



TO SEA OR NOT TO SEA

- An exploration of housing design on water in the varied climate of the archipelago

Master's thesis Spring 2022

Supervisor: John Helmfridsson Examiner: Julia Fredriksson

Chalmers School of Architecture Department of Architecture & Civil Engineering

Ellinore Olofsson



CHALMERS
UNIVERSITY OF TECHNOLOGY

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Direction: Rurban Transformation

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Architecture & urban design

ABSTRACT

The starting point of this thesis is based on the possibility to explore alternative building design in coastal and water vicinity environments. To study exploitation where buildable land is limited and nature preservations creates values to preserve and protect.

The aim has been to produce a plan proposal on Öckerö in Gothenburg's northern archipelago. In addition to find tools to develop design and housing on water in the varied and harsh climate.

The locally based project identified and mapped the need for housing in the municipality. In the process, the theoretical framework has been involved in the inventory of housing qualities, such as meeting places, intersections between private and public, and safety in the area. Weather elements and the local needs also dictate the framework for design. Mapping of the proximity to central Gothenburg and the historical narrative of Öckerö is examined and taken into account.

The possibilities of the site have been used in the project, additionally challenged by the existing structures on the island. To create space through volume configurations, spatial investigations and light that will enhance the new residential area. The proposal includes floating housing with focus on the plan structure to improve the social interaction and lift qualities for the local area.

As detailed plans and building permits are slow processes, the proposal can be designed as both temporary and permanent. The result of this thesis is a housing project with a mix of units in a small scale that will support the local housing needs in the municipality. The place where the project will be designed, analyzed and evaluated is an area that will be connected to the center on the island.

Key words: archipelago, coastal community, suburb, pontoon housing, weather, wind, water, nature, housing, meeting places, social interaction



PREFACE

I grew up and live on the islands, have always been surrounded by water, it is my element. I love to be around and in it, not only at home but wherever I travel, it is the sea and water that makes me calm and clear my mind.

The subject of this master thesis origins from the curiosity to develop housing on water in this environment. It has followed me through architectural education, as it can be placed on different sites and changed conditions. There are several aspects in planning of floating houses, which makes it interesting for an exploratory architectural project.

I have been able to follow the housing development in Öckerö municipality over the years, and noticed that supply and demand are unbalanced, so are the supply of buildable land and needs. Housing for young people with an acceptable rent level is rare. Families with children find it difficult to enter the housing market and large villas are inhabited by older people as it is cheaper to stay than to move to an apartment.

I feel an urge to develop the place around me, to challenge and in an innovative way enrich my local area.

AUTHOR

Ellinore Olofsson

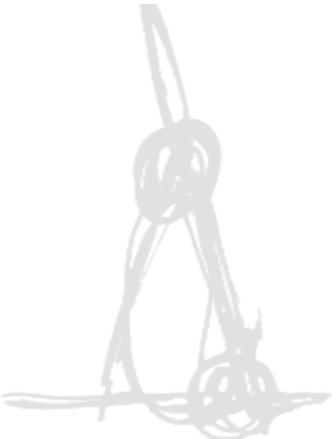
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01. INTRODUCTION

*Jag vill ha ett hus vid havet
Där jag kan se på alla båtarna
Som lägger till*

*Jag vill ha ett hus vid havet
Där jag kan höra alla måsarna
Och göra som jag vill*

*Och varje morgon
Innan solen värmt mitt tak
Ska jag ligga där och lyssna
Efter vägorna*

*Jag vill ha ett hus vid havet
Där jag kan höra alla måsarna
Och göra som jag vill*

*Jag vill ha ett hus vid havet
Där jag kan höra alla måsarna
Och göra som jag vill
(Marie Fredriksson)*

**BACKGROUND
& PROBLEM SETTINGS**

Locations along the sea and lakes have always attracted people. Communities and buildings have expanded along the coast and the land has in some places been used above its ability to preserve natural values. The sea has and still has people's livelihoods through fishing and transport. People are attracted to spend their vacation by lakes and at places by the sea, which places demands on the sustainable development of the coastal communities. Along the coastline and on the islands, the requirements are particularly specific and innovation is required, the challenge of prospecting in those places where the capacity of the land is limited.

The study for this thesis is located in Öckerö municipality. In this area the houses are expensive and the availability of apartments is limited. The need for housing affects the opportunities for young people and families with children. It is difficult to enter the housing market, at the same time the municipality needs to create many new jobs.

There are also very few natural meeting places on the island, those offered today are connected to everyday service, churches and sport clubs.

Surface of the islands is limited, and large parts are protected by either coast line protection (strandskydd) or by nature protection. There is also a curiosity from the municipality to use the sea. The municipality has therefore set aside resources to investigate the question of whether it is possible to develop housing on the water. Is it right and defensible against future generations to meet all the housing needs we have today and appropriate all vacant land. What happens in 50 or 100 years when there is no land left except the one that we save because it has nature protection?

AIM & PURPOSE

The aim is to show how housing problems in a local context can be handled in coastal areas where the supply of buildable land is limited. To develop a plan proposal with floating houses, to explore how architecture can respond to the surrounding conditions on site, additionally with the ambition to investigate how the knowledge from research of good qualities in city planning can improve the design. This is done by developing a design proposal with floating homes on Öckerö in Gothenburg's northern archipelago. Thereby, the thesis strives to raise awareness and be a source with inspiration on how we can use the sea to promote future environmental and social sustainability in a local context.

SITE

Stackeskär 57°42'15.3"N 11°39'30.9"E

DELIMITATIONS

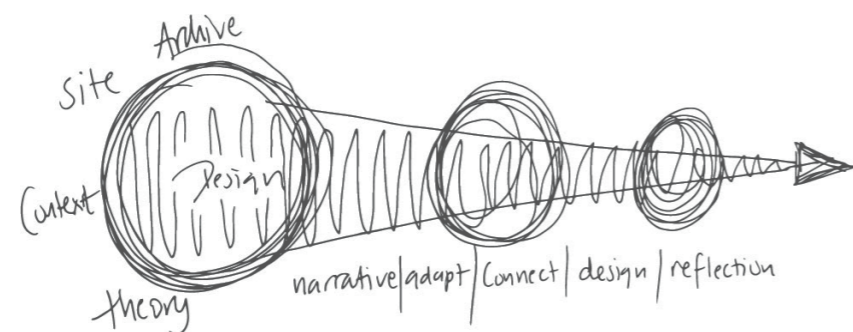
The idea in this project is to show examples of design solutions that can inspire, by doing a design proposal for floating houses, which can be applied in different places based on its specific context. In this thesis, Öckerö municipality is studied specifically and certain delimitations have been taken into account.

- Technical solutions have been touched on in general but not studied in detail.
- The project does not point out parking places even though the harbor has plenty of space.
- The housing volumes in the plan proposal are two sizes in pairs on each pontoon. The possibilities of how the homes can be used have been studied, but no floor plans are reported in this thesis.
- The subject regarding land ownership and detailed plans for the classification of the area will be touched on but limited to be lifted as a discussion.
- Water depth has been taken into account, but deviations deviating from those recommended may occur.

METHOD

The ambition is primarily to use Research by design, the method is distinguished by an interaction between theory and practice, and is applied in the context of this thesis. Parallel with sketching a selection of elaborations and site inventory theories will emerge.

Definition of the process has been repeated iterations related to the identified contextual needs in the region, additionally with the design process ongoing in interaction with the theoretical framework, the weather, nature and surrounding structures. The thesis aim and purpose has been investigated through research, sketch, compiling and feedback to increase complexity of the mapped aim and represent a theme of theory to influence the design.



ANALYSIS & LITERATURE STUDIES

Context analysis and an inventory of housing needs in the local context is done. Architectural references and literature studies have been involved in the inventory of housing qualities, such as meeting places, intersection between private and public and safety in the area. Expertise from areas related to the project has been contacted and facts in general are studied of what is required for floating housing in terms of conditions and technical solutions.

SITE INVENTORY & CONTEXT STUDIES

Observations and mapping of the place from the present and past. The historical perspective is part of the narrative for understanding the settlement and development of the place. Ambient parameters such as nature, weather and sound have been taken into account in the studies of the site. The municipality's officials have taken part in the project and the authority's governing documents have been taken into account. The broader and the limited geographical context is already well known, so I try to look past my preconceived notions, deepen my thoughts and see new connections and innovations.

DESIGN PROPOSAL

The ambition has been to give my interpretation on how architecture can put emphasis and respect on the surrounding landscape. Iterations of the new housing blocks have been made through volumes, plan, section, and elevation. Selected reference projects have been revised when uncertainty and questions have arisen, to extract solutions related to the project.

02. ANALYSIS



02.1. Problem settings

02.1.1 CLIMATE CHANGES

- high rising sea levels



The County Administrative Board's (Länsstyrelsens) handbook '*Stigande vatten*' (high rising sea levels) states that the variation in sea level depends on many factors. Globally, the most important factors are the thermal expansion (expansion of the ocean during warming) and contributions from melting glaciers and the large landings in Greenland and Antarctica. There are also large local differences, which are due to changed salinity conditions, as well as changes in the local wind climate. Land uplift counteracts sea level rise to some extent, especially in the latter half of the decade (Faktablad Kusten, 2014, p.1).

We need to adapt our society and what is being built today to the calculations of rising sea levels that have been researched. According to the handbook 'Stigande vatten', the future highest tide in Gothenburg in 2100 is according to the altitude system RH 2000, estimated to be +3.4 metres. In the new detailed plan for Öckerö's new centre and in the municipality as a whole, the height system RH00 is followed, which means that the lowest level of the finished floor is +3,165 above normal water level (ÖNC_DP1_Planhandlingar Granskning, 2021, p.4).

On the islands in the municipality and in the archipelago in general, there are buildings below these levels, what is being built now and in the future needs to be adapted to new calculated sea levels.

The question is - if it is justifiable against future generations to meet all housing needs we have today and appropriate all the vacant land?



01.1.2. TO SEA - why on water?

Lack of buildable land, little or no damage to nature and a solution as sea levels rise. The preliminary study report of Floating housing from the Plan unit of Öckerö municipality, says that: In general, the coastline is regarded as a very valuable resource that since the 1950s has had statutory protection in Sweden through Strandskyddet. From Öckerö municipality's perspective, however, the resource supply looks different compared to the country as a whole. There is greater access to the shoreline here than buildable land. At the same time, the natural geography within Öckerö municipality is an asset of national interest, which means that there will be several high thresholds during the process of developing floating housing. (Förstudierapport Flytande Bostäder, Öckerö Kommun, 2022, p.2).

In the world, floating housing is an issue that has begun to come up on the agenda. In 2019, there was a roundtable discussion within the UN's program for housing and housing issues on sustainable floating cities and whether it could be a possible solution to various types of challenges, such as climate change and the lack of affordable housing (Förstudierapport Flytande Bostäder, Öckerö Kommun, 2022, p.3). The report also claims that floating homes can help provide value to various areas, such as:

- Attractive contribution to the housing stock.
- Natural adaptation to rising sea levels.
- Flexible location and flexibility in living space through the possibility of module solutions.
- Knowledge-enhancing / technology development through new challenges for materials, construction and technical systems etc. (Förstudierapport Flytande Bostäder, Öckerö Kommun, 2022, p.4).

01.1.3. REFERENCE PROJECTS

The water is used for floating housing in many places in the world. In Sweden, this development has taken place in a couple of projects and more are being processed. Architects Arne Algerö and Christer Blomqvist have developed various proposals along the coast.

ARNE ALGERÖD
Architect -PE teknik och arkitektur



-When the owners of Salt & Sill at Klädesholmen contacted me they had a vision of expanding their seasonal business. Arne explains that the restaurant was blooming during the summer months and around christmas but had a hard time during low season. The problems with hiring staff for the seasonal openings led to the decision to invest in hotels and conference activities. Since the land around the restaurant was completely built, they realised that the hotel needed to be placed on water. The first idea was to restore a boat but the choice then fell on a pontoon construction. The hotel rooms are placed on a number of assembled pontoons. These were constructed in Rönneå harbour and then towed by a small boat to the place outside the small island where the restaurant is located. The construction is a regular wooden construction and its weight has been carefully calculated. The project was completed in 2010. Arne also explains his experiences with the laws regulating buildings on water and how they should be classified, such as a boat or a dwelling. He further tells me more about how insurance companies and banks approach, how to relate to leasehold. (A. Algeröd, personal communication, 24 of march, 2022)



Salt & Sill. PE-arkitektur



(Salt & boende. flytande hotell på klädesholmen, 2008)

A project with large building volumes placed on joined pontoons. An interesting project where the sea is used as the land on the island is limited. The pontoons are placed in a semi-protected location on Klädesholmen, the waves are swaying it and the weather is sometimes harsh, despite this, the buildings are still in good condition.

CHRISTER BLOMQVIST Architect
Tengbom Malmö



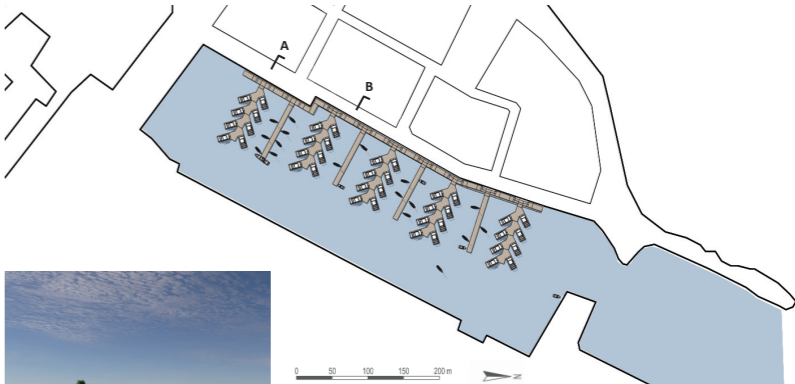
-Floating housing is in line with good development, both for the environment and towards a sustainable future, Christer begins. He works at Tengboms in the studio for complex projects and has developed several plan proposals with floating homes, including Limhamn and Falsterbo, which are being processed with the municipality and authorities. His experience with these projects is that they encounter opposition from municipalities and authorities as they are not used to the law. Further there is no clear set of rules in the matter, so these projects often end up in the shadows and are often delayed. However, he sees no problems at all with the law. You solve a lease or buy a plot of land in the water that runs for 100 years, since the residential area is classified in the detailed plan. This has been solved easily in Västervik. Falsterbo has drawn a plan proposal with 160 apartments in the eastern mouth of the canal. In the immediate area, the supply of land is largely depleted and the location around the canal is the area to be developed to solve housing needs. Tengbom has drawn a proposal with 150 apartments located on pontoons in the northern harbour basin in Limhamn. He continues: -The best places for housing on the water are at ports, where it has already been dredged for good water depth, and the dialogue with the County Administrative Board and the Swedish Environmental Protection Agency will be easier.(C. Blomqvist, personal communication, 30 of march, 2022)



Falsterbo canal. Tengbom (Förstudie Flytande Bostäder, Limhamns Hamn, 2020)

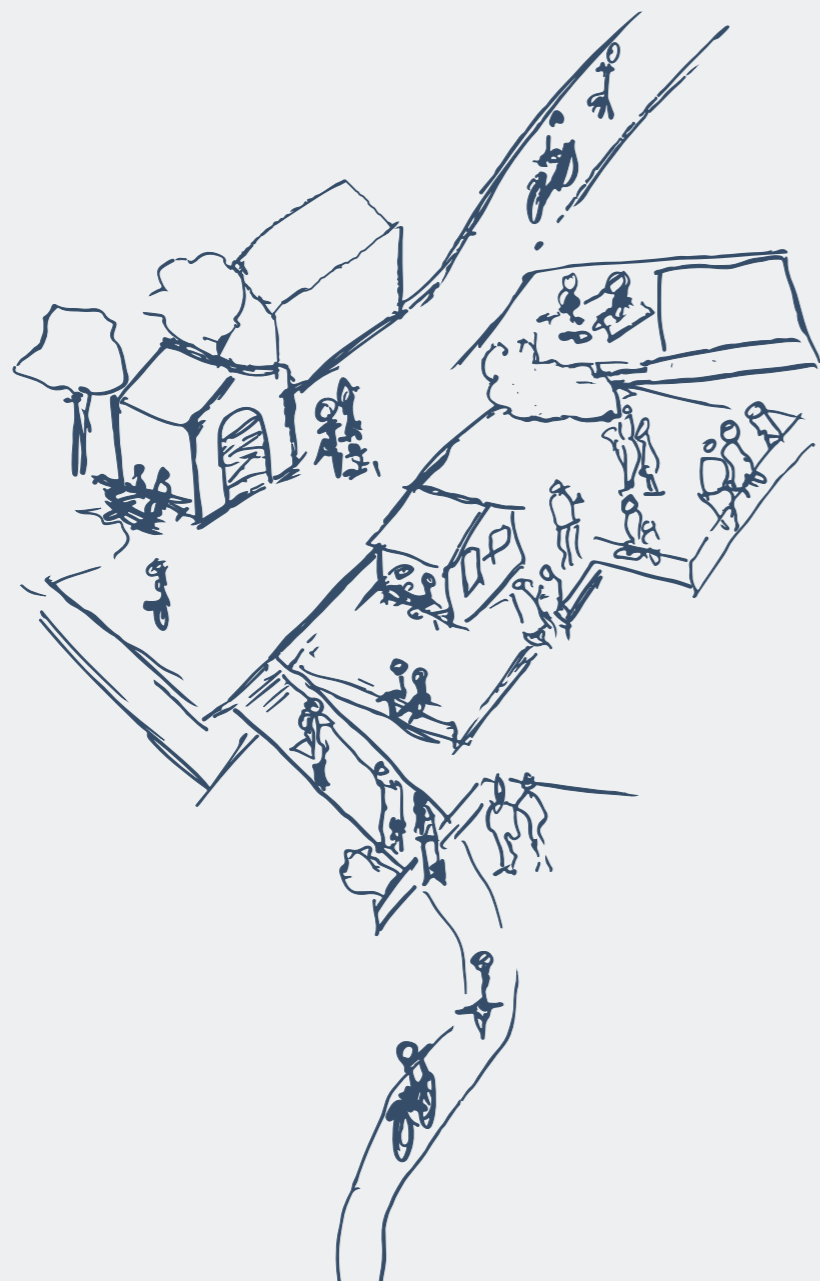


Skeppsbrostaden i Västervik. Tengbom & Aqua floating group



(Förstudie Flytande Bostäder, Limhamns Hamn, 2020)

From this point of view, planning buildings on the water can be seen as an innovative but also a relatively obvious approach. The problem is to get the municipality involved as there is a fear of making mistakes. In summary, a kind of template and a set of rules should be investigated.



02.2.1. CITYPLANNING QUALITIES

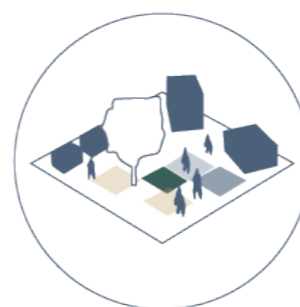
The ambition of this thesis is to design a place based on the local context and strategies that are grounded the academic discourse. It has included inclusive meeting places, design of safe places and paths, developing principles that create welcoming streets where private and public meets.

-Meetings

The most important function of the public space is meetings, so what ingredients are important to look at in the design of a city and places for diversity and preserve good opportunities for meetings. What is a good public space and what can it offer to the area?

In Jane Jacobs book *Death and life of great American cities* she believes that four theses are required if the conditions for diversity can be incorporated. The need for mixed primary functions is the first. Preferably more than two to get a rich life over most of the day, both homes, workplaces, shops and cultural institutions. The second is the need for short blocks, not to large buildings. A smaller-scale feature of the city's design contributes to unexpected encounters with passers-by. The third thesis is the need for older buildings, with them comes different rents and also a mixture of different kinds of activities. The last and fourth condition is the need for high concentration. This applies to both residents, workers and passers-by (Jacobs, 1961, p.153-221).

-Strengthen the character and atmosphere of the physical environment and create an attractive place with functions facing movement.

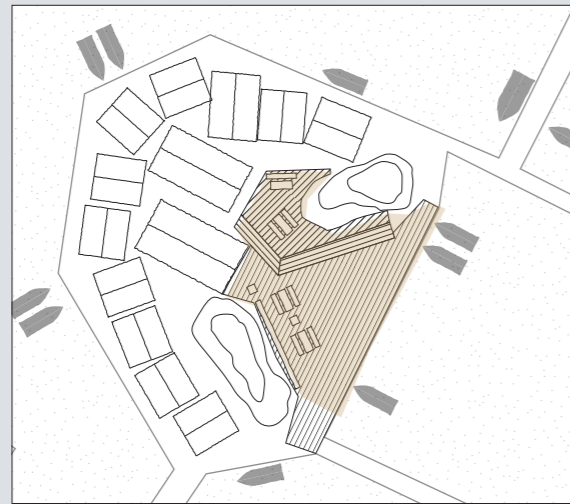


Alexander Stähle writes in his book *Closer together*;

”Build new squares and parks - a city without public places such as parks and squares is not a city. In the case of densification of urban development, a plan is thus needed for how parks and squares are to be developed, this is one of the most important means against urban sprawl”(Stähle, 2016.p.157)

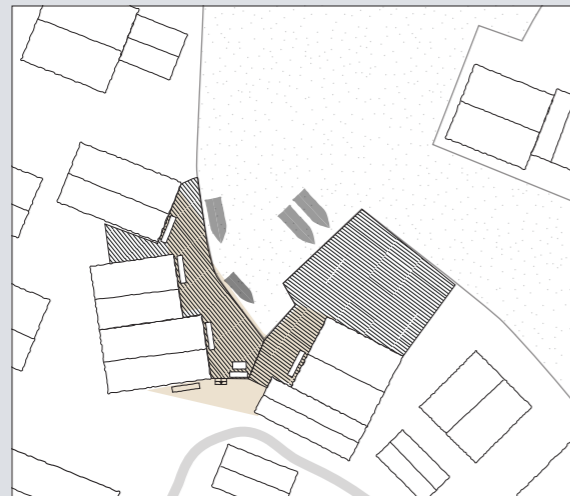
The anthropologist William H. Whyte was the one who drove the change of Bryant park, he worked a lot with program activities such as yoga and concerts and said that the most important thing is not to hire a glassy landscape architect;

”What attracts people most, it would appear, is other people”(Whyte, 1980, p19).



In the guest harbour, people gather on the small central island, a place where the piers are walkways from the moorings towards the coastal resort's service points. The square is oriented by the boathouses circular formation and the island's cliffs are welcoming for a stay in the sun and barbecue evenings. The place has good opportunities to provide protection, against the most common wind direction from the southwest.

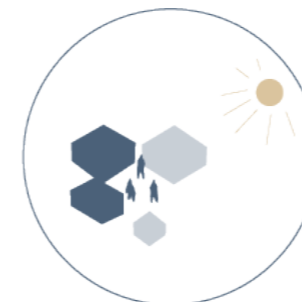
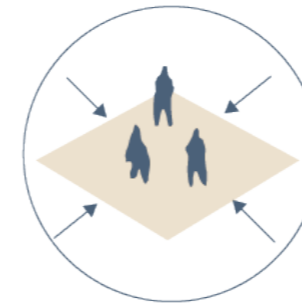
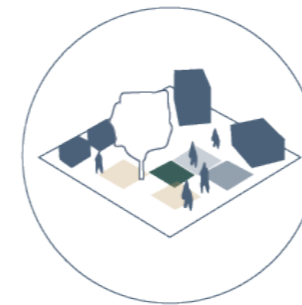
Skärhamn Sweden.



A bit of an intricate situation in different levels, the small "square" facing the canal has become a meeting place for it's simple but important functions. The fishermen make their nets in the sheds, sit and 'lie' on the benches and it is a crossing corner for people who use their boats or take a walk along the canal. A wind sheltered spot.

Hasselösund Sweden.

02.2.2 PUBLIC PLACES



Jane Jacobs, the most influential author of modern urban planning. In the *NCU journal* her speech has her speech been shared from when she received the Vincent Scully Prize from the Green Building Council in 2000. Although the speech was held 22 years ago, so is her theories still highly relevant. She claimed that we need to nurture places where people, on foot, will naturally meet each other. Parks become lively and successful for the same reason as sidewalks: due to functional physical diversity among adjacent uses, and hence diversity among users and their schedules.

”Let’s think a minute about the natural community anatomy of community hearths. Wherever they develop spontaneously, they are often consequences of two or more intersecting streets well used by pedestrians. On the most meager level, we have the cliché of the corner store or pub that is recognized as a local hangout. “Corner” implies two streets intersecting in the shape of an X or a Y. In traditional towns, the spot recognized as the center of things often contains a triangular piece of ground because it is where three main routes converge in the shape of a Y.” (Steuteville, 2016)

Jacobs offers four principles for good park design: intricate (stimulates a variety of uses and repeat users), centering (a main intersection, breakpoint or climax), access to sunlight and fencing (the presence of buildings and a variety of surroundings). (Jacobs,196, 1p.103).

”Small parks, if they are popular, knit together their neighbourhoods from different sides, and mingle the people from them”.(Jacobs,1961, p.264).

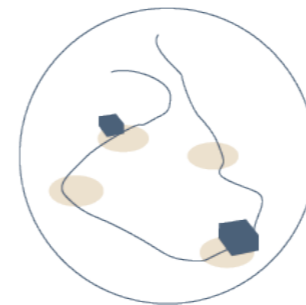
She believes that the emerging places in the street anatomy create meetings, places that are important pieces of the puzzle in the entire social network that fertilises squares and parks. It is not necessary to hire a landscape architect to design a park, but places should be taken care of where people, on foot, naturally will meet each other.



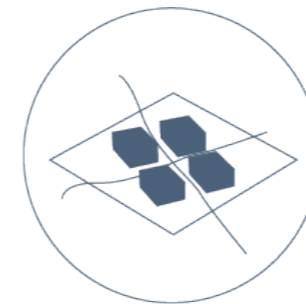
02.2.3. PATHS AND SAFETY

- Extend paths and strengthen them, create routes and destinations.

Paths will strengthen the connections between the public places and create inclusive areas that are open to everyone. Alexander Stähle emphasises that it is the people, not the cars, that create the city. He advocates that we should create city boulevards that enable accessibility for everyone, who is child-friendly. That we should have safe seamless bicycle nets and maximise the sidewalks (Stähle, 2016, p.152-153)



-Promote security, create lines of sight to avoid unsafe places, ensure that you are seen even from a distance. Security both among people and to be seen from the aspect that you can fall into the sea.



Neighbours who have their eyes on the street create safer urban spaces and can help to prevent crimes and avoid unsafe places. This means that neighbours recognise if something unusual happens rather than observing each other (Jacobs, 1961, p.35).

Mark Isitt analyzes in GP Kultur how he experiences the security around Hauser Plads in Copenhagen;

”When the playground is off and the smørrebrøds restaurant in the basement is closed for the day. A perceived insecurity, without a basis in the crime statistics. But still worth taking seriously.”

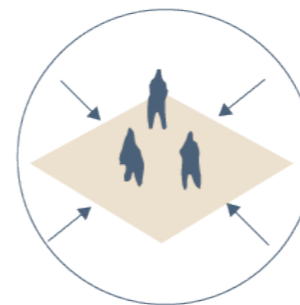
However, he feels that the municipality of Copenhagen understands this, by prescribing more city life (Isitt, 2022) .



Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

*Rowhouses placed in two semicircles facing each other.
The courtyard forms a village square, the entrances to the
homes face inwards.
Djingsi Khan. Bananparken Lund Sweden.*

02.2.4. THE NEIGHBORHOOD - the villages

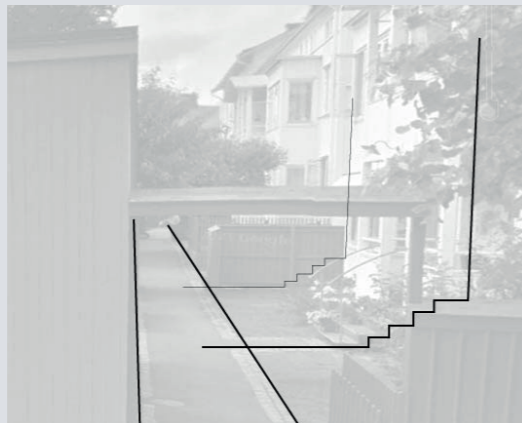


On the other side of the interface we have the street and public space. In the small scale this space is the neighbourhood, it is here where the inhabitants are on the way to work, where they walk, bike and stop for a chat. When streets and the space between the buildings are designed with the ambition of creating qualitative urban space, beautiful and a well functioning neighbourhood will occur.

In the book *Life between buildings*, Jan Gehl studied outdoor activities in residential areas. He measured different types of activities taking place in the front yards, porches and streets of row houses and detached houses. He divided the activities into 'coming and going activities', that in most cases were the necessary activities like going to work or school and running errands, and 'stationary activities', that often were optional like going for a walk, training, sitting on a bench and drinking coffee in the sun.

As a result of his study, Gehl came to the conclusion that when outdoor areas have a high quality, then the frequency and duration of 'stationary activities' increases, because the physical conditions are better and a broad spectrum of human activities is possible. In urban spaces and streets of poor quality, only a minimum of activity takes place, human activities have poor conditions to be established, people hurry home (Gehl, 2011, p 9-11).

Jan Gehl saw in his studies that some activities do or work directly in front of the house, good staying areas directly in front of it and easy access in and out of the house, these three factors can make a livelier and more pleasant neighbourhood. and thereby increase outdoor time. To encourages people to go to a place and use it can be to design something as simple as a bench in front of a sunny wall. (Gehl, 2011, p 187)



The interface between the walkway and the entrance, the stairs and the small front yard garden dictates the welcoming impression in this semi private garden.

Lindholmen Gothenburg.



The street along a canal in Venice Italy, imagine a floating house being placed in the water. The interface along the facade on the left side provides a short distance from passers-by. The lower part of the street creates the gap that provides a point of intersection between private and public. A fairly dense situation that both offers activity but also involves private zones at the entrances. Venice Italy.

02.2.5. THE STREETS / INTERFACES The streets and sidewalks are actually the main public spaces of our cities and communities. Of course, parks and squares are the main public places we think of which is correct on the other hand. But when we are on our way to work and school, where we bike, walk, do our everyday errands and stop for a chat, we move along the streets. And most importantly, along the streets is where our homes are situated. In between the street and the home is the interface between private and public.

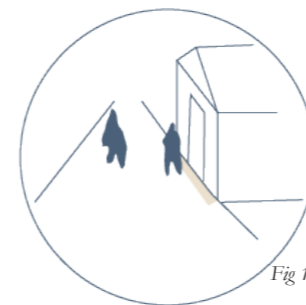


Fig 1

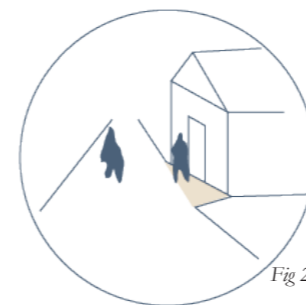


Fig 2

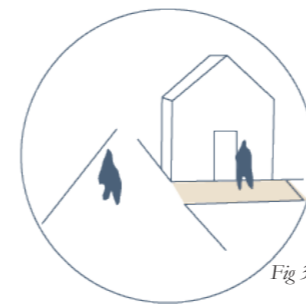


Fig 3

In his book *The interface between private and public territories* Jan Gehl states in a similar situation as in figure 1: The houses as well as the streets, tend to look a little more forbidding and uninviting, a hard interface. A situation analysed where there is no buffer zone in the area between, the public and private butt directly at each other. He claims it to be a hard interface.

In the situation as in figure 2 Gehl states that the only semi private area is the steps to the front door;

'Nonetheless this provides the occupants with an opportunity to sit or stand outdoors in sunny weather and to position themselves either close to the the street, on the steps, or away from it on the landing, as they wish(Gehl, 1976, p.29).

In the situation as in figure 3 on the other hand is a soft interface, claims Gehl, a gradual transition between public and private has been provided with a front yard; One is not restricted to being either in public or private territories. An array of in-between possibilities is left open. The borderlines have been softened(Gehl, 1976, p.5).

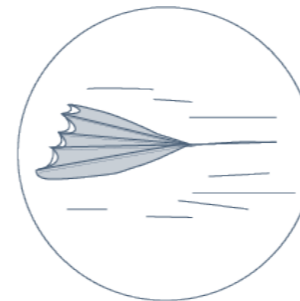


02.3. Weather

02.3.1. ARCHITECTURE RELATING TO WEATHER

In addition to studying context and local needs, this thesis project is also focused on allowing nature's changes and variations to set the tone in the design work. In Sweden, the education in architectural building and city design are separated from those in landscape architecture, which means that the holistic view of surrounding outdoor environments is mainly emphasised in the landscape architecture area. Nature and architecture (the built environment) are seen as separate things. But this matter is looked upon differently in Eastern society. The two fields, architecture and nature are intertwined in a holistic sight of view.

Jonathan Hill's investigation in the book weather architecture in which he explores the creativity of the weather. His overriding aim is to understand the history of architecture through the history of weather, in time of growing awareness of our environmental surroundings in a time of climate changes. To include the weather as an architectural author who influences architectural design is this book an inspiration in this thesis(Hill, 2012).



The aim, to conceive architecture for this new environment where the role of nature is present, the Japanese architect Junya Ishigami message is that we should look at architecture in a new way:

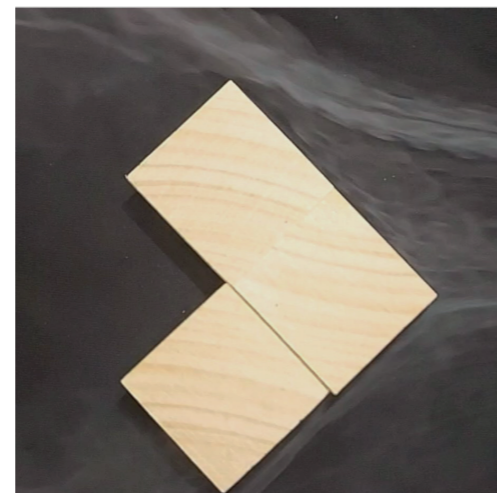
”To embody in architecture that which has never been architecture before - I wish to explore this possibility. Today, we can no longer draw a line between the natural environment and man's artificial environment in our conception of architecture. The artificial environment we are creating has grown enormous in extent. So much so, it has even affected the natural environment, and the natural environment in its turn is heavily affecting our artificial environment. As the boundary between these environments, natural and artificial, has grown steadily more ambiguous, a new environment is taking shape” (Ishigami, 2011).



"Lorarts lä"
Even if the wind direction is right at an angle,
the wind strength inside the corner decreases
by 50%.



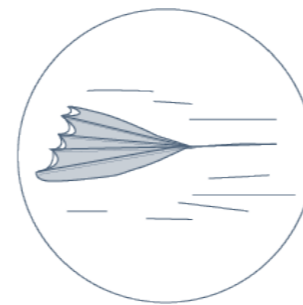
The strength of the wind accelerates along the
volumes, creates vortices after, but provides
shelter inside the angle.



The screened plank next to the volume
significantly reduces the strength of the wind

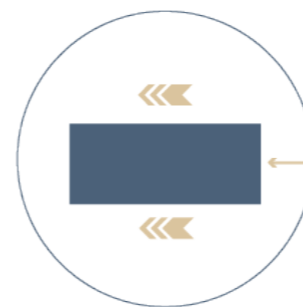


02.3.2. WIND TUNNEL EXPERIMENTS

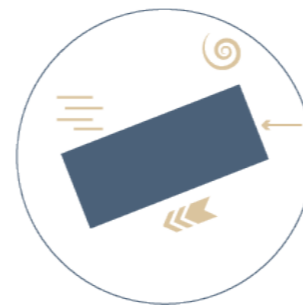
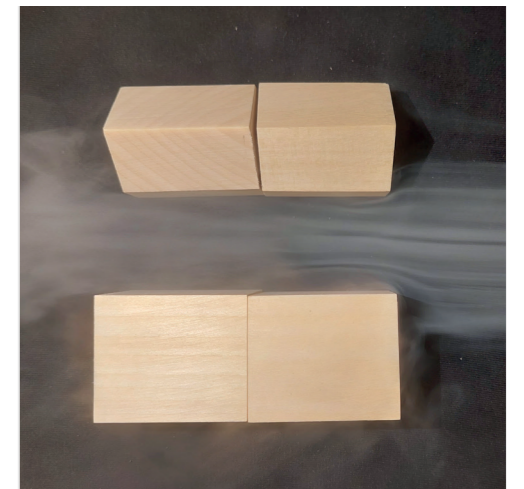


The knowledge and intuition when it comes to the forces of the weather and not
least the wind in the archipelago is one of several strategies in the design work.
Corners, angled volumes and variation can provide protected spaces. Glaumann
and Westerberg wrote:

“Planning with a notion of the wind in the outdoor environment is based
on how the wind is experienced. There is no doubt that winds in our climate
have a negative impact on the outdoor environment in general”(Westerberg
et al., 1988, p.8).



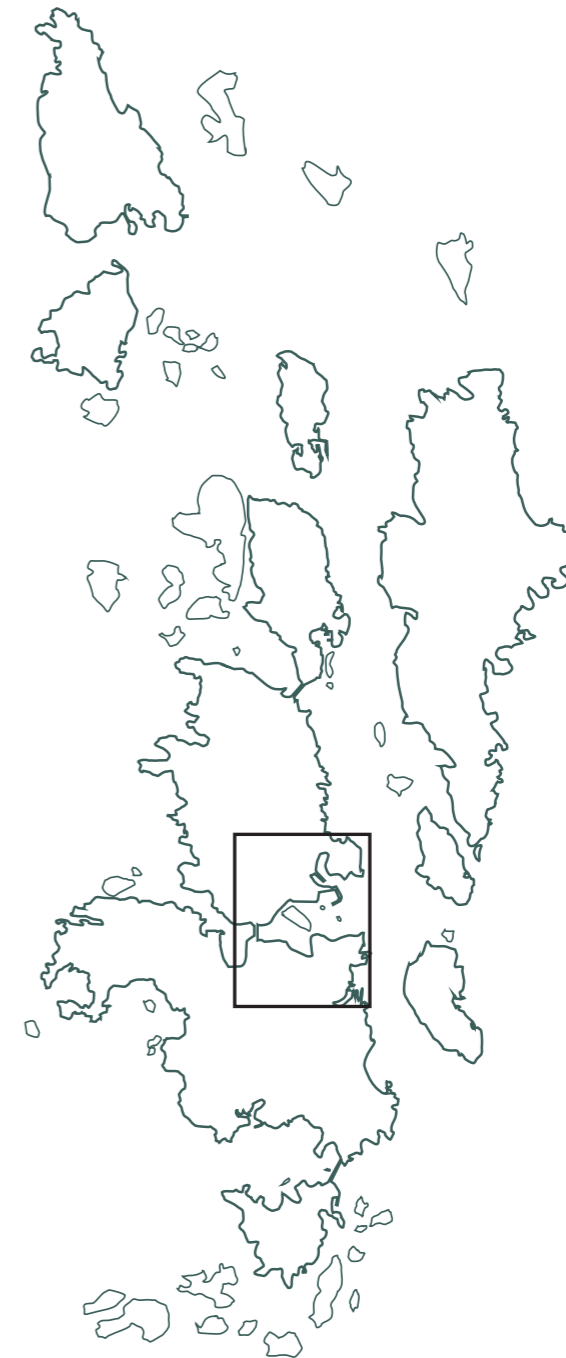
When the wind direction pointing towards and
along the volumes, the speed accelerates and
creates a windtunnel.



Just a slightly angled volume makes the wind
behave completely different than with straight
units.

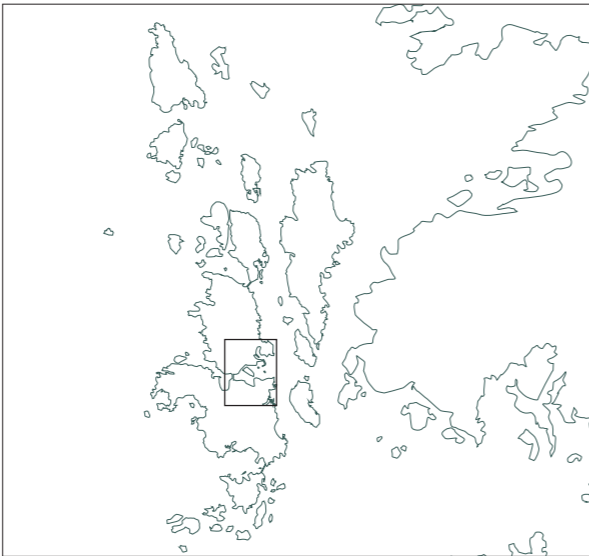
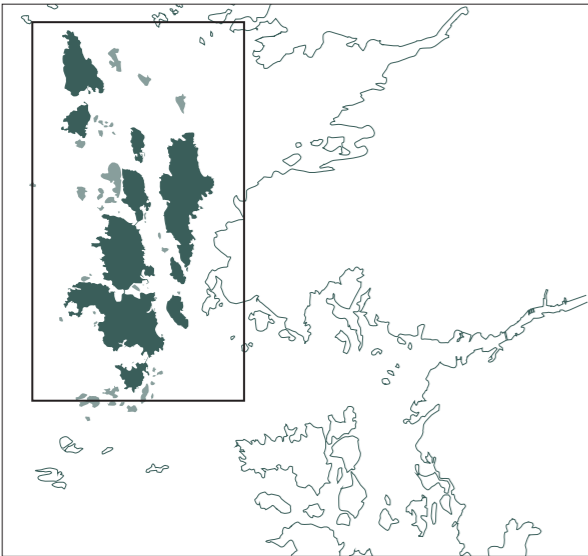


03.CONTEXT



03.1.1. THE AREA

Approximately 20 kilometer from the core of the city, towards the west, we find the northern archipelago of Gothenburg. It is an independent municipality, which consists of 10 inhabited islands, more or less connected. The islands have no fixed connection with the mainland, and the short distance by drive-on ferry to Hisingen takes 12 minutes. Most of the inhabitants live on four islands - Öckerö Hönö, Hålsö and Fotö, these are connected by bridges. The ferry terminal connects Hönö with Hjuvik on Hisingen. The other islands in the municipality are tied together with smaller ferries or boats, on two of these islands car traffic does not exist.



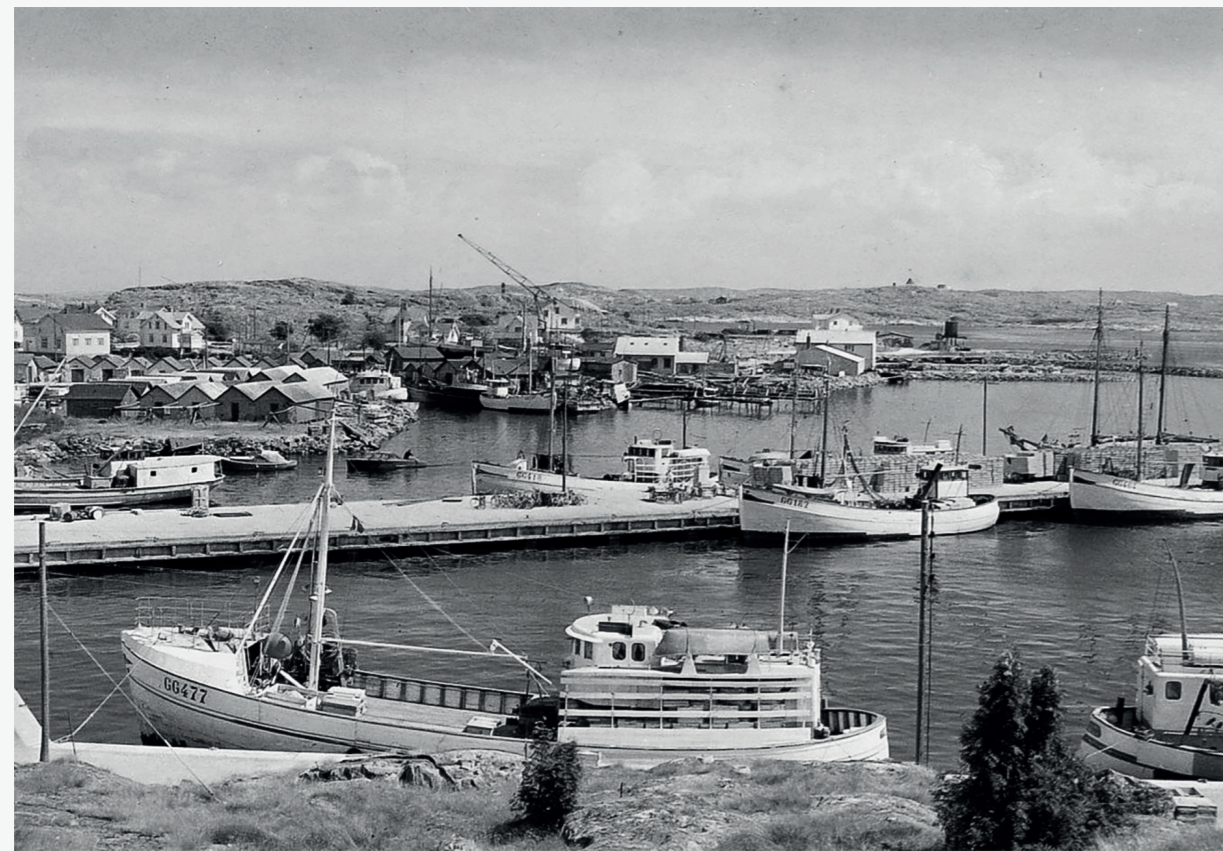
03.1.2. THE MUNICIPALITY

Öckerö municipality had several economical growth and decline cycles from the 16th century until the 50s of the last century. The main reason was mainly based on the fishing industry, at times when new techniques were invented and the fish was a rich source. The whole area grew and an entire industry around the fishing boats started an remaining era of self-employment. The inhabitants of the islands became a united crowd with the weather elements as their best friend and toughest enemy. The sea gave and took.

Buildings on the islands have grown organically with few areas where several buildings have been planned at the same time. The islands also became known as an attractive place for vacation and rest. From the end of the 18th century it was most common to build houses with a separate kitchen in the basement or attic. The householders could either move down to the basement or rent out the upper floor to summer guests. In winter, these spaces were neither insulated nor heated. This tradition has naturally shaped a society with multi-family houses where the houses today are well-functioning all year round.

As communications and infrastructure have developed and the municipality is within commuting distance to Gothenburg, additionally it has gone from being a fishing community to a suburb of the city, with mostly permanent residents. Today, the municipality has just over 12,000 inhabitants, which is a doubling since the 1920 century. As in the rest of the country, there is an increasing elderly population and for the municipal economy to function, more taxpayers are needed.





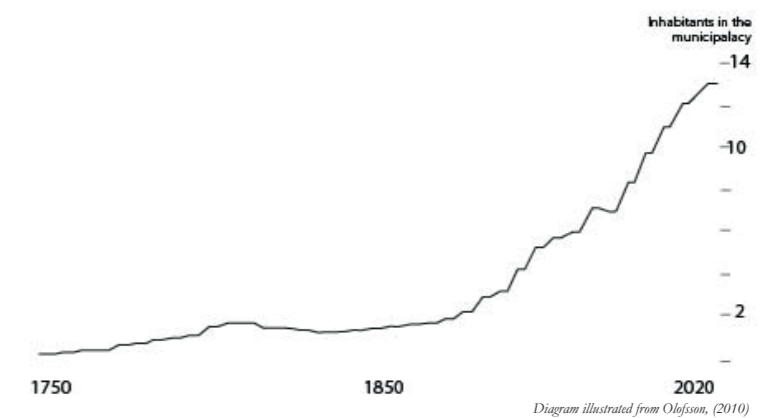
Öckerö harbour 1950. Unknown

03.1.3. HISTORY OF FISHING & ECONOMIC GROWTH

The rich herring fishing and hunting has for thousands of years created good opportunities to live out in the archipelago. People found their way to the Öckerö islands and there were good conditions for settlement. In the script *Från dåtid till nutid*, Sture Olofsson writes, the population gave its name to the archipelago and Öckerö was early called Eikr eyia, Ekön. For it should have grown an oak grove where the island's first church was built during the 13th century (*Från Dåtid till Nutid - Glimtar Ur Öckerööarnas Historia*, 2010, p.5).

The economic growth and decline cycles have varied through the years, and the main reason was mainly based on the fishing industry, at times when new techniques were invented and the fish was a rich source. The inhabitants have seen the weather elements as their best friend and toughest enemy. The entire industry around the fishing boats started an remaining era of self-employment, an era that has continued through all time (*Från Dåtid till Nutid - Glimtar Ur Öckerööarnas Historia*, 2010, p.19).

As communications and infrastructure have developed and the municipality is within commuting distance to Gothenburg, additionally it has gone from being a fishing community to a suburb of the city, with mostly permanent residents. Today, the municipality has just over 12,000 inhabitants, which is a doubling since the 1920 century.





Photos 1960 & 2021 (lantmäteriet)

03.1.4. BUILDING DEVELOPMENT The settlements on the islands have grown organically with few co-planned areas. The islands also became known as an attractive place for vacation and rest. From the end of the 18th century it was most common to build houses with a separate kitchen in the basement or at the attic. The householders could either move down to the basement or rent out the upper floor to summer guests. In winter, these spaces were neither insulated nor heated. This tradition has naturally shaped a society with multi-family houses where the houses today are well-functioning all year round.

Westerlind's investigations of the municipality's history have shown that villages of agriculture and fishing were formed. The population farmed the land and supported themselves on the sea, fish and shipping. During the years 1850-1950, the people of Öckerö were pioneers in Bohuslän and invested in sea fishing with new gear and larger boats. New ports were built and the settlement grew. The inhabitants arranged their own steamboat connection to Gothenburg and summer visitors began to spend their vacation on the Wislands. The houses were built and decorated in a magnificent archipelago style, they were also built larger to accommodate rentals.

In connection with fishing came service activities such as shipyards, net and trawl binders, ice mills and workshops. The profitability of fishing declined after 1965, but by the 1960s the car-ferry connection had been opened to Hisingen, where the large industries needed labor. This was the start of a new development phase, with increased occupancy to new residential areas when the car connection made it possible to commute to Gothenburg. The fishing industry improved again with new industries, however, the Öckeröarna would continue to be dependent on Gothenburg (Westerlind et al., 1982)

Olofsson writes that in 1962 came the first car ferry to Öckerö, it was state-funded and could transport 16 cars. An arrival point at Öckerö Bratten was built. Soon enough, the capacity became far too small and below.

In the 1980s, the ferry route was moved to Hönö Pinan and the ferries' capacity was greatly increased (Från Dåtid till Nutid - Glimtar Ur Öckerööarnas Historia, 2010, p.33).

03.02.Orientation



03.03. Öckerö municipality

03.3.1. GENERAL PLAN (ÖP)

The municipality’s vision is to be a living archipelago municipality with man in the center. The vision is concretized in the municipality’s Housing Supply Program, which, among other things, raises the security principle of gender equality and the child perspective. The municipality’s Traffic Strategy states that new residential areas should be planned based on people, not the car. It should give an impression in the planning regarding block size, design, the amount of parking and its location in relation to homes and businesses(Översiktsplan Öckerö Kommun, 2018, p.9).

03.3.2. DEVELOPMENT AREAS

According to the master plan (ÖP) and its designated development areas for buildings on water, these have been analyzed in this thesis.

-The area at Hönö Röd (1) was chosen out as the sea level there is very shallow, at high pressure it can be completely dry, so large intervention with dredging is required. In addition, the area is geographically far away and has a weak connection to service, only a grocery store and postal agent are nearby.

-The area by Öckerö ferry terminal (2). Some dredging work needs to be done here as well. Protests can arise as the pontoon homes can take sea views from several properties. Although service is available in the port, a barrier is created by the topography.

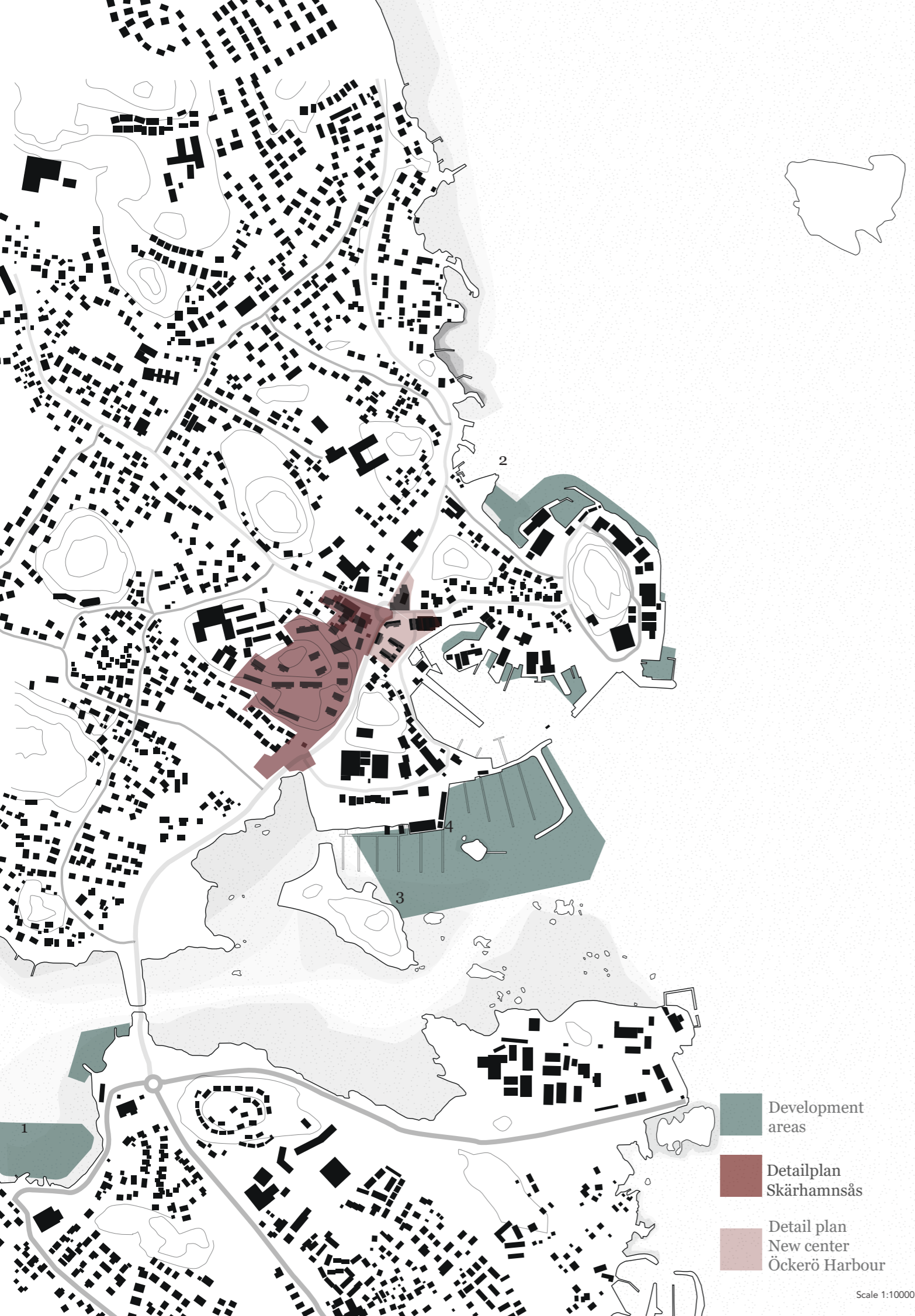
-Outside Öckerö harbor (3) east of Lammholmen has been studied more carefully as a possible location. A nice stretch between the harbor and Hönö Pinan with the intended walk and a earlier planned bicycle bridge would connect the area with both Hönö and Öckerö. However, the beautiful place was abandoned as it would become its own island with a poor connection to other activities and services.

-The site for the project finally became the harbor basin inside Stackeholmen (4). With nice location and the opportunity to create paths and connections to Öckerö’s new center. The area enables streets and public places to be created for everyone, not just for the residents of the area.

03.3.3. FLOATING HOMES

The planning unit in Öckerö municipality has the task of investigating housing on water. In the master plan from 2018 it has been highlighted which development areas close to the sea are relevant for the issue. (Översiktsplan Öckerö Kommun, 2018)

Some identified factors influence the choice of location - the water depth, consideration for nature and costal protection, exposure to wind and waves and what opportunities there are for plumbing solutions on the site (Förstudierapport Flytande Bostäder, 2022, p.5)



03.3.4. THE MUNICIPALITY'S STRATEGIES

Öckerö Municipality's business strategy program is one of the municipality's overall governing documents, that describes how it should work with strategic business issues in a concrete, long-term and goal-oriented way. The program is based on Öckerö municipality's role in the development of the Gothenburg region. It clarifies the municipality's overall work with the business community to create good conditions for entrepreneurship.

The overall goal of the program is to create 120,000 new jobs in the Gothenburg region, in Öckerö municipality 900 new jobs will be created by the year 2035. The program means that the municipality must be innovative, safe, with social sustainability, have good access to housing and an education system that maintains high quality and a wide cultural offer. In Öckerö, a strong growth of population is planned, on a selection of the municipality's islands there is support in detailed plans for increased housing construction. The growth areas of the tourism, industry and the maritime industry are the engines for business development (Öckerö Näringslivsstrategiska Program 2020)

03.3.5. PLANNING UNIT
- Öckerö municipality



The planning unit has several ongoing detailed plans. In the harbor area, housing is currently planned both on Skärhamnsås and to some extent in the new center. Two primary schools have been demolished and new detailed plans are being planned. In the northern part of the island there is a well-visited nature area with toboggan run and nature paths, the area has an old detailed plan, which allows exploration, a proposal to build 13 semi-detached houses in the area has been presented to the public. The unit's task is to investigate housing on the water in the municipality and has produced a feasibility study. The investment is based on a political will for housing for various forms of tenancy to increase. In prioritizing the surface, the unit wants to facilitate densification and review technical and environmental possibilities with floating housing(Förstudierapport Flytande Bostäder, Öckerö Kommun, 2022, p.1). The environmental possibilities are strongly linked to the choice of location and also to the actual design of the homes. To be able to carry out the project, you need to find a place where there are no high natural values or species worthy of special protection (Förstudierapport Flytande Bostäder, Öckerö Kommun, 2022, p.5) Janna Petersson (Community planner) and Linnéa Rösiö (Municipal ecologist / Environmental strategist). Work on the feasibility study of the report and they welcome ideas for plan proposals and various design options. However, they experience a problem with how to classify the area as there is a lack of material for guidance.

Hopefully, knowledge about similar processes in Sweden will be disseminated, through the exchange of experiences both in the architectural industry, at municipal and governmental level. That floating housing will have a clear regulatory framework and simplified processes.

03.3.6. HOUSING NEEDS IN THE AREA

The governing document also highlights strong links between the population of a region and its ability to generate growth. The larger the region, the greater the range of jobs, industries, skills, experiences, culture, goods and services - and the greater the conditions for growth (Öckerö Näringslivsstrategiska Program 2020). In the municipality's housing supply program, strategies and guidelines are for building homes in locations close to public transport with an emphasis on apartment buildings. Prioritize detailed plans of great public interest and secure mixed forms of lease. Use the municipal housing company for more tenancies and work for good design and architectural qualities. The document also emphasizes that it wants to promote innovative solutions for alternative forms of housing, such as floating homes.

Houses in the municipality are expensive and the availability of apartments is limited. With a long waiting period for rental apartments and very few condominiums on the market. Difficulties in finding housing result in young people either being forced to move out of the municipality or remaining in the parental home.

03.3.7. HIGH SCHOOL

The maritime high school with 300 students is located on Öckerö, the school has regional and national admissions to its programs, which means that most of the school's students need a home during the school. Despite the fact that the municipality is the owner of the school, there is no plan in place to provide housing for the students. These dwellings are today instead provided by private landlords who rent out their apartment in the villa or free standing smaller houses (attefallshus) on the plot. These small homes were formerly inhabited by young people or a small family.

03.3.8. TOURISM

In recent decades, tourism in the municipality has steadily increased. The wide range of restaurants and small picturesque shops in Hönö klåva attracts many to go with the archipelago boats that are operated in summer. Many sporting events such as hockey camps and football cups attract tourists to rent accommodation on the islands. The churches also have events that require overnight stays.

Jenni Wernäng, 37
-Living on a boat in Öckerö harbour



- I'm happy every morning when I wake up here in the boat, Jenni exclaims when I meet her. Jennie and her family has lived a year in their 65-foot (about 20 m) boat, the whole family, including her husband and two children appreciates it, even the eldest son. The children have been given the largest rooms in the boat, it is spacious and holds everything they need. What can cause problems is when too many electrical appliances are running at the same time, it overloads the system. Then Jenni takes the opportunity to involve the children in the cooking.

-We felt that we were done cutting the grass and taking care of the house. Earlier, we had a regular vacation boat, when the holiday ended it was tough to leave it. She continues:

-The municipality's strategy to investigate housing on the water is something we are hoping for, but we couldn't wait.

Jenni, is also politician in the municipality, concludes by saying:

-Since there is so limited buildable land on the islands, we need to review the possibility of using the water.

My vision is that the design should be small-scale with a coherence with the other buildings on the island. (J. Wernäng, personal communication, 1 of february, 2022)

Jennis' boat is a large boat with all equipment. The first issue though is the entrance to the boat, you need to climb up on a ladder and at the same time open a zipper on the boat chapel. They have to drive the boat to the septic container every week and fill water from a water post on the pier. To sum up, the accessibility is working for younger persons, it seems hard to visit for an older person with limitations.

Annica, 40
-Single parent, 2 children,
Living in the municipality



-My first apartment with my previous partner was with two rooms and a kitchen, at a private housing company, says Annica and continues: When our first son arrived, we could switch to a larger apartment in the same building. But when our second son came we moved on to a private three bedroom accommodation in a villa. Then we separated after a couple of years. I moved to a small apartment in a villa, where I slept on the sofa and the children shared the bedroom. After two years, I got hold of a three-room apartment upstairs in a villa. It was expensive and the house was not built with sound insulation so it didn't work. We moved out quickly and had to let the children live completely in their father's apartment for a number of weeks until the next apartment became vacant. The children's father and I then moved back and forth to our parents every two weeks. We now live in a private 3-room apartment. I'm dreaming of getting a first-hand contract with a housing company, to a decent rent, so it will be a safe existence for me and the children. (A. Larsson, personal communication, 15 of march, 2022)

Unfortunately, Annica's story is common on the islands, it is difficult to enter the housing market as a young person. It becomes even more difficult after a separation with children. Despite the fact that the municipality has ambitions to build homes, they rarely have a rent level that functions as a single person.

Mikael Pettersson, 59
-Harbor captain and committed
municipal resident



The following chapter is the result of a small qualitative survey, where three residents on the islands describe their personal experiences.



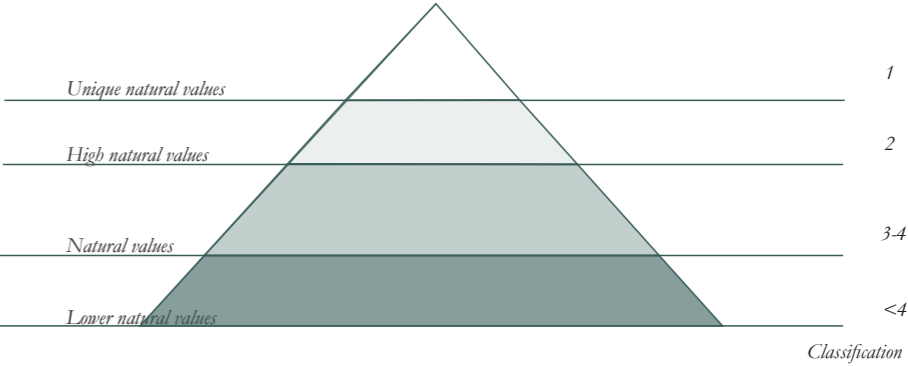
-Today, 20 boats are inhabited all year round in the harbour. The municipality looks between the fingers because it is not really allowed, says Mikael, and continues: They do not know how to classify the area and what regulations should apply. So the residents have no right to complain about noise or other inconveniences. But overall, they know what they are getting into, and see the benefits of freedom, beautiful views and the opportunity to move at all times. He looks forward to the development of the port and welcomes the new detailed plans in the area:

-Öckerö needs its own centre with a functioning harbour for the people. This could be really good, he says and points to the municipality's rendering of the area. When the conversation about floating housing comes up and the different places from the municipality's General Plan (ÖP) are shown, he gets stuck developing the area just west of Lammholmen (development area 3.page 47). However, he also sees gains in developing this area into a port and placing floating homes inside Stackseskär. Mikael has a strong commitment and takes responsibility for improving the environment at the port. He has invented a sound-absorbing air stopper, this is threaded into the gap that creates whistling sounds in the sails of the sailboats. -Since this was introduced in 2021, there have been no complaints. from the residents in the area around the port (M. Pettersson, personal communication, 11 of february, 2022).

There are many enthusiasts in the municipality and the attitude among the old men at the harbor is not infrequently that 'this is what we have always done'. Suggesting housing instead of boats at this location can be seen as bad as swearing in church. Therefore, a plan to replace lost space in the port is further to investigate.

03.5.1. NATURE RESERVES

In the municipality’s vision 2025, there is a goal that ”Nature, cultural heritage and historical environments are preserved and developed for future generations.” A nature conservation plan has been developed as a first step in the municipality’s environmental work of identifying and documenting the municipality’s most valuable nature areas. The plan points out 50 areas in the municipality natural values that are particularly worth paying attention to; these are mainly located on the western sides of the islands, which have escaped settlement due to the exposed weather in that direction. Areas with nature values that are pointed out in the nature conservation plan correspond to approximately 45% of the total area of the municipality. In the area there are places that are classified with nature conservation value 2, which means that: Exploitation that threatens nature values should be avoided, but can in some cases be possible. Then after in-depth examination and balancing between natural values and other public interests in the individual case. Should then be designed so that the natural values are not threatened. The area west of Lammholmen is sea beach meadows and healthy grasslands with rich flora, where there is also one of the few shallow, muddy beaches in the municipality. The area is classified according to nature conservation value 2 (Naturvårdsprogram, 2014).



03.5.2. EELGRASS

Eelgrass beds have a unique ecological role in Swedish seas. They are important habitats for a large number of marine animals and plants, and serve as a nursery for species such as cod and beach crab. Eelgrass meadows are today an endangered habitat type that is covered by an action program(Havs och vattenmyndigheten). In Bohuslän, more than 60% of the eelgrass has disappeared since the 1980s as a result of eutrophication and overfishing. The eelgrass usually grows relatively shallow and requires good light conditions. Measures such as planting eelgrass are made and it is generally recommended to plant at depths between 1.2-2.5 meters (Handbok för restaurering av ålgräs i Sverige, 2016).

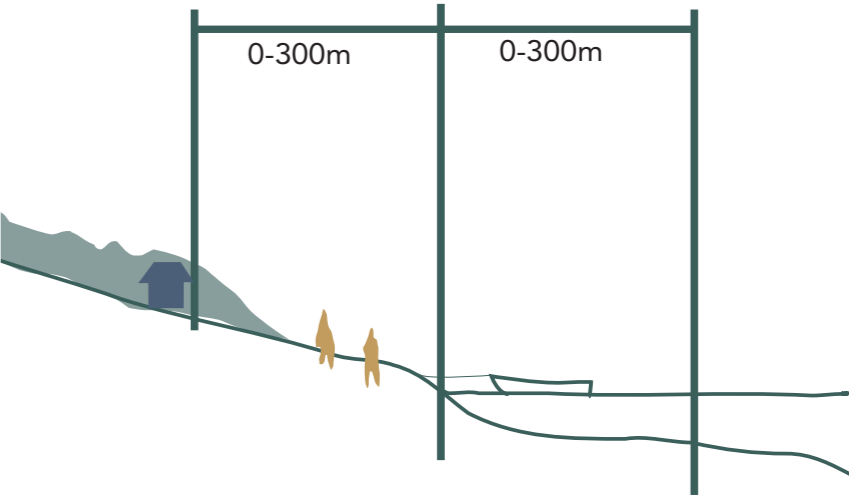


Eelgrass

03.5.3. COASTLINE PROTECTION
(strandskydd)

The beach protection means that the right of public access and staying by the sea and watercourses, the protection regulates buildings, exploration can take place as close as 100 meters from the waterline, up on land and 100 meters out to sea. Exemption is given to urban areas, where the beach protection has been removed. But the Swedish Environmental Protection Agency can in some cases extend the beach protection to 300 meters. Beach protection applies throughout the whole country(naturvårdsverket.2022). The County Administrative Board (Länsstyrelsen)of Västra Götaland has made an inventory of Öckerö municipality, the beach protection has with the help of this inventory been adapted to more natural boundaries on the map and varies everything between 0 and 300 meters, both on land and in the water(Öckerö kommun, 2020).

The beach protection aims to secure the long-term conditions for public access to beach areas and to preserve good living conditions for animal and plant life on land and in water(Miljöbalk (1998:808) Svensk författningssamling 1998:1998:808 t.o.m. SFS 2021:1018 - Riksdagen, 1998).



Coastline protection

03.5.4. ORIENTATION OF PUBLIC SPACE

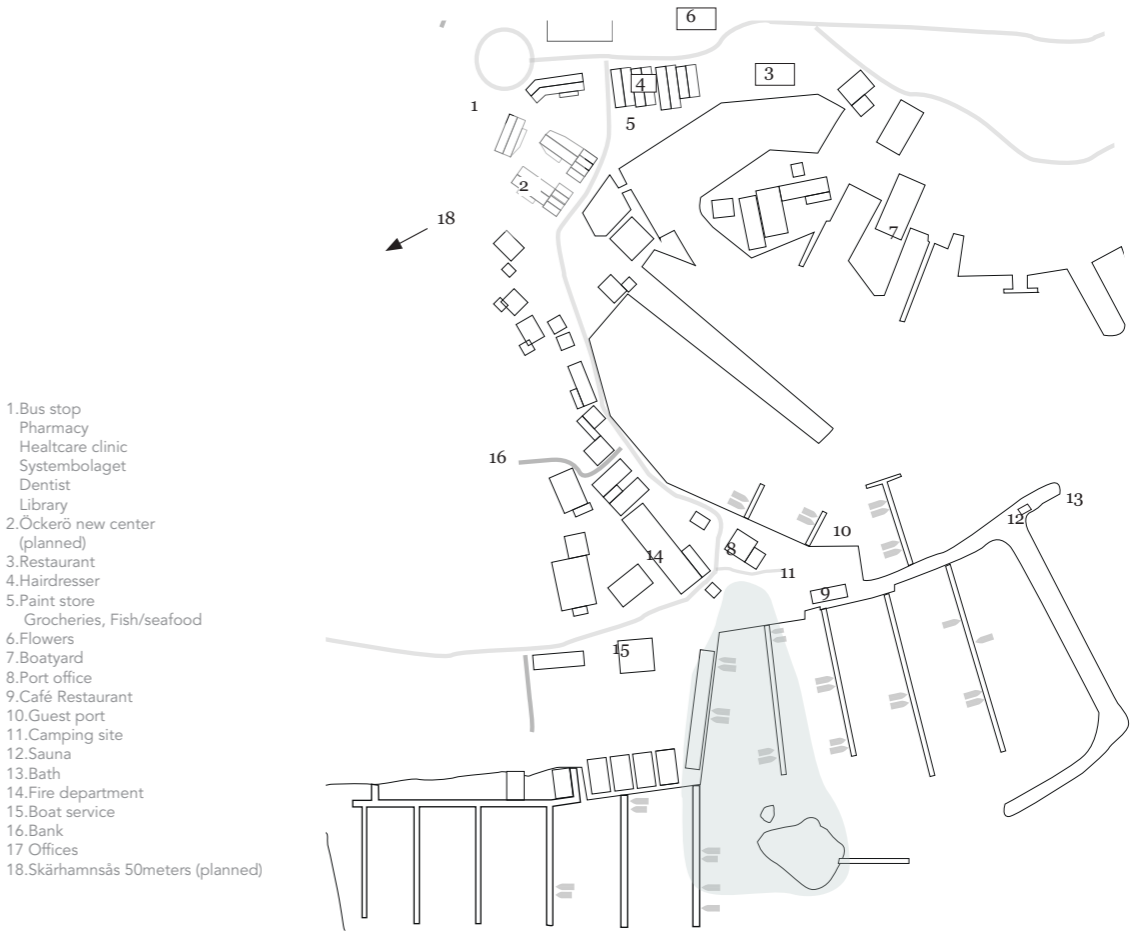
In the municipality with ten inhabited islands, Öckerö is geographically most centrally located and one of the largest in area. The island provides all daily basis service that's required, however, a gathering place that can fall under the criterion 'meeting place' is absent. The meeting places on the island are at the grocery store, at the dump and outside the pharmacy and liquor store (Systembolaget). Of course there are sports clubs with strong commitment and the churches on the island have good activities for all ages. But if the residents do not belong to these contexts, or want to vary the activities, then there are few or no meeting places nearby. Previously, there was a well-functioning old restaurant/pub where the new center is planned, it was a meeting place with a large screen and a well-attended lunch restaurant but it was demolished despite protests, the new plans met with resistance and ended up in stage 2 of the new center. The center that is available is located furthest south on the neighboring island of Hönö, where there is a relatively rich selection of retail and restaurants. But from central parts of Öckerö, the distance is 3.5 km there, a long way to walk on the evening twig after a restaurant visit. The new detailed plans for Öckerö testify that a new center is within reach and can connect places and people. Many new homes are planned in these detailed plans among service, grocery stores and hopefully some new restaurant or pub.



New center at Öckerö harbour. (Tornstaden)

03.5.5 .SITE

The choice of site follows the idea of strengthening the social interaction in the area, and also to go in line with the municipality's recommendations which are oriented by national guidelines on coastal and nature protection. The site is also oriented in the natural setting that harbors offer along the coast, in sheltered locations from the North Sea wind and the forces of the weather. The coastal protection (strandskydd) has been removed in the harbor, and as the bottom is dredged, the harbor offers a sufficient depth. And as the predominant depth exceeds 2.5 meters, the risk of occurring eelgrass is minimal. According to the current detailed plans, new residential areas will be formed in the surrounding context with places for everyday meetings around trade and squares. Connecting to this area of the harbor strengthens community and movement.





The boatyard in the harbour

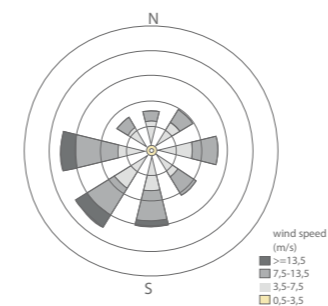
03.5.6. SOUND

The geographical location of the site is linked to places for center formation and tourism, which creates interaction and flows to the site's public areas. From the noise perspective, the area can be studied in more detail. As a boatyard is located north of the other side of the upper harbor basin, and the sounds of the wind vibrating among the boats in the harbor.

The yard has a large business and is an important employer in the municipality. During the noise investigation prior to the detailed planning of Öckerö's new harbor plan, the decibel levels were measured at acceptable levels for housing. However, there is some hesitation and they want to focus on operations with lower noise requirements being built closest to the shipyard, in case the limit values change in the future.

The second parameter is that the floating area is located in a port, where there are many sailboats. When it is windy, the masts of the boats make a whistling sound, it is in the notch where the ropes run that the sound occurs. Complaints from the residents of the villas next to the harbor have expressed complaints about this. Now the harbor's creative captain has remedied the problem by designing an air-stopping Slejf that is threaded into the groove when the boat is in the harbor. Complaints have been absent since this was introduced.

03.5.7 .WEATHER



Sweden's west coast is well known for its beautiful barren landscape with bare cliffs and picturesque communities. From the south up to northern Halland, the absence is clear from the varying archipelago that is seen from Varberg up to Norway. Here the archipelago has a completely different character, large landscapes spread out with islands skerries and cobs off the coastline. The archipelago and its characteristic interplay between weather and landscape attract a large crowd of tourists during the bright part of the year. What the coast has in common, however, is its exposed location from the harsh winds of the sea, the rain does not always fall down, it often comes horizontally. According to the wind rose from SMHI gives an overview of the dominant wind directions and wind speeds in one place, it is clear that the wind direction from southwest is dominant (Vindrosor för analys av lokala vindförhållanden, 2022).

Glaumann and Westerberg wrote that "Planning with a notion of the wind in the outdoor environment is based on how the wind is experienced. There is no doubt that winds in our climate have a negative impact on the outdoor environment in general." (Westerberg et al., 1988, s.8) The exposed location with mostly strong winds from the west / southwest has through decades shaped the location of ports and buildings on the islands.

03.06. Mapping

03.6.1. BUILDING TYPOLOGIES

The landscape has shaped the buildings based on the topology and location of the islands. The often harsh weather with strong winds from the west has naturally and historically placed ports and building clusters in an eastern location or in sheltered bays. The decorations of the classic archipelago houses can, as in many places along the coast, be traced to one or a couple of local carpenters who have practiced their type of details. These houses were usually built with the possibility of renting out to summer guests, or the families moved down to the basement so the guests could live in the house. However, holiday stays have never dominated the islands, permanent residents have solved their livelihood through fishing and thanks to the northern archipelago being located within commuting distance to Gothenburg, the population can work both on the island and on the mainland. This has meant that villas and houses have been built through all the decades on the islands, small-scale and varied. There are few monogamous areas so ornate wooden villas from the early 1900s mingle with mexican brick villas from the 1980s. New buildings from 1990 onwards have, however, been dominated by wooden houses with inspiration from the classic archipelago houses.



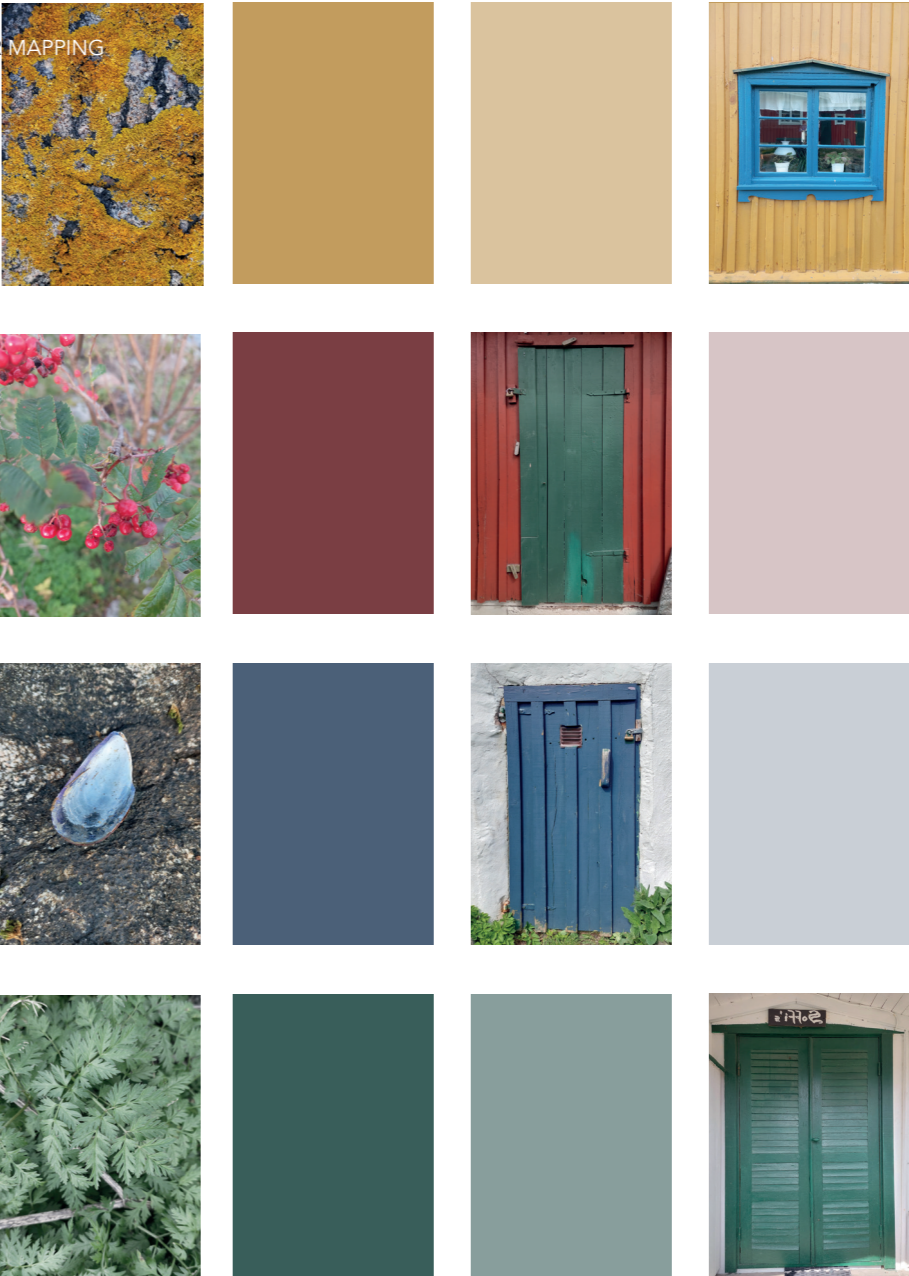
Based on the analysis of existing buildings and topologies, the ambition is that the plan proposal in this project will contain the variables
- small-scale and variation.





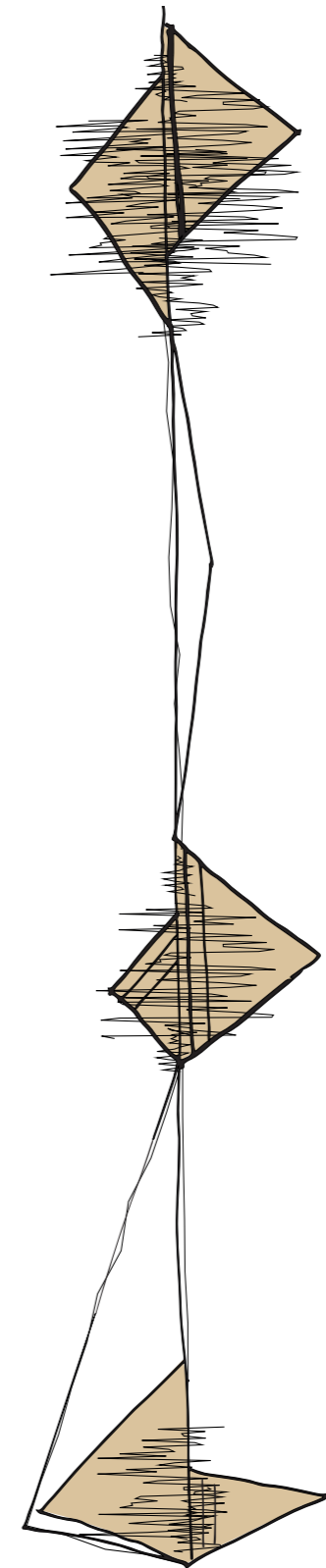
At Öckerö's inner harbor, the boathouses are painted red, blue, green and yellow.

03.6.2. COLOR MAPPING



Observations of the color scale in nature and among the buildings in Öckerö historical village (hembygdsgård)

04. DESIGN PROPOSAL



04.01. Plan Proposal

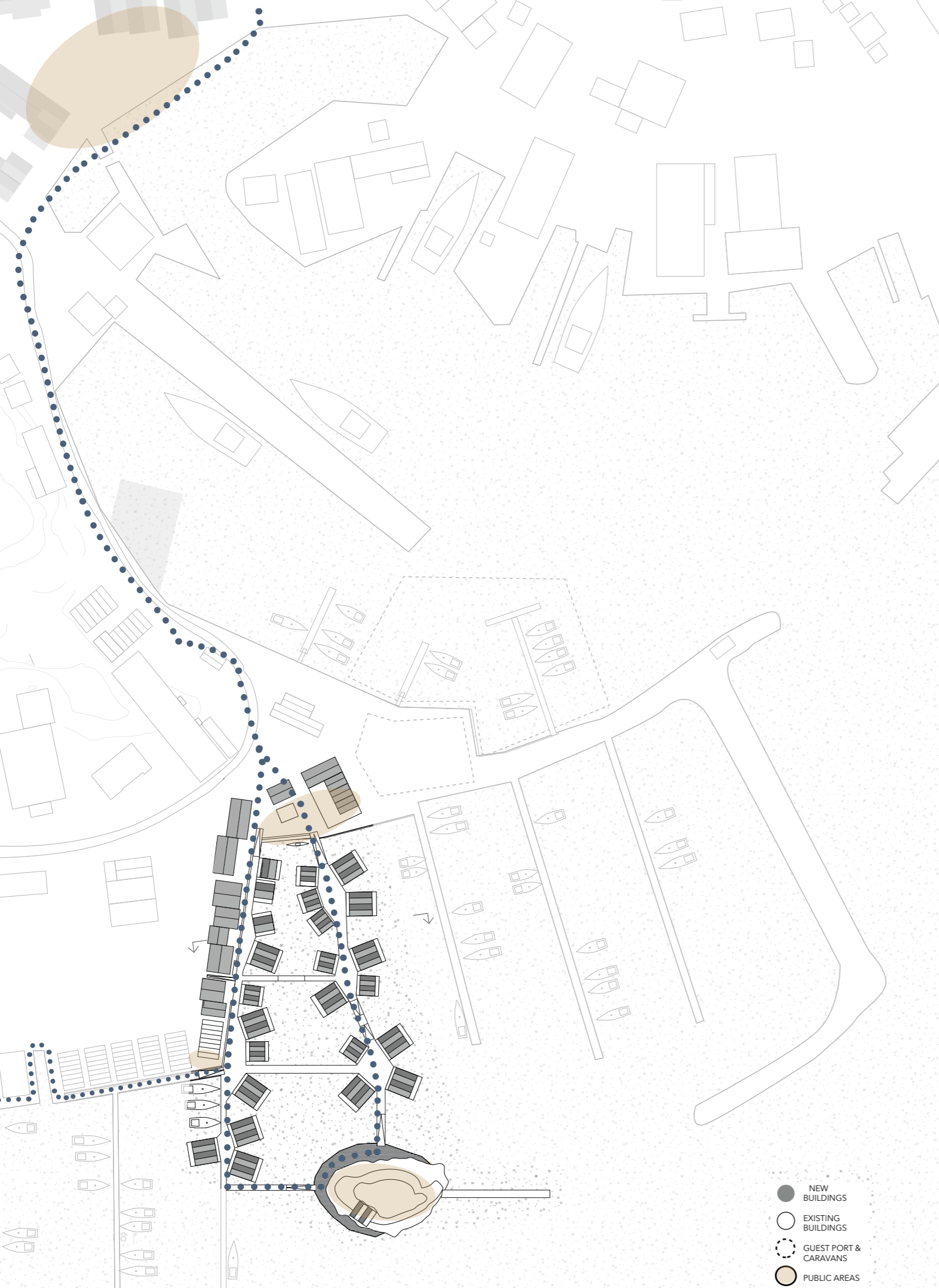
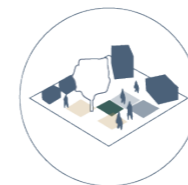
04.1.1. PROPOSAL

The plan proposal faces the sea towards southeast with Öckerö, the promenade and the new center, tying the areas to a unit. Paths will strengthen the connections between the public places and create inclusive areas that are open to everyone.

The design proposal follows the idea of keeping the area character of mixed primary functions with housing to strengthen movement and interaction, with seasonal tourism densification. The small scale and variety are reflected in the plan proposal. In this context where villas with gardens dominate the community, the proposal offers density based on these local conditions. Jane Jacobs means that one parameter for diversity is small blocks, in the proposal the blocks are formed as small villages (Jacobs, 1961).

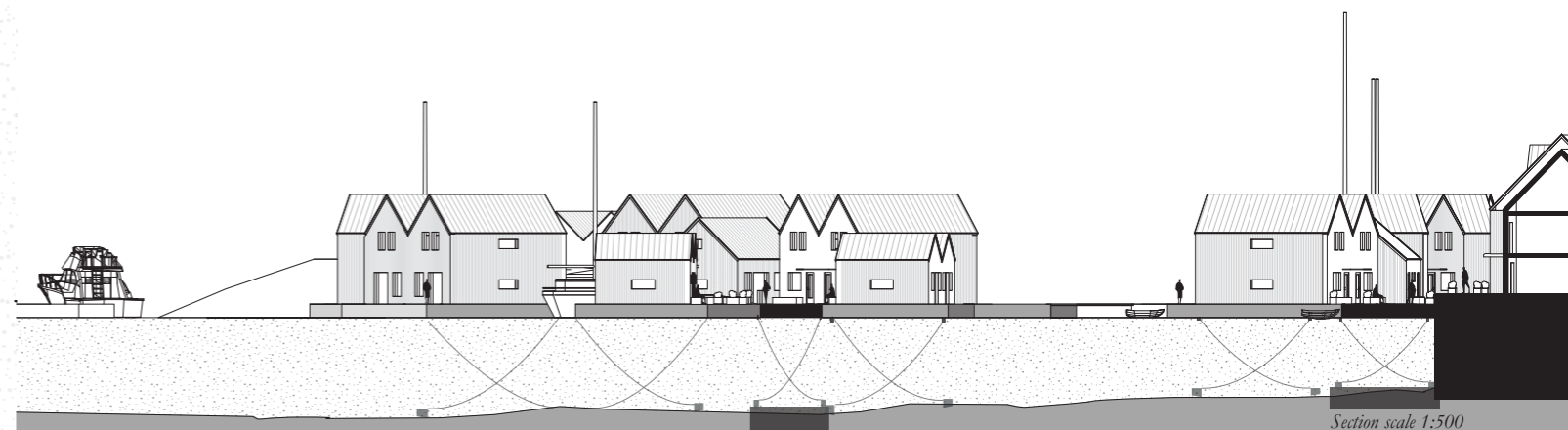
The cafe's earlier placement out on the pier was a bit off and the move of it also offered an extension with a sheltered terrasse in the corner. The quare is the entrance to the area with buildings formed in a half circle towards the sun and a playground in the middle. The harbor captain's office is moved to the square and a pizzeria will improve a rich life over most of the day. An attractive place with functions facing movement, to attract people, which attracts more people, as the anthropologist Willian H. Whyte said (William H. Whyte, 2010).

The location of the units leaves the sunny and nature-dominated small island Stackeholmen almost unoccupied and piers and a sauna is placed on the island's more accessible nort western part. The small island Stackseskär holds an unobtrusive sense. To enter the place, it is done by foot, and the sauna and bath is a recreation place for the whole island.

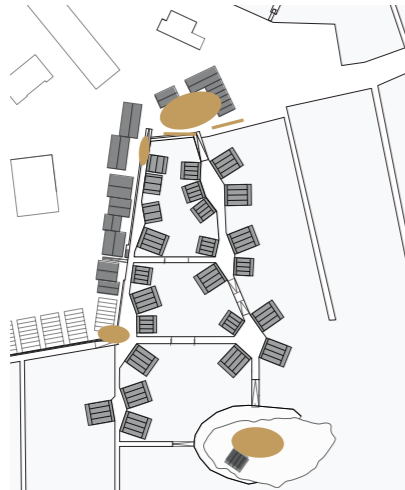


- NEW BUILDINGS
- EXISTING BUILDINGS
- GUEST PORT & CARAVANS
- PUBLIC AREAS

Overview plan, scale 1:2500

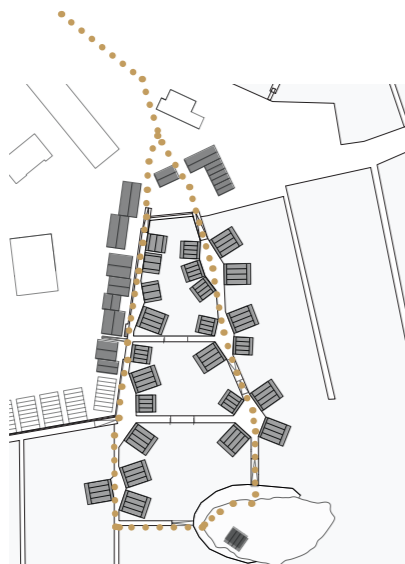


Section scale 1:500



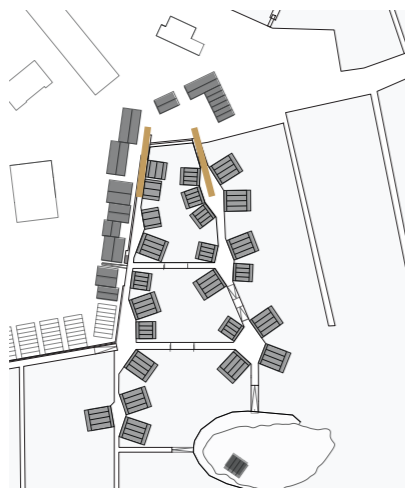
Public places

The new square is a meeting place for play, ice cream and a meal in the sun. The piers is preserved with benches and cracks in the volumes for people to sit down, the barbecue area and places of recreation on Stackeholmen with sauna and bath gives values to the whole area.



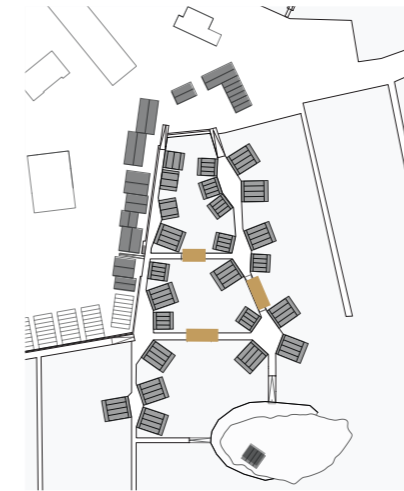
The welcoming quay walk

The quay and piers are welcoming and accessible to everyone, the area should not be perceived as a place only for the residents, the public should be able to stroll out to the Stackeholmen, take a swim and round the area. The area will be an extension of Öckerö's new center.



Technical supply

Pipes for fresh water, wastewater, electricity, fiber can be laid in the common pier. Every installation is connected to it via flexible pipes municipal network at the quayside. The pipes are adapted to cope with the inflection that due to different water levels occur between the pier and land.



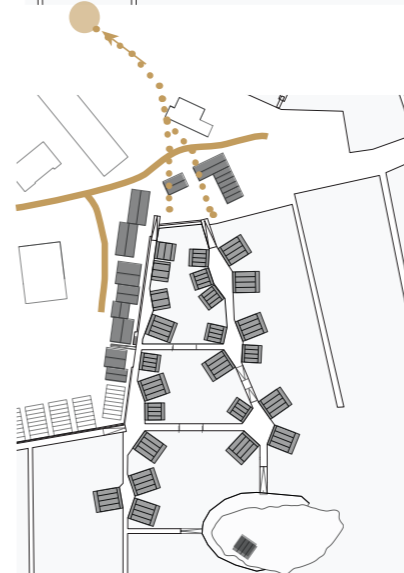
Boats

Foldable sections in the bridges allow small boats to enter the area and dock next to the housing pontoons.



Emergency services and availability.

Dwellings may not be constructed further than 50 m from the possible parking space for emergency vehicles, therefore the bridges are drivable in one direction. The area is mainly for pedestrians and cyclists and car-free, but it is made possible for people with reduced mobility to enter by car.

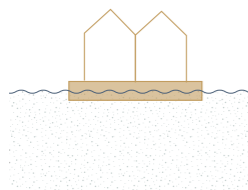


Anchoring and communication

The access by car to the area is from the west and the port area has plenty of space for parking. The nearest bus stop is at Öckerö's new center.

04.2.1. FLOATING HOUSING

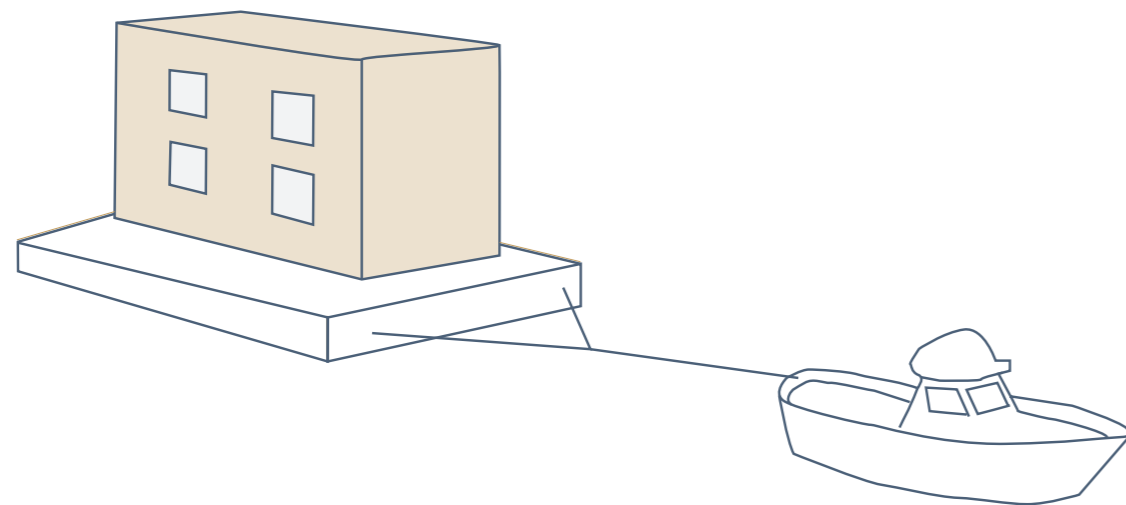
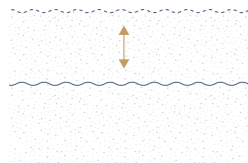
Floating housing is a normal lightweight construction, placed on a pontoon. The pontoon is the building's foundation and site, it has been prepared for sewage management and other installations. The pontoon is mounted to bridges connected by ramps for accessibility. The common denominator for all these floating elements is the cellular plastic molded concrete structure.



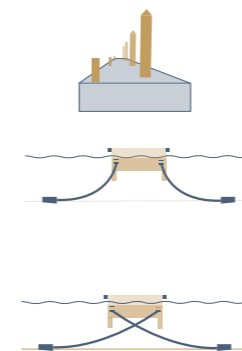
Pontoons for on top buildings generally protrude 80cm into the water, it has a total height of 150 cm. The building is placed above this height. 100cm of free water under the pontoon is also needed to secure the anchoring methods. In summary, the minimum depth for placement is 1.7m.

04.2.2. WATER LEVEL VARIATIONS

The coast around the northern archipelago has variations in the water level, controlled both by tides and by high and low pressure. The largest tidal variation in Sweden is on the west coast and it is a maximum of 30 cm. High pressure and low pressure, on the other hand, create greater variations. According to observations from the Swedish Maritime Administration's digital service Viva, where Mävholmsbådan has been studied, the sea level measures a maximum of +90 cm and a minimum of -40 cm. (Anchors & Connectors, 2021)



04.2.3. ANCHORING METHODS

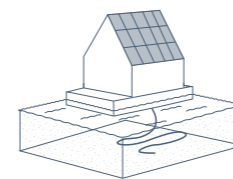


(Adapted from SF marina 2022)

Pile anchoring - When variations of the water level are extensive, the pontoons can be secured with piles driven into the seabed. This allows the pontoons to rise and fall with large variations of the water level(Anchors & Connectors, 2021).

Bottom anchorage with chains - this method is designed and calculated based on each specific location based on conditions and load. It can handle depths up to 50 meters and anchoring methods can be concrete anchors or screws into the rock in the seabed(Anchors & Connectors, 2021).

04.2.4. ENERGY SYSTEM

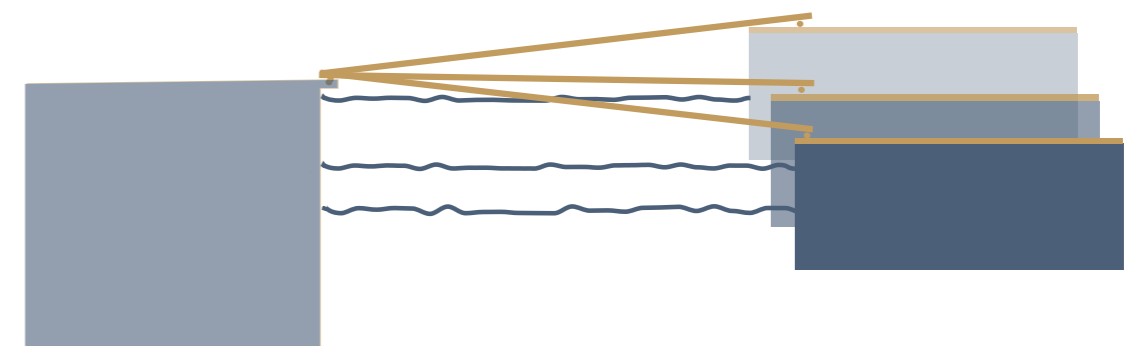


Sunlight can be used as a source of energy to generate direct current electricity through solar panels. Mounted on the roof's relatively sharp angles, energy is generated even during the winter when the sun is low.

Heat pumps can be connected and extract heat from the salt water, as the sea does not fall below 4 degrees at the bottom.

04.2.5. ACCESSIBILITY

The challenge with floating houses is the sea level, which creates different heights and depths to handle. Ramps to the floating streets may be designed according to calculations based on the highest and lowest levels. Accessibility for pontoon construction applies to the same regulations as other housing designs used for permanent living. Boverket writes that homes must offer "accessibility and usability for people with reduced mobility or orientation"(Boverket, 2022).





Plan proposal, scale 1:800

04.03. Housing area

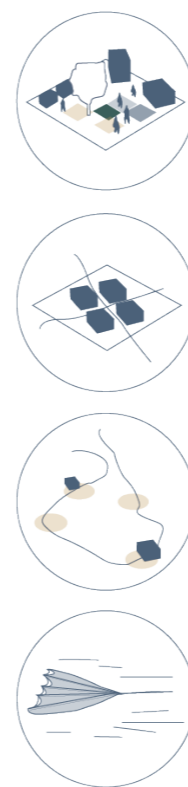
04.2.1. STACKEHOLMEN

The quay and piers are welcoming and accessible to everyone, the area should not be perceived as a place only for the residents, the public should be able to stroll out to the Stackeholmen, take a swim and round the area.

A new square is a meeting place for play, ice cream and a meal in the sun, an attractive place with functions facing movement. As Jacobs claimed in her speech that in the center of a X or a Y is the spot pot recognized as the center of things(Steuteville, 2016). The pier is preserved with benches and cracks in the volumes for people to sit down. A place for barbecue and a recreation area on Stackeholmen with sauna and bath gives values to the whole island.

The slightly twisted volumes deceive the wind and create some quiet places inside the villages on the pontoon piers. The entrances of the volumes are facing the inner streets and the private terraces meet the water and the sun, screened planks protect the outdoor living spaces and break strong winds. Light gaps will find their way in this varied and small scale.

The proposal is designed to promote security, create lines of sight to avoid unsafe places. Hopefully it will ensure that people are seen even from a distance. Security both among people and to be seen if ones fall into the sea. As Jacobs claims, neighbors who have their eyes on the street create safer urban spaces, can avoid unsafe places and help to prevent crimes (Jacobs, 1961).

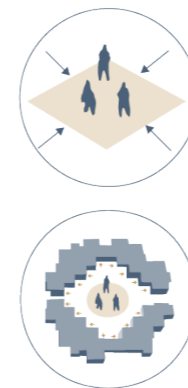


The mapped colour palette are added in the proposal.

04.04. The neighborhood

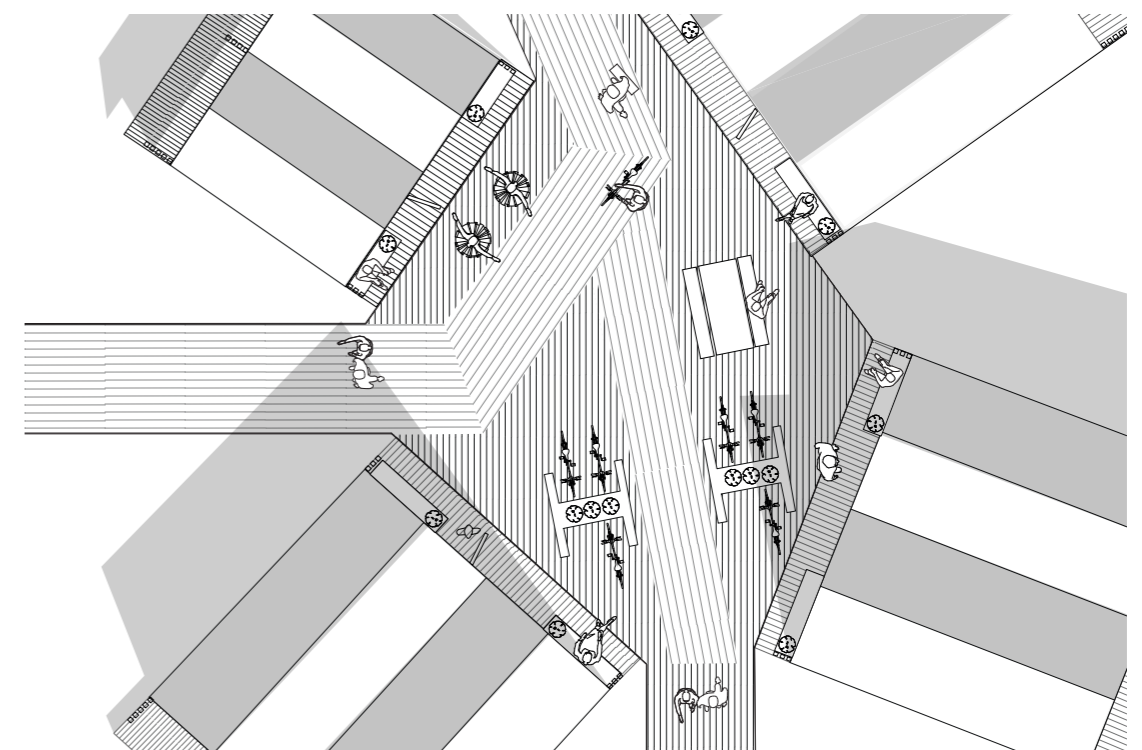
04.4.2. THE VILLAGES

The streets and the space between the buildings are designed with the ambition of creating qualitative urban space, for a beautiful and a well functioning neighborhood. As in Gehl's studies, the ambition has been to design spaces in the villages that lay the foundation for the activities that create natural social activities between the houses (Gehl, 2011).



In many cases the 'coming and going activities', that in most cases are the necessary, will occur, it is activities like going to work or school and running errands. The 'stationary activities', that often are optional like going for a walk, training, taking a bath, kayaking or sitting on a bench and drinking coffee in the sun (Gehl, 2011).

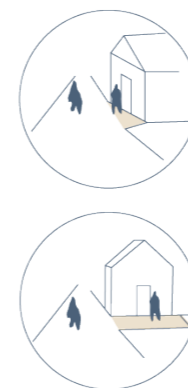
The ambition with the villages is to create a rich social place in the small neighborhood, connected to the other villages along the piers. The village square with surrounding volumes can form sheltered places from the wind and beautiful places in the sun. Benches along the facades create conditions for community and the surface between the houses creates space for play, to arrange the flower boxes, take care of the day's fish catch or to fix the bike.



The villages, a place between the buildings for interaction in the neighborhood



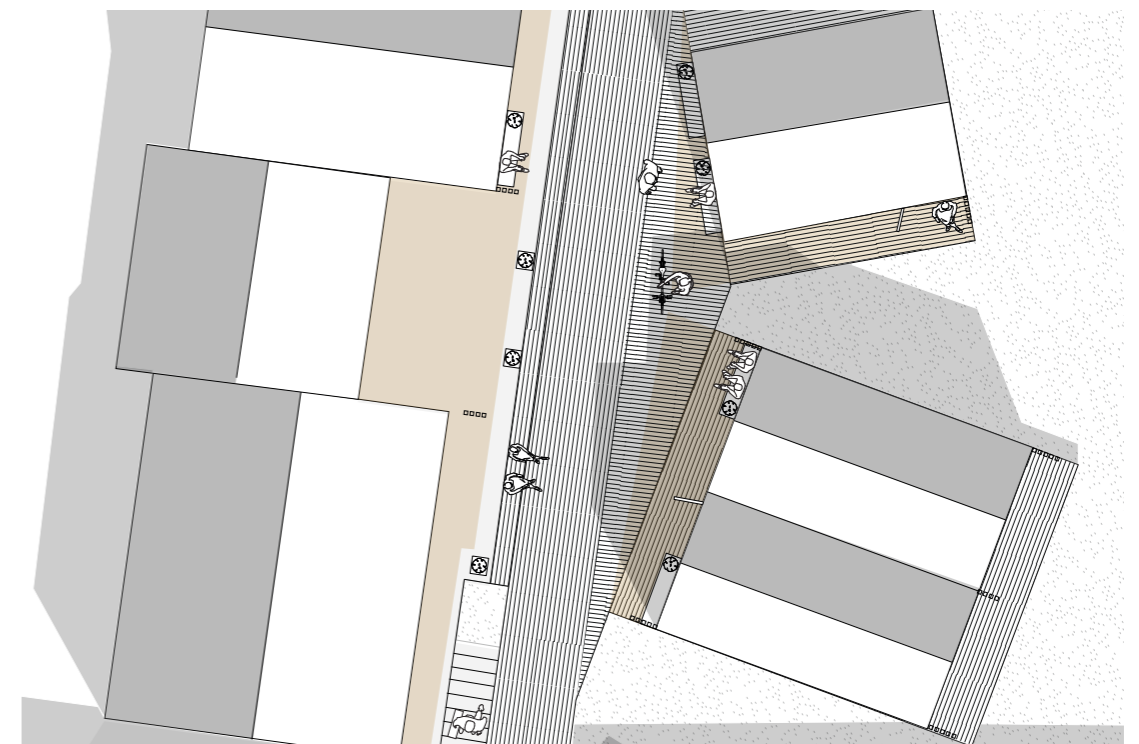
04.4.3. THE STREETS - INTERFACES

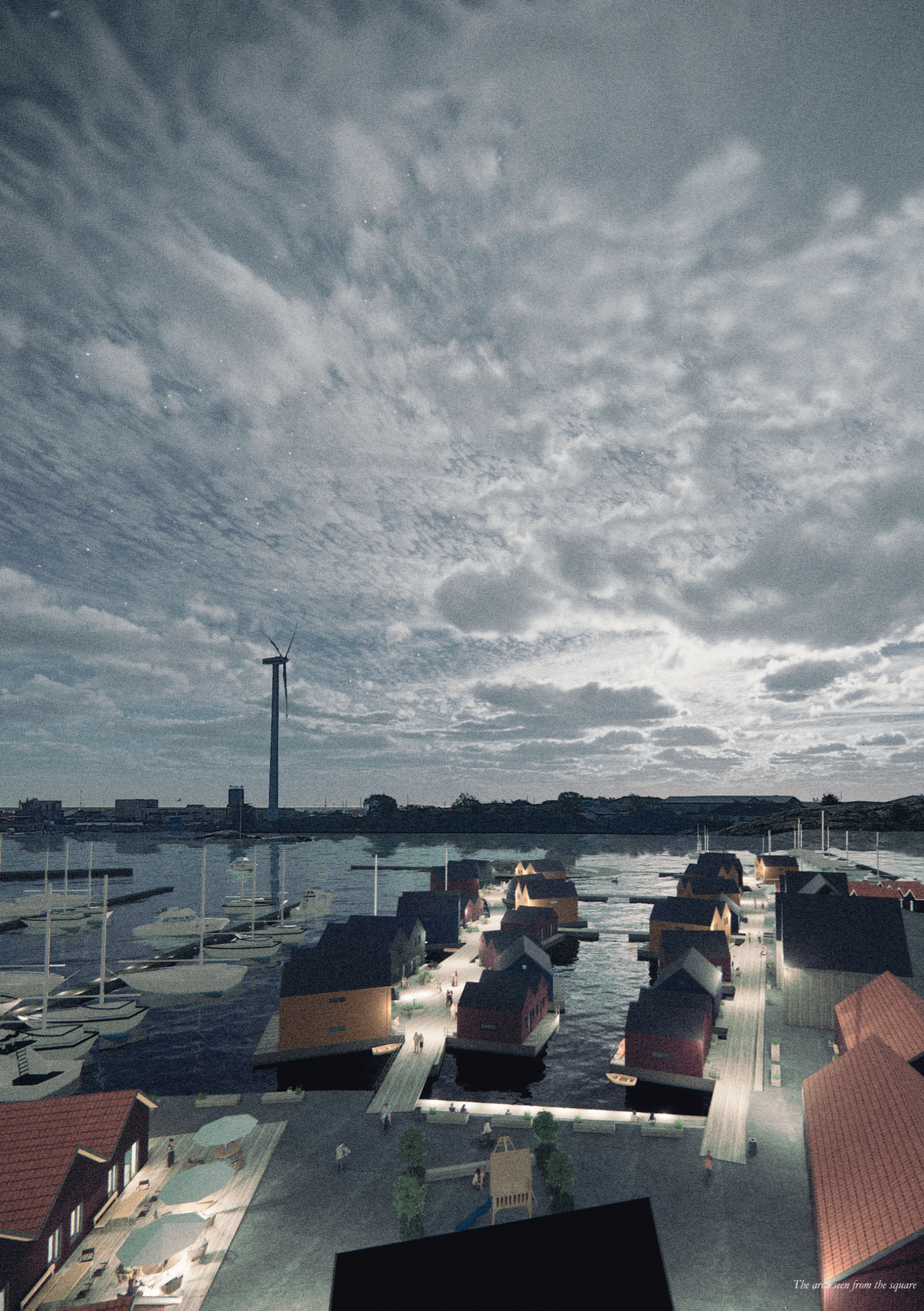


Along the streets is where our homes are situated. In between the street and the home is the interface between private and public. With the ambition to create welcoming streets, with conditions so people want to stay without the feeling of staying in a private place.

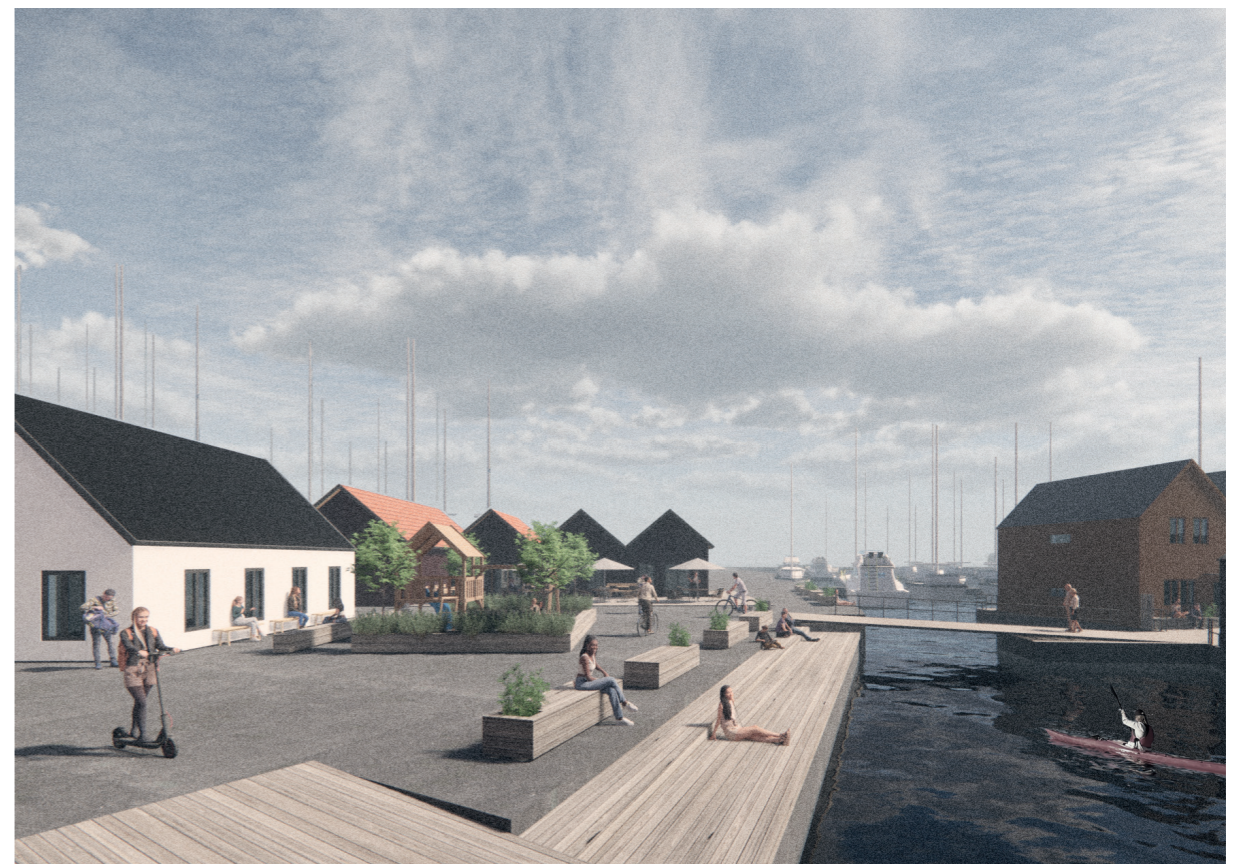
In this thesis proposal, for the most part, Jan Gehl's semi-private interfaces have been used in the design, with a slightly enhanced depth, which creates a more soft interface(Gehl, 1967).

This will provide the occupants with the opportunity to sit or stand outdoors in sunny weather and to position themselves either close to the the street or on the benches. The space on the bridges is large enough for cars to pass, but only for emergency vehicles and people with reduced mobility. The piers will be used by cyclists, pedestrians, socializing and for play.





The area seen from the square



The square in the sun



A short sequence

CONCLUSIONS

This master’s thesis is an investigation of the possibility to design floating housing in the northern archipelago of Gothenburg. With the aim of examining how housing needs should be tackled in coastal communities where buildable land is limited, if it is defensible against future community builders to appropriate all the land that exists when natural values limit the use.

The result of this thesis is a plan proposal with floating units, the design proposal has been developed based on both a theoretical and a context-based part with support from reference projects. The context has been studied partly on the basis of historical layers and mapping of the area today. Investigative material has been processed from the municipality’s documents and the municipal residents’ votes. Studies of approaches and technical solutions have been developed with the support of reference persons and expertise in the field. Based on its context, the proposal is relatively densely exploited, 13 semi-detached houses and 11 smaller units in pairs on pontoons, the proposal also includes housing volumes on the quay.

The theoretical discourse has included qualities that create value for the sustainable city. In this case in the local context that prevails on Öckerö. Jane Jacobs book ‘The Death and Life of Great American Cities’ has provided good tools and been a great inspiration in this work, where she explains what parameters and components are required for a functioning diverse urban planning. Also Jan Gehl’s ‘The Interface between Private and Public Territories in Residential Areas’ where the borderland between private and public is reported and analyzed. In addition, several other authors have been used as inspiration.

The design choices have been based on the ambition to create housing units designed for community and interaction. Where the bridges’ lines of sight both create security, welcoming paths towards Stackeholmen and nice views towards the sea, which has been an aim through the whole project.

Based on the results, the following conclusions can be drawn

- Difficult to find good places for placement of residential areas on the water in the archipelago, beach and nature conservation create restrictions, to use ports for the purpose was my conclusion, likewise, the planning unit at the municipality has arrived at this position.
- The importance of connecting places and densifying areas also on the islands to create conditions for flows and meeting places. Doing ‘as we have always done’ is a well-used expression on the island, an expression that should be taken into account and consider whether it really works in today’s society where many people lack context and need meeting places. The meeting places on Öckerö are of a weak nature and in this project it is stated that they should be created and strengthened
- The islands’ housing needs are being worked on by the municipality and more detailed plans are underway. The lack of student housing under municipal auspices, based on the fact that the municipality owns the sailing school with a regional intake, has had consequences as many private apartments are occupied by students.

The method of working in parallel with theory behind the design challenge and a design project is a classical way of working in architecture. To meet the challenge to connect the theory with the design. The design strategies helped to bridge the gap between these arch methods, the theory were concluded in concrete and spatial elements and factors that were useful on the drawing table.

DISCUSSION

In the process, the original expected result has been guided on a different scale than the early idea of origin, it has become a positive, natural and instructive turn. The chosen method has been Research by design, where iterations between design, literature studies and context analysis have taken me forward.

The knowledge and approach to using our waters for construction can hopefully be spread. A kind of template should be developed for it and a set of rules should be investigated in authorities and municipalities. Planning and designing floating homes seems to be a problematic challenge if you ask certain people, on the contrary if you ask others. Tengbom architects see no problem at all in solving the technical and legal issues, more a fear from municipalities and authorities, as he feels that it is easier to work from old templates. However, the positive parameters should be considered from a sustainable perspective:

- The houses are anchored at piers and insensitive to changes in sea level.
- No blasting or excavation is required and the public can continue to use the beach and water
- The pontoons are flexible and can be anchored at another pier or quay.
- The concrete of the pontoon around the cellular plastic core is estimated to last for 100 years, then it can be lifted ashore and restored to last for another 100 years.

Finding good locations for good placement of floating homes is determined by beach protection, previously dredged bottoms at ports and by water depths. The eelgrass grows at a depth of between 1.2-2.5 meters and must be protected. Priorities of accessibility and linking residential areas versus having protected places for leisure boats is a discussion that should exist in the municipality and in coastal places in general. Good solutions with floating breakwaters are available on the market, which can be used to widen the ports.

New detailed plans are ongoing in the municipality, hopefully it will fill some housing needs. However, the risk with new constructions is often that young people cannot afford them and there may be a relocation of an older population that may dominate the new housing. It would be desirable that new homes create a domino effect so villas and older houses can be an entrance to the housing market for the younger ones. In this thesis plan proposal, 13 semi-detached houses and 11 smaller pairs of volumes on pontoons are presented, in the detailed plan proposal on northern Öckerö (Hörstebäck) 13 semi-detached houses have been presented, in a nature area with a detailed plan from the 1940s. A proposal that has raised many votes among the municipality's residents.

The discussion about whether the degree of exploitation of the area in the proposal is fairly balanced or not, if the villages have a good mix and number of homes to create a functioning cohesion and community. In the proposal, entrance situations have been studied, however, housing qualities and floor plans on each pontoon have not been studied specifically, a topic that also should be developed and analyzed further.

When it comes to how the design proposal corresponds to my various design studies, it is relevant to take the notion of and point out the fact that certain aspects have been lost based on the scale. City planning strategies in relation to the scale in the context prevailing in the proposal. A big struggle has been to tie everything together, in the case of design studies, programs based on local needs and the site. I finally ended up focusing more on larger structures with additions than I expected in the beginning of the project period.

I believe that the question of this thesis and the conclusions will follow me as an architect, and be important, as long as design of residential buildings and areas will follow me in the future.

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PICTURE

(Images and illustrations without credit have been illustrated or photographed by the author)

- p. 20. Salt & boende. Flytande hotell på Klädesholmen. (2008, January). Mats & Arne arkitektkontor AB.
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- p.57. New center at Öckerö harbour. Tornstaden.

Jag vill rikta ett stor tack till min familj som
tålmodigt och peppande följt mig genom
denna långa studietid
♥

Jag vill även tacka följande personer för all hjälp,
intressanta diskussioner och värdefullt material
ni har gett mig under examensarbetet

John Helmfridsson - handledare
-för ärlig och värdefull vägledning

Julia Fredriksson - examinerator
-tack för extra stöd i rimlet av text

Öckerö Kommuns planenhets
Jenni Wernäng

Eva Wallin
-för goda råd, spetskunskap och hjälp

till er andra som bidragit med era berättelser..
SF marina för nödvändig information

Alla studiekamrater på Chalmers

Sist men inte minst, tack alla vänner och bekanta
som utifrån diskussioner bidragit med en och
annan snilleblxt

//Ellinore



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