

# RECLAIMING ECO-ASSEMBLAGES

Emphasis on ecosystem resilience in human-oriented urban design  
in Varvsstaden, Malmö, Sweden

Thesis Project in Sustainable Urban Design  
**Ghada Shaaban**



# RECLAIMING ECO ASSEMBLAGES

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Emphasis on ecosystem resilience in human oriented urban design in  
Varvsstaden, Malmö, Sweden

- EXPERIMENTING WITH A FUTURE URBAN SCENARIO -

ASBM01 | Master Thesis Booklet

MSc. Architecture with Specialization in Sustainable Urban Design  
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Chapter 01

# PREFACE

- Statement of Intent
- Abstract
- Executive Summary
- Definitions

# STATEMENT OF INTENT

Cities are the major contributors to climate change. They are responsible for: 75% of natural resource consumption, 50% of global waste, 60% of greenhouse gas emissions. Approximately 50% of the climate emissions and more than 90% of the world's water shortages and biodiversity losses are a result of inefficient resource management. As an urban designer, I feel responsible towards the environmental crisis we are drowning in now. My curiosity about how the built environment affects how citizens and users make choices in their everyday life related to climate change is on the rise. When selecting the topic, I wanted to dive into an interdisciplinary topic that would allow me to learn more about enabling ecosystem resilience in human-oriented urban design.

The aim of this project is to reflect on the possibilities to transform an old contaminated industrial site to a healthy neighborhood where all species live in harmony from a blue and green approach.

## Overall research question:

How can an ecosystem resilient approach guide the built environment in human-oriented urban design in the context of the old industrial sites?

This master thesis booklet is divided into several chapters. The research part consists of introduction, understanding the regional context and zooming in the western harbor of Malmö where the goal is to redesign the old industrial harbor into a mixed-use neighborhood. The design part of the booklet consists of a site specific strategy, master plan and design specifics.

Note: I came from an Interior design background, this allows me to approach the project with a different angle and it is my wish that this project give a presentation of some globally important questions that concerns us all and their regional development in a local livelihood



## ABSTRACT

Many cities are facing the problem of old industrial areas whose soil has been contaminated with toxic substances created by different historical activities within the area. The great unsolved environmental problems, such as: water, soil and air pollution problems, and habitat loss in the Öresund region today, are a result of the industrialization era.

“Reclaiming Eco-Assemblages” lays out a manifesto for increasing consciousness in thought and in actions when proposing an urban design for post-industrial areas. It also addresses problems related to climate change including environmental degradation and increasing climate extremes. The interdisciplinary approach taken in this thesis culminates key aspects and potentials that evoke ideas and reactions for governments, architects, and developers in order to implement blue-green strategies with nature-based management.

The project site is called Varvsstaden. It is an old industrial area in the western harbor of Malmö, Sweden. I have chosen Varvsstaden as it is a prioritized development area for Malmö City.

The site today is experienced as an empty backside of the city. The development of the detailed urban design of Varvsstaden follows a literature study of ecological urbanism and nature-based management. This was supplemented with an in-depth regional and specific site analysis that focuses on spatial aspects of the existing and newly built environment in relation to the spatial quality of the green and blue landscapes as they make the cities healthier, livable and attractive for all species. Varvsstaden, as proposed in this project, will become a pedestrian-friendly district with a continuous and directly accessible green path. Flexible yet robust spaces with visual and spatial connectedness will be the highlight of the project aiming to achieve a cohesive and holistic urban design approach.

**Keywords** – Post Industrial, Ecosystem Resilience, Green-Blue Infrastructure, Malmö, Öresund

# EXECUTIVE SUMMARY

## The Ultimate Aim

The ultimate aim of this thesis is to set a manifesto for increasing consciousness in thought and in action when proposing an urban design for an post-industrial area.

The second aim is to research how Malmö could use an ecosystem resilient approach in human oriented urban design in order to create livable and attractive community life for all species.

The third aim is to evokes ideas and reactions for governments, architects and developers in order to implement blue-green design interventions.

The final goal is giving solutions in respect to the local context and combine aesthetic and scientific approach for care and remediation

of the public space; “Varvsstaden”.

## Research Questions

The problem statement and the selection of the site led to the following main research question:

### How can an ecosystem resilient approach guide the built environment in human-oriented urban design in the context of the old industrial sites?

The focus of this thesis is in Malmö, Sweden.

Hence, the following sub-questions will be answered:

1. How can we restore the ecosystem in Varvsstaden?
2. How can the strengthening of

people’s relationship with nature through urban design function as an accelerator to improve the global environmental crisis?

3. How could the redesign of the shallow water of Varvsstaden function as a catalyst to restore the ecological assemblages and increase the urban quality?

## Research Approach

**1. Literature Study:** For gaining more knowledge about the domains of ecosystem resilience, Baltic sea, waste water and human-oriented urban design, as well as the socio-spatial and planning characteristics of Malmö.

**2. Interviews:** Between one to one and online interviews are conducted to understand the specifics of environmental, socio spatial, and water management issues in Malmö context and Varvsstaden.

**3. Mapping and Timeline Collages:** In order to understand the spatial relation on relevant aspects of Malmö urban fabric.

**4. Scenario Making:** Scenarios are used as a method to help us understand longer-term futures.

**5. Research by Design:** Design research focused in Malmö region is both the study of design and the process of knowledge production that occurs through the act of design.

## DEFINITIONS

### **Assemblages** –

Which are socio-culturally and environmentally productive.

### **Eco Assemblages** –

A collection of species inhabiting a given area, the intersections between the species, if any, being unspecified.

### **Urban Resilience** –

Urban resilience refers to the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.

### **Up-cycling** –

The practice of taking something that is disposable and transforming it into something of greater value.

### **Phytoremediation** –

Phytoremediation (“restoring balance”) Phytoremediation is the use of living green plants to remove contaminants from contaminated soil, water, sediments, and air.

## Chapter 02

# BACKGROUND

- The Öresund
- Historical Background
- Malmö Dynamic Coastline
- Malmö Today
- Location

## THE ÖRESUND



Fig 1| Map of the Öresund. Map by the author (2022), based on data from Kartor

## GLOBAL POSITIONING

The Öresund is the name of the narrow water between Copenhagen, Denmark and Malmö, Sweden. During the last 15 years, the Öresund region has become one of the most dynamic regions in Europe and it became the foundation for the Danish-Swedish Cooperation. The Öresund connects water,

- **Water Connection:** Connects the Baltic Sea to the Atlantic Ocean
- **Land Connection:** Scandinavia and Rest of Europe | Sweden and Denmark
- **Ecological Connection** (Birds Migration)
- **Human Activity:** Settlements and Cultural Relation.

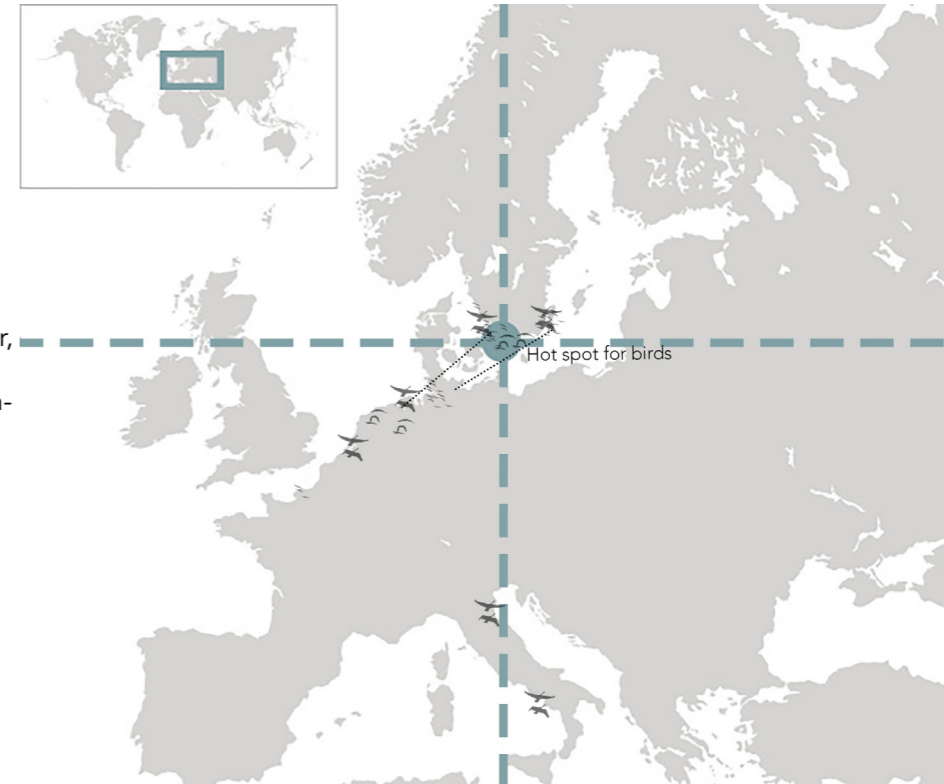


Fig. 2| Map of the Öresund. Map by the author (2022), based on data from Kartor Malmö Stad (2022).



# HISTORICAL BACKGROUND

The Öresund is carved out by the ice melting away at the last ice age, the Öresund area and hinterland was soon an environment of bounty, probably exploited by humans as early as 12,000 years ago. While remains of the early cultures are scarce, the last millennium has witnessed a broad range of well-documented encounters between man and nature in this part of the World. During the last 200 years, the Öresund region has undergone dramatic transformations which have not only changed the economy, settlement patterns and daily lives of its inhabitants but also fundamentally transformed its environment and landscapes.



Fig 3| The First Known Image of Malmö, from the late 16th century.

# ÖRESUND TRANSFORMATION

## Urbanization and Population

The Öresund region has undergone dramatic transformations which have not only changed the economy, settlement patterns and daily lives of its inhabitants but also fundamentally transformed its environment and landscapes.

## Increasing of CO2 Emissions

When industries were established during the nineteenth century, large housing estates for workers were built at a rapid pace.

The work environment in the factories was characterized by poor air quality, high accident rates and noise. Factories also contributed to polluting the external environment with discharges into the water and smoke.

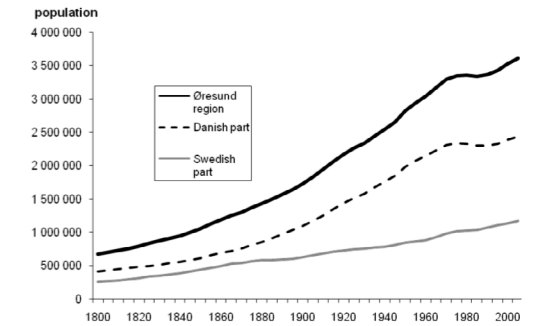


Fig 4| Population development in the Öresund region 1800–2005.

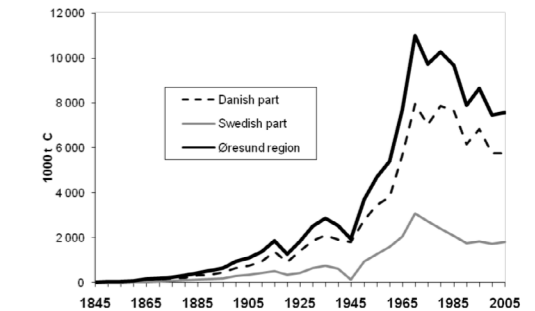


Fig 5| CO2 emissions from fossil fuel combustion in the Öresund region 1845–2005

# MALMÖ DYNAMIC COASTLINE

The coastline had been pushed further out to the sea in favor of having larger and deeper ports.

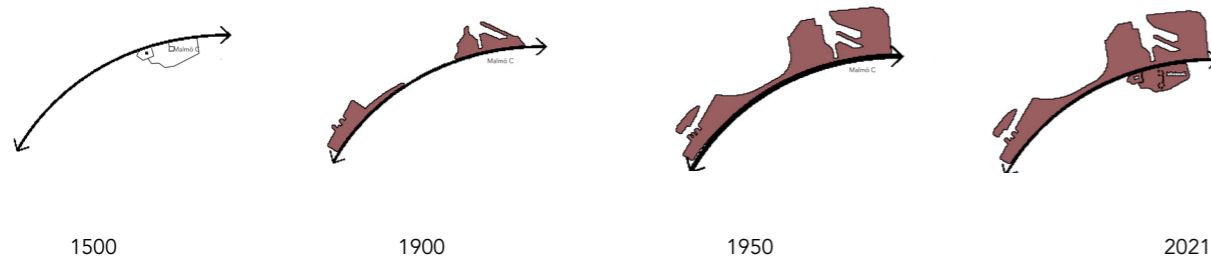


Fig. 6| Malmö Dynamic Coastline. Illustration by the author (2022) based on blue urbanism approach thesis (2022)



Fig 7| Map : Häradsekonomska kartan, year: 1812



Fig. 8| Map : Häradsekonomska kartan, year: 1910

# MALMÖ TODAY

City of Malmö:

- Area: 332,6 km<sup>2</sup>
- Density: 4,05/km<sup>2</sup>
- 351 749 inhabitants
- Sweden's fastest growing city
- 183 different nationalities
- 150 languages
- Young population: 48% under 35 years
- 24,000 students from worldwide

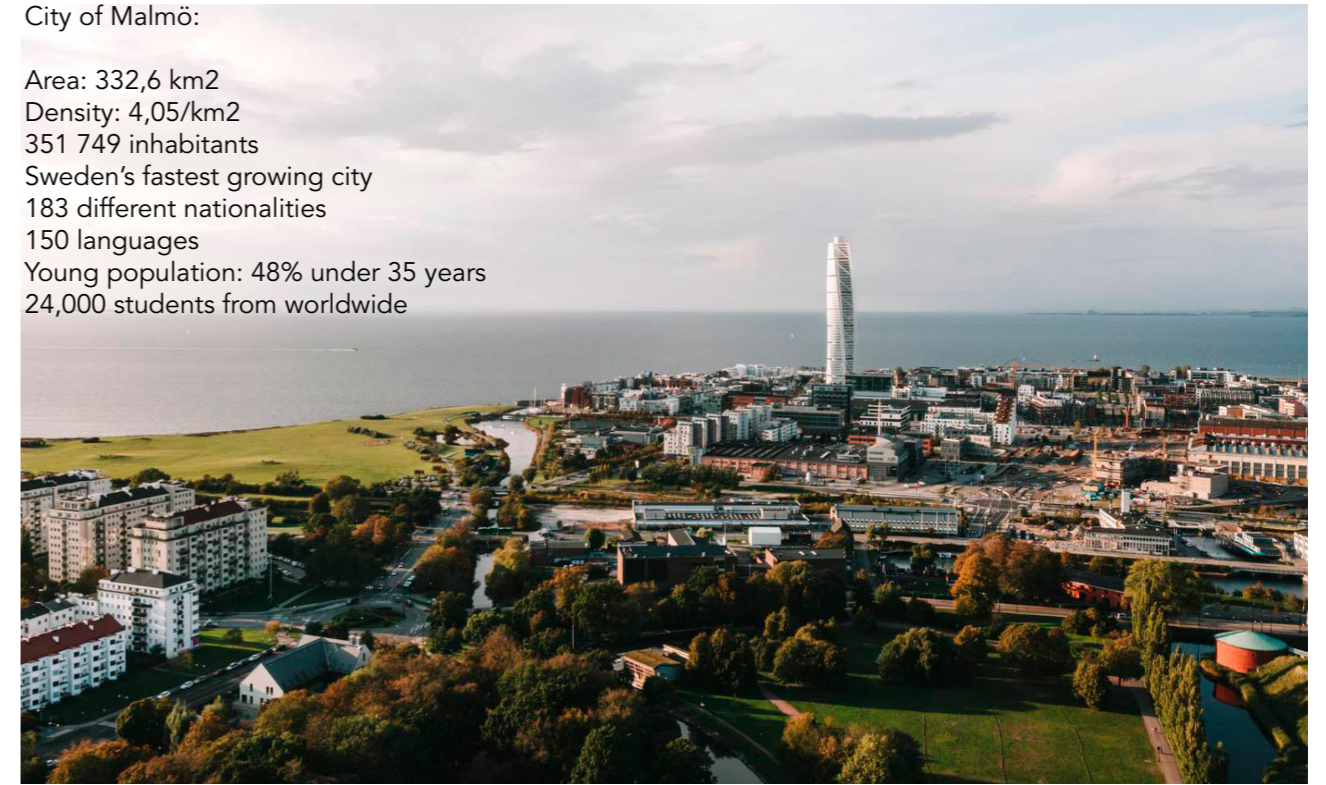


Fig. 9| Photo Credit: Shutterstock



# LOCATION

Skåne, South of Sweden



Fig. 10,11 | Location of Malmö. Map by the author (2022), based on data from Kartor Malmö Stad (2022).



Fig. 12 | Map of Malmö edited by the author (2022), based on data from Kartor Malmö Stad (2022).

## Chapter 03

# METHODOLOGI- CAL FRAMEWORK

- Project Outline
- Research Approach
- Research Questions

# PROJECT OUTLINE

## Problem Focus

Based on the issues relating to the problem field, the research field is narrowed down further with the knowledge gap, problem statement and research aim. The problem focus of this thesis is environmental degradation of cities and ignorance of marine life in shallow water.

## Knowledge gap

### General Knowledge Gap

There are certain knowledge gaps between relevant disciplines that are capable of dealing with the development of coastal industrial areas (think of urban planning and design, landscape architecture, architecture, water management, marine design, etc.). That this thesis addresses through a multidisciplinary approach in order to strengthen the positive impact of each individual discipline. Current approach towards these climate extremes is recovering instead of preventing.

### Malmö Knowledge Gap

This thesis addresses how ecosystem resilient ap-

proach guide the built environment in human-oriented urban design with an example of designing the area of Varvsstaden by integrating spatial strategies and urban design with ecological elements. Malmö could benefit considerably in terms of adapting and recovering from the industrial history that destroyed a lot of ecological assemblages.

## Problem Statement

The great unsolved environmental problems in the Öresund region today are the environmental impact of the industrialization era. The regional water pollution problems and habitats loss.

## Research Aim

The ultimate aim of this thesis is to research how Malmö could use an ecosystem resilient approach in human oriented urban design in order to create livable and attractive community life for all species. The second aim is to evoke ideas and reactions for governments, architects and developers in order to implement blue-green design interventions. The final goal is giving solutions in respect to the local context which is Varvsstaden.

# RESEARCH APPROACH

Different methods are used at different points in the thesis.

**1. Literature Study:** For gaining more knowledge about the domains of ecosystem resilience, Baltic sea, waste water and human-oriented urban design, as well as the socio-spatial and planning characteristics of Malmö. Part of this is a theoretical paper on using urban water corridors to provide better flood resilience in Malmö

Ex. Literature studies about premeditation and Blue mussels

**2. Interviews:** Between one to one and Online interviews are conducted to understand the specifics of environmental, socio spatial, and water management issues in Malmö context.

**3. Mapping and timeline collages:** In order to understand the spatial relation on relevant aspects of Malmö urban fabric, mapping is used. This way intervention opportunities are identified.

**4. Scenario Making:** Scenarios are used as a method to help us understand longer-term futures. In order to bridge the gap between research and design, visual techniques are used to apply scenarios on the site in order to come to a design.

**5. Research by Design:** Design research focused in skåne region is both the study of design and the process of knowledge production that occurs through the act of design. It also allows an expressive component in research, which in turn allows for the possibility of expressing qualitative aspects, experiments and proposals.

### Main Research Question:

How can an ecosystem resilient approach guide the built environment in human-oriented urban design?

#### Sub 01:

How can we restore the ecosystem in Varvsstaden?

#### Sub 02:

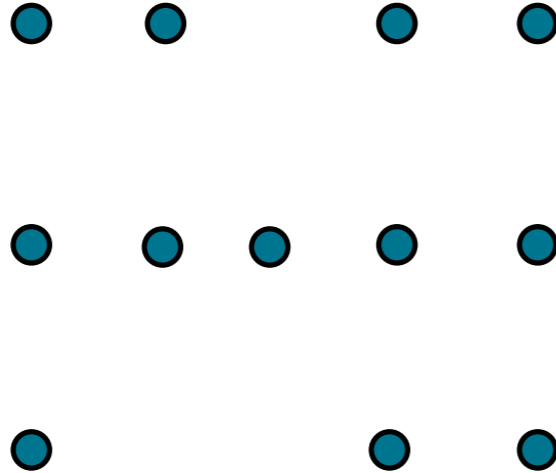
How can the strengthening of people's relationship with nature through urban design function as an accelerator to improve the global environmental crisis?

#### Sub 03:

How could the redesign of the shallow water of Varvsstaden function as a catalyst to restore the Eco assemblages and increase the urban quality?

### Method 01 Method 02 Method 03 Method 04 Method 05

Literature Study Interviews Mapping Scenario Making Research by Design



## RESEARCH QUESTIONS

The problem statement and the selection of the site led to the following main research questions:

**How can an ecosystem resilient approach guide the built environment in human-oriented urban design?**

The following sub-questions are defined:

1. How can we restore the ecosystem in Varvsstaden?
2. How can the strengthening of people's relationship with nature through urban design function as an accelerator to improve the global environmental crisis?
3. How could the redesign of the shallow water of Varvsstaden function as a catalyst to restore the ecological assemblages and increase the urban quality?

## Chapter 04

# SITE ANALYSIS

- The history of the Environmental Situation
- Land Cover
- Public Green Areas
- Prioritized Development Areas
- Upcoming Development
- Site Selection
- Site Location
- Site Context
- Current Situation
- Site Materiality

- Grey Infrastructure
- Green Infrastructure
- Blue Flow and Depth
- Spatial Quality
- Site Accessibility
- Noise and Topography
- Climate Data
- Analysis Conclusion

# THE HISTORY OF THE ENVIRONMENTAL SITUATION



The Öresund with rich fish catches!

**In 1200**, the ecological conditions permitted a constant catch of large quantities of herring, but there was also a more or less mythical awareness of overfishing."

"Malmö was founded and will become an important trading city, a transformation point where trading fish markets take place in connection to the water"

"Industries are emerging. Wooden harbours are replaced by stone harbours and further expansion in order to facilitate a larger need of goods and traffic"

**In 1932**, the decision to prohibit trawling in the öresund was made. This has been of great importance for the seabed fauna and well-being of Öresund

The **1950's** industrialization resulted in large amounts of industrial waste in the water. This together with the fact that we as residents around the öresund consumed and littered more in general, led to a dirty Öresund.

In **the mid 60's** was the last time we could see Tuna in the Öresund. Overfishing was extremely widespread throughout the world after this delicacy

In **2001**, Bo01, one of the first Swedish models for sustainable urban planning was built

In **2017**, the Marine Education Center's new building at Ribersborgstranden is completed. Here marine specialists promote knowledge about marine sustainable development.

In **2022**, about 80% Malmö's water now comes from lake Vombsjön

Fig 13| The history of the environmental situation collage by the author (2022)



# LAND COVER AND PUBLIC GREEN

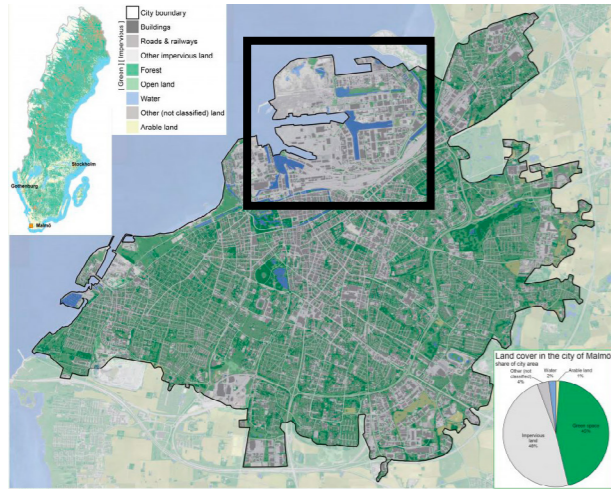


Fig 14| Map shows land cover in the city of Malmö from Statistics Sweden and Lantmäteriet (2018)

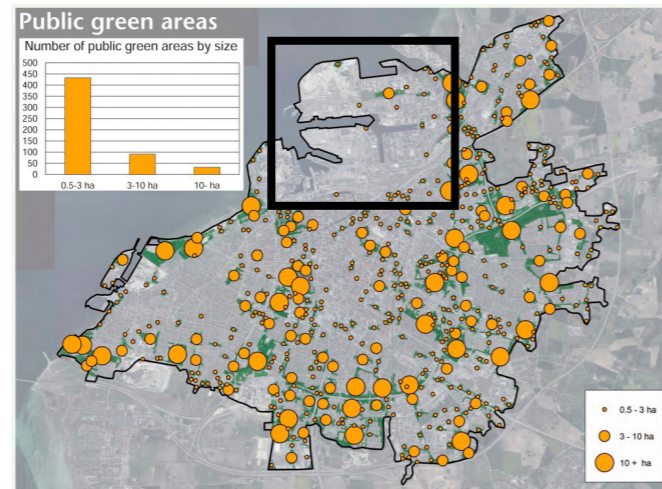


Fig 15| Map shows the public green area from statistics Sweden and Lantmäteriet (2018)

# PRIORITIZED DEVELOPMENT AREAS

## Prioritized Development Areas

These areas are strategically important in various ways. In these places there is capacity and a large potentials to contribute to developing Malmö.

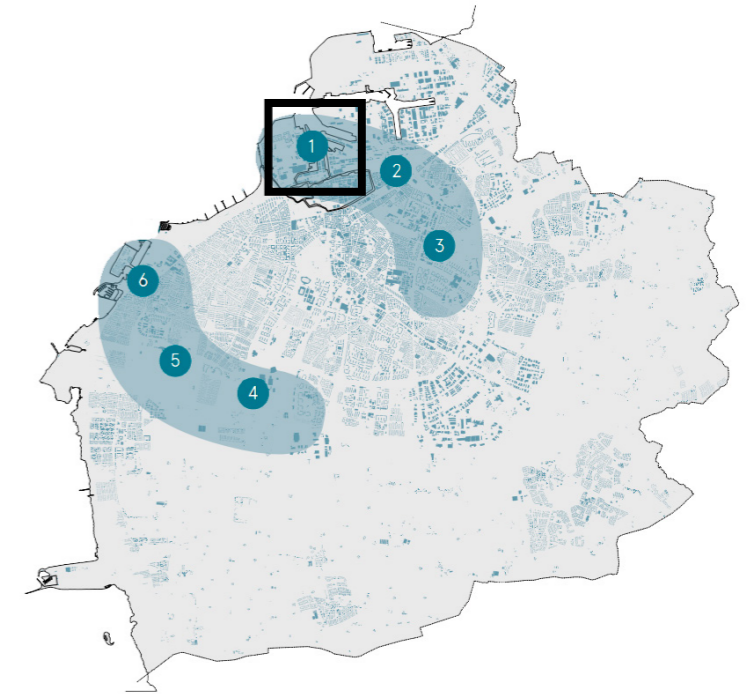


Fig 16| Map shows prioritized development areas based on Malmö planning office vision(2018)

## UPCOMING DEVELOPMENT

### Öresund Metro: New connection between Sweden and Copenhagen

Passing through the western Harbor (Varvsstaden)  
A high-speed rail from Stockholm will create sustainable access to Copenhagen Airport, while more rail freight will increase greener freight transport. This will accommodate the EU Commission's objective that, by 2030, 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport, and more than 50% by 2050.



Fig 17,18 | Map shows Öresund Region plan for the new connections (2018)



Fig 19| Map shows Malmö City plan for the new connections (2018)

## SITE SELECTION

### Why Varvsstaden?

My site selection is based on the information I got through from an interview with an architect from Malmö Planning Office and analysis of GIS data and some the guidelines of Malmö comprehensive plan.



Fig 20| Selected Site. (2022)



## SITE LOCATION

Varvsstaden is located in the western harbor, close to the sea and close to the center of Malmö.

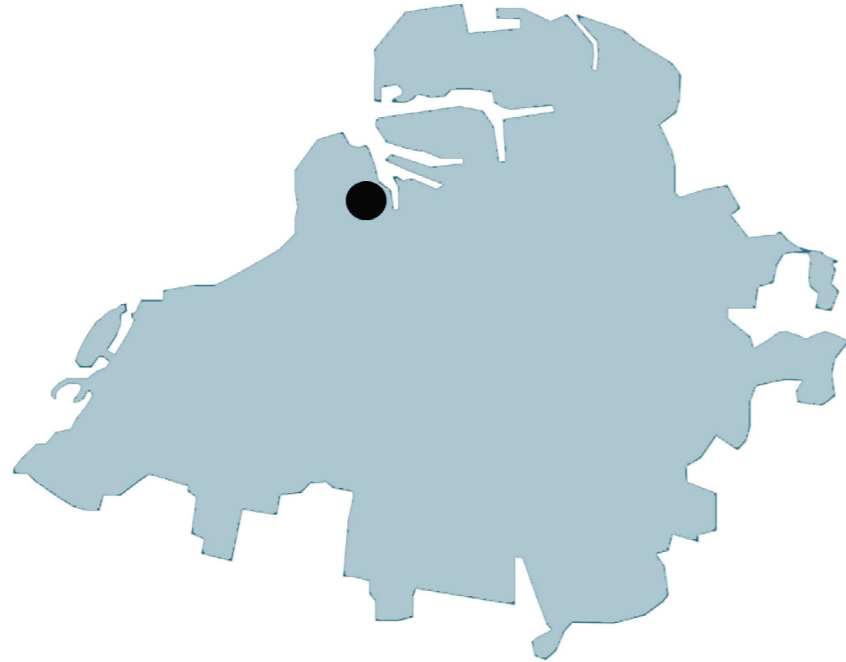


Fig 21| Site Location (2022)

## SITE CONTEXT



Fig 22| Site Context (2022)



# CURRENT SITUATION

## VARVSTADEN

- Area-182 000 m<sup>2</sup> - 19ha
- Land use: Manufacturing industry, approx. 65,000 sqm

The site is centrally located in the western harbor (västra hamnen), north of Malmö. There are several important regional connections cutting through the site. It is in the south of Stora Varvsgatan and north of Varvsbassängen. It is close Malmö university and newly built office and residential quarters in the port area. The area is built with industrial buildings of varying character, erected from mainly 1910s until the 1980s. Many of the buildings that were built up in the 1950s are in red brick, while the ones have facades in sheet metal. In the eastern part of the area, around Varvsbassängen, the buildings are relatively small-scale. In the eastern part there are large hall buildings, some of which are very extensive in their volume. Parts of the premises are today empty, while others are used by small businesses or viable industries. The area is closed for unauthorized visitors. At the same time, it is largely clearly visible from public land due to its location next to Varvskanalen, Varvsbassängen and Stora Varvsgatan. Varvsstaden is known of the dock, the quays and the shipyard basin.

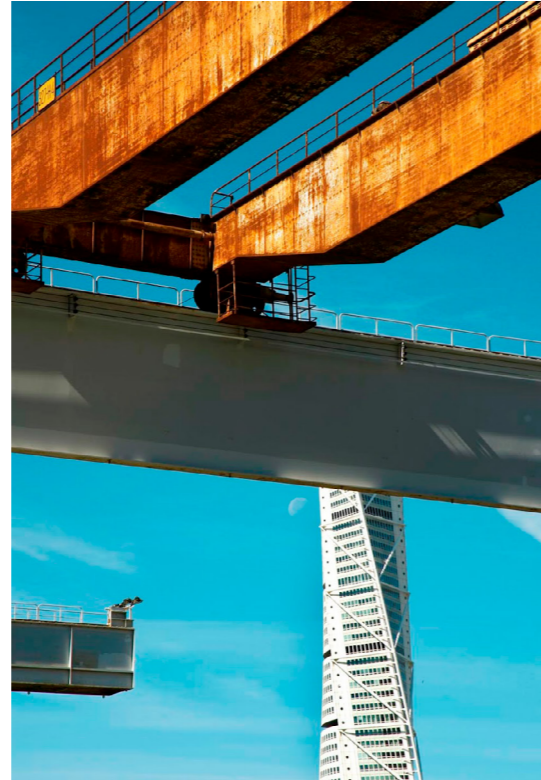


Fig 23| View of the Turning Torso in the Western Harbor from Varvsstaden. Picture© Varvsstaden AB

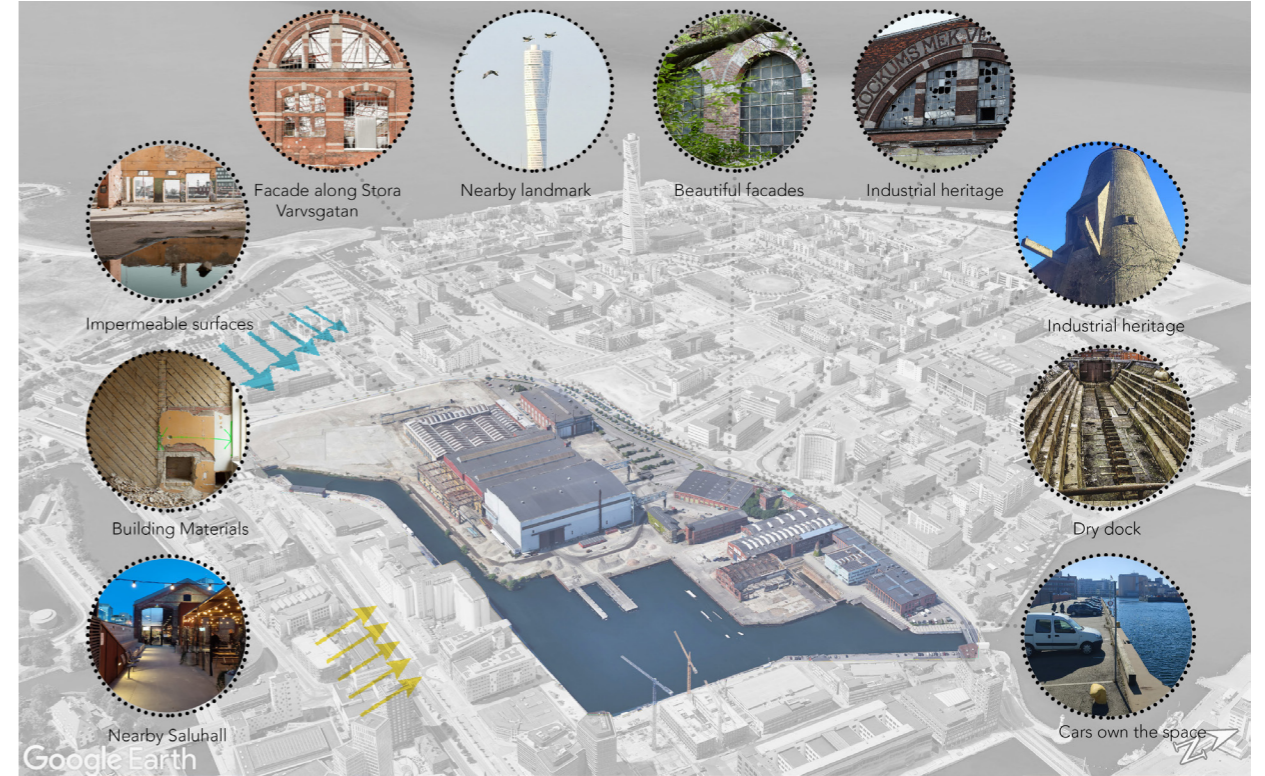


Fig 24| Highlights of the site (2022)



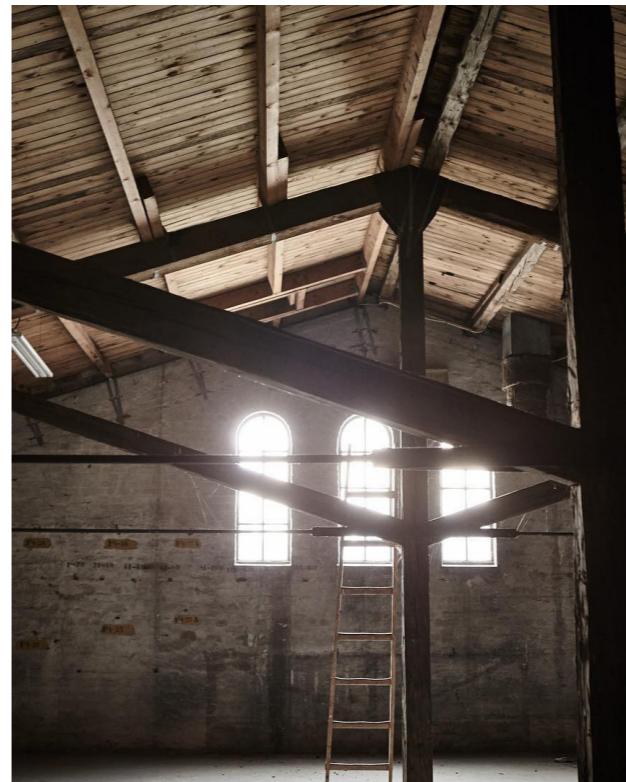
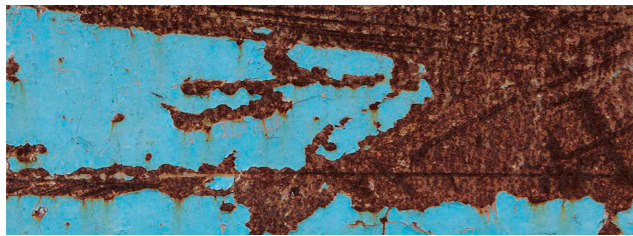


Fig 25| Site Pictures. Picture@Varvasstaden AB



# SITE MATERIALITY

Varvsstaden offers lots of water supplies, materials and exciting raw materials

The predominant materials within the area are related to the past industrial activities.



UPCYLING

- Red bricks
- Concrete
- Steel
- Wood
- Glass

Fig 26| Materiality Study Collage (2022)

## GREY INFRASTRUCTURE



Primary distributors roads  
District distributors

Fig 27| Roads Infrastructure

### Road Network

Bigger roads just outside of the site.



Built Environment

Fig 28| Typologies

### Typologies

Big warehouses in Varvsstaden and the surroundings are mostly offices with width of 15M.

## GREEN INFRASTRUCTURE

Dense greenery in the west and the south of the site.

The green areas in the site are poor and hard to access but in the same time, there are a 100 year old tree in the area around Kockum.



Green Spaces  
Denser Green Spaces

Fig 29| Green Infrastructure (2022)

# BLUE AND GREEN FLOW



Fig 30| Blue Flow (2022)



Fig 31| Blue and Green Flow (2022)



Fig 32| Depth of the Water of Varvsstaden (2022)

## Quality and Depth of the Water

Due to the industrial history, the water is contaminated with no access to water for recreational purposes within the area and the current depth is between 4.5 and 6.5M

# SPATIAL QUALITY: Interview Takeaways



Fig 33| Takeaways from the interviews by the Author (2022)



# SITE ACCESSIBILITY



## Cycling Movement

Cycling routes connect the area to the surroundings.



## Car Movement

Active around the site.



## Bus Stops

- Very accessible by bus.
- Several bus stops outside of the site.

Fig 34,35| Generated maps of movement in the Western Harbor (Västra hamnen) for 700 700 respondents with 46 000 travels @Malmö City

Fig 36| Bus movement and stops in the Western Harbor (Västra hamnen) by the author (2022)

# TOPOGRAPHY AND NOISE

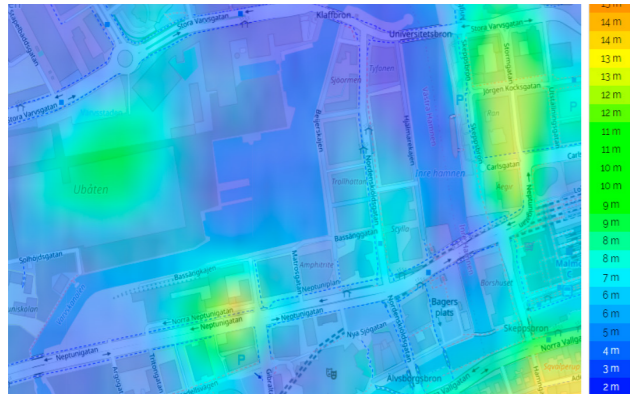


Fig 37| Topographic map from Kartor Malmö Stad (2022)

## Topography

Highest point are in the middle and lower in the edges.



Fig 38| Noise Map from Kartor Malmö Stad (2022)

## Noise Map

Noisy outside of the site.

# CLIMATE DATA

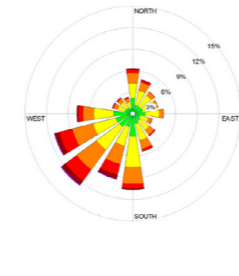


Fig 39| Wind Roses from SMHI

## Wind Direction

The dominant wind blows from west and south-west and the highest speed is more than 61 km/h during winter.

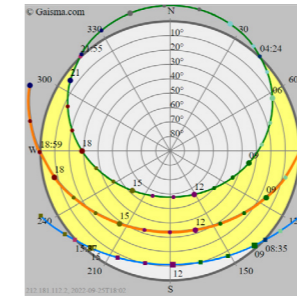


Fig 40 | Sun Direction Diagram from Gaisma

## Sun Direction

South will be the direction closest to the sun.

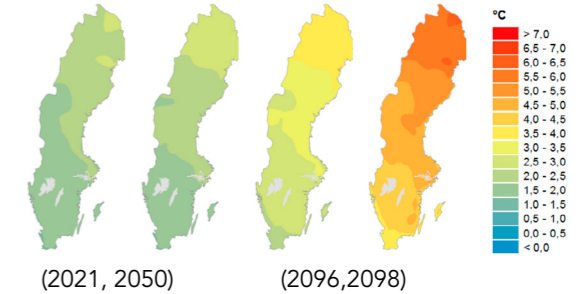


Fig 41| The maps show how much the annual average temperature changes in the middle and the end of the century (compared to the period 1961-1990).region 1845-2005. Map from Klimatförändringarnas lokala effekter (2019). Translated by the Author.

## Weather Future Prediction

No one really knows what will happen. But the likelihood of extreme weather with drought and forest fires is increasing. Sweden is undergoing rapid climate change, with temperatures predicted to increase by 3-5°C by 2080.

# ANALYSIS CONCLUSION



Fig 42| SWOT Analysis (2022)



Fig 43| Photo of Varvsstaden taken from Malmö Liv. Photo Credit: Vinicius Ferreira de Oliveira (2022)

## Chapter 05

# VISION AND DESIGN

- Environmental Vision
- Principles
- Varvsstaden Vision
- Target Group
- Site Plan
- Master Plan
- What To keep and Renovate
- Site Specific Strategy
- Structure Concept
- Connections
- Urban Realm
- Blue and Green
- Uses
- Buildings Heights
- Design Details

# ENVIRONMENTAL VISION

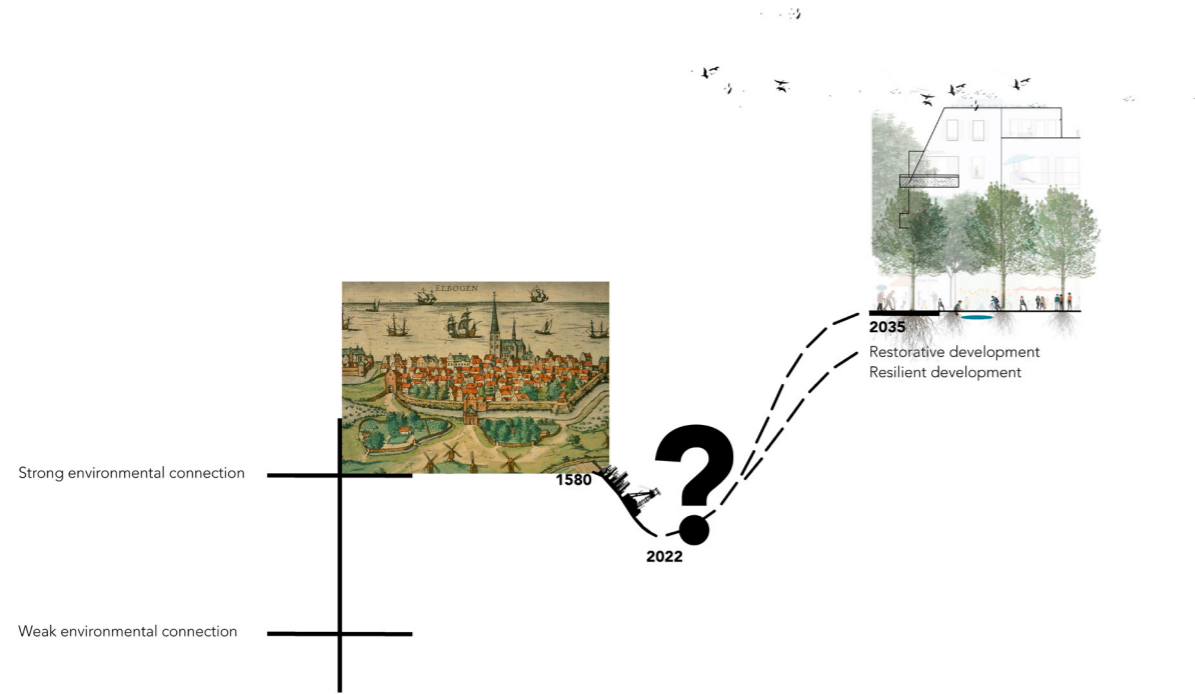


Fig 44| Graph developed by the Author (2022) based on Map from Malmö from the late 16th century (2019)

# PRINCIPLES

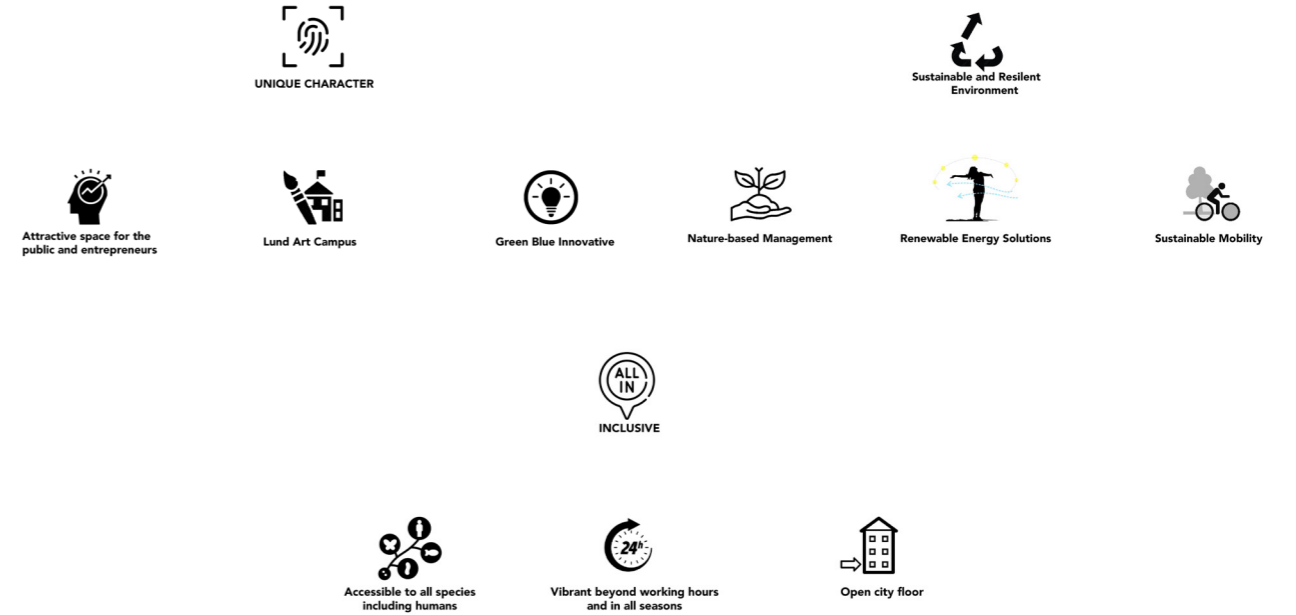


Fig 45| Site-Specific Principles. Selected from Malmö comprehensive Plan (2022)



# VARVSSTADEN VISION

## RESILIENT | VIBRANT | HEALTHY

The overall goal is to hand over to the next generation a society in which the major environmental problems have been solved. A future of clean air, a healthy living environment where all species can be productive and enjoy life.



Fig 46| Vision Collage by the author (2022)

# TARGET GROUP

“ I came from Lund to try the best Mussels in skåne! ”



“ I am a student at The Faculty of Arts! I love theater, music and art! ”



“ I found my home!Woho!! Clean shallow water!! ”



“ I am originally from Varvsstaden! I am proud of it :D ”



“ We live in Varvsstaden! We feel more connected to the history of Malmö ”



“ I live and work here in a tech start-up! Inspiring environment ”



Fig 47| Target group by the author (2022)

# SITE PLAN



Fig 48| Site Plan

# MASTER PLAN

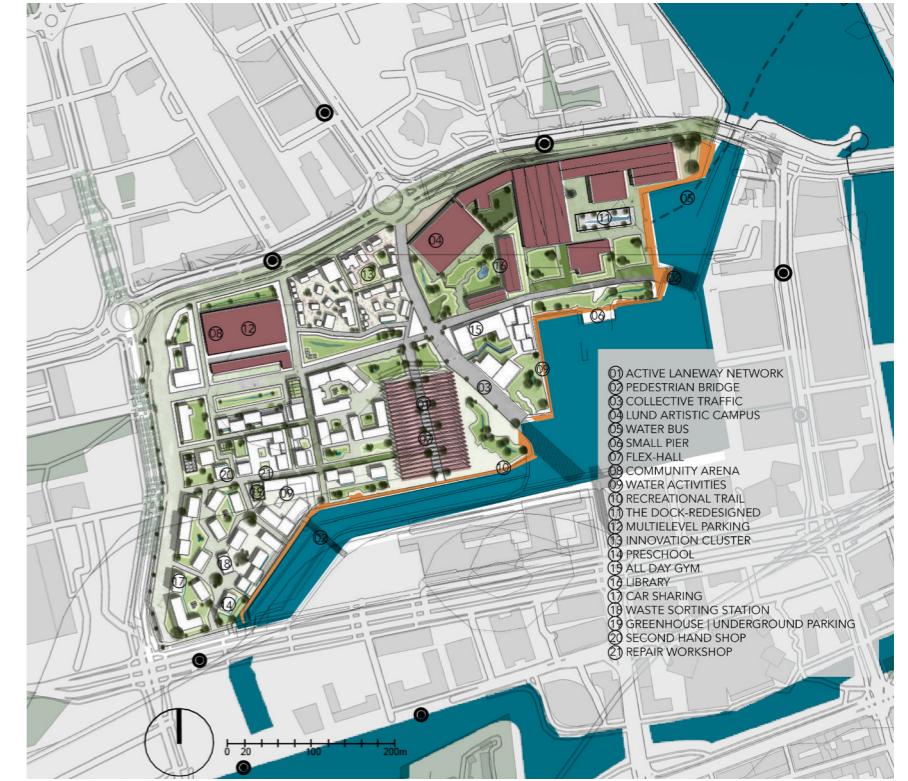


Fig 49| Master Plan





Fig 50| Site Picture @Varvsstaden AB

## WHAT TO KEEP AND RENOVATE

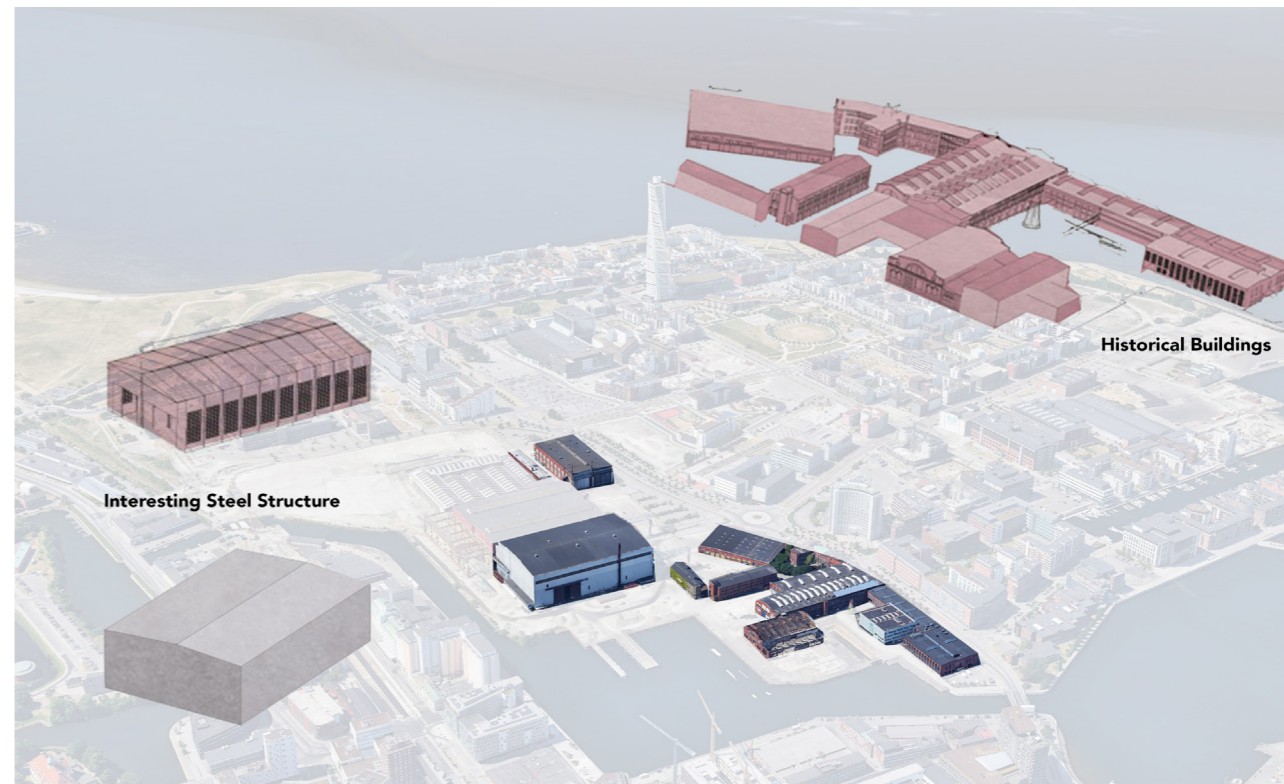


Fig 51| To Keep buildings (2022)



# STRATEGY: Clean, Renew, Define, Establish

## A. Clean

[01] Contaminated soil especially around the roots of the existing trees.

[02] The water manually before bringing marine species

[03] Bring blue mussels as cleaners from farms in Malmö.

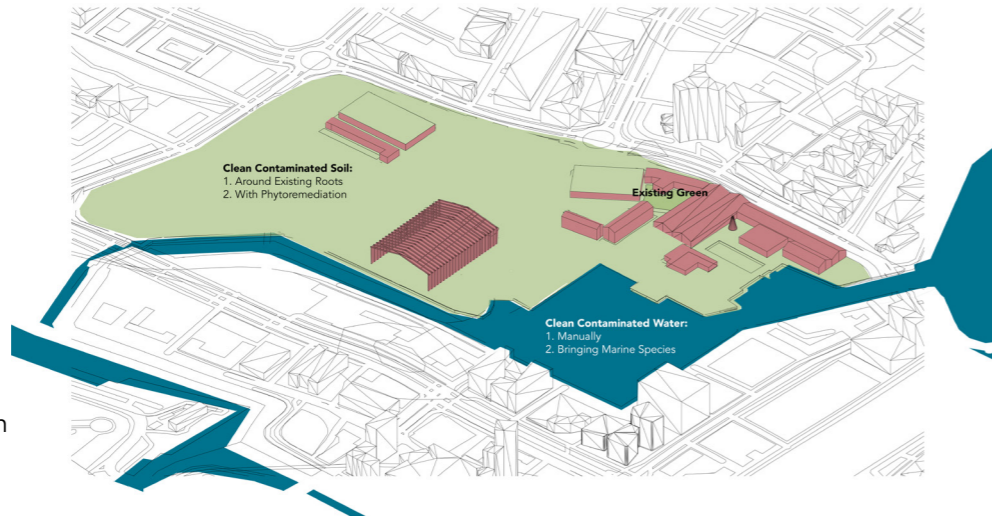


Fig 52| Strategy Diagram (A) by the author (2022)

## B. Renew and up-cycle

[01] The historical and in good condition existing buildings.

[02] Up cycle the materials of the demolished buildings.

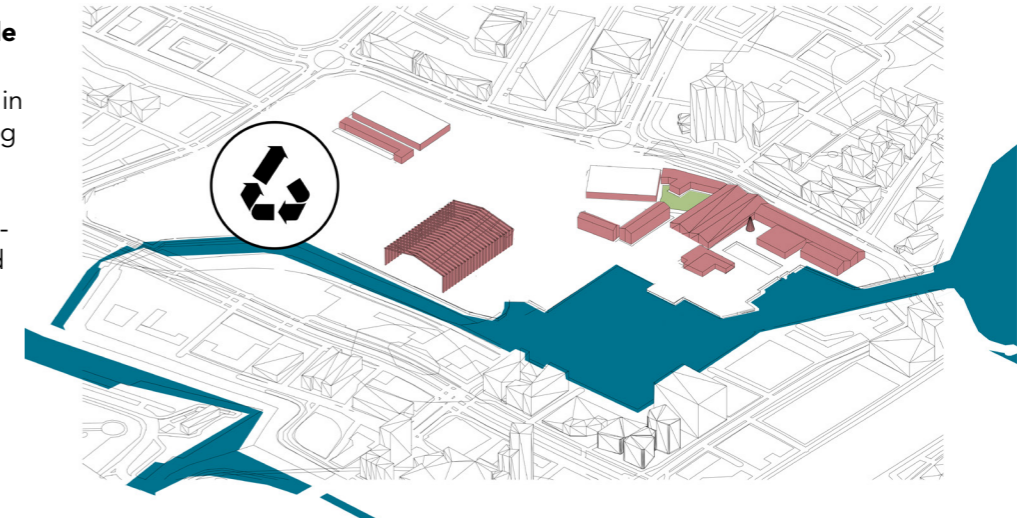


Fig 53| Strategy Diagram (B) by the author (2022)

### C. Define

[01] Public spaces including the recreational trail, the art hub, water activities and the dock plaza.

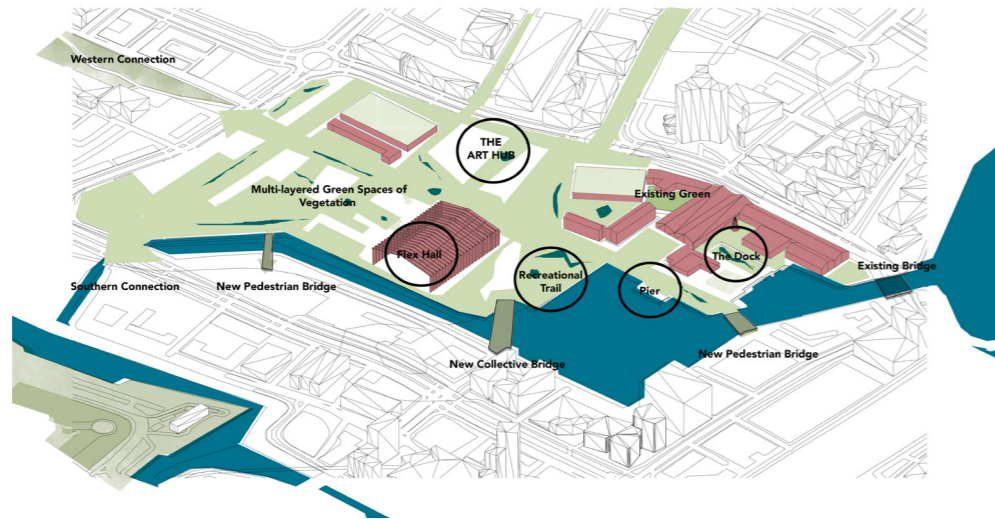


Fig 50| Strategy Diagram (C) by the author (2022)

### D. Establish

[01] Multi-layered green spaces of vegetation with a focus on connecting the green to the west and south part.

[02] Runoff channels.

[03] New tram-line and three bridges.

[04] New social nodes through mixed-use buildings including houses, local productive spaces.

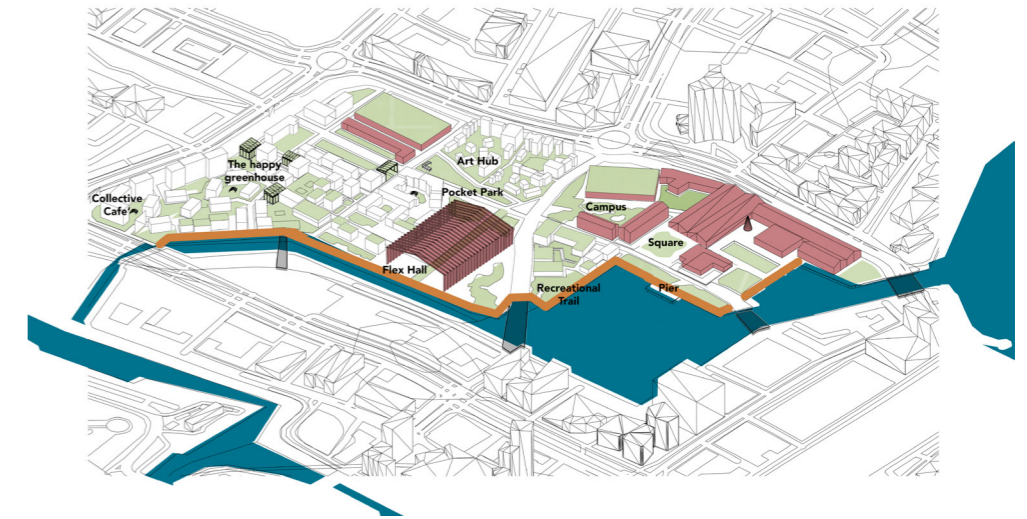
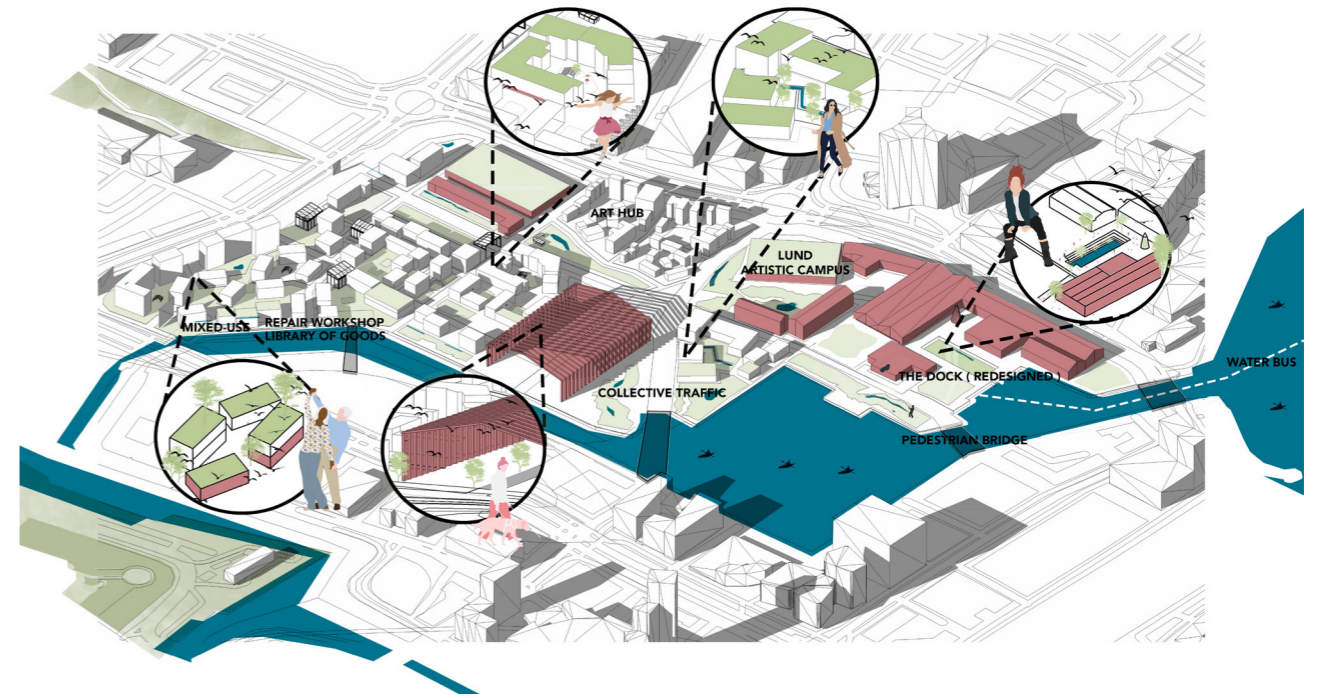
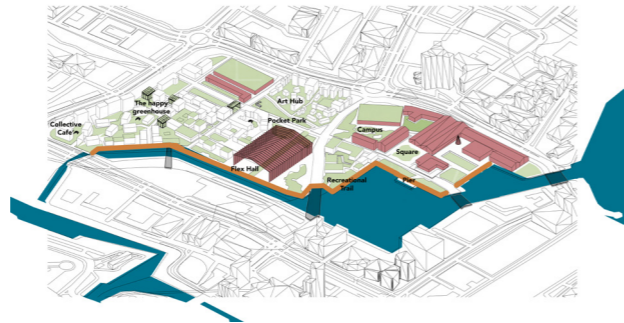
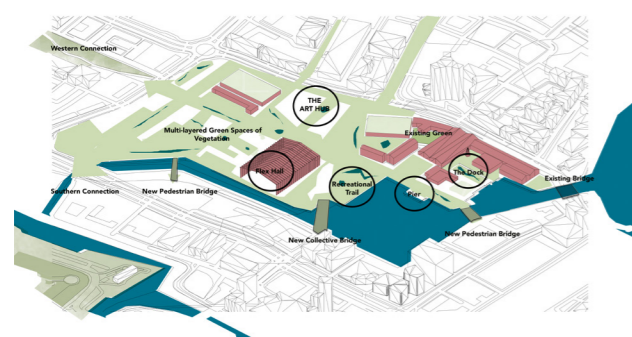
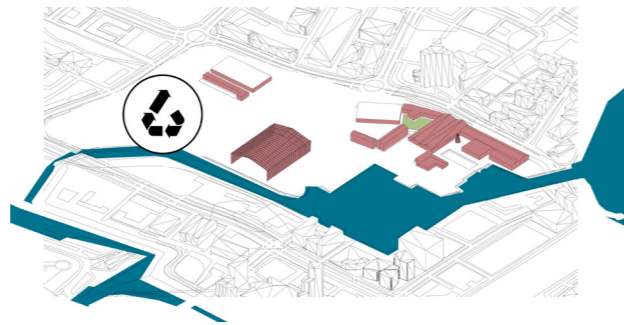
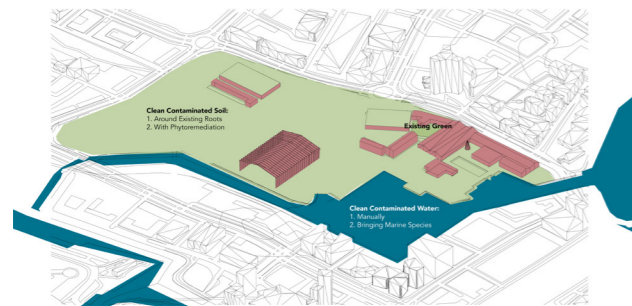


Fig 51| Strategy Diagram (D) by the author (2022)





# PHYTOREMEDIATION OF POLLUTED WATER



Fig 54| Source | Marine Education Center in Malmö and published in cities advancing global, ICLEI World Congress (2022)

**“The sea and life in the sea have a direct impact on life on land. More than 70% of the air we breathe comes from the sea. The sea regulates the weather and the climate”**

The Öresund long industrial history has left behind a large number of contaminated sites. These sites must be investigated, evaluated, and if necessary re-mediated using nature based management.

## **Mussels as natural filtration**

Mussels provide us with a fantastic ecosystem service as they combat eutrophication in a totally natural way. They filter out nitrogen and phosphorus from the water, two substances that cause serious problems in terms of marine eutrophication. However, the filtering benefits of the mussels can be increased if the mussels are consequently harvested.

**In Öresund, 75 square kilometer area is covered with millions of mussels (2022)**

In Öresund, beneath the surface of the sea, hides

northern Europe’s largest mussel bed. This 75 square kilometer area is covered with millions of mussels. However, the most impressive part isn’t the size of the bed, it’s the fact that the mussels act as natural filtering organisms, keeping the Öresund sea clean. From the information I got from the education with a marine focus in Malmö (Marint Kunskapscenter) that blue mussels could be used to clean the water in Varvsstaden as blue mussels could live in water depth of 4 to 6 Meters.



# PHYTOREMEDIATION OF POLLUTED SOIL



Fig 55| Photo Credit: Southern Sweden Design Days

**WHY? "Soil contains almost 2X as much as carbon as the atmosphere and living flora and animals combined"**

## Phytoremediation: How does it work?

Plants store the contaminants in the roots, stems, or leaves then they convert them to less harmful chemicals within the plant or, more commonly, the root zone and finally convert them to vapors, which are released into the air.

## Site Specific Cleaners

In the following info-graphic is a list of vegetation that could be used in the phytoremediation process in Varvsstaden. They are suitable for the weather in Skåne.



Fig 54| The Cleaners Diagram by the author (2022)

# STRUCTURE CONCEPT

Flexible Structure as the needs are changeable: the structure system subdivide the building volume into different parts, promoting multiple uses, the culture of sharing and allowing content to be developed over time.

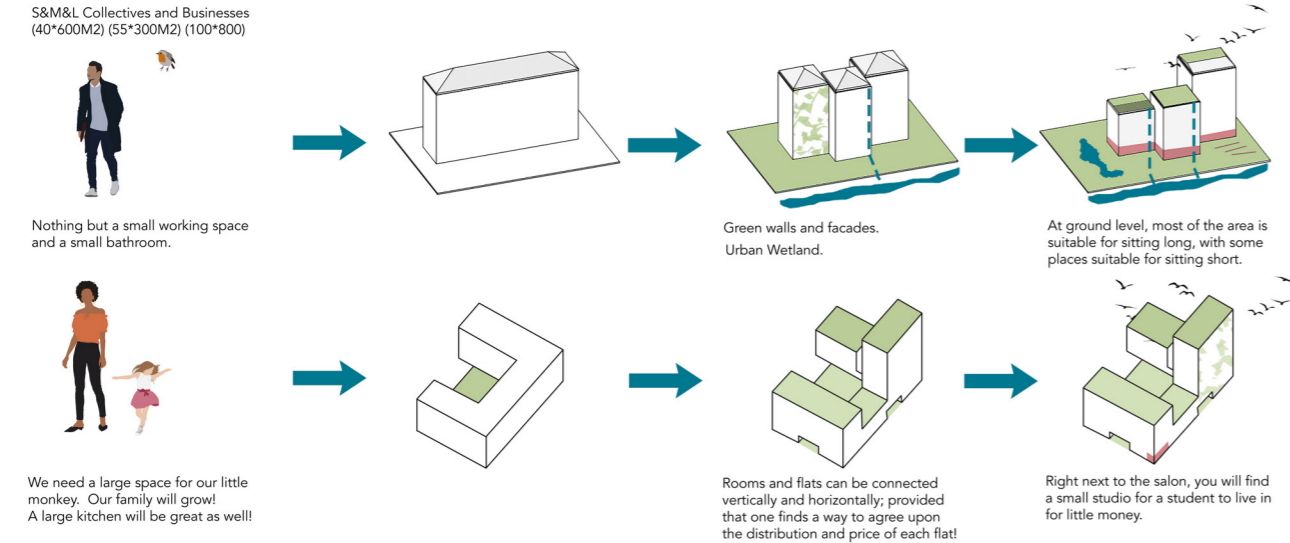


Fig 56| Selections and development of the structures by the author (2022)

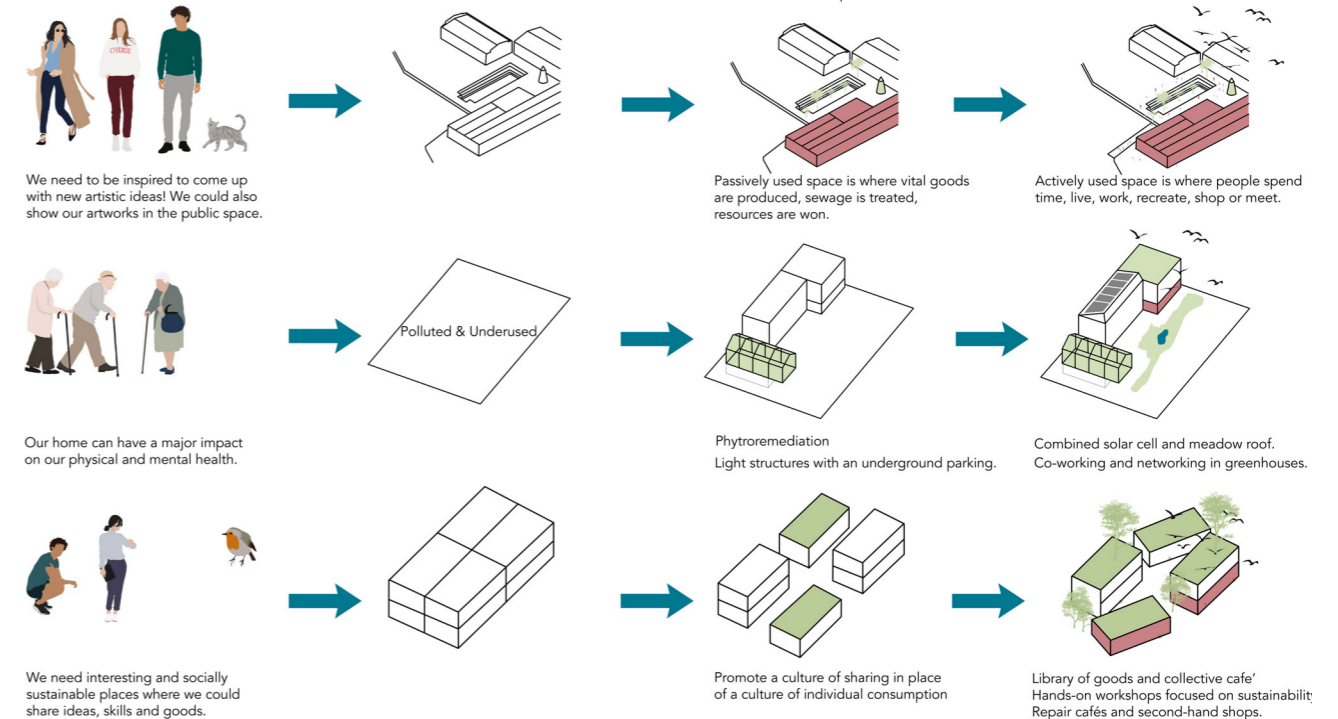


Fig 57| Selections and development of the structures by the author (2022)



# CONNECTIONS

Offering sustainable transportation prioritizing walking and cycling.

Establish more connections with the surroundings.



Fig 58| Main Connections



Fig 59| Mobility Hierarchy flow

## URBAN REALM

Strengthen the connections with the surroundings

Open, permeable and flexible spaces

Shared greenhouses with parking in the underground

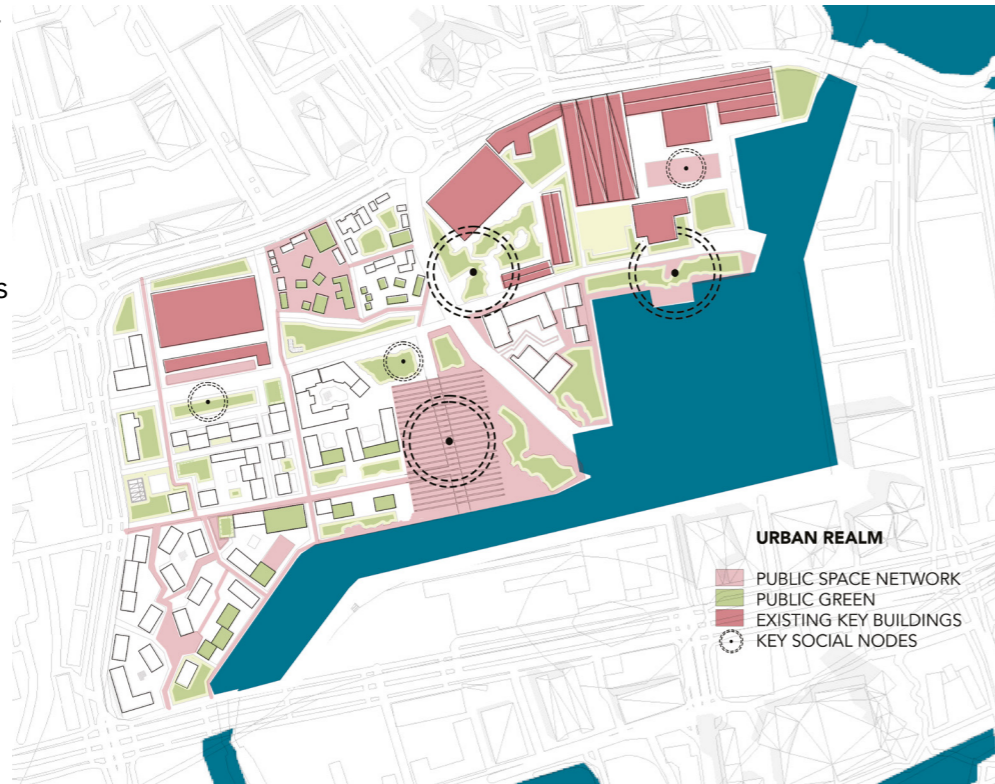


Fig 60| Urban Realm

## BLUE AND GREEN Management

Consists of Green roofs, facades, courtyards and squares.

Ponds and streams

Using surfaces that are permeable to water



Fig 61| Blue and Green Management



## WELCOMING STREETS TO THE SITE

- All rainwater is recycled inside the building or used for irrigation.
- Wind Turbines that are not harmful for the surrounding species.
- Connectivity between the Interior and the exterior.

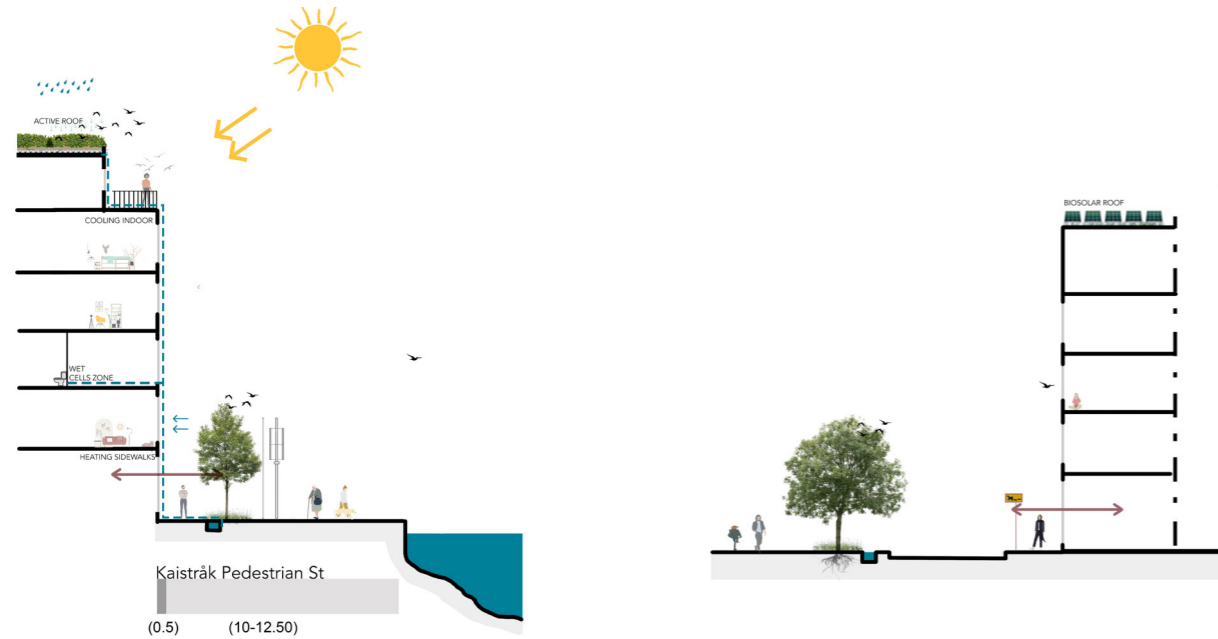


Fig 62, 63| Welcoming to the site Street Sections

## USES

Based on promoting the **culture of sharing** concept.

Different uses:  
Lund Campus, flex hall,  
library, business uses,  
mixed-use and art hub.

The mixed-use:  
Repair workshops, sec-  
ond-hand shops,  
collective cafes and  
open air seatings.

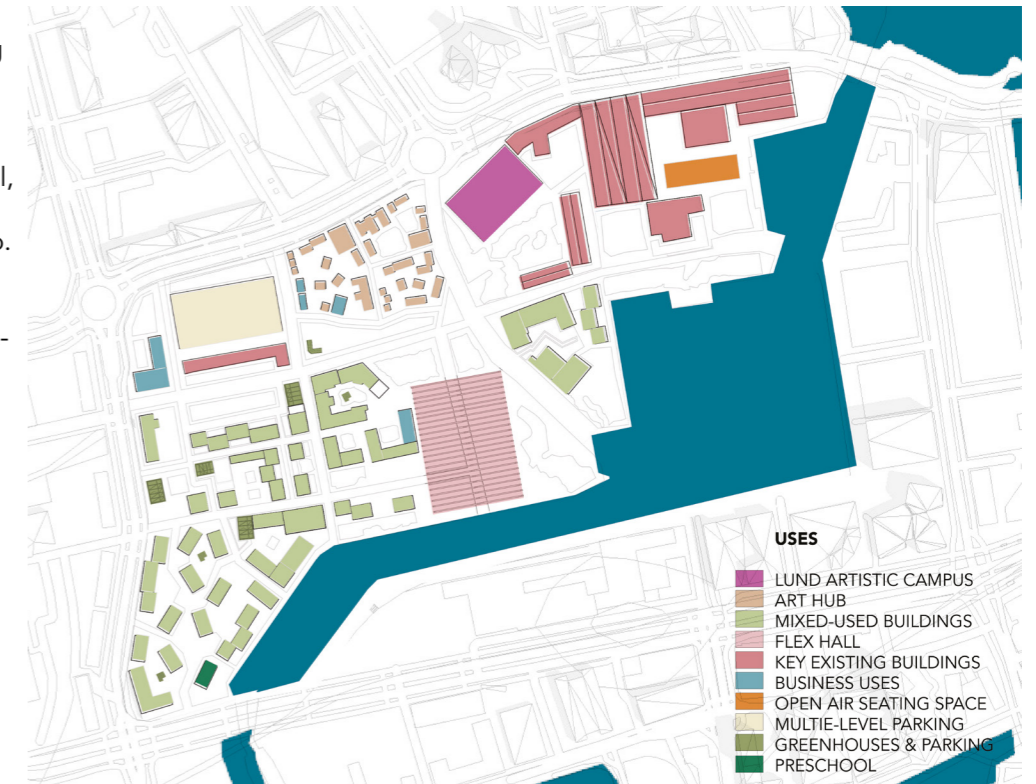


Fig 64| Proposed Uses

# BUILDING HEIGHTS

3 to 7 storey height for solar access

Higher in the west side to work as a windbreaker and in the north part to prevent noise.

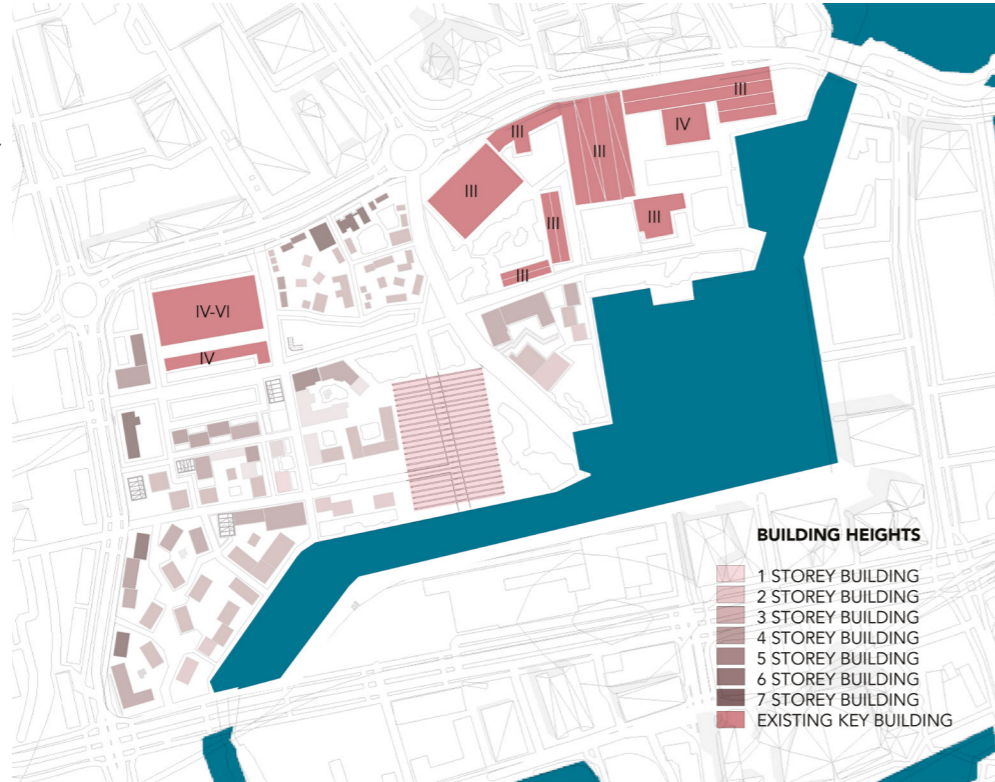


Fig 65| Buildings Heights

# FACADE

Active and open Facade around the public spaces and main streets.

Calmer in the courtyards.

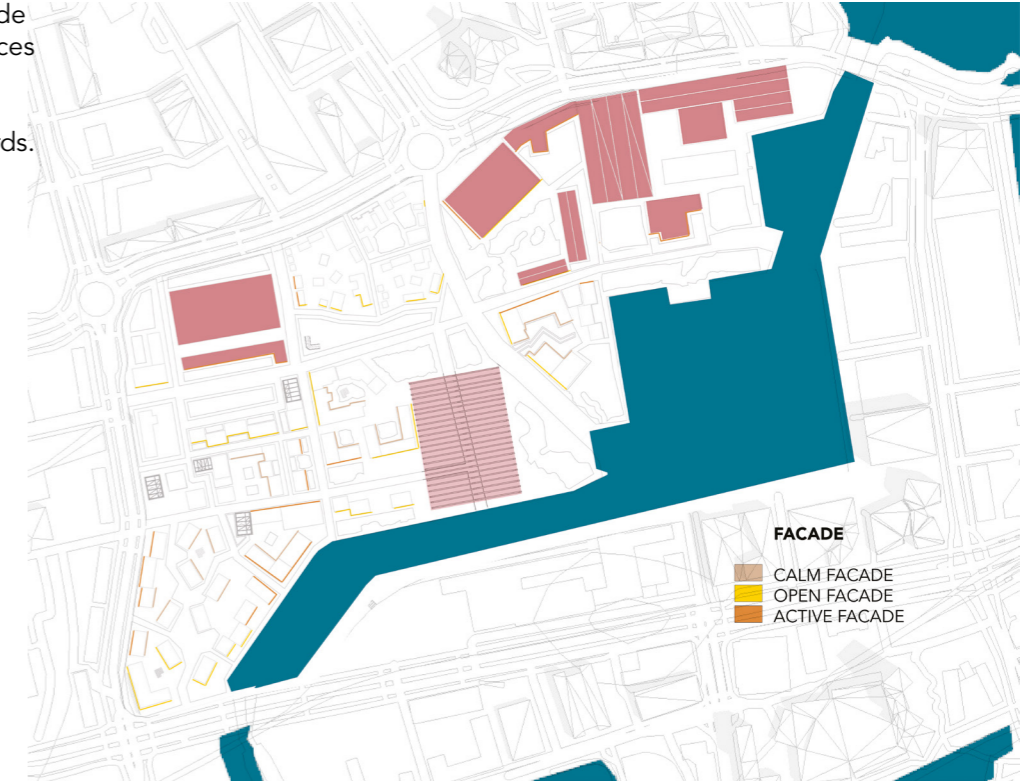


Fig 66| Facade Types



# DESIGN DETAILS

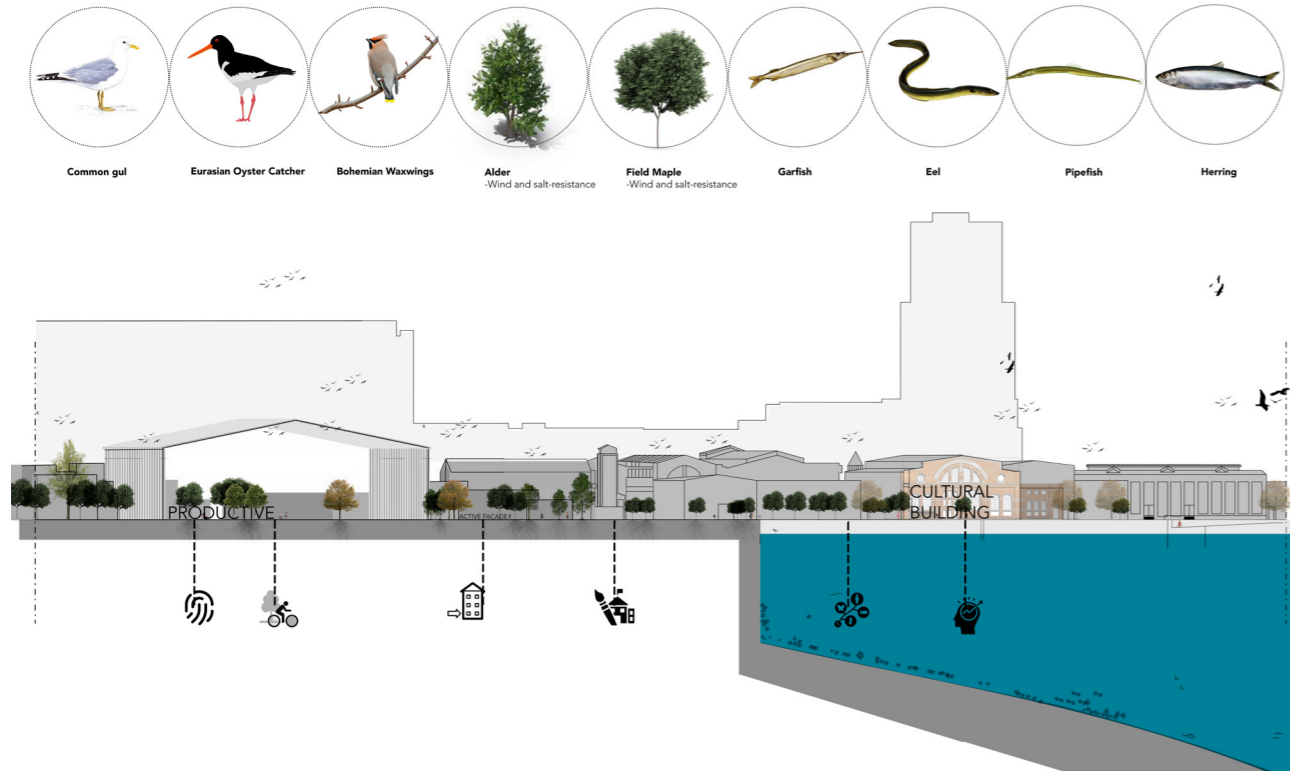


Fig 67, 68| Bring life back Section With Species details

In a time of calls to action to address climate change and environmental degradation, the construction industry is under fire for the large part it plays in the global environmental crisis. It causes 40% of the world's co2 emissions.

Architects are highly influential in determining the materials, methods, and overall footprint of construction and can disrupt the current cycle of wasteful material usage by choosing to specify reused materials found in the existing buildings. Consequently, I believe the up-cycling concept could be implemented in the site with using local produced materials. And in case of Varvsstaden, the following are the proposed materials:

- Up-cycled materials for roofs, windows or urban furniture.



Fig 69| Selected materials for the site

- Ash wood
- White glass
- Local Stainless Steel
- Oak Wood
- Clay Pavers
- Bricks

And the color scheme of the site could be colors that blends with the surroundings such as:

- Cream
- Blue
- Red palette

# SECTIONS

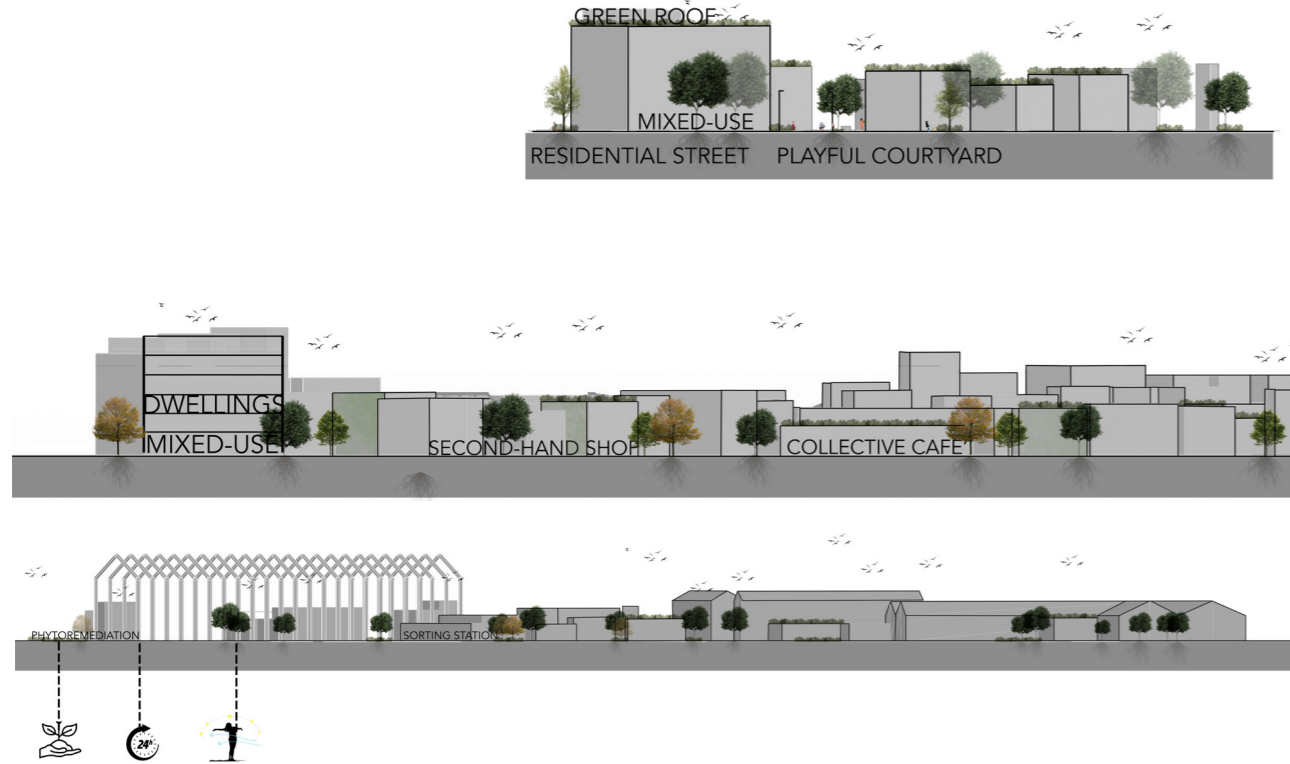


Fig 70,71,72 | Detailed Sections

# OVERALL AXONOMETRY

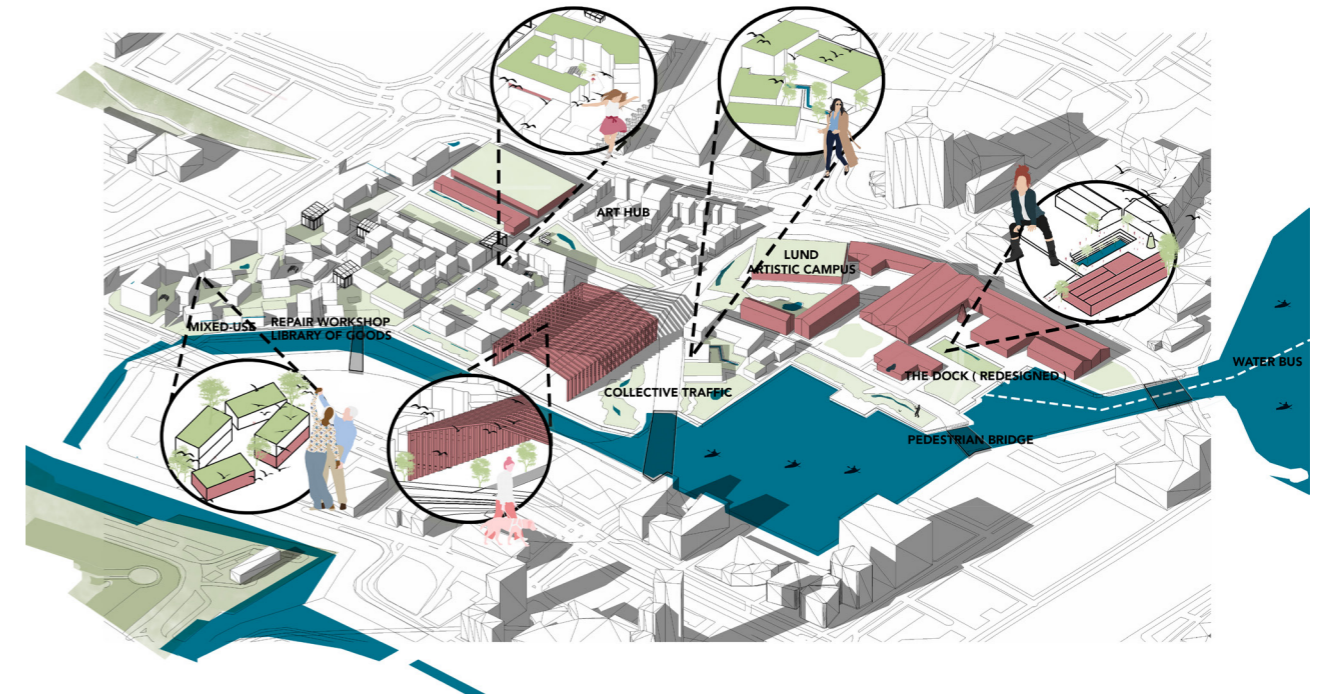


Fig 73 | Overall Axonometry

# MASTER PLAN

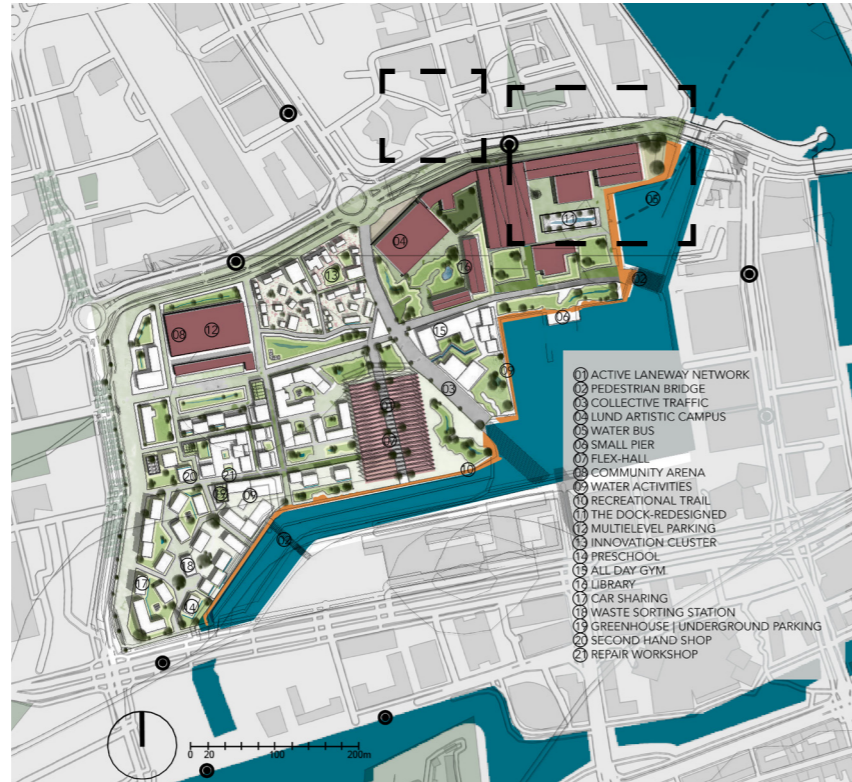


Fig 74 | Master Plan

# ZOOM-IN PLAN 01

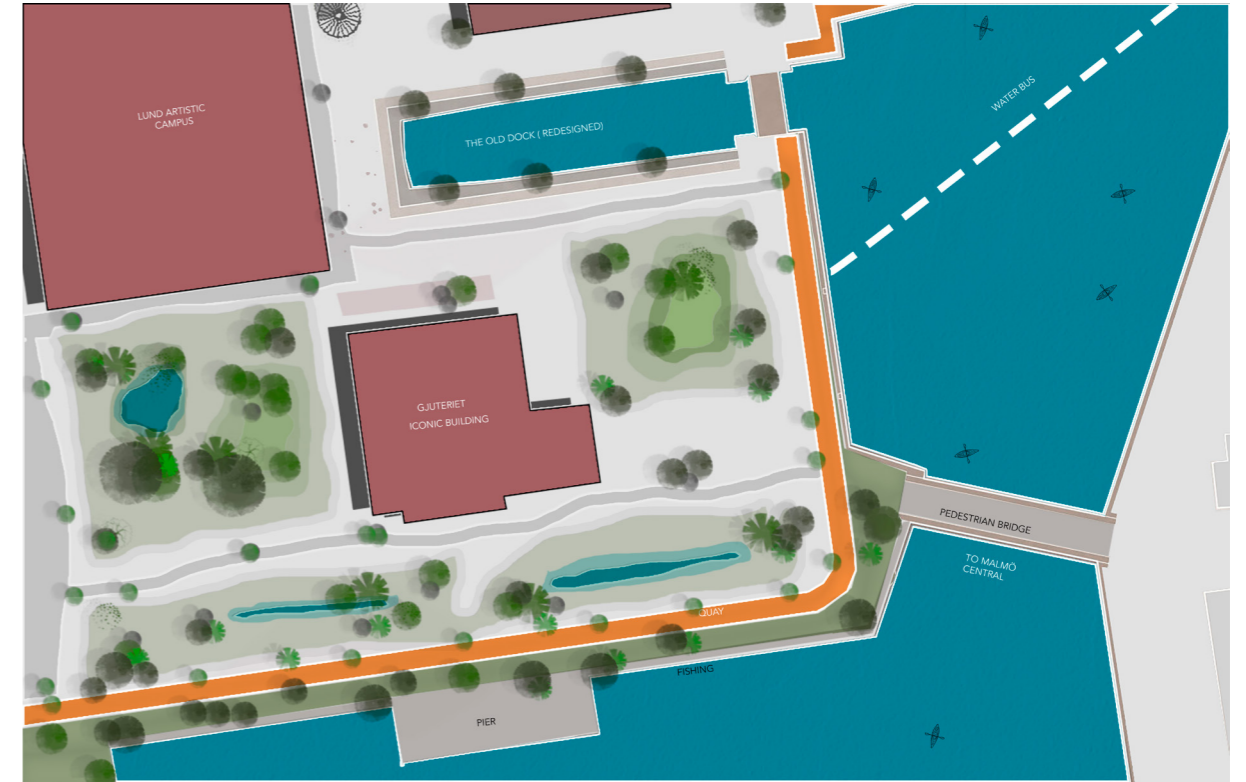


Fig 75 | Detailed Plan



## ZOOM-IN PLAN

Clean roots of the existing trees.

Renovated walls.

Exciting green spaces.

Different uses to the existing buildings.

Safer Streets by adding street lights.

Meadow Roofs.



Fig 76 | Connecting the Dots Between Old and New Zoom-in Plan

## PEDESTRIAN POINT OF VIEW COLLAGE

Benches can be rotated 360° and moved along the rails to optimize the sun position.

Different urban furniture typologies to activate the public space.

Not only adding trees but widening streams and returning it to more natural shape, which increases biodiversity.

Transparent solar panels that replaces windows.



Fig 77 | Pedestrian point of view collage for the changeable weathers.

Chapter 06

# CONCLUSION AND REFLECTIONS

- Before and After
- Conclusion Remarks
- Reflections



# BEFORE



Fig 78 | Current Situation Photo of Varvsstaden @Varvsstaden AB

# AFTER



Fig 79 | Future Varvsstaden



## CONCLUSION REMARKS

Climate change affects our ecosystems by making the air more polluted.

Without healthier soils, sea and a sustainable land and soil management we cannot tackle the climate crisis.

This thesis examines the links between the industrial era and climate change. It is an attempt to address some arguments and solutions to restore the assemblages of the ecosystems which will help in solving the climate crisis and provide all the species with a healthier life.

The design proposal developed a schematic ecosystem that integrates all the necessary procedures for the development of a post-industrial area to be healthy and livable. The proposal is specific to the site in Malmö, and aims to address its own characteristics. However, the design principles related to ecosystem resilience can be adapted to different contexts within the Öresund region and similar design sites from all over the world. On a macro scale, the project concept structure can be adopted

in different cities around Sweden. My aim with this project is to fill in the gaps between relevant disciplines that are capable of dealing with the development of industrial areas.

Finally, I wish for the project to be developed further, and to be a reference for future developments of post-industrial sites in Sweden and the world.

## REFLECTIONS

Cities are the major contributors to climate change. They are responsible for 75% of natural resource consumption, 50% of global waste, 60% of greenhouse gas emissions. Approximately 50% of the climate emissions and more than 90 % of the world's water shortages and biodiversity losses are a result of inefficient resource management. City makers should act now.

During the development of this degree project, I had the chance to reflect on various topics regarding the urban design process and that made me raise and reflect on some important ideas and questions.

First, I believe that city making should be a mix of top-down and bottom up approaches. Governments bodies and local groups can work alongside each other to strategically create livable cities.

Secondly, I deem it necessary to generate knowledge in the area of nature based management in order to guide authorities and individuals. It would be beneficial to continue research in combination with

multidisciplinary collaboration in order to optimize knowledge and viewpoints from other disciplines. This new collaboration would create new questions, new viewpoints, and new solutions, which will increase the performance of ecosystem resilience in ways that would also benefit the spatial and social quality in the urban design.

As a participant in the ICLEI congress 2022 in Malmö, I had the chance to learn a lot about the ongoing work in sustainable planning based on development in resilience, circularity, equality and inclusion and nature-based solutions in cities in a global context. This experience influenced my work in promoting blue urbanism culture and the culture of sharing in the concept structure.

In regards to the design, there is an opportunity for the project to be strengthened by exploring typologies on a more detailed level and taking further the up-cycling concept.

Chapter 07

# END NOTES

- Bibliography
- List of Figures

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## APPENDICES

Throughout my qualitative research data collecting process, I have used some questions from the Environmental Psychology Department, Lund University.

### Questions were related to

- Choosing the site
- Planning in industrial areas
- Future plans of Malmö City Office
- Quality of soil
- Quality of water
- Water-based management
- Enhancing shallow water

### Multiple Choice Questions:

There are a lot of interesting things to look at  
 The greenery is attractive  
 The environment is disorganized  
 The environment is varied  
 The buildings are noticeable  
 The route is safe  
 The area is noisy

Your experience at Varvsstaden!

Please answer these questions while you walk along the route or if you are familiar with the site.  
 © Environmental Psychology, Department of Architecture and Built Environment, LTH

Email \*

Valid email

This form is collecting emails. [Change settings](#)

### Open Questions

What is your impression of the walk?  
 How do you experience the environment you see?  
 Do you feel any connection to the surrounding water?  
 Do you have a special memory of the site?  
 Feel free to share anything you want to share here?

### Professionals From Interdisciplinary Disciplines:

- Water Engineers
- Planning Office in Malmö
- Marine Education Center in Malmö
- Cultural Analysis
- Fish Biologist

### Online Survey

Residence of Malmö | 10 Responses



### Zoom Interview

Professionals | 8 Interview including 3 in-depth interview



### Go-Along Interview

Professionals | 6 in-depth interview



### Chatting Interviews

People living in and around Malmö | 16 | Different ages | Re



## RECLAIMING ECO ASSEMBLAGES

Emphasis on ecosystem resilience in human oriented urban design in  
Varvsstaden, Malmö, Sweden

- EXPERIMENTING WITH A FUTURE URBAN SCENARIO -

ASBM01 | Master Thesis Booklet  
Sustainable Urban Design  
School of Architecture, LTH, Lund University

Author: Ghada Ahmed Shaaban

Primary supervisor: Teresa Arana Aristi, Architect | Urban Designer  
Secondary Supervisor: Peter Siöström, assoc. Professor, Director of SUDes, LTH

Examiner: Lars-Henrik Ståhl, Director of SUDes, PhD, Professor

Defense Date: September, 2022



LUND UNIVERSITY

**Post-Industrial**

**Urban  
Design**

**Manifesto**

**Up-cycling**

**Blue-Mussels**

**Blue**

Sustainable Materials

Öresund

**Phytoremediation**

**Resilience**

Meadow

People-planet

Flexible typologies

Malmö

**Eco Assemblages**