

Cultivating Community

Exploring an urban design proposal merging food production with future development for sustainable living.



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Preface

I am honoured to present this thesis, which represents the culmination of my dedicated efforts and passion for exploring the intersection of architecture, sustainability, and urbanism. Throughout my academic journey, I have been fortunate to delve into the fascinating world of urban sustainability, examining the challenges and opportunities it presents for creating more liveable and resilient cities.

This thesis work has been a significant part of my master's education at Lund University as a significant phase of M.Sc. in Architecture with main focus on Sustainable Urban Design. I started working on this thesis on 20th December, 2022 and till 6th June, 2023.

This thesis is the result of countless hours of research, analysis, and reflection, driven by a desire to contribute to the advancement of knowledge in the field. It has been an incredible journey of self-discovery, growth, and intellectual exploration, guided by the support and expertise of my mentors, colleagues, and the academic community.



Acknowledgment

I would like to express my sincere gratitude and appreciation to several individuals who have provided invaluable support, guidance, and encouragement throughout my journey in completing this master's thesis.

First and foremost, I extend my deepest thanks to my supervisor Louise Lövenstjerne, for her exceptional guidance, constructive feedback, and unwavering support throughout this entire process. Her invaluable insights and expertise have been instrumental in shaping and refining this work. The unexpected passing of Louise came as a profound shock to us all. However, her teachings continue to resonate, ensuring that her legacy lives on. Furthermore, I extend my gratitude to Teresa Arana Aristi for her moral support in this tough time and for constructive feedback that helped me shape my project.

I am also grateful to my parents, Dr. Narinder Pal Singh and Mrs. Surinder Kaur; for their constant love, support, and encouragement. Their unwavering belief in me has been a source of strength and motivation during the ups and downs of this journey.

To my friends, who have been my constant companions and sounding boards, I cannot express enough how much I appreciate their love, encouragement, and laughter.

I would also like to thank my colleagues, who have been a source of inspiration and motivation throughout this process. Their shared insights and experiences have been critical in shaping my thinking and helping me to develop my ideas.

Finally, I would like to express my gratitude to everyone who has played a role, however small, in helping me to complete this master's thesis. Your support and encouragement have been essential to my success.

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ABSTRACT

The global population soaring to eight billion in the year 2022 has rattled the world. As the population is rapidly growing, so will there be rapid urbanisation. People continuously move from rural areas to urban areas for better jobs and opportunities. This means that there would be increased pressure on our resources to cater to a growing population. Housing, infrastructure and food shortages are some of the challenges faced by the growing cities. The objective of this thesis is to focus on circular economy as well as urban food production as a development and urban designing strategy for a heavily industrial area. The circular economy's main principle is to reduce wastage and re-introduce resources within the economy once again. The site is selected for test-bed is located in Malmö, Sweden. An old industrial neighbourhood that is now used for shipyards and car storage.

AIM

This master's degree project aims to create a new neighbourhood that hopes to create a possible future that meets the needs of the people of Malmö, creates a potential for growth, and inspires food production on the harbour area. This project will analyse and create a holistic design proposal using the research, trends, and visions of Nyhamnen.

RESEARCH QUESTIONS

This thesis attempts to answer the following research questions:

1. Can brown-field neighbourhoods be utilized for food production?
2. How can food production transform an industrial area to a sustainable and liveable neighbourhood?

Ultimately, these research questions will guide the thesis direction and open the discussion about resilience, adaptability and the footprint of the city on Earth. The conclusions drawn at the end of the research process will formulate a system on which the design proposal will be based. The research and thesis work are focused on Nyhamnen, Malmö. Nyhamnen is a heavily industrialised neighbourhood located just north of the Västra Hamnen. As seen through google maps, it is dominated by cars and asphalt. With the application of the research interventions to the design proposal of the neighbourhood, a system for sustainable development can be brought to light.

Keywords: Circular economy, urban food production, brownfield transformation, urban sustainability, housing & development.

Introduction

Linear Economy

Humans in the past have evolved to build systems that have facilitated the human desire for building a complex society that adheres to basic human needs and more. We have extracted natural resources that fundamentally become a unit in the global supply chains that would meet the consumption of eight billion people. As (Nogueira, Ashton, & Teixeira, 2019) in their paper mention, “our limited capabilities to understand the dynamics of systems from which these resources were drawn has led to the creation of linear, fragmented models, in which resources flow in one direction creating significant and often irreversible negative ecological impacts.” This can be classified as a linear model that puts our planet at risk of global instability in the nearing future.

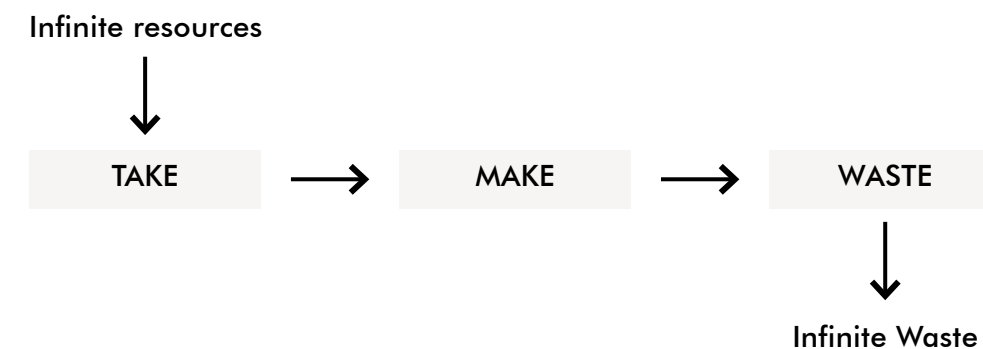
The linear model, in the past, has been quite successful in providing people with food, water, and other services. With a global surge in population and increasing pressure on global resources, access to these services would become a luxury for many. As brought to light in a report by Ellen MacArthur Foundation, as the global middle class more than doubles in size to nearly five billion by 2030, consumption and material intensity will rise accordingly. Symptoms of these constraints are currently most visible in the food and water supply. (Ellen MacArthur Foundation, 2012) This poses a potential threat to sustainability within cities and neighbourhoods. The linear model can be simply defined as ‘take-make-waste’, where finite resources are constantly being used for the production of goods for human consumption. After the utilization of the product, the waste usually goes into landfills or the oceans putting ecosystems in danger. Throughout the process, water and land are exploited, to extract raw materials to meet global consumer demand.

Circular Economy & Development

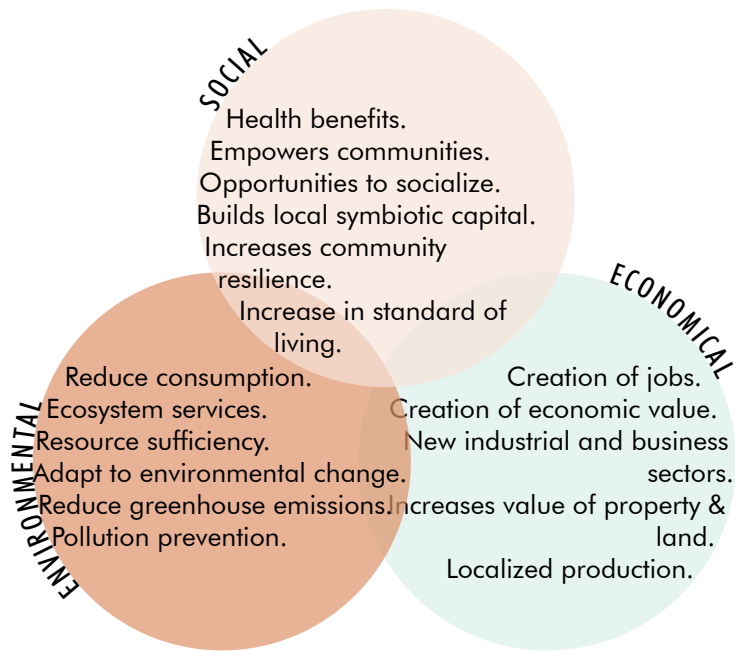
There is no static point in history which proves the initial emergence of the word circular economy (CE) but can be traced back to the year 1966. It can

be defined as an economic system of closed loops in which raw materials, components and products lose their value as little as possible, renewable energy sources are used and systems thinking is at the core (Ellen MacArthur Foundation, 2012).

In the past decade, the concept of circular economy has gained popularity among scholars and researchers working in development, environmental and economic studies. Although this is not a new concept, it stands out as a development model that comprises innovation, sustainability and competitiveness. It is taking a lead role in local institutions, government, associations and companies. (Cities of Tomorrow - Circular Cities, 2018) In March 2020, the European Commission Adopted a new circular economy action plan that aims to reduce global pressure on natural resources. The circular economy has laid its significance in the future of development. Circular development allows cities to adapt to shocks and long-term changes in the wider landscape, with minimal ecological impact. It aims to reduce urban resource consumption (materials, land, water, infrastructure, and energy), waste and greenhouse gas emissions whilst generating urban ecosystems and building urban resilience. (Williams, 2021) Numerous studies indicate that implementing circular economy (CE) development models in urban areas can provide sustainable benefits. This can be classified into three categories; environmental, social and economical. These three categories work together to collectively form a system that interacts with external conditions to form a sustainable model. Sustainability cannot exist in isolation but make different interdependent processes last longer.



Linear economy model as explained by Ellen MacArthur Foundation



Own edition of circular economy model diagram based on the principles of circular economy by Ellen MacArthur Foundation.

Relationship with Food Production

The global agriculture system is based on a linear model of economy. This is where the food industry is structured around finite resources, which pose a threat to future food needs. High energy consumption and waste production are key challenges of the 21st century. To overcome this challenge, it is necessary to transform our food system from linear to circular. The linear model of food would have been sustainable based on the presumption that the world has infinite resources, and infinite space to dispose of wastage. The world that we live in has finite resources and huge global waste is leading to the destruction of ecologies. Intensive agricultural practices are also a significant contributor to the 39 million hectares of soil that are degraded each year globally (an area the size of Zimbabwe) and place a demand on approximately 70% of global freshwater. (Ellen MacArthur Foundation, n.d.) These numbers are alarming and raise the need to pay more attention to food production. Based on several types of research conducted, it is evident that the current food system is not suitable for the 21st century and a new production method is required.



2.5 billion tons of food is wasted each year globally

If we talk about an existing circular food system in cities, then Gothenburg in Sweden is a good example how this transformation can be achieved. The Environmental Administrator in the city of Gothenburg looks at what needs to be done to achieve a sustainable local food supply while reducing environmental impacts on the wider world. If the food is produced and supplied locally, then the transformation from to a more sustainable food economy can be built in the long term. Such interventions are taken place in the city of Gothenburg. In Gothenburg, there is a lot of agricultural land and they are also at the forefront of urban farming. If you maximize the area where it is possible to grow circularly

and measure what could be produced, it is clear that Gothenburg can become self-sufficient in vegetable production. (Borneke, Gonzalez, & Gullström)

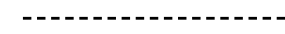
Wasteful Linear Production

Our current agriculture system contributes to more waste than people in certain parts of the world getting food. According to Ellen Macarthur Foundation, each year 30% of the food ends up in landfills i.e approximately 2.5 billion tons of food wasted each year. In light of this, it is a matter of social injustice to the area affected by food scarcity and hunger. Food is produced on a large-scale level for commercial supply. This results in overproduction and wastage of food by never reaching the local consumer. Conventional agriculture practices often rely on monoculture crops and heavy tillage, which can result in soil degradation and reduced soil fertility. To increase production, heavy usage of pesticides and chemical fertilizers is used which results in further degradation of fertile land. (Ellen Macarthur Foundation, n.d.)

The linear model has yielded great economic success in the past and worked for centuries by swelling productivity, enabling farmers to produce more desired crops for more money. Over the decades, it has increased job opportunities for people in the farming industry. The agricultural industry has been a catalyst for the world's greatest innovation and technological development. This has led to the new development of more efficient tools, equipment, and practices adding higher productivity and economic growth. But everything comes with a price, high economic development came at the soaring cost of our environment. The linear food industry's detrimental impacts on the environment and rural communities are significant. The future of our planet cannot afford to ignore it. Therefore, a transition from a great dependency on a linear food system to a more long-term beneficial and sustainable circular food system is the need of the hour.



70% of the
Food produced
is consumed by



55% of the
Population lives
in cities

Cities and Food

According to FAO, at least 55% of the world population currently lives in urban areas and up to 70% of all produced food is destined for consumption here. (Food and Agriculture Organization of the United Nations, n.d.) By the year 2050, food consumed in cities is projected to surge by 80% as per the EMF report. Urban areas are where most of the produced food is concentrated, and therefore cities provide a unique opportunity to introduce local food production as a medium for sustainable development. With a large number of skilled people, the workforce and commerce become a hub to promote sustainable agriculture methods. Cities can realise three ambitions to catalyse a circular food economy:

- Source food is grown, locally and wherever suitable
- Make the most of food
- Design and market healthier food options

Growing foods in close vicinity of urban development will result in more sustainable local options for food production systems. (Ellen Macarthur Foundation, n.d.) Cities can be made to grow their food for local supply using technology and urban design interventions. Urban food production may take

many forms such as community gardens, rooftop gardens, allotments and hydroponics. Production of foods within neighbourhoods can potentially lead to greener spaces within the city areas, cuts down the need for transportation of foods makes local produce accessible, and prevents the effect of the creation of heat islands. These are some of the urban solutions based on extensive research that can support the food needs of the ever-growing population. With the integration of these techniques, a neighbourhood that is fuelled by circularity and food production can be proposed.

A Circular City

“A circular city promotes a just transition from a linear to a circular economy across the urban space, through multiple city functions and departments and in collaboration with residents, businesses and the research community.” (Robinson, et al.) The aim of a circular city can be defined as ‘an act of consistently keeping people above in the system’. This can be introduced by long-distance sustainable transport, promotion of walkability and infrastructure that encourages less use of private cars within cities. There are several ways of promoting circular cities within a linear economy:

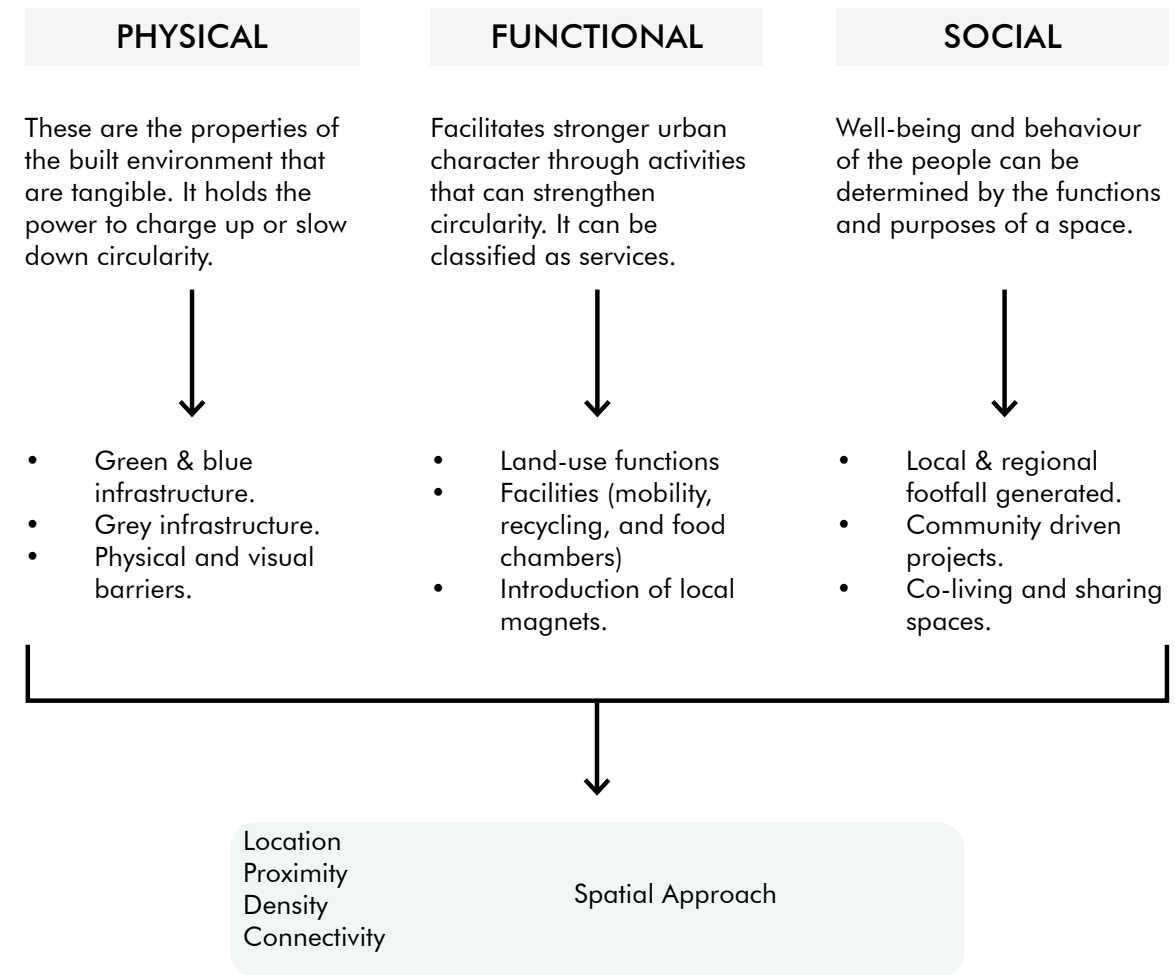
A shared economy: Circular cities aim to promote a shared economy, where resources are shared and reused, rather than consumed and discarded. This can include car-sharing, bike-sharing, and even tool-sharing programs.

Building green infrastructure: Circular cities aim to integrate nature into the urban environment by building green spaces, such as parks and gardens, as well as green roofs and walls.

Promoting compact, mixed-use development: By encouraging the development of compact, mixed-use neighbourhoods, circular cities aim to reduce the need for long-distance transportation and promote walkability and bike-ability.

Encouraging public transportation: In a circular city, public transportation is a key element of the transportation system. This can include buses, trains, trams, and even gondolas or cable cars.

Encouraging community participation: Building a circular city requires active participation and engagement of the community to ensure that their needs and preferences are taken into account in the planning and development process.



Thematic clusters spatialising variables relevant for circularity and urban designing. Own edition, based on ideas of Nieto, “Circularity in Cities.”, 2020.

Urban Agriculture

Urban agriculture from the lens of spatial planning can be placed within a city where there are ongoing plans for redevelopment or rejuvenation. It can be clubbed with housing, farmer's markets, food halls, etc. to generate vibrance within the community. A city's underutilised neighbourhood can be transformed into an agriculture-driven locality. These interventions can be made through roof-top farming and within the in-between spaces such as parks, community gardens, or public spaces. While urban parks and play areas are designed by the city municipality, it is the people (individuals or communities), who run and interact with these urban agricultural spots in a neighbourhood. (Meenar, 2017) These parks merged with urban agriculture, over many projects, have been expressed as green-corridors, eco-friendly transit corridors, green design, storm water management corridors, etc. Such projects are proposed and realised throughout Europe and other countries all over the world.

Housing and urban agriculture are closely linked to one another. Urban agriculture has been used to address equity issues as some city governments are encouraging developers to build public housing projects that include community gardens, greenhouses, hydroponic systems, and rooftop orchards. (Meenar, 2017) Other ways to maximize the benefits of the growing food within the city limits can be studied through sustainable development projects that bring together multiple functions.

Pathways to Sustainability

The Urban Insight by SWECO has talked about pathways of becoming a circular city and these pathways can be used as a catalyst to build the foundations of not only a circular city but also a sustainable neighbourhood. (Borneke, Gonzalez, & Gullström) They are mentioned below:

- **Mindset shift – the city as a shared space**
From refuse to reuse and recycling. Working with the behavioural change.
- **Ecological Resilience – the city as an ecosystem**
Closing the loops and focussing on ecological regeneration.
- **Track, Trace and Connect – the city as the driver of change**
Monitor and manage material flows, and facilitate stakeholder engagement.

- **Governance measures – lessons learned from circular cities**
Clear targets, value sharing and circular businesses enabler. A circular waste system strengthens a city's economy, creates jobs and enables innovation.

- **Systematic thinking – the next steps**
The importance of a holistic approach. Nothing is wasted and every resource is reused.

As mentioned earlier in this thesis, the benefits of adopting these ideologies into city or neighbourhood designs are environmental, social, and economic. Circularity does not happen over one night or even ten years. It is a series of decisions on planning, designing, governance, and public levels that fuel the shift piece by piece which can lead to less wastage and high quality of living.

Discussed next are the two examples around Europe that combine food production within the neighbourhood that generates economy and a lively area.

Los Perros Urban Farming / Malmö

In the heart of Malmö, there exists a small-scale urban farm dedicated to organic and machine-free food production. The farm supplies two renowned cafes and restaurants in the area, namely 'Flax-Café & Farmstand' and 'Pepper Pepper Deli'. These establishments have gained city-wide recognition for their commitment to urban agriculture, using bicycles to deliver their homegrown vegetables to various locations. Notably, they pride themselves on their use of hand-tools instead of heavy machinery. This exemplary case highlights the community's awareness of climate change and its impact on both livelihoods and the food industry. The farm owners' conscious decision to cultivate organic produce locally reflects their dedication to sustainable practices. These practices are happening within Sweden and has gained a lot of popularity. The urban farm/café is not only restricted to this but also generates an economy though selling their produce online through their website.

Los Perros Urban Farming in
Malmö
Source: Los Perros Urban Farming Website



Café de Ceuvel / Amsterdam

In 2012, the land was secured for a 10-year lease from the Municipality of Amsterdam after a group of architects won a tender to turn the site into a regenerative urban oasis. A sustainable development project in Amsterdam is an innovator's gem that left the ground cleaner than how it was found. The site was an old industrial area with heavily polluted patch that was a shipyard years ago. Today, the area hosts urban food production, offices, and cafes. De Ceuvel is a cultural urban hub on the cutting edge of technology, sustainability and art. We want to be the vanguard and a symbol of the social transition to a contemporary circular lifestyle. With our cultural programme we try to inspire and involve like-minded individuals into a growing movement of innovation and transition to a more sustainable city, country and world. (De Ceuvel, n.d.)



Café de Ceuvel aerial view
Source: Café de Ceuvel webpage

Conclusions

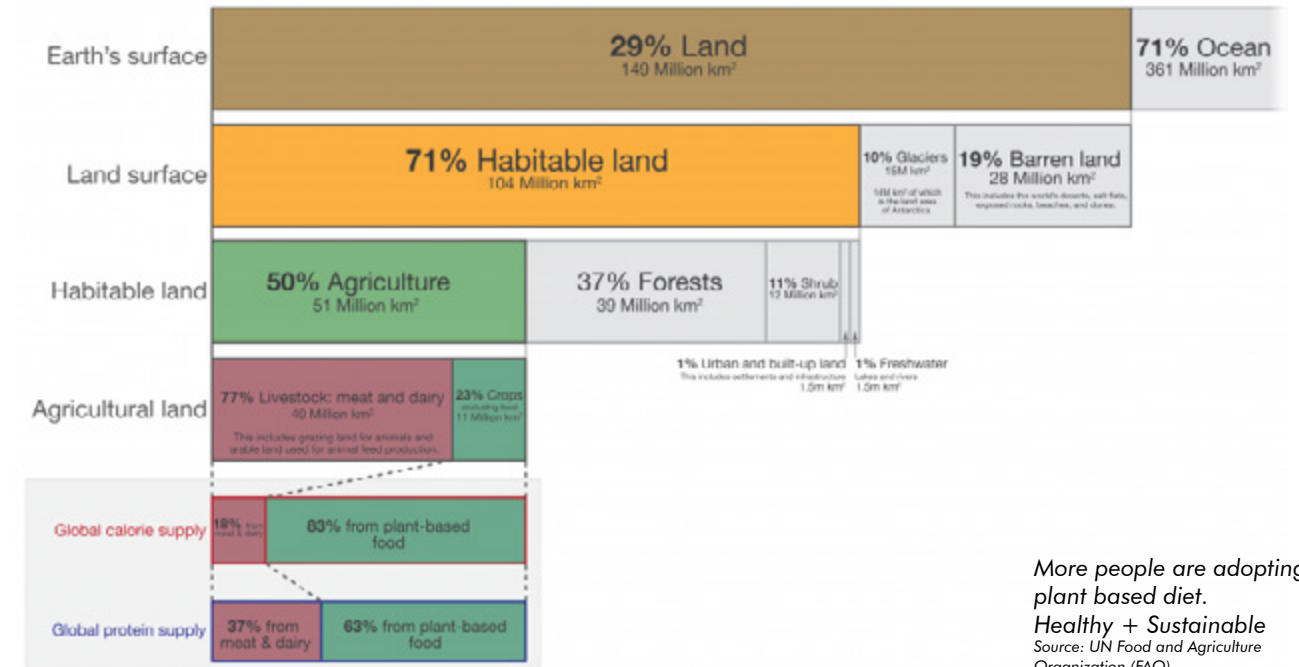
Mentioned above are two examples that are similar in principal but yet, different in its implications. Los Perros Urban Farm is based in the Skåne region with the most fertile soil in Sweden whereas Café de Ceuvel take the opportunity of regenerating an industrial land to create a food supported neighbourhood. When residents become aware of something "unique" within their city, it sparks curiosity and a desire to delve deeper into its core principles. By becoming customers of these organic cafes, which prioritize climate change and sustainability, residents not only enjoy their products but also actively contribute to the positive changes happening in urban farming. This engagement fosters a sense of community and empowers individuals to make a social impact through their everyday choices.

Spatial Requirements

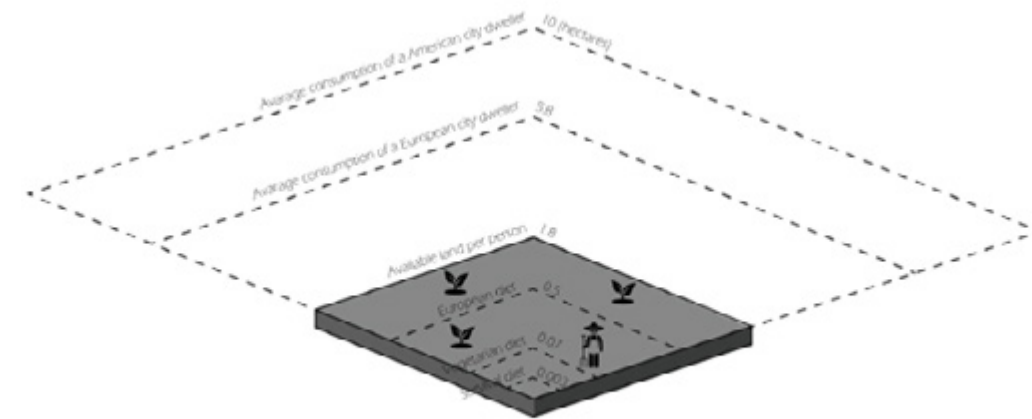
It is a crucial first step to understand the spatial requirements for a food productive neighbourhood's manifestation. Thus, background research is conducted on the current agricultural practices. As suggested in the spatial diagram by (Einarsson, 2021) in his thesis, the space needed to produce the minimum human survival diet is significantly less than a standard European diet. A person's survival diet would take up 0.003 ha of land whereas a standard European diet required 0.5 ha of land. This does not simplify things because as most of the population is moving and living in cities, so it is important to consider an average European diet spatial need. This exceeds the available land for a person by approximately 3.2 times.

From this perspective, it is crucial to adopt a less resource-intensive diet in order to equitably distribute global food resources among the entire population. For instance, a vegetarian diet, which requires only 0.07 hectares per person, would necessitate approximately 67% of the total arable land. In theory, an individual could survive on a mere 0.003 hectares, equivalent to 30 square meters of land, representing a mere 2% of the total arable land. While these figures offer hope, it is important to acknowledge that implementing such dietary changes on a global scale is a complex undertaking and may not require such extreme measures. Nonetheless, employing these figures serves as a means to comprehend the development of cities that provide individuals with the opportunity to achieve self-sufficiency. (Einarsson, 2021)

As we see in the table on the net page, plant based diet has a potential to provide us with the nutrients such as protein and calories one a more efficient scale as compared to the meat industry. Slowly, more and more people are shifting their food choices from a meat based to plant based. This means, that growing food (plant based) within the city boundaries is beneficial.



More people are adopting a plant based diet.
Healthy + Sustainable
Source: UN Food and Agriculture Organization (FAO)



Spatial requirements dependent on specific diets and consumptions
Source: Einarsson, 2021

Sustainability Efforts: Sweden

Towards Climate Neutrality

From being the country to host the first UN conference on the global environment to actively taking steps for the preservation of the wildness, Sweden has made large strides in climate action. It is not difficult for one to feel the country's inclination towards an inclusive environment for all.

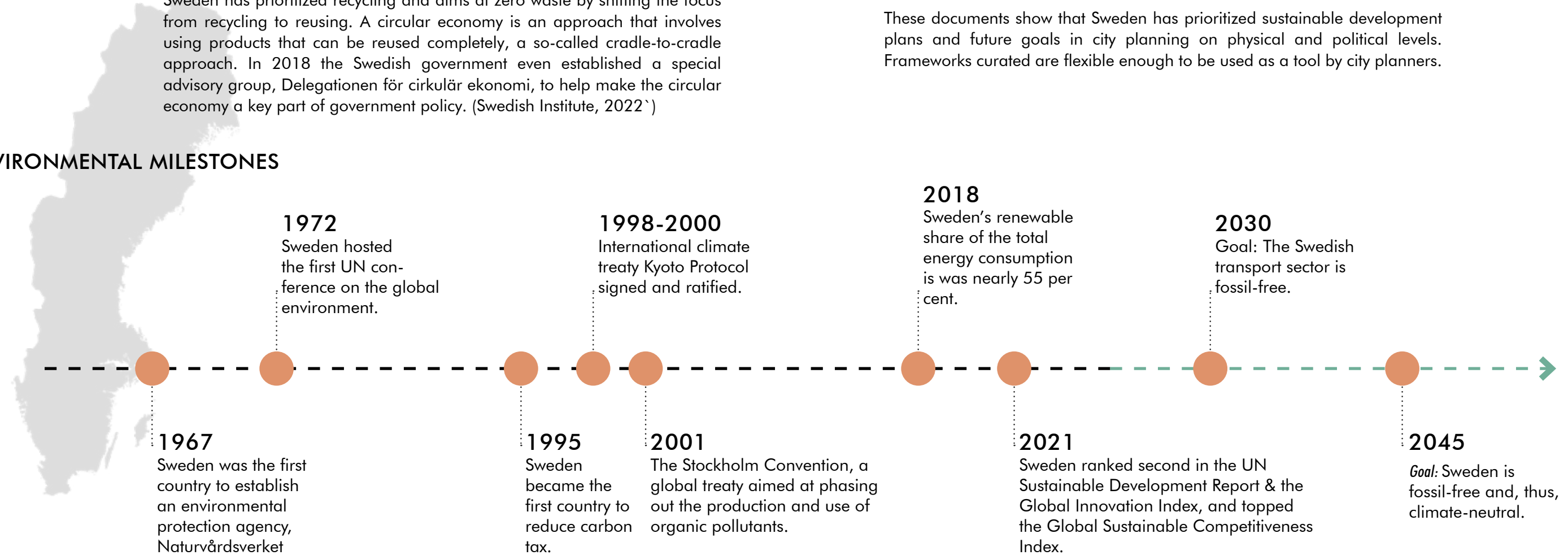
Sweden has prioritized recycling and aims at zero waste by shifting the focus from recycling to reusing. A circular economy is an approach that involves using products that can be reused completely, a so-called cradle-to-cradle approach. In 2018 the Swedish government even established a special advisory group, Delegationen för cirkulär ekonomi, to help make the circular economy a key part of government policy. (Swedish Institute, 2022`)

Development Goals in Sweden

Sweden has the vision to be one of the leading countries in the implementation of the Agenda 2030, as stated in Regeringskansliet. In June 2020, the government laid a framework on how the development goals can be integrated with Sweden's development, both nationally and internationally. Apart from this, Sweden has also adopted the New Urban Agenda. A report published by Global Utmaning, states the national thematic priorities as housing & basic services, social well-being, culture and mobility among other aspects necessary for a sustainable future. (Fabre, 2017)

These documents show that Sweden has prioritized sustainable development plans and future goals in city planning on physical and political levels. Frameworks curated are flexible enough to be used as a tool by city planners.

ENVIRONMENTAL MILESTONES



National Environmental Goals

As it is evident, Sweden understands the gravity of its role towards its environment. In response to the climate crisis, the country has set up its own environmental goals. The goals show the way towards sustainable development and constitute the environmental dimension of Agenda 2030. There are a total of sixteen Environmental Quality goals. They describe with specifications what constitutes a good environment for better liability. They can be considered a starting point for various policy instruments.

Sweden's environmental goals are based on Generational Goals, which guide the framework for environmental development at all levels. These goals aim to promote sustainable development on local and regional levels in Sweden. On a smaller level, the country has introduced "Stage Goals", to create easy steps to reach the generational goals.

- The proportion of walking, cycling, and public transport.
- Integrating urban greenery and ecosystem services in urban environments.

These two-stage goals will guide the framework for the strategy development in rejuvenating a former industrial neighbourhood. The other goals can be accessed at the *Sveriges Miljömål* official website. The other goals can be accessed at the *Sveriges Miljömål* official website. We see that Sweden has taken and done intensive measures to ensure the quality, sustainability and viability of outdoor environments. Along with these, Sweden emphasises the protection of flora & fauna found in the Swedish landscapes. These goals can further be localised and implemented as a part of various professions. In the profession of urban design and city development, the environmental goals are crucial during the early planning and conceptual stages. This practice becomes critical when future-resilient comes in the picture. "All actors in society need to increase the pace of implementing the urgent transition to a sustainable society." (Sweden's environmental goals, n.d.) For this thesis, I have considered the following development goals in the beginning stage of decision making of the future development design.

Following are the goals that I considered for my thesis:

- Fresh air
- Poison free environment
- Living lakes and streams
- Good built environment
- Limited climate impacts



Sweden's 16 environmental quality goals.
Source: Si.(2022, June 2)

Case Study: Västra Hamnen

Malmö over that past has developed and invested in Bo01 waterfront development. The city takes pride in its sustainable development and eco-friendly planning interventions. As illustrated earlier in this thesis, the shoreline of Malmö has been reclaimed from the sea, similar is the case for Västra Hamnen. The neighbourhood was built in 1987, with infilling of dock for shipyard activity. The vision and aim for the neighbourhood were to develop the neighbourhood as the face of the upcoming development and economics for the city of Malmö that aimed to offer “attractive to young professionals, reduce the level of unemployment and provide high standards of urban space.” (Jenkins, Smith, & Ferrari, 2012) The Västra Hamnen masterplan prepared by a professor at Lund University, Prof. Klas Tham had mixed-use buildings with 1000 residents, schools and leisure spaces. The masterplan also put emphasis on high-quality as well as wind protected urban spaces for the people.

The masterplan was a manifesto of three main strategies (Jenkins, Smith, & Ferrari, 2012):

High-rise buildings to protect the neighbourhood from highspeed sea winds.
The inner streets always leading to buildings to break the wind flow.
Landmark building i.e., Turning Torso (180m tall) designed by Santiago Calatrava.

These interventions within the neighbourhood made Bo01 a high quality and protected for the residents. Alongside this, the development of the waterfront boardwalk was intended to serve as a public space, and it has successfully transformed into a vibrant urban environment, offering a variety of amenities such as cafes, restaurants, and shops. This area has not only gained popularity among the local residents but has also become a favoured destination for city dwellers. The significant level of community engagement observed in Västra Hamnen can be considered a noteworthy accomplishment.

Key learnings from Västra Hamnen:

From the neighbouring example to Nyhamnen, the following learnings can be concluded:

- To create a lively and liveable neighbourhood the first step is to protect it from the harsh weather (in this case, the wind).
- Make the most of the conditions (geographical, climatic, social, etc.)



that the site/location has to offer.

- Identify the key players (existing universities, cafés & bars, restaurants etc.) and involve them into the planning stages to generate or boost the economy.
- Vision and strategies based on analysis of the area can form the defining bed for a successful neighbourhood.

These key learnings can be transferred to the similar development project within or even outside Sweden. Therefore, I take up these lessons into the design proposal for the upcoming neighbourhood of Nyhamnen.

Circular Sweden:

Conceptually, the circular economy has made a significant impact on the Swedish government and policymakers. Sweden's economy has started its transition from linear to circular. The government has formed strategies to direct long-term goals to ensure a sustainable transition. Ultimately, it aims to contribute to the national goal of becoming the world's first fossil-free nation.

The Circularity Gap Report (CGR), Sweden in collaboration with RISE and RE:Source has research that tell a tale of contradiction to Sweden's agenda to become a carbon-neutral country by 2045. As per the report, the pathway to achieve climate neutrality is to adopt circular economy. The researchers found out that the country funnels more than 266 million tonnes of materials into its economy each year, meaning that the residents consume more than twice as many materials as the global average: 25 tonnes per person, per year. It also sheds some light on the fact that 96% of the resources are extracted from virgin sources and therefore, threatening our planet's ecosystems and quality of life. (Circle Economy, RISE, RE:Source, 2022)

By actively incorporating circular economy within Sweden development systems, the country will ultimately consume less and become more sustainable. Building new neighbourhoods and providing food for a growing population provides urbanists and policy-makers with opportunities to reduce material use in Sweden (Circle Economy, RISE, RE:Source, 2022) :

- Construct a circular build environment: Retaining and refurbishing the built, making resource efficient constructions and shifting the energy consumption to optimise high value cycling.
- Cultivate a thriving food system: Consuming less and avoiding wastage, promoting a healthy diet, and putting sustainable food production and consumption into practice.
- Making manufacturing circular.
- Reshaping extractive industries.
- Drive clean mobility forward.
- Design conscious consumables.

The good news is that the Swedish government understands these challenges, and is coming up with innovative neighbourhoods that are based on these principles in Stockholm, Göteborg, Malmö, Linköping, etc. Thus, proposing solutions for new developments that tie together sustainable living based on the principles of circular living and food production could be one of the possible pathways to carbon-neutrality by 2045.

“By building a circular economy, Sweden can reduce consumption by 42.6%.”

- Circular Economy



The region has the most fertile soil in Sweden and consequently, has the highest agricultural production within Sweden.

Coastal city located on the west coast in Sweden. Home to more than a million residents. A city born out of industrialization as told by the harbour connections and coastline in Malmö.

Coastal city located on the west coast in Sweden. Home to more than a million residents. A city born out of industrialization as told by the harbour connections and coastline in Malmö.



1.5% full-time employment is in agriculture.

2.7 million hectares land is cultivated. This make up for **6.6%** of the total land area in Sweden.

Sweden, despite being located close to the Arctic circle enjoys favourable climatic conditions for food production. More than half of the country's land is covered by forest land and only 6.5% of the land is cultivated. Most of which is found in Skåne province towards the southern part of Sweden. Agriculture provides only 1.5% of total employment in Sweden with a decline in full-time employment.

Agriculture and Production

As per the data, Swedish crop production is mainly dominated by cereals such as barley, oats, and wheat. The production depends on geographical location and seasons. The south yields more crops and has approximately a hundred days longer growing season. Apart from traditional agriculture, fruits, berries, decorative plants, and vegetables are cultivated through horticulture. Green efforts by the country are commendable as being a part of the Scandinavian land, organic food production is pushed by the state. The government is an active investor in organic food production with a market share reaching 9.1%. One can see many initiatives by the residents of Sweden that not grow their food but also turn it into a meal. Such community-driven farmland within the urban boundaries can be found in Malmö.

It can be argued that as a way of building a sustainable food production future, Sweden can further push urban farming and growing food within the cities. Existing measures by the Swedish government and citizens are commendable, yet there still is space for improvement.



300 hectares of land cultivated with greenhouses



12 560 hectares of land has open-air cultivation



Physical Context

About Malmö

The city of Malmö is the third largest city in Sweden with a total population of about 357,377 (December 2022) located in the county of Skåne. It is the fastest-growing city in Sweden mostly comprised of young people, half of whom are under the age of 35. There is a high diversity within the city with people from 186 different countries. As the fastest-growing city, the population growth from 2021 to 2022 is projected 1.6%.

Malmö is a coastal city with historic significance as an industrial city that gained a lot of attention after its reinvention post-1970s. Today it is known as a cultural hub and a knowledge centre with its infrastructure and programmes. The harbour has expanded over the years because of high-level industrial activities. The in-land periphery supports a strong agricultural industry. The harbour provides opportunities for sustainable redevelopment responding to the current global challenges of liveable cities, waterfront regeneration and urban food production. The coastline of the city can be made accessible to the general public.

Location of Malmö

Malmö is situated at one of the prime locations within the Öresunds area in Sweden. It has great connections with Denmark through Öresunds bridge and the sea between the two countries. The region has one of the world's densest boat traffic trading off goods and imports.

Malmö Comprehensive Plan:

The municipality of the city has come up with a document that states the long-term city planning ideas. The main objective of the city is to achieve sustainability in social, economic, and ecological aspects. Along with this, the city aims to achieve a denser, closer and greener locality. Malmö aims to be a cultural and democratic area. In cooperation with Copenhagen, Malmö is planning to be the very first carbon-neutral area in the Öresunds region in Europe. As per the comprehensive plan, the future of Malmö is a dense and green city. To do this, the city must strengthen its relationship with the sea. Include it in its daily economics, and the municipality has plans to further enhance this connection.

- Öresund is the densest water traffic.
- Rich fishing in the area is the reason behind Malmö's establishment.
- Make the coast accessible to the public and have seaside development areas.
- Clean and healthy plant life.



Network of parks, and green corridors.



Local Analysis - History of Nyhamnen

Malmö has a historic background of being one of the earliest Scandinavian industrialised cities. The ports of the city have relatively modern traces in history. In the year 1775, Frans Suell took the initiative of building the Malmö harbour. Nyhamnen has served many purposes since then. Following are the facilities to which the harbour was used:

- Emigration
- Food handling
- Railway operations
- Ferry traffic

The question is mostly about the nature of activities going on at the site and how does it affect the ground. It can be studied through various sources that the origin of the Öresunds region has been rich with trade and fishing activities. Ocean trading kept on flourishing in Malmö until a war in the 17th century and early 18th century caused it to decline. This led to decay and abandonment of the area until the end of the 18th century when trade and ocean activities flourished once again.

As a result of industrialisation, the capacity of the ships had to improve. The construction began between the years 1894 and 1895. The development continued and finally finished in 1903. The initial function of Nyhamnen was to provide regular shipping traffic to and from several European harbours. Looking at Malmö's planning strategies appears to phase out the activities of the industrial nature. Therefore, the area is up for redevelopment for the future.



Coastline 1860



Coastline 1912



Coastline 1968



Coastline 2017



Nyhamnen in Malmö

Distances between Malmö Central Station and neighbouring cities of importance.

Site Dimensions

The city municipality has plans to redevelop the area of Nyhamnen into an upcoming commercial district. It is planned to be an extension of the existing commercial hub around the central station in Malmö. As per the development document, the vision for Nyhamnen is to create a 'sustainable district' by expanding density with mixed and efficient land use and an environment-friendly transportation system. Nyhamnen has a strategic location with proximity to the water as well as to the city centre. The neighbourhood is expected to have space for 9000 dwellings and 21 000 new and existing workplaces. The development of Nyhamnen will take several decades and the entire project is expected to be finished by 2050. (Malmö Stad, 2019) This is the same project year with the global population soaring to 9.3 billion. Therefore, Sweden needs to secure its food requirements. Analysing Nyhamnen from a lens of sustainable food production can be the catalyst of new urban development within Malmö.

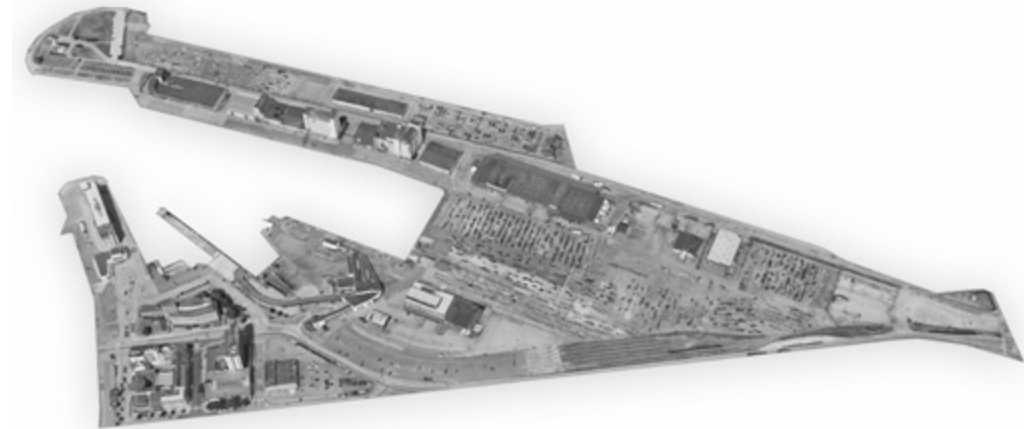
The site area is twice the size of other sizable developments based on the ideology of 'sustainable development' in Sweden i.e. Vallastanden and Hammarby Sjöstad. None of the two neighbourhoods works with circular food production whereas Nyhamnen provides sufficient space to land the finding of working with food production. The site is a 650m walk away from the central station.



Vallastanden, Linköping
Area - 18.7 ha



Hammarby Sjöstad, Stockholm
Area - 26.6 ha



Nyhamnen, Malmö
Area - 57.9 ha

Site Visit Reflections

Through my several site visits, in order to understand the physical dynamic of the site I documented my experience in form of an audio recording. In the excerpt below I talk about my first impression of the locality:

“I am walking inside a car park, mostly because there is no clear pedestrian walkway defined. I feel like I should be here. It does not feel safe, the neighbourhood feels quite isolated and far off from the city centre. I can hear the loud horn blaring from the ships in the nearby areas.”

Nyhamnen is only 650 m which is five minutes walk away from the central station. Yet, the five minutes long felt much longer as a result of the industrial nature of the locality. The lack of a well defined pathway for the people can not only lead to accidents but one might have a hard time finding their way in the neighbourhood. The structures present, including the built structures and urban infrastructure have a monotonic character. Being in a space that is not human-scaled is a unwelcoming experience. Through the photographs and images, it can be said with confidence that the are is in inhabitable conditions but has a lot of great potential. The future development plans that exist for Nyhamnen are focussed to make the are suitable for people to live-in.

There is a significant gap between the internet study and physical visit to the site. The first of the site was on a relatively sunny day but, the harsh winds can still be felt.



1

Infrastructure the is dominated by cars and supports car-centric activities. A threat to the green future of public transportation.



2

At the edge of Nyhamnen, a park with grassy ground despite the entire area being contaminated with bad quality soil.

3

The way that leads a pedestrian to the harbour areas of Malmö i.e. Västra hamnen and Nyhamnen. Pedestrian centric pathways do exist but not great of cyclists.



5

The site does not offer many access points. Most of the space are barricaded with heavy fencing meant to keep the general public out. These area are private owned properties.



4

Unkempt and abandoned built structures does not promote a sense of belonging or safety within the neighbourhood.



58.

6

There are multiple spots where one can clearly see the heavy influence of huge infrastructure mainly build to support cars or trucks.



59.

7

There are certain buildings with a unique character. Yet, these built structures do not house attractive functions.



9

After an ever-so-long walk, the edge of the site has a beautiful view of the sea to offer. This is where one would like to spend some time.



8

Misplaced urban furniture, I assume that it is in place for the workers in the area but its utility is in question based on the low density of the area. There is a good visual access to the sea and nearby buildings.



10

Visually striking of the new neighbourhood, Västra hamnen. The two neighbourhoods are not physically connected.





- Unwelcoming infrastructure.
- Barricaded areas with privatized zones and restricted zones.

- Old wheat storage building makes the cultural identity of the site.
- Preserving



- Regional and cultural development over time.
- Easy public access to nearest public park or courtyard.
- Access to local educational, recreational, health and food facilities.

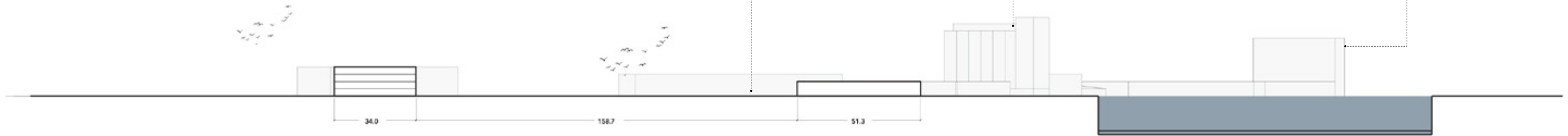


- Edge of Nyhamnen.
- Recreational area for the people working at Nyhamnen.

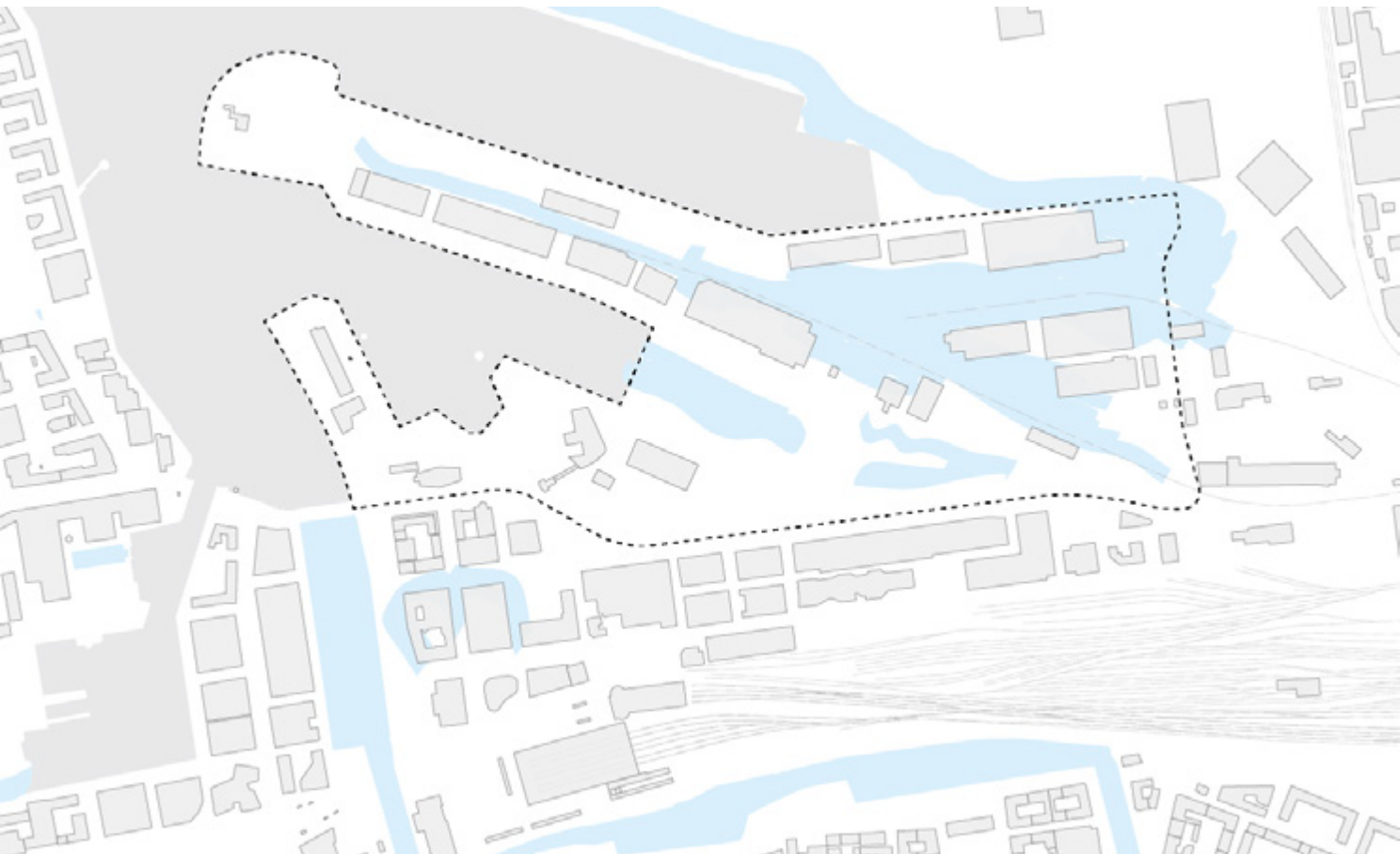
- Old wheat storage that defines the character of the space.
- Undefined spaces covered with asphalt.
- Lost in huge scale.



- Old salt factory transformed into commercial hub.
- Location for an existing restaurant.



Existing site conditions

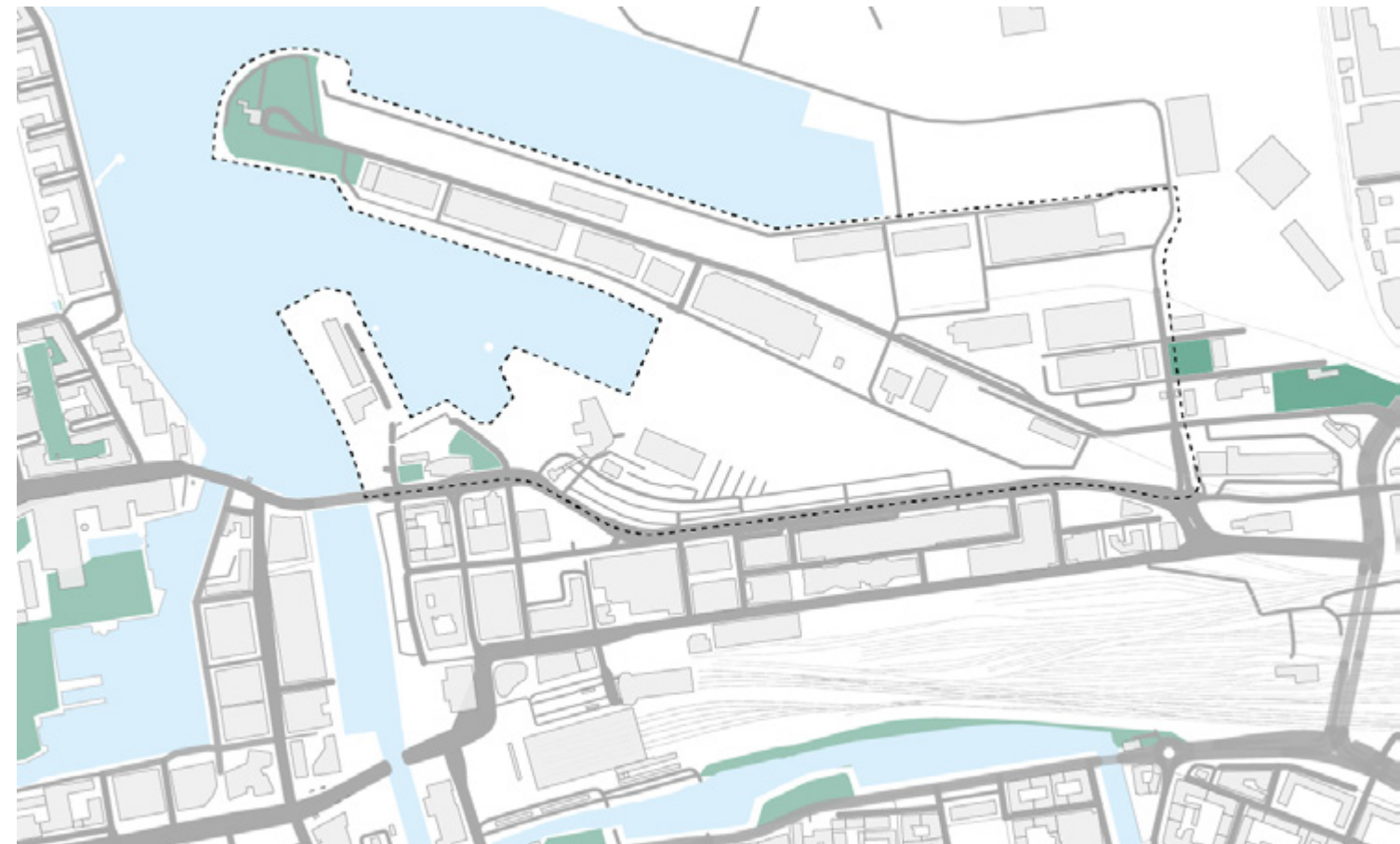


Flooding Map

- Flooded Area
- Water

Potential Future Flooding

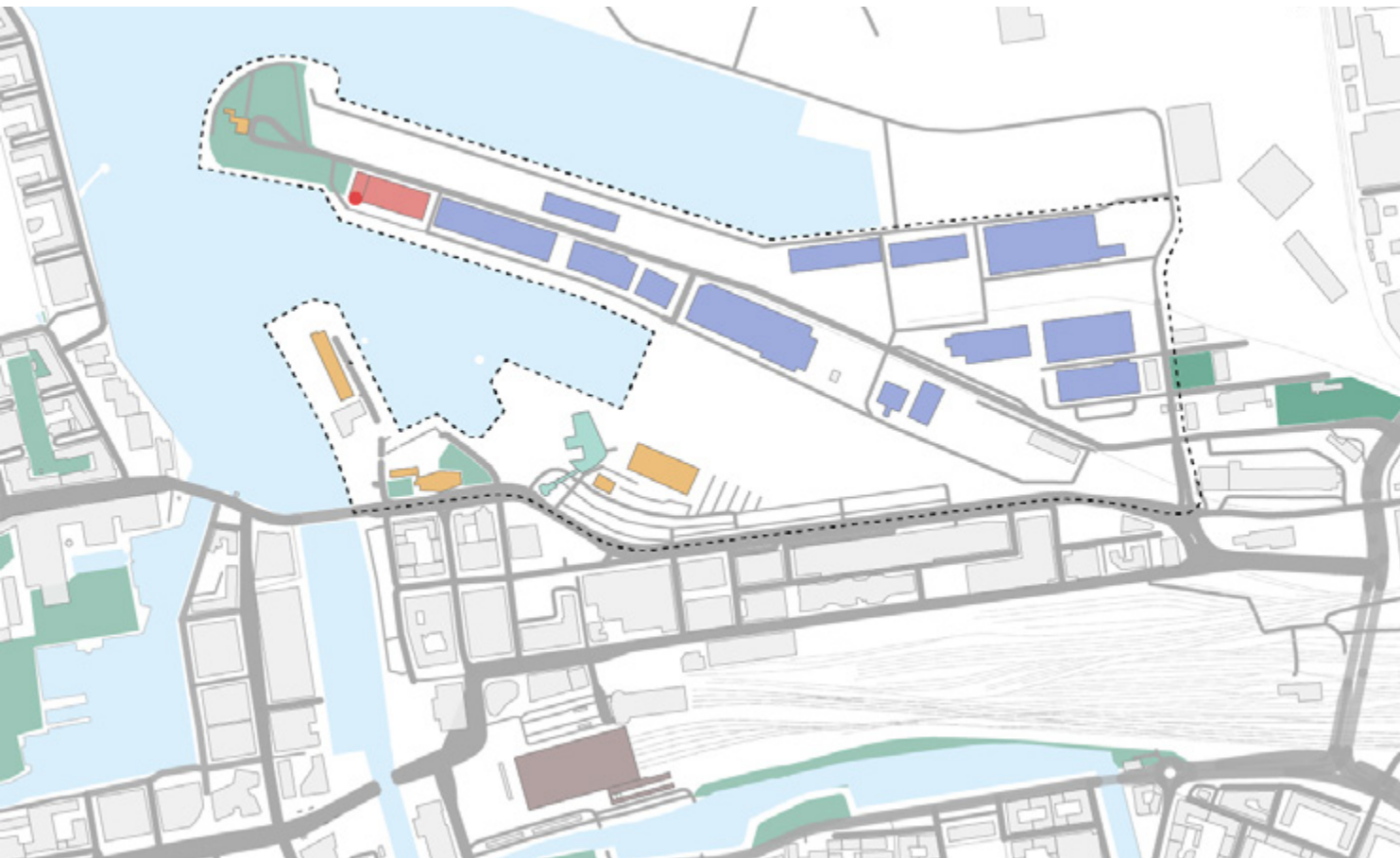
Studies have shown that the border in the harbor area can resist a rise of around 2 ms of the sea level, but above that the negative impact would be significant. The location of the potential flooded areas need to made interactive enough to deal with fishing, wetlands, etc.



Existing green and blue infrastructure

Green and Blue Infrastructure

It is quite evident from the exiting green and blue mapping that the site does not have significant spots that have vegetation. At the tip of the artificial land lies a green patch where we can see. This patch supports local lively activities and hold outdoor seating spots. The entire land is surrounded by water on three sides with close proximity to the new neighbourhood of Västra Hamnen. Yet, there are no water streams that penetrate Nyhamnen.

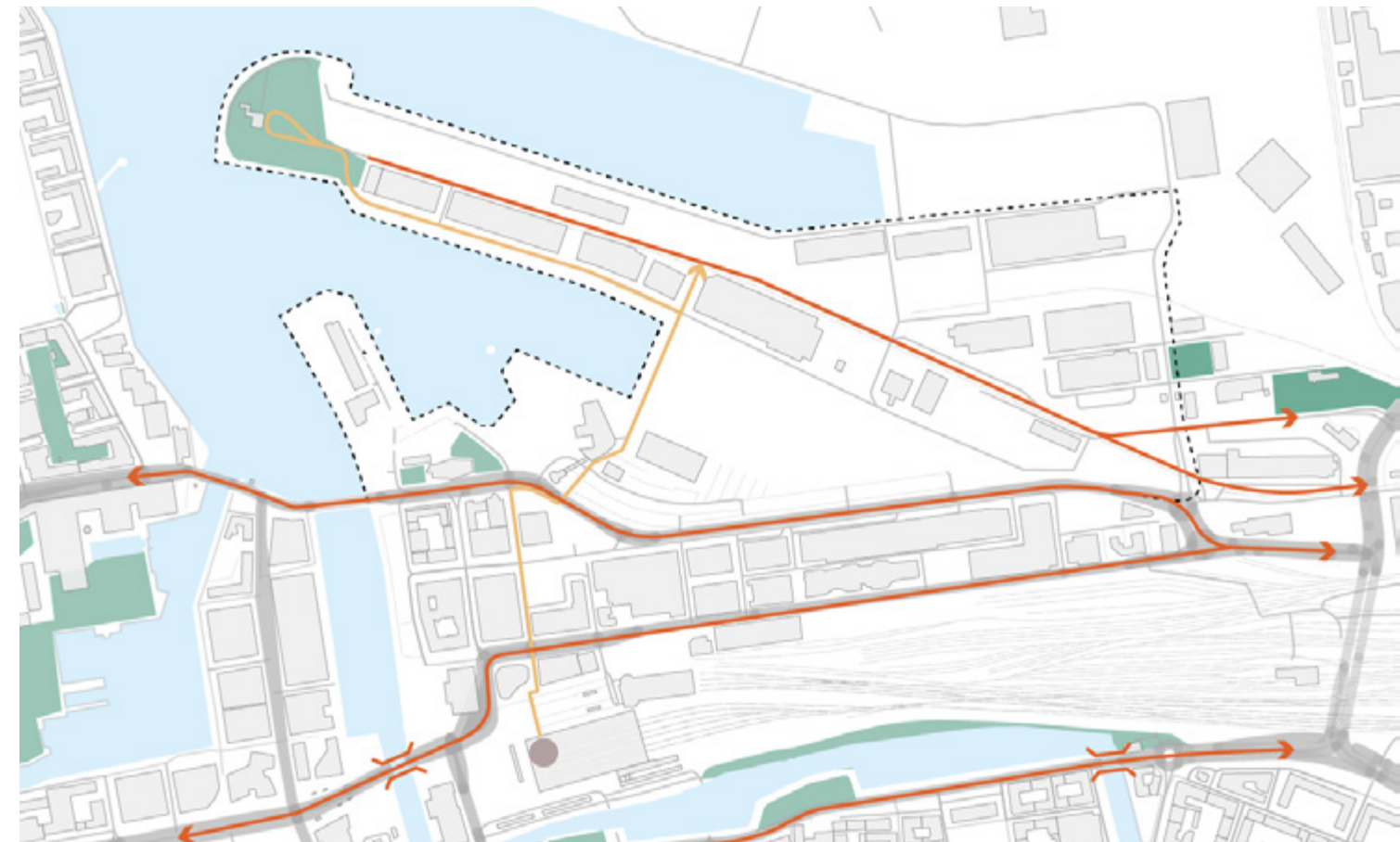


Current function map.

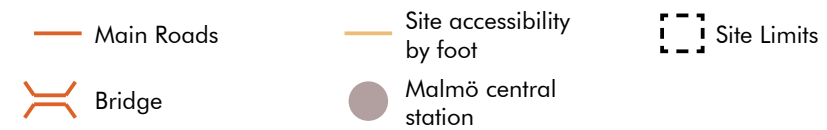


Functions

Functions map of Nyhamnen is a depiction of how public magnets surround the central train station in Malmö but there are no magnets in the neighbourhood of Nyhamnen. Addition of new functional magnets in Nyhamnen will potentially soar the footfall in the locality. Most notable functions spotted in the locality are storage warehouses. Offices, restaurants, and shops are the main activities that surround the central train station. These activities can be classified as high-commerce activities with a prime location.



Existing grey (road) infrastructure



Road Network

Existing road network supports heavy vehicular movement and does not facilitate cyclists or even pedestrians. It is difficult to access the site without a car, these are no bus or tram connections that can lead to Nyhamnen. Asphalt and concrete are the dominant materials, yet it is not supportive of human activities.

Yet, the road network around the central station is pretty strong with accessible ways for the pedestrians and cyclists.



Vegetation & Soil

The land of Nyhamnen has threat of soil contamination. This is due to its history of industrial activities and the fact that the entire land is artificial. Yet, Malmö has many redevelopments plans that deal with contaminated soil for future development. The ground is porous and the artificially filled. Therefore, making it a challenge to grow plantations in the area. (Sauer, 2017) Nyhamnen is prone to flooding in the future, and the neighbourhood needs to be prepared for the upcoming flooding crisis. Vegetation can be a method to mitigate flooding but the main problem is that having porous land makes it hard for plants to infiltrate themselves into the soil. There are large parts of the neighbourhood with hard surfaces that can be a potential risk of flooding. (Karlsson & Skagerling, 2017) There have some spots in the neighbourhood with weed growth.

One method that is in discussion for the re-mediation of contaminated soil is Phytoremediation. It is defined as the growing of plants as a tool to remove contaminants from the soil and water. Västra Hamnen had soil that was unfit for residences with high levels of contamination. According to Malmö municipality, the soil had to be purified after excavation. After the process, 75% of the soil could be returned to the area and 25% of the soil was further re-mediation. (Malmö Stad, 2021)

Another method of soil cleansing is to decontaminate the top layer of the soil (2.5 m) and replaced by class A soil. Further, another layer of 1.5m is should be added on the top, much like in Västra Hamnen. These steps are important to take in order to ensure a healthy production of any kind of vegetation. Plants and trees that do not bear fruit need an access to a healthy soil for a liveable neighbourhood. Jan Gehl mentions in his books that every house, apartment needs to have a tree in its line of sight. Therefore, considering the quality of soil and dealing with it is an important aspect for the future of the area and thus, these measures are sustainable in nature.

Saltimporten Canteen

The building that was once built to store salt for trade when Nyhamnen was an active industrial neighbourhood is now the home to a minimalistic canteen. The canteen is open two hours a day and serves food to the workers of Nyhamnen. This canteen is run by Ola Rudin and Sebastian Persson since 2011, that serves affordable and high quality meals to their customers. In an interview conducted with Ola Rudin, one of the co-owners of the canteen said that he is happy with the location and with the new development plan for Nyhamnen by the municipality while showing his worry of the place losing its exclusivity. In an interview conducted, he answered questions that were asked as a part of the thesis research:

How do people know about the place?

I don't have any particular marketing strategies, it is mostly word-of-mouth, Instagram. People when they visit the place, they share the photos for the other people. It became popular through food bloggers.

What is your experience?

It is fantastic. It would be nice to have more bridges to go over to the sides. It is nice to be off the grid but the accessibility will be increased.

Would you like to grow your own food?

It is hard, maybe I can grow my own herbs. I would be interested to grow food on a small scale. It takes a lot to grow food on a larger scale. I work with the local farmers and growers of vegetables.

It can be concluded that Saltimporten Canteen is an existing node within the neighbourhood as it attracts customers not only from the area but also from the city of Malmö. Much like Los Perros Urban Farm, this place holds the potential to become a local food-related district that attracts people and boosts the local economy. I see channelising the waterfront and the south-west facing windows as an opportunity to create a board-walk along the waterfront. This would increase the commerce as well as invite more people such as Ola to invest in the neighbourhood with their small businesses. The role cafés and bars play to maintain a dynamic city life is crucial and should be explored more not only in Nyhamnen but also in other places.



S

- Nyhamnen is situated protruding into the sea. The close proximity of the site can be built on strategically.
- Geographical proximity to Västra hamnen. Although this is purely physical and not physically accessible.
- Walking distance from the Malmö central station with a total distance of 650 m.
- The site is close to a well established commercial hub.
- Nyhamnen has a significant history and some of these buildings have an unique character.
- An existing restaurant and park at the edge of the artificial land.
- Auditory senses are engaged with sounds of birds and water.

W

- Due to heavy industrial activity, the soil is contaminated making it hard for flora and fauna to flourish.
- The site is deserted and lacks public magnets to generate a larger footfall.
- Nyhamnen, due to its history has an industrial character with neglected built structures.
- The site lacks a sense of safety due to fencing, enormous machineries, and restricted accessibility.
- Asphalt and metal dominated urban character.
- A lot of hard surfaces gives high chances of flooding.
- Ground is porous.

O

- Nyhamnen has a strategic location bring in life from the neighbourhoods i.e. Malmö city centre and Västra hamnen.
- High potential of integration and accessibility with public transportation.
- Rise in commercial activity through introduction of mixed-use functions, residences, and businesses.
- Due to begin a former port, it has a high value nationally, locally and regionally.
- The site as substantial undefined and grey areas which can be developed.

T

- As the land is claimed from the sea, there is a high potential of flooding and rising sea levels.
- There is a possibility of high speed winds in the site as it is next to the sea. This causes a threat to the thermal comfort of a the people.
- Loud blaring ship horns are audible from the neighbouring port.

Vision and Strategies

A Sustainable Future

The vision for the redevelopment of the neighbourhood based on the data studied and analysed is to introduce Malmö to a sustainable and circular neighbourhood. This can be done by harnessing social, economic and ecological strengths enjoyed by the city such as a great location for production and public participation. Urban food production in form of open-air horticulture, aquaponics and greenhouses is a catalyst for a sustainable and food-secure future. Integration of its working principles would give birth to a new development project prototype for neighbourhoods to follow. The vision is to integrate Nyhamnen into the built city centre with perks of locally grown food and food-related education opportunities for the public. Supermarkets, cafes and bars, restaurants, and community-driven horticultural gardens encourage urban agriculture.

Nyhamnen, is a prototype neighbourhood in Malmö that is self-sufficient and prudent based on circularity. It supports food production, community living, and ecological preservation.



Vision collage for Nyhamnen's rejuvenation



Aquaculture

Farming of algae oysters, and fishes



Food Markets

Production and sale of locally produced food products.



Educational Facilities

To educate people about the food production methods and consumption.



Open-air Horticulture

For production of herbs, tomatoes, lemons, ornamental flowers, etc.



Housing

Addition of housing typologies that work with food production and to invite people for a vibrant district.



Public Parks

Parks and pocket parks to enhance public activities and interaction.



Gardens

Gardens that preserve and tell about the methods of urban agriculture to the people.



Terrace Farming

Private/shared farming on the roof tops of residential/mixed-use buildings.



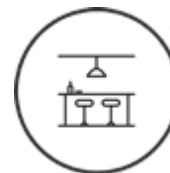
Community Farming

In courtyards or shared semi-public spaces.



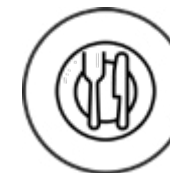
Greenhouses

Small to medium scale farms that grow food all year long.



Cafés & Bars

Actors that attract people from different neighbourhoods.



Restaurants

Food produced at Nyhamnen served at restaurants in the neighbourhood.



Shops & Commerce

In courtyards or shared semi-public spaces.



Offices

Local businesses that create a vibrant environment.



Waterfront Public Spaces

Activated connection of the people with the harbour,



Wetlands

Spaces that are responsive to floods and rain-water catchment areas.

Phytoremediation Plants



Black mustard



Indian mustard



White Willow



Indian grass



Sunflower

Foods suitable for urban farming



Cucumbers



Broccoli



Kale



Peas



Spinach



Bell pepper



Blush tomatoes



Basil



Chives



Celery leaves

Soil Treatment Procedure

Heavy metal accumulation in soil has been rapidly increased due to various natural processes and anthropogenic (industrial) activities. As heavy metals are non-biodegradable, they persist in the environment, have potential to enter the food chain through crop plants, and eventually may accumulate in the human body. Owing to their toxic nature, heavy metal contamination has posed a serious threat to human health and the ecosystem. Therefore, re-mediation of land contamination is of paramount importance. Phytoremediation is an eco-friendly approach that could be a successful mitigation measure to revegetate heavy metal-polluted soil in a cost-effective way. To improve the efficiency of phytoremediation, a better understanding of the mechanisms underlying heavy metal accumulation and tolerance in plant is indispensable.

Mentioned are some of the plants that can be grown at the site to help take away the toxins from the ground and make it fit to grow food.

Biodiversity Enhancing Plants



Iris



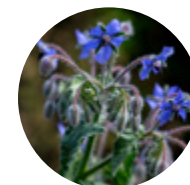
Oak



Water lily



Beech



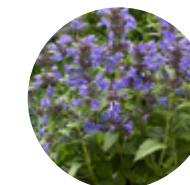
Borage



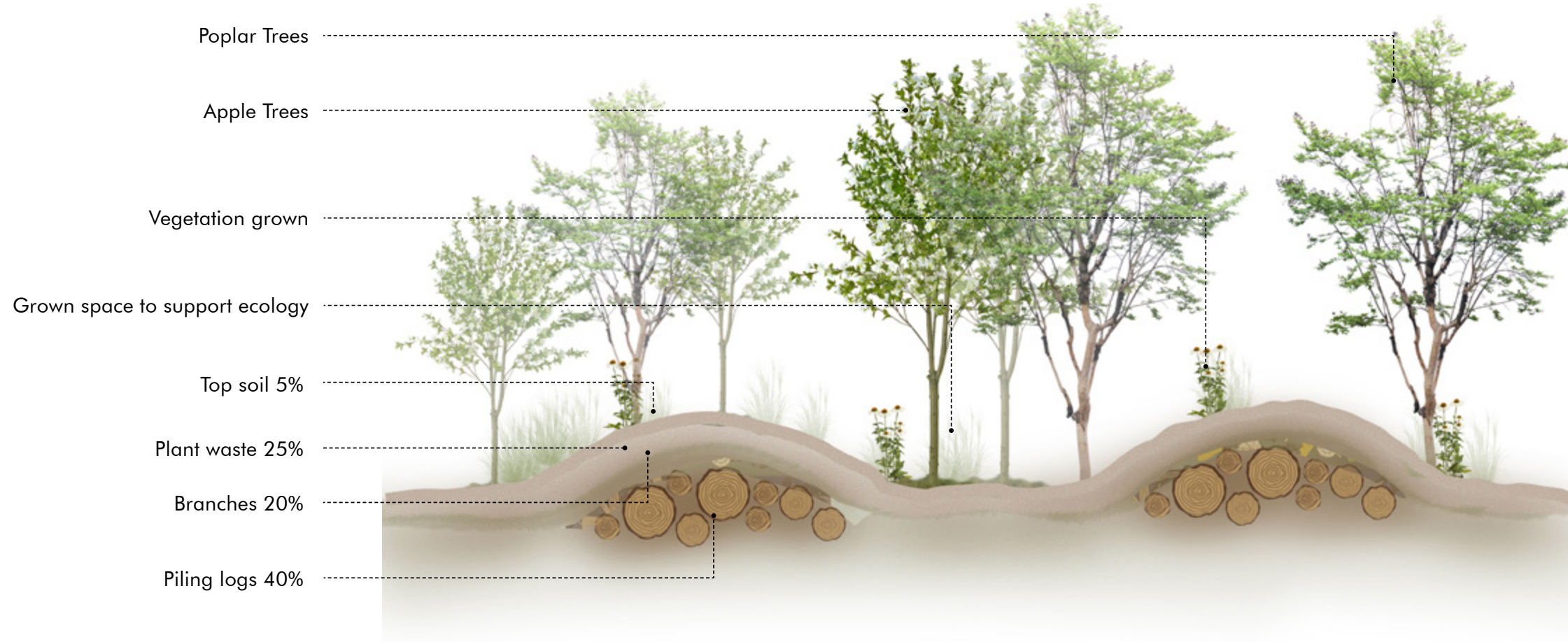
Crocus



Daisy



Nepeta



Hugelkultur

Hugelkultur is a method of growing urban vegetation in which the discarded tree logs are used to provide nourishments to the plants. When the fungus attacks the logs, it creates a warm and moist environment for the plants to grow. This can exceed the lifespan of the plant grown by more than 20 years. This method is mostly adopted from Germany and can be helpful in cold countries' urban environments.

Other benefits that come with adoption of hugelkultur as a method of growing plants is that along with utilizing the decomposing materials, its

is a good source of storage of rainwater. The rainwater is stored and used during drier days. Woods that work well with this method of nourishment are Alders, apple, aspen, birch, cottonwood, maple, oak, poplar, willow (make sure it is dead or it will sprout).

Neighbourhood Approach

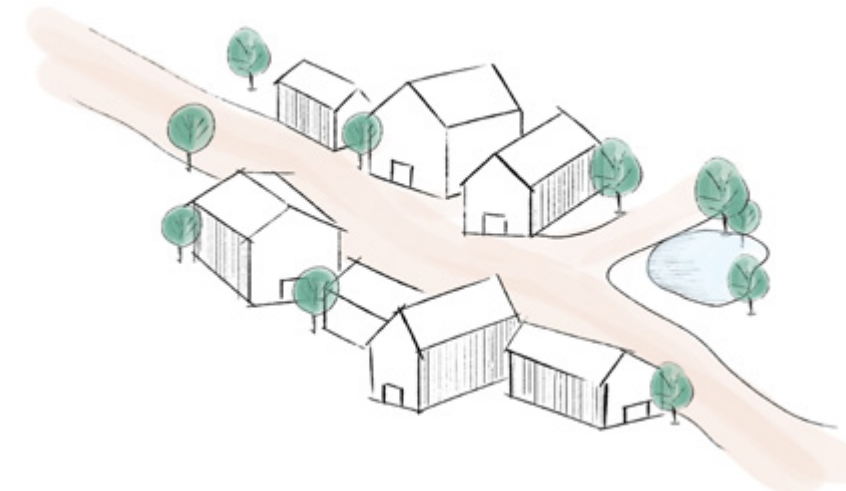
The approach to achieve the vision of a vibrant and food-charged neighbourhood is based on the following three physical factors; people, harbour and food production. Food production provides an opportunity for the rejuvenation and higher quality of biodiversities and an interaction with water can therefore supports the proposal. Integration of existing features with new development aims to bring people closer to the environment through a well integrated area. The approach of people, harbour and food production is a perfect ground to create these opportunities.



Link between people, waterfront, and food for the site of Nyhamnen.



Standard Urban Typology



Standard Rural Typology



Mixed Typology



Design Proposal

Design Proposal - Nyhamnen

It is evident from online sources and research data that the world is fighting another pandemic of unsustainable food production practices. Therefore, this project takes the opportunity of viewing Sweden's former industrial neighbourhoods and its development plans under the lens of circular food production.

The proposed masterplan for Nyhamnen is strategized with a sensibility of the food localizing the food production and distribution.

This is done in two major phases:

- Contaminated soil treatment
- Production and development

In the first phase, the contaminated soil is taken care by methods discussed in the research chapter of this project. One of the methods adopted is through phytoremediation. The soil cleaning plants are grown to reduce the toxins within the soil that makes the area unfit for any type of plant growth. After the soil is free from toxins and the ground stable for vegetation growth, the second step is to add lush vegetation and horticulture facilities to the locality.

The vision for the neighbourhood is to introduce housing areas and integrate it with the city of Malmö. This is achieved by taking an advantage of the proposed bus line and adding people friendly streets connected to the Malmö central station further south. Housing units with variation in typologies are added.

The second phase of the site is introduction of houses that are mixed-use typologies as well as inviting bidders for investment in the neighbourhood. This development is aimed to be near completion by the year 2045.

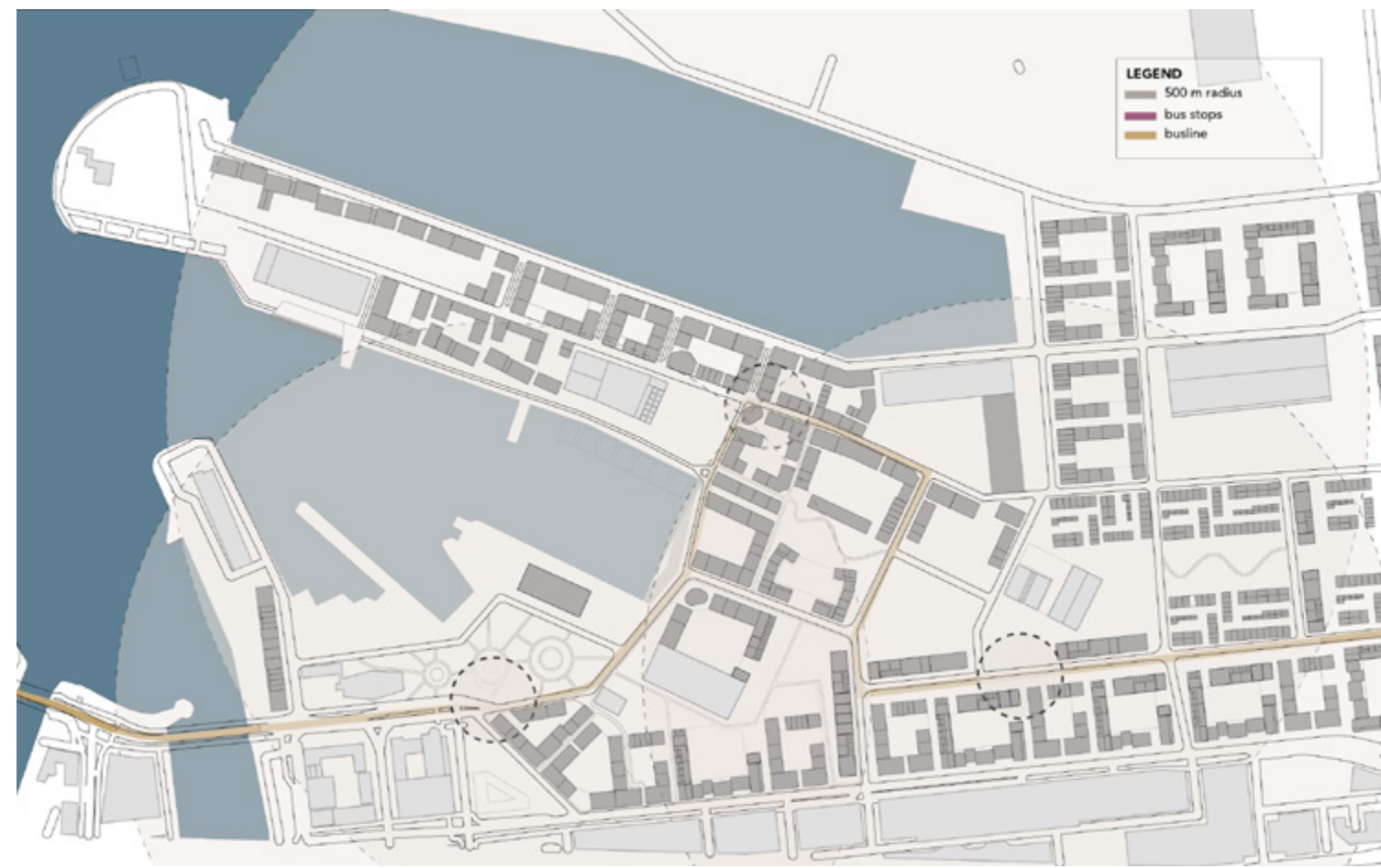


Green connections

■ Added green connections

Green Connections - Walkability

The green connection is retaining the character of the area while added green is creating a connection within the neighbourhood. This enhances the walk-ability and urban farming nodes inside the enighbourhood.



Bus stops added

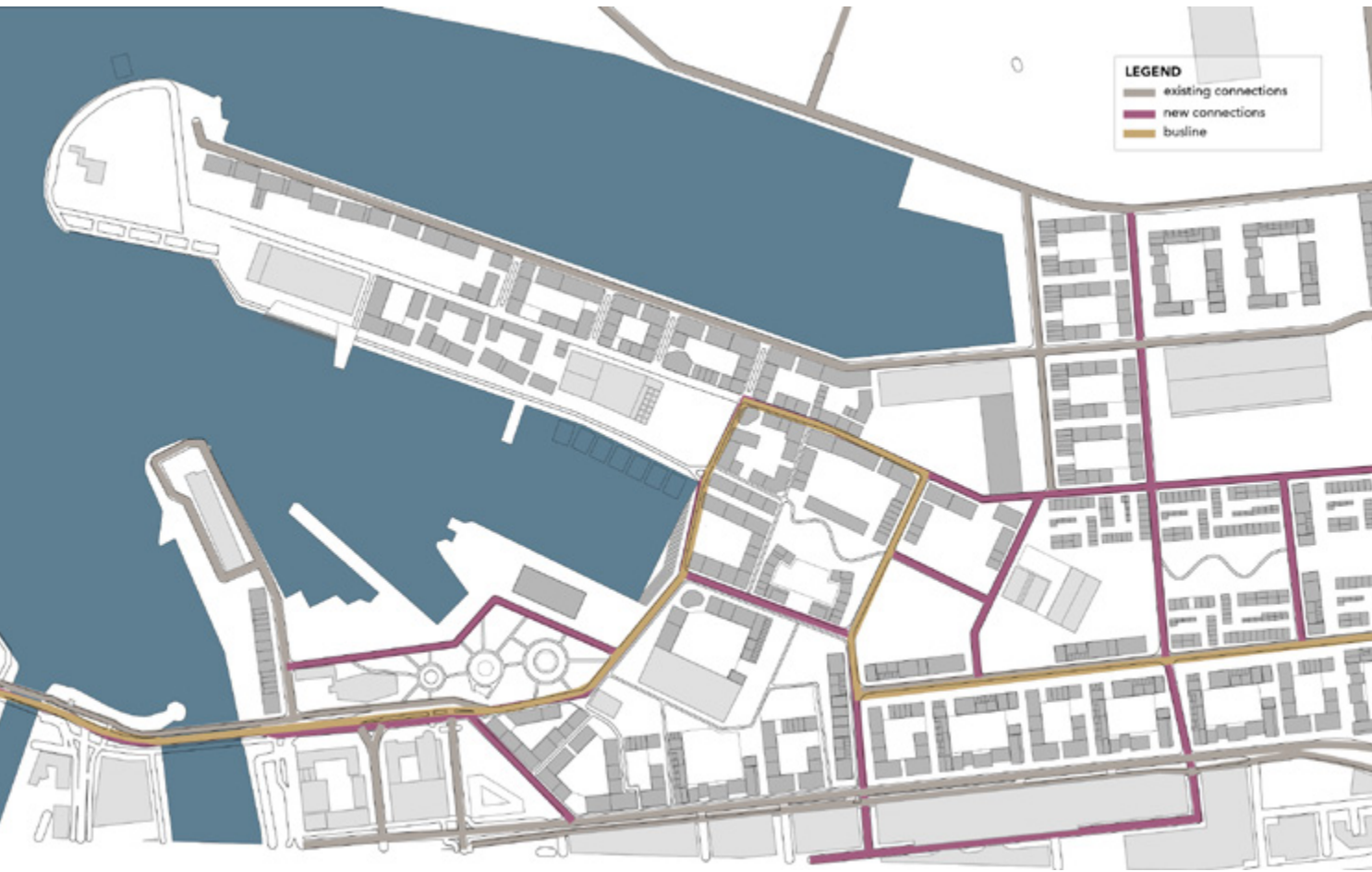
○ Bus stops

— Bus line

● 10 minutes walking distance

Added Bus Stops

Three bus stops are introsuced in the area that cover most of the neighbourhood in a 5 minutes walk. The mamximum distance from a bus stop till the edge is 500 m.



Grey Connections



Enhanced Grey Connections

I have added and made a stringer network of the grey or the roads. These roads are seen as arteries that further enhance the area and its connections.



Waterfront Access



Waterfront Access

Access to the public area and the waterfront is given a high priority as zones to mingle and interact with people.



📍 Master Plan 1:2000

Landscape Strategies - Human Scale

As Jan Gehl mentions in his book 'Cities for People', "life, space, buildings – in that order, please". Therefore, it is not sufficient to create a masterplan from a bird's eye view that works great on paper but does not attract people and life. For this neighbourhood, and its connection to the human scale, the urban settlements is along the trails of pathways, gardens, courtyards, etc. (Gehl, 2010) In order to achieve the same, a separate set of landscape strategies have been adopted to ensure the integration of urban food production into the city planning and development. These landscape strategies can be adopted for a similar neighbourhood development project.

01



Waterfront Connection:

1. Create a meaningful connection with the water.
2. Extension of urban life into the water.
3. Reclaiming the water with life.

02



Local Food Production:

1. Locally produced and marketed food.
2. Generating a micro economy of the neighbourhood.
3. On the trajectory of self sufficiency.

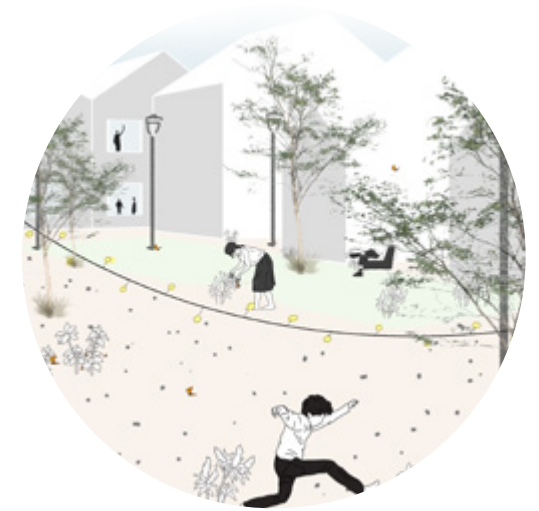
03



Ecological Rehabilitation:

1. Cleaning the ground of pollutants for vegetation growth.
2. Land and resources utilized for food production.
3. Establishing communities revolved around food.

04



Shared Community:

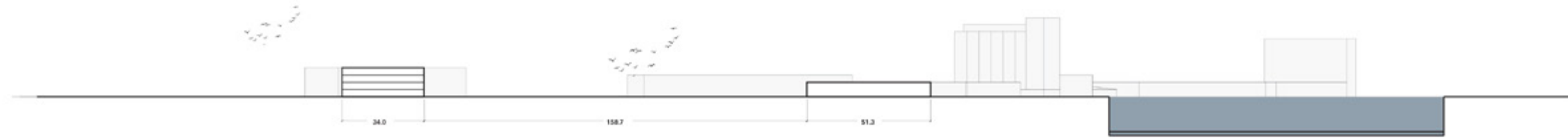
1. Regional and cultural development over time.
2. Easy public access to nearest public park or courtyard.
3. Access to local educational, recreational, health and food facilities.



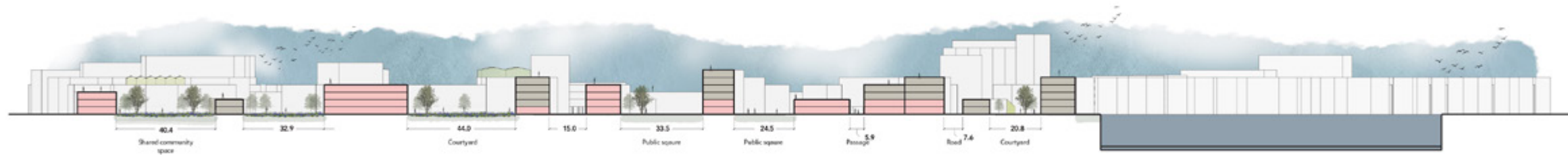
In order to adopt a clean energy flow within the neighbourhood, number of solar panels have been installed on the building tops that are south-west facing. The energy produced is further used in greenhouses. Apart from this, storm water is collected in water bodies within the courtyards and further re purposed in the greenhouses as well in building water supply.

This is a diagrammatic depiction of the resource distribution within the neighbourhood of Nyhamnen.

Energy Flow Assessment



Section with existing built structure



Section with new development

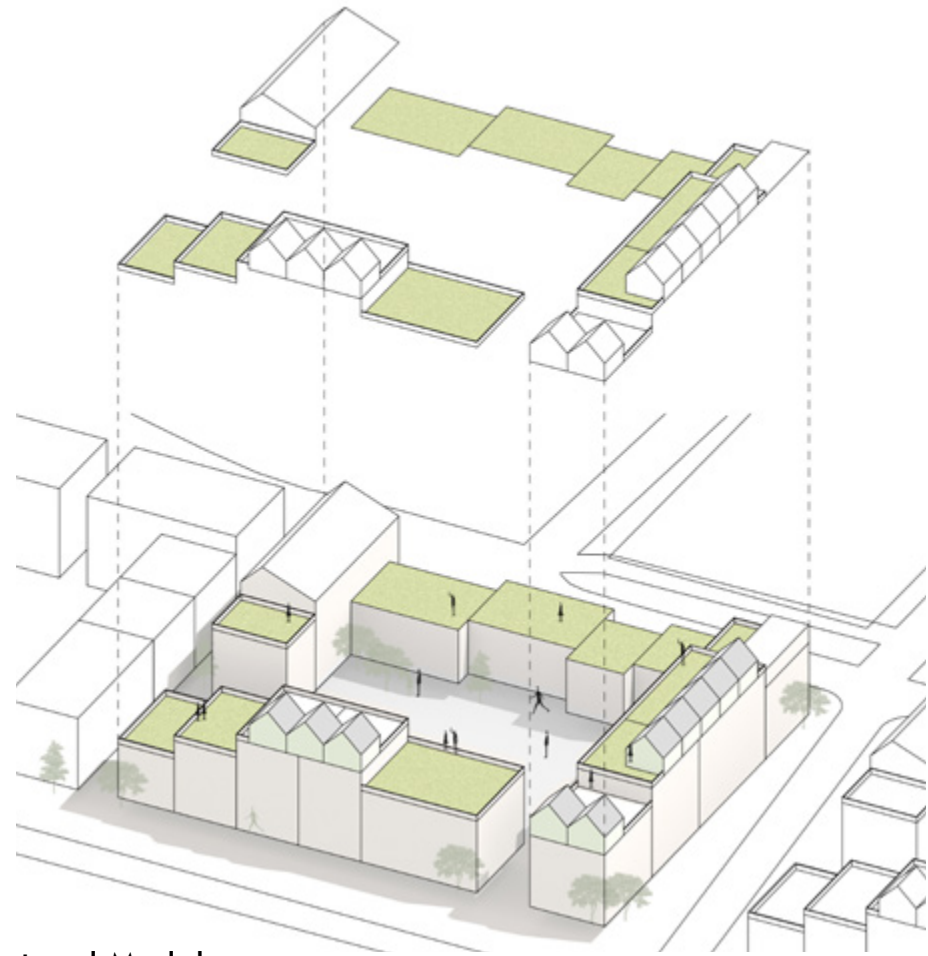
Detailed Plan - I

The first detail plan shows a closer look of a neighbourhood that is dominated by residential buildings that range from 2-3 floors. The proposed bus line is passing through the area which is further connected with residential areas. The bus line is 7m wide with bike-ways and pathways on each side. Along the building façades, there is an introduction of a neighbourhood public space with bakeries, cafés and bars that use the food produced within the courtyards and public parks. This generates a node for the public interaction based on the people's movement and activities.

The detailed plan area includes the following functions:

- Row housing
- Courtyard module
- Restaurants
- Cafés & bars
- Garden (food producing)
- Parks and recreation areas

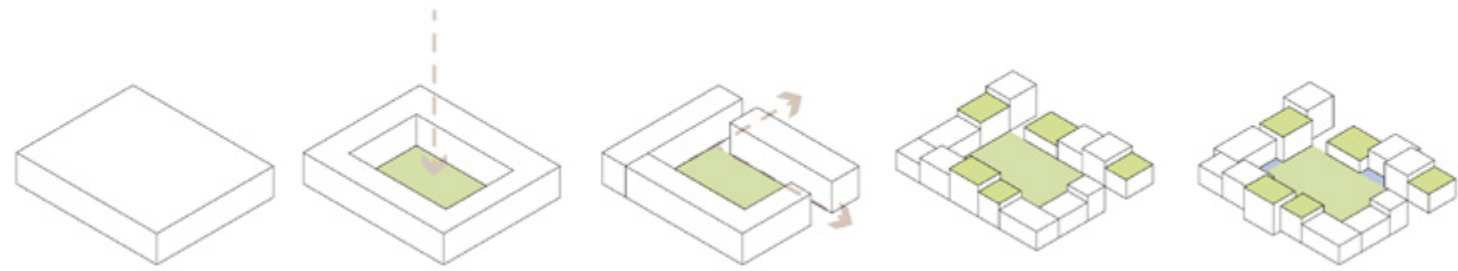




Courtyard Module



Section A-A'



A block (78x64x12)

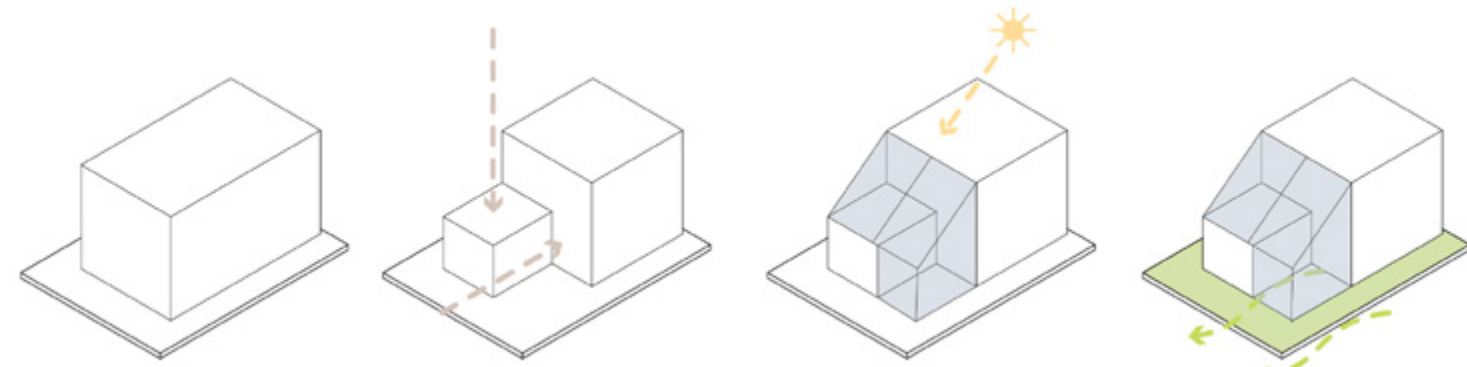
104.

Create a void for courtyard

Introduce flow

Introduce roof profiles

Move blocks to create niches



Row House (65-70 sqm.)

Sun access & private garden

Greenhouse effect

Green spillage to the street

105.





⊕
Detailed Plan II 1:500

Street Hierarchy

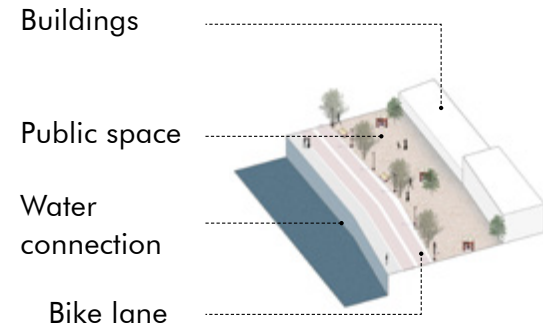
The roads that follow go within the neighbourhood follow a hierarchy depending on the function and the type activity it supports.

Street classified as below:

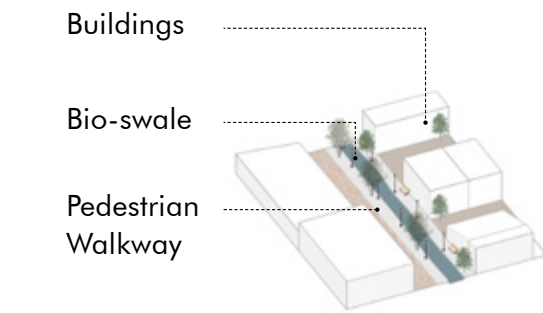
- The first street is a connection between the land and the waterfront, with spaces to interact and move from Nyhamnen to Västra Hamnen. This is further integrated with open public spaces to create zones for people to interact. This is also a connection to other areas through bike connections.
- Second street is used to soak-in the storm water with a bio-swale and buildings that face the street. A slow, yet protected from the wind zone.
- Finally, the third is the car friendly road for vehicular access for the residents.

Courtyard Module

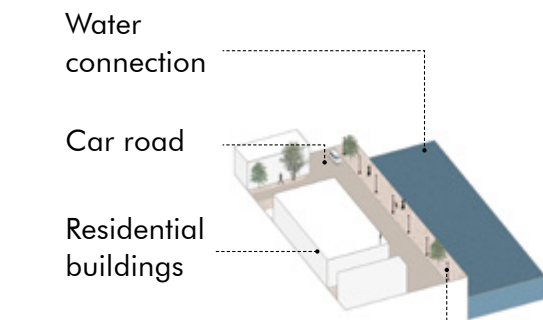
The courtyard module design integrates building energy systems and greenhouses, aiming to optimize energy utilization and enhance sustainability. The energy diagram illustrates the efficient distribution and utilization of energy within the module. Additionally, the design incorporates a rainwater harvesting system, which collects and stores rainwater for use within the building and greenhouses, contributing to water conservation efforts.



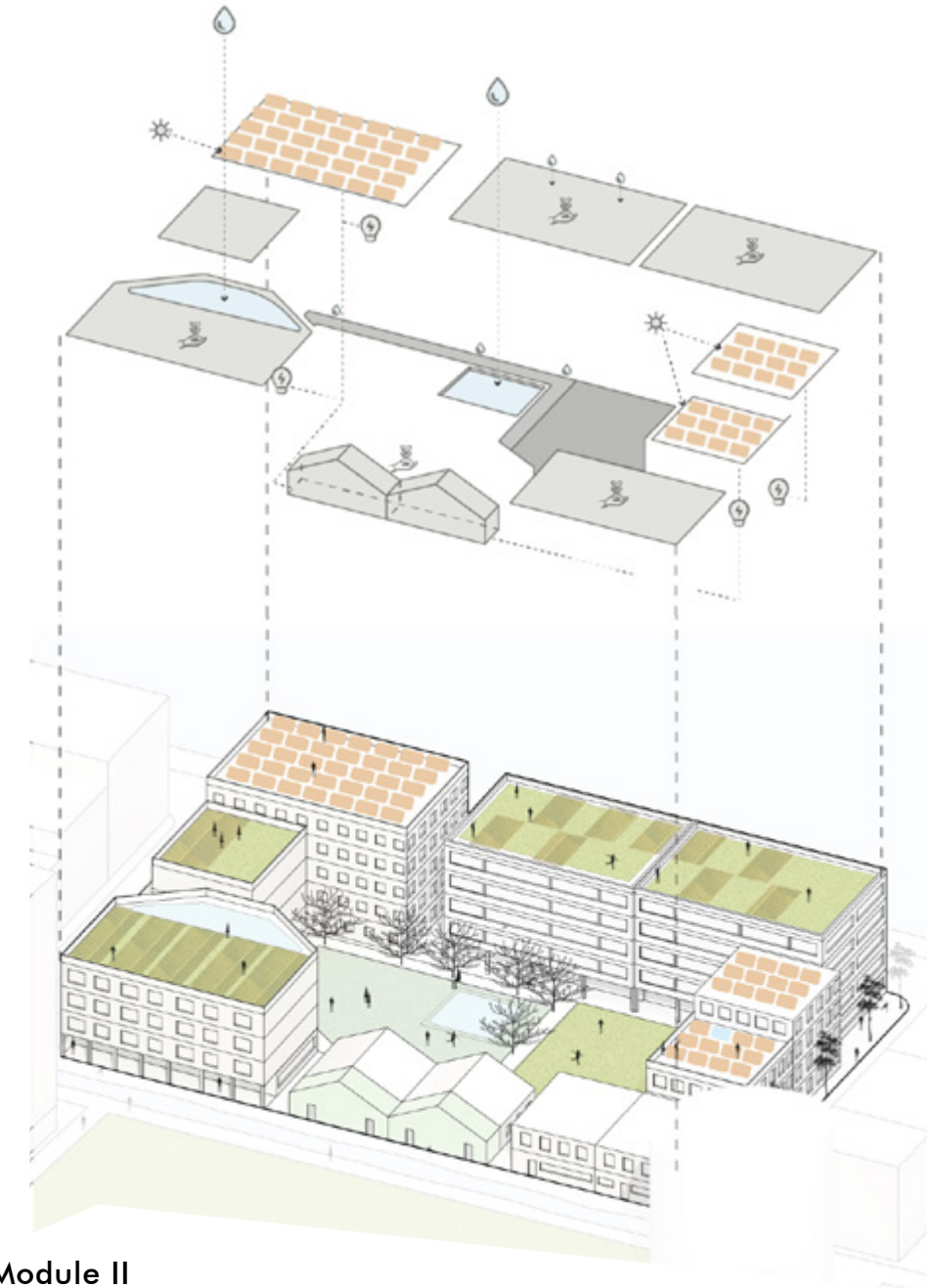
Street A



Street B



Street C



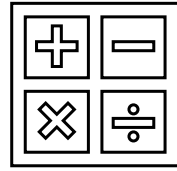
Courtyard Module II



Section BB'



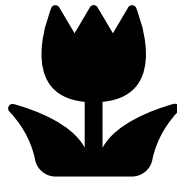




Total Neighbourhood Area = 400 000 sq.m. (40 ha)



Total Area Food Grown = 456 000 kg per year (approx.)



Area for parks/gardens = 95,000 sq.m. (approx.)



Greenhouses = 100 (approx.)

Food produce = 40, 000 kg per year (approx.)



New development for 18,000 people

Conclusions

As a result of the process of writing this thesis, it can be concluded that using former industrial zones are a good neighbourhoods to grow food for the growing population. The thesis study begins from an awareness of the global scenario of food and climate crisis. It's impacts on the well-being of our planet. This thesis's main approach is to find plausible solutions by using sustainability and circularity as two of the three main pillars of the urban design solution. Through the process of undertaking this thesis, it becomes evident that repurposing former industrial zones as neighborhoods for urban food production holds considerable potential in addressing the pressing issue of feeding the growing population. The study is rooted in a comprehensive understanding of the global food and climate crisis and their profound impacts on the well-being of our planet. To navigate this complex landscape, the thesis adopts a three-pronged approach, prioritizing sustainability and circularity as fundamental pillars within the overarching urban design solution.

The first pillar is integration of urban food production with the neighbourhood development for the food needs of the people who will move into the neighbourhood. As the metrics can tell, the number are relevant for the are and uses a variation of typologies for the neighbourhood. Second pillar for the urban design solution is cleaning the soil and adopting methods that are fit to grow food in such soil and spatial conditions. The third and the most crucial pillar is making the most of the what the space has to offer. The thesis delved deeper into the materials of the buildings, circulation, spacial classification in a neighbourhood and the ways in which these aspects can help in creation of a sustainable and self-sufficient neighbourhood. However, in the process of creation of a food focussed neighbourhood, many challenges can be faced along the way. One of such challenges, for an old industrial neighbourhood can be dealing with the soil contamination. Our innovative and scientific community has many experts who are capable to deal with it. Yet, as urban designers and developers, it is the professionals responsibility to understand the constraints, collaborate and come up with a solution that is an integration of the solutions.

References

Borneke, A., Gonzalez, F., & Gullström, C. (n.d.). Urban Insight - Circular City Transformation. SWECO.

Circle Economy, RISE, RE:Source. (2022). Closing the Gap .

Cities of Tomorrow - Circular Cities. (2018, October). Retrieved January 18, 2023, from <https://www.enel.cl/content/dam/enel-cl/en/sustainability/circular-economy/paper-circular-cities/2018/cities-of-tomorrow-en-2018.pdf>

De Ceutel. (n.d.). General Information. Retrieved from <https://deceutel.nl/en/about/general-information/>

Einarsson, D. (2021). Urban Foodprint. Lund: Lund University.

Ellen MacArthur Foundation. (2012). Towards the circular economy Vol. 2: opportunities for the consumer goods sector. Retrieved from Ellen MacArthur Foundation: <https://ellenmacarthurfoundation.org/towards-the-circular-economy-vol-2-opportunities-for-the-consumer-goods>

Ellen Macarthur Foundation. (n.d.). Food and The Circular Economy. Retrieved from <https://archive.ellenmacarthurfoundation.org/explore/food-cities-the-circular-economy>

Fabre, E. A. (2017, October). Local Implementation of the SDGs and the New Urban Agenda. Retrieved January 30, 2023, from Global Utmaning: <https://globalutmaning.se/wp-content/uploads/2022/05/Local-Implementation-of-the-SDGs-The-New-Urban-Agenda.pdf>

Food and Agriculture Organization of the United Nations. (n.d.). Urban Food Agenda. Retrieved February 20, 2023, from Food and Agriculture Organization of the United Nations: <https://www.fao.org/urban-food-agenda/en/>

Gehl, J. (2010). Cities for People. Island Press.

Jenkins, P., Smith, H., & Ferrari, S. M. (2012). Successful Place-Making on the Waterfront. In H. Smith, & M. S. Ferrari (Eds.), *Waterfront Regeneration - Experiences in City-building* (pp. 153-176). Routledge.

Karlsson, E., & Skagerling, E. (2017). Transforming Nyhamnen - Using Evolutionary Design as a Tool for Developing Flood Adapted Urban Spaces. Alnarp: Swedish University of Agricultural Sciences. Retrieved from : <http://stud.epsilon.slu.se>

Macdonald, C. (2022, September 27). The Shift From Linear To Circular Economy Is The Road To Sustainable Digitalization. Retrieved from LinkedIn: <https://www.linkedin.com/pulse/shift-from-linear-circular-economy-road-sustainable-digitalization/>

lar-economy-road-sustainable-caroline/?trk=pulse-article

Malmö Stad. (2019, December). Malmö Stad. Retrieved from <https://malmo.se/nyhamnen>

Malmö Stad. (2021, June 11). Eco-cycle. Retrieved from Malmö stad: <https://malmo.se/Welcome-to-Malmo/Sustainable-Malmo/Sustainable-Urban-Development/Western-Harbour/Eco-cycle.html>

Meenar, M. R. (2017, 09 01). Assessing the Spatial Connection between Urban Agriculture and Equity. *Built Environment*, 43(3), 364-375. doi:10.2148/benv.43.3.364

Nogueira, A., Ashton, W. S., & Teixeira, C. (2019, July 04). Expanding perceptions of the circular economy through design_ Eight capitals as innovation lenses. *Elsevier Enhanced Reader*, 149, 565-576. doi:<https://doi.org/10.1016/j.resconrec.2019.06.021>

RISE Research Institutes of Sweden. (2021, September 13). Retrieved February 23, 2023, from Could we run out of food?: <https://www.ri.se/en/our-stories/could-we-run-out-of-food>

Robinson, B., Russell, M., Greco, A., Guénard, M., Horn, O., Tuncer, B., . . . Tulac, M. (n.d.). Circular Cities Action Framework.

Sauer, A.-L. (2017). *Climate in Mind - Climate Adaptive Neighbourhood Design*. Lund: LUCSUS, Lund University.

Sweden's environmental goals. (n.d.). Retrieved from naturvardsverket: <https://www.naturvardsverket.se/om-miljoarbetet/sveriges-miljomal/>

Swedish Institute. (2022`, July 19). Retrieved January 30, 2023, from Swede.se: <https://sweden.se/climate/sustainability/swedish-recycling-and-beyond>

Williams, J. (2021, May 20). Circular Cities: What Are the Benefits of Circular Development? 13(10). doi:10.3390/su13105725

Thank you.

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