of change that was mentioned most often throughout the interviews. Interest from the residents was shown by requesting more GI in the neighbourhood and by implementing GI in private spaces, *«The residents would like more green»* (Palm, By&Havn). From the interviews it was also found that there is a general tendency to focus on GI in city- and urban planning, «*There is also a general tendency in urban planning to focus on integration of urban nature as a part of the classical city»* (Boserup, COBE). From the architects perspective it was also mentioned «personal» interest in GI and urban nature. The municipality of Copenhagen investing in climate adaptation was also mentioned as a driver, *«The number one topic in Copenhagen, is planning for climate adaptation»* (Gulsrud).

Constraining conditions – Battle of space in the streetscape is a challenge that was mentioned by all the stakeholders interviewed *«It is always a struggle of place, because everyone wants to use these urban areas for something»* (Mortensen, By&Havn). Lack of technical knowledge regarding changing climatic conditions is another constraint that makes it challenging to plan and implement GI. The cost of implementing GI can also function as a barrier, as well as the lack of incentives towards developers, *«There is no incentive there for the people who are building the neighbourhood to actually deliver on something that won't be realized for 30 to 80 years..»* (Gulsrud). Outdated plans (local and structural) that do not address the current needs and demands for GI was mentioned as a constraining condition, *«in a way the plans are outdated in relation to the needs that have occurred»* (Palm, By&Havn). The lack of legal requirements and frameworks aimed at the developers was also found to be a constraining condition *«if there are no legal demands aimed at the developers, it will not be included»* (Boserup, COBE). Different understandings or perception between the stakeholders regarding the concept of GI was also found to be a challenge, *«there are very different understandings of what green infrastructure actually is»* (Gulsrud). The focus on quick turnover in regards to benefits of GI combined with the short timeline in political decision making is a challenge, *«robust ecosystems they have a much different timeline then political decision making»* (Gulsrud). Finally, the lack of active involvement of citizens and future residents in the planning of the streetscape can also be considered a constraining condition, *«it is difficult to involve them (residents) in like the measures of the street and the roads»* (Mortensen, By&Havn).

Enabling conditions - for the enabling conditions it was found that the few legal requirements set by the municipality are important for the GI implementation e.g. in the form of local plans, *«in the local plan there is requirements for green roofs, unless there is a roof terrace»* (Palm, By&havn). The developers themselves have also established some requirements that can contribute to the green experience of the streetscape, *«25% of the buildings must have a common roof terrace, this can be combined with something green»* (Palm, By&Havn). Public information meetings and workshops with citizens and future residents about the Nordhavnen development was also mentioned as enabling factors that should be used to a greater extent, *«I think it has a huge impact when you involve the citizens»* (Sørensen, Miljøpunktet).

By looking at what role the different stakeholders have in influencing the GI implementation in Nordhavnen, it was found that visions and goals implemented on a higher institutional level, in this case the municipality, function as both initial condition and drivers of change. These goal and visions are operationalised through plans and regulations which also makes them enabling conditions. The residents were also found to have an important role as drivers of change, and the involvement of residents was found to be an enabling condition with big potential. The constraining conditions can be divided into local biophysical challenges and socio-political challenges affecting GI implementation on the neighbourhood scale.

### 4.1.2 Findings from content analysis - Municipal Green Infrastructure Strategies and Tools

*Urban nature in Copenhagen (Bynatur i København), strategy 2015 - 2025*

The urban nature strategy was implemented by the municipality of Copenhagen in 2015. This urban nature strategy is based on two visions. The first vision is about getting more nature to Copenhageners, and the second one is focusing on urban nature with high quality (Municipality of Copenhagen, 2015). This strategy includes all types of urban nature in Copenhagen, meaning urban nature at different scales, in both public and private spaces. The purpose of the strategy is amongst other things to ensure that urban nature is integrated when the municipality develops local plans for new and existing areas. The strategy is based on four topics. 1. Urban nature in public green areas, 2. Urban nature in the city development, 3. Urban nature in municipal areas, 4. Urban nature in private areas (Municipality of Copenhagen, 2015). For the purpose of this project looking at the implementation of GI in neighbourhood streetscapes, topic 3 and 4 was found to be the most relevant topics. Each topic includes some interventions that will work towards fulfilling the goals of the strategy, this includes tools, catalogues, projects and partnerships. For the municipal areas it is mentioned measures such as a catalogue of urban nature solutions, development of green stormwater management solutions, action plan for implementation of 100 000 trees, and partnership agreements. For the private areas it is mentioned a catalogue for urban nature solutions and the establishment of partnerships (Municipality of Copenhagen, 2015).

Multifunctionality

Ecological: the ecological aspects of GI is given a lot of priority in the strategy. Especially climate adaptation is a recurring topic mentioned in numerous of the interventions. Biodiversity is an also a topic discussed in relation to the different measures and interventions.

Social: in regards to the social aspects of the strategy, the focus on enhancing the «experience value» of the GI is mentioned as a motivation for the different interventions, as well as the knowledge, ownership and understanding of the urban nature. What this actually entails, and if the focus is on aesthetic value or recreational value is unclear. The establishment of different partnerships in private and public areas is also mentioned, but not elaborated on.

Economic: the economic benefits or consequences of implementing green infrastructure is barely mentioned in the green strategy. The exception is the catalogue of urban nature solutions, which addresses this topic.

Stakeholder inclusion

Stakeholder inclusion is mentioned in the strategy in the form of partnerships in both public and private areas, it is however unclear specifically how people are motivated and encouraged to participate in the implementation of GI, as well as who will be included and how democratic participation processes will be ensured.

*The municipality of Copenhagen's greening tool*

The greening tool is developed by the municipality of Copenhagen and is used to ensure quality and quantity of urban nature in municipal projects (Municipality of Copenhagen 2017). This is done by illustrating how much of a projects total area is allocated to urban nature and what qualities this nature is providing. The tool is used in relation to the local plans, and it is also described as a tool for communication between different stakeholders involved in the greening of the city (Municipality of Copenhagen 2017). As the tool is used to determine a greening factor, a score will be given to the project, indicating a low, middle or high green factor. The urban nature qualities are defined on the basis of the utility value and amenity values associated with the urban nature. Utility value includes the regulating services provided, e.g. rainwater management, air quality and micro-climate regulation. Amenity value are described as the cultural services, e.g. related to learning, sensing and affiliation with nature (Municipality of Copenhagen 2017). The municipality of Copenhagen have chosen to focus on the qualities climate adaptation, biodiversity, recreation and uniqueness (Municipality of Copenhagen 2017).

Multifunctionality

Ecological: ecological function of GI seems to be the main priority of the tool. Biodiversity and climate adaptation are two of the main topics discussed in the tool description.

Social: the tool is also developed to include social aspects of GI. Recreation is an important topic discussed, including the promotion of physical and mental health. This includes creating spaces for activity and movement, as well as quite places for sensory experiences and social interaction. The term uniqueness is also used in this context, described as taking use of the historical, cultural and landscaping features in the planning of the urban nature. It is however unclear what practical impact this has on the implementation of GI.

Economic: There is almost no discussion of the economic impact of the tool, in regards to what economic impact the different interventions will have on the plans it is being used in.

Stakeholder inclusion

The greening tool does not say anything specific about stakeholder inclusion expect that it will be used to establish communication between stakeholders. In what ways the tool will facilitate communication and who's perspectives this will include, is unclear.

From looking at the urban nature strategy and the greening tool it was found to be a strong focus on ecological aspects of GI, especially concerning GI as a climate adaptation tool e.g. used in stormwater management. It also found that both economical aspects of GI and the inclusion of stakeholders are topics that are not receiving significant attention.

### 4.2 Case 2: Västra Hamnen

Since the building expo Bo01 in 2001, the city of Malmö has been in a frontrunner position when it comes to sustainable ecological urban development. The city has several prizewinning projects due to innovative solutions (Delshammar 2015). Especially the Bo01 have become a popular example of how to use green infrastructure in reducing negative consequences created by an expanding city (Malmö Stad, 2003). Västra Hamnen is an area that provides a great variety of green infrastructure. The area consists of various types of visible GI solutions, such as trees and lush vegetation that adds exciting qualities to the urban environment (Delshammar 2015). There is also a lot of focus on the quality of the public spaces and the neighbourhood streetscapes, by ensuring meeting places and developing quality programs designed by external landscape architects (Kruse 2011). One of the main reason for introducing open stormwater management systems in Bo01 was the high aesthetic value that this solution brings to the surroundings (Kruse 2011). In the Bo01 neighbourhood, it was found that the courtyards needed special schemes to prevent them from being grey and boring. The city council decided to use the tools «green space factor» and «green points system» to achieve a minimum of green qualities in private developments (Delshammar 2015). The most important topic when introducing the green planning instruments was to present a healthy and attractive environment for people to be in (Malmö City Planning office 2008). Another reason for introducing these tools was the promotion of biodiversity. A goal was at the time and still is, to demonstrate how biodiversity can be supported in inner city landscapes through the development of green areas that provide biotopes (Malmö City Planning office 2008). The final purpose of the greening tools is to help and minimise stormwater run-off (Kruse 2011).


*Figure 9: map showing green areas and green connections in Västra Hamnen (Malmö City Planning office, 2008).*

*Figure 10: green street in Bo01, Västra Hamnen.*

*Figure 8: green courtyard in Bo01, Västra Hamnen*

*Figure 11: green courtyard in Bo01, Västra Hamnen*

4.2.1 Findings from the Process analysis

Following the findings from the process analysis in Västra Hamen will be presented

# Västra Hamnen

## Initial Conditions

Branding

Creation of a good micro-climate

Recreation

Climate adaptation

Biodiversity

Aesthetic value

Adding scale to the built environment

## Drivers of change

City of Malmö - visions, goals and regulations in local plans

A general tendency in urban planning - focus on GI

## Constraining Conditions

Battle of space

Costs

Lack of technical knowledge - changing climatic conditions

## Enabling Conditions

Detailed plans regulating GI implementation

The green space factor - GI tool

The green point system - GI tool

Initial conditions - Climate regulation was mentioned as a significant motivation for implementing GI in Västra Hamnen, *«It is above all climate regulation»* (Sundström, Malmö City). Other initial motivations and reasons for implementing GI in the streetscape, is the adding of scale to the built environment as well as recreation and focus on the creation of a good micro-climate. From the urban vision strategy it was also mentioned focus on branding and marketing, as well as the creation of lively streetscapes.

Drivers of change - the general tendency of prioritising GI and urban nature in urban planning, is also functioning as a driver of change in the case of Västra Hamnen. The city of Malmö has also been recognised as a frontrunner city when it comes to sustainable development, as they have the goal of being Sweden's most climate friendly city. Another very import driver of change is the city of Malmös integrated focus on GI in the local plans, *«We always work with the ambition of creating as green environments as possible around our streets»* (Sundström, Malmö City), *«GI is actually legislated as a priority at the local plan»* (Gulsrud).

Constraining conditions – for the constraining conditions it was mentioned the battle of space in the streetscape *«there is also the lack of space, there is simply not enough space for trees, or sufficiently large tree pits in order for the trees to grow and develop»* (Sundström, Malmö City). There is a constant battle between different priorities in the streetscape and there are many aspects that has to be accounted for. Lack of technical knowledge in regards to what types of vegetation that works best in a specific location, and how it will respond to changing climatic conditions are also constraining conditions, *«it is actually difficult to plant trees that thrive and do well in urban contexts»* (Gulsrud).

Enabling conditions – from the urban vision strategy for Västra Hamnen it was found that the detailed plans regulating the implementation of GI are important enabling conditions. The green point system and the green space factor are examples of greening tools that are used on private neighbourhood land that enables the implementation of GI, *«Green space factor is used in Malmö only for private neighbourhood land...»* (Sundtröm, Malmö City).

From the process analysis it was found that the especially the municipality has a strong position in GI planning in Malmö, because of their legislative power which makes GI an priority in local plans, and through the development of tools aimed at private developers.

### 4.2.2 Findings from content analysis - Municipal Green Infrastructure Strategies and Tools

*The green space factor*

The green space factor is a planning instrument that guarantees a certain volume of greenery in residential courtyards. The green space factor was first introduced in 2001 in connection with the Bo01 international housing exhibition fair, and has later been used in other residential projects in the area (Malmö City Planning office 2015). The aim of the green space factor is to secure a certain amount of green cover, the tool ensures that developers describe in their detailed plans how they plan to achieve the green space factor (Kruse 2011). The approach assigns scores to different surface types, where the surface types that has a higher functionality is rewarded with a higher score. Examples of green features that can receive high scores are green roofs, large trees, and facades covered with climbing plants (Kruse 2011).

Multifunctionality

Ecological: the greening tool have great focus on enhancing ecological aspects of GI, depending on priority of the developer. The tool can be used to support biodiversity and climate adaption, which also are examples of priorities in the Bo01 development.

Social: the recreational and aesthetic value of the GI is not discussed in specific in regards to this tool, as scores are given based on the quantity of green features. Recreational and aesthetic values of GI is not a priority of the tool.

Economic: the economic implication of the tool in regards to how GI can affect the cost of the project is not discussed.

Stakeholder inclusion
As this tool is designed by the municipality and aimed at developers of private urban development project, there is limited opportunities for other stakeholders to influence the choice and implementation of GI unless the developer facilitates for this. The tool itself does not facilitate for communication and dialogue regarding the implementation of GI.

*The green point system*

One of the challenges of the green space factor tool, is that it does not evaluate the quality of different types of green infrastructure. An example can be that extensive and intensive green roofs are given the same score (Kruse 2011). To deal with this challenge there was developed a new tool named «the green point system» that can be used in combination with the green space factor tool. Using the example of Bo01 the developers were given a list of 35 green points were they had to choose at least 10. Some points are aimed at supporting biodiversity whereas other points can be aimed at improving e.g. architectural qualities (Kruse 2011). The 35 points cover a wide aspect of services, which makes it possible for developers to choose one aspect to focus on, or preferably ensure that all aspects of GI (social, economic and ecological) as are facilitated for. The tool allows for the developers to become very specific in their goals and visions, e.g. by prioritising biodiversity or recreational values. It also allows for them to ensure a wide spectre of functions that can complement each other and the needs in the area (Kruse 2011).

Multifunctionality

Ecological: the green point system can be used as a tool to promote GI solutions that can enhance biodiversity and climate adaptation, all depending on the focus and priority of the developer implementing the GI.

Social: The tool enables social services provided by GI to be prioritized. GI that focuses on recreational and aesthetic values can be provided if this is a priority of the developer.

Economic: a problematic aspect of this tool in related to the economic aspect of GI implementation. There is a possibility that developers choose the cheapest GI solutions in order to achieve the points required, even though these solution are not the most suitable ones in the a specific location (Kruse 2011).

Stakeholder inclusion
As with the green space factor, the tool is designed from the perspective of the municipality and aimed at private developers. The tool does not promote or facilitate communication and inclusion of residents and other stakeholders. This is left to the developer who is using this tool as a part of their detailed plans.

Looking at the greening tools used in Västra Hamnen it was found that these are developed from the perspective of the municipality and aimed at private developers, the inclusion of other stakeholders is not discussed. Economic impacts of these tool are also not discussed.

# 5. Discussion

## 5. Discussion

The following chapter discusses the findings in relation to the research questions and recent scientific literature addressing green infrastructure implementation in urban areas. Some recommendations for planners and urban practitioners on how to facilitate for green infrastructure in neighbourhood streetscapes will also be presented. Some reflections and limitations of the project will be included, as well as some suggestions for future research.

### 5.1 Using the examples of Västra Hamen (Malmö) and Nordhavnen (Copenhagen), what are the opportunities and challenges of implementing Green infrastructure in neighbourhood streetscapes?

One of the reasons why the two cases under study is found interesting, is because they both have a vision of being international rolemodels of sustainable urban development. The integration of green infrastructure as a part of this vision is emphasised through the establishment of urban strategies and tools addressing this topic. The important value of GI in sustainable urban development was also mentioned by one of the stakeholders in Nordhavnen *«City and port have a goal of developing a world class urban district. Green infrastructure and green spaces is a part of a good city, where there is a high degree of livability. Green infrastructure is an integrated part of their (city and port) vision of creating a good urban district»* (Boserup). However, looking into the two cases it was found that the implementation of GI in neighbourhood streetscapes is a complex urban planning challenge, that can be approached in different ways and is influenced by a variety of biophysical, technical and socio-political factors. Some of these factors will be discussed in this chapter.

#### 5.1.1 Opportunities for GI implementation in Neighbourhood Streetscapes

As a result of the process analysis a number of reasons and motivations for implementing GI was identified. Following some of the opportunities of GI implementation identified in the two cases will be discussed in relation to findings from the literature.

Branding and symbolic value - In the two cases it was found that GI is being used as a branding tool by developers in the area. Newell et al. (2013) points out that green infrastructure is often explicitly linked to sustainable development. The implementation of GI is a way of visually and symbolically branding an area as green and sustainable. By one of the developers in Nordhavnen it was stated that *«...one cannot call it a sustainable urban development and not have green roofs»* (Palm, By&Havn). The implementation of GI as a branding tool can be used to send a message that sustainability is a priority, but it can also be linked to business interest as GI can increase property values (Slätmo et al. 2019).

Visions and priorities implemented at the city scale - The city of Malmö have a vision of being Swedens most climate friendly city. This goal implemented on the city scale does also have an impact on newer development projects in the city, and is reflected in local plans and strategies also regarding green infrastructure. In the case of Nordhavnen it was found that the City of Copenhagen's goal of being CO2 neutral by 2025 was functioning as a motivation for implementing GI solutions. This demonstrates the importance of signals from higher institutional levels in the planning regime. In some cases such as seen in Malmö, these visions are also operationalised by the planning authority through the implementation of tools supporting GI.

Ecological services - Ecological benefits and services was also mentioned as a motivation for implementing GI in the two cases. In the case of Nordhavnen ecological services such as climate adaptation and biodiversity was found to be additional services provided by GI, meaning that the GI was not intended to address a specific ecological issue. In the case of Västra Hamen and Bo01, GI was found to be a measure used in supporting biodiversity by creating biotopes and habitats for fauna and flora. This shows that ecological services function as a motivation for implementation in both cases, but for different purposes.

Recreational services - in the urban vision strategy for Västra Hamnen the creation of «lively» streetscapes was found to be an important priority, and GI is used as tool in supporting this. In the urban strategy for Nordhavnen, the creation of active and varied outdoor life is also mentioned in as reason for implementing GI. It is however important to recognise that the cultural ecosystem services provided by green infrastructure are social constructs, they are not inherent features of ecosystems (Delshammar 2014). This means that in order for the GI to promote social and cultural ecosystem services, the solutions must be designed in a way that facilitates for these services, e.g. by creating green spaces that invite to social interaction and activity, and is aesthetically pleasing. Also Frantzeskaki (2019) found that visually interesting solutions, is important in making people appreciate and accept GI solutions (Frantzeskaki 2019). In the two cases there have been taken different approaches to the design and visual aspects of the GI solutions. In the case of Bo01 in Västra Hamnen, the use of SUDS was chosen because of its visual contribution the area (Kruse 2011). Other types of GI such as green roofs only offers interaction with nature for a limited group of people (Delshammar 2014). Green roofs also have limited impact on the streetscapes as they are often not visible from this perspective.

From the process analysis it was found that the motivations and reason for implementing GI is related to both economic, social and ecological aspect of GI. These findings are also supported by findings from the literature, where GI is presented both as a solution to a problem and as a visual contribution to the built environment that supports a number of ecosystem services (Newell et al. 2013, Lennon & Scott 2014, Wouters et al. 2016). However, sometimes one aspect of GI is found to be more dominating. What aspect is dominating and being prioritised must be understood in relation to the power relations between the stakeholders involved, meaning who has the most power in the decision making processes, and who's interests are being prioritized.

### 5.1.2 Challenges of GI implementation in neighbourhood streetscapes

Especially in the Nordhavnen there was found to be some discrepancy between the vision stated in the urban strategy for GI in the Århusgade Quarter, and what is actually being implemented in the streetscape. From the findings there was identified some contradicting messages. In the urban strategy it is stated that GI will be implemented to promote activity and outdoor life. From the interviews it was however found that the residents are missing green spaces, and are requesting these. Furthermore, from the municipal sustainability assessment it was found that there is not added any new nature to the area, and that the green areas do not facilitate for any recreational activites (Municipality of Copenhagen 2011). This is an indication of challenges related to the implementation of GI. Looking at challenges of using GI as climate adaptation measures, Matthews et al. (2015) identified a number of both biophysical and socio-political factors that can challenges the utility of GI.

The biophysical factors include the availability of areas for greening, engineering and geological conditions as well as vegetation characteristic and climatic conditions. The socio-political factors include governance systems, involvement of the public and financial constraints (Matthews et al. 2015). This categorization concedes well with the findings from the process analysis. Following some of these constraining conditions will be discussed.

The battle of space - the battle of space was found to be the most recurring topic during the interviews in both cases. Streetscape planning is a complex challenge, partially because of the predetermined conditions of what the streetscape must include. The compact urban structures makes it challenging to find room for green spaces (Delshammer 2014). The battle for space involves technical challenges such as interference with underground infrastructure, as well as infrastructure and physical features on the surface. These findings are also found to be consistent with findings from other cases, Haaland & van den Bosch (2015) also mention high buildings that reduce the access to sunlight, traffic constraints as well as contaminated soil as reasons for why it is difficult to plan for street greenery in dense urban areas. These factors creates limitations in regards to the streetscape design, and calls for innovative and creative streetscape design.

Lack of goal clarification - another interesting finding in the case of Nordhavnen, was that the understanding and perception of GI was different depending on the stakeholder asked. The awareness regarding the important value of GI and the potential benefits provided was generally agreed upon, but there was no common consensus regarding the role and purpose of GI. Matthews et al. (2015) found that ambiguity in defining GI is often a challenge for planners trying to integrate GI as a part of a project. A clearly defined and common understanding of what role GI will play in the specific context, and what functions it will provide, is important in establishing realistic expectations. When approaching the developers in Nordhavnen with questions regarding GI in the streetscape, this was first interpreted in relation to green mobility. The architects on the other hand, emphasised the visual experience and the access to green spaces in the streetscape. When using GI as an asset in place branding it is necessary that the purpose and goal of the GI is specified and targeted, this means that terms such as sustainable and green-blue infrastructure should be defined, also including the socio-economic benefits associated with these terms (Gulsrud et al. 2013). In the case of Nordhavnen there is a clearly defined goal in the urban strategy of being a blue and green district, it is however not clarified why this is a goal. Green features such a street trees and green roofs are justified by their wind shielding qualities and rainwater filtration, but the overall vision or motivation for aiming to be a green and blue neighbourhood is not clarified. A clearly defined vision and purpose can work as an integrating tool that creates a shared narrative that the stakeholders can work towards (Frantzeskaki 2019).

Institutional challenges - The role and position of stakeholders - according to Haaland & van den Bosch (2015) institutional constraints are found to be one of the major challenges in GI planning and implementation. When discussing the challenges of GI on the neighbourhood scale it is necessary to look at what role the different stakeholders have in the GI planning. This also means to identify whether the one who have the power to implement GI also have this as an interest and priority. In the two cases this was assessed through identifying the drivers of change. According to Marks et al. (2015) the drivers of change can include political support, individuals, social groups and movements that works towards the implementation of GI. Being a driver of change does however not always imply power or a significant role in decision making. In the two cases it was found that the power relations between the city and developers had some differences. Looking at GI planning in the UK, Roe & Mell (2013) reported that the relationship between the roles of stakeholders is critical in GI planning and implementation.

The City - in both cases it was found that goals and targets implemented on the city scale is influential also at the neighbourhood scale, as these goals are often reflected in local plans. Because of this, the city is functioning as a driver of change. Examples can be that the city is making requirements in regards to green roofs, or investing in climate adaptation. In both cases the city was mentioned as a driver of change due to regulations in the local plans. In Västra Hamnen there is also implemented GI tools in some of the local plans which makes the role of the city as a stakeholder even stronger. Especially in Sweden the municipal authorities have a strong position in ensuring green infrastructure, as green infrastructure is protected by detailed plans in both public and private land (Delshammer 2015). Because the local planning authorities have a strong position in the GI planning and have the possibility to intervene in private development projects regarding the implementation of GI, there is reason to believe that the interest and priorities of the municipality will be reflected in the physical planning of the neighbourhood streetscapes.

Developers - developers have an important responsibility as drivers of change in implementing GI, especially in cases where there are limited regulations, policies and tools introduced by the planning authorities. This leaves a lot power or «freedom» to the developers. It also means that the developers have to make GI a priority in the planning of their developemtns in order for GI to be implemented. The lack of priority from the developers is often related to other competing urban planning challenges as well as economic considerations and market forces (Chee Keng Lee et al. 2015). Lack of incentives aimed at developers was also found to be a constraining condition. As said in one of the interviews *«A green roof is more symbolic than actual functional, these kind of ideas reign within new urban development projects, it is very difficult to have focus on something that will give you benefits in 20 years and 30 years and 80 years...»* (Gulsrud). This focus on a quick turnover in realtion to benefits provided by GI makes it difficult to motivate developer to invest in GI. Financial incentives aimed at supporting developers in GI implementation are examples of measures introduced to overcome this challenge. On example can be German cities such as Berlin where green roof subsidy programs have been introduced, and where a percentage of the building cost is covered by the municipality (Carter & Fowler 2008).

Residents and citizens - In the case of Nordhavnen one of the main drivers of change was found to be the residents requesting more GI. Meeting the demands of the residents was mentioned as an important priority by the developers. The residents do however not have any formal position or power in the GI and streetscape planning. This makes the role of developers and the municipality as facilitator for residents and citizens involvement even more important. According to Derkzen et al. (2017) the inclusion of people's needs and beliefs regarding GI is especially important for successful implementation. The involvement of people in the planning process is also important in order to create solutions adapted to fit the local context and address the resident's preferences for different GI solutions (Derkzen et al. 2017). In Nordhavnen there was held public meetings and workshops before the plans for the area was made, giving citizens the opportunity to share their ideas for the area. After this, By&Havn have held public meetings twice a year with the residents. According to the developers it is however found to be difficult to include the residents in the planning process of the streetscape and GI. This finding is consistent with other findings from the GI literature, looking at green space planning in cities undergoing densification Haaland & van den Bosch (2015) found that the lack of stakeholder inclusion and involvement of citizens is generally found to be a challenge in GI planning. Level of participation is an important topic when discussing how residents are being included in planning processes. Co-creation and co-design approaches are examples of bottom-up approaches to GI planning, meaning that the users are actively participating in the design and planning process (Voorberg et al. 2015).

Judging from the number of constraining conditions found in the case of Nordhavnen, it is assumed that the process of implementation is found challenging in this area. The number of constraining conditions can also help explain the discrepancy between the vision presented in the strategy and the current situation. In the case of Nordhavnen different understandings of GI between the stakeholders, and lack of goal clarification was interpreted as constraining conditions, as there is no clearly defined plan or purpose for the GI. Furthermore, the institutional challenges of GI implementation such as the role of different stakeholders and the power relations between them was found to be an important factor in understanding how GI is being prioritised. This also pointed out some major differences between the two cases. Physical aspects such as battle for space and technical challenges was found to be constraining conditions in both cases.

Following the second research question will be discussed looking at the municipal tools and strategies addressing GI at the neighbourhood scale.

### 5.2 What tools and strategies address green infrastructure at the neighbourhood scale, and how can these tools and strategies influence the implementation of green infrastructure in neighbourhood streetscapes?

Juhola (2018) describes green factor tools as a way of improving the ecological sustainability of the built environment, by providing freedom in choices of green features and their location within a given area. In the case of Västra Hamnen the two greening tools the «green space factor» and the «green point system» have been applied to some of the private developments in the area, one example is Bo01. In the case of Nordhavnen the green factor tool was not used in the Århusgade Quarter as it was developed after the plan for this area was made. The green factor tool was implemented by the municipality of Copenhagen in 2017. It can however potentially be relevant for future municipal projects in this area.

The tools were assessed according to multifunctionality and stakeholder inclusion which are to core principles of GI. From the literature it was found that GI programs are often criticised for not including opportunities for multifunctionality (Basnou et al. 2015). From the two cases it was found that the green factor tools could be used to support ecological and social aspects of GI, all depending on the priorities of the developer. Especially climate adaptation and biodiversity was found to be major topics. If the tools are used in producing plans for a development e.g. through planning regulation, it is important that budgetary concerns are accounted for (Juhola 2018). In both cases there was however little discussion of the financial implications of the tools. The missing discussion of the economic aspect is a challenge considering private developers, as they might choose the easy, least expensive solutions in order to reach a certain score, even though these solutions are not the most efficient and sustainable ones in the given context (Juhola 2018). When assessing the green point system used in Västra Hamnen Kruse (2011) also found that there is a chance that developers choose the least expensive GI solutions.

Another aspect of the green factor tools that was assessed was the inclusion of stakeholders, meaning who's perspectives are considered, and who can partake in the use of the tool (Juhola 2018). The Copenhagen green factor tool is described as a tool for establishing communication between stakeholders, but it is not specifically addressing how users and residents are included. Also in the case of Västra Hamnen the tools are designed and implemented by the municipality and primarily aimed at developers and architects.

Specifically looking at how the tools could be used to involve residents and citizens it was found that this aspect was missing. Juhola (2018) also found that the interest in these types of tool are often positively perceived by city planners, but private developers do not share the same view. The reasons for this can be as earlier discussed, economic considerations and other priorities.

Juhola (2018) found that green factor tools would have a more significant impact if they were introduced as a compulsory part of the planning process. If tools are introduced but not legally binding, they are found to have a limited impact in making changes (Juhola 2018). These tools can also have a more significant impact on neighbourhood streetscapes if they are implemented coherently and not just in selected projects. The greening tools in both Copenhagen and Malmö are only implemented in selected plans chosen by the municipality. If the aim is coherency the tools should be a mandatory practice in all local plans. A challenge of this is however that green factor tools have a tendency of missing special conditions and local differences, as they are designed to be widely used (Juhola 2018). This calls for tools that are designed and structured in a way that allows for adaptation to specific local contexts.

Looking at strategies addressing GI at the neighbourhood scale it was found that the urban nature strategy in Copenhagen includes GI at different spatial scales and discusses different types of ownership. GI in non-public areas are one of the topics discussed in the strategy. According to Slätmo et al. (2019) urban nature strategies are often trying to collect a wide range of GI goals in one holistic strategy. The idea of a holistic strategy makes it possible to include a variety of GI goals, but it also increases the chances of conflicts occurring between the goals, or that some aspects of GI are being neglected (Slätmo et al. 2019). This can delimit the effect of the strategy as the transition from strategy to practice is already found to be challenging (Mell 2017). When assessing how multifunctionality is addresses in the strategy, it was found that that there is a great focus on ecological aspects of GI, especially concerning climate adaptation and to some degree biodiversity. The social aspect is often mentioned using the term «experience value» but this is not further explained. According to Haase (2017) the social dimension is often missing when assessing the impacts from green solutions. The least present aspect in the strategy is the economic implications and considerations of GI implementation. Looking at stakeholder participation it was mentioned establishment of partnerships and communication between the stakeholders, but this was also not further addressed.

When assessing available tools and strategies addressing GI at the neighbourhood streetscape scale it was found that there is a limited selection of available tools and strategies in the two cases. It was found that in order for GI tools and strategies to have a real impact on GI implementation in neighbourhood streetscapes, they have to be adjusted to the neighbourhood scale both by addressing specific issues and by addressing different stakeholders. A general finding that was similar for all the initiatives, was that ecological aspects such as climate adaptation and biodiversity was clearly prioritised. Looking at stakeholder participation it was found that the municipality and developers are the main stakeholders addressed. It was found that these initiatives should also address developers and house owners in a way that motivates them to invest in efficient solutions, e.g. by providing some sort of incentives. The inclusion of residents and users was also missing, especially in the green factor tools. Tools and strategies that consider the perceptive of the users of the streetscape is important for a democratic streetscape planning process. According to Derkzen et al. (2017) the involvement of residents and citizens is essential in order to address the preferences and needs of people. Ahern (2013) also found that urban greening initiatives lack measurements and monitoring of the outcomes and ecosystem services they claim to provide. The evaluation of tools after the implementation process is important in order to say something about the success of the implementation (Juhola 2018).

### 5.3 What recommendations can be given to planners and urban practitioners on how to facilitate the implementation of green infrastructure in neighbourhood streetscapes?

Based on the discussion of the two previous research questions, there has been developed a few recommendations on how planners and urban practitioners can facilitate for green infrastructure in neighbourhood streetscapes. As discussed, the two cases investigated are subject to different planning systems which is found to have an important impact on the implementation of GI as well as the findings of this project. Because of this the findings are also context specific. However, the following recommendations will be based on leanings from the two cases in combination with learnings from the literature.

The recommendations are divided into recommendations considering more practical aspects of GI planning, and recommendations specifically looking at how GI tools and strategies can be designed to support GI implementation.

Recommendations for urban practitioners:

*1. Defining GI within the project* - establishing a common understanding, a set of goals and a plan for the GI between all the stakeholders involved in the streetscape planning is essential in order to promote a variety of ecosystem services. Creating a shared narrative between the stakeholders specifically aimed at the motivations for implementing GI in the streetscape is one way to approach this.

*2. Mapping the potentials for GI in the specific Neighbourhood* - technical, biophysical and institutional challenges regarding GI implementation is something that has to be accounted for before deciding to invest in GI. A local assessment can identify the relevance and effectiveness of GI and the potential services and functions provided in the given location (Madureira & Andersen 2014). Mapping the potentials is also necessary in order to create realistic expectations of what the GI can contribute to.

*3. Including residents and citizens in different stages of the GI planning process* - residents and citizens are the user of the streetscapes and should for that reason be actively involved in the planning. The implementation of GI in the neighbourhood streetscape can facilitate opportunities for participation and inclusion of community members in the planning of the area. Co-creation is a bottom up approach that gives residents the opportunity to develop a sense of ownership and place identity in their neighbourhoods. This is a way of facilitating for the social services of GI, which again can promote activity, walkability, and other types of use that supports health and social interaction between residents.

4. *Visible solutions* - The city can support the implementation of GI in neighbourhood streetscapes by taking use of greening tools, regulations and policies aimed at GI, but it is the responsibility of the developers and designers/architects to find the most efficient way of meeting these targets (Juhola 2018). This also means that the design of the streetscape and GI solutions is often left to the developers and architects/landscape architects. Visual solution in the streetscape is not only making the streetscape more aesthetically pleasing, it can also contribute to different recreational actives. Therefore, visible solutions can support the implementation of GI by creating greater acceptance and demand for GI from the perspective of the users of the streetscape.

Recommendations on how tools and strategies can be designed to support GI implementation on the neighbourhood scale:

*1. Flexible tools and strategies* - tools and strategies should have a flexible structure that makes it possible to adapt the tool or strategy to different spatial scales and contexts. It is also important that the tool or strategy is specific in what it is targeting and trying to achieve.

2. *Tools and strategies should aim to include a variety of stakeholders* - tools and strategies should be designed to ensure inclusion of stakeholders and especially users of the streetscapes. The perspective of residents and citizens is important when implementing GI, in order to create lively streetscapes that promotes activity and social interaction.

3. *Tools and strategies should address the financial implications of implementing GI* - the economic impacts of implementing GI are often neglected in tools and strategies aimed at supporting GI. Tools and strategies should be design to also address this challenge. The inclusion of financial incentives aimed at private developers can also be used as a tool for implementing GI when there is a lack of policies and regulations.

4. *Tools and strategies should invclude an integrated evaluation process* - tools and strategies should also include some sort of evaluation process that makes it possible to monitor the impact of the tool on the built environment. This also makes it possible to adjust and improve the tool or strategy.

## 5.4 Reflections

### 5.4.1 Significance of the findings

The findings from this project will hopefully be relevant and applicable to other GI cases at the neighbourhood scale, as it points at some general opportunities and challenges found in GI planning, independent of local circumstances. There is however limited transferability of the cases presented because of the biophysical and cultural difference which will always be unique to the specific case (Ahern et al. 2014).

The reason for choosing to not compare the two cases but rather discuss the learnings from each of them, is related to the fact that the Västra Hamnen neighbourhood is much further along in the development as this project was initiated more then 20 years ago. This means that planners and developers in this area have had more time to adjust their approaches to GI planning. Another reason is the different contexts of the two cases, meaning that they are subject to two different planning systems and cultures. This will naturally have a significant impact on the local planning and GI implementation. As discussed earlier in this chapter, it is acknowledged that polices have a stronger legal status than tools and strategies. The discussion of why GI seems to be prioritised differently in the two planning systems can be related to a number of factors such as political will and priorities implemented on the regional and national level. This discussion was however not in the scope of this project, and for that reason not prioritised. The connections between goals and priorities implemented on the city scale and the impact of these on the neighbourhood scale is however one of the important findings of the project.

### 5.4.2 Reflections on the research design and methodical approach

To approach the first research question it was decided to take use of the analytical framework «The expanded process model». This was found to be a practical approach to identifying opportunities and challenges of implementing GI in neighbourhood streetscapes. As the tool has a relatively “simple” structure it is also believed to be a good tool for urban practitioners who are trying to identify challenges before deciding to implement GI. The simple structure was also considered to be a strength of the analytical framework, as this quality makes it applicable to a variety of cases at different scales. Another strength of this framework is that it allows for the perspective of all the different stakeholders to be included.

A limitation of this framework is that it is not always possible to place a finding in only one category. For example, some factors can not be reduced to only be an enabling conditions, because it can also be a driver of change. This means that the actors can have several roles within the same process.

The choice of informants have also had an important role in shaping the findings from the process analysis. The selection of interviewees was meant to present the different stakeholders involved in streetscape and GI planning in the two cases. In the case of Malmö there was little response from the stakeholders approached. This created an imbalance of available data for the two cases. Because of this it was decided to supplement the interviews with information from urban development strategies and local plans. The inclusion of these documents was also found to be a strength as they served as a objective source of information in relation to the interviews.

In answering the second part of the research question a content analysis of municipal GI tools and strategies was conducted to assess the availability of tools addressing GI at the neighbourhood scale, and to see how these could have an impact on GI implementation in the streetscape. The analysis was based on two core principles of GI, multifunctionality and stakeholder inclusion. This approach was found useful in identifying the main focus of the initiatives as well as who the initiatives were meant to address. Additional GI-planning principles could have been included to provide a more detailed analysis of how the tools and strategies is supporting or constraining GI implementation at the neighbourhood scale.

A quantitative mapping of the GI in the two neighbourhoods could also have been an interesting contribution to the project. However, one significant and challenging aspect of this is that the Västra Hamnen development is much further along in the development phase, which also means that the urban nature in this area have had more time to develop and grow.

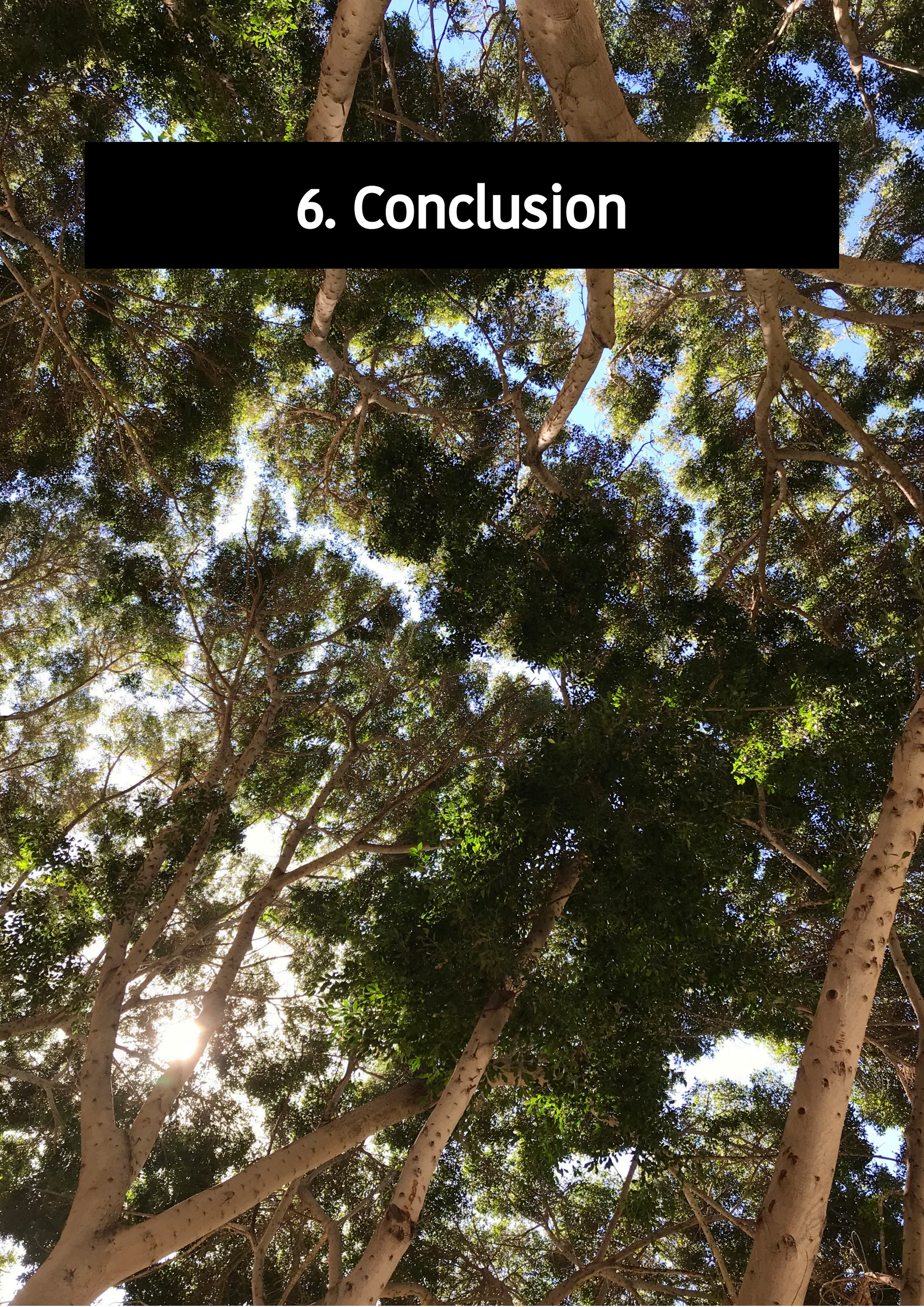
## 5.5 Limitations

Implementation of green infrastructure in neighbourhood streetscapes is a topic that includes a great variety of actors that are important to account for. The perspective of residents and users of the streetscape could have provided insight on how people experience GI in the streetscape and how they perceive the different services provided by GI. It could also have provided insight on how residents are being included in the planning of neighbourhood streetscapes.

### 5.6 Further research

Further research could look into how different actors such as developers and planning authorities are valuing and prioritising different ecosystem services when they are planning for GI in neighbourhoods streetscapes. This could be compared to data on how residents and users of the streetscape value different ecosystem services.

Further research could also look at the involvement of residents and users in streetscapes design and GI planning, and specifically how residents can contribute to address the challenges in streetscape planning, such as the battle of space.



# 6. Conclusion

## 6. Conclusion

Green infrastructure is widely recognised as an important planning tool and approach to challenges imposed on cites and urban areas by climate change and densification. Creating green neighbourhood streetscapes is one way to approach the present need for more urban nature in densely built areas. Green streetscapes are found to promote a variety of benefits addressing sustainability and resilience e.g. by contributing to biodiversity, improved air quality, and by promoting walkability, recreation and social interaction. From the GI literature it is however identified a number of physical and institutional challenges of GI implementation. The findings from this projects supports these findings and argues that many of the challenges identified for GI planning on the city scale are also relevant to cases on the neighbourhood scale. By doing so these findings also strengthen the argument for more research on how to overcome challenges and barriers of GI implementation in urban areas.

By looking at the two cases Nordhavnen and Västra Hamnen it was found that visions and goals implemented on the city scale had an significant impact on the GI planning also at the neighbourhood scale. Both Copenhagen and Malmö are cities that are branding themselves on being sustainable and climate friendly. Branding was also found to be an important motivation from the perspective of the developers. GI can be used as a tool in creating a visually appealing neighbourhood or as a way of signaling that sustainability is a priority. This can lead to increased attention and interest from citizens which again can have an impact on property values.

It was found that the power relations between the stakeholders in the planning regime is an important factor in GI planning at the neighbourhood scale. In the case of Västra Hamnen it was found that the municipality had a strong position in GI planning, which was reflected through the implementations of detailed plans including GI regulations, and through the development of tools ensuring quantity and quality of GI in private developments. The strong legislative power and priority of GI from the perspective of the municipality, also means that the main responsibility of the developers is to distribute and design the GI in a way that meets these requirements. In the case of Nordhavnen it was found that there are some regulations implemented by the municipality in regards to GI, but there is also a lot of responsibly and «freedom» left to the developers. This means that implementation of GI is relying on the developer to have an interest in GI in order to prioritise it in the planning. In the case of Nordhavnen the developer By&Havn made a urban strategy presenting goals for the new district, where GI is mentioned as an important topic. An ambitious strategy does however not have the same legislative power as a policy or local plan implemented by a planning authority. Ambiguity in defining the role of GI within the project was also found to the a constraining condition in the case of Nordhavnen, which can also help explain the discrepancy between the visions for the area and the current situation. The inclusion of stakeholders and especially residents in the case of neighbourhood streetscapes, is found to be a very important aspects because residents and citizens can functions as driver of change as well as co-creators in the design and planning process. This was found to be missing in both cases.

Assessing what impact GI tools and strategies have on implementation at the neighbourhood scale it was found that there is a limited availability of tools and strategies addressing GI at the neighbourhood scale. When assessing the topic of multifunctionality it was found to be a strong focus on the ecological aspects of GI. In the case of Copenhagen the focus on climate adaption was found to be especially important. The tools used in Västra Hamnen also had a strong focus on biodiversity. The economic impacts of these initiatives was not thoroughly accounted for, this is especially problematic considering the impact these tools can have on developers who have to implement GI as a part of their project.

The inclusion of stakeholder, and especially the involvement of citizens and residents was lacking in all the initiatives assessed. This was also supported by findings from the literature. This can be related to the fact that GI tools are often designed from the perspective of the planning authorities and aimed at developers. This leaves limited opportunities for the perspective of residents and citizens to be included in the use of the tool.

The recommendations developed was based on the discussion of the findings from the two cases as well as findings from the literature. The recommendations for urban practitioners included mapping the potentials of GI and defining one or more goals for the GI specified to the given location and the context. The active involvement of citizens in different GI planning process was also suggested as a collaborative planning approach to cope with some of the challenges of GI implementation. Finally prioritizing visible solutions was suggested as a way of contributing to the perception and experience of the streetscape as well as facilitating for social ecosystem services and receiving support from resident and citizens. Regarding the design of GI tools and strategies it was recommended that the tools should be developed to have a flexible structure that can be adapted to different contexts and to cases of different scales. Tools should also aim to include the perspectives of different stakeholders such a residents, and they should address the financial implications of GI implementation. Finally the tools should include some sort of evaluation process in order to assess and monitor the impact and efficiency of the tools.

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# Appendix

# Appendix I : Interview Guides

# 1. Jane Hegner Mortensen, Project manager at By&Havn

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do developers understand the concept of GI? Is it considered a technical solution to a environmental issue or as a planning approach? Different stakeholders might have different perceptions of GI. Is there established a common understanding of the meaning of GI between the stakeholder in the specific project? | Different understandings of GI between developers and other stakeholder can lead to different expectations or lack of a common understanding. This can lead to a result were one part have more influence in the decision making. | How is the concept of GI understood? How do you understand the concept of GI in ration to the Nordhavn development? |
| What are the motivations for implementing green infrastructure in the public area/streetscapes in the neighborhoods? | It is necessary to identify the problems, motivations and reasons for choosing to integrate GI in a project. | What is the motivation/purpose or reason for introducing green infrastructure to the neighborhood streetscape? |
| Is the GI planning including all stakeholders or is it primarily a dialogue between «experts» such as planners and designers/ architects? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Was the residents included or involved in the planning of the GI in the streetscape? If so, in what ways? |
| Are the residents involved in the maintenance of the streetscape?<br><br>Is the GI being utilized as a measure for creating communication and interaction between the residents?<br><br>Are there established any forms of communication between the residents on the use of the streetscape? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Who are responsible of maintenance of the GI in the streetscape?<br><br>Are the residents involved in the maintenance of the GI and/or other features in the streetscape/?<br><br>Do you know if there is established some sort of communication between the residents in regards to use of the streetscape? |
| Is the streetscape designed to facilitated and support the implementation of GI?<br><br>Is the streetscape designed for different types of activities, and is GI a part of this design? | The design of the streetscape have an important impact on the choice of GI solutions in the streetscape. Innovative design and spaces for walking, activity and recreation in the streetscape can facilitate for GI. | What sort of activities is the streetscape designed for?<br><br>(is it primarily planned for walkability or vehicles?) |
| What types of activities are finding place in the streetscape? | Little activity or only one type of use could be an indicator that the streetscape is not facilitating different activities or that the streetscape is not perceived as attractive by the users. Many people and different types of use could indicate that the streetscape is perceived as interesting and attractive. | What sort of activities is the streetscape used for? |

# 2. Lise Palm, Project manager at the planning department, By&Havn

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do developers understand the concept of GI? Is it considered a technical solution to a environmental issue or as a planning approach? Different stakeholders might have different perceptions of GI. Is there established a common understanding of the meaning of GI between the stakeholder in the specific project? | Different understandings of GI between developers and other stakeholder can lead to different expectations or lack of a common understanding. This can lead to a result were one part have more influence in the decision making. | How is the concept of GI understood?<br><br>How do you understand the concept of GI in relation to the Nordhavn development? |
| Who is making the decision in regards to green infrastructure in the streetscape? | Knowing who has the power to influence the implementation of green infrastructure is important when trying to understand the challenges of implementation | As a developer in this area what role do By&Havn have in regards to facilitating and planning for the green infrastructure? How much is already decided by policies and regulations? |
| What priority is GI given in relation to other priorities, goals or challenges connected to the under development project | As one of the stakeholders in this process it in necessary to understand how the developers prioritize GI, and what impact this have on the implementation | What priority was green infrastructure given in the design and planning process of the neighbourhood? |
| What are the motivations for implementing green infrastructure in the public area/streetscapes in the neighborhoods? | It is necessary to identify the problems, motivations and reasons for choosing to integrate GI in the project | What is the motivation/purpose or reason for introducing green infrastructure to the neighborhood streetscape? |
| What are the challenges and barriers of implementing GI, e.g. policy and regulations, cost? | Identifying barriers and challenges of GI implementation. | What are the major challenges of introducing GI to the neighborhood? |
| Depending on how involved the residents and users have been in the planning process, what are there feelings about the GI? | GI is a micro-scale element that has an impact on the experience of the streetscape. GI contributes to the experience of the streetscape. | Has there been any response from residents after in regards to the GI? e.g. is it too much or too little? |
| Was all stakeholders involved in the planning of the streetscape design? including the users of the streetscape and residents? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Was the future residents and users of the area involved in the design process of the streetscape or regarding the use of GI? If so, in what ways? |

# 3. Rune Boserup, Project manager for Nordhavn COBE architects

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do developers understand the concept of GI? Is it considered a technical solution to a environmental issue or as a planning approach? Different stakeholders might have different perceptions of GI. Is there established a common understanding of the meaning of GI between the stakeholder in the specific project? | Different understandings of GI between developers and other stakeholder can lead to different expectations or lack of a common understanding. This can lead to a result were one part have more influence in the decision making. | How is the concept of GI understood?<br><br>How do you understand the concept of GI in relation to the Nordhavn development? |
| What is the reason for the discrepancy between the visions for the development/the plans and the final result regarding GI in Nordhavn? | Understanding why the original plans and visions are not being realized is important in order to analyse challenges and barriers for implementing green infrastructure. | Being a blue and green neighborhood was one of the visions for Nordhavnen according to the plans. The blue elements are difficult to avoid, because it was already there. How did you incorporate this green vision in the design and planning of the area? |
| What is the reason for the discrepancy between the visions for the development/the plans and the final result regarding GI in Nordhavn? | Understanding why the original plans and visions are not being realized is important in order to analyse challenges and barriers for implementing green infrastructure. | According to the illustrations and the plans there is a lot more green infrastructure then in the reality, and the municipality gave the neighborhood a score of 3 (average, meets all necessary requirements) on their sustainability assessment regarding green and blue infrastructure. Why is there not more GI if this was a part of the plan and vision for the ara? |
| How did the vision of the architects and designers influence the implementation of green infrastructure? Was GI a part of their vision as well? | As one of the stakeholders in this process it is necessary to understand how the architects influence the implementation of GI. | What priority was green infrastructure given in the design and planning process? |
| Who is making the decision in regards to green infrastructure in the streetscape? | Knowing who has the power to influence the implementation of green infrastructure is important when understanding why | As the architects of this area what role did you have in regards to facilitating and planning for the green infrastructure? How much is already decided by policies and regulations? |
| Depending on how involved the residents and users have been in the planning process, what are there feelings about the GI? | GI is a micro-scale element that has an impact on the experience of the streetscape. GI contributes to the experience of the streetscape. | Has there been any response from residents after the planning and construction phase in regards to the GI? e.g. is it too much or too little? |

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| What are the motivations for implementing green infrastructure in the public area/streetscapes in the neighborhoods? | It is necessary to identify the problems, motivations and reasons for choosing to integrate GI in the project | What is the motivation/purpose or reason for introducing green infrastructure to the neighborhood streetscape? |
| What ecosystem services are provided, if any? In what ways does the GI make the neighborhood a better way? what is the GI providing to the neighborhood? | what value does GI have in the neighborhoods, why is that or why not? | What function does the green infrastructure in the Århusgade Quarter have? e.g. climate adaptation, increased biodiversity? |
| What are the challenges and barriers of implementing GI, e.g. policy and regulations, cost? | Identifying barriers and challenges can help explain the discrepancy between the plans and the outcome | What is the major challenges of implementing green infrasttrucre in Nordhavnen? |
| Is the streetscape designed to facilitated and support the implementation of GI?<br><br>Is the streetscape designed for different types of activities, and is GI a part of this design? | The design of the streetscape have an important impact on the choice of GI solutions in the streetscape. Innovative design and spaces for walking, activity and recreation in the streetscape can facilitate for GI. | What sort of activities is the streetscape designed for?<br><br>(is it primarily planned for walkability or vehicles?) |
| Was all stakeholders involved in the planning of the streetscape design? including the users of the streetscape and residents? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Was the future residents and users of the area involved in the design process of the streetscape or regarding the use of GI? If so, in what ways? |

# 4. Sabine Sørensen, Project leader at Miljøpunkt inner city and Christianshavn

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do developers understand the concept of GI? Is it considered a technical solution to a environmental issue or as a planning approach? Different stakeholders might have different perceptions of GI. Is there established a common understanding of the meaning of GI between the stakeholder in the specific project? | Different understandings of GI between developers and other stakeholder can lead to different expectations or lack of a common understanding. This can lead to a result were one part have more influence in the decision making. | How is the concept of GI understood?<br><br>How do you understand the concept of GI in relation to the Nordhavn development? |
| Who is making the decision in regards to green infrastructure in the streetscape? | Knowing who has the power to influence the implementation of green infrastructure is important when trying to understand the challenges of implementation | As a developer in this area what role do By&Havn have in regards to facilitating and planning for the green infrastructure? How much is already decided by policies and regulations? |
| What priority is GI given in relation to other priorities, goals or challenges connected to the under development project | As one of the stakeholders in this process it in necessary to understand how the developers prioritize GI, and what impact this have on the implementation | What priority was green infrastructure given in the design and planning process of the neighbourhood? |
| What are the motivations for implementing green infrastructure in the public area/streetscapes in the neighborhoods? | It is necessary to identify the problems, motivations and reasons for choosing to integrate GI in the project | What is the motivation/purpose or reason for introducing green infrastructure to the neighborhood streetscape? |
| What are the challenges and barriers of implementing GI, e.g. policy and regulations, cost? | Identifying barriers and challenges of GI implementation. | What are the major challenges of introducing GI to the neighborhood? |
| Depending on how involved the residents and users have been in the planning process, what are there feelings about the GI? | Important to understand how GI contributes to the experience of the streetscape. | Has there been any response from residents after in regards to the GI? e.g. is it too much or too little? |
| Was all stakeholders involved in the planning of the streetscape design? including the users of the streetscape and residents? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Was the future residents and users of the area involved in the design process of the streetscape or regarding the use of GI? If so, in what ways? |

# 5. Ewa Sundström, Landscape architect at the planning department City of Malmö

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do developers understand the concept of GI? Is it considered a technical solution to a environmental issue or as a planning approach? Different stakeholders might have different perceptions of GI. Is there established a common understanding of the meaning of GI between the stakeholder in the specific project? | Different understandings of GI between developers and other stakeholder can lead to different expectations or lack of a common understanding. This can lead to a result were one part have more influence in the decision making. | How is the concept of GI understood?<br><br>How do you understand the concept of GI in relation to the Nordhavn development? |
| Who is making the decision in regards to green infrastructure in the streetscape? | Knowing who has the power to influence the implementation of green infrastructure is important when trying to understand the challenges of implementation | As a developer in this area what role do By&Havn have in regards to facilitating and planning for the green infrastructure? How much is already decided by policies and regulations? |
| What priority is GI given in relation to other priorities, goals or challenges connected to the under development project | As one of the stakeholders in this process it in necessary to understand how the developers prioritize GI, and what impact this have on the implementation | What priority was green infrastructure given in the design and planning process of the neighbourhood? |
| What are the motivations for implementing green infrastructure in the public area/streetscapes in the neighborhoods? | It is necessary to identify the problems, motivations and reasons for choosing to integrate GI in the project | What is the motivation/purpose or reason for introducing green infrastructure to the neighborhood streetscape? |
| What are the challenges and barriers of implementing GI, e.g. policy and regulations, cost? | Identifying barriers and challenges of GI implementation. | What are the major challenges of introducing GI to the neighborhood? |
| Depending on how involved the residents and users have been in the planning process, what are there feelings about the GI? | Important to understand how GI contributes to the experience of the streetscape. | Has there been any response from residents after in regards to the GI? e.g. is it too much or too little? |
| Was all stakeholders involved in the planning of the streetscape design? including the users of the streetscape and residents? | The involvement of a variety of stakeholders is an important principal in GI-planning. Inclusion of residents and «users» of the area is an important aspect of GI-planning. | Was the future residents and users of the area involved in the design process of the streetscape or regarding the use of GI? If so, in what ways? |

# 6. Natalie Gulsrud, Associate professor at University of Copenhagen (green infrastructure expert)

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| How do different stakeholders understand the concept of GI. Is it considered a solution to a environmental issue or as a climate adaptation measure or more as a planning strategy? different stakeholders might have different perceptions of GI and how and for what purposes it is being implemented. Is this communicated during the planning? is there established a common understanding of the meaning of GI between the stakeholder? | Different understandings of GI between developers and other stakeholder can lead to different expectations or different no common understanding of GI can lead to a result were one part have more influence, or where noe parts are informed enough. This will lead to uneven distribution of the GI benefits, or minimal utilization of the benefits. | How do you understand the concept of GI? |
| What is the reason for the discrepancy between the visions for the development/ the plans and the final result? | Understanding why the original plans and visions are not being realized is important in order to analyse challenges and barriers for implementing green infrastructure. | I am looking at Västra Hamnen in Malmö and Nordhavnen in Copenhagen, which are two masterplanned developments that are both aiming to be green and blue neighborhoods.<br><br>In Nordhavnen there is a discrepancy between the vision presented and the actual results, what could be the reasons for this?<br><br>Is it a problem that GI can be understood and interpreted in different ways, e.g between stakeholders in one project? |
| What are the challenges and barriers of implementing GI, e.g. policy and regulations, cost? | Identifying barriers and challenges can help explain the discrepancy between the plans and the outcome<br><br>Identifying challenges of GI implementation in neighbourhood streetscapes | What do you think is the challenge of implementing green infrastructure in new developments in Copenhagen? And why is that?<br><br>On a more general basis what is the most challenging part of implementing GI in neighborhood streetscapes? e.g. maintenance or cost of implementation? policies regulations? |

| What do I want to know? | Why do I want to know this? | Question |
|---|---|---|
| Who has the power when it comes to implementing GI in neighborhood streetscapes in Copenhagen?<br><br>e.g. how is this beneficial or damaging for the implementation of GI? | Understanding the power and role of different stakeholders is important in order to assess how these relations influence the implementation of GI. | Who has the power when it comes to implementing GI in neighborhood streetscapes in Copenhagen?<br><br>e.g. how is this beneficial or damaging for the implementation of GI? |
| What are the motivations for implementing green infrastructure in neighbourhood streetscapes? | It is necessary to identify the problems, motivations and reasons for wanting to integrate GI in a project | What are the motivations for implementing GI in neighborhood streetscapes?<br><br>From the municipality perspective?<br><br>From the developers perspective? |

# Appendix II : Transcribed and Coded Interviews



## Codes

Initial conditions - reasons, problems and motivations that creates a demand for green infrastructure

Drivers of change - the actors and/or tools that initiates the implementation

Constraining conditions - challenges and barriers that makes the implementation more complicated

Enabling conditions - tools, strategies, technical solutions that supports the implementation

# 1. Jane Hegner Mortensen, Project manager at By&Havn

1. What sort of activities is the streetscape designed for? (e.g. is it primarily planned for walking for transport or does it promote other activities as well?)

When we plan our areas we do it in corporation with the municipality of Copenhagen, because they have the local plan, we have to follow them. They have these practical measures of how wide a sidewalk should be, and the bicyclelanecs and the streets. We are looking very much into how tall we are building buildings in the context of how wide the streets are so we don't get to much shady urban areas. We are obliged to making sure that green mobility, whether it is pedestrians or bicycles are having good circumstances and we are also looking into having shared spaces like «Hydlebroplads» in Århusgade kvarter were there are no marked streets or marked lanes, but it is a shares space were you as a car driver have to slow down because you cant really see either were the bicycles or the pedestrians are walking.

2. What sort of activities is the streetscape used for? are people actually using these shared spaces?

If you go out in Århusgade kvarterert and have a look at Sandkaj, there are very many people. Last summer when we had this really great summer, it was around 2000 people just on the boardwalk, because it is also a swimming area, so it was very very attractive to be there. Hopefully this summer we are going to introduce a self driving mini shuttle in the area. We have some issues with it because it is self driving, it is driving on a particular route and it can not drive any other way, and if there are people in the streets or illegal parked cars it can not drive around it, because it stops whenever there is an obstacle on the route. We are very excited to see how this project is going to succeed because there are so many people in the area. It is for free for the first year (showing the route of the mini shuttle, the bus will also go in between the resident area). In Sandkaj, there is no difference between pedestrian, bicycles and cars,  it is just shared space.

3. What was the motivation for introducing green infrastructure in the neighborhood streetscape?

Well, in our corporation with the municipality of Copenhagen we are obliged to look at the CO2 carbon emission. Because in the climate plan for 2025 in Copenhagen we are going to be CO2 neutral, and of course we have to be looking at green mobility and smart intelligent green mobility. We are partners in a project called Energy lab Nordhaven, we we are testing DC and AC charging of electrical cars in our parking house. It is a test project, and we get out the data for the users of these chargers, so that we can see whether... some of the parking places are just for shared cars like «drive now» and «green mobility», and some of the parking are just for privately owned electrical cars and some of the parking are for quick charger which means that you drive your electrical car to the AC charger, you plug it in and within 10-15 you will have a fully charged car. And those different ways of charing, we are getting out data to see how are they being use and who are using them at which hours, so that we in the future we can design our parking houses with the right amount of DC chargers in our parking house. But it is focusers to reduce co2 but is has to be smart and it has to be efficient.

Q: So it is primarily for the environmental benefits?
Also the aspect of... of course this is the electrical cars but by supporting pedestrians and bicycles we are all looking into health. With this self driving shuttle we are also looking at the social sustainability for these communities. Communities that occur for these room form 20 people in the shuttle. So we are also trying to analyze how these people are getting together in these shuttles because they don't have to concentration on driving or anything. they can just be a part of this social interaction with people and also experiencing this bus. so this is a part of the project, looking into these communities that occurs when you are airing this bus. But, health, CO2 and the social...

4. Was the residents included or involved in the planning of the green infrastructure or of the streetscape in general? If so, in what ways? (e.g. were they informed about how the end result would be, or were they asked about suggestions and ideas for the design of the streetscape?)

it is difficult to involve them in like the measures of the street and the roads, but we are inviting... we are hoping to get some ambassadors for these projects so that we can point out certain target groups and have like... is it for kids getting from home to sporting activities, is it for elderly people who have some difficulties walking or is it for a young mom having here groceries transport. And we are introducing this project hopefully next months so that the residents can come an see the shuttle, and open the doors and go in. And if they would like it, we would like them to be ambassadors for this project so we could interview them about the project, and ask them what is the use of this bus, what are the worries. So we are trying to involve people in it, because it has been many concerns. Is it going to be safe? is it going to drive in to people? So we are trying to involve people, we are also introducing the project on these huge neighborhood meetings that occur... that we plan two meeting a year, were we introduce them to this project, and to the energy Lab Nordhavnen project. And we ask them how do you live in your areas? Is everything ok in that matter. Last summer, when we had many warm summer day, and there were a lot of people in the area some of the residents experienced noise at night, and we had to really speed up on our maintenance because the garbaged was everywhere in the street.

6 I am also thinking of the use of micro-scale elements in the streetscape, e.g. the use of trees and benches? design measures.

I do not know it they have a saying, but we are trying to... well of course it is the municipality that is making the frames for how many benches and how many trees there has to be. They have a high rate of especially trees, and we have to get as many as possible in our areas. It is always a struggle of place, because everyone wants to use these urban areas for something. So we have to make sure there are bicycle parking, trees, benches, city lights, all these things that we have to squees in to this quite small place. It is very dense, high density.

7. Do you know if there is established some sort of communication between the residents in regards to use of the streetscape? (e.g. do they have a neighborhood association?)

Yes, we have an «open window» called «spørbrisa?» which is a .. you can always wright an email to «spørbrisa) where you can say that your are experiencing this as an issue. And then By&Havn are planning a different event in the area. We have sustainable weekend on the 25 of may. And I know that the residents are having community dinners were they eat together on Wednesday. We are trying to support all these activities by being as open as possible, and being as communicative as possible and inviting people to come and give their opinion. We establish this, for instance the ... at the rooftop of the parking house. e.g. we had to close it a ten at night (because young people were having parties up there). We are trying to be open and hearing what the residents are saying. It is mostly those that are not happy that are communicating.

# 2. Lise Palm, Project manager at the planning department, By&Havn

1. Hvordan forstår du konseptet grønn infrastruktur, f.eks i forbindelse med nordhavnen? hvordan forstår du begrepet grønn infrastruktur i denne sammenhengen?

Med grønn infrastruktur så tenker jeg umiddelbart som noe med har med elbiler, noe som er grønt energimessig. Hvis jeg ikke visste at det var dette vi skulle snakke om så ville jeg tenkt grønn infrastruktur som noe med grønn energi og bæredyktig offentlig transport. Men en grønn infrastruktur som et strukturerende byplanleggings-verktøy da tenker jeg det er et element ut av flere, fordi i et byområde så er det en rekke med behov som skal oppfylles så vi kan ikke kun ta utgangspunkt i at det skal være landskap når det skal være by og det skal leve mennesker og det skal fungere. Men det kan være et bærende element i forhold til at man som beboer også skal ha god adgang til grønt og landskap. Igjen, Amager Fælled prosjektet jeg jobber med så er det jo det som blir bærende i vår konkurranse, at man skal leve i pakt med den naturen som omgir en, fordi det er så avgjørende element.

Der er det avgjørende at det grønne blir et viktig element, hvis man skal utvikle et sted på Øst-amager så vil det også bety noe for stedet at det er en grønn struktur, men det vil ikke være så bærende. Men hva man man få innført av grønt i dette området, så det er en del av stedets premisser, en del av lesningen av steder. Men det har helt sikkert blitt et større issue nå er det var for få år siden. Det blir noe vi kommer til å ta med.

2. I planene for Nordhavnen kommer det frem at dere har en strategi om å være et (blå)grønt byområde/ nabolag?

Det er to ting som har styrt utviklingen i Nordhavnen markant. Først og fremst selve masterplanen og konkurransen fra 2009, som jo handler om, det man skal være oppmerksomhet i Nordhavnen, så tenker man hele Nordhavnen. Strukturplanen som skal være det styrende for hele utviklingen. I konkurransen ba vi om en strukturplan, så vi hadde en overordnet ide om å kjøre etter. Så bad vi også om en strategi for den indre del, som er den urbane del i Nordhavnen. Den del er den tette og den hvor den grønne struktur er ytterst begrenset i forhold til de mindre plasser og byrom der er i området. Så strategien er å starte med en tett og urban del her, også etterhvert så blir areal grønnere og grønnere. Så med en blanding av det blå og det grønne, så blir de større sammenhengende arealene lenge og lenger ut. Så det vi ser i Århusgade kvarteret er den urbane delen. Så det er den overordnede strategien for område og for bebyggelsens tetthet. Den overordnede struktur, tett, urbant innerst og mer sammenhengende grønne arealer jo lenger man kommer ut, sammen med en blå struktur som vi jo også oppfatter som rekreativt areal. Så det ene er masterplanen og konkurransen og så er det andre styrende redskap er lokalplanen og dens bestemmelser om all utforming av både bebyggelse og plasser. det er jo den som binner oss kan man si, man har en strategi og en struktur og så blir lokalplanen brukt til prinsipper for hvordan man bearbeider prosjektet. Tettheten i Århudgade kvarteret, begrenser jo hvor mange stor grønne sammenhengende areal. De kommer først i neste del, når containerterminalen flytter ut og Levantkaj blir aktivert med de grønne parkrom og skutehavnen som er der i dag. Men lokalplanen fastlegger noen begrensinger eller krav til hva det skal være. Virkeligheten når man utvikler et byområde som er så tett som dette, er at det ligger mye i jorden under terrenget som styrer f.eks hvor det kan være trær. Det har faktisk vist seg i de tette byrom å være vanskelig å etablere trær mange steder fordi det er ledninger, varme, vannforsyning, kloakk og avstanden til de som gjør det vanskelige å få trær i stredene/gatene. Det som ligger i planen er enkelte trær i stredene mellom byggefeltene, og eller beplantning som en del av... markante plasser. Det er det som styrer hvor mye vi kan plante. Vi mangler fremdeles noen av plassene, dette betyr noe for det grønne inntrykket. Det blir en plass her med gress og sti og forskjellige fargede planter. Vi hadde opprinnelig en plan om at dette (peker på illustrasjon) skulle være mer et vannelement, det har vi endret til at skal være beplanting. Fordi det er en etterspørsel etter noe grønt der ute.

Er det beboerne i området rundt som etterspør mer grønt?

Ja, de vil gjerne ha mer grønt. Og når man er der ute i dag, så er det ikke så mye grønt, men det dels fordi det er så tett og del fordi de steder der det skal komme grønt har vi ikke fått anlagt enda, fordi det er byggeplass. Men det er jo noen begrensede arealer, det er ikke noen fotballbaner osv. Gårdrommene/bakgårdene styrer de jo selv til en viss grad, det er beplantning her nede i flexsonene. Alle gatene og stredene skifter med noen flexzoner hvor det er sykkelparkering, bilparkering og noen felter med beplantning enkelte steder. Det er den begrønningen som er. Den overordnede grønne strategi gjør at man må vente på noen større sammenhengende grønne areal. Her ute blir det jo en stor park på 24 hektar (peker på kart).

Hvordan er det for eksempel med grønne tak og vegger?

Jo, det er krav i lokalplanen om grønne tak, så i det omfang det ikke er takterasser. Så det er det i området. Når det er så tett i bykvarteret som det er, så har vi i By&Havn stilt krav om at det skal være 25% skal være felles takterrasse. Minimum 25% skal være felles takterrasse, det kan jo godt kombineres med noe grønt. Det er taktereasser og det er grønne tak, og så er det jo mange steder der er bygningsreglementet har blitt skjerpet, så da er det behov for å supplere med solceller. Så det er mange steder med solceller. Men det er riktig at det er krav om grønne tak, det er prosjekter.... det er flere steder hvor det er klarteplanter (grønn bekledning) men det er ikke satt krav om at det skal være grønne fasader. Det er noen som selv har foreslått og ønsket det, men som såden er det ikke krav om det. Det er strategiene hvis man kan se det sånn, men som sagt så betrakter vi betrakter vi de grønne trekk og elementer som er tenkt ut fra den store planenen sammen med en blå struktur som vi også mener har en vesentlig rekreativ verdi for området.

ved Sundmolen ønsker man å få noen sammenhengende grønne områder, som også har noe le. For det er et havneområde og det blåser og det er ikke nødvendigvis å få.. det er selvfølgelig noen trær som tåler et robust klima og det er også dem vi har gått etter her nede, men her har vi lagt det grønne forløp, som et sammenhengende forløp midt på Sundmolen for å gi det del en viss volum og større sammenheng. Og et mer mikro-klimatisk behagelig klima, så har vi lagt det her inne, og havnepromenade langs sydsiden med noen plasser hvor man kommer tettere på vannet.

3. Hva er motivasjonene for å implementere grønn infrastrukturen? årsaken(e)?

Rekreasjon er viktig. Biodiversitet er kommet inn fra sidelinjen. Da vi lagde planene for 10 år siden var biodiversitet ikke overskriften, på den måte endrer det seg også etter tid. Hver gang vi lager et nytt byrom, hver gang vi får en... Jeg vil si at vi i By&Havn står for å anlegge all infrastruktur, også plasser, byrom, parker osv og så er det opp til grunneierforeningene å drifte. Så vi anlegger, og hver gang vi starter på nytt byrom så er mantraet at vi skal gjøre det så grønt som vi kan gjøre det og det er noe som er kommet litt etter. Fordi det er en helt annen etterspørsel etter grønt, og også sammenhengende grønt det er liksom blitt det neste. Før var det så grønt som mulig, nå er det sammenhengende grønt som er viktig fordi det gir noen andre muligheter for å opprettholde et økosystem med flere forskjellige arter og typer osv, insekter og planter. Så jeg tror våres motivasjon når vi anlegger er å understøtte den etterspørselen og det behovet det er for grønt. Nå er det jo tette byområder, så det blir ikke de store sammenhengende byområder og grønne areal, men jeg tror hele det er der med å arbeide med grønne strukturer det er noe av det vi har fokus på i de neste delene og i de andre byområdene vi arbeider, hvordan kan vi kanskje ta mer utgangspunkt i en grønn struktur enn i en bystruktur. Hva er det for en grønn struktur det skal være? alt ettersom hvor i byen det er. Så på den måten skifter fokus i byplanleggingen.. tiden til å utvikle er så, det er 10 år siden vi lage strukturplanen og masterplanen eller strategiplanen for den indre delen, og bare i den perioden, man kan si at den er jo i prinsippet robust fordi den har noen helt overordnede strategier med å dele opp i mindre kvarterer og utvikle litt av gangen osv. Så kan man godt ta forskjellige temaer inn etter hvert som man utvikler. Men ellers så er det jo sånn at det går 10 år før det begynner å bli virkelighet, så på en måte er selve planene litt bakut (utdatert) i forhold til de behovene som oppstår. Prinsipper og strukturer som kan absorbere det man etterspør, det tror jeg er viktig. Det er hvertfall noe vi har erfart i byplanleggingen at det er vesentlig at man ikke legger seg så fast på en fast struktur, som gjør at man ikke kan arbeide litt mer fritt med det. Byggefeltene er jo prinsipper som man kan arbeide med, skal det være et mer sammenhengende område så lager man mer grønt areal for eksempel.

4. Er det fokus på klimatilpasning i dette området?

I utgangspunktet når det har vært krav om grønne tak, så er det meget, det er også symbolpolitikk fordi i virkeligheten her hvor det ligger ved vannet så er klimaproblemer ikke så stort, det regnet som faller det går ut i havnen men eller så det jo et symbol i forhold til forsinkelse og fordampning, og varme og isolering. Det kan godt være det ikke har samme stormflo/klima betydning, men som et bæredyktig kvarter, altså hele Co2 regnskapet da er det jo på plussiden. Så jeg tror det er utrolig viktig å ha det grønne og de grønne takene er også pene å se på når man kommer opp i høyden og kikker på hverandres tak.

Er det også brukt som et markedsføringsverktøy?

Ja, jeg tror det er viktig. Det er viktig som branding. Man kan ikke kalle dette et bæredyktig bydel og så ikke ha grønne tak. Det er et tydelig signal, så det syns jeg er utrolig viktig. Ofte er det jo en diskusjon, er det grønt nok? man da må ja jo se på det større området, f.eks når vi får Levantkaj.

5. Hva er de største utfordringene knyttet til å implementere grønn infrastruktur i Nordhavnen?

Noen av de store utfordringene er at det skal være plass til alt, det skal være plass til hele forsyningsdelen og det kommer ofte som en overraskelse. At forsyningene tar så mye plass under bakken. Nå er det tette byggefelt med små streder/gater, det er en tett massiv struktur og det er kanskje bærekraftig på andre måter, at man har optimert arealet og bruker det effektivt. Om man hadde hatt en 5 meter bred gate, eller 8 meter så kunne man hatt en rekke med trær eller beplantning så det er et valg mellom hva som skal prioriteres. Ikke at det nødvendigvis betyr grønt eller ikke grønt, men i det omfanget man kan få grønt inn, så er det helt klart det vi gjør nå. Det hadde ikke samme fokus da vi startet, så det kan godt være vi har tenkt noen ting annerledes men jeg syns vi har forsøkt på de premissene som er, å få grønt inn i plasser og byrom også så langt det er mulig inn i stredene og gatene. Og felter med grønt, og grønne tak. Man kunne ha arbeidet mer med grønt på fasader, eller vi kunne ha etterspurt det. Med utfordringene mener jeg er prioriteringene, det er et tett byrom hvor forsyningene fyller riktig mye, det betyr noe for trærne, man kan selvfølgelig god ha noen grønne planter og busker ovenpå. Forsyninger og tettheten.

6. Hvilken betydning tror du den grønne infrastukturen har for opplevelsen av gatelandskapet?

Jeg tror at det grønne, f.eks de trærne som er her nede, jeg tror de er med på skape en skala sånn i forhold til meg, til begyggelse og til landskap. Også tror jeg de gir noe i forhold til at det føles fint, også i forhold til vind og mikroklima. Nå er det relativt små trær enda, de kan jo virke både dårlig og godt, men som oftest så er det godt for vind osv. Jeg tror at det er elt klart på plussiden å få så mye grønt så mulig.

7. Har fremtidige beboere vært involvert i planleggingen av gatelandskapet, e.g. med tanke på grønn infrastuktur?

Innen vi lagde konkurransen i 2009 holdt vi to borgermøter, to åpne borgermøter hvor det var flere hundre deltakere. Det var jo ikke noen beboere på det tidspunktet, så det var åpne borgermøter hvor vi inviterte inn Københavnere for å diskutere. Det svarer jo til en dansk provinsby. Hva for noen elementer skal man arbeide med hvis man tenker på bæredyktighet, det var det ene temaet. Det andre temaet handlet om bylivet, hvis man skal lage et nytt byområde med aktivt byliv, hva er det for noen elementer man kan innarbeide, samtidig med... det var jo ingen premisser at det hele bare skulle være til rekreasjon, men at det er et nytt byområde en ny provinsby, så man kan si at da inviterte vi borgere inn til å delta å komme med innputt til konkurransen. Så i selve konkurranseprogrammet ble det lansert som en ny bæredytkig bydel, og det er også det vi arbeider med, med bæredyktighet på mange forskjellige parameter. Men, nå som det er flyttet 3000-4000 i området, så holder vi nå noen halvårige beboermøter hvor vi inviterer folk inn til informasjon men vi inviterer også sånn særlige aktive grupper. det er særlig i forbindelse med å etablere noe foreningsliv i området. I dette området (peker på kart) skal det være en vannrelatert funksjon, der lager vi en prosess med borgere der ute med hva er det for noen aktiviteter man som beboer i området gjerne vil ha, sånn i et vannrom. dette steder handler mye om vann. Vi skal innen ikke så lang tid, utvikle dette området (peker på kart) og da vil vi invitere borgergrupper. Nå som det er beboere der ute, og det er aktive beboere så er det jo noe man kan.. sette i gang borgerprosesser. Så holder halvårige alminnelige informasjonsmøter, om hva holder vi på med? hva skjer? osv. de kan stille spørsmål, så setter vi igang aktiviteter noen steder.

9. Tror du det ville ha vært mer grønn infrastruktur om det var mer reguleringer og krav om det fra kommunen sin side?

Hvis det hadde vært krav så forsøker man nok å prioritere fordi det er jo mye det det handler om. Hvis det hadde vært krav om 50% at alle plasser skulle vært grønne, så måtte man jo ha prioritert det. Det ser vi jo i noen lokalplaner nå, der er det hvor mange antall trær man skal plante, og det er også krav om hvor mye av overflaten som skal være grønt eller gress eller blomsterbed eller hva det måtte være. Det arbeider man med fra kommunens side, etter de har laget strategi for begrønning og begrønningsverktøy og sånn trepolitikk. Da ser vi mer presise krav i lokalplaner om hva som skal være av grønt. Det som er vanskelig så er noen ganger så er stedet ikke undersøkt godt nok, f.eks. spissen av Sundmolen her ute, vi vet faktisk ikke hvor mye som er under jorden av gamle fundamenter osv og forsyninger som sagt som kan gjøre det vanskelig å få på plass nok trær. Men jeg tror at det vil bli prioritert når det er et krav, så blir det man velger fremfor andre aktiviteter fremfor andre som kanskje også kan gi noe kvaliteter til stedet, f.eks. slepesteder til båter eller en lekeplass med noen aktiviteter. Så det vil være en prioritering, især når man arbeider med så tette områder som her. Men hvis det er det grønne man vil prioritere så er det jo helt sikkert en vei frem å kreve det.

# 3. Rune Boserup, Project manager for Nordhavn COBE architects

1. I planene for Nordhavnen er det presentert noen visjoner. Blant annet en visjon om å være et blågrønt nabolag. De blå elementene kan man ikke unngå, men jeg lurer på hvordan dere inkluderte denne visjonen om å være et grønt nabolag i planleggingen? Med tanke på denne visjonen, synes du selv det er nok GI?

Helt grunnleggende så kan man si at Nordhavnen er rett stor, på størrelse med hele Københavns indre by. Hovedideen er at det skal være mest urban tett på København, så blir det mer og mer grønt jo lenger man kommer ut nord. En annen hoved ide er at man inndeler bydel inn i forskjellige holmer eller øyer. Hver øy har så sitt eget litt bykvarter, og innenfor det bykvarteret skal det også være en form for forskjellighet, det skal være blandet med grunnstrukturer. Lengst mot syd er mest by og minst grønt og hvor lenger nord man kommer er det mer grønt og mindre by.

Og den måten det kommer til uttrykk på er f.eks nede på Sandkaj eller i Århusgade kvarteret er da gatetrær, så er det 2,3,4 mindre grønne plasser. Nå er det ikke mange som er etablert enda fordi det stadig vekk er en masse byggeri, det er meget urban grønt. På neste, Sundmolen hvor vi sitter nå, der kommer det et langt forløp av grønne hager nedover midten. Hvor det ikke blir biltrafikk, biltrafikken kører rundt kanten så blir det grønt og bilfritt i midten. På den neste holmen så blir det er stor grønt trekk, på størrelse med islands brygge en form for havnepark, osv osv, så blir det mer og mer grønt. det er de store trekk. På hver holm er det også en serie av mindre lommeparker, inne i strukturen, altså mindre grønne byrom.

Grønne parkområdet ytterst i Nordhavene som vises på de orginale planene, er dette fremdeles en del av prosjektet?

Nei. Her oppe kommer det, eller det er allerede et oppfylt basseng. Kontainerhallen vil flytte opp hit. Det som var planene her oppe blir ikke oppfylt likevell, det er en lov som forbyr det. Men vi håper å kunne lage noe ekstra grønt her (peker på områder lenger syd). Det blir, her ute er det mye byggeri som er vist, dette vil heller ikke skje. Så fordelingen av grønt vs. byggeri i hele Nordhavnen det blir den samme. I og med at det kommer mindre byggeri her ute, så forholdsmessig vil det også være stadig vekk det samme antall grønt, eller arealer grønt.

Ifølge illustrasjonene og visjonene for området så var det tenkt ganske mye mer grønn infrastruktur en det man kan se i dag. Hva er årsaken til dette? På København kommunen sin bæredyktighetsrosett fikk blågrønn infrastruktur i Århusgade kvarteret en score på 3 av 5. Som betyr at alle nødvendige krav er møtt, men ikke noe mer enn det. Dette strider jo litt i mot visjonen om å være et grønt nabolag, hva kan være årsaken til dette?

Hvis man ser isolert på Århusgade kvarteret så er det jo ikke der det er mest grønt, det er jo mer byggeri en det er grønt. På den måten er det jo helt forkert, det er ikke et naturområde, det er mer et byområde. Men samtidig er den rosett et gammelt verktøy, den er nesten 10 år gammel den måten å bedømme på.

2. Som arkitekter for dette prosjektet hvilken rolle hadde dere når det kom til å planlegge for grønn infrastruktur, hvor mye var allerede avgjort av kommunens retningslinjer og foreskrifter/ regler?

Våres rolle som arkitekter og planlegger i forhold til Nordhavnen det er at vi er rådgivere for by&havn som eier hele området, og vi er nødt til å planlegge områdets struktur. Så det vil si at når man kikke på illustrasjonsplanen så har vi faktisk en strukturplan, og der fastlegger vi faktisk på overordnet nivå de steder hvor det skal være grønt og hvor det skal være by. så man kan se det er en god sammenheng mellom de store linjer og hvordan det kunne komme til å se ut (illustrasjon). Og den måte man så fastlegger andelen av grønt er det faktisk kommunen som har noen retningslinjer. De sier at hvis det er boligbyggeri, så er 30% av etageareal skal være friareale, og hvis det er erhvervsbyggeri så er 10% av etageareal skal være friareal. Så når man regner ut hvor mye byggeri det er innenfor de grå soner så gir det også et tall for hvor mye grønt/friareal det skal være. Så er det våres oppgave som rådgiver for by&havn å gi det en fysisk form. Hvordan deler man så det grønne ut innenfor denne bystrukturen. Så etter det, når vi har arbeidet med dette på et overordnet nivå så laver vi noen detaljerte planer, f.eks for Århusgadekvarteret. Så skal vi så omsette disse her litt firkantede grøntområder til noe som faktisk er et prosjekt.

Det er kanskje vanskeligere å få grønn infrastruktur i dette områdene (Århusgade kvarteret) hvor det er så tett bebyggelse?

Ja, det har ikke vært et hovedmål å lage en grønn bydel i Århusgadekvarteret så det er mer en forlengelse av Østerbro kan man si, så det er en tett bydel.

3. Hva tror du var motivasjonen for å introdusere grønn infrastruktur i Århusgade kvarteret? f.eks for å gjøre nabolaget mer attraktivt?

Man kan si at By&Havn har som erklært målsetning å lage verdensklasse bydistrikt/bydel. Grønn infrastruktur og grønne områder er en del av en god bydel hvor det er høy grad av livability. Så det er innarbeidet i deres visjon at de vil lage en god bydel, og herunder hører også grønt til. Så har kommunen et meget stort fokus på grønt byrom og ikke bare mindre grønne parker men også større sammenhenger områder. I og med at By&Havn også skal samarbeid med Københavns kommune skal de også leve opp til kommunens målsetninger, så det er større og større fokus kan man si hos By&Havn gjennom påvirkning fra København kommune, det er også en generell tendens i byplanlegging å få integrere bynatur bedre, med den klassiske by.

4. Hvilken funksjoner har den grønne infrastrukturen i Nordhavnen? f.eks fungerer det som klimatilpasningstiltak, biodiversitet. Hvilken verdier bidrar det med til nabolaget?

I lokalplanen for Århusgadekvarteret der står det at alle tak som er minder enn 30 grader de skal være grønne tak, hvis det ikke er en takteresse, og det er jo et riktig godt utgangspunkt at det skal være grønne tak. Og det er jo egentlig flere formål med den bestemmelse, det ene er jo at man forsinker regnvann, altså når det regner så bleser det ikke kloakksystemet. Så er det med at de grønne tak beskytter tauerbygningen. Så har du det med urban heat island effekt at det nedkjøler bydelen om sommeren og så er det også med på å økt biodiversiteten når det kommer insekter og fugler osv. Så det er faktisk tre eller fire forskjellige formål med å ha grønne tak, det er også en del av Københavns kommunes politikk, at de stiller krav om at det skal det stå i lokalplanen og det blir så et at krav over på bygherrene som oppfører husene. Så det med å innføre grønne tak kommer egentlig fra en lovgivning, som så blir til det byggede miljø.

Så det handler mer om lovgivningen, det var ikke en prioritet fra deres side?

vi har alltid veldig gjerne ville ha grønne tak. (s.35 i den grønne bok) dette er fra konkurranse forslaget som er fra 2009, her har vi allerede vist en hel masse grønne tak, det er faktisk ikke alle takene som er grønne. Dette er jo en visjonskollage, men bare for å si at det har vært med helt fra starten. Faktisk når man kikker på takene så er det mer grønt i virkeligheten enn det er på dette bilde, men om man så kikker i gatene så er det jo flere trær på dette her bilde enn i virkeligheten. Til gjengjeld så er det også trær og store busker oppe på takene her (bilder) faktisk, og det er det jo ikke kommet, det er sedum tak men laver i bygningen.

5. Det var vel også planer om å ha grønne fasader, men det finner man ikke så mye av?

Det er parkeringshuset som har grønne fasader, det er noe som vi alltid har ønske om som arkitekter at det kommer grønne fasader, men hvis det ikke står i lokalplanen, hvis det ikke er et krav til byggherren så blir det sparret vekk. Men i den lokalplanen for trelastholmen, der er det krav om grønne fasader rundt om her og det står i lokalplanen så det kommer det også. Det handler mye om, hva kan man faktisk stille krav om til byggherrene (developers), fordi de tenker alltid grønt det er dyrt. Er det noe vi skal eller det noe vi kan? Er det noe vi kan så gjør vi det ikke, er det noe vi skal så gjør vi det.

6. Hva er de største utfordringene når det kommer til å innføre grønn infrastuktur i et nabolag som Nordhavnen, fra deres perspektiv som arkitekten?

Som sagt så er det som er på selve bygningen er meget økonomi, dem som bygger husene gjør kun den investering hvis de skal. Så er det i byrom på veier og gater, så er det faktisk en kamp om plassen kan man si. Hvis man ser et utsnitt av en ganske alminnelig vei så vil man jo ha så masse grønt som muligt men man kan si at det er faktisk bare masse kamp om plassen med alle de tingene man skal ha inn i et byrom. I en alminnelig gate (viser bilde) blir man nødt til å kombinere mange ting, så man har faktisk fortau og veibane i samme nivå. Vi har noen områder med bilparkering, sykkelparkering, det er grønne beder og noen trer. I planene ser vi man har noen steder hvor bilene skal kjøre, noen steder man kan plante trær, man har sykkelparkering, bilparkering, og to biler skal kunne passere hverandre, så selv om man vil ha masse grønt inn så skal det også være plass til andre til, brannbiler og lastebiler så det er en utfordring når det kommer til gatene. Foran fasader må man heller ikke stille for mange trær sier brannvesenet, for da kommer de ikke til. Hele tiden er det denne kampen om plassen, så det er gatene. Så er det de større sammenhengende grønne områdene, der er det jo nemmere kan man si å få mer grønt volum inn hvis man gjør det større og f.eks kombinerer det med noen sportsfunksjoner eller rekreative funksjoner, så kan man bedre synes jeg få frem noe kvalitet hvis man samler noen ting.

7. Har dere fått noen tilbakemeldinger på bruken av grønn infrastruktur i område? f.eks fra beboere eller brukere av området? er det for mye, for lite?

(Snakker om st. Pederplads ved det røde parkeringshuset, de orginale planene ble endret pga. av ønske fra beboere). I stedet for å ha en fordypning i betong som kommer det mye mer grønt inn, det er faktisk også et utrykk for den her tendens i byplanlegging, til at man vi gjerne integrere og ha mer grønt i byrommet og tett på der hvor folk bor, så det har likevel skjedd noe de 10 siste år på hvordan man ser på grønt i byrommet. Jeg tror kombinasjonen er viktig, til at man har noen store steder hvor man kan komme til å spille fotball og bli blest igjennom og stå å kikke utover vannet. Men det er også viktig at det noen små lommeparker som er tatt på hvor man bor, og steder hvor det er en lekeplass og man kan slappe av tett på sin bolig. Jeg tror kombinasjonen er viktig.

8. Hvilken påvirkning tror du den grønne infrastukturen i Århusgade kvarteret har på opplevelsen og bruken av gatelandskapet?

Jeg tror det har en virkelig stor påvirkning for hvordan man opplever et byrom og man føler seg godt tilpass. Et eksempel måske vi har prøvd å gjøre i Sandkaj, som er den sydelige strekkningen i århusgade kvarteret, vi prøver å stille trærene skiftevis på den ene og den andre siden av gaten, det betyr at når bilene kjører så skal de kjøre litt i slalom, så gjør byrommet rolig på den måten. På den andre siden når man står her å kikker i denne retning ned langs promenaden så får man et mer opplever et stort volum for trærene står på hver sin side av veien. Jeg kunne godt tenke med at det var flere grønne fasader f.eks fordi det gir bare en annen opplevelse av byen.

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10. Hvilken type bruk er gatelandskapet designet for? er det designet for å promotere ulike typer aktivet og bruk, eller er primært designet for transport og mobilitet?

Der er det faktisk gjengitt et hierarki, det er den som heter Helsinkigade og den der heter Århudgade det er noen bygater eller veier med asfalt på, og der kjører bilene og sykkelstier, og folk går på fotauet. Så er det alle de her korte stredene og gatene hvor det er betongbelegging over det hele, så det har mer gågade karakter, så der vil vi faktisk gjerne, hvis folk vil bruke det mer som en gågate, bruke det mer fleksibelt så man ikke går sånn opp etter bygningene men man faktisk beveger seg mer fritt. Og også promenadene, det er også noen avslappede gater som ikke handler så mye om å komme fra A til B, men mer hvor man har en langsom hastighet og kan oppleve byrommet. Så er det denne sykkel infrastruktur som vi kaller den grønne loop» det er faktisk en seks meter bred sykkelsti, også er det også et fortau langs med som kommer til å løpe hele veien fra Nordhavn stasjon og kommer til å fordele seg utgjennom hele Nordhavnen, så det er virkelig en hurtig fra A til B. Det er et byroms hierarki, så det er for det første noen forskjellige byrom som er urban byrom, så har man de her små grønne lommeparker og plasser, også har man den her forbindelse som man kan gå på . Man har altså selvfølgelig «den grønne loop» sykkelsti, det er den hurtige forbindelsen, men så har man den her fotgjenger forbindelse hvor man kan bevege seg litt mer sirklet. Man har forskjellige lag, noen hurtige forbindelser og noen sånn mer opplevende, labyrintiske forbindelser. Så det handler å kombinere ting, altså små grønne trekk og store grønne parker, og langsom hastighet og mange svinger, og direkte forbindelser. Kontraster mellom et tett bykvarter og noen store horisonter.

11. Var fremtidige beboere og brugere af området involveret i designprocessen i gatelandskapet? Hvis ja, på hvilke måder?

Ja det ha de faktisk, det var jo den her konkurranse i 2008 og 2009, og allerede innen da var det faktisk, så avhold By&Havn noen borgermøter som handlet om. I 2007 besluttet man å utvikle Nordhavnen, og så hold man allerede før konkurranseprogrammet, workshops med borgere og kanskje de forskjellige lokale hvor de kunne komme med deres ønsker til hva skal en fremtidig by være, og det ble jo så kondensert i konkurranseprogrammet. Så allerede innen man har en konkret ide kan være med å ha en visjon om for hva skal dette her området være, og på det tidspunkt bor det ingen mennesker i Nordhaven, det var jo et industrikvarter. Det var verksted, parkhus og... De som kom til disse borgermøtene var folk som bodde på Østerbro, eller var interessert på den ene eller andre måten. Men siden det, siden vi så har laget de neste planene for de kommende områdene så har det begynt å bo mennesker her, så de blir også hørt når det kommer, når man skal lage den neste og neste og neste planen. Det er satt helt i system i forhold til borgerhøringer. Så holder By&Havn også på eget initiativ noen nabomøter hvor de inviterer to ganger om året aller som bor eller arbeider i kvarteret til dialogmøte hvor til forteller om kommende planer. Så er det en grunneeier forening som alle som bor i området har plikt til å være med i den her forening av grunneiere, og det er blant annet dem som er kommet med noen ønsker til de her nye plasser hvor man har fått noe mer grønt inn og offentlig toalett og noen sånne ting som folk syns «mangler det ikke et sted man kan lufte sin hund» det er et eksempel. Så kommer det i fremtiden, her nede på Nordhavnskaj, et sted hvor man kan gå tur med sin hund eller sånn et hundeområde. Så det er eksempel på at borgere blir inndratt (inkludert) i prosessen.

Så da har det vært et ønske fra folk at det skulle være mer grønne områder?

Det er også fordi... en ting er at det er selvfølgelig mest urban her og mer grønt jo lenger ut man kommer ut. Men det går kanskje 10-15 år før det kommer noe riktig. Det kan jeg riktig godt forstå, det er vanskelig å forstå når man nettopp har flyttet inn «skal jeg vente 15 på at det kommer en park?» det er den ene ting, og den andre tingene er at de grønne områder som faktisk er planlagt, det er ikke alle som er etablert enda pga byggeplasser og ja.. så det er nok primært de ting som gjør at folk etterspør grønt.

# 4. Sabine Sørensen, Project leader at Miljøpunkt inner city and Christianshavn

1. How do you understand the concept of green infrastructure? (e.g. do you see it as a tool used in climate adaptation, or as a planning approach?)

I see it absolutely as a tool used in climate adaptation. Both to cool down the city, both also take up water also when you think about air quality in the city. So all these climate questions, and also when you think of all these great questions there are right now about the bees and so on, that you can make small biotopes for insects in the city. What we also work with in Miljøpunkt is noise in the city also. If you plant trees or use green at the facades that can also absurd some of the noise both from traffic and people in the streets. Thats another angle, but its also a problem that you have in Copenhagen. But also you know, green for the eyes. Less stress for people, you get another area with green where there is a better you could say mood.

I think that what we are talking a lot about now is the social aspect, actually there is a lot of lonely people in Copenhagen. And when you have these.. As an example, not related to green infrastructure we collect garbage with the citizen, both in Christianshavn and by the lakes, and we can see that there is a lot of social aspects to it. That people meet and that we give them some breakfast and they sit together and talk, so that people meet each other. So thats another aspect. Also when you have these small urban gardening, thats all a good example from Østrebro that we have worked a little bit together with, that you can adapt these flowerbeds underneath the trees and so.  And I think there needs to be more focus on lonely people sitting around, for example when you are working in the inner city you think that you have a lot of money and so on, but that does not mean that you are not lonely. So just to get together and eat something or grow something.

2. What role does MIljøpunkt have in green infrastructure planning in Copenhagen? In what ways can Miljøpunkt influence the implementation of GI in neighborhood streetscapes?

You can call us a small NGO, we get economy both from the municipality and what you call the local representative (lokaludvalget), it all in the local areas, so we cover Christianshavn and the inner city. We have a double role because we give input for the municipality, and we support their ork by getting their work to the citizens and help to tell the citizens learn about the work that the municipality do. But the other way, we also put a little pressure on the municipality, are they actually doing what they are telling? But we work together with them.

So its mainly the municipality? or do you also work with private developers and other actors?
Yes. We work with a plan each year, but we also search for funding for greater projects and that could be together with... right now we work together with Niras and also some other small companies about nature in the city. So its both.

3. What do you think are the motivations for implementing GI in neighborhood streetscapes in Copenhagen? E.g from the perspective of the municipality of Copenhagen? From the perspective of developers?

I think from the municipality they really do need to think about climate, it is just nessecary to cool down the city, and now we have experienced all this huge rainfalls, and you just need to be prepared. But also when you see it as a citizen, for example in out backyard we know that we will have water in the basement so we have to do something about it ourself so. Maybe as a citizens its also because it just looks nice. But we also experience that citizens takes action themselves.

4. What do you think are the challenges of implementing green infrastructure neighborhood streetscapes in Copenhagen? e.g. maintenance or cost of implementation, policy regulations?

If I think of a project that we have worked with, that is about green facades, we have advised citizens. Then there is a problem when you need to apply for permission, so that can be a challenge for a lot of people, and citizens have just stopped there. So it can be hard for them to get in contact with the municipality, and getting to know who to talk to and the right way in there.

So it is the application process that is a bit to complicated?

yes, but also when you talk about the inner city, if you want to plant trees for example. You can not just do it because there is a lot of things in the underground, sewers and so on. So you can not just plant a tree where you want to. And then also who is going to take care of it afterwards the project, when it has been implemented. Thats also because, again I have worked on this facade project and you have to tell people about the maintenance work. You can not just plant a rose and then let is take care of itself, you also have to cut is every year, and you have to water it. That is really a big issue, the watering. You can see it if you walk around in the city, there are a lot of project that looks like.. yeah I dont know..

5. Looking at Copenhagen, what tools and strategis are supporting the implementation of GI in neighborhood streetscapes?

I though about the urban nature strategy from the municipality, and then they also have this tree policy.

Do you think these strategies work? Do they have an impact?
About the tree policy, I think that is more talking and it sounds nice that you want to plant a 1000 trees. We have tried to support the municipality by connecting ideas from the citizens on where to plant new trees, but I dont think we really get the feedback we need. 32 000 ideas from citizens we got in, but you really dont see the input that you want and I dont think they put in the money needed for the project. And it is the same about, they want to find the iconic trees so then you can not just cut down trees.. it has to go through a application process in the municipality before it is cut down. And they also have made it easier for citizens if they want to make a small garden by there house, by the pedestrians streets. Because they have seen that people put up small gardens in front of their house, and actually you have to get promission from the municipality to do that, and now they have made that easier. Also, about the green facades, we had some students last year working with this project they made this whole prosess easier together with the municipality. Because before you had to apply for.. i didn't make any sense.

6. Do you think there is a need for more policies and legal requirements regarding the implementation of green infrastructure in private developments?

Actually I think the volunteering part is more important, so that is more free for the citizens. I dont know if you have heard that they have skipped the voluntary-coordinator at the municipality, working with all the volunteering people. They have just skipped it this year, and there are 37 projects that they right now dont know it they can continue. Green projects around the city.

Is that because of financial limitations or cuttings?
Yes. But actually it was one person taking care of all these green projects, and all these projects was not even in contact with this person, but there just had to be this person in the municipality taking care of it. The volunteers were doing the jobs themselves. So thats also a thing that we are working with right now, at the different Mijopunkter but also in the local communities. Because we can see how it affects all these small projects around the city, and its so sad. Volunteering citizens are doing a huge job.

7. Do you think private developers have to much «power» when it comes to planning for green infrastructure?

No. I dont think they have to much power. Its also about this ownership of the local area, because then you take care of the things there.

But for example when developing a new neighborhood, how do you think should have the responsibility of making sure that there is some green infrastructure? perhaps there it is a dense neighborhoods with no parks or recreational areas nearby, and there is a need for other types of GI such as trees and pocket parks, do you think it is up to the municipality or someone else to make sure that this is in place?

Yes the municipality. If you look at Fredriksberg kommune they have, you have to see a tree from your apartment or your house. So they have a huge focus on this, trees in the streets.

8. How can involvement of citizens and future residents of the area have an impact on the implementation of GI in neighborhood streetscapes?

I think it has a huge impact when you involve the citizens. And about this ownership, so you do things yourself, and you care for the things there.There has also been a project on Vesterbro Before called blomstrende by, but it was also about flow erbed underneath the trees, and it was your place so you could-plant what you wanted to.

# 5. Ewa Sundström, Landscape architect at the planning department City of Malmö

1. What was the motivation for introducing green infrastructure in the neighborhood streetscape?

The motivation was to create an attractive urban environment where vegetation was seen as a good way to create a human environment by bringing down the scale, creating a good microclimate and breaking the winds.

2. Was the residents included or involved in the planning of the green infrastructure or of the streetscape in general? If so, in what ways? (e.g. were they informed about how the end result would be, or were they asked about suggestions and ideas for the design of the streetscape?)

Information on the design of the public areas of Boo1 was mainly made using image material from the winning architectural proposals for the public spaces.

3. What methods/tools was used to involve residents in the planning of the streetscape?

Since Bo01 was an exhibition area built on old industrial land and mainly completed in its entirety for the exhibition in 2001, there was no residents in Västra Hamnen that could be involved in the process.

3. Who are responsible of the maintenance of the GI in the streetscape? Are the residents involved in the maintenance of the GI and/or of other features in the streetscape/?

It is the Real Estate and Streets and Parks Department that is responsible for the operation and maintenance of public areas including the streets of Västra Hamnen and Bo01.

4. What sort of activities is the streetscape designed for? (e.g. is it primarily planned for walking for transport or does it promote other activities as well?)
It is primarily planned for walking, accessibility to parking garages and for goods deliveries.

5. What sort of activities is the streetscape used for?
Mainly for walking.

6. What ecosystem services is the green infrastructure in Vastra Hamnen contributing to?

It is above all climate regulation; to break the ever-present wind and create better microclimate. But also cultural services such as breaking down the large scale of the house construction (creating dimensions) and creating attractive environments for recreation.

7. Are specific ecosystem services/benefits prioritized when planning for GI?

Explicitly planning with and for ecosystem services is something that has recently become relevant. A unspoken but a clear starting point is and has been to create good living environments with good microclimates, where vegetation helps to curb winds. Planting trees in street also improves air quality and creates shade. Something that has become relevant in recent years is, with the help of design in park environments, to take care of the rain water and in the street environment work with the cleaning of water before it gets into the management system.

8. How is the green infrastructure contributing to the experience of the streetscape?

It is of course very subjective what people think of trees in the street environment. But it contributes to a better street environment where the scale of the streetscape can be broken down. It also breaks strong winds, gives shade and space for seating in connection with trees, provides seasonal changes, facilitates infiltration of storm water, improves air quality and more.

9. What tools and methods from the perspective of the municipality is used to integrated more green infrastructure in the streetscape? e.g. «the green space factor» and «the green point system»

Green space factor is used in Malmö only for private neighborhood land and not for public space. However, we always work with the ambition of creating as green environments as possible around our streets, all in regards to factors that affect the possibility of the green infrastructure such as underground pipes, crossings, the need for entrance and parking areas, room for lighting poles. There is also the lack of space, there is simply not enough space for tees, or sufficiently large tree pits in order for the trees to grow and develop.

10. What do you think is  the key to success implementation of green infrastructure in neighborhood streetscapes?

That the street section allows enough space for space with such large tree pits that are needed to give trees the opportunity to establish and grow.

# 6. Natalie Gulsrud, Associate professor at University of Copenhagen (green infrastructure expert)

1.How do you understand the concept of GI?

That is a really interesting question. It can be interpreted in different ways and you could almost say that is has been kind of contested as an idea, because green infrastructure can be defined in sort of a very classic sense, as blue and green ecosystems or biophysical aspects that link together from the rural to the peri-urban, to the urban.So if we take Copenhagen as an example were you can think of some of the waterways and green wedes they connect the agricultural hinterlands to the green suburban areas in to urban green areas, and then into the harbor and the lakes, and then in to the Øresund. So that is a classic way of understanding green infrastructure, but if you sort of look how its used in urban planning regimes, then you will se that it takes on kind of a multifaceted and almost conflicting identity, where you can se it as a kind of green to grey continuum whereby engird efficient buildings, bicycle infrastructure, concrete bioswales are all identified as urban green infrastructure. As are trees, community gardens, parks, green roofs and so we see that all of these aspects have to fit together under this one umbrella. But is really different timelines associated with building like a parking structure that has green walls or green roof as opposed to planting an urban forest, and their is also very different kinds of political impatise and political incentives. So what I always talk about is that it is super important to understand local strategies and the politics of it, because it is nested. If were talking about Copenhagen or Malmö then you need to look at the actual local plans, you need to look at the city wide strategies and you need to understand the links to regional and state strategies. So in a Copenhagen context or danish context understanding how it links to the finger plan and to broader planning strategies, and then you also need to understand how it links to the broader architectural and urban planning machine you could say. Another way to look at it is through kind of technological social and ecological connections, because the number one topic in Copenhagen, is planning for climate adaptation, and thats a very technocratic approach. So the idea is that by using green infrastructure as an material, its an object, its not something thats living. Within this discourse it is very much an object. And you see the same also in Malmö, when their talking about climate adaptation especially in the Western Harbour it is about channeling rainwater and absorbing rainwater. So it becomes kind of a engineering project, but we know that there is a lot of really important social connections to green infrastructure as well and those are often times left out. And what is often times ignored in this context is, when you build infrastructure our kind of making channels that will be repeated again and again, because you have such big investments that your making, that those channels dont just go away. So if the city of Copenhagen in spending 20 million kr on climate adaptation projects over the next 15 years, which they said they were going to do, or 20 billion kr. Were gonna see those pathways replicated and worked on again and again and again.

We need to understand those connections and how those impact the political process, and decision making processes. So Nordhavn is a really interesting case in that it is tad like, there has been a lot of promises and ideas through the local planning and through By&Havn kind of their structures and ideas what to do, also kind of citizens engagement, but if you look at what is actually happening on the ground, you can start to see that their are different aspects that are dominating. So its really not the biophysical aspects, its more kind of these ecological-technological connections. Or the grey(er) side of green to grey. Because thats really easy to implement. Concrete, you pour it, you use engineering firms to kind of draw on market value. You put a little bit of green on there. It might die, very quickly, which we see happening. But at least it looked nice the first year, and it was in the architectural renderings. So there are some contradictions there and tensions.

2. I am looking into how developers, architects and planners in the municipality understand the concept of GI, my impression is that they dont always share the same understanding of how to approach GI. E.g. some look at is more of a technical tool to fix a problem, whereas others look at is more as holistic planning approach to achieve more sustainability goals. Do you think it a problem that GI can be understood and interpreted in different ways, e.g between stakeholders  in one project?

I think it should be expected. So I think it is the point of departure, and then we can say, because there is always different understandings of every term. Whether it is green infrastructure, nature based solutions, whether its urban nature, whether a green city, a sustainable city, so we should always expect that there are different perspectives and different ideas, different priorities embedded in peoples understanding, and then what we need to do as academics. As people in research is to try to understand the consequences of those different perceptions. So one way of being able to do that is by tracing whats promised in the local plans and local strategies and then looking at what is actually happening in reality through implementation. And then you see that maybe some of the perceptions and ideas of green infrastructure are more dominant then others. So the hypothesis that I would have is that the green-grey continuum always skews a bit more to the grey in the beginning. And in a Swedish context, because GI is actually legislated as a priority at the local plan, planning level, the might have a stronger way of implementing actual biophysical aspect. Cause they have a big, they have a very strong policy focus on biodiversity and delivering ecosystem services, we dont have that at all in the danish context. This is the nested policy aspect that I was talking about, its really important, you have to understand that so if we look at the Swedish context, in kind of the broader rings which would be regional and state legislated aspects, they have policy that actually enforces focus on the biophysical. In the danish context we only have policies that focus on climate adaptation and that does not take biodiversity or biophysical aspects, or ecosystem services in consideration, that language isn't there. So, you can describe it as a problem and see what the outcomes are if you think the outcome should be more focused on biophysical aspects, which I personally argue for, because biophysical aspects such as treets, especially trees, but kind of robust ecosystems they have a much different timeline then political decision making. I we think about political periods being 2-4-6 years, it takes 30 years to grow a mature tree that is actually considered to be a three by citizens, and it takes 80-100-150 years to really grow a mature forest, that people are interested in. And we know that there are very important services associated with those forests, so that important to focus on.

3. In many big cities such as Copenhagen there is a lot of focus on larger green areas such as parks, and access to parks. Do you think there is enough focus on streets and small meeting places in neighborhoods? (should there be more focus on this?)

guess if we look at the city of Copenhagen urban nature strategy, they really intentionally break it down to be all sort of different typologies. They talk about street trees, kind of this in-between spaces you could say, between spaces. They look at green roofs. But whether thats actually happening in implementation is another question. So I think what we have to think about is what kind of policy mechanisms are in place. Because plans are not policies, plans are ideas, they are suggestions of how we can move forward, but policies actually have teeth and make things happen. And we can also look at budgets, to see where are budgets being allocated. And what are they allocated for, whats prioritized in our budgets. And what well see is that it is often times not enough money to support the renovation of courtyards or to support tree planting on streets, street trees. So over the last five years we have had some really good programs in Copenhagen, specifically focusing on the renovation of green courtyards, so looking at courtyards as areas that the city, even though they are privately owned they are kind of semi-public because they are often times open, and their open to a wider group of citizens, so there is a lot of opportunity there. But that money has been cut back in the most recent municipal budget. And another aspect to look at is the partnership tree program, which was focusing on citizens assisting in planting of the trees, and that program has also been cut back due to resources and so forth.

I So I think that is a pretty clear indication that when you focus on kind of semi-private and or private spaces which are very important in terms of the cohesiveness of the GI and specifically biophysical channels and wedges, then you also need to have more innovative policy mechanisms in place and the resources to follow through. It becomes a bit more complex. And when the municipalities are not given enough money to do that it is difficult to do that. If you just rely on volunteers it gonna be very uneven, so those neighborhoods that have a lot more social capital you could say, citizens with the resources to spend time and money on green materials, their gonna have more street trees, their gonna have more pop up gardens, their gonna have nicer courtyards. Areas that dont have as much capacity are going to have less qualities

4. What do you think is the motivations for implementing green infrastructure in neighborhoods from the perspective of private developers? from perspective of the municipality?

Well there is a lot of research that shows that real estate value go up by 20% if you have quality street trees, so a great example is.. if you have ever been to Brooklyn, that is the nicest neighborhood in New York with really big beautiful street trees, brownstone apartments, like beautiful streetscapes and it creates a type of atmosphere that everybody appreciates. There is always conflicts between proper owners, municipalities, developers over who takes care of the tree, who owns the tree, if the tree falls who has to pay for those damages. But thats usually not something that is taken into consideration when trees are planted by developers, generally there is the idea that either the local plan dictates that the tree should be there which is an important policy mechanism and or developers put them in as part of a branding scheme. There needs to be a lot more focus on incentives to provide developers with either money or the desire to plant more trees you could say. If we look to a place like Singapore they have created kind of a green building masterplan, so not only do the streetscapes need to be kind of greened by developers, but the actual buildings need to be green as well, through green roofs or green walls. Thats pretty, its not straight forward but its a lot easier to do in a place where the average temperature is 27-26 degrees celsius, here in Copenhagen we have obviously a different weather-scape and different challenges associated with vegetation, but we have the expertise, we can do it, we just need to put the incentives in place. The green masterplan is incentivized with building code bonuses and so fourth, they can build up or they can do other things, they can scale out, if their following through with the green masterplan. And they have had a huge kind of adoption rate, were developers have been very keen to be a part of that process, because the incentives in place are the right ones, you could say. So we have a lot of grow and learn here in the Scandinavian context.

In Copenhagen you have a lot of ambitious plan for green infrastructure (I am e.g. looking at the use of GI in Nordhavnen, were the original presented a very green neighborhood but this has not been realized) what do you think is the major challenges of implementing green infrastructure in neighborhoods? (There is a discrepancy between the vision presented and the actual results, what could be the reasons for this?)

So the overarching challenges that we have is as I suggested, very different understandings of what green infrastructure actually is, and this idea of kind of quick turnover and quick profit, quick implementation dominates in out urban planning schemes, so the focus on energy efficiency, rainwater absorption, on maybe a green roof that is more symbolic then actual functional, these kind of ideas reign within new urban development projects, it is very difficult to have focus on something that will give you benefits in 20 years and 30 years and 80 years, that is not how the current urban planning and urban development regime actually works. There is no incentive there for the people who are building the neighborhood to actually deliver on something that wont be realized for 30 to 80 years. And politicians in tern, dont have an incentive either because they are voted in for four years or for six years and in some cases only two years, therefor they are focusing on short term incentives as well. So thats the biggest challenge I would say, the second biggest challenge is that it actually difficult to plant trees that trive and do well in urban contexts. An urban context is challenging and is getting more and more challenging you could say, as air pollution levels rise, as soil gets more compact, as weather becomes more unpredictable with climate change. We are not necessarily always using the right species, so there are som disconnects not in terms of only planning timelines and incentives, but that we also lack I would say the technical knowledge to really plan our urban vegetation in a way that is in line with peoples preferences, in line with changing climate and in line with urban development regimes. Because it is okey if you get the money, it is great if you get the money to plant the trees, the second battle is actually finding the space for them. So if you have ever seen an underground cut, where you see the different layers of the sidewalk, and whats happening under the sidewalk it is incredibly complex so everybody is fighting for space underground, and what does that actually mean for the tree and the planting of the tree. It is super hard, and it costs 175 000 kr to plant a street tree in the most complex areas, that a lot of money.

5. Do you think that more policies and legal requirements are more efficient then e.g strategies, schemes and different greening tools when it comes to implementing GI?

I think you need to have a combination of both, so I think that when your trying to figure out how to move forward and advance something that has been lacking behind, you need to pull on different ropes so to say. So engaging with citizens, and figuring out what would citizen actually like to have, and would like to be involved as stuarts as volunteers as active participants in kind of the greening of landscapes specifically around their home is a really golden opportunity, yet we also have to be aware that not all citizens have the resources. So if we only rely on citizens, as I said before your gonna get a very uneven outcome, so thats very also need to draw on the requirements of the private sector. The private sector really needs to deliver more then they are right now. Right noe they deliver half big products and they get payed a lot of money for doing that, so the incentives needs to be changes so that the product becomes much more resilient for the future and pays of not only in the short terms but also in the long term, we need to think returns in different ways and new dimension. And following that, that requires policy makeovers you could say, that we need to get more politicians on board to kind of regulate the private sector. There has been a lot of hesitancy to do that, but the private is just like taking everybody to the bank right now and their getting so much money, and this current development kind of creates.. we as a public needs to receive a lot more.

# Appendix III: Findings from process analysis

## Västra Hamnen

| | Stakeholder/source | Quote | Finding |
|---|---|---|---|
| **Intial Conditions** | The municipality og Malmö | "The motivation was to create... a goo micro climate! | creating a good micro climate |
| | | "...creating a good microclimate and breaking the winds" | fucntioning as wind breakes |
| | | "seen as a good way to create a human environment by bringing down the scale" | adding scale - relationship between people and the built environment |
| | | "It is above all climate regulation" | cliamte regulation |
| | | "creating attractive environments for recreation" | recreation |
| | GI expert | strong policy focus on biodiversity and delivering ecosystem services | biodiversity |
| | GI expert | "talking about climate adaptation especially in the Western Harbour it is about channeling rainw | climate adaptation |
| | | | |
| | Urban vision and strategy Västra Hamen | | branding and marketing of the Västra Hamnen area |
| | Urban vision and strategy Västra Hamen | | Housing expo Bo01 - showcase for sustainaible urban district |
| | Urban vision and strategy Västra Hamen | | focus on lively streetscapes |
| | Urban vision and strategy Västra Hamen | | decrease the impcats from climate change |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Drivers of Change** | GI expert | "GI is actually legislated as a priority at the local plan" | GI legislated in local plans |
| | | | |
| | | | |
| | The municipality og Malmö "we always work with the ambition of creating as green environments as possible around our streets" | | Municpality driven by the ambition og being the most sustainble city in Sweden |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Constraining Conditions** | The municipality og Malmö | "There is also the lack of space, there is simply not enough space for tees, or sufficiently large tr | lack of space |
| | GI expert | "it costs 175 000 kr to plant a street tree in the most complex areas" | the price of urban nature |
| | GI expert | "it is actually difficult to plant trees that trive and do well in urban contexts" | lack og technical knowlegde - planting in a changing climate |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Enabeling Conditions** | The municipality og Malmö | "Green space factor is used in Malmö only for private neighborhood land and not for public spa | green area ratio/ biotope area factor |
| | | | |
| | urban vision and strategy Västra Hamen | | green point system |
| | urban vision and strategy Västra Hamen | | detailed plans regulating the implementation og GI |

# Nordhavnen

| | Stakeholder/source | Quote | Finding |
|---|---|---|---|
| **Intial Conditions** | Developer (By&Havn ) | "in our corporation with the municipality of Copenhagen we are obliged to look at the CO2 carbon emissio | CO2 reduction |
| | | "when we plan our areas we do it in corporation with the municipality of Copenhagen, because they have | local plan |
| | | "Because in the climate plan for 2025 in Copenhagen we are going to be CO2 neutral, and of course we h | focus on green mobility |
| | | "health, CO2 and the social" | health |
| | | det er innarbeidet i deres (By&Havn) visjon at de vil lage en god bydel, og herunder hører også grønt til | branding |
| | | "Rekreasjon er viktig" | recreation |
| | | "våres motivasjon når vi anlegger er å understøtte den etterspørselen og det behovet det er for grønt" | meet the demands og residents and future residents in regards to GI |
| | | | |
| | Architect | "innarbeidet i deres visjon at de vil lage en god bydel, og herunder hører også grønt til" | Vison from the develpers - goals of being a worldclass sustainable urban disitrict |
| | | "Så har du det med urban heat island effekt at det nedkjøler bydelen om sommeren" | urban heat island |
| | | "man forsinker regnvann" | rain water filtration |
| | | "grønne tak beskytter bygningene" | protection of buildings |
| | | "økt biodiversiteten når det kommer insekter og fugler" | biodiversity |
| | | | |
| | GI expert | the number one topic in Copenhagen, is planning for climate adaptation | climate adaptation |
| | | "a lot of research that shows that real estate value go up by 20% if you have quality street trees" | increased property prices and real estate value |
| | | "developers put them (trees) in as part of a branding scheme" | GI as a part og the branding scheme |
| | | | |
| | NGO (Miljøpunktet) | "a tool used in climate adaptation" | Climate adaptation |
| | | "green for the eyes" | visual and aesthic value og GI |
| | | "the social aspect" | social aspect of GI - meeting places and activites |
| | | | |
| | Urban strategy Nordhavn 2009 | | integrated vision og being a "blue and green" city |
| | Urban strategy Nordhavn 2009 | | creating active and varied outdoor life |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Drivers of Change** | Developers By&Havn | "De (beboerne) vil gjerne ha mer grønt" | residents requesting more green spaces |
| | | "Det er noen som selv har foreslått og ønsket det (grønne fasader), men som såden er det ikke krav om de | residents taking charge og the urban greening |
| | | | |
| | Architects | "...andelen av grønt er det faktisk kommunen som har noen retningslinjer" | Coorpoartion with the municiplaity to reach som goal-targets |
| | | "folk etterspør grønt" | residents request and show interest for more green infrastrucutre |
| | | vi har alltid veldig gjerne ville ha grønne tak | (Personal) interest and motivation |
| | | "det er også en generell tendens i byplanlegging å få integrere bynatur bedre, med den klassiske by". | genreal tendency in city planning - more focus on GI |
| | | | |
| | GI expert | "the number one topic in Copenhagen, is planning for climate adaptation" "So if the city of Copenhagen in | the city is investing in climate adaptation |
| | | | |
| | NGO - Miljøpunket | "citizens takes action themselves" | Citizens showing interest in GI and take action |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Constraining Condition** | Developer By&Havn | "It is difficult to involve them in like the measures of the street and the roads" | difficult to include citizens and residents |
| | | "It is always a struggle of place, because everyone wants to use these urban areas for someth | battle for space |
| | | "på en måte er selve planene litt bakut (utdatert) i forhold til de behovene som oppstår" | The overall stratey for the area is outdated - demand and focus on GI has changed |
| | | "vist seg i de tette byrom å være vanskelig å etablere trær mange steder" "Forsyninger og tettheten" | the densly built enviroment |
| | | | |
| | Architects | "det har ikke vært et hovedmål å lage en grønn bydel i Århusgade i Århusgadekvarteret" | Conflicting messages in the original and revised plans for the area |
| | | "hvis det ikke er et krav til byggherren så blir det ikke inkludert" | If there is no legal requirements for GI, then it will not be prioritized |
| | | "Byggeherrene... tenker alltid grønt det er dyrt" | Economy - developers always assume that GI is expesive |
| | | "dem som bygger husene gjør kun den investering hvis de skal" | developers implement GI if they have to, if they can chose they dont |
| | | "Så er det i byrom på veier og gater, så er det faktisk en kamp om plassen" | battle for space |
| | | | |
| | NGO | "problem when you need to apply for permission...hard for them to get in contact with the m | difficult for citizens to apply if they want to implement GI as a private person, |
| | | "you have to tell people about the maintenance work" | costs and challanges realted to maintances - functions as a barrier for implemeting GI |
| | GI expert | "very different understandings of what green infrastructure actually is" | different perspectives and understandings oF GI |
| | | "focus on biodiversity and delivering ecosystem services, we dont have that at all in the danis | lack og focus on biodiversity and ecosystem services in the dansih urban planning context |
| | | "the number one topic in Copenhagen, is planning for climate adaptation" | (too much) focus on climate adaption in the danish urban planning context |
| | | "plans are not policies, plans are ideas, they are suggestions of how we can move forward" | Plans are not policies - they have no legal force |
| | | "Often times not enough money to support... or tree planting on streets" | Budgets - GI is not being prioritized |
| | | "robust ecosystems they have a much different timeline then political decision making" | Timeline in policitcal decision making |
| | | "... different challenges associated with vegetation" | wheater and climatic condtitions |
| | | "..idea of kind of quick turnover and quick profit" | Too much focus on quick turnover |
| | | "...maybe a green roof that is more symbolic then actual functional" | more focus on symbolic value then function |
| | | "needs to be a lot more focus on incentives to provide developers with either money or the desire t | no incentives for private developers (building something that wil give return in 30-80 years) |
| | | "it actually difficult to plant trees that trive and do well in urban contexts" | lack og technical knowlegde - planting in a chaning climate |
| | | "the second battle is actually finding the space for them" | Battle for space |
| | | "it costs 175 000 kr to plant a street tree in the most complex areas" | the price of urban nature |
| | | | |
| | Inner Nordhavn from Plan to project | | windy environment |
| | Inner Nordhavn from Plan to project | | densly built |
| | **Stakeholder/source** | **Quote** | **Finding** |
| **Enabeling Conditions** | Developer By&Havn | "it is the municipality that is making the frames for how many benches and how many trees there h | policies and regulations set by the municiplity |
| | | "krav i lokalplanen om grønne tak, så i det omfang det ikke er takterasser" | requirements in the local plan for green roofs |
| | | "Minimum 25% skal være felles takterrasse, det kan jo godt kombineres med noe grønt" | By&Havn have reuired that 25% og the building will have roof terraces - this can lead to green spaces |
| | | | |
| | Architects | "Og den måte man så fastlegger andelen av grønt er ved at kommunen har noen retningslinje | GI stated in the local plans |
| | | "workshops med borgere og kanskje de forskjellige lokale hvor de kunne komme med deres ønsker" "borgerhø | Meeting with ctizens and future residents |
| | | "Så holder By&Havn også på eget initiativ noen nabomøter...hvor de forteller om kommende | Local meetings with current residents |
| | | | |
| | GI expert | "if we look at the city of Copenhagen urban nature strategy" | Urban nature strategy |
| | | "another aspect to look at is the partnership tree program" | tree planting program |
| | | | |
| | NGO | "I though about the urban nature strategy from the municipality" | Urban nature strategy |
| | | " they also have this tree policy" | tree planting program/policy |
| | | "I think the volunteering part is more important" | Volunteers |
| | | "I think it has a huge impact when you involve the citizens. And about this ownership" | involving citizens and residetns - creating ownership |
| | local plan Århusgade Kvarteret | | requirements regarding the sloope og the roof - enabeling green roofs |
| | local plan Århusgade Kvarteret | | reuirements regarding streettrees |