

SHARING FLUID GROUND

A Landscape of Co-existence Building upon the Unstable “New Land” Along the Coast of Stavanger

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2097: WE MADE OURSELVES OVER

PREFACE

INSPIRATION

— *What is the motivation of my interventions?*

NORÐVEGR,

Old Norse, which is the etymological root of the name of a northern European country, Norway, and literally means the way northwards and refers to the sailing routes along the Norwegian coast. This is where my graduation project locates.

There is a famous Norwegian documentary series called <Where No One Would Believe that Someone Could Live>. Judging by the name of which, one could make a first guess that the urbanization process in this country is a history of humankind struggling to earn square inch of living space from the domination of nature. During my field trip to Norway, I found that human settlements are usually limited to a narrow strip of flat land between sea and mountain. Infrastructure of enormous size is constructed to connect mainland and surrounding islands. The preciousness of available land for urbanization makes coastal areas incomparably crucial and

more densely populated than the inland mountainous areas.

The mean sea level along the coastline of Norway has been dropping for the last century, with glacial isostatic adjustment as the main contributor to GMSL(global mean sea level) change which could mitigate the ongoing sea level rise in global settings. This means that Norway is not considered to be vulnerable to sea level rise, for now. Under this circumstance, lots of transformation projects, such as former shipyards and port areas transformed into residential, commercial and office areas area taking place.

However, due to the largely concentration of the population in coastal urbanized areas and uncertainties lies in future sea level, it is crucial to develop an integrated plan or design with the IPCC(Intergovernmental Panel on Climate Change) projections on sea level change.



INTRODUCTION

The time scale of this project was set by another science fiction project called 2097: We Made Ourselves Over.

It is the culmination of a year long project inviting residents and experts on sea-level rise, smart cities and community activism etc, from Aarhus, Hull and beyond to describe their hopes for the coming century. The project itself springs from a desire to explore human capacity for self-determination and resilience in this context. It continues our concern with the social impact and opportunities of rapidly changing technology on our everyday lives. It takes the city on a journey into an imagined time at the close of this century and asks questions about the respective roles of technology, utopia and our own imaginations in setting a course for the future.

The most interesting thing I found in these interviewing videos is the complexity of human being. Professor coming from a rather rigorous data researching background seems to possess the wildest imagination, while designer who is supposed to be more sensitive built his vision for 2097 in a more realistic way, and researcher

from geo-science who inspects on flooding risk every day concerns most about the life status of his family members by then. And children like an 6-year-old pupil are always unfettered by the bound of reality, and let their imagination roar as high as their are supposed to be. Regardless of what background they are coming from, people all expressed a beautiful and positive wish for embracing new technology, a better human society and better environment.

As an urbanist, I always have to imagine for the future, based on rational analysis. Given the context of the North Sea, the first concept come to my mind is that with the rapid developing of new technologies, there will not be a clear boundary of land and sea any more. Without the limitation of surviving only on land, a lot of things could be achieved by human beings. But, great nature could be a good friend and an awesome foe at the same time. If we don't have to struggle against nature anymore, maybe we should question our meaning of existence instead.

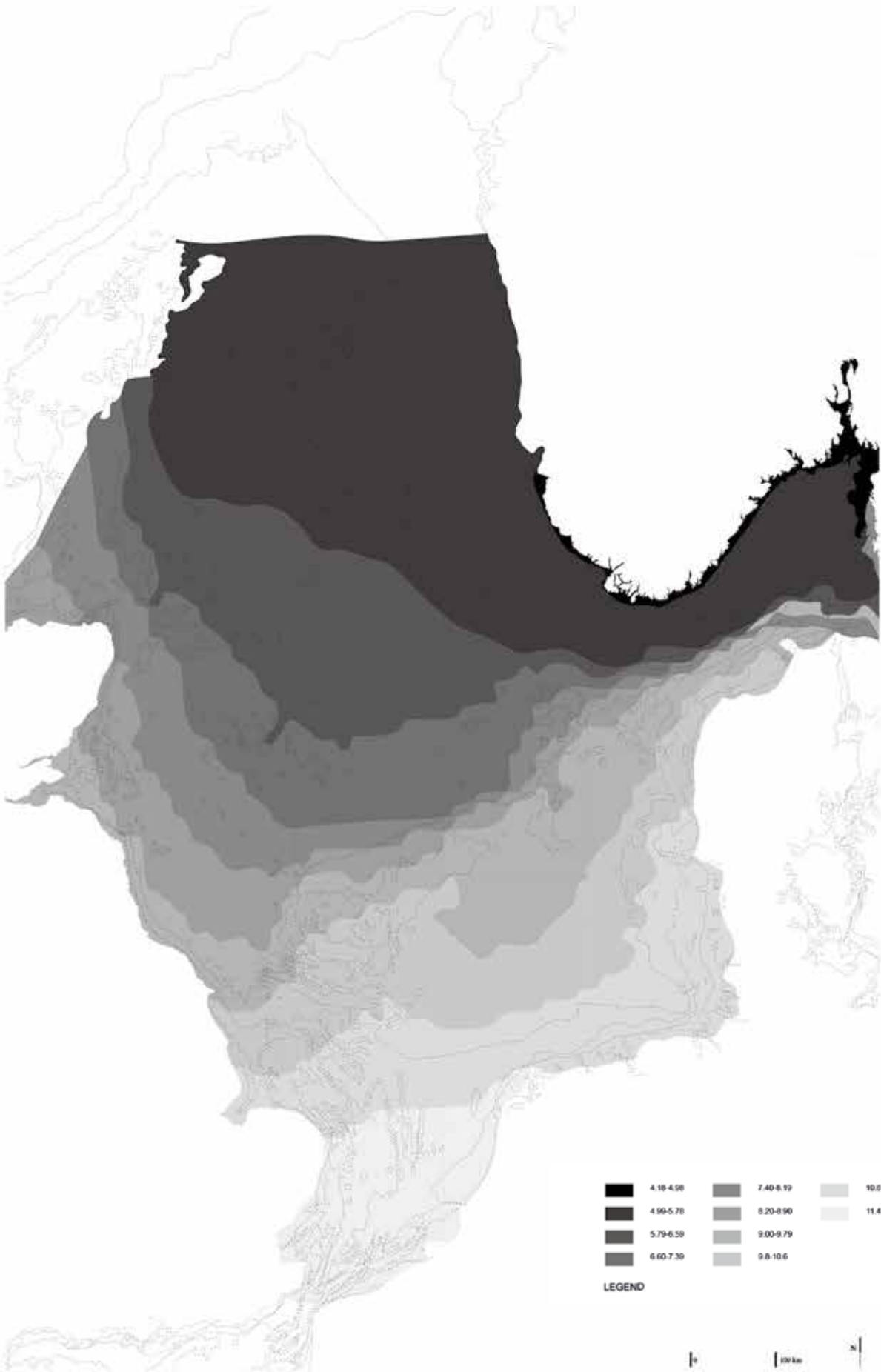
However, the landscape of coexistence on the context of the North Sea will be an intriguing scene to behold!



ENVIRONMENTAL: CLIMATE CHANGE

GLOBAL TRENDS

GLOBAL WARMING & SEA LEVEL CHANGE

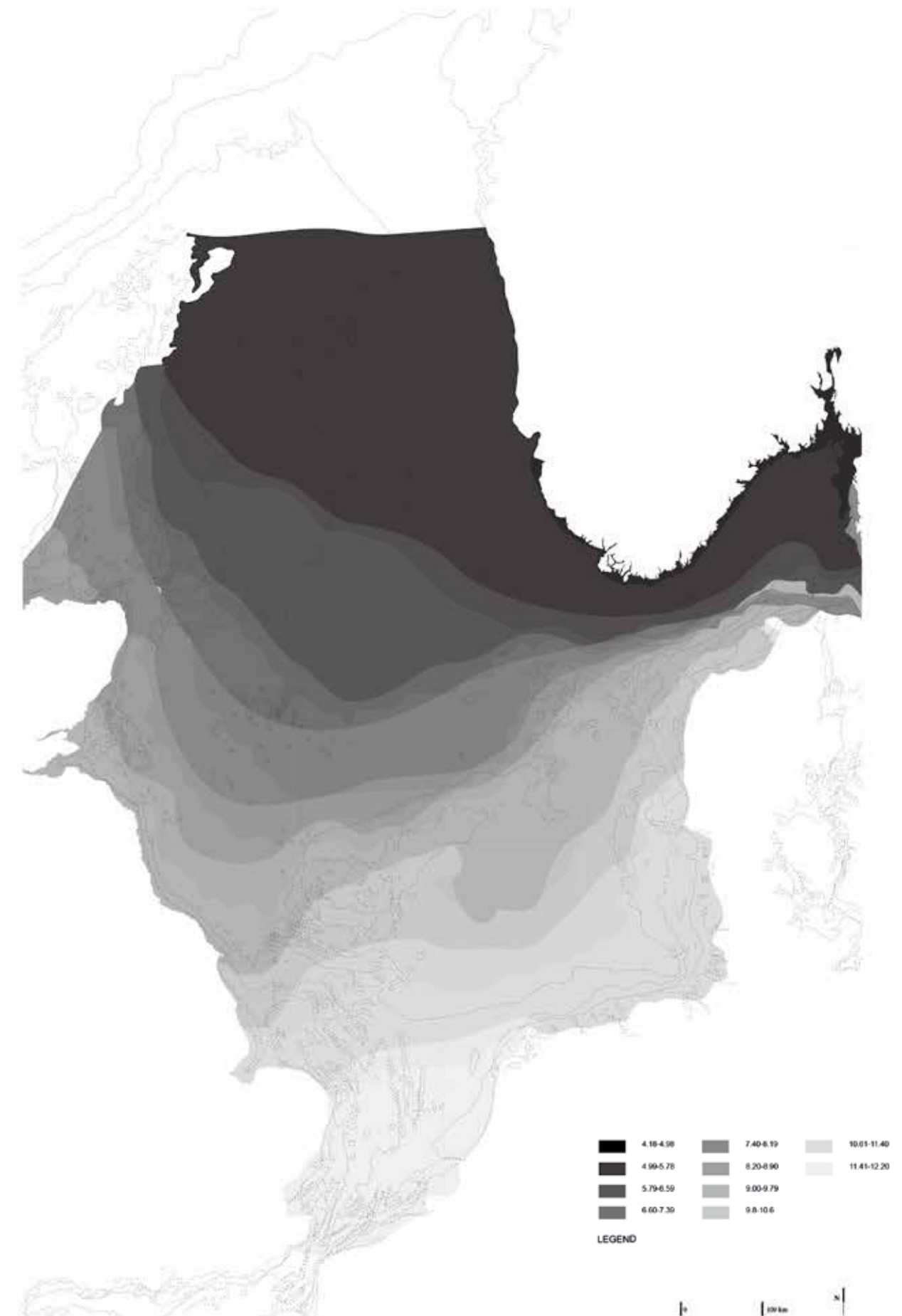


Climate change is already happening: environmental change is being observed on all continents and in all the major oceans. The climatic changes that have been observed over the past 150 years cannot be explained unless anthropogenic greenhouse gas emissions are taken into account. The combustion of coal, oil and gas has generated large volumes of carbon dioxide (CO₂). These releases, combined with greenhouse gas emissions from deforestation and forest degradation and other sources, have resulted in an increase in atmospheric greenhouse gas concentrations. According to the Intergovernmental Panel on Climate Change (IPCC), the rise in greenhouse gas concentrations is the main cause of global warming,

which in turn results in climate change. Climate change has impacts on the natural environment and major consequences for most sectors of society.

The Norwegian Sea has become warmer and saltier since 1978.

It is uncertain how climate change will affect the marine environment in the North Sea. Studies of benthic organisms have shown that many species previously found on the seabed of the North Sea have been moving northwards into the Norwegian Sea. This pattern has been found for almost 600 species, and on average their distribution has shifted by 750–1000 km during the past 13 years



ECONOMIC: LIMITATION

GLOBAL TRENDS

LIMITATION IN NATURAL RESOURCES & TRANSFORMATION OF TRADITIONAL INDUSTRIES

All available data point in the sense that the Earth is now reaching its limits in the use of its natural resources. All that has just been described on the duration of fossil fuel reserves indicates that, given the longevity of coal, it would be the source of energy to be used in the future when other fossil fuels are depleted, a fact that would aggravate the greenhouse effect in the atmosphere. Humanity must become aware of the urgent need to replace fossil

fuels with renewable energy sources to avoid the catastrophic scenario of using coal as an energy source as well as to replace the current model of development for sustainable development, which, by reverse logistics, with the reuse, recovery and recycling of materials, thus reaching the so-called closed production cycle, could delay the exhaustion of natural resources of the planet Earth.



SOCIETAL: MIGRATION

GLOBAL TRENDS

HUMAN FLOW

The migration of human beings is the ongoing trends all over the world. political asylum, climate and famine refugees are the main driving force of migration today.

According to reliable source of information(UDI), the number of asylum seekers arriving in Norway drops by 95% since 2016 which they called refugee crisis. This fact has already caught the attention of certain human right organisations. It seems like this country is becoming more and more inhospitable to immigrants. But, the par-

adox is that the whole country is now facing a severe problem of minus growth in population. The ageing population results in a shortage in labour force. Maybe the growing frequency in terrorism has lead to Norway's harsh immigration policies. But simply shut down its open gate to immigration won't do good to anybody. Not to mention that immigrants does not equal to terrorists. A mature reviewing mechanism towards immigration would certainly have positive effects on social stability.



FIELD TRIP JOURNAL

IMPRESSION ON THE NORTH SEA ROAD

Although one would never know a place completely even if he lives there for a lifetime, in order to build a intimate connection with my project site, I took a cycling trip along the North Sea Road from Bergen to Kristiansund in Norway. What impressed me most was the vast, vacant, breath-taking landscape along the coastline. And that was also what I saw during most of my field trip. Sometimes I could feel this overwhelming solitude on my way cycling along a void shoreline, across silent woods, passing by a deserted lighthouse or cottage. The only thing that reminds me of the human existence

was the distant sound of engine of the trucks which passed me by. I couldn't help but thinking that maybe hundreds of years ago, this was a wonderland for fishes or certain mammals. Then humankind took place. The great nature is a miracle. What we could do is respect the discipline of nature and admire the beauty of natural succession. Human society on the planet is like a child who is trying to get more attention in front of his mother. Standing on the rocky shore of North Sea, I suddenly felt an strange urge of going back to the city.





SOURCE: PHOTOGRAPHY BY YELIN ZHANG

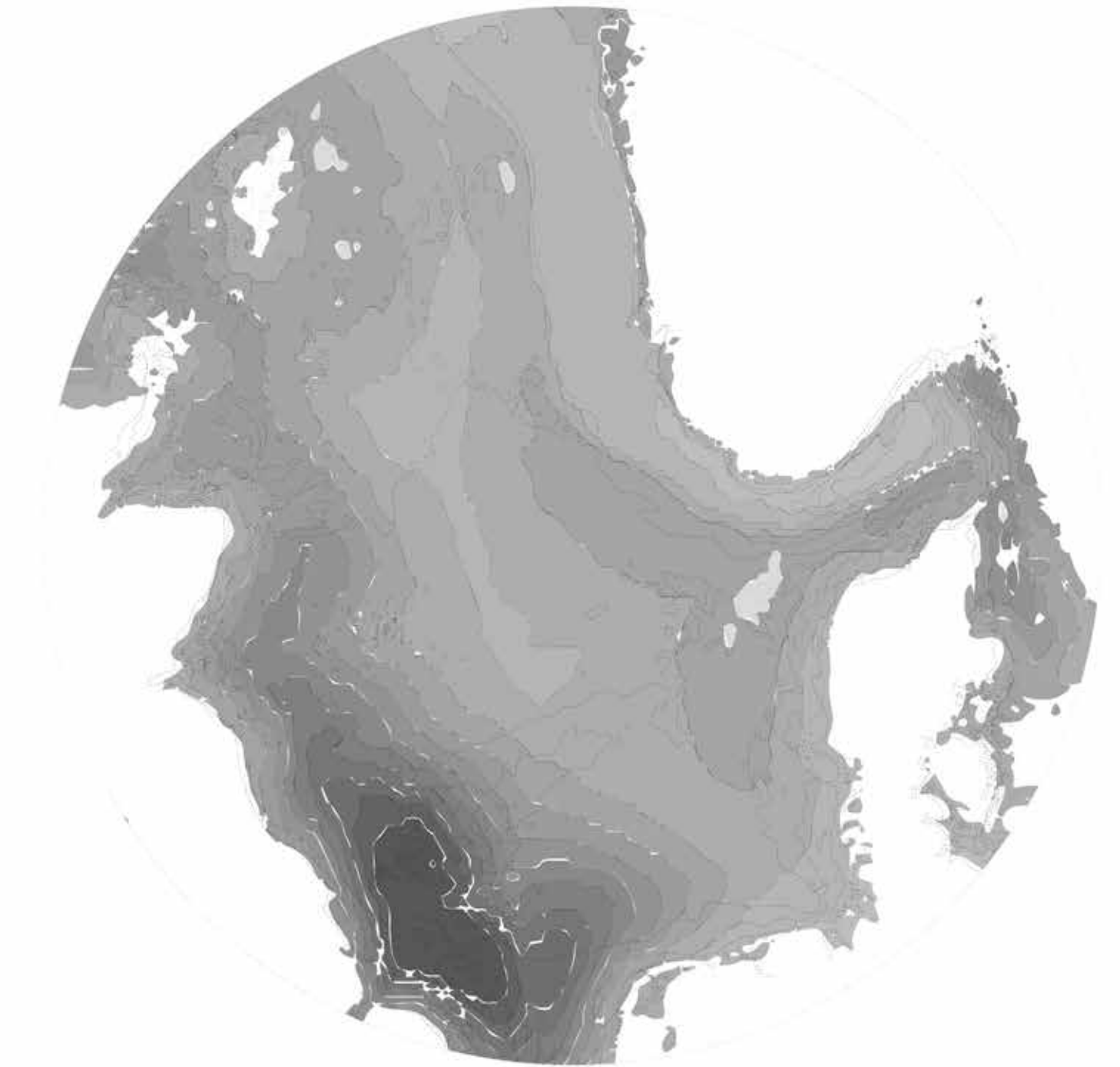


SOURCE: PHOTOGRAPHY BY YELIN ZHANG

ENVIRONMENTAL: ADAPTIVE MIGRATION OF FAUNA SPECIES

PROBLEM STATEMENT: WHAT PROBLEMS ARE EMERGING IN **NORWAY** RELATED TO GLOBAL TRENDS?

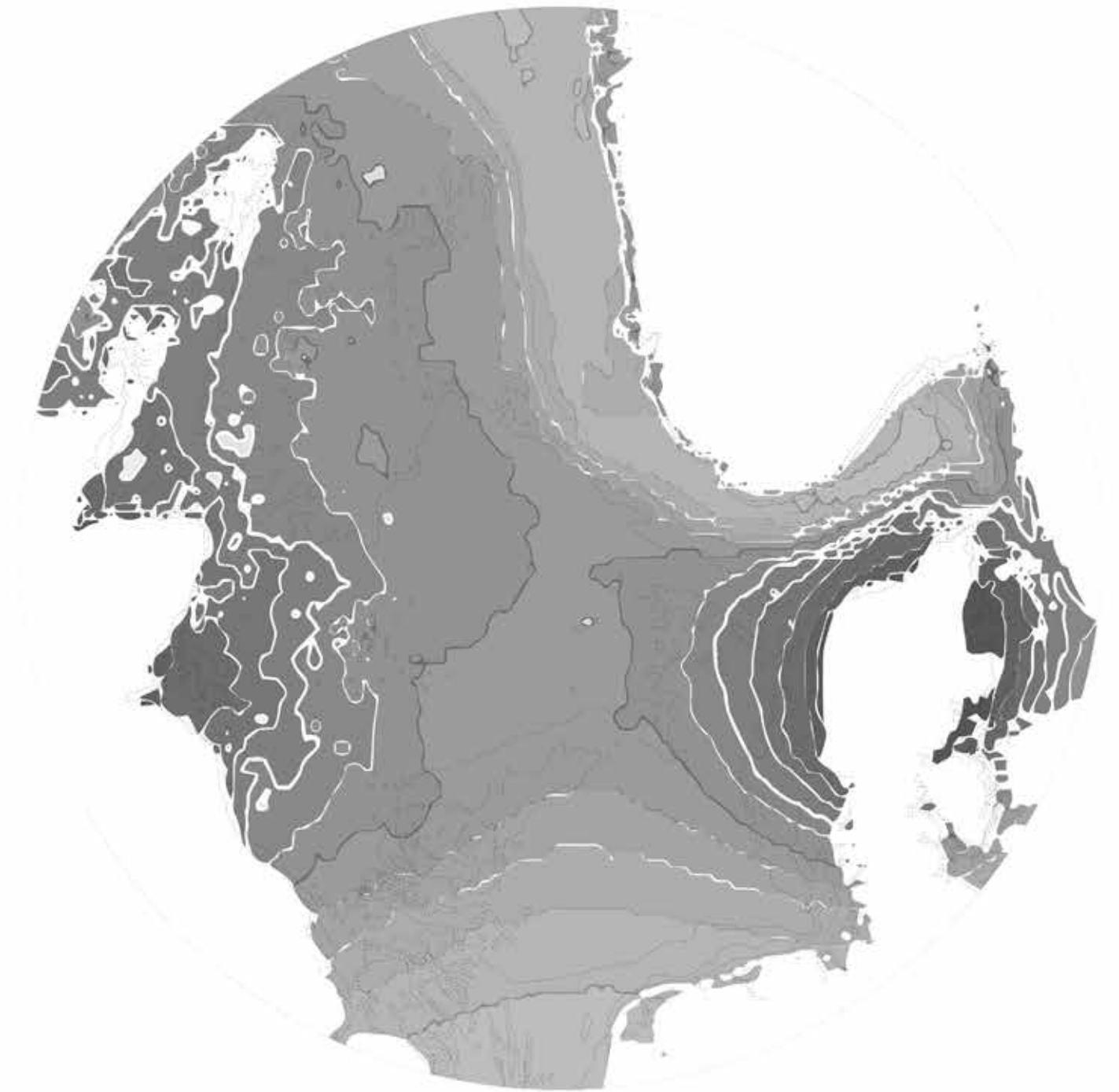
DISTRIBUTION AREA SHIFTING NORTHWARDS OF FAUNA SPECIES



SOURCE: [HTTP://WWW.MAREANO.NO/EN](http://www.mareano.no/en)

Think about butterfly effect, even one sole simple change would have enormous effects, not to mention the rising temperature brought by global warming. In the specific case of Norway, the rising temperature in sea water has become

the driving force of the migrating of certain fish species which are used to habitat or spawn in colder water. Furthermore, the migration of these species could cause the migration of other fauna and human communities.





SOURCE: [HTTP://WWW.MAREANO.NO/EN](http://www.mareano.no/en)

The Norwegian Sea is rich in species and supports large populations of fish, marine mammals and seabirds.
The dominant fish species in the ecosystem are mackerel, herring and blue whiting. The

Norwegian spring-spawning herring stock is the world's largest herring stock, but has declined in recent years as a result of poor recruitment.
The mackerel stock grew from 2012 to 2014, but declined slightly in 2015.





LEGEND



A wide variety of marine mammals can be found in the Norwegian Sea. Northern bottle-nose whales, orcas, blue whales, fin whales, humpback whales and minke whales all pass through the Norwegian Sea as they migrate between warmer waters where they spend the winter months and the northern feeding grounds where they find plankton and other prey in the summer months.

The Norwegian Sea is of vital importance to some of the largest seabirds populations in the Northern Atlantic, several of which are considered to be very valuable at both national and international level. Seabirds are wholly or partly dependent on the sea for food. For a number of seabirds, survival at the global level may depend on the breeding success of the colonies around the Norwegian Sea.



ENVIRONMENTAL: VERTICAL MOTION OF LAND VS SEA LEVEL RISE

PROBLEM STATEMENT: WHAT PROBLEMS ARE EMERGING IN **NORWAY** RELATED TO GLOBAL TRENDS?

3 SCENARIOS ON THE MEAN SEA LEVEL CHANGE PROJECTION OF NORWAY

Representative Concentration Pathways (RCPs) represent different future scenarios of concentrations of greenhouse gases, aerosols, and other climate drivers. Such emission scenarios are dependent on human activities, technology development, and policies.

RCP8.5 is a high emission scenario, also known as a 'business as usual' scenario. There are no reductions in emissions, but instead there a tripling of CO2 emissions by 2100, and a rapid increase in methane emissions.

RCP4.5 involves strong reductions in emissions. There is some increase in CO2 emissions, but reduction is achieved around 2040, and the concentration stabilizes by 2100. This

pathway can be reached by creating an energy efficient society and having ambitious climate policies in most countries. By 2100 temperatures are more likely than not more than 2°C warmer. Methane emissions are stable in this scenario. It is expected that many regions will experience shortage of water, and high threat of extinction for many species.

RCP2.6 is a low emission scenario. It describes a path where emissions are reduced by 2020, and atmospheric concentrations go down from 2040. The scenario is based on expectations of reduction in use of oil, lower energy consumption in general, and a human population stabilizing around 9 billion.

emissions of greenhouse gases (from IPCC report on sea level projection)

RCP 8.5

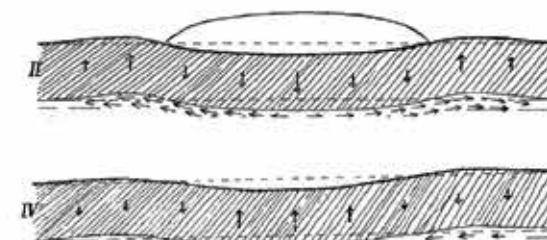
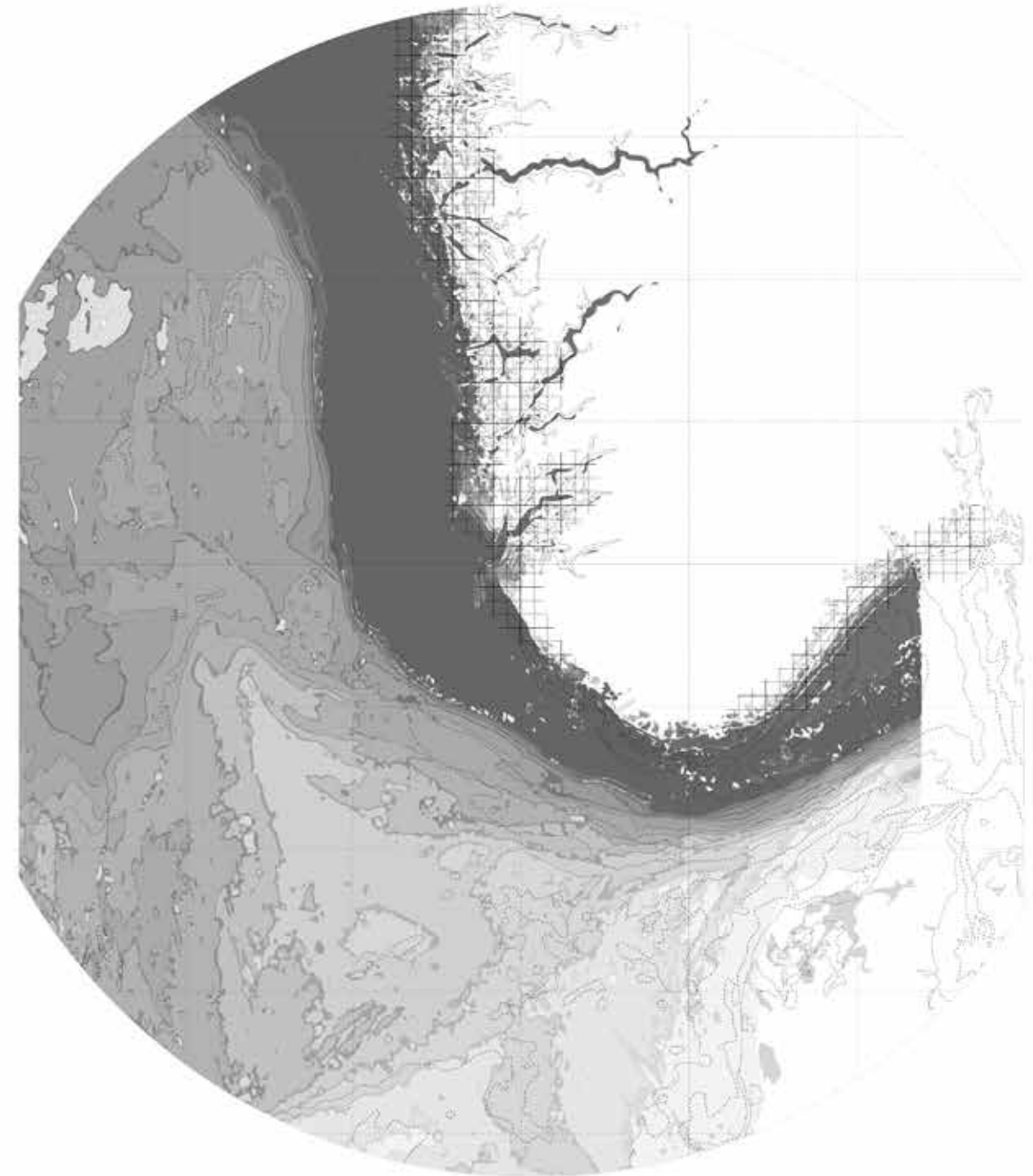
RCP 4.5

RCP 2.6

business as usual

reductions after
2040

drastic cuts from
2020



SOURCE: [HTTP://WWW.NATURALEARTHDATA.COM/](http://www.naturalearthdata.com/) [ALTIMETRY]
CHANGING ICE LOAD AND VISCOUS FLOW OF SUBCRUSTAL MATERIAL (NANSEN, 1921)

ENVIRONMENTAL: VERTICAL MOTION OF LAND VS SEA LEVEL RISE

PROBLEM STATEMENT: WHAT PROBLEMS ARE EMERGING IN **NORWAY** RELATED TO GLOBAL TRENDS?

3 SCENARIOS ON THE MEAN SEA LEVEL CHANGE PROJECTION OF NORWAY

The main driving force in Norway is the uplifting of Earth's crust after the melting of continental glaciers caused by global warming released the loads.

Another crucial criteria as shown here is the three scenarios mentioned in the IPCC sea

level projection report which represent different level of greenhouse gases emissions. And according to which, in the first 2 scenarios the impacts from rising sea level will affect low-lying areas on Norwegian shoreline more frequently in the next century.



ECONOMIC: DECLINING IN FISHERY AND PETROLEUM INDUSTRY

PROBLEM STATEMENT: WHAT PROBLEMS ARE EMERGING IN **NORWAY** RELATED TO GLOBAL TRENDS?

SHIFTING/TRANSFORMATION OF INDUSTRY IN NORWAY

Commercial fisheries are the human activity that is putting most pressure on the Norwegian Sea ecosystem today. With the advances in fisheries technology, the stock of certain commercial species is shrinking. Besides, Shipping density in the Norwegian Sea is highest along the coast. Shipping can have negative impacts on the environment through releases of green-

house gases, oil and chemicals and through noise pollution. For the consideration of sustainable development, the authorities prohibit catches of fish below certain size and of certain species. And the commercial activity of crude oil extraction is declining as for the limitation of natural resource storage.

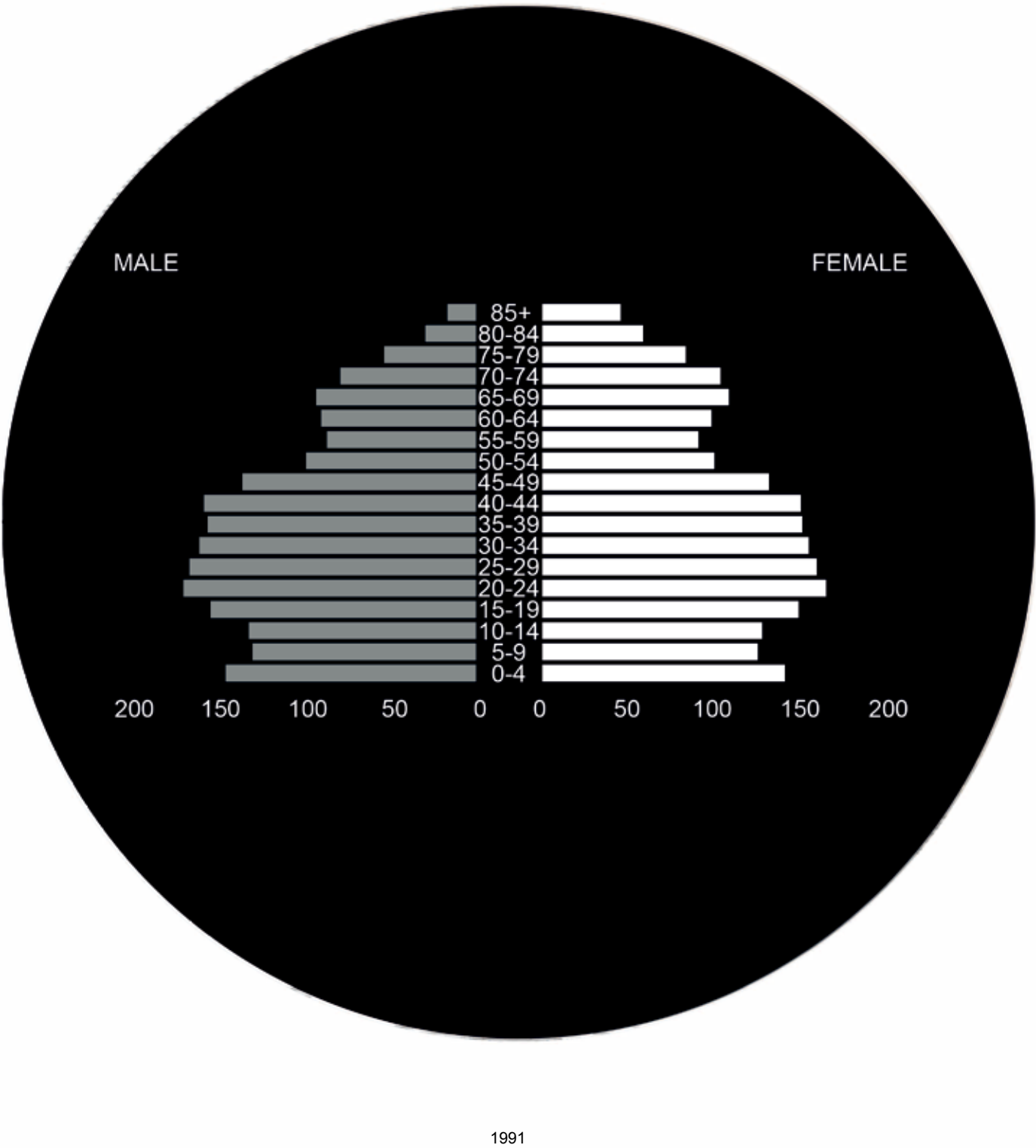


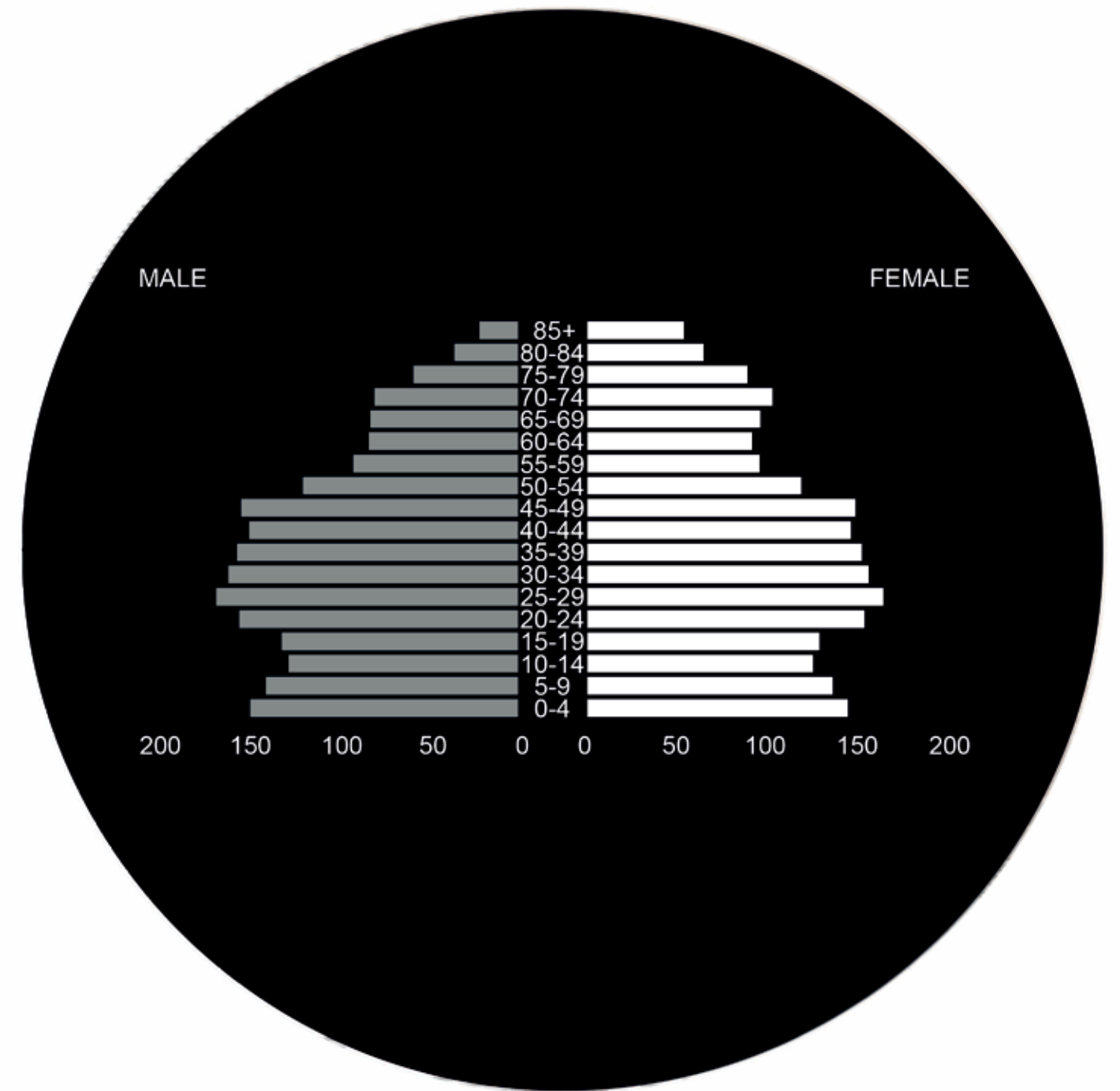
SOURCE: DIRECTORATE OF FISHERIES, WATER RESOURCES AND ENERGY, DIRECTORATE FOR NATURE MANAGEMENT, NORWEGIAN MAPPING AUTHORITY,

SOCIETAL: AGEING TENDENCY OF POPULATION

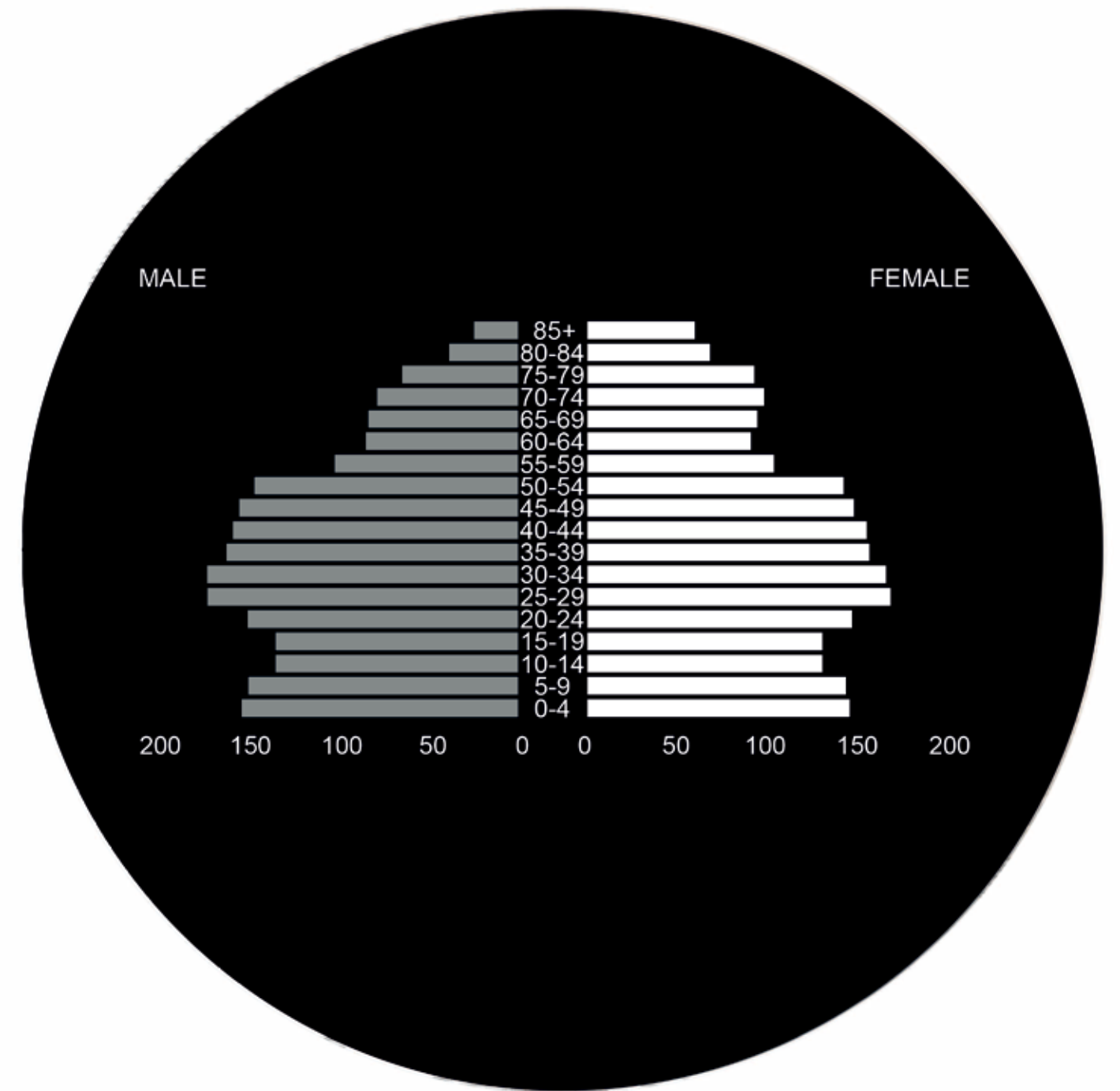
PROBLEM STATEMENT: WHAT PROBLEMS ARE EMERGING IN **NORWAY** RELATED TO GLOBAL TRENDS?

PARADOX IN THE ECONOMIC GROWTH DEMANDS & LACKING OF LABOUR FORCE

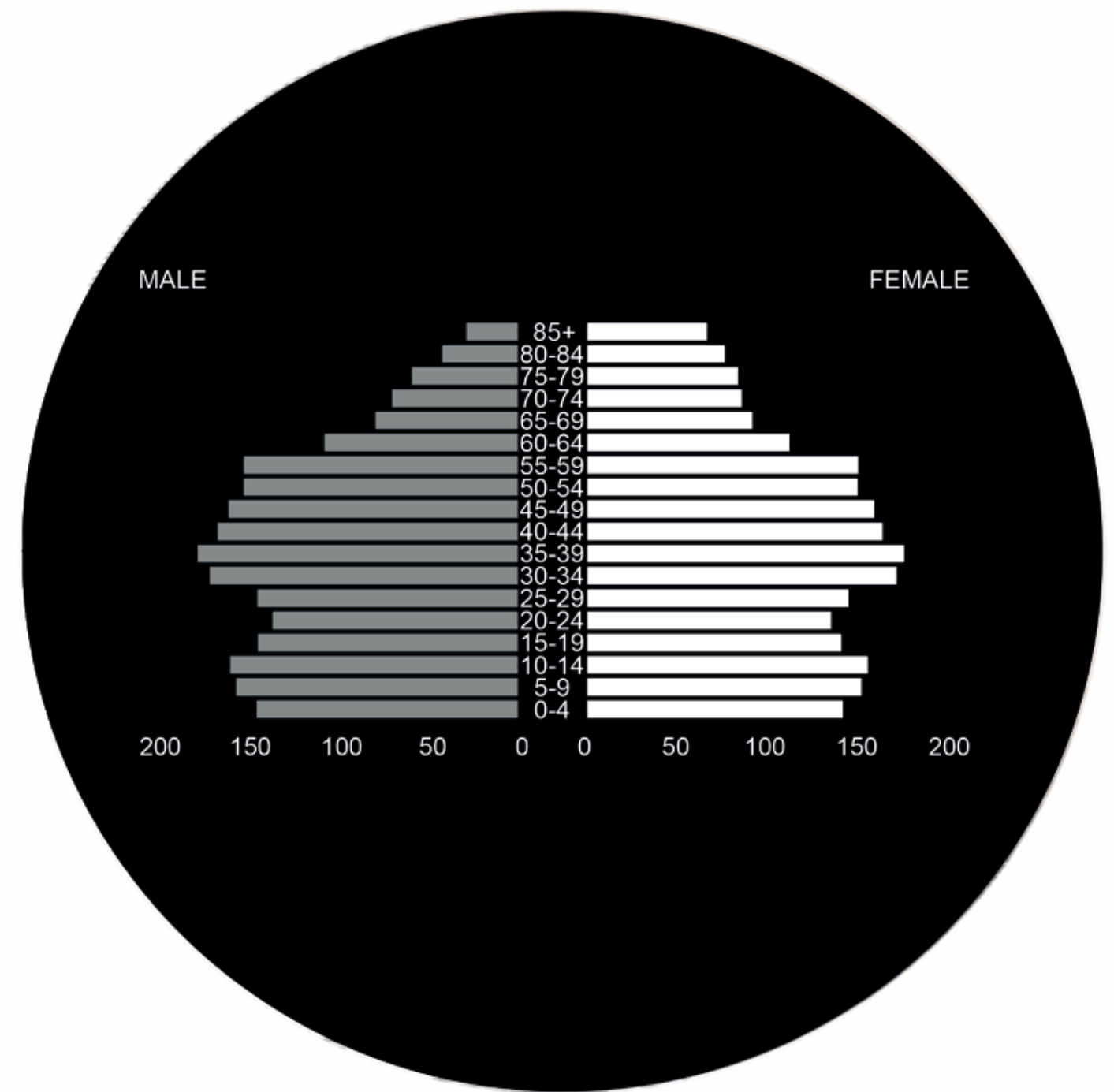




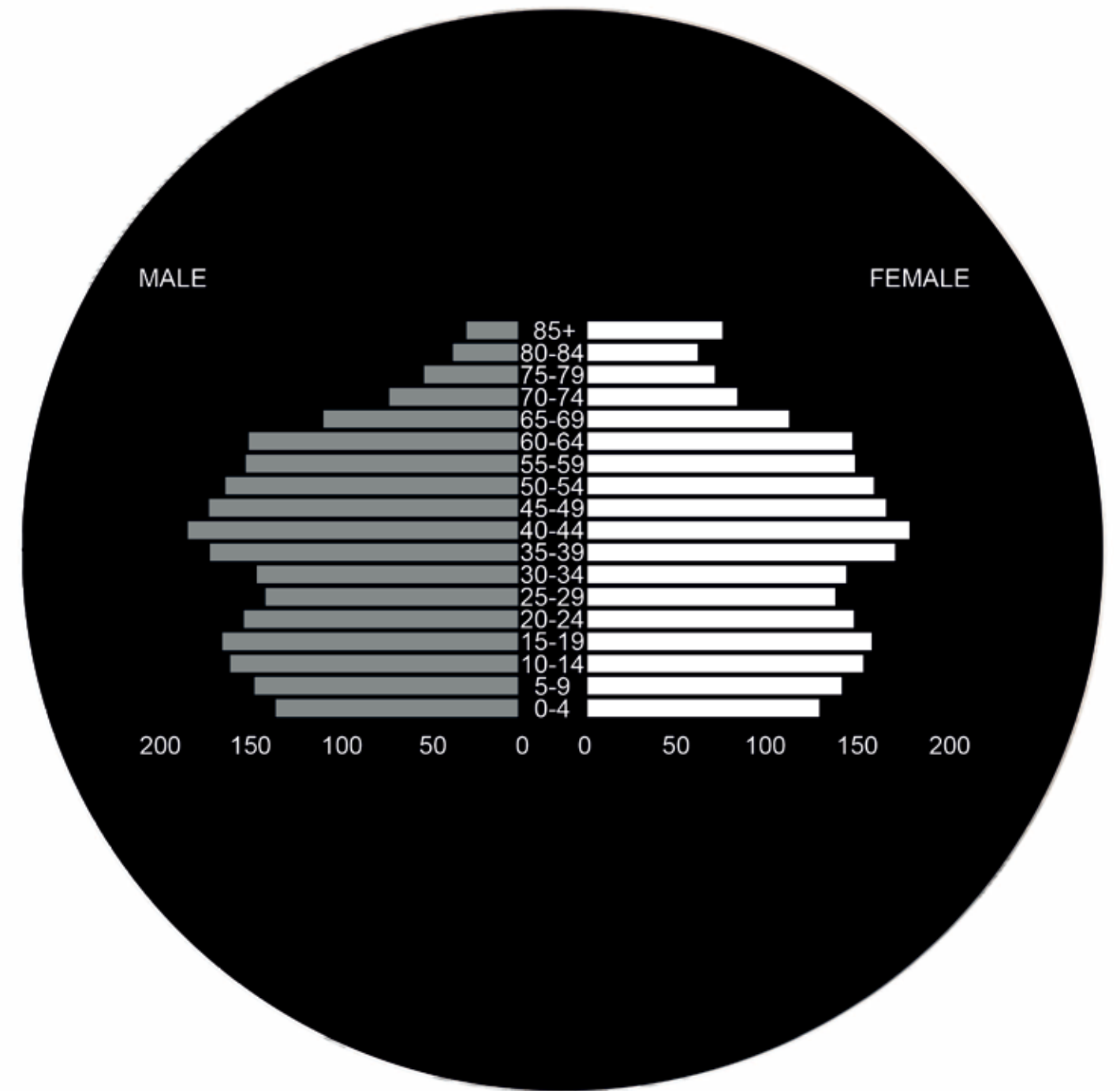
1995



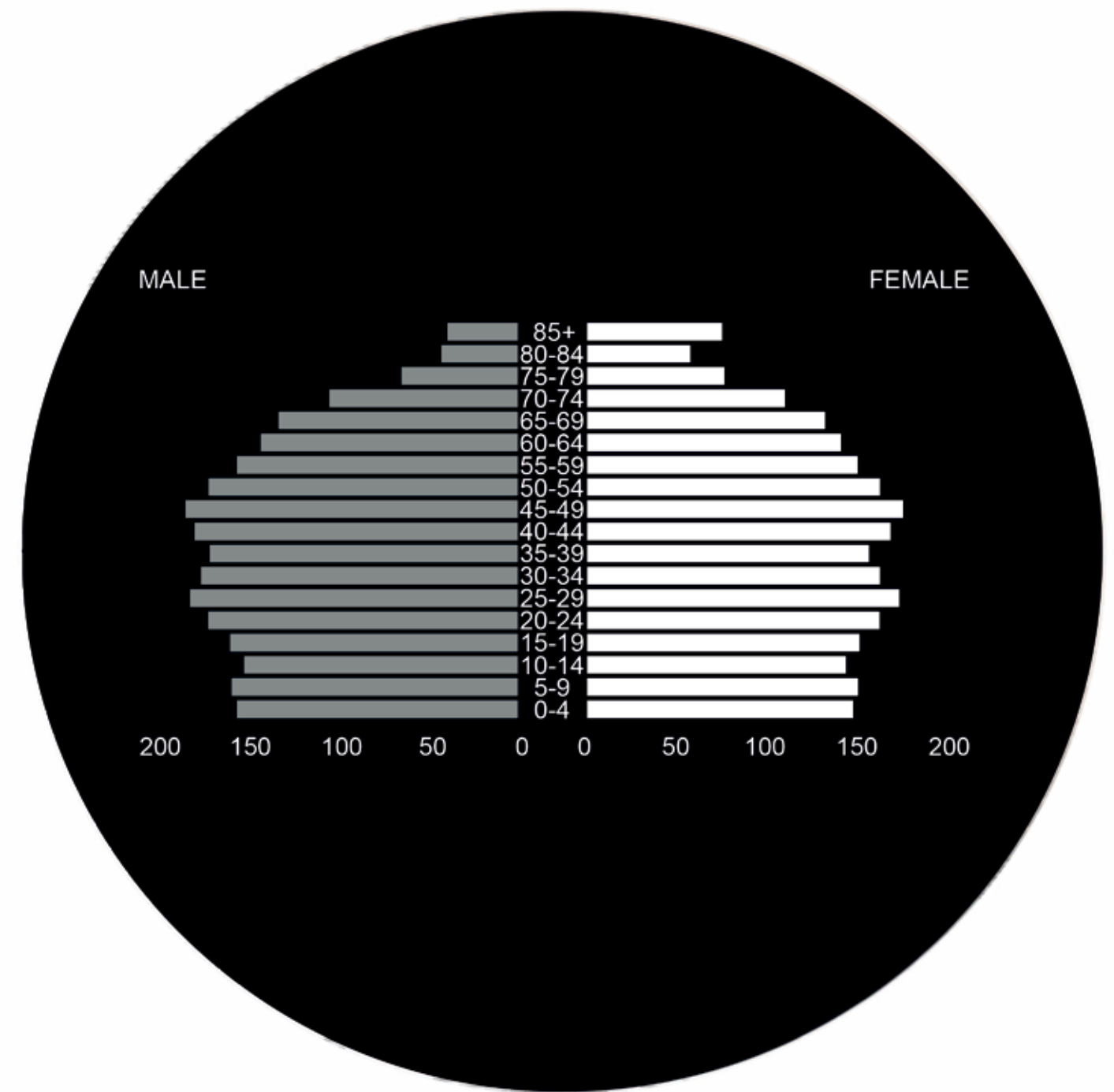
1997



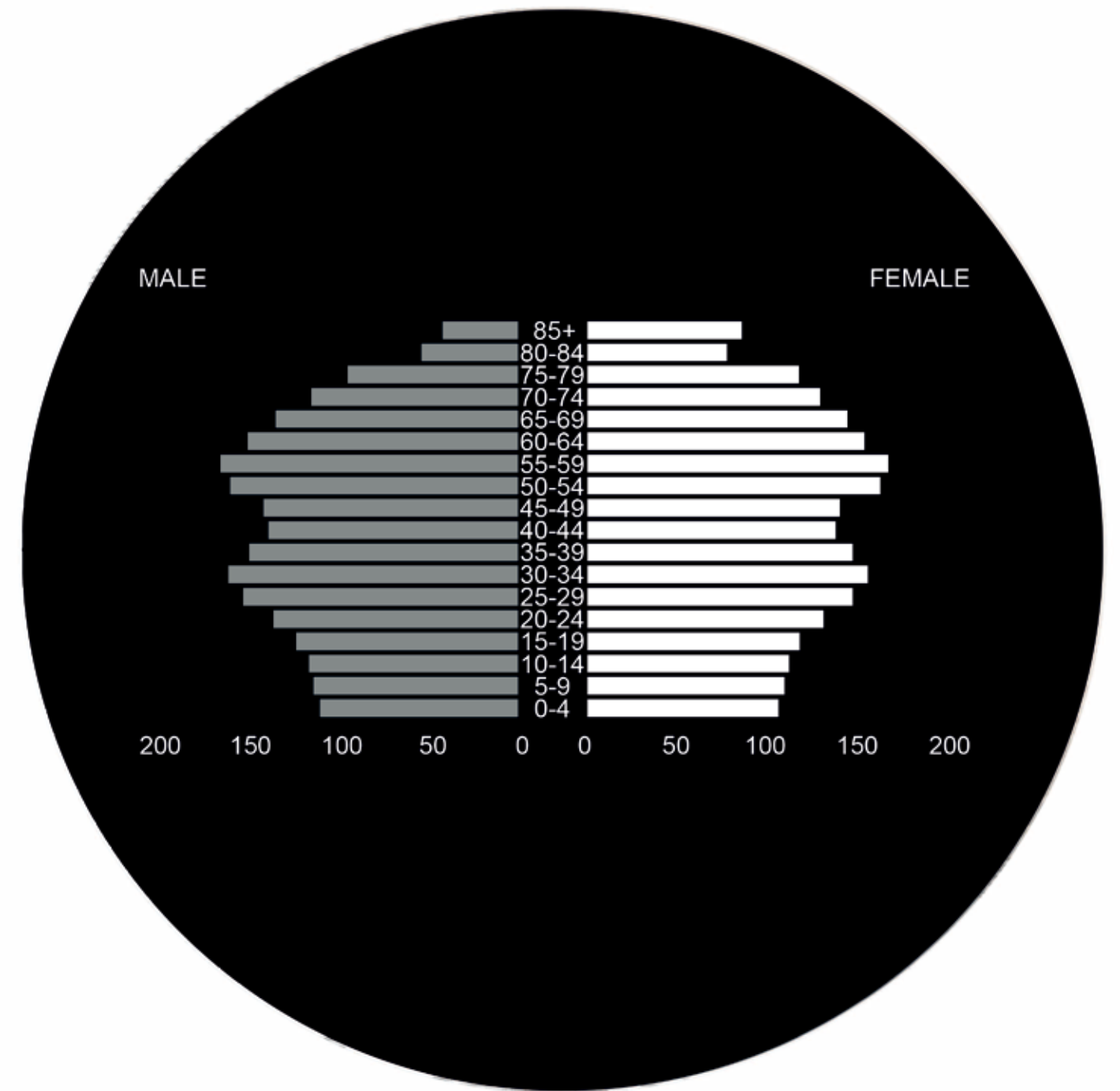
2004



2010



2016

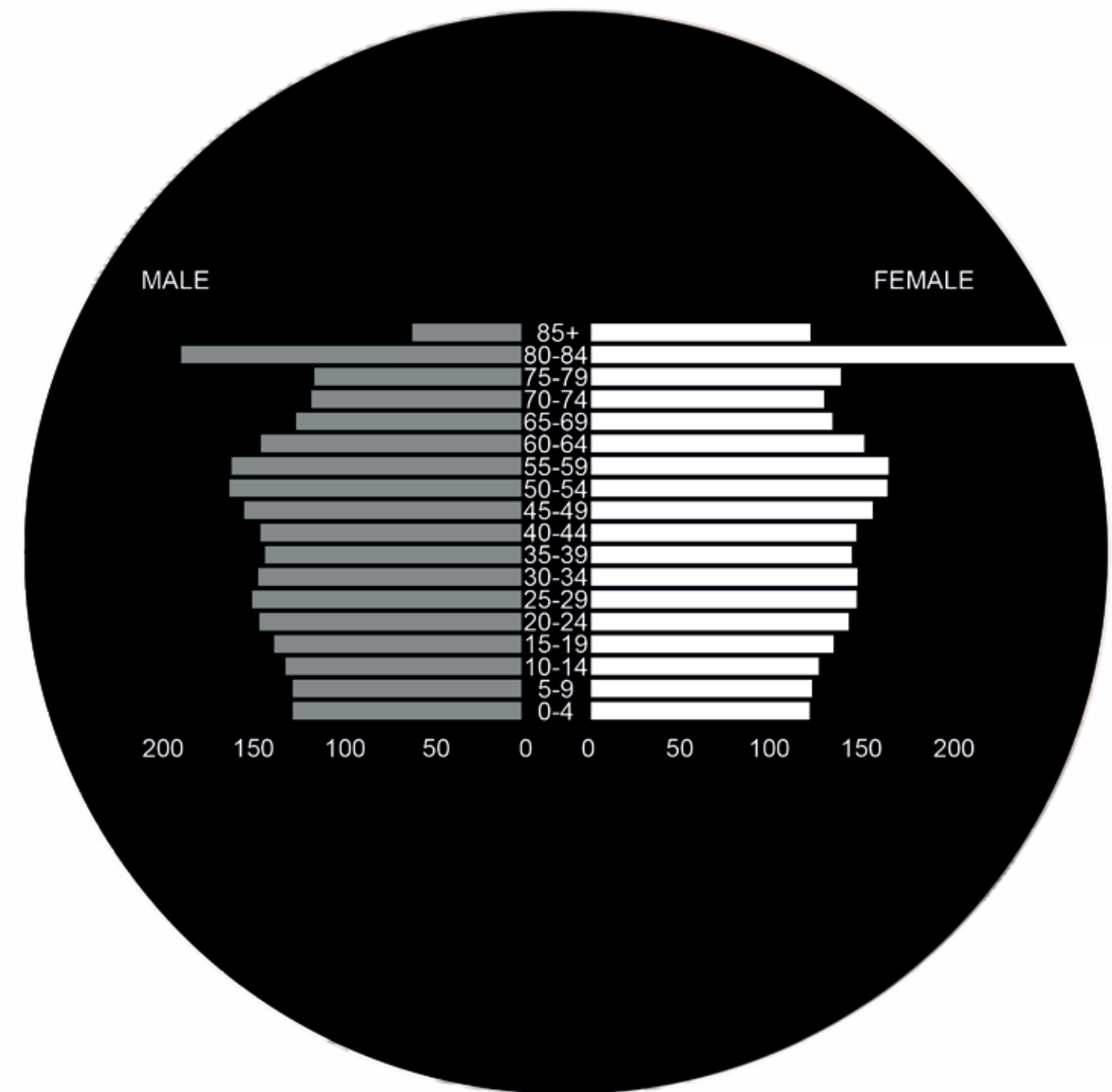


2025

People are living longer and, in some parts of the world, healthier lives. This represents one of the crowning achievements of the last century but also a significant challenge. Longer lives must be planned for. Societal aging may affect economic growth and many other issues, including the sustainability of families, the ability of states and communities to provide resources for older citizens, and international relations. The Global Burden of Disease, a study conducted by the World Health Organization and the World Bank, with partial support from the U.S. National Institute on Aging, predicts a very large

increase in disability caused by increases in age-related chronic disease in all regions of the world. In a few decades, the loss of health and life worldwide will be greater from noncommunicable or chronic diseases (e.g., cardiovascular disease, dementia and Alzheimer's disease, cancer, arthritis, and diabetes) than from infectious diseases, childhood diseases, and accidents.

In Norway, the problem seems quite severe. According to the societal research results of Statistics Norway, there is a obvious aging tendency in the nation's population.



2050

RESEARCH QUESTIONS

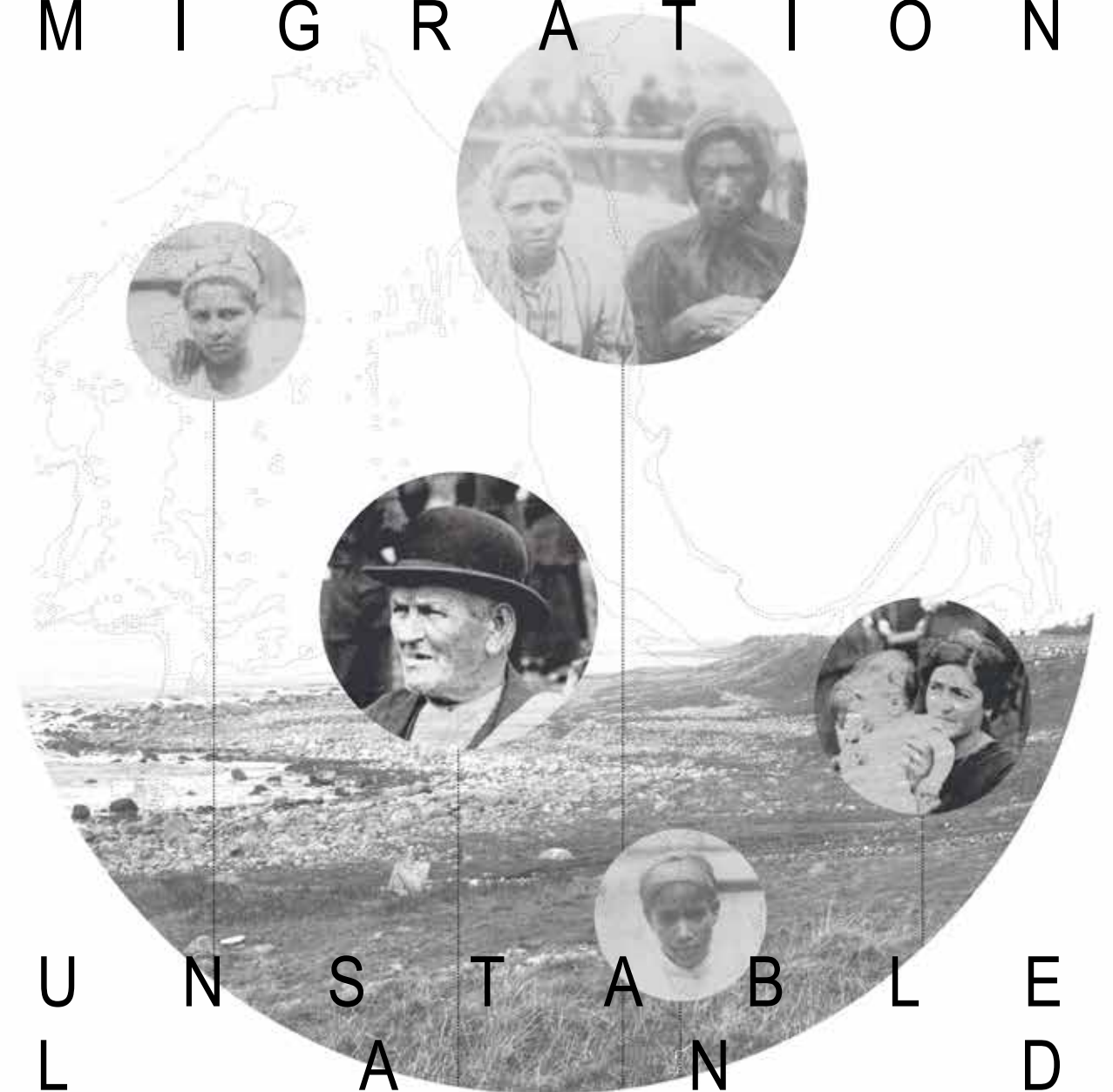
Main research question:

How to react to the changing sea level, build upon a ground of uncertainties, accommodate human and fauna migration, and ultimately achieve a scene of co-existence in coastal areas of Norway?

Sub-research questions:

1. What is the changing trend of sea level in Norway?
2. What are the status of the maritime landform and physical conditions in intervening region and its meaning to the coastal areas?
3. What are the changing trends of maritime landform and physical conditions in intervening region and its meaning to the coastal areas?
4. How would the "new land" emerged in intervening area accommodate the migratory flora and fauna?
5. How would the "new land" emerged in intervening area accommodate the immigrating human population?
6. What is the changing trends in the fishing and petroleum industry and how does that relate to the changing trends in environment and society?
7. How would urbanization on "new land" be adaptive to future sea level?
8. How would urbanization on "new land" affect the urbanization on mainland?

M I G R A T I O N

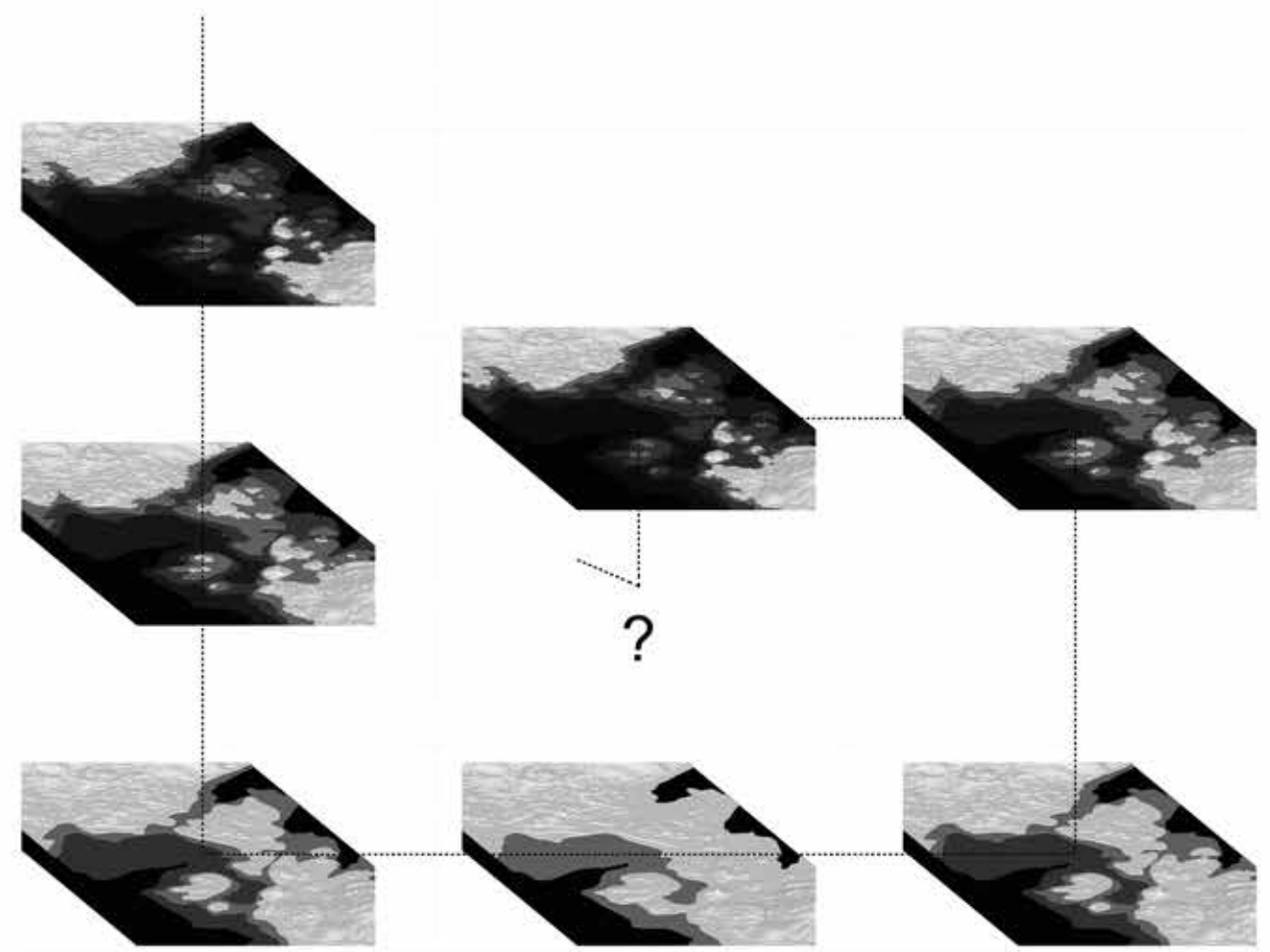


U N S T A B L E

SCENARIO & HYPOTHESIS

To continue my research and design with a more specific condition, I would like to take the last green gas emission scenario as a starting

point, in which case the sea level along the coastline of Norway would keep on dropping in most areas.



WHY STAVANGER?

GENERAL

Known as Europe's capital of energy, Stavanger region is the the richest and most automobile dependent region in Norway, it is also the fastest growing urban area, a strong cultural hub and a destination for breathtaking extreme sport. The Stavanger region has an income per

capita that is about 20% higher than the national average. Incomes in the Stavanger region will also grow much faster than the national average in the years up to 2040, according to government projections.

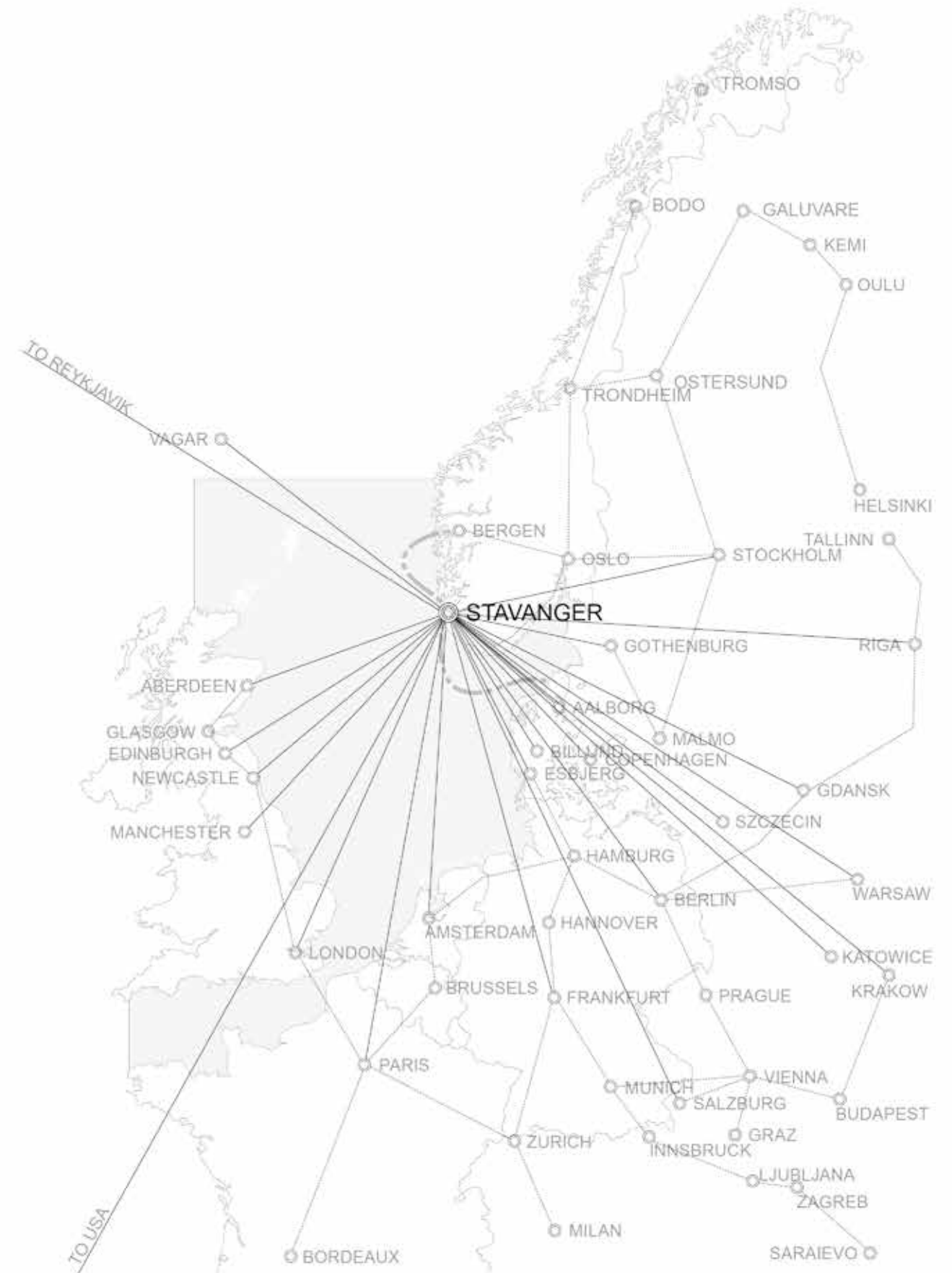


WHY STAVANGER?

INFRASTRUCTURE FOR MOBILITY & DATA

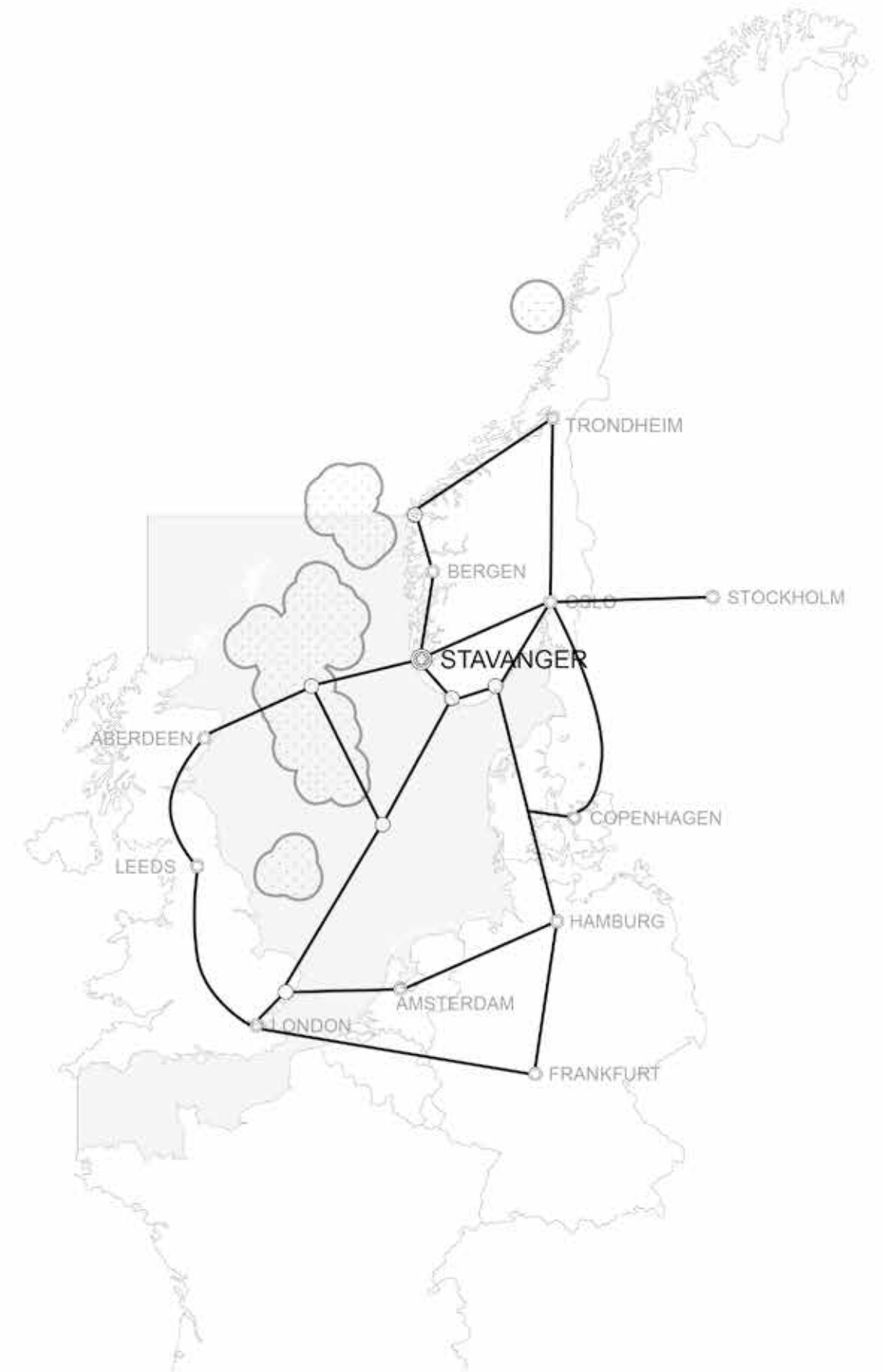
Stavanger has a very convenient transportation connection through all means with the world. And it is also a crucial spot in the network of

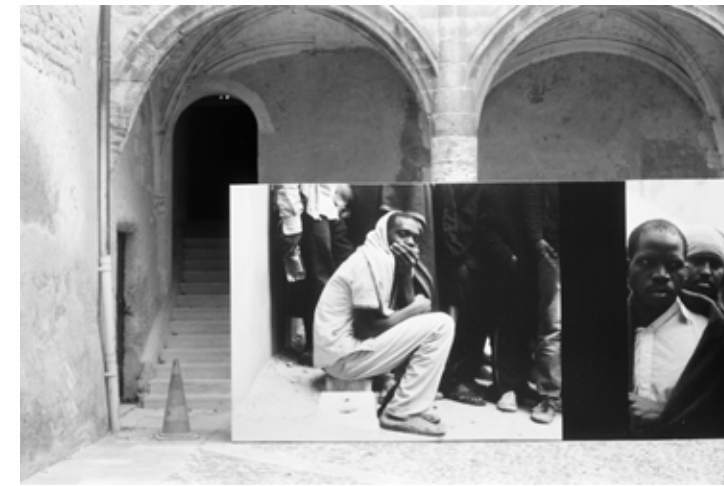
data communication in the whole North Sea region.



(Stavanger 20th September, 2017) — Tampnet, the leading provider of high-capacity, low-latency telecommunication infrastructure and services for the offshore Oil&Gas and maritime industry, announced today an increase of more than 30% on their offshore 4G LTE coverage. This aggressive continuous build-out further

enables the Oil&Gas industry to fulfil their goals of increased safety and efficiency, as well as enabling the ongoing important digitalization of the industry. The coverage increase consists of no less than eight new 4G LTE base stations, most of which are on the UK sector of the North Sea.





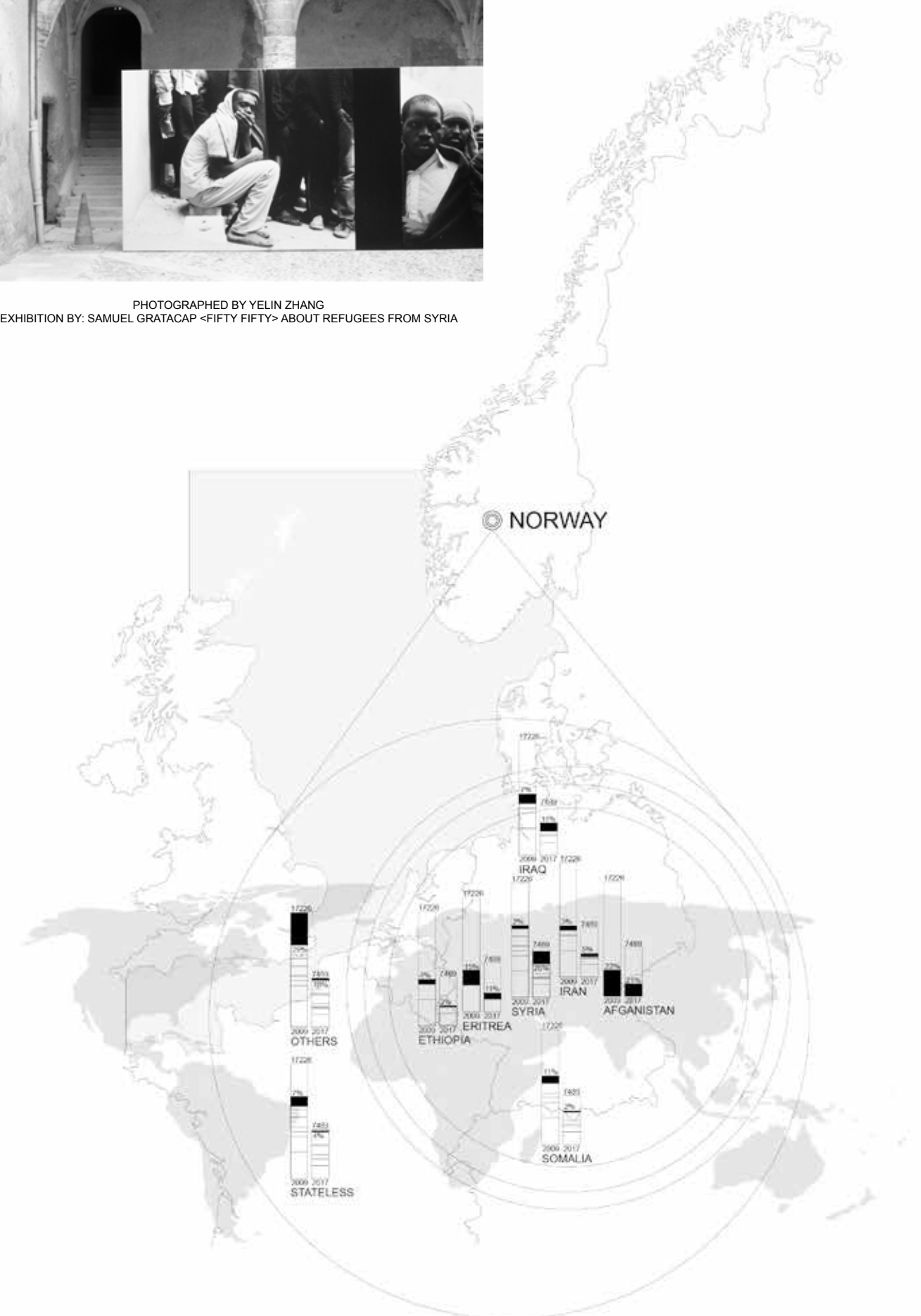
PHOTOGRAPHED BY YELIN ZHANG
EXHIBITION BY: SAMUEL GRATACAP <FIFTY FIFTY> ABOUT REFUGEES FROM SYRIA

WHY STAVANGER?

ATTRACT MIGRATION TO BOOST ECONOMY

With the declining in its traditional economic strength — petroleum industry and dropping of sea level would affect the logistic ship-ping routes, the geographical condition of the Stavanger Region could be a perfect location for the spawning area of certain fish species, there is a call for industrial transformation to-

wards a more sustainable and environmental friendly development.
The development of this region relies largely on migration for the local population is shrinking which could lead to a shortage in labor force.



IMAGINATION

AMPHIBIOUS

双栖;

fish, bird, or human;

Your scent in the air, the water, on the rock or between weeds;
What if the memories of different species could be connected;
Only by stepping in to the territory one once lived, flew or swam.



MEANING OF CHINESE PAINTING:

BORN AS TWINS
INNER CONNECTION

CONCEPT

URBAN LEVIATHAN

I wish the city we live in could act like Leviathan, it should have the quality of the amphibious. In this case, the boundary of 'land' and 'sea' blurs in a harmonious scene of sharing the same space among all the species through time. Time would be the witness of this natural succession on this 'fluid ground'. This scope of co-existence between human and nature could be a futuristic and sustainable mode for us to live with changes.

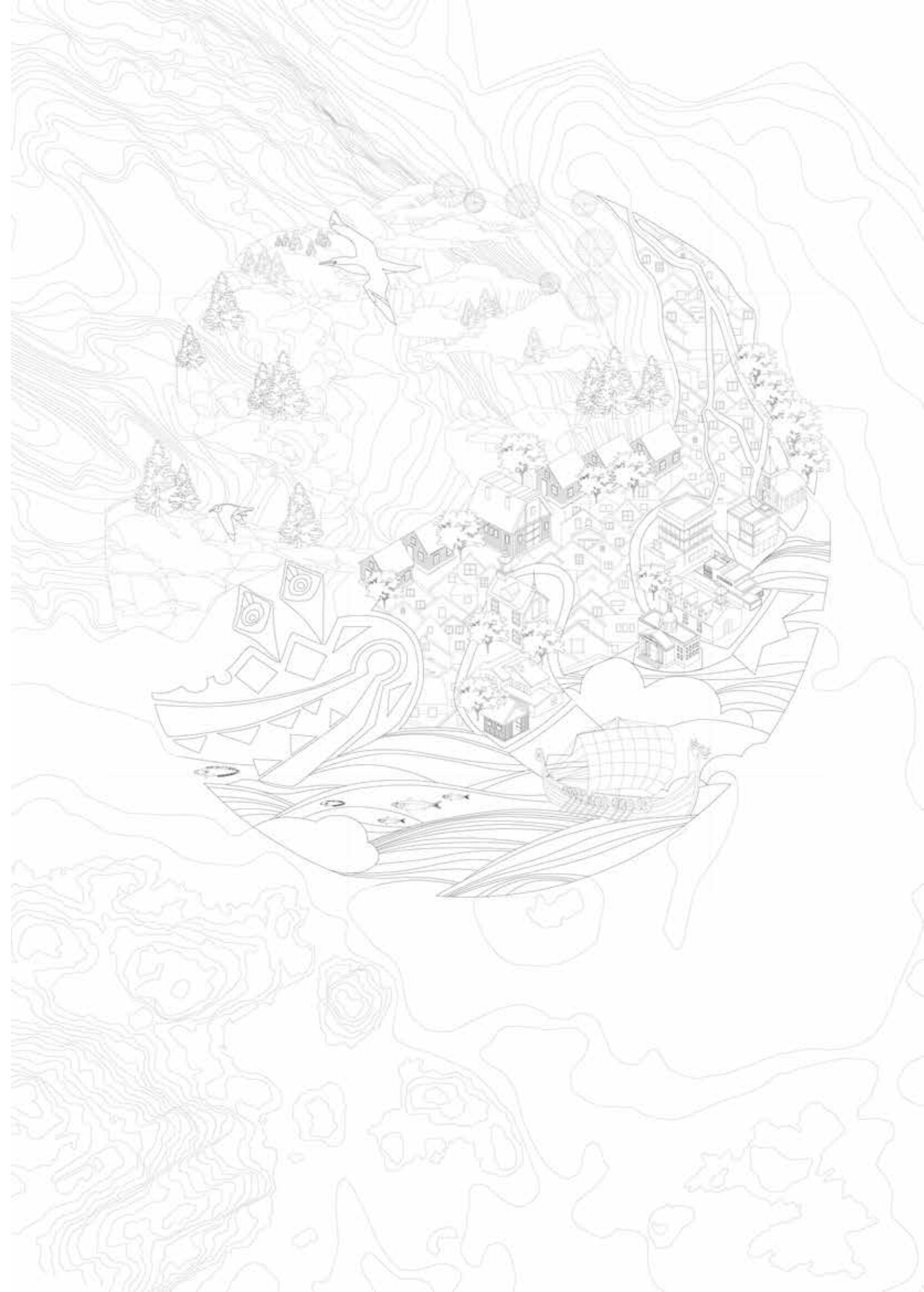
On the JACOBIN magazine's official website, an article called If We Fail written by Christian (2017) says:

In the near term, perhaps starting in the 2020s or 2030s, the foremost problem will probably be a new climate-driven urban crisis of disinvestment, abandonment, and depopulation caused by rising sea levels and large inundating storms that will leave rotting urban infrastructure. As

the water rises and the floods increase in severity and regularity, the once posh shoreline will be the new ghetto.

This sort of worry may be quite common in the circumstance of the incremental frequency in climate-related catastrophes. What we as human beings ought to do is to implement more and more environmental-friendly gestures in our daily lives. Everyone should play a role in control damage and reduce consumption. As an urbanist, I would like to respect the natural processes and in the mean time ensure the living quality would improve for human and the other species as well.

Thus, ideally, the urbanisation towards the sea would be a brand new mode which could be adaptable to future sea level and provide a sense of belonging to the groups of living creature who habitat within.



PROPORTION

DEFINITION OF AMPHIBIOUS URBANISATION

— What is the definition of Amphibious Urbanization in my graduation project?

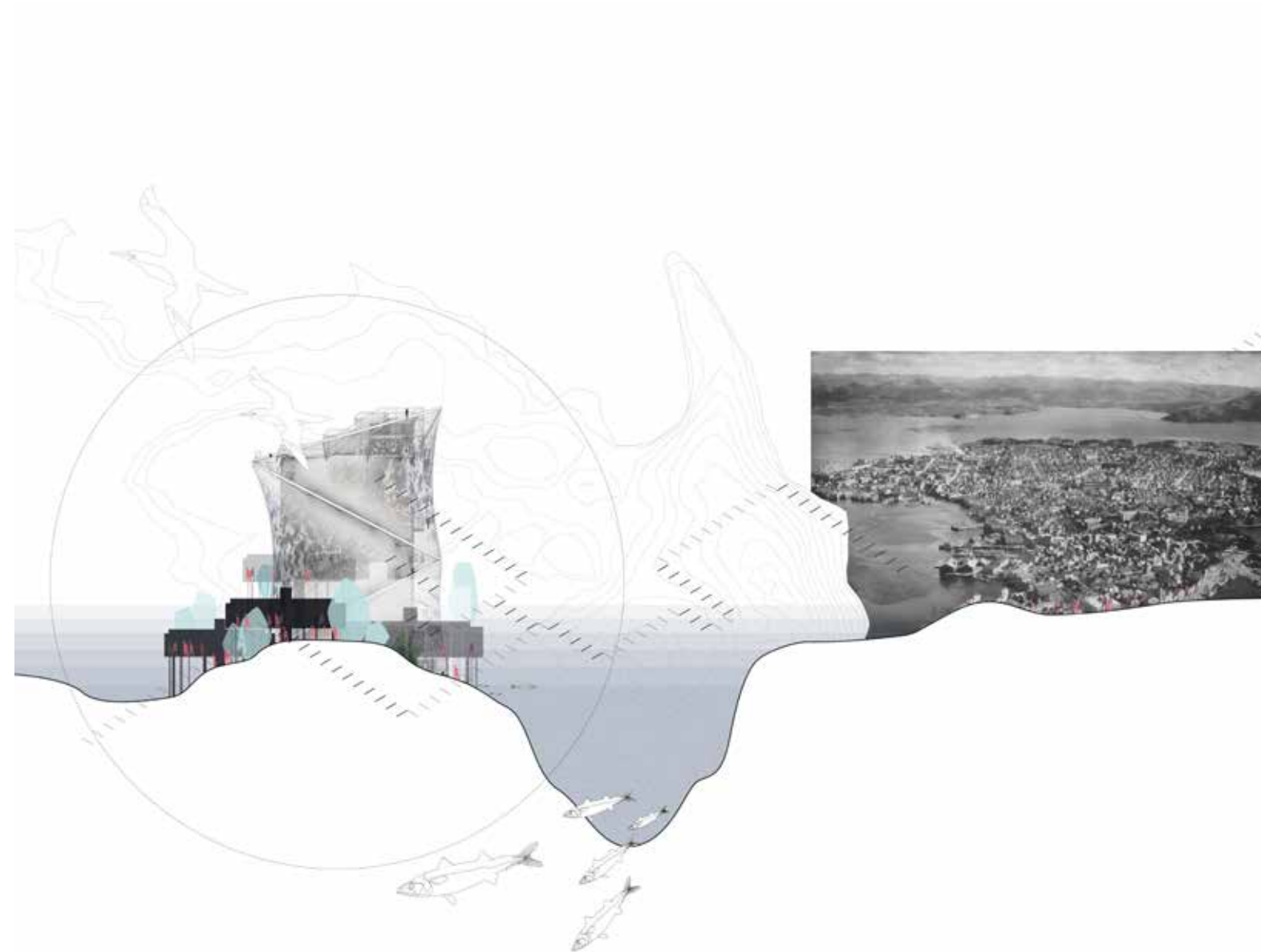
The title of my project is “Sharing Fluid Ground”, with which I wish to indicate the space we live in could act like Leviathan, it should have the quality of amphibious. In this case, the boundary of ‘land’ and ‘sea’ blurs in a harmonious scene of sharing the same space among all the species through time. Time would be the witness of this natural succession on this ‘fluid ground’.

Just as the topic of our studio this year: NORTH SEA: Landscapes of Coexistence, the ideal vision of co-existence between human and nature will always be an objective for us to design with changing sea level, unstable physical conditions on land and develop a more adaptable futuristic lifestyle.

I try to define what amphibious urbanization is in the whole graduation phase. And it's still

changing along with the deeper delving in my design and understanding of the chosen site.

To me, the identity of a Norwegian city is a harmonious status of urban tissue blending into natural environment and I do not intend to change that. Thus a new urbanization mode would only enhance that characteristic. The amphibious urbanization does not simply mean an occupation on potential ‘new land’ which might emerge with a dropping sea level in an less greenhouse gas emission scenario. It will include a cautious urban expansion on ‘new land’ which would be adaptable to environmental uncertainties and respect the nature of site as much as possible, a connection with more flexible infrastructure from mainland to make it accessible, a transformation on the surrounding built and natural environment where this new urbanization would have an intense interaction with.



The methodological framework of my thesis consists of 3 phases, the research or design results of former phase would contribute to the developing of next one. The general procedure could be concluded briefly as follows:

Through researching(observing, interviewing and reviewing, etc.) and analyzing (data collecting, layer approach, etc.), I would conclude a problem statement covering issues related to the intervention site in three dimensions which are environmental, economical and societal. Then my own proposition build upon this state-

ment which is the research question, and in my project it would be: How would the potential “new land” which emerges with the changing sea level accommodate the migrating human, flora and fauna populations, thus reshape the landscape of co-existence on the coastline of Norway? To answer this question, I will set up limits in order to do a more specific design for the next phase. The limits will be presented in forms of hypotheses on 3 dimensions corresponding to the problem statement, in my case it would be: What if the sea level in Norway

METHODOLOGY FRAMEWORK

keeps dropping which means the relative vertical growth of land goes on for the next 100 years then the situation might be reversed in a further future? What if future development urges a transformation in fishery and resource extraction, storage and transportation? What if the shrinkage in local population and development of new technology and industry requires a new policy on migration? Based on these hypotheses I would build up a scenario for the next century which serves as the pre-condition of my design which will be: 1. an amphibious urbanization mode which consists of the construction of the whole infrastructural network which itself should be amphibious, contributive in leading life to ‘new land’ and effective in linking new urbanization to the existing urbanized territory and series of patterns which are compositions of different urban functions and their performances in holding human and fauna activities, design of public space and design guidelines of amphibious architecture in this new urbanization mode; 2. a strategic plan on potential site to assure the synergetic development of the experimental fields of amphibious urbanization mode and surrounding areas. Besides, other than spatial interventions, series of developing strategies and societal policies will be part of the final products as well, which will also contribute to the evaluation tool to evaluate the feasibility and

value of spatial design.

To elaborate more of research and design methods in each phase, I will explain the related methods and interlinks in chronological order.

Phase1: Researching & Analyzing

The main aim of phase1 is to develop a problem statement which covers all three dimensions as mentioned: environmental, economical and societal. Through historiographical navigation map and GIS topographic study, a relative rational recognition of the whole region could be achieved. Research findings will be produced as a series of layer maps, each of which focuses upon different topics and flows. Each mapping study can be read independently as a singular narrative, and in the mean time they would be overlaid to contribute to read the interrelations between different topic in different dimensions which may presents a more nuanced tale of temperature, climate, maritime topography, migration of flora and fauna, circulation of water, resource exploitation, soil type and politics, etc. The interpretation of these informations which firstly present themselves in raw datas is most decisive in proposition making. These objective maps provide new information and insight into previously hidden territorial logics and will contribute to an subjective opin-

and insight into previously hidden territorial logics and will contribute to an subjective opinion on potential site.

However, this multilayer approach may not be enough to let a researcher dive into the spiritual inherent context of intervening site which requires a site visit to travel deeply into the intriguing complexity and possibilities of landscape and urban environment. Through the dialogue between the cartographies delineated in datas and plans and the real natural and built environment where one could sense, feel and wander, researcher would have a more holistic recognition of this territory and more accurate judgement of existing problems.

Phase2: Build Up Scenario

In the former phase of researching and analyzing, critical reflections on the seemingly disparate and contradictory social, economic and environmental phenomena would help to understand what issues I am dealing with which would come up as problem statements. In this phase, the proposing of research question will firstly depend on what kind of value one could construct from literature reviewing and professional practicing with which the intention of my design endeavor will not be meaningless. Then based on this value and former research on the history of urbanization and reference projects, a general idea of “what to do” will be generated. After that, series of hypotheses would help to answer the “how to do” question. However, the specific design interventions will start from building up a scenario which could clarify project objectives and serve as the pre-condition of design interventions. Moreover, the construction of scenario is an essential transitional process to put one’s propositions and concepts into the tangible or visible urban forms and spatial elements. The actions toward landscape and urban systems will decided by the hypotheses one make and the corresponding scenario built upon these series of hypotheses. This scenario will indicate propositions in environmental, economical and societal dimensions as to relate to the former problem statements. And these propositions should come from the former process of analyzing with the methods of historiographical archival research, scientific, literature and research papers reviewing, mapping and context study.

Phase3: Design Products

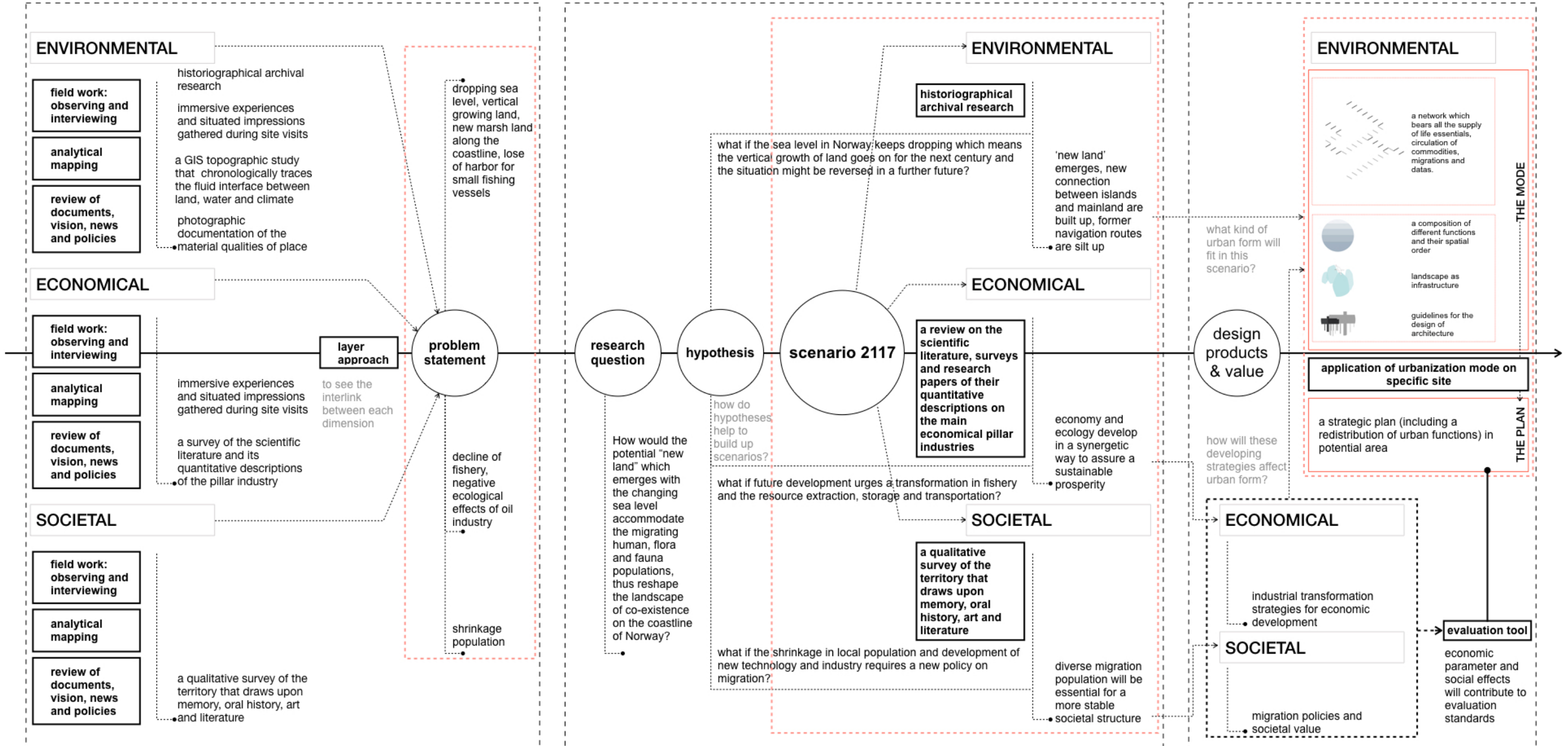
In the former phase, the construction of scenario help to clarify the specific area where the design interventions would happen, thus the physical conditions of potential site will be concrete. It would also be clear that which group of people or animated beings I will design for, what perspectives I will consider for them, and the main direction of industrial transformation. So the first part of the design products will be a spatial strategical plan for the potential area. The plan deploy defined measurements and succinct labels to illustrate territorial dynamics. The most important part and key element of which would be the innovation, redefinition and construction of the infrastructural network. The network itself should possess this characteristic of amphibious which would make the definition of infrastructure more broad. And this could be the most innovative point of my project. So the main methods involved will be a critical reviewing of existing plan and then mapping of my own spatial strategies.

A new urbanization mode will be developed which in my case it would be an amphibious urbanization mode. It would be applied with pattern tools which are categorized in three types including the multi-function patterns, public space patterns and amphibious architecture patterns. These design patterns would be inlaid in the whole network and serve as the basic spatial elements that could transform depending on specific location and contribute to the functioning of amphibious urbanization mode. As for the economic and societal dimensions, a series of strategies will be produced and the strategy making process will also contribute to the construction of evaluation standards. Analytical mapping and typo-morphological urban form study will be applied in the interpretation process of transforming strategies to urban form.

phase 1
researching & analyzing

phase 2
building up scenario

phase 3
design products



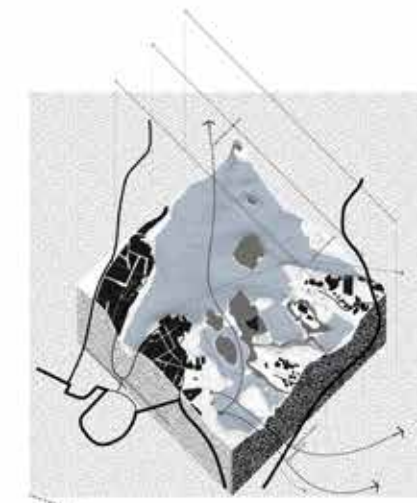
To achieve my concept, I would produce structural plans and design on 3 scales: the Stavanger regional plan, site plan on city center of Stavanger and a sample design where representative 'new land' would bring changes to the existing urbanized area.

In the meantime, a series of amphibious pat-

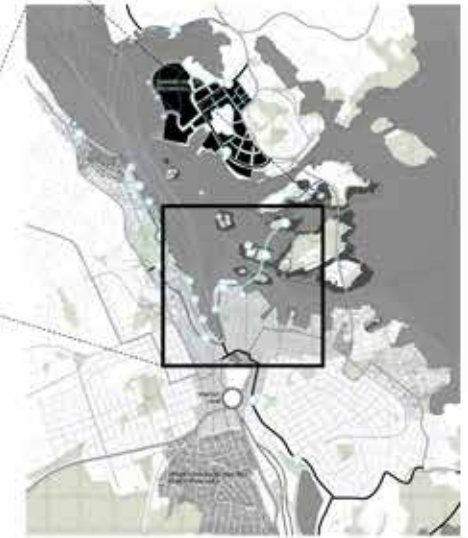
terns and components would be produced and then be applied on locations where physical conditions would allow, in order to show a little bit about how to achieve amphibious and adaptation through details.

METHODOLOGY DESIGN METHODS

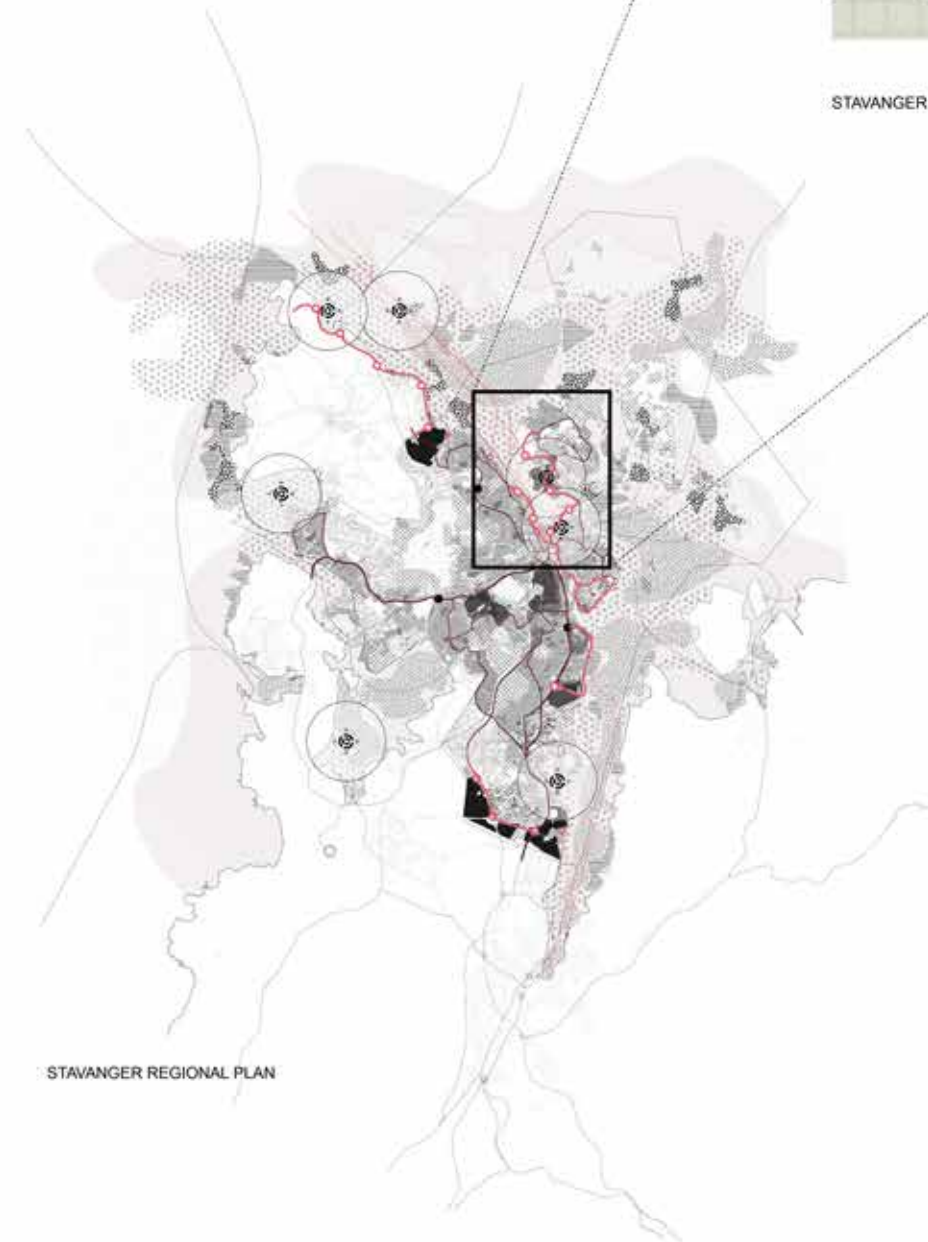
3 SCALES



500 X 500 SAMPLE DESIGN



STAVANGER CENTER SITE PLAN



STAVANGER REGIONAL PLAN

PRE-DESIGN ANALYSES
SYSTEMS(COUNTY)
REGIONAL SCALE



1 1 1



1 1 1



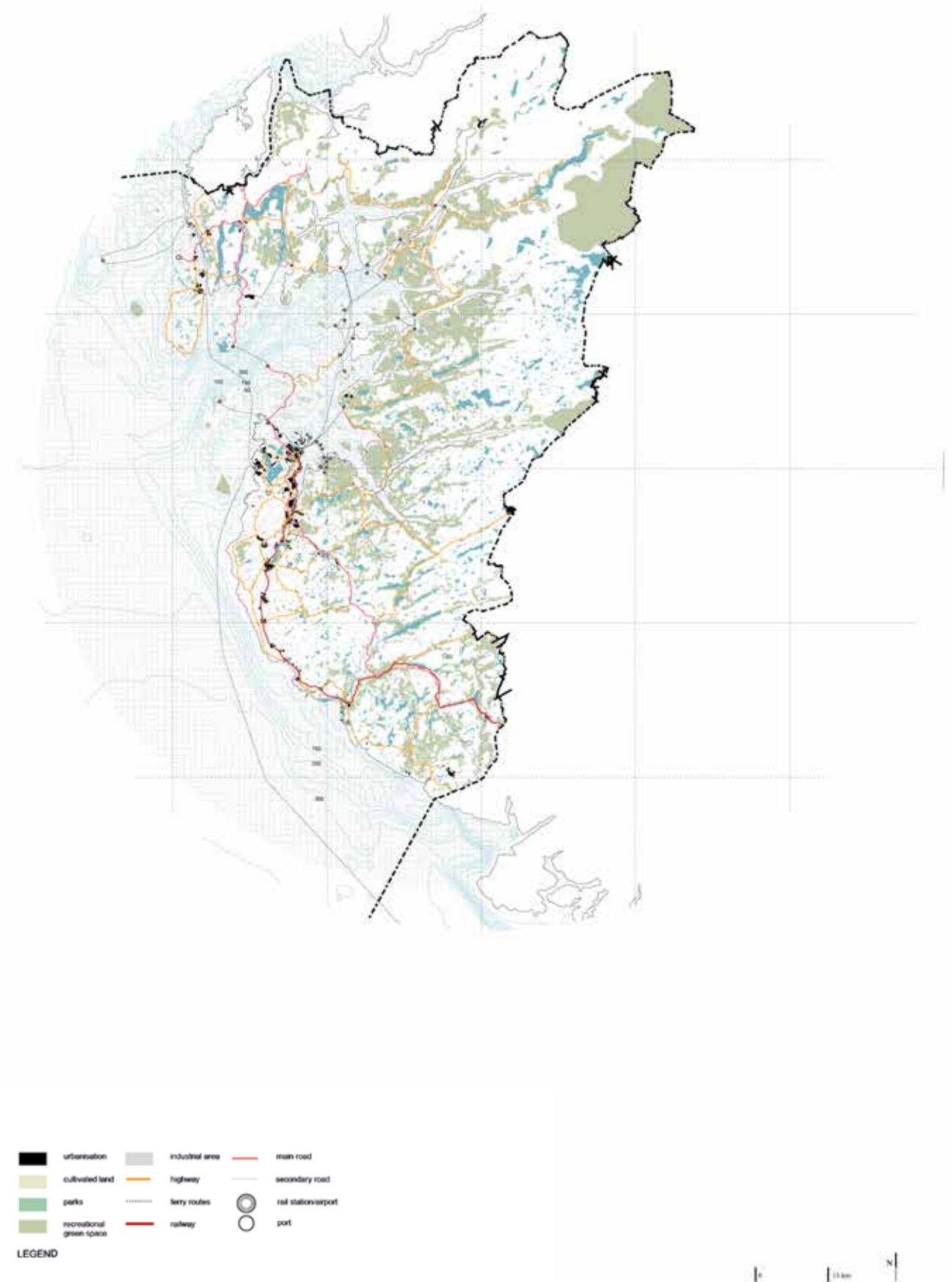
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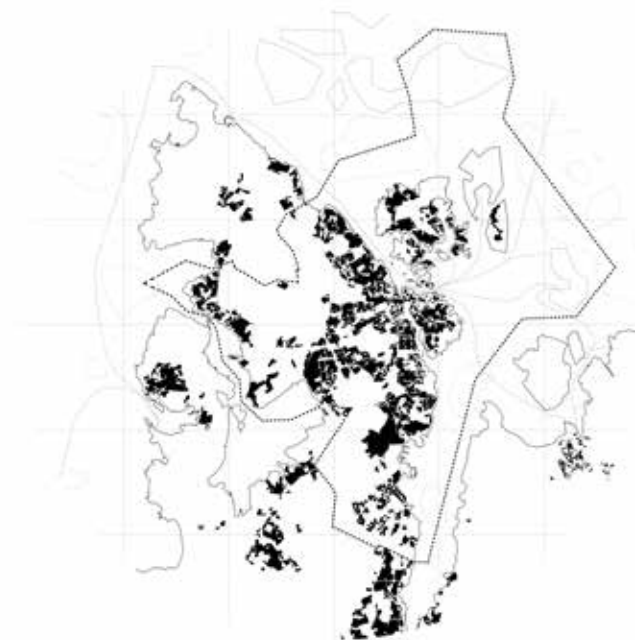
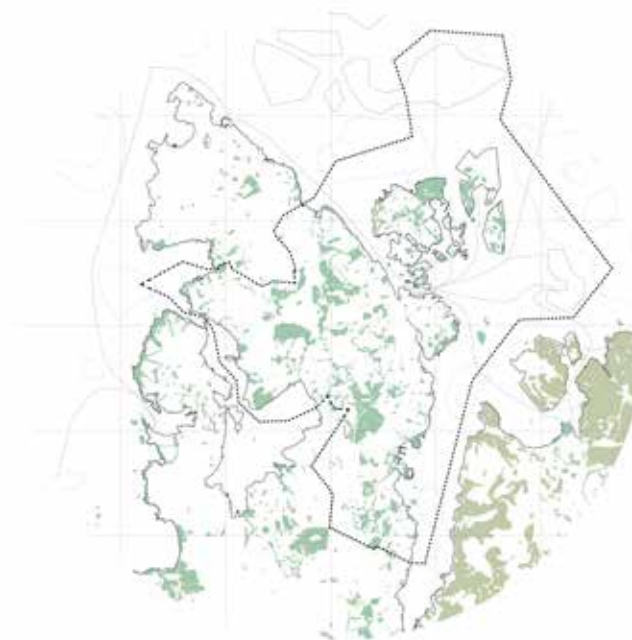
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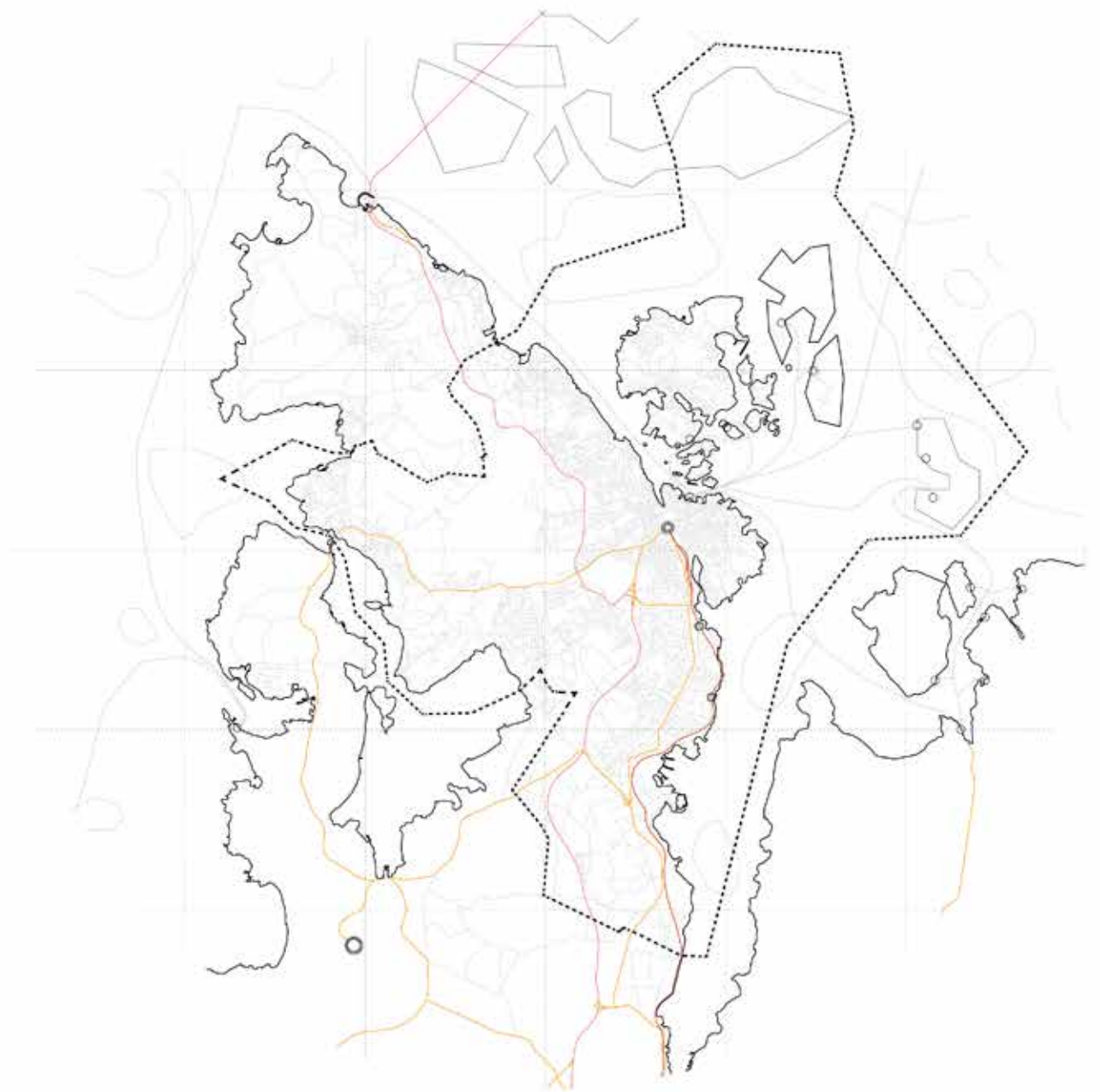
A new urbanization mode will be developed which in my case it would be an amphibious urbanization mode. It would be applied with pattern tools which are categorized in three types including the multi-function patterns, public space patterns and amphibious architecture patterns. These design patterns would be inlaid in the whole network and serve as the basic spatial elements that could transform depending

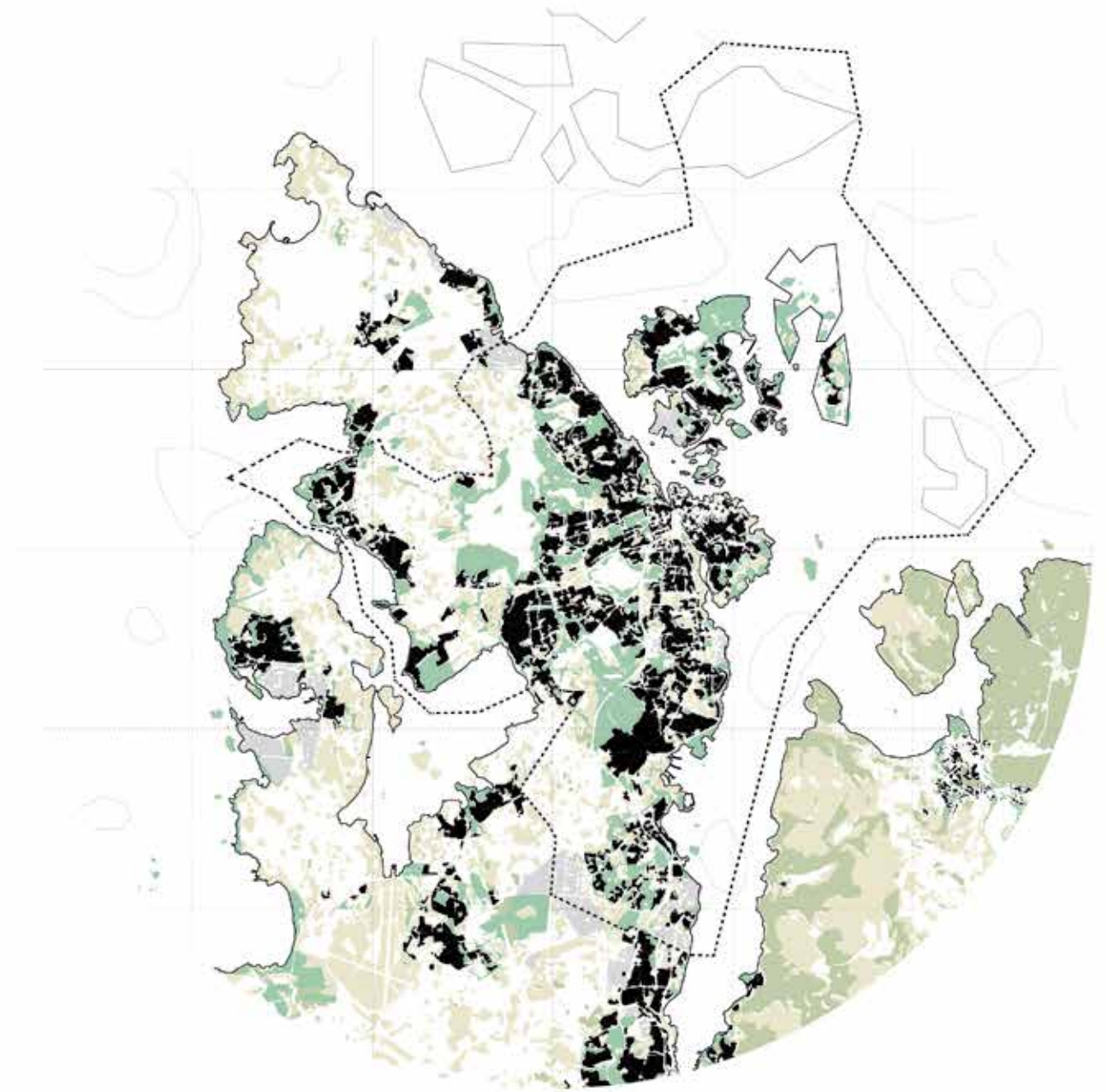
on specific location and contribute to the functioning of amphibious urbanization mode. As for the economic and societal dimensions, a series of strategies will be produced and the strategy making process will also contribute to the construction of evaluation standards. Analytical mapping and typo-morphological urban form study will be applied in the interpretation process of transforming strategies to urban form.



PRE-DESIGN ANALYSES
SYSTEMS(STAVANGER REGION)
REGIONAL SCALE







PRE-DESIGN ANALYSES

MARITIME SOIL TYPE(STAVANGER REGION)

REGIONAL SCALE





STAVANGER MOT 2029
PLANPROGRAM FOR
KOMMUNEPLAN 2014-2029

KOMMUNEPLAN FOR
STAVANGER 2014-2029

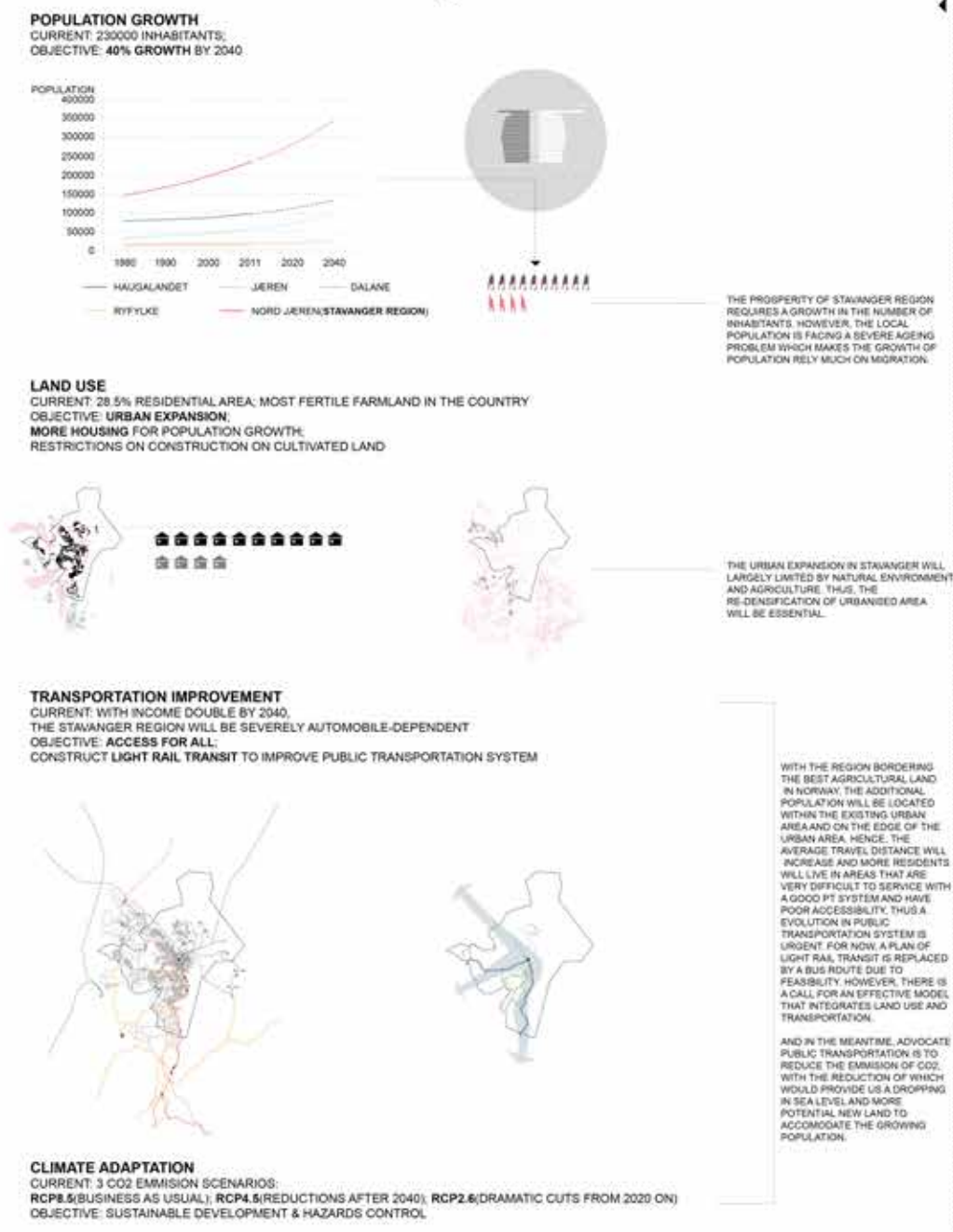
KOMMUNEPLAN FOR
STAVANGER 2014-2029
RISK ANALYSE

INTEGRATING SEA LEVEL
RISE AND STORM SURGES
IN LOCAL PLANNING

PRE-DESIGN ANALYSES

REGIONAL SCALE(STAVANGER REGION)

EXISTING PLAN REVIEWING



PRE-DESIGN ANALYSES

REGIONAL SCALE(STAVANGER REGION)

EXISTING PLAN REVIEWING

POPULATION GROWTH, EXPANSION & DENSIFICATION

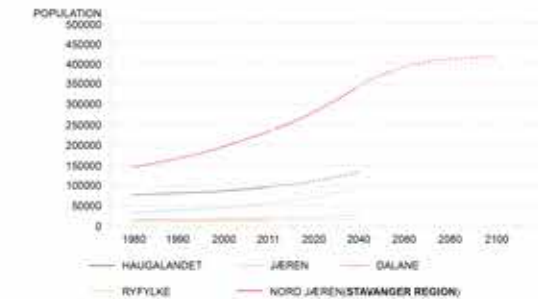
With 230 000 inhabitants, the Stavanger region is the third largest urban area in Norway. It is the fastest growing region in Norway, and the population is expected to increase by more than 40% by 2040 (more than 100 000 new

inhabitants). However, with a shrinking in local population, the growth will largely depend on migration.

RESIDENTIAL AREA 2017

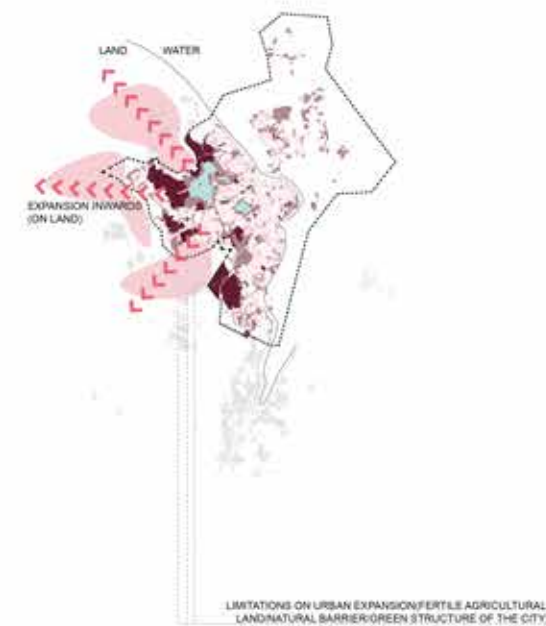


OBJECTIVE: 50% POPULATION GROWTH BY 2097

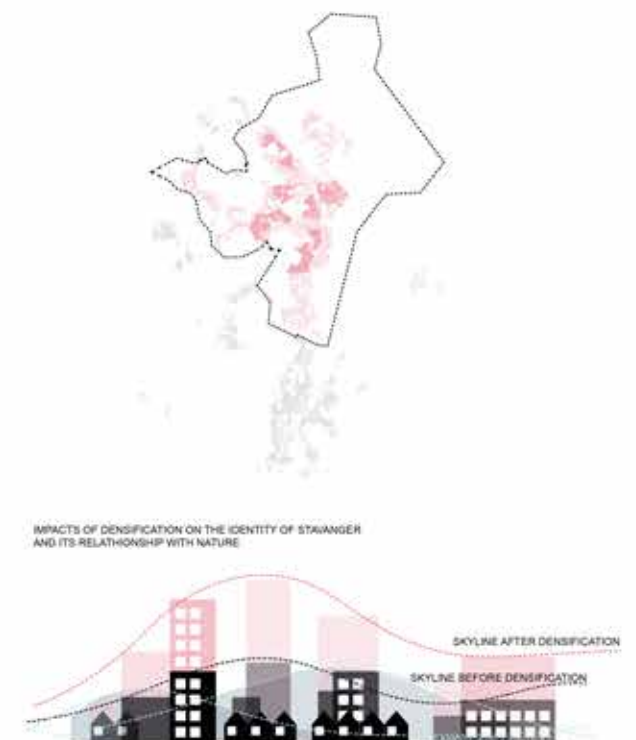


ALTERNATIVES

URBAN EXPANSION



DENSIFICATION ON CERTAIN AREA



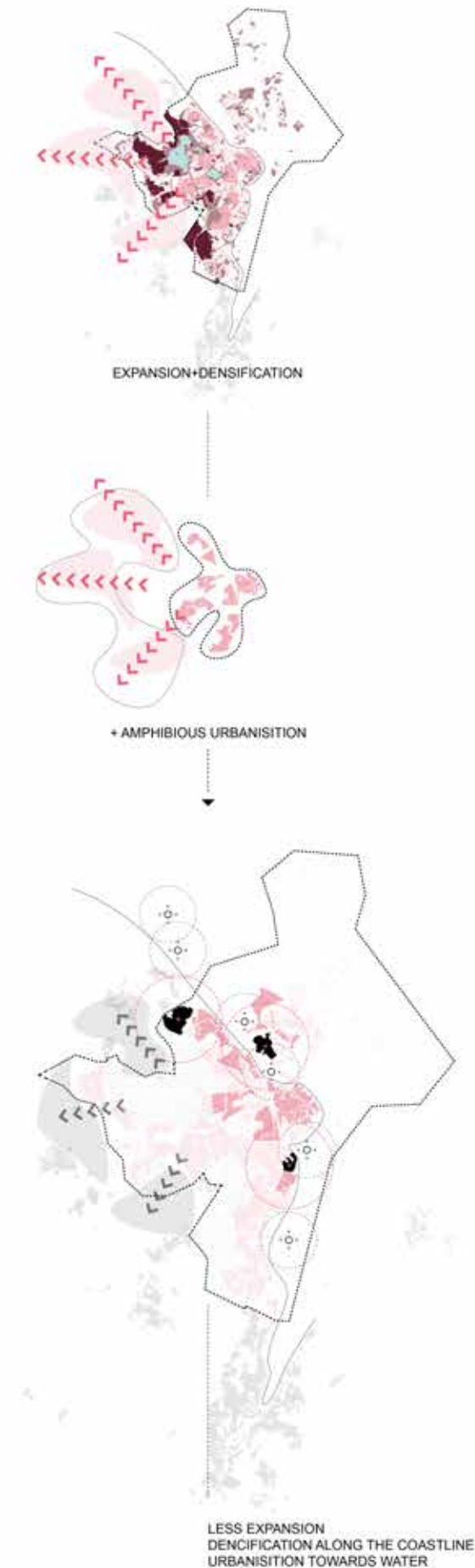
PRE-DESIGN ANALYSES
REGIONAL SCALE(STAVANGER REGION)
EXISTING PLAN REVIEWING

COMPARISON WITH AMPHIBIOUS URBANISATION INVOLVED

Imagine that the population growth objective will be achieved by 2040, the densified urban area of Stavanger will be totally different from what it looks like now. The identity of this city will be redefined.

But for me, the most harmonious scene of built environment blending with natural environment

would represent the city much better. thus I hope an amphibious urbanization on new land would help release the pressure on deification or expansion inland keep the fertile agricultural land and green structure of the city from invaded.



PRE-DESIGN ANALYSES

REGIONAL SCALE(STAVANGER REGION)

EXISTING PLAN REVIEWING

INFRASTRUCTURE FOR MOBILITY

The region has also the most fertile agricultural land in the country, which poses a major challenge for urban expansion.

The Stavanger region is heavily car dependent and with income expected to double by 2040, car ownership will continue to increase and so will car use (see concluding section for details).

To meet these major challenges, the Stavanger region is pursuing a light rail transit (LRT) system. However, the proposal was stopped right now and replaced by a Busway alternative. This complex context is the arena for our investigation of accessibility tools in planning practice.

NUMBER OF TRAVELLERS DISTRIBUTED BY DIFFERENT TRANSPORTATION METHODS



MAIN PURPOSE OF TRAVELLING



PRE-DESIGN ANALYSES

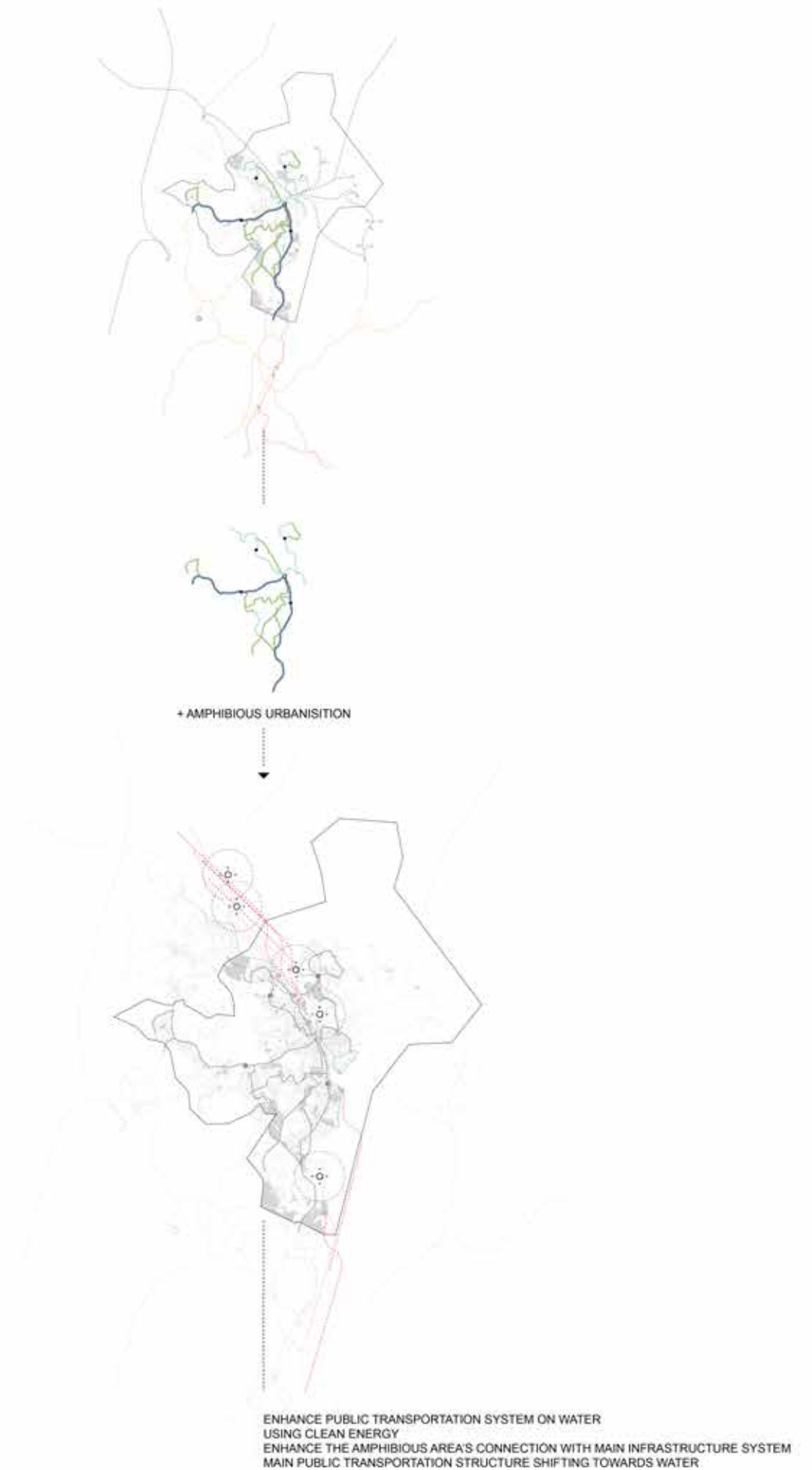
REGIONAL SCALE(STAVANGER REGION)

EXISTING PLAN REVIEWING

COMPARISON WITH AMPHIBIOUS URBANISATION INVOLVED

Of course the 'new land' could not be an isolated island, the accessibility to these spaces, depending on different functions and ownership should be easily achieved through public or

private transportation systems. As it will be an urbanization process towards water, the public transportation network would be shifting towards water as well.

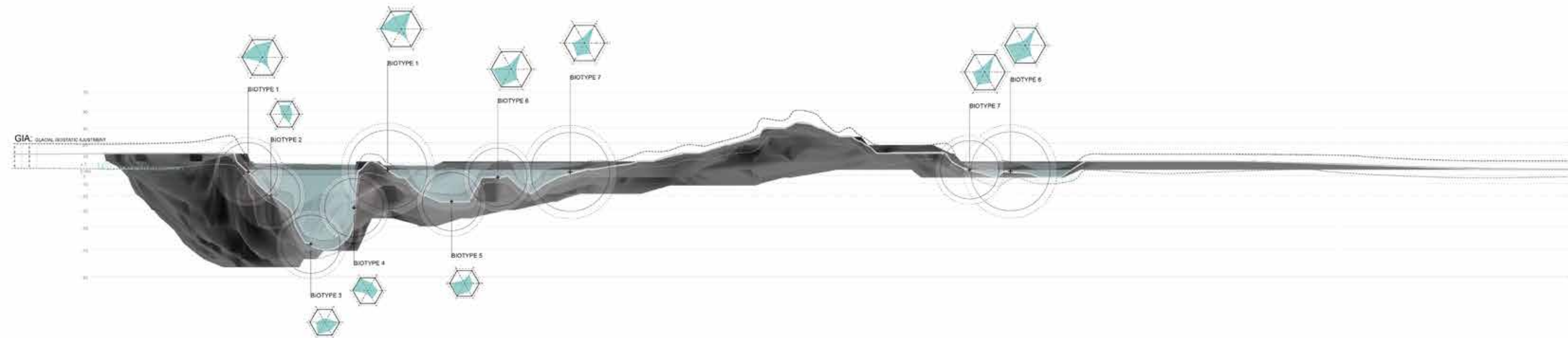


BIOTYPES

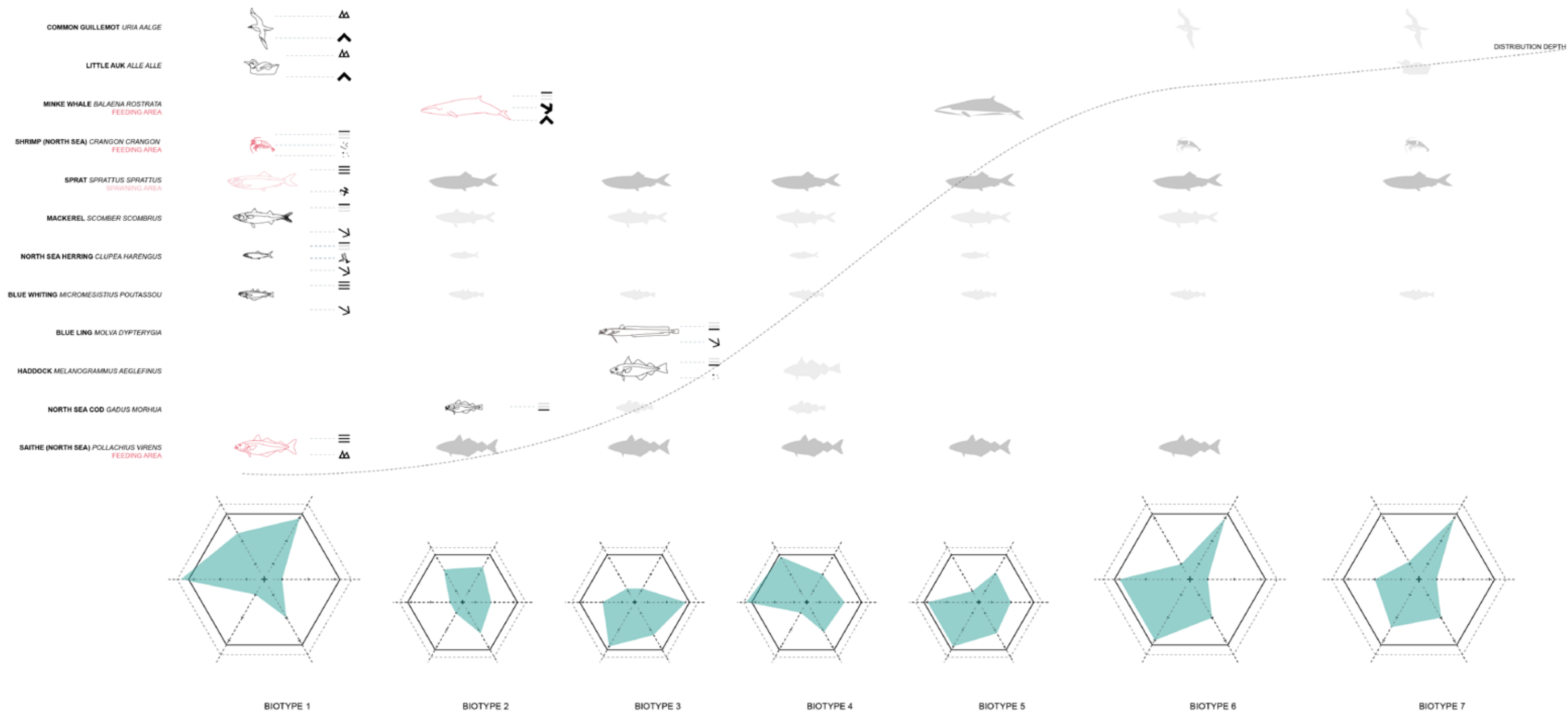
PHYSICAL CONDITIONS WITH FAUNA TYPE

Physical conditions on site with local fauna species to define different biotypes, which will help me make decisions on what kind of interventions I want to implement on specific site. In biotype 1, existence of commercial species such as saithe and shrimp in this type of environment indicate a potential to develop fishery

in this area in the mean time with the spawning area of sprat in this region means the waters should be protected from pollution. the habitat of common guillemot and little auk calls for the preservation of natural environment such as rocky and reef coasts.



↘ DECREASING DUE TO SHIPPING/OIL/GAS ACTIVITIES ↘ DECREASING DUE TO FISHERY ACTIVITIES ⬆ DISTRIBUTION SHIFTED NORTHWARDS ≡ BENTHIC ≡ SHALLOW WATER ≡ ANYWHERE IN WATER COLUMN ⚠ PREFER ROCKY/REEF AS HABITAT 🐟 PREFER GRAVEL/WEEDS BOTTOM ⚡ PREFER SANDY BOTTOM 🌊 PREFER BRACKISH WATER 🌊 PREFER SALTY WATER



REGIONAL PLAN STRATEGIES

INTERVENTIONS WITH AMPHIBIOUS URBANISATION

Strategy1:

Based on physical conditions and land use status in Stavanger region, and the biotypes on potential “new land” as concluded before, choose certain areas to urbanize and make specific developing strategies on each site.

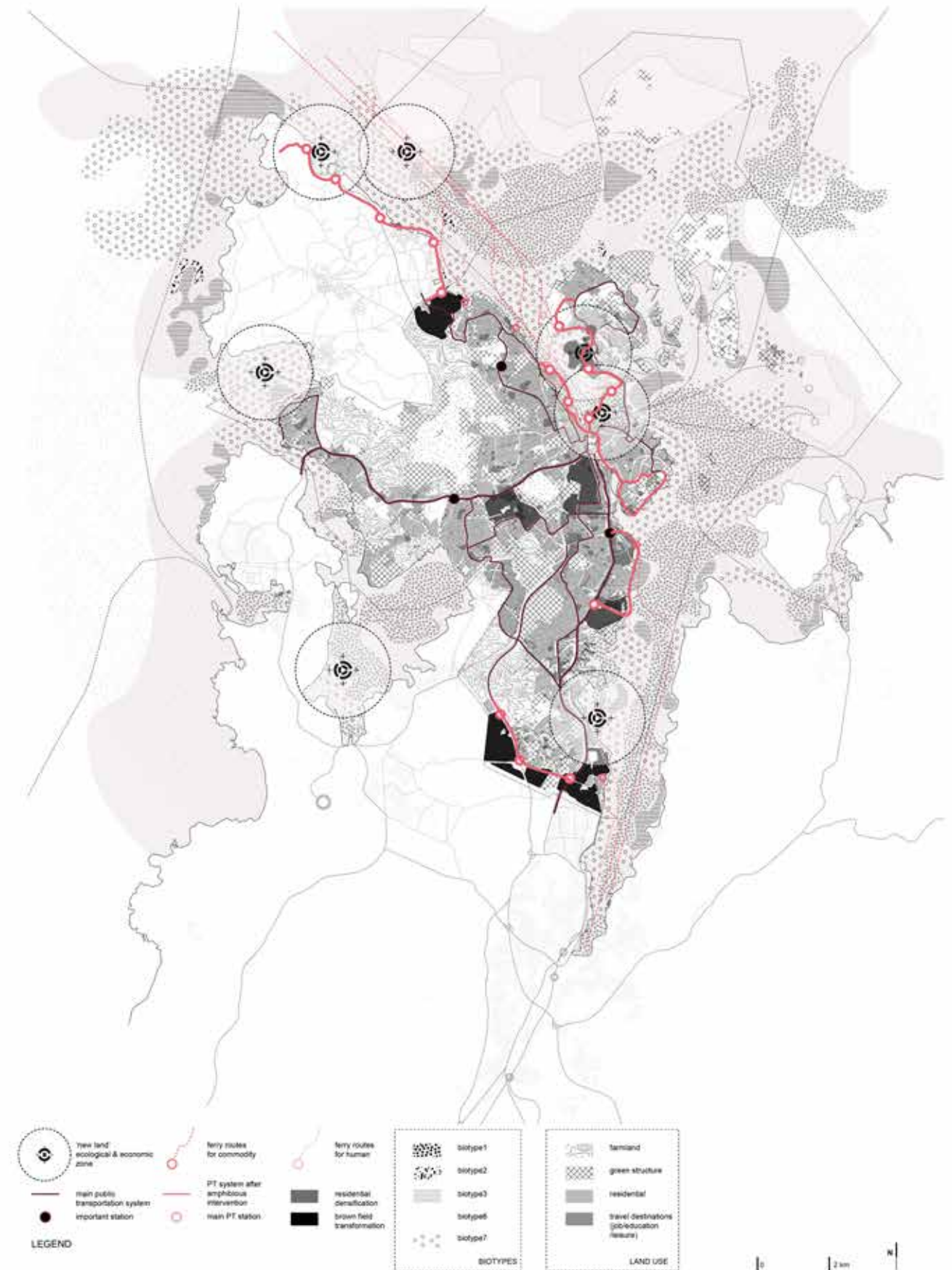
Strategy 2:

Prepare surrounding areas for the urbanization on new land, including changing of functions,

densification on coastal areas and construction of entrances in the infrastructure system to be connected to the urbanized “new land”.

Strategy 3:

Build infrastructures which could be adaptable to the changing sea level and interweave into the existing transportation system to achieve accessibility to the new urbanization areas.



REGIONAL PLAN

SPATIAL QUALITY

INTERVENTIONS WITH AMPHIBIOUS URBANISATION



CASE STUDY

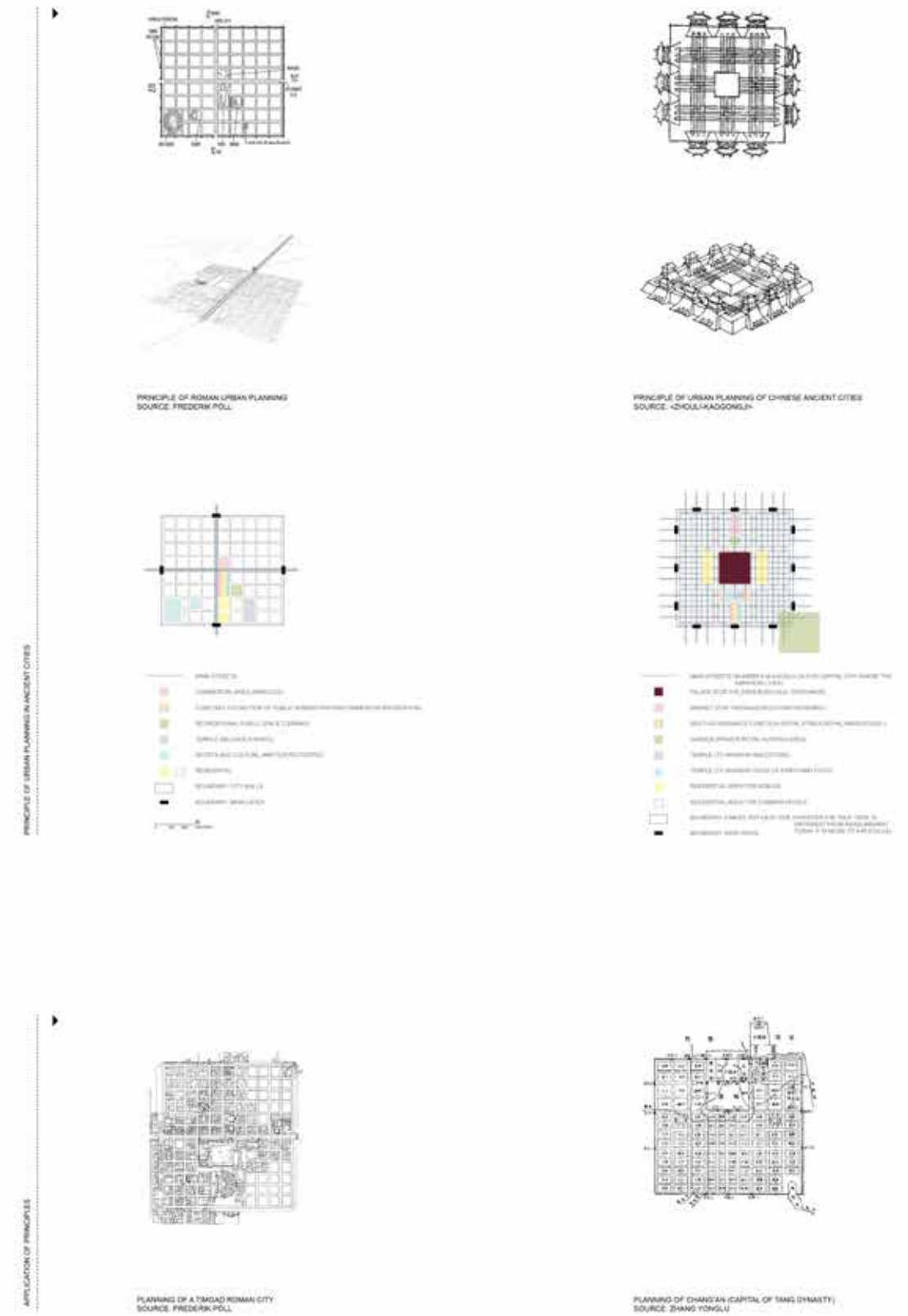
URBANISATION

CITY SCALE

COMPARISON BETWEEN WEST & EAST

Because on this scale I will focus more on urban blocks, I'll first start with the urbanization study of ancient urbanization modes and extract the most important elements in these urbanization process. infrastructure and urban functions

placed in different sizes of urban blocks. The principles in layout represent different philosophy of sovereign, social classes and distribution of interests.

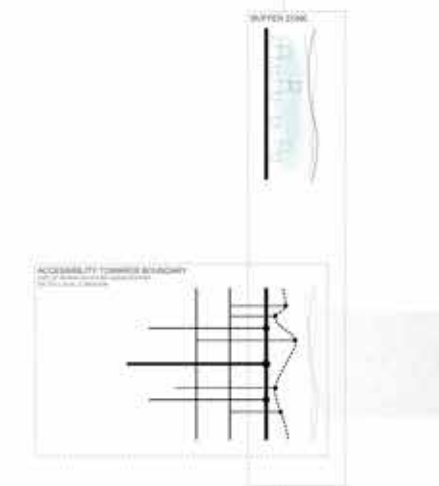
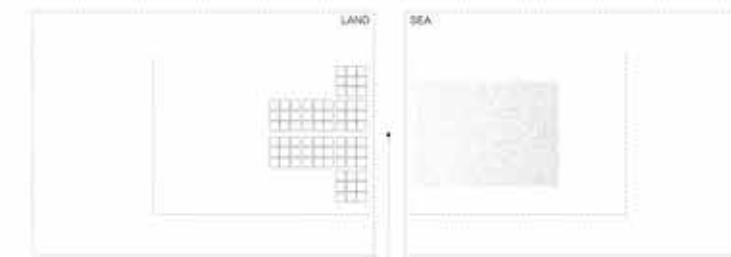
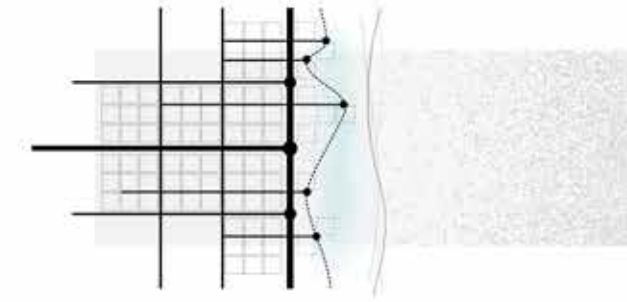


CASE STUDY URBANISATION CITY SCALE

URBANIZATION TOWARDS WATER

How does urbanization happen towards water?
There is always a main road to assure the accessibility to the waterfront, and a buffer zone between main road and water. The density on the buffer zone is usually very low and functions are mostly recreational, commercial or municipal. The transportation in buffer zone are al-

ways supported by secondary road.
After the emerging of new land the buffer zone will be shifting towards water as for the uniqueness of fjord area, new land may probably not directly connected to the mainland which requires a connection above water.



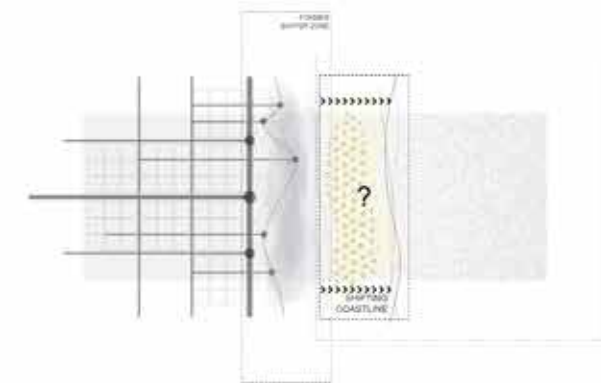
CASE STUDY
URBANISATION
CITY SCALE

URBANIZATION TOWARDS WATER IN FJORD AREA

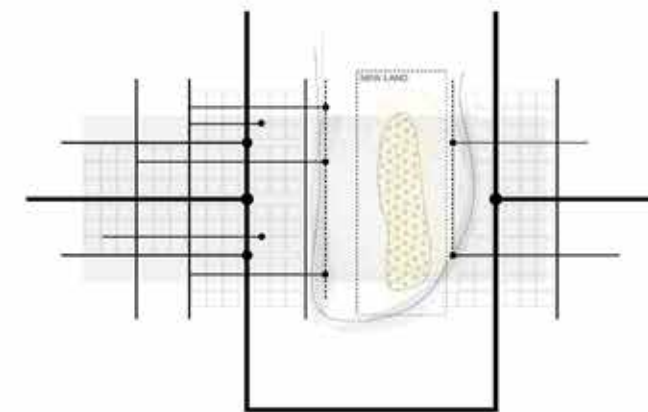
In fjord areas, as the “new land” will be surrounded by the mainland on 2 or 3 sides, the relationship between “new land” and mainland

will be different. And the methods to achieve connection and the influences “new land” reflects on mainland will also be different.

HOW WILL POTENTIAL NEW LAND CHANGE THE URBANIZATION MODEL?



THE URBANNESS OF A FJORD NEW LAND SCAPE



CASE STUDY
URBANISATION
CITY SCALE

URBANIZATION STRATEGIES ON 'NEW LAND' IN FJORD AREA

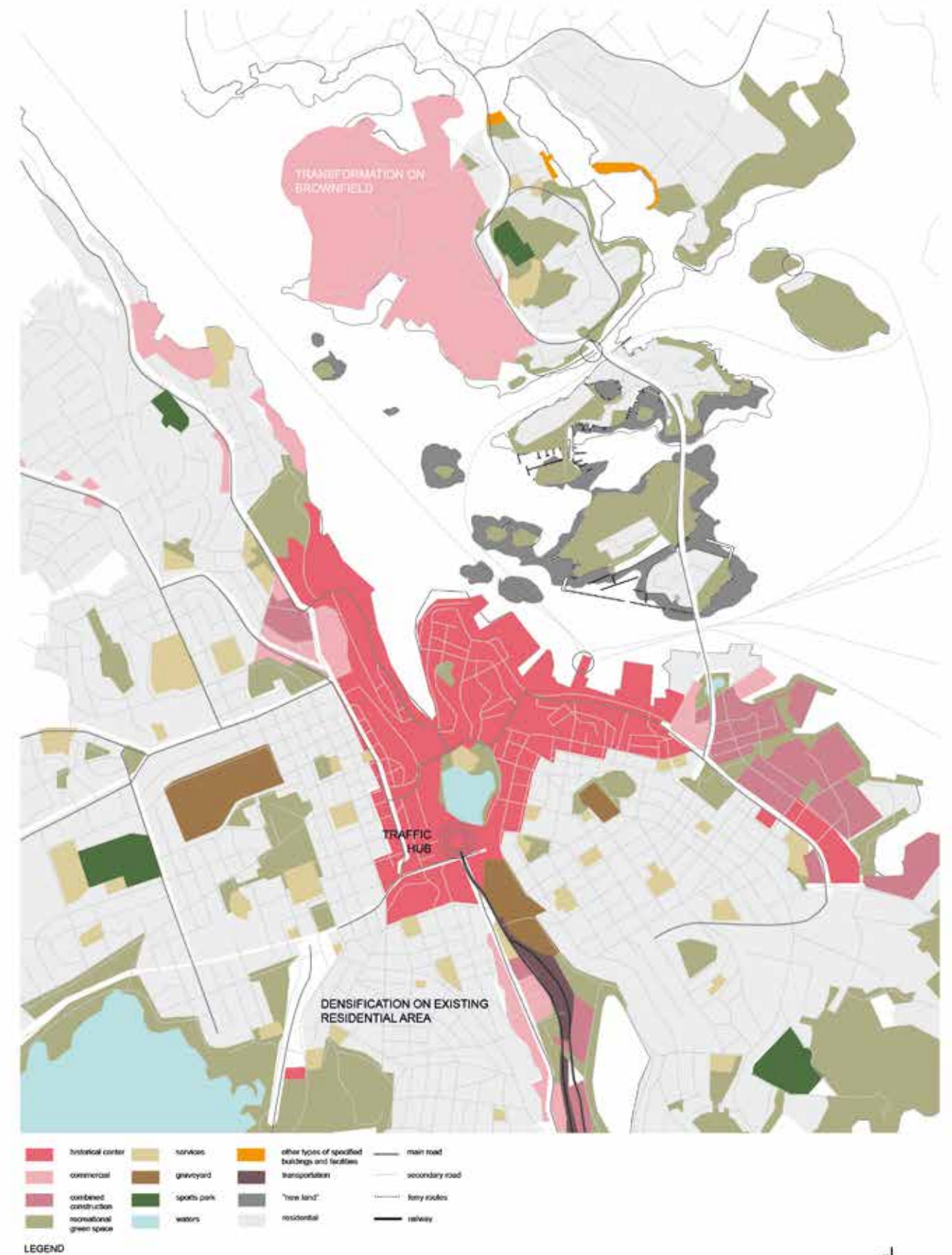
So the main aim on this scale will be achieve connection from “new land” to mainland.



PHYSICAL CONDITIONS

CITY SCALE

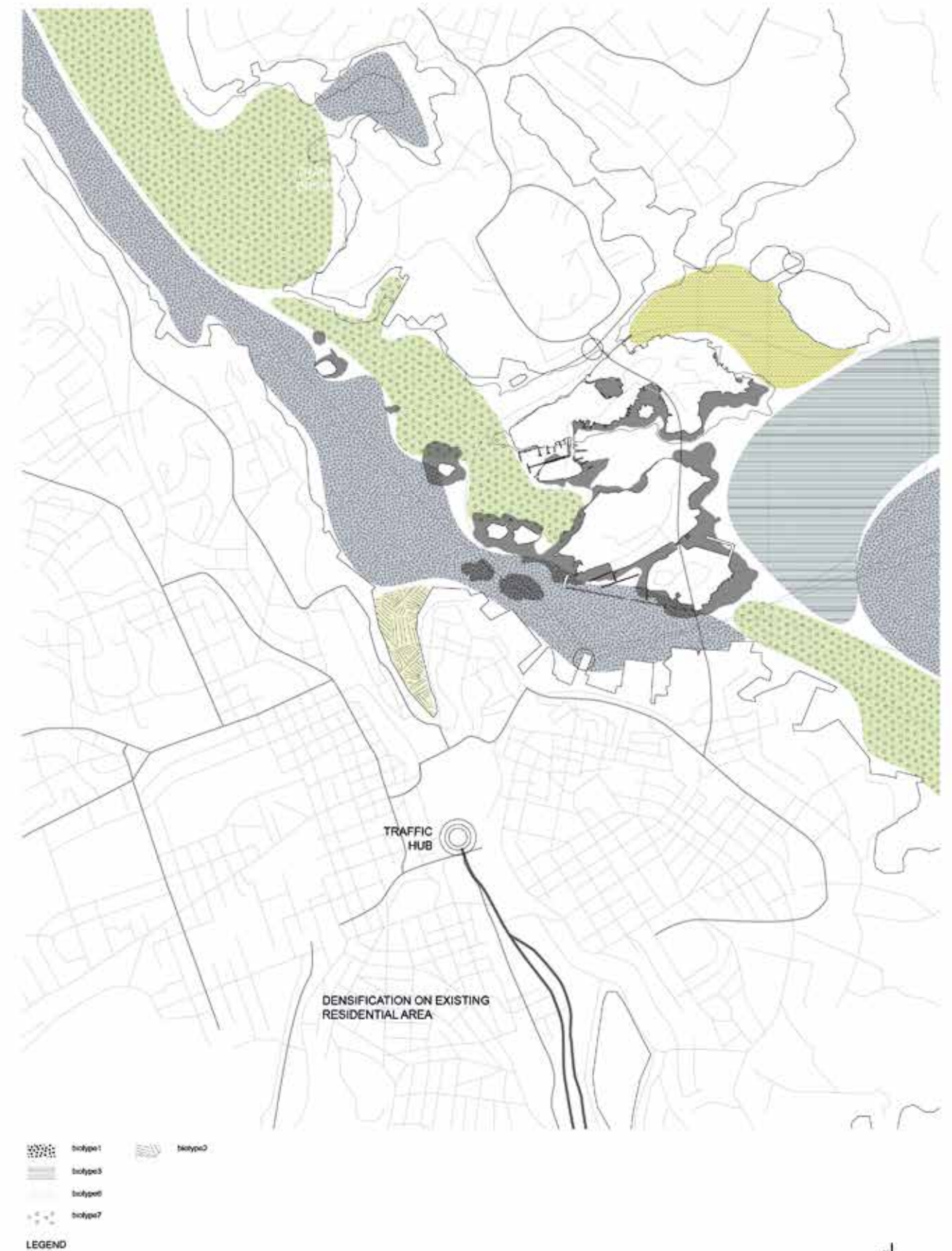
LAND USE & INFRASTRUCTURE ON MAINLAND



PHYSICAL CONDITIONS

CITY SCALE

'NEW LAND' & BIOTYPES



STRATEGIES

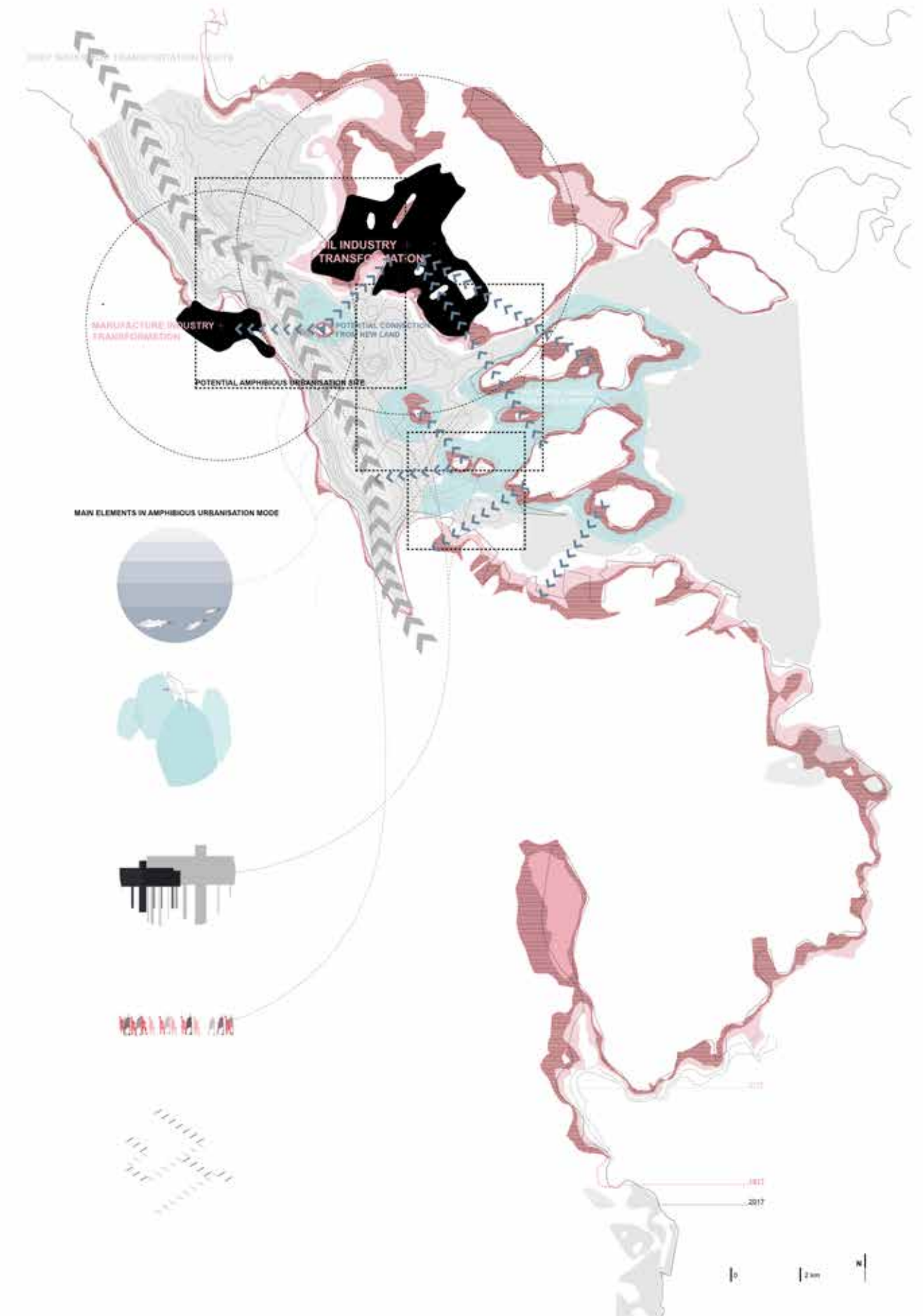
CITY SCALE

According to the dropping rate of sea level in 100 years, the sea level projection in the Fifth Assessment Report (AR5) of the Intergovernmental Panel for Climate Change (IPCC) and the maritime landform in the surrounding waters it's not difficult to locate the areas of "new land" near the historical area of Stavanger city center. Based on the physical conditions, biotypes, existing infrastructure systems and urban functions in this area, a series of more specific strategies could be made to assure that urbanization on "new land" would help to boost local economy, enhance societal coherence and contribute to the holistic development in the whole area.

First, the biotypes as concluded before suggest that this area is suitable for the spawning and feeding of commercial fish Sprat and shrimp. The natural condition allows to develop fishery in this waters.

Second, the developing of fishing industry on "new land" would certainly influence the surrounding areas on the mainland. Abandoned oil factory and vacant brown field could be transformed into multi-functional industrial and new residential area.

Third, new infrastructural system should be added into the existing network to ensure connectivity.



CITY PLAN CITY SCALE

The radial effects of new urban functions on “new land” have reshaped the infrastructure network on the surrounding coastal areas. New public transportation system, bicycle lanes and ferry routes have been interweaved into the existing network. And a convenient connection between “new land” and traffic hub in the old city center should be assured.

With new economy boosting economy and

providing more jobs for out-comers, more residential spaces are required. Multi-functioning of old industrial and commercial areas, deification on existing residential area and occupation on “new land” should be combined to meet the demands.

The urban and outskirts green spaces should be connected to form a green structure to accommodate other fauna species.



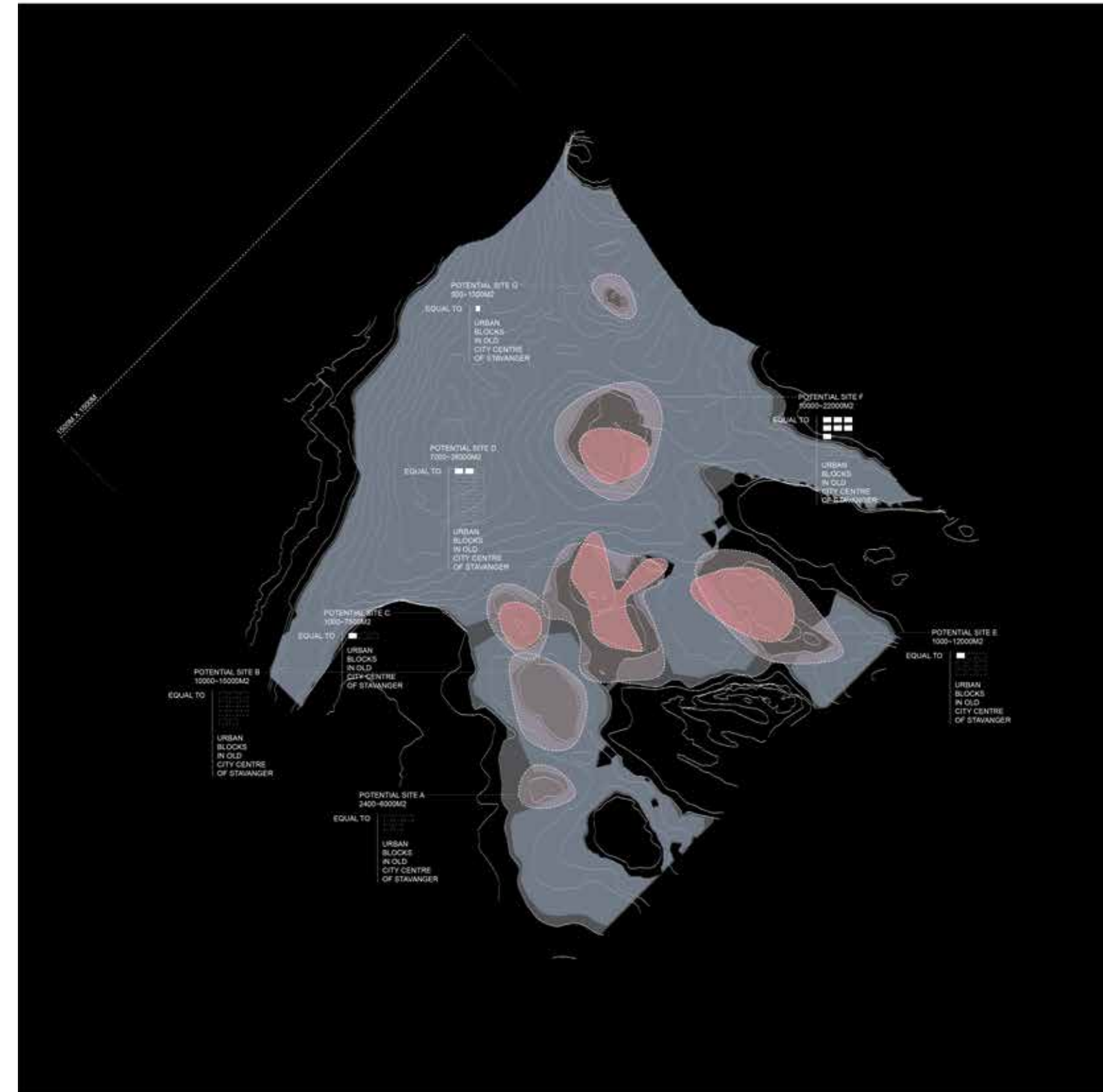
CITY PLAN

SPATIAL QUALITY



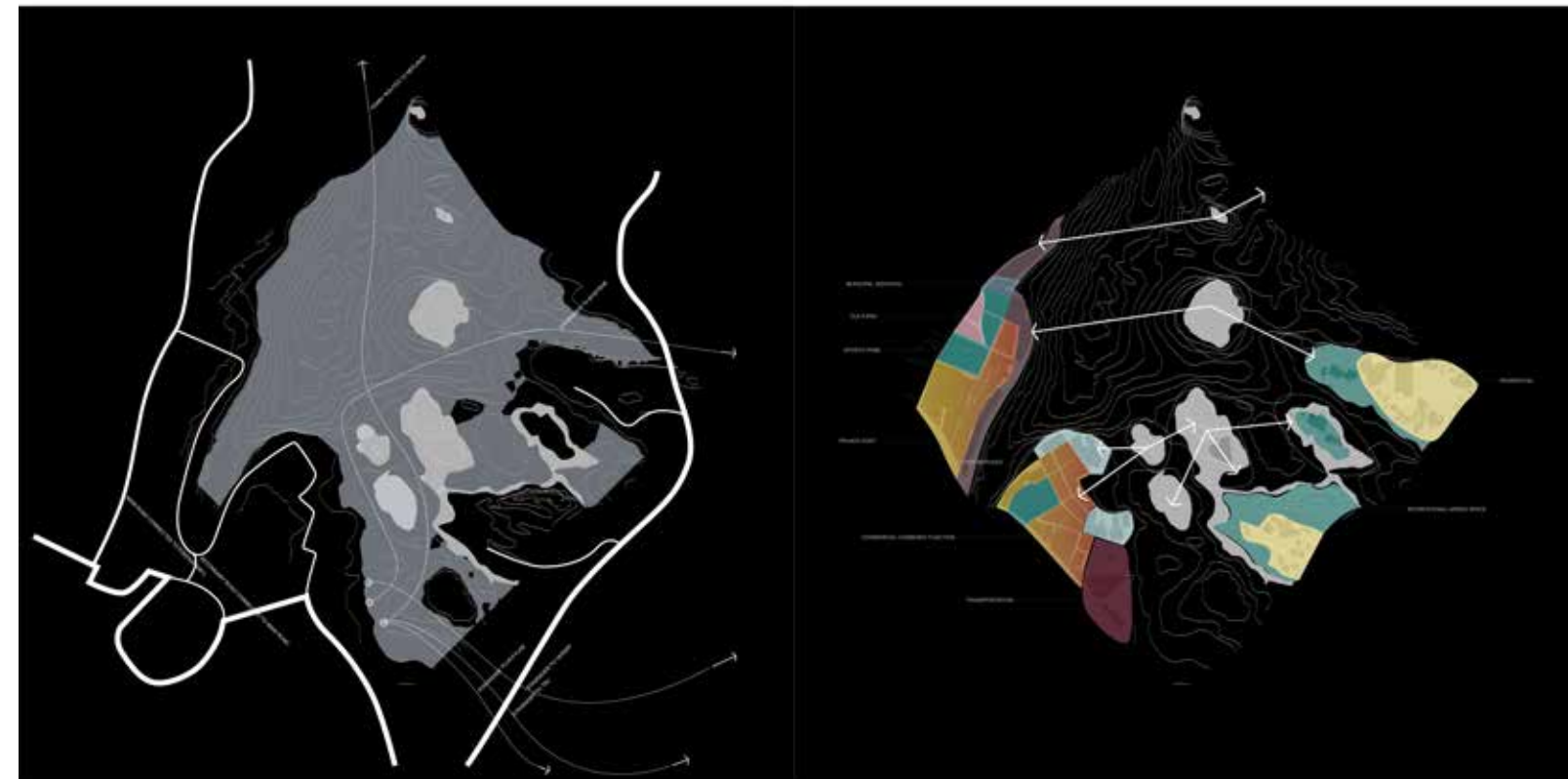
PHYSICAL CONDITION ON SITE

SAMPLE SCALE



To make more a specific design on site and see how amphibious urbanization adapt to sea level and affect surrounding urban functions on mainland, I chose a sample site of 1500m*1500m to do the design. The amphibious urbanisation

patterns and components would be applied on specific site. Then the flexibility or spatial variability of these modes could be tested through the resilience of each specific site.

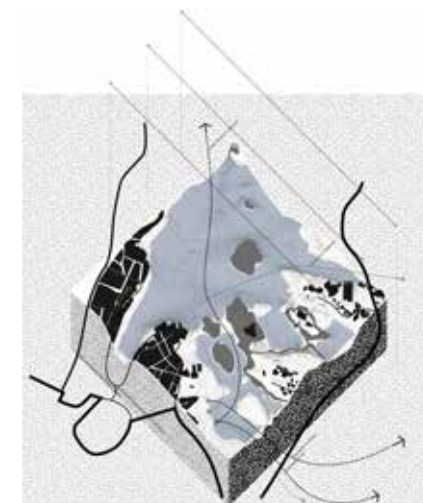
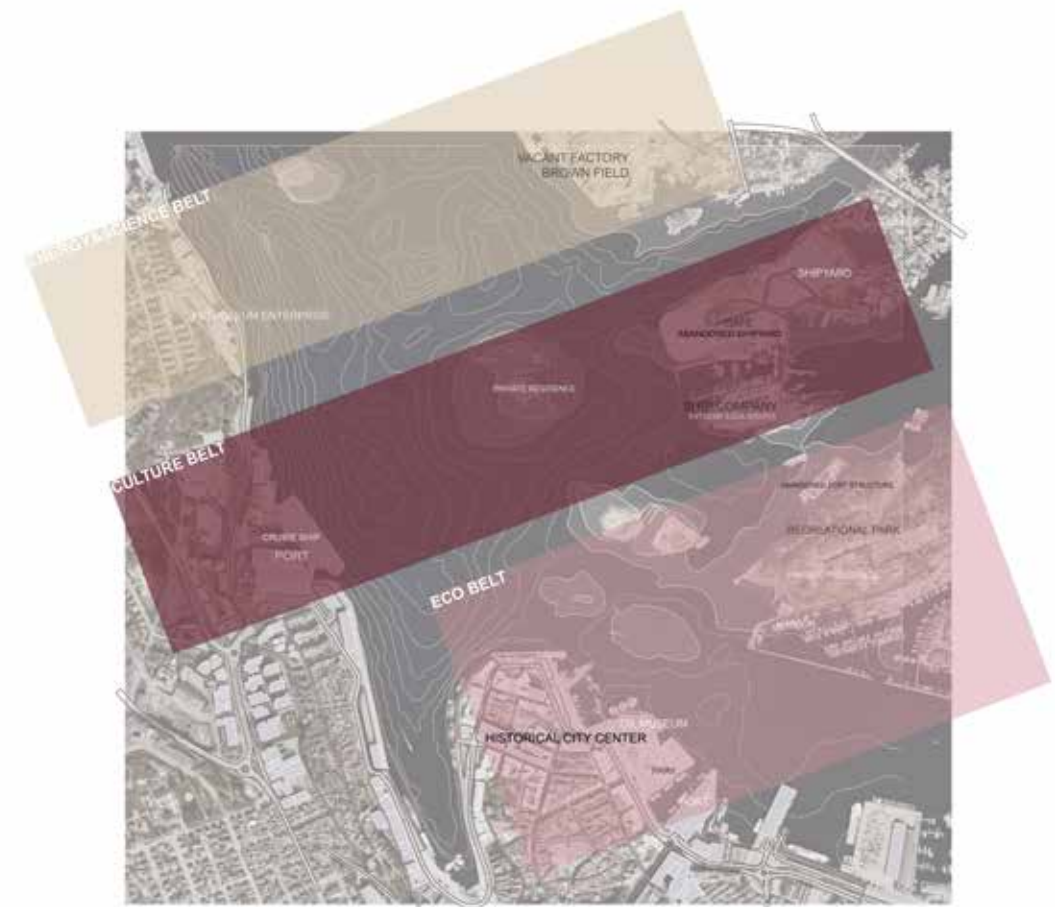


INTERVENING STRATEGIES

SAMPLE SCALE

According to the specific urban functions and structures on the surrounding areas of where “new land” emerges, I designed 3 belts with 3 different themes on intervening site in which se-

quence from north to south are energy&science belt, culture belt and eco belt. The details will be elaborate as follows:



SITE PLAN

SAMPLE SCALE

Belt1

Existing structures on site: recreational park, harbor, historical city center, culture heritage;
Transformation strategies: fishing community on “new land”, waterfront squares on mainland, amphibious infrastructures, multi-functioning of business buildings in historical center, floating market in new harbor;

Belt2

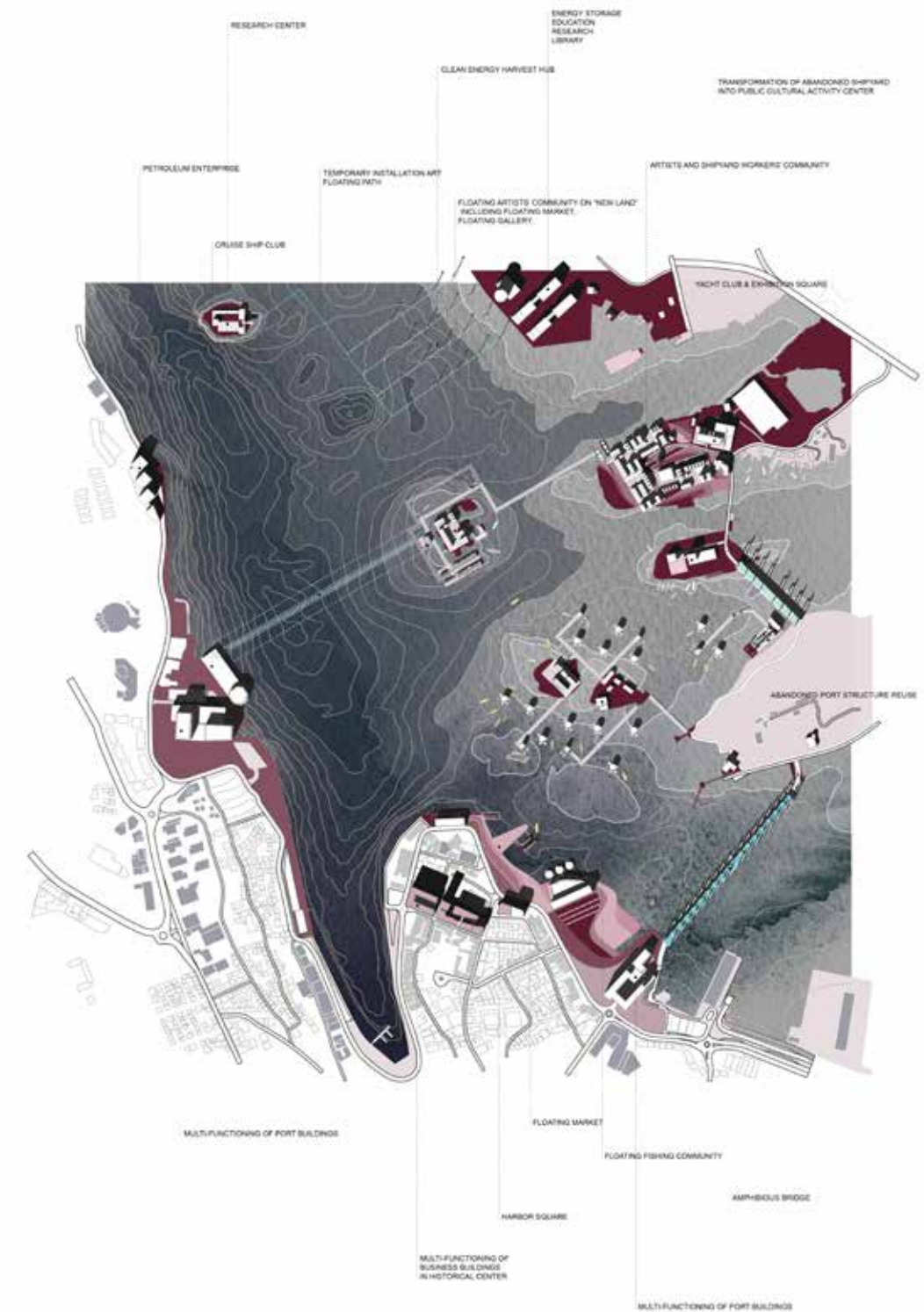
Existing structures on site: private harbor, abandoned shipyard, functioning shipyard, vacant land, museums, ship company, small retails and cafes with poor appearance;
Transformation strategies: floating artists’ community on “new land” including floating market, floating gallery, temporary installation art, artists

and shipyard workers’ community on mainland, amphibious infrastructure, transformation of abandoned shipyard into public cultural activity center, commercial functions;

Belt3

Existing structures on site: Petroleum company, oil factory almost abandoned, large vacant brown field;

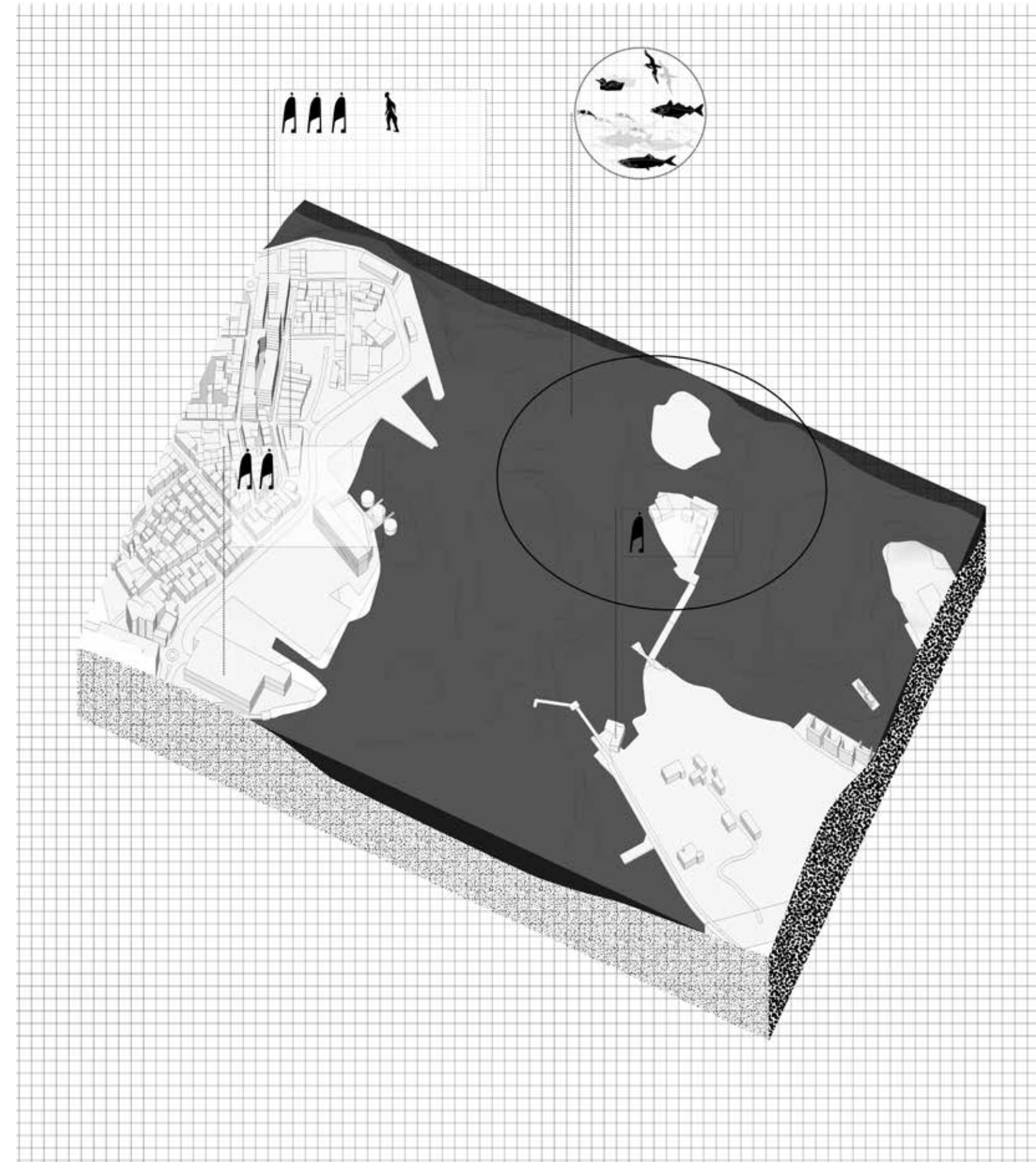
Transformation strategies: multi-functioning of business building, redevelopment of brown field, transformation of traditional energy processing combining with research and clean energy production, seabirds research center on “new land”, clean energy storage hub on “new land”.

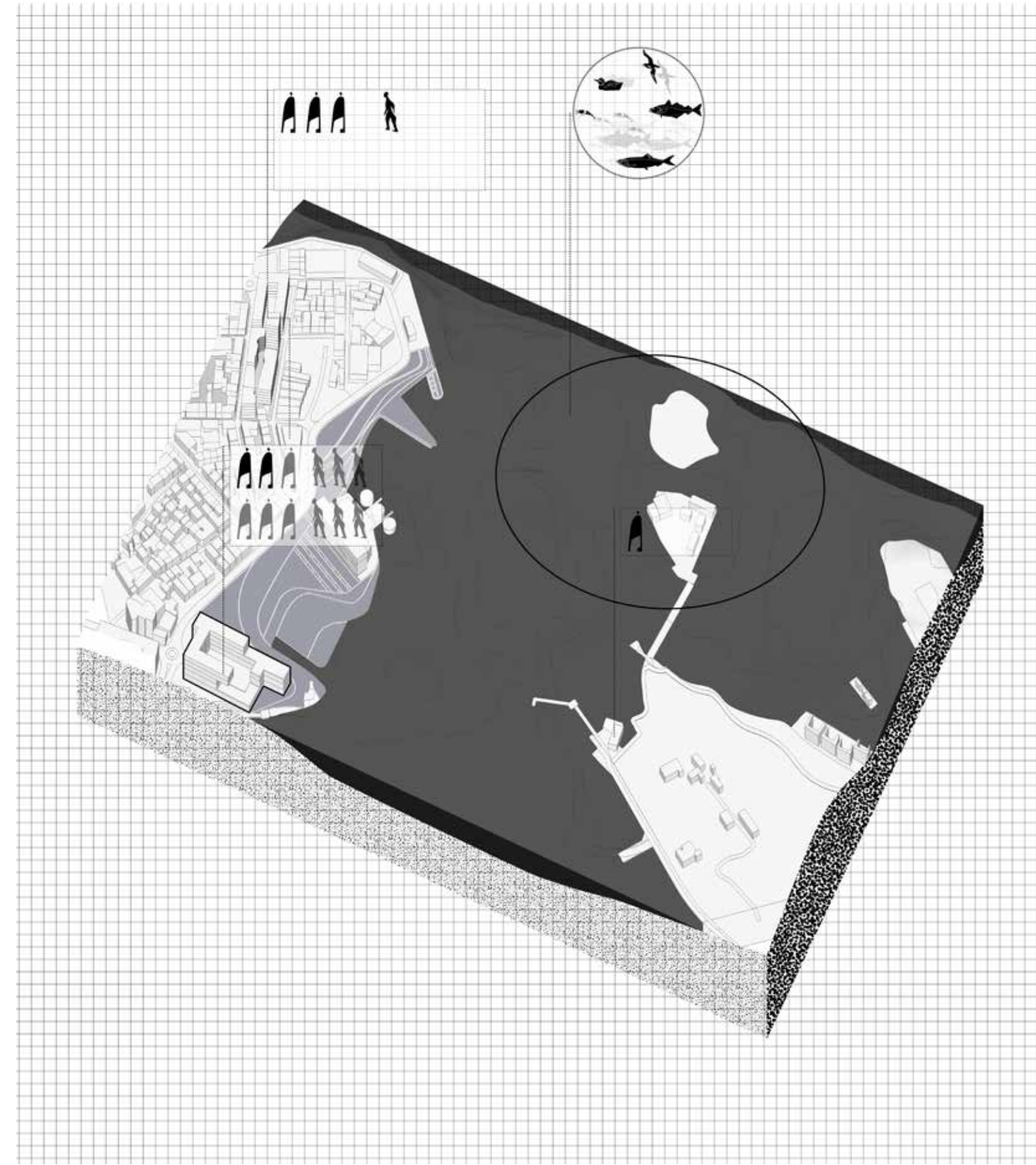


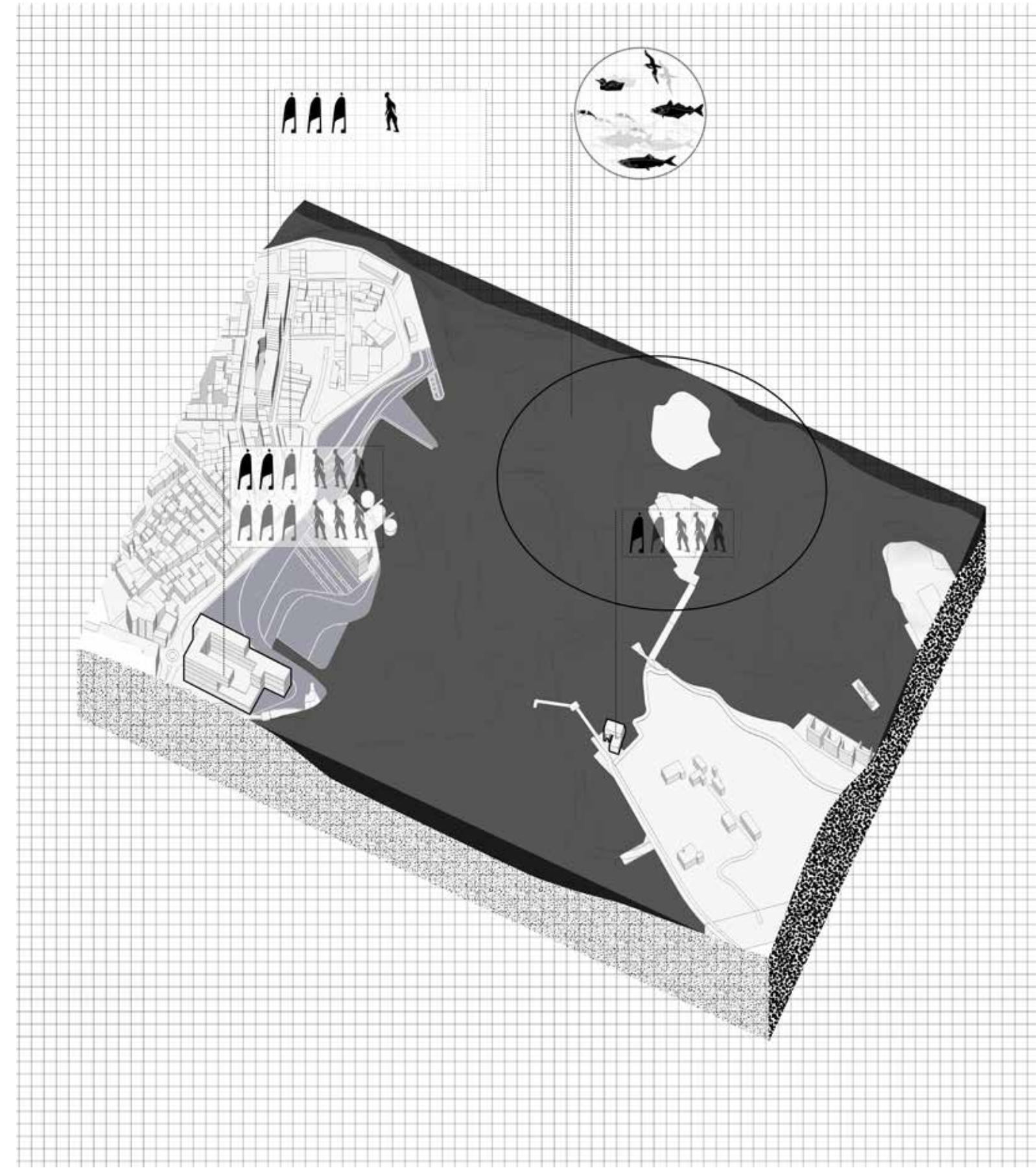
ECO BELT

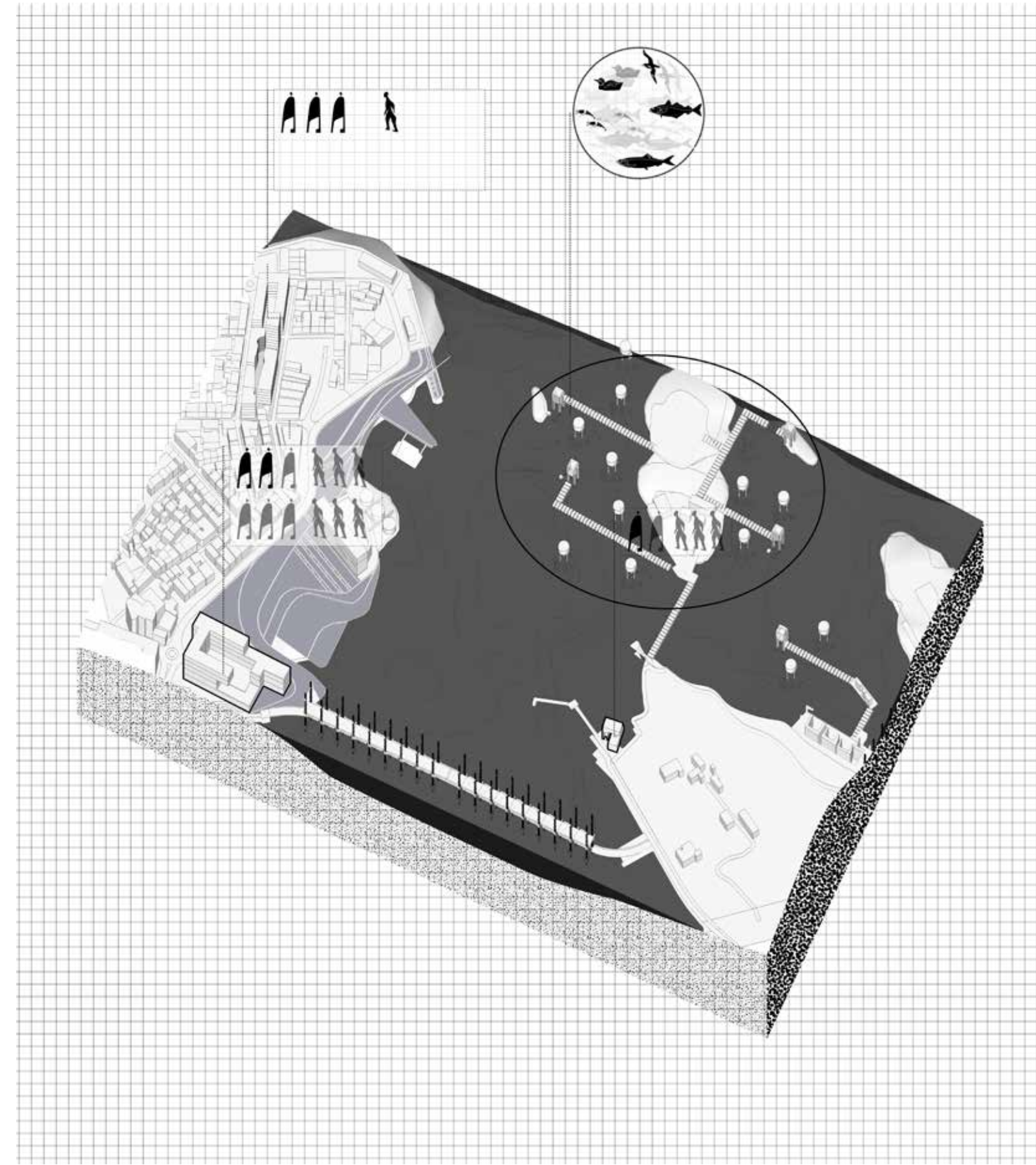
SAMPLE SCALE

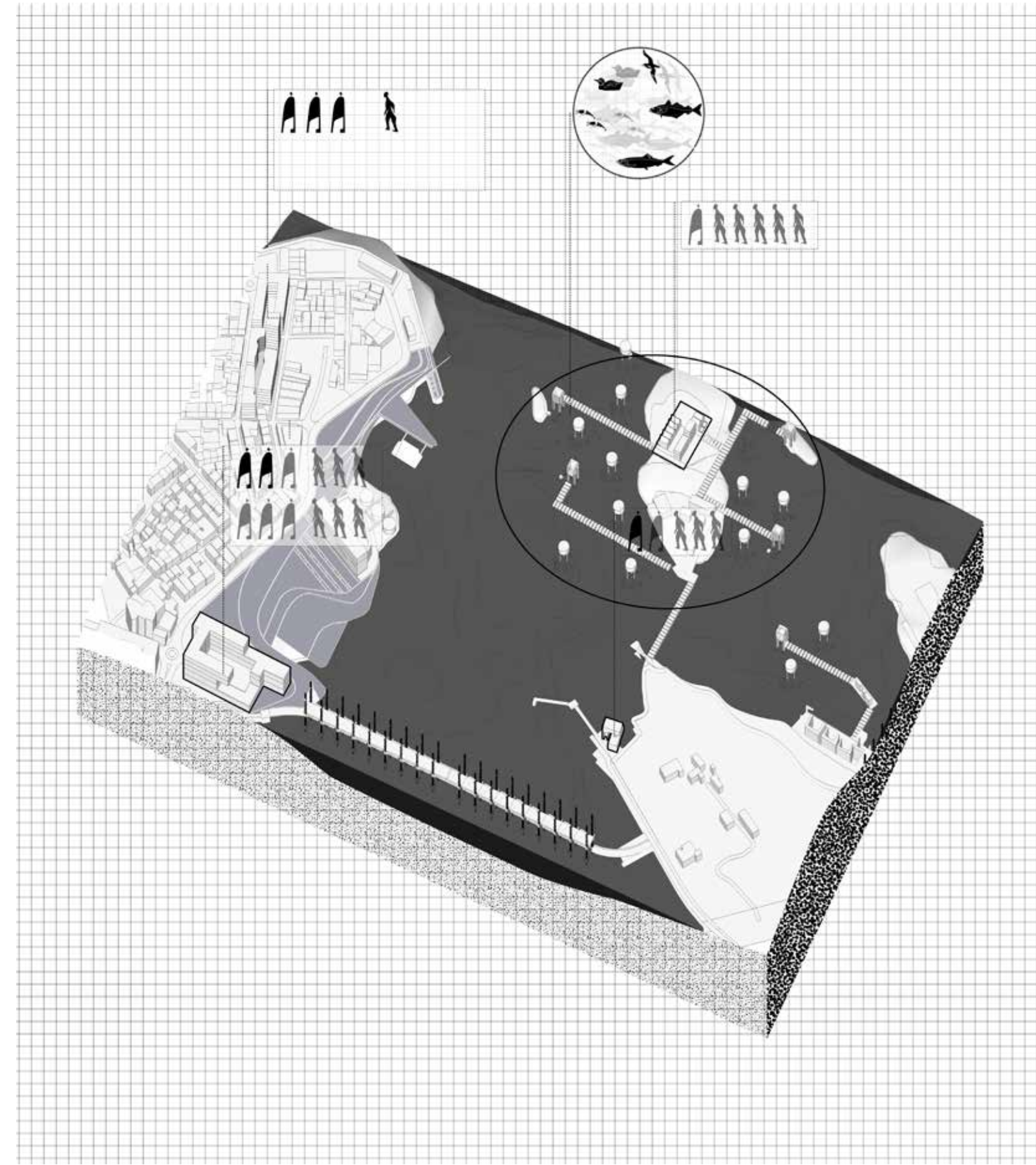
EVOLUTION

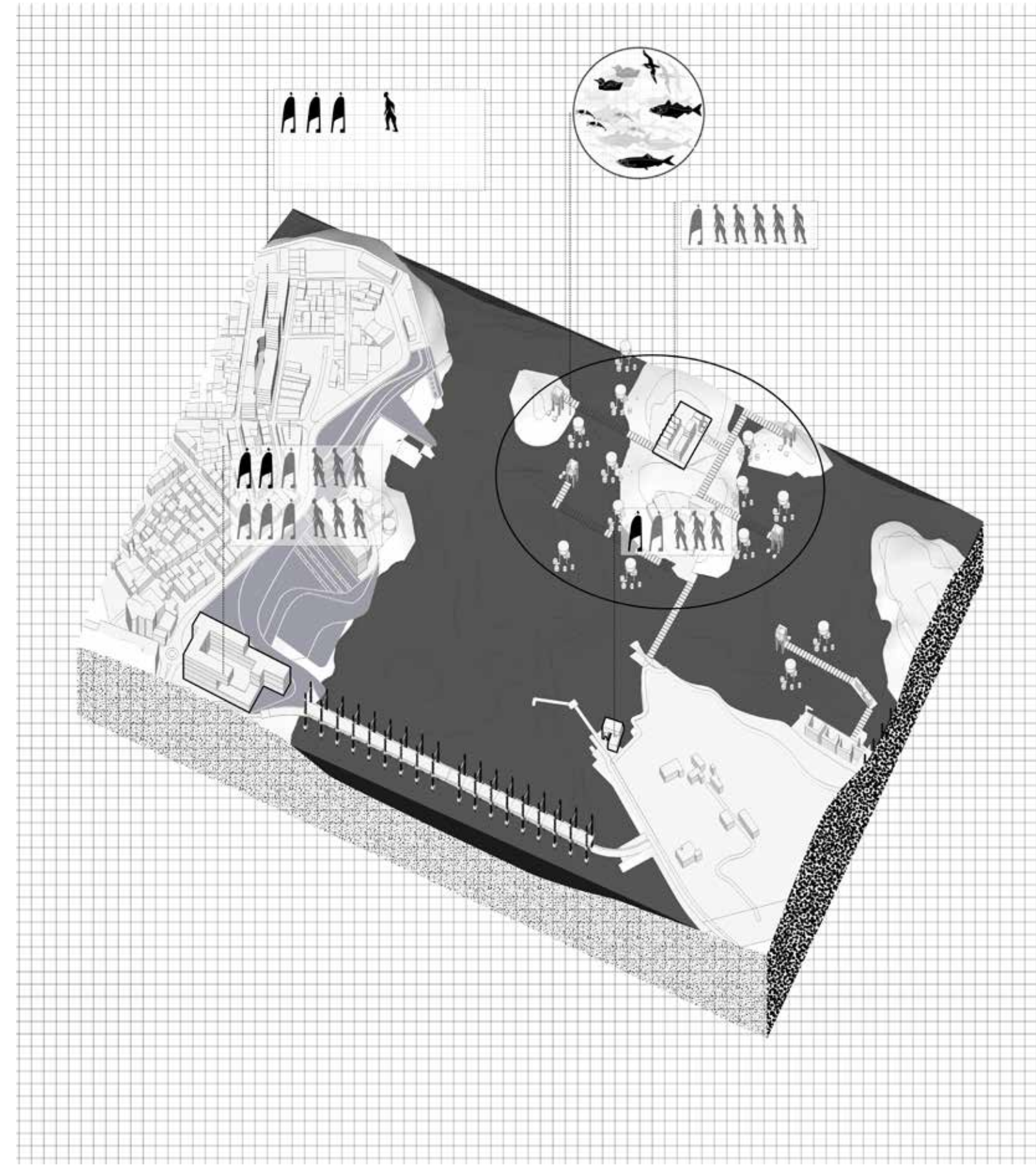


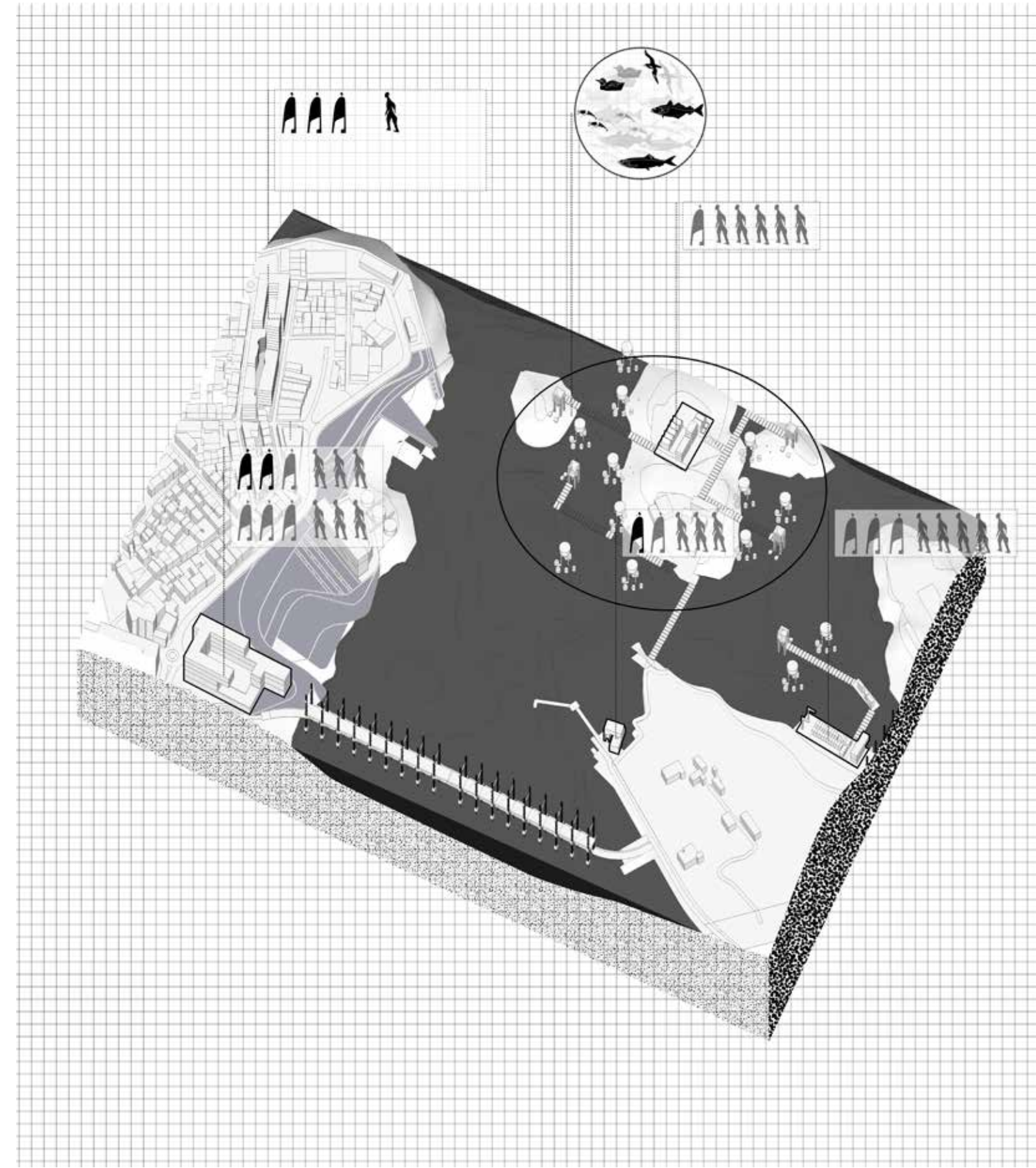


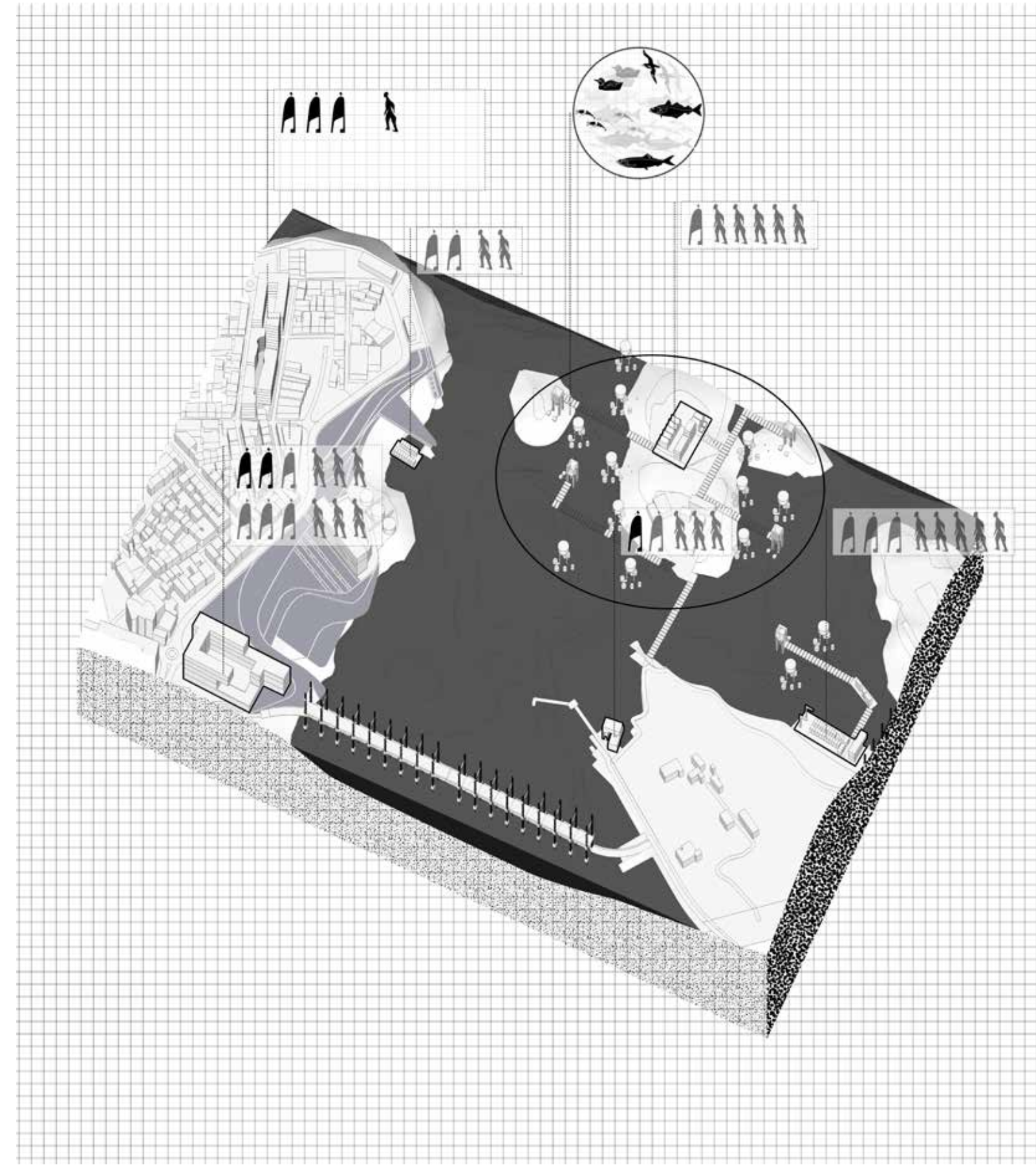


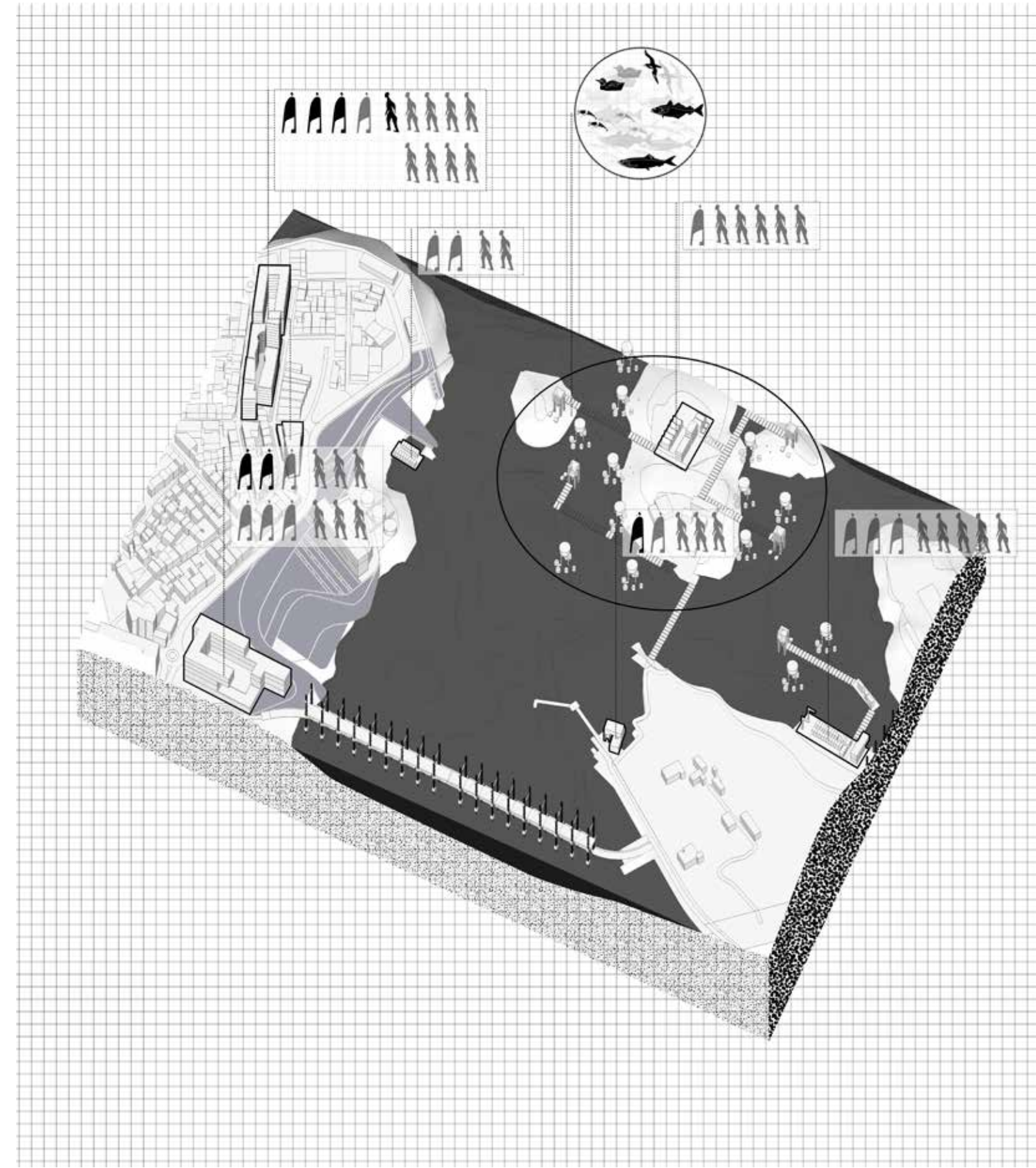


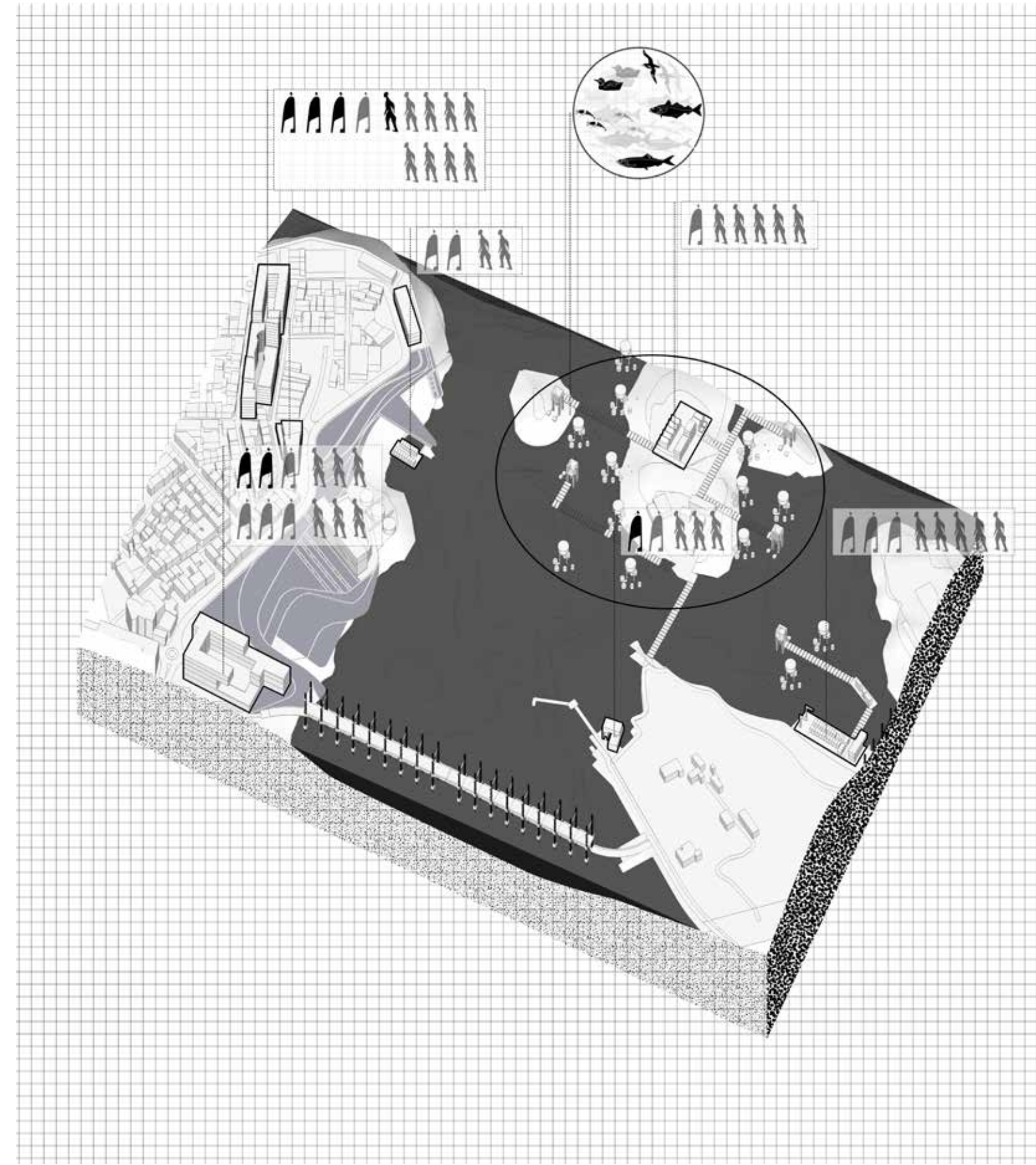






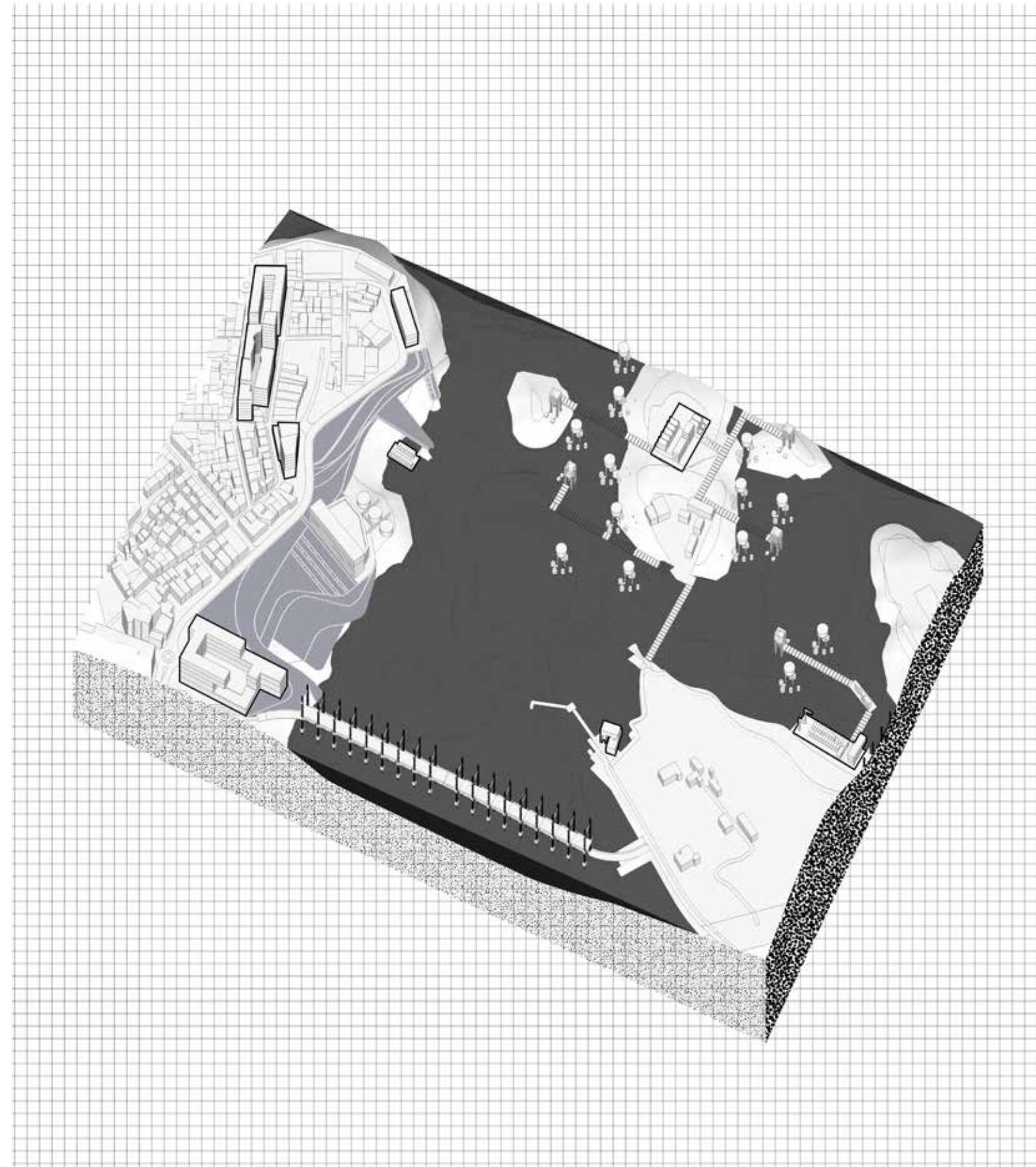






Existing structures on site: recreational park,
harbor, historical city center, culture heritage;
Transformation strategies: fishing community
on “new land”, waterfront squares on mainland,

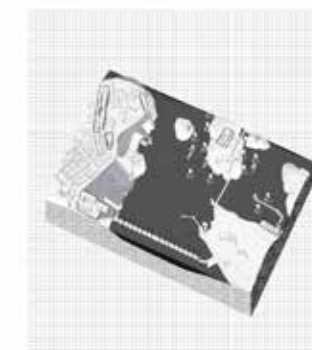
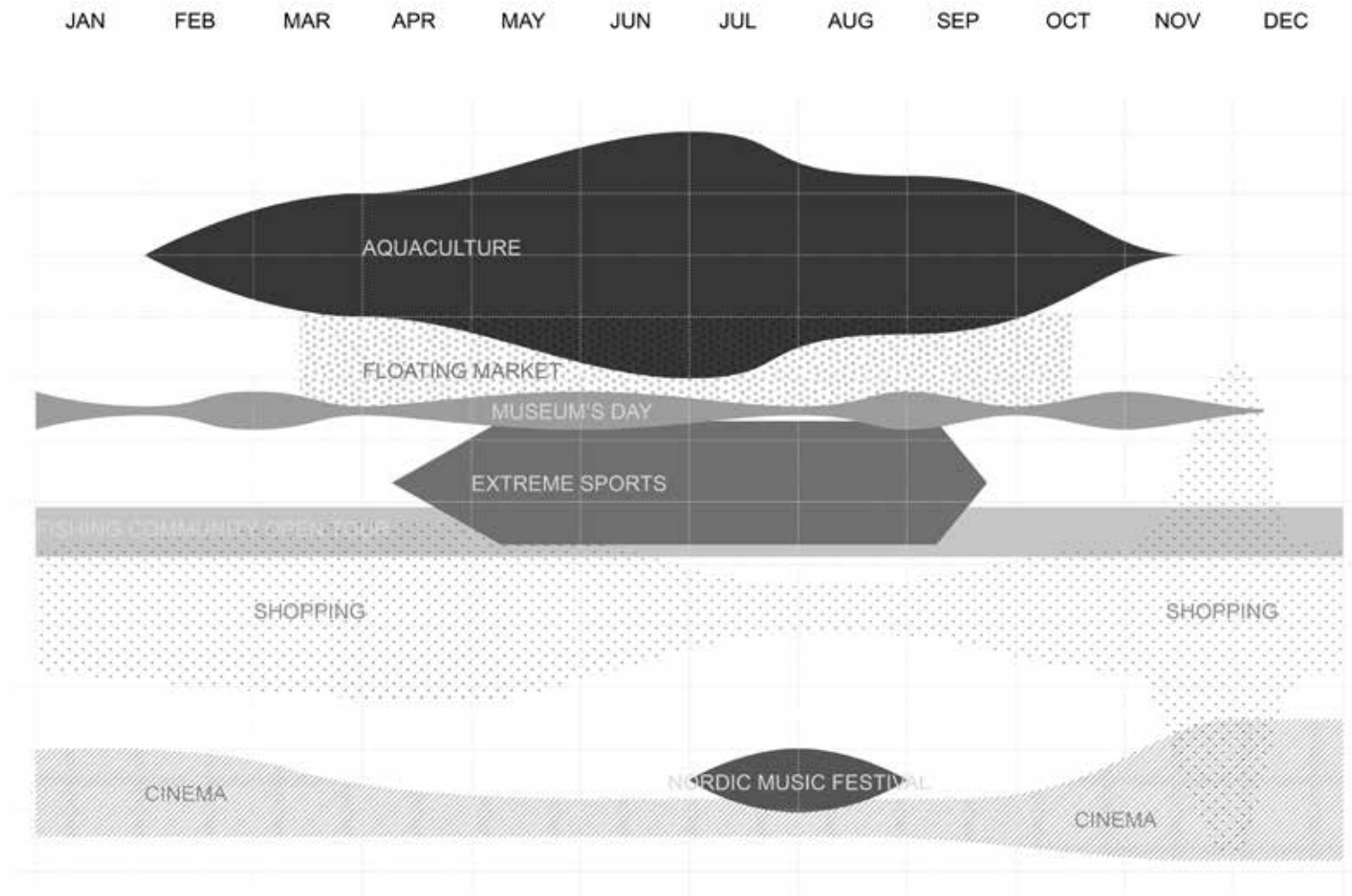
amphibious infrastructures, multi-functioning of
business buildings in historical center, floating
market in new harbor.



ECO BELT

SAMPLE SCALE

EXPECTED EVENTS



ECO BELT

SAMPLE SCALE

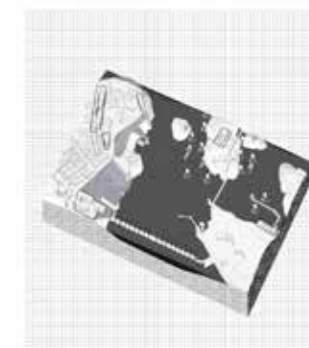
STORIES ABOUT INHABITANTS



Fisherman
Gebreselassie

Where do you come from?
Eritrea

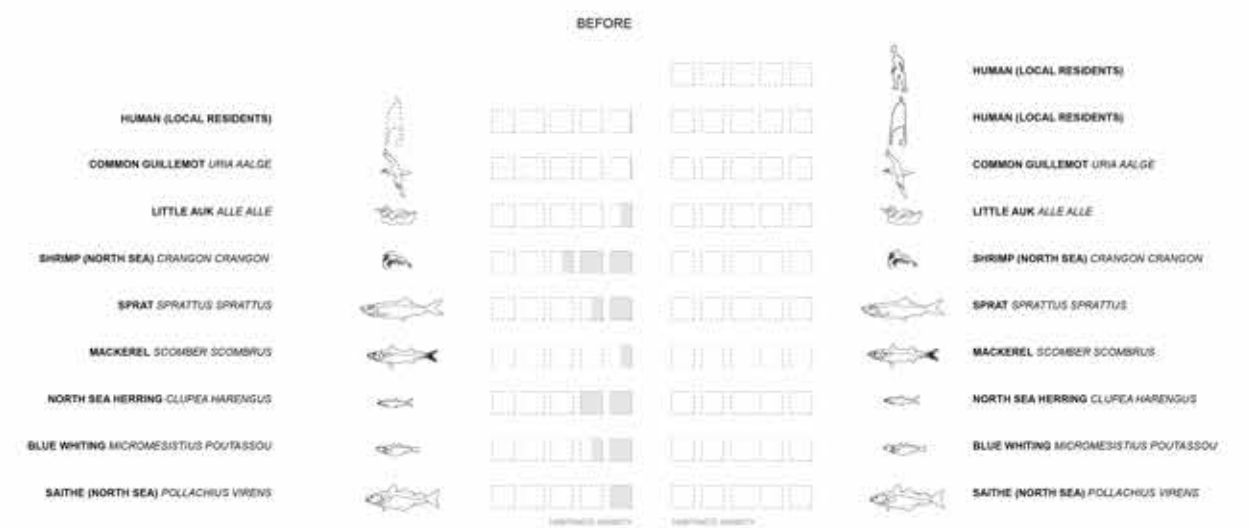
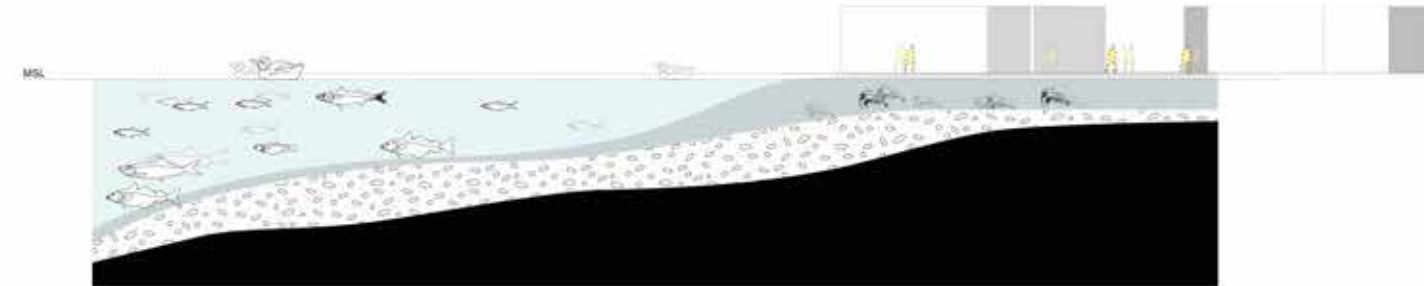
How about your life in Stavanger?
My family moved to Stavanger since 2046. I got my fishing skill from my father.
Ever since we moved to the fishing community on new land, I have
received technical supports from local government, with the help of whom I
rented an advanced fishery factory on the sea. The production and fish stock are
highly under-control. And our products are transported to the floating market
directly by unmanned aerial vehicle.



ECO BELT

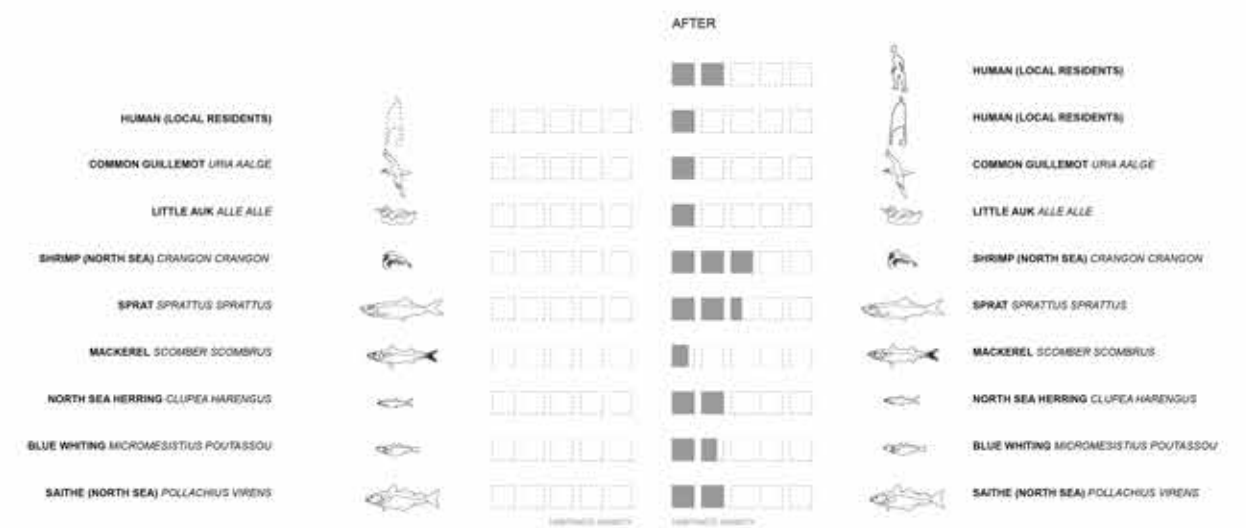
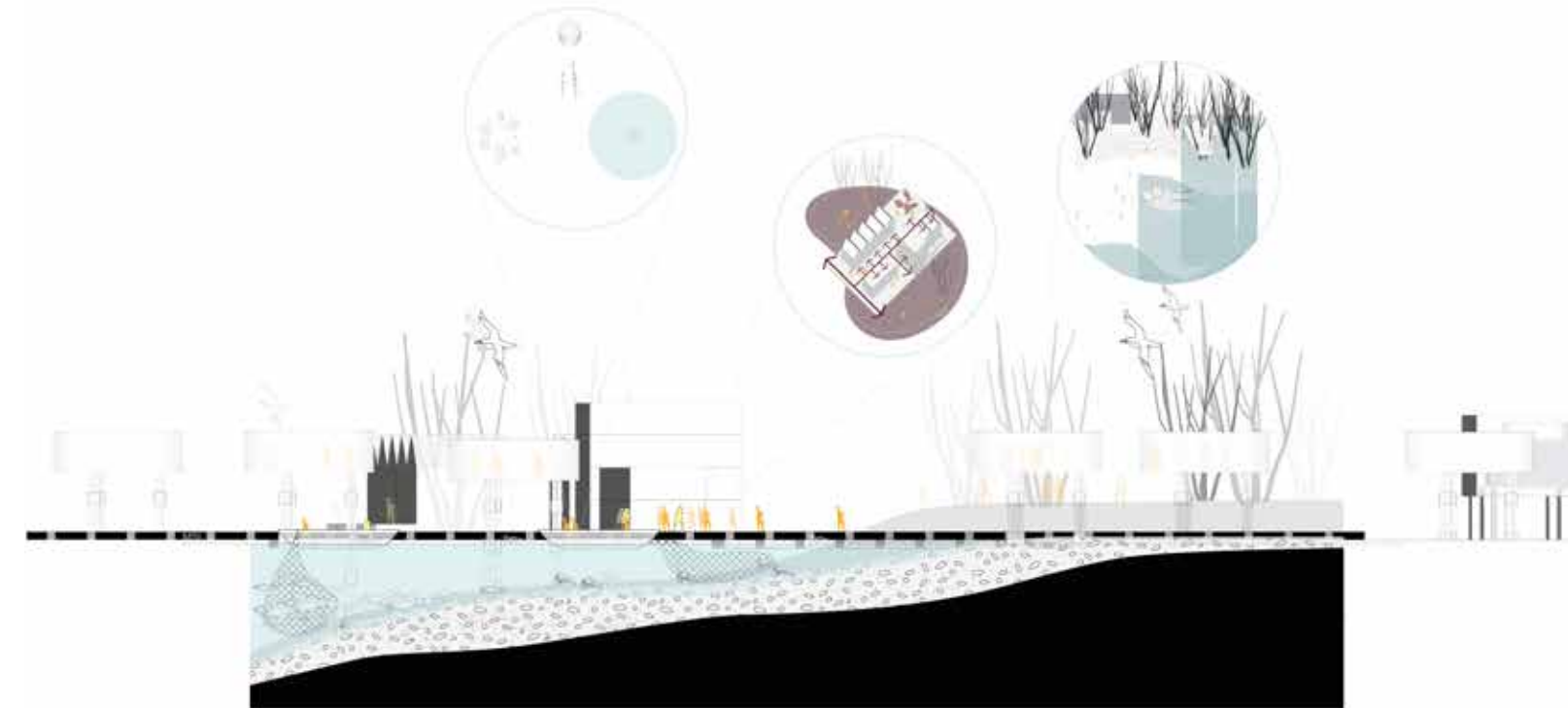
SAMPLE SCALE

EVALUATION



Existing structures on site: recreational park, harbor, historical city center, culture heritage;
Transformation strategies: fishing community on “new land”, waterfront squares on mainland,

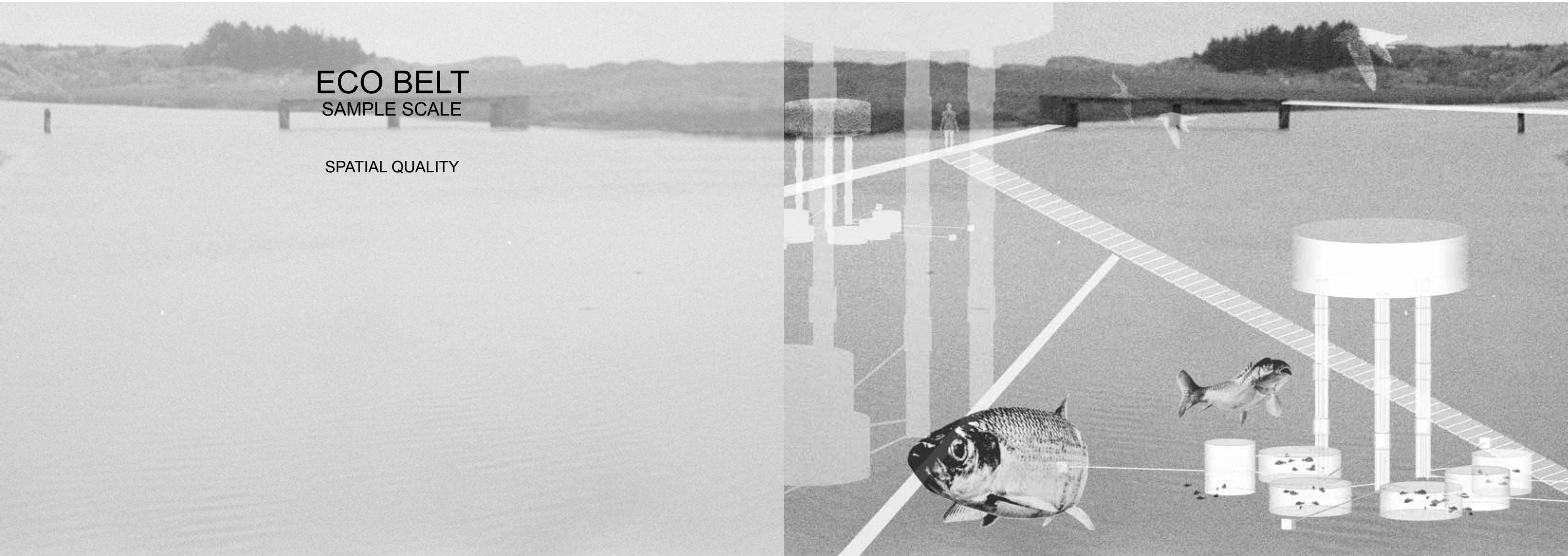
amphibious infrastructures, multi-functioning of business buildings in historical center, floating market in new harbor.



ECO BELT

SAMPLE SCALE

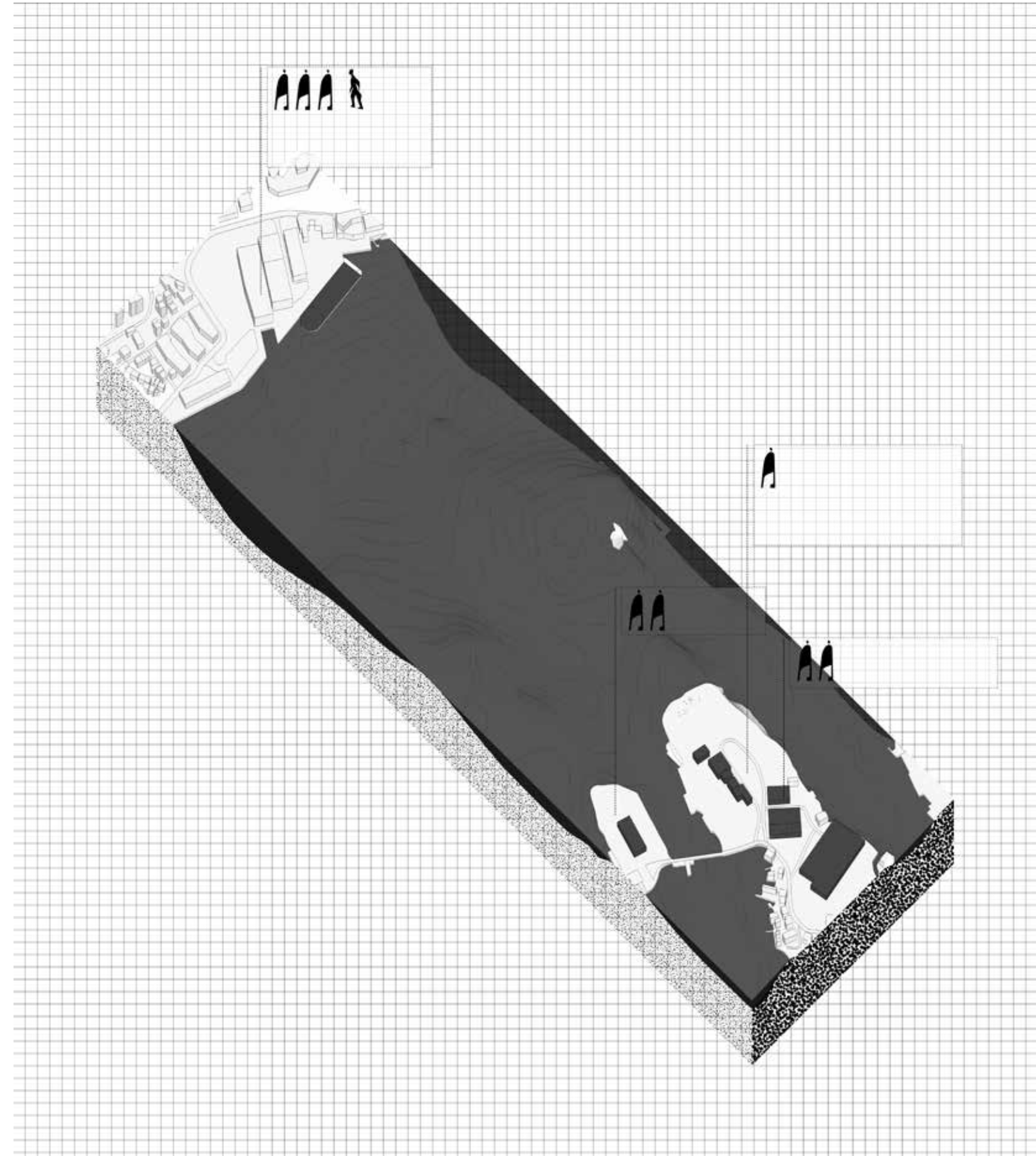
SPATIAL QUALITY

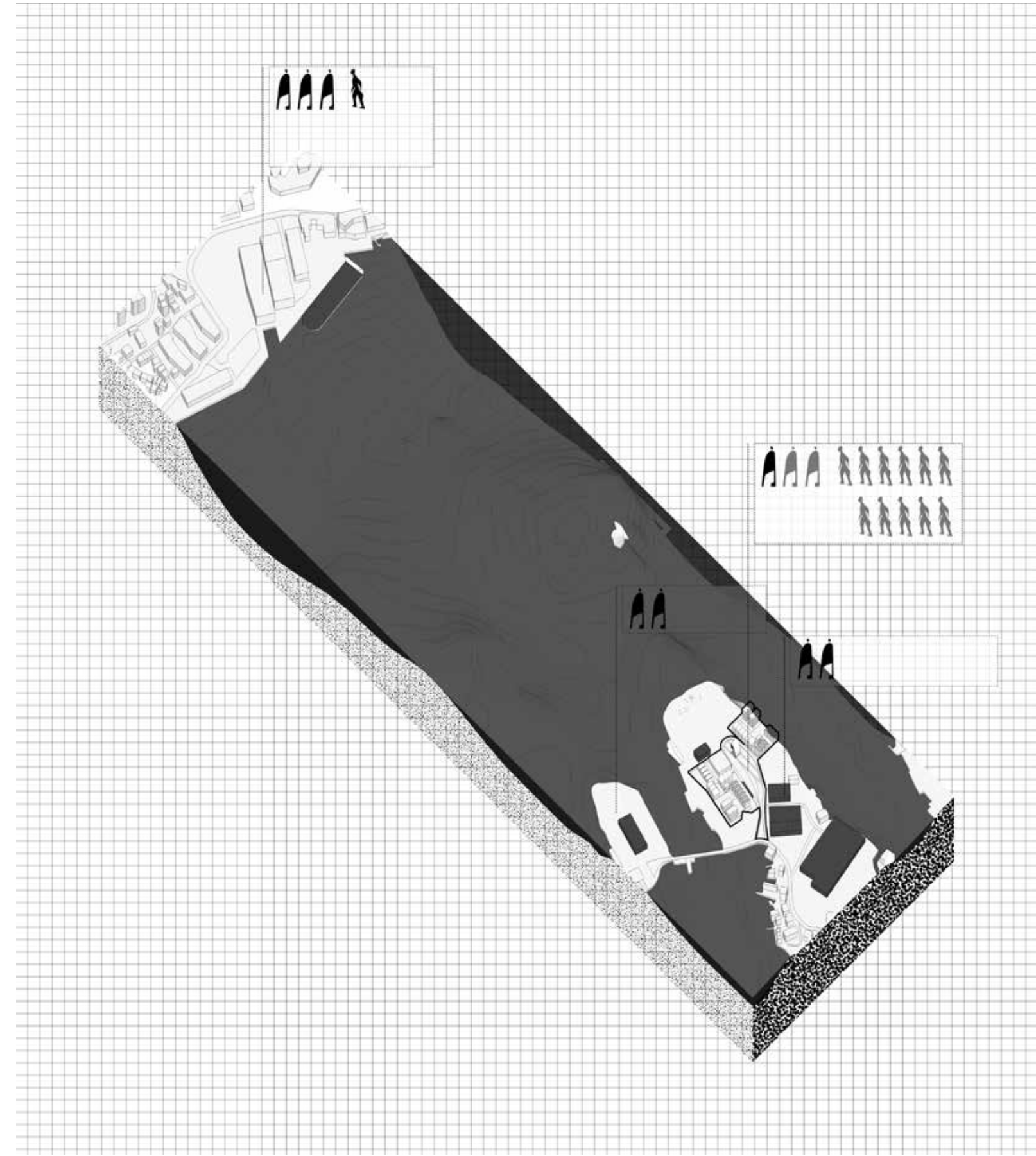


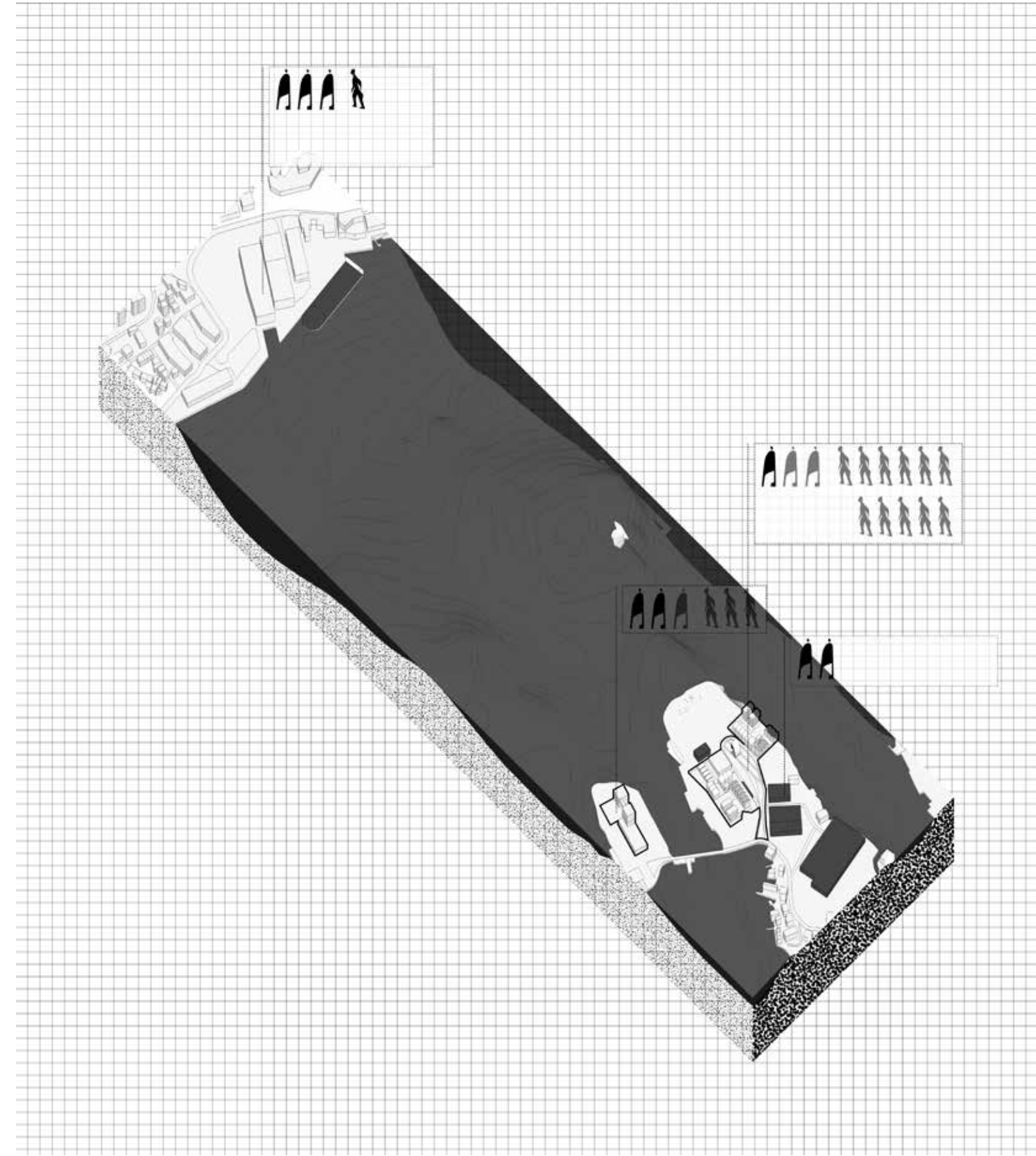
CULTURE BELT

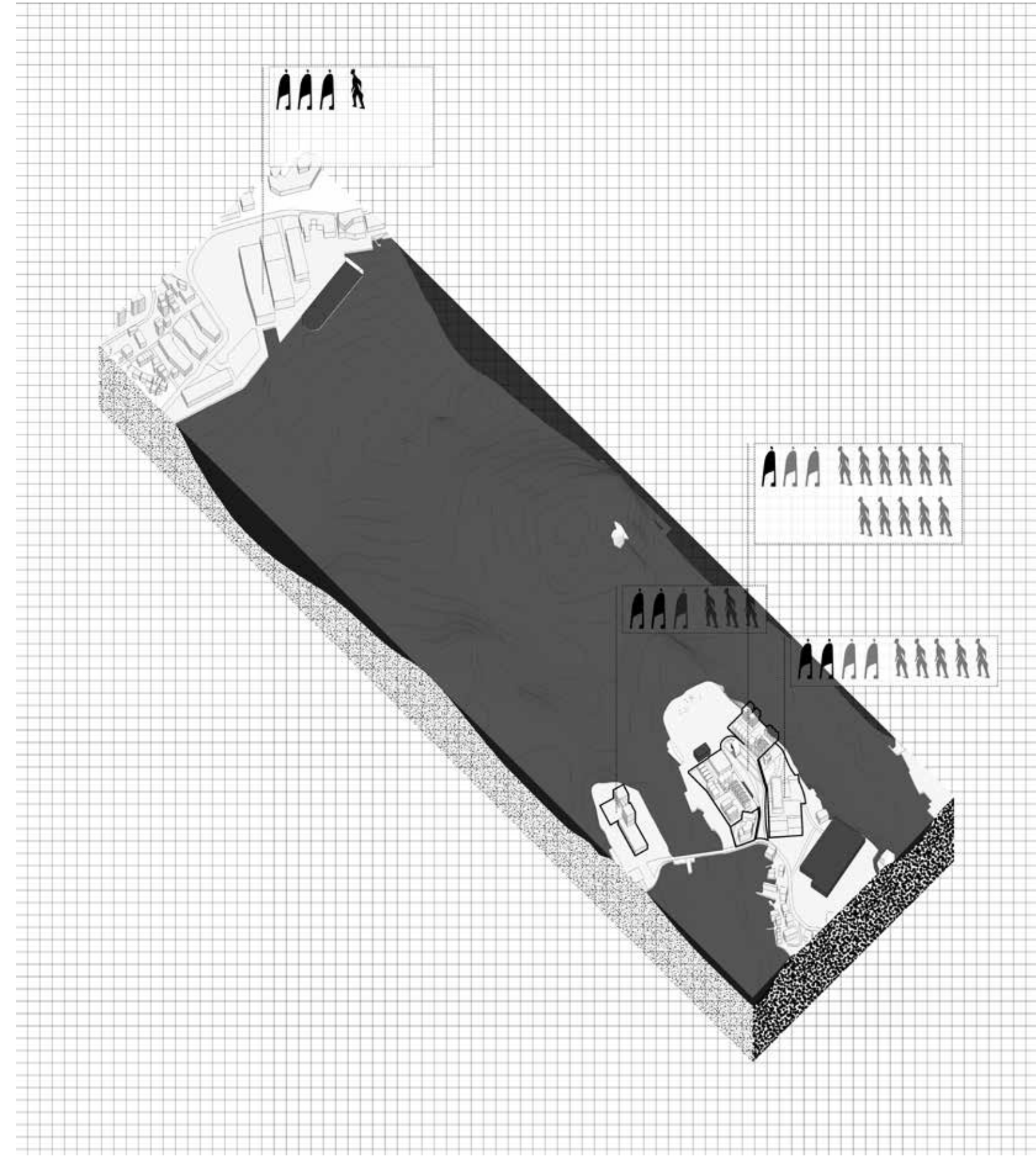
SAMPLE SCALE

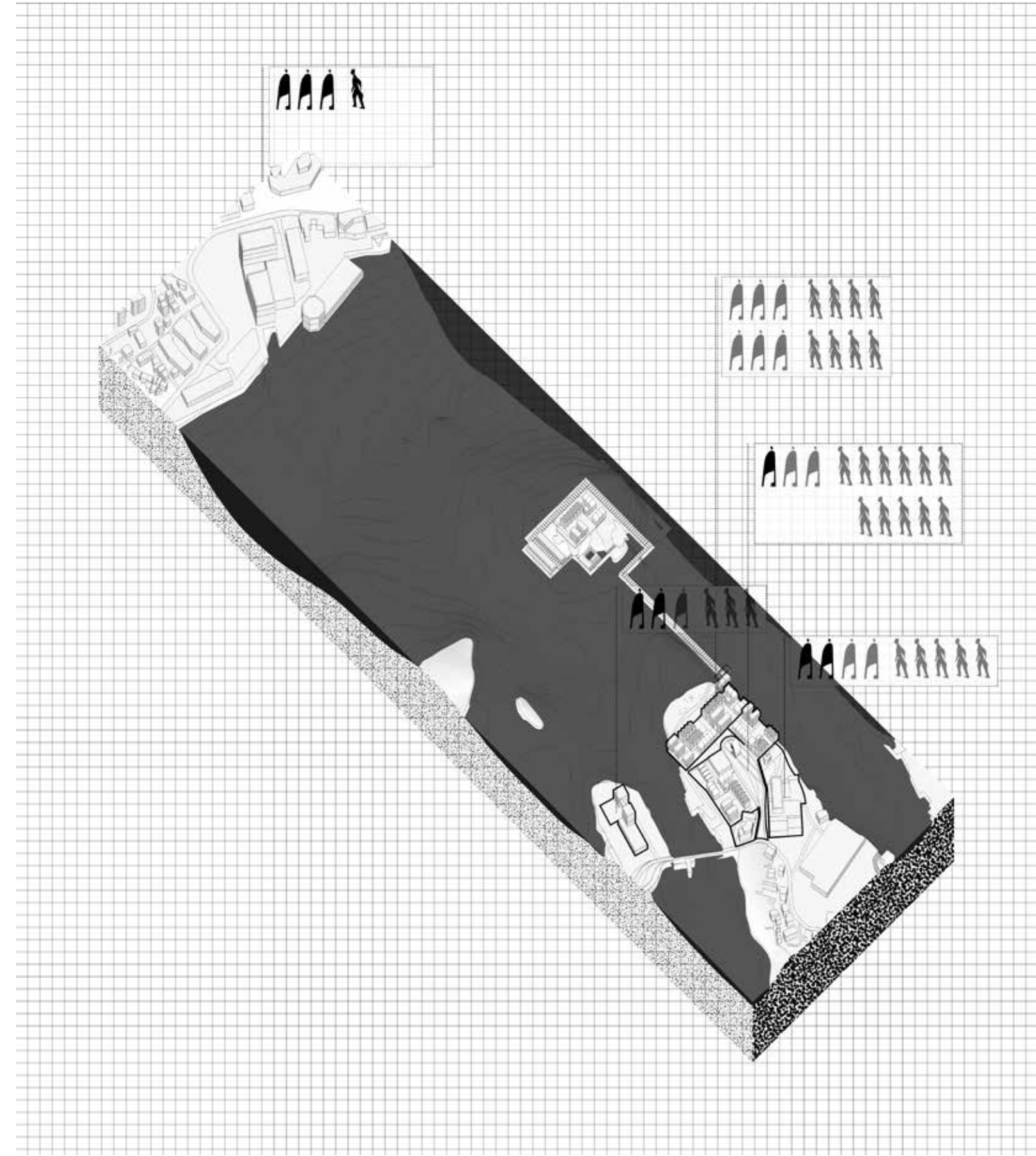
EVOLUTION

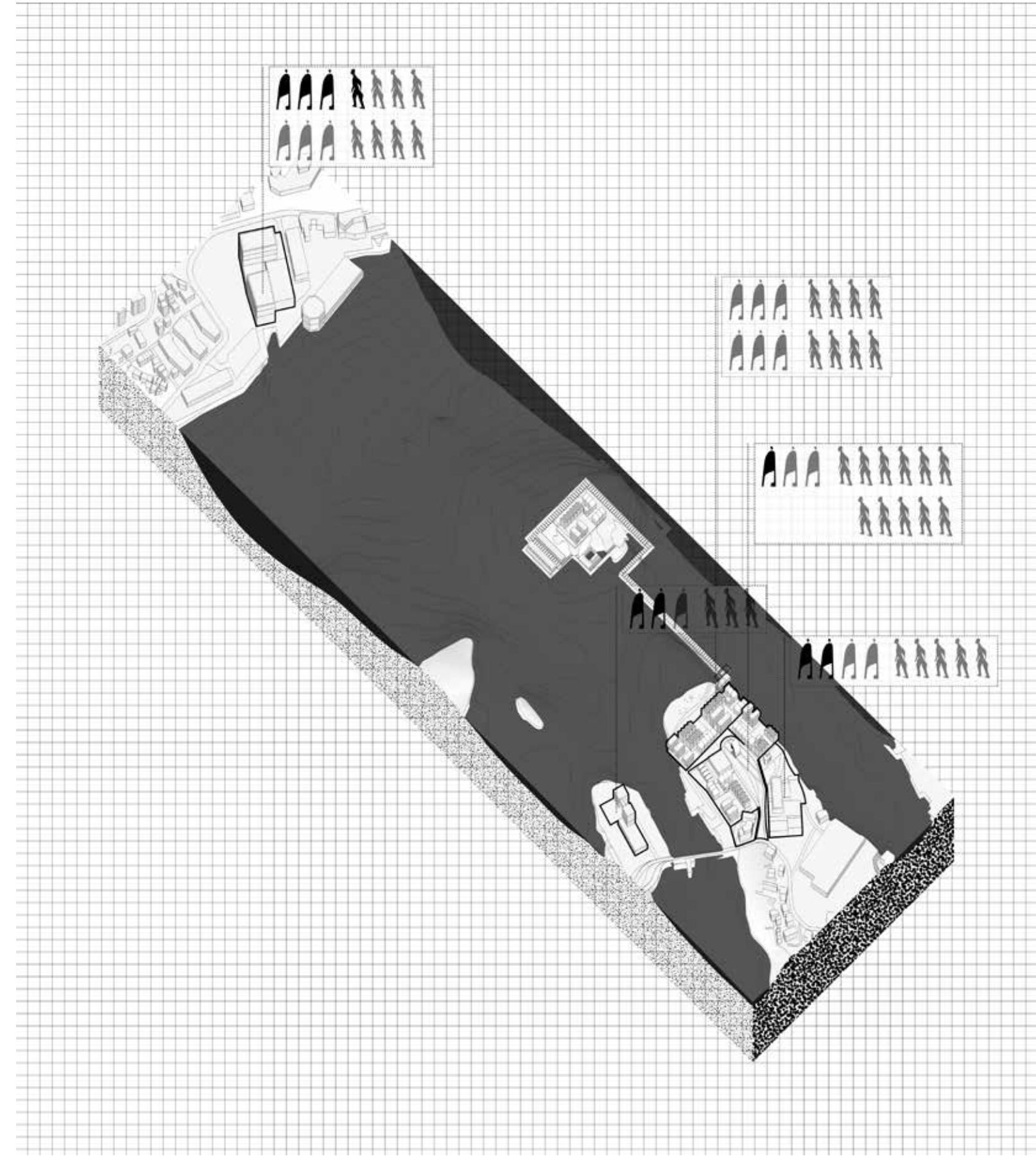


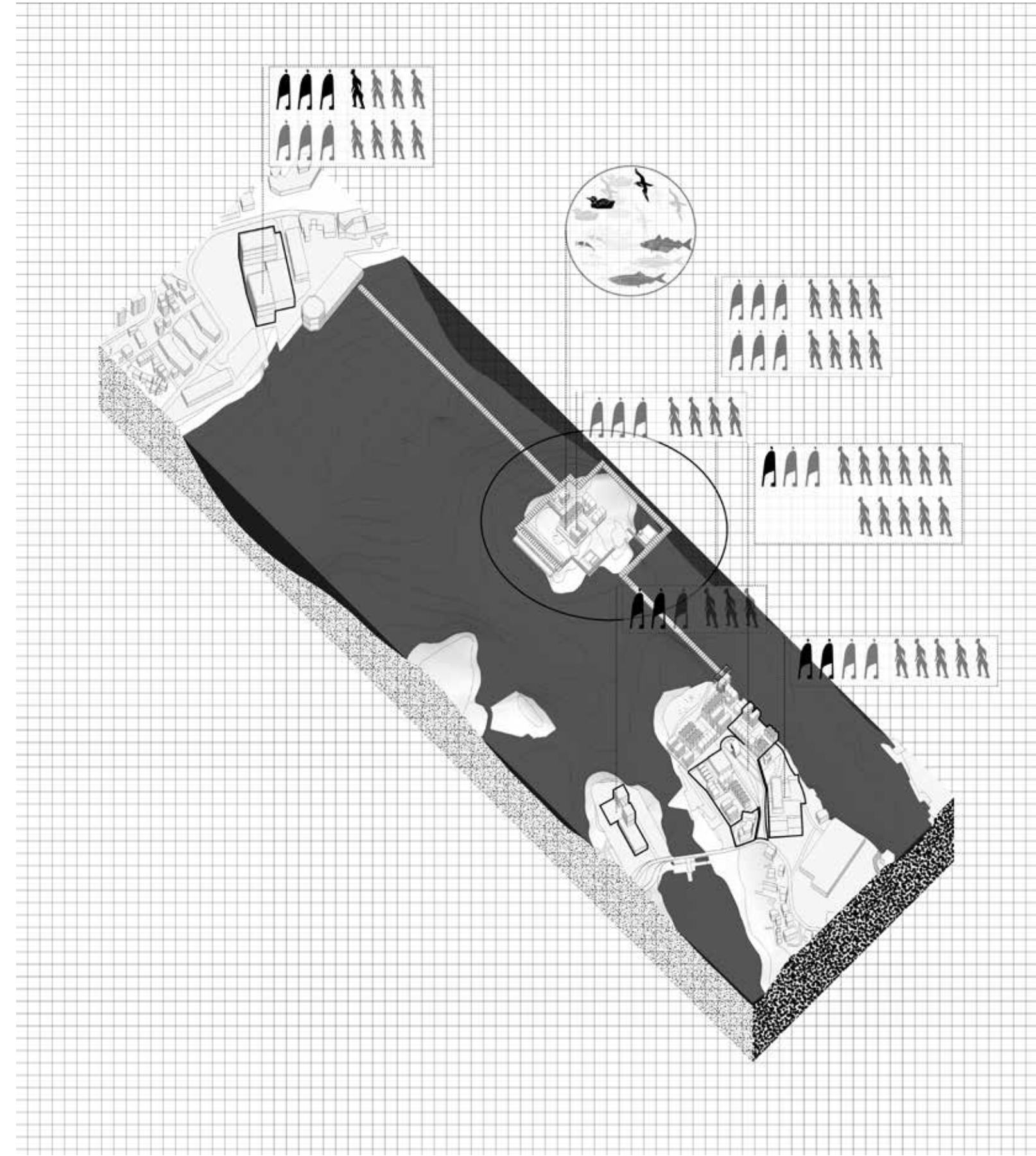






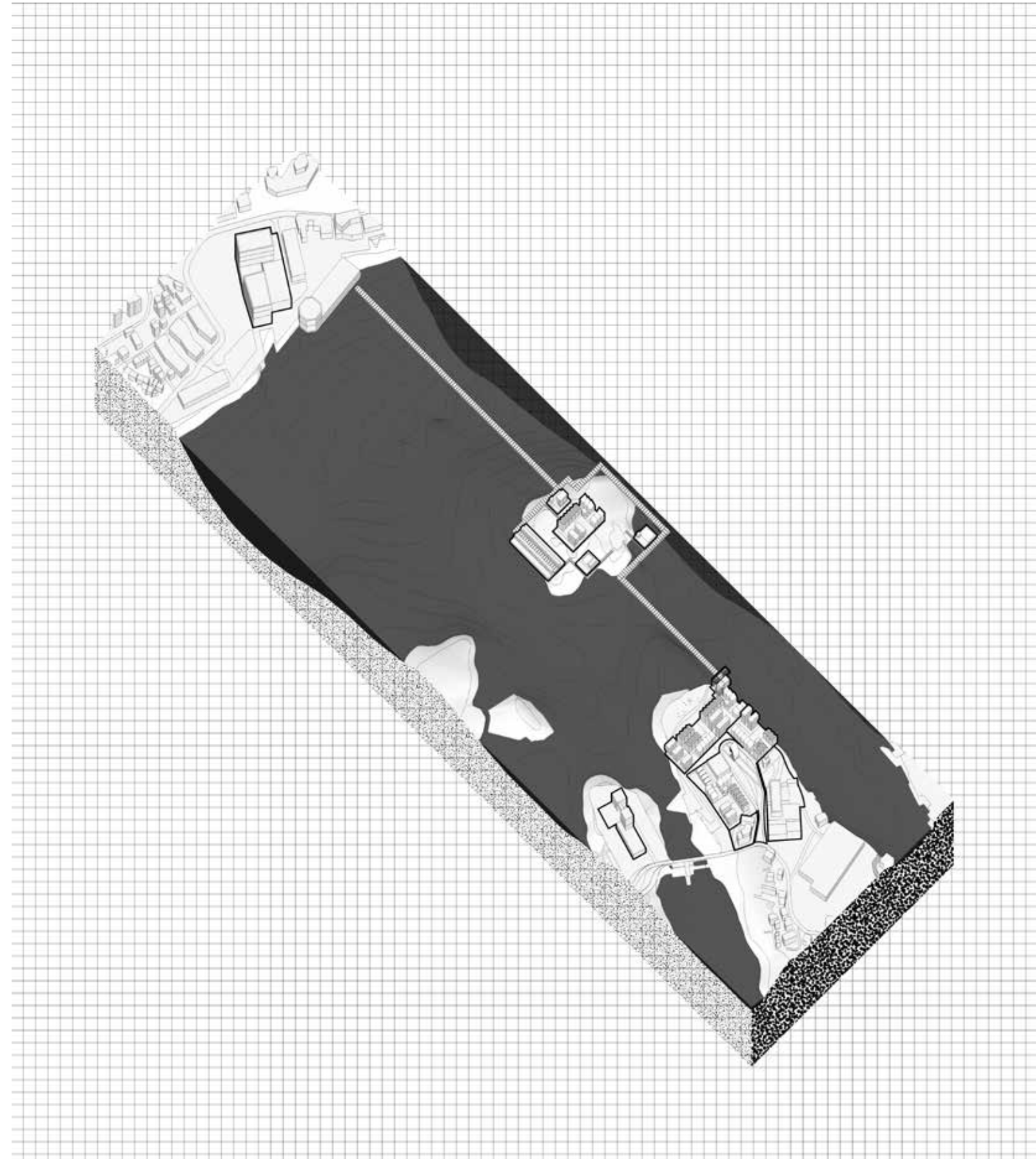






Existing structures on site: private harbor, abandoned shipyard, functioning shipyard, vacant land, museums, ship company, small retails and cafes with poor appearance;
Transformation strategies: floating artists' community on "new land" including floating market,

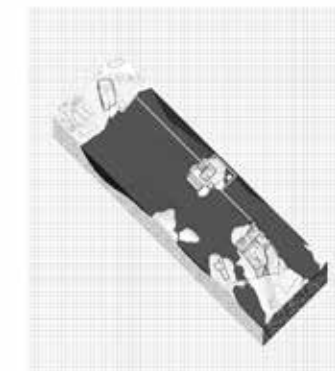
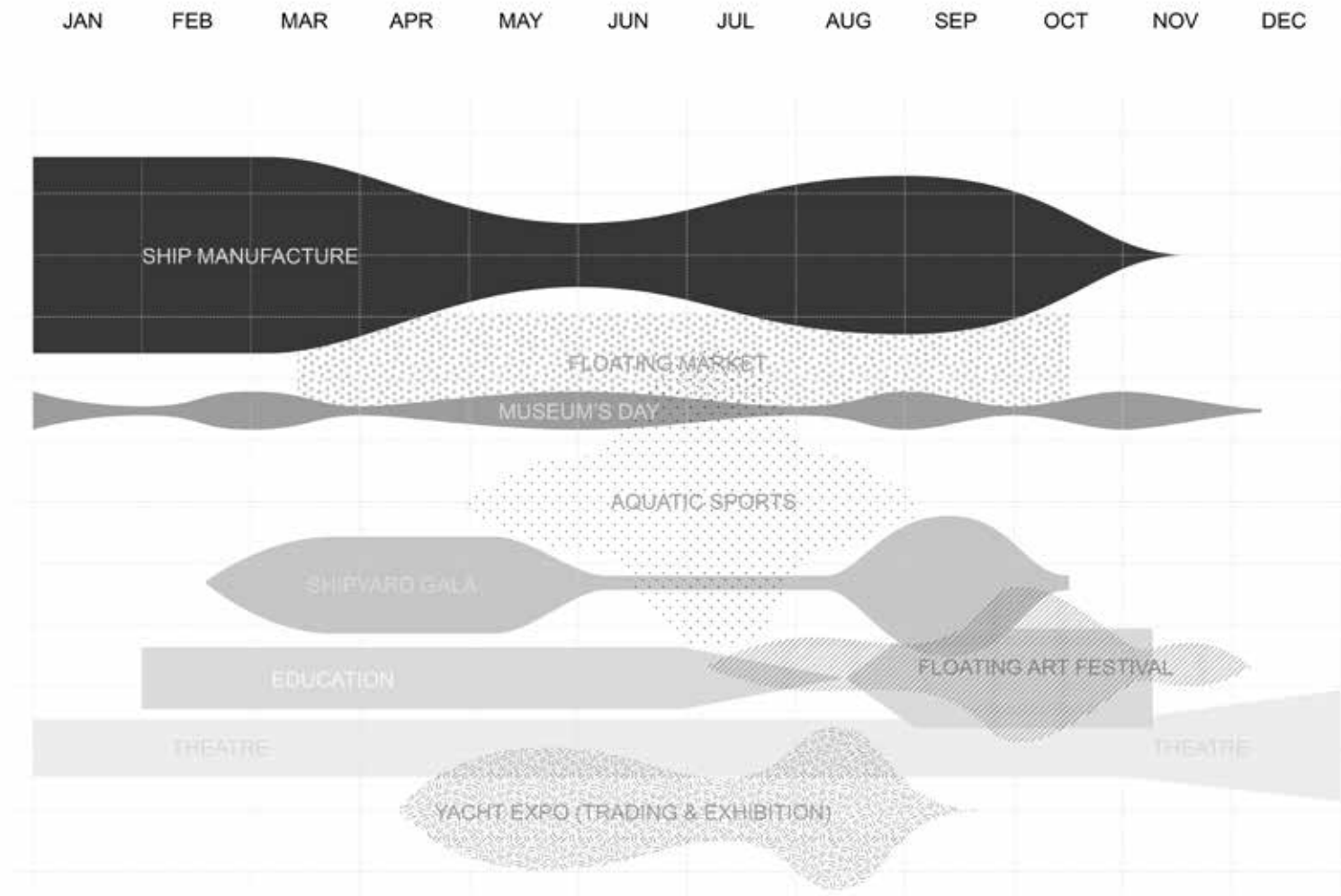
floating gallery, temporary installation art, artists and shipyard workers' community on mainland, amphibious infrastructure, transformation of abandoned shipyard into public cultural activity center, commercial functions.



CULTURE BELT

SAMPLE SCALE

EXPECTED EVENTS



CULTURE BELT

SAMPLE SCALE

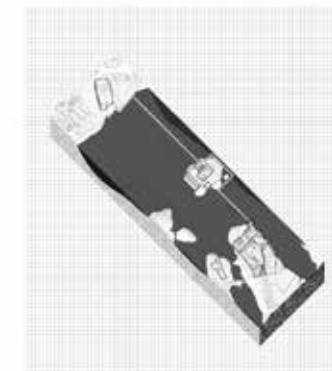
STORIES ABOUT INHABITANTS



Art Curator
Christian

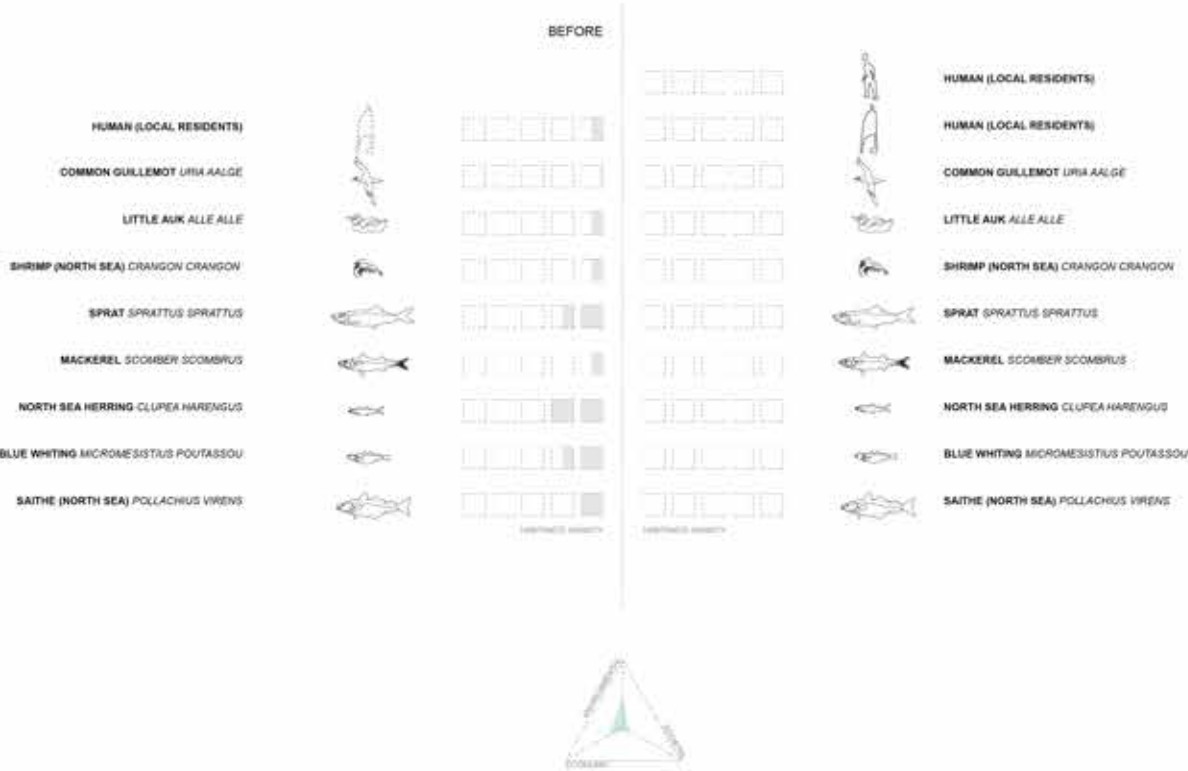
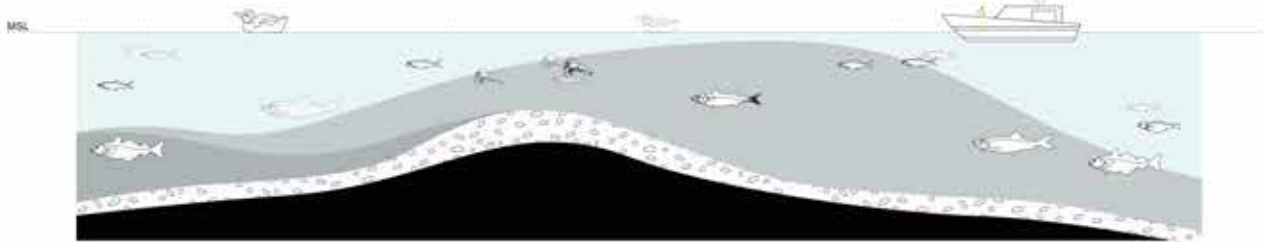
Where do you com from?
Local

How about your life in Stavanger?
There are more and more abandoned shipyards in Stavanger right now.
They are perfect spaces for art installations and gathering of artists.
And the coolest event I created is the annual connection through floating path
from west to east. The artists cluster on 'new land' will be an important
spot to hold all the festivals and activities.



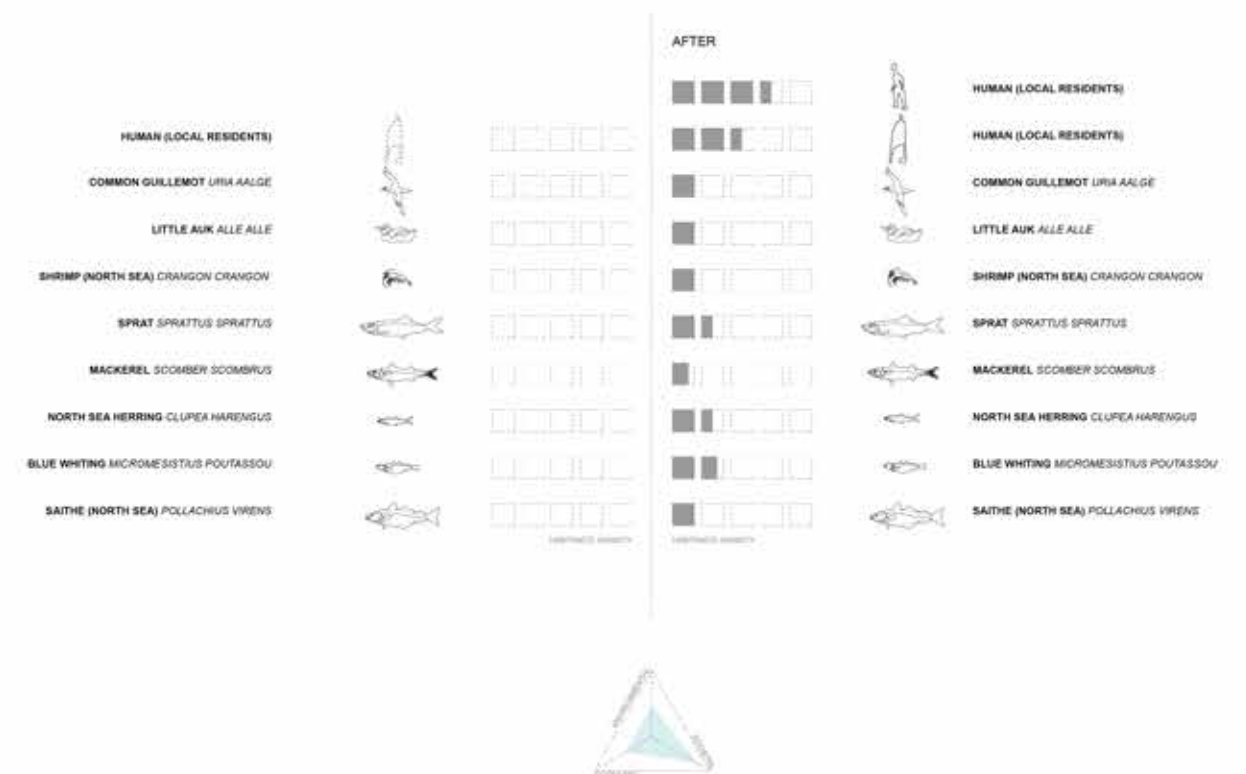
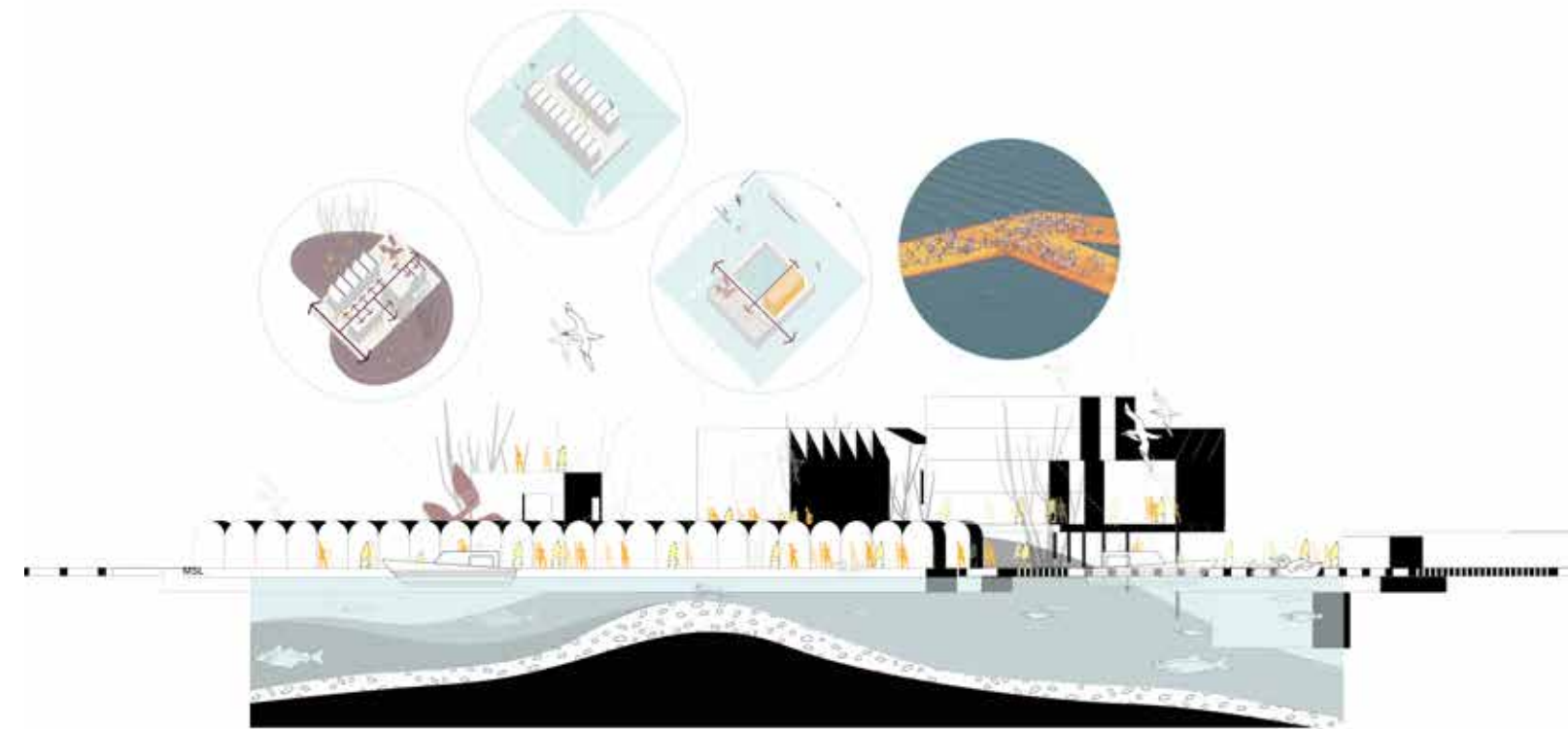
CULTURE BELT
SAMPLE SCALE

EVALUATION



Existing structures on site: private harbor, abandoned shipyard, functioning shipyard, vacant land, museums, ship company, small retails and cafes with poor appearance;
Transformation strategies: floating artists' community on "new land" including floating market,

floating gallery, temporary installation art, artists and shipyard workers' community on mainland, amphibious infrastructure, transformation of abandoned shipyard into public cultural activity center, commercial functions.



CULTURE BELT
SAMPLE SCALE

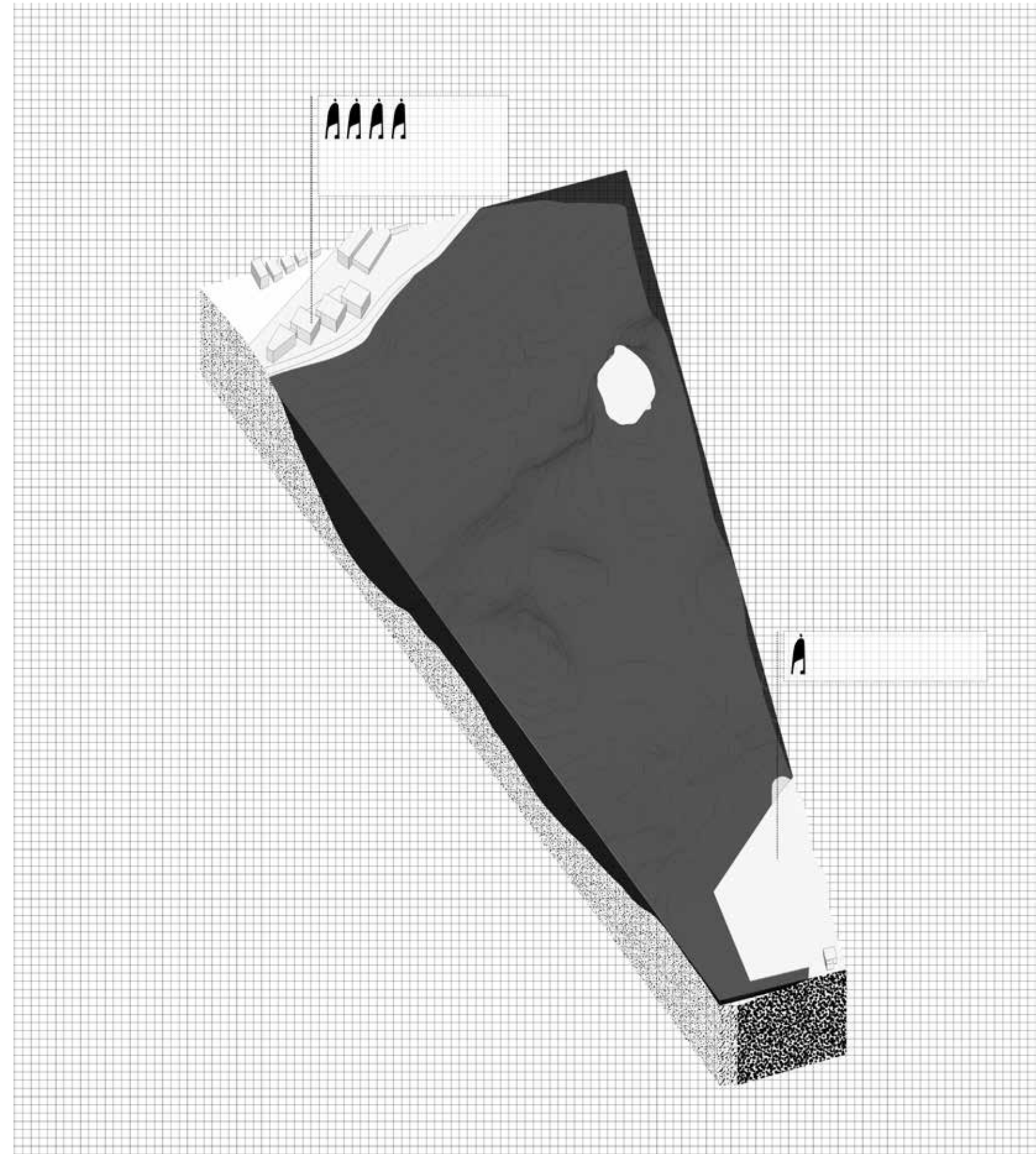
SPATIAL QUALITY

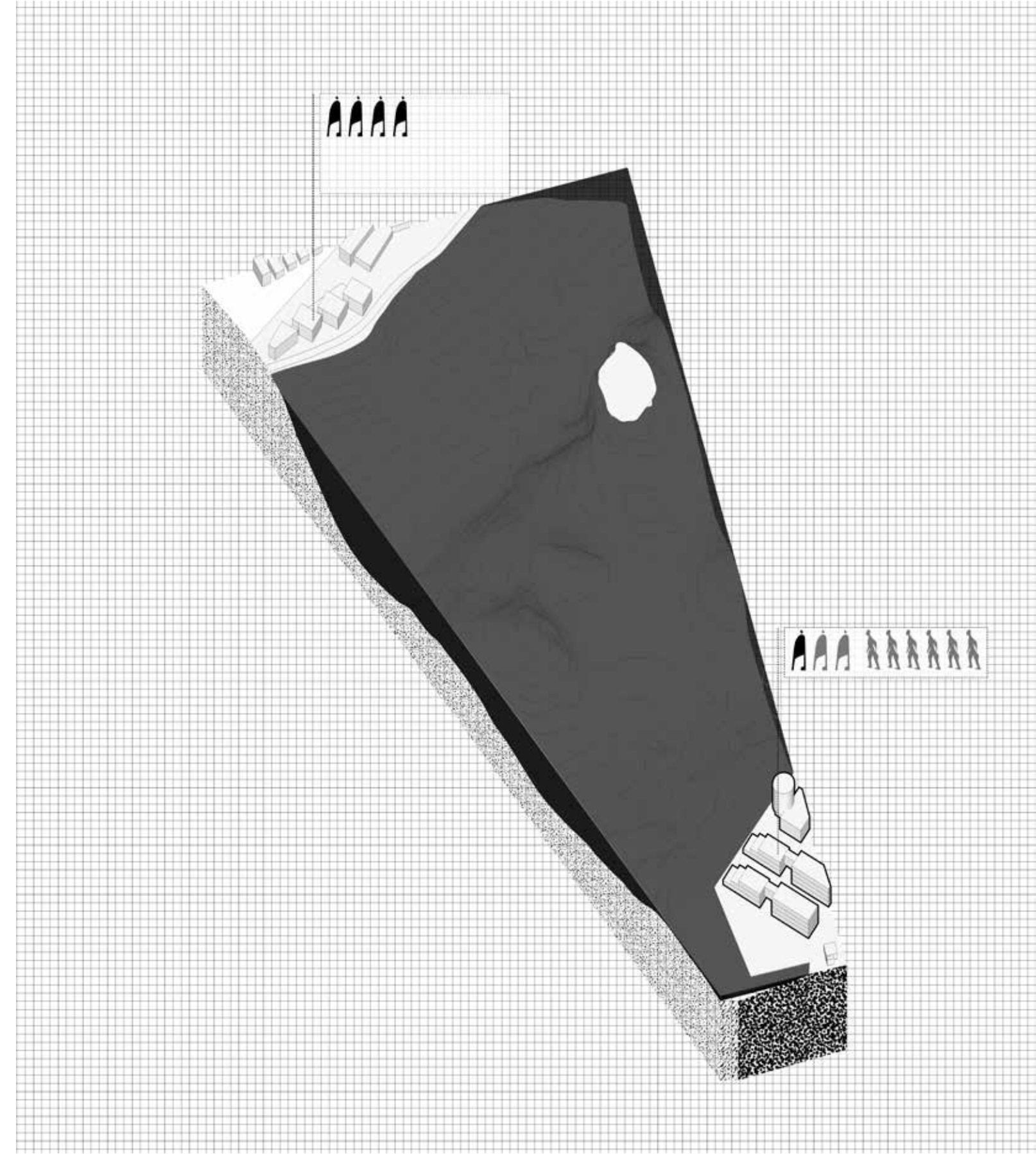


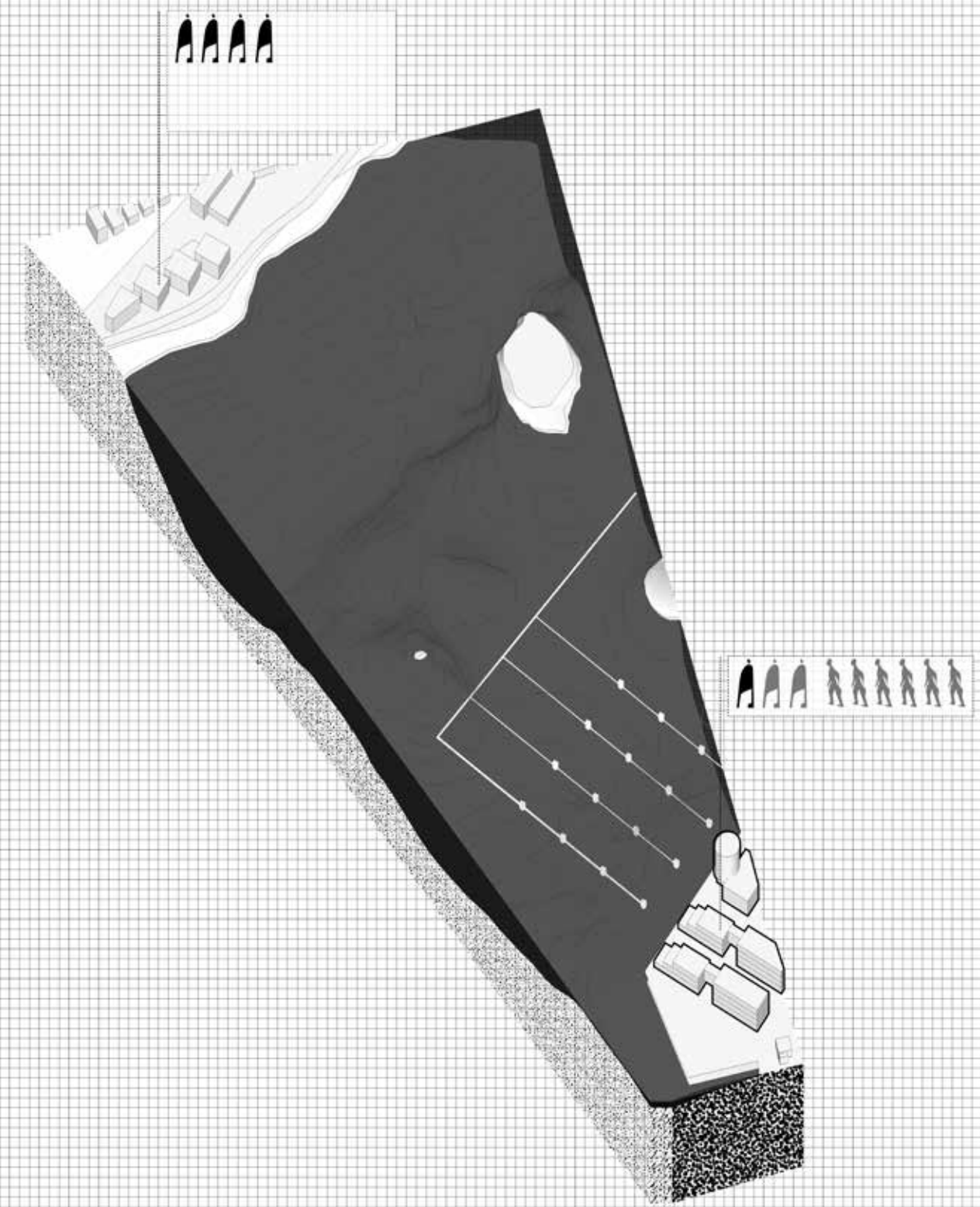
ENERGY/SCIENCE BELT

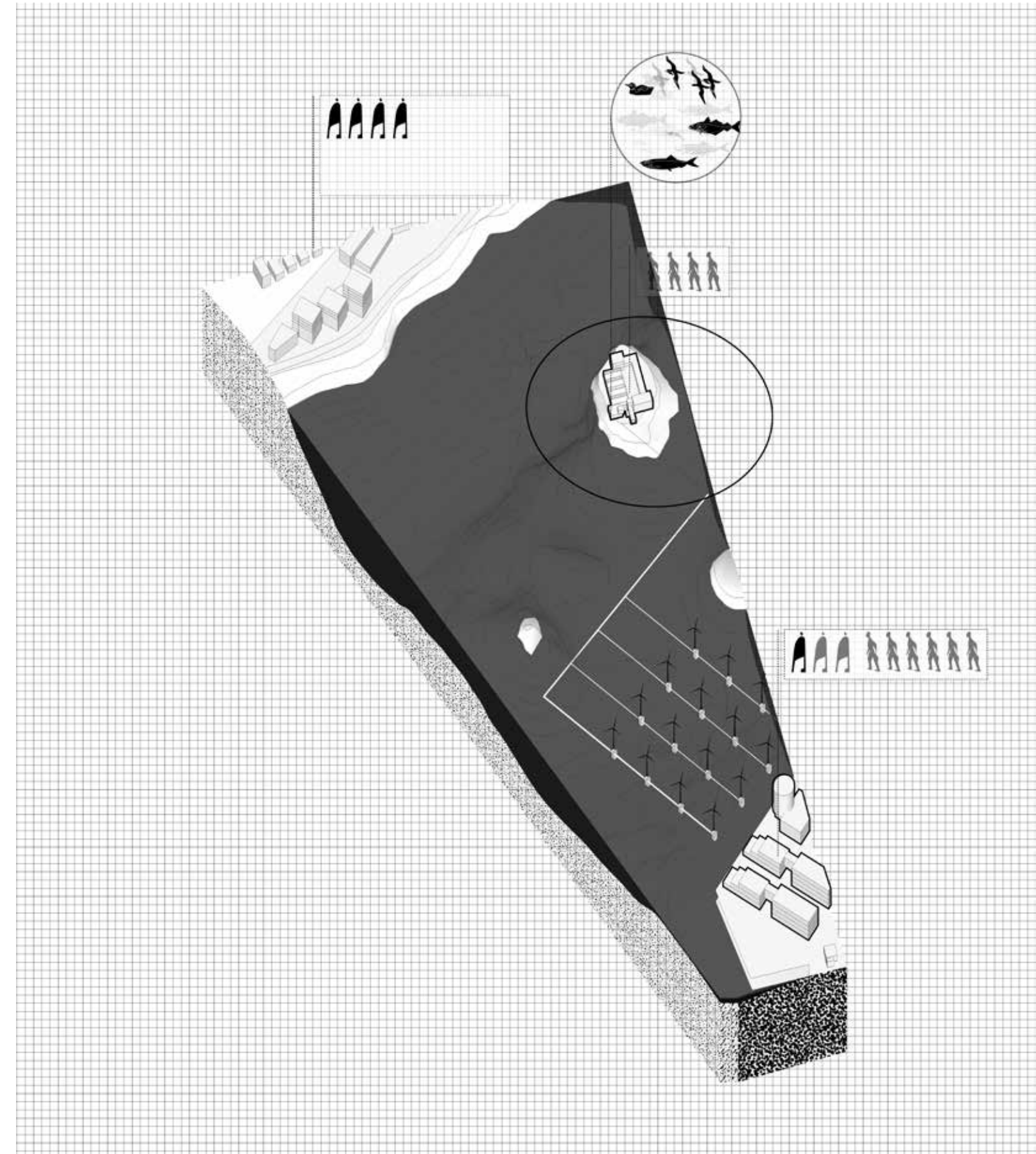
SAMPLE SCALE

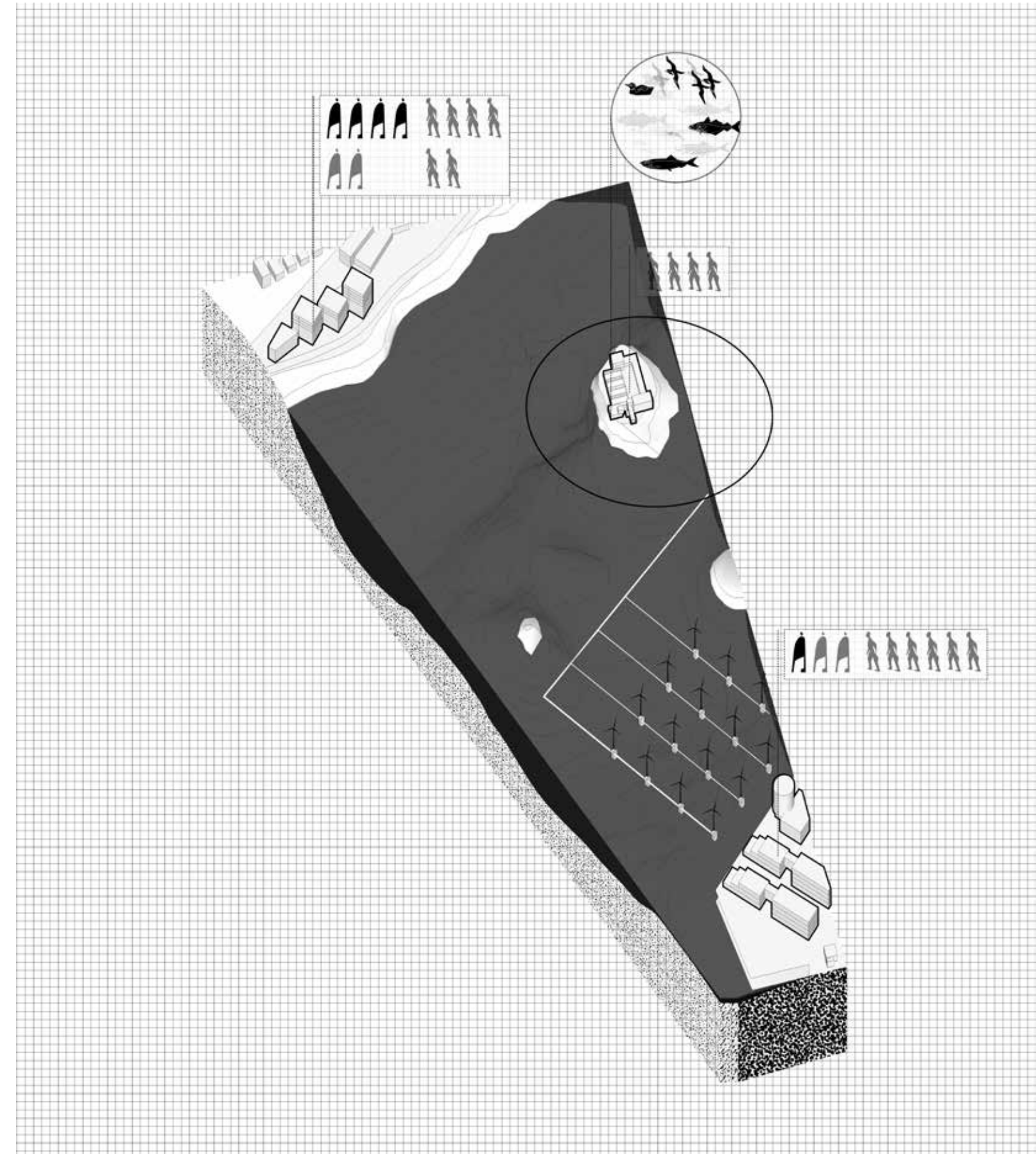
EVOLUTION







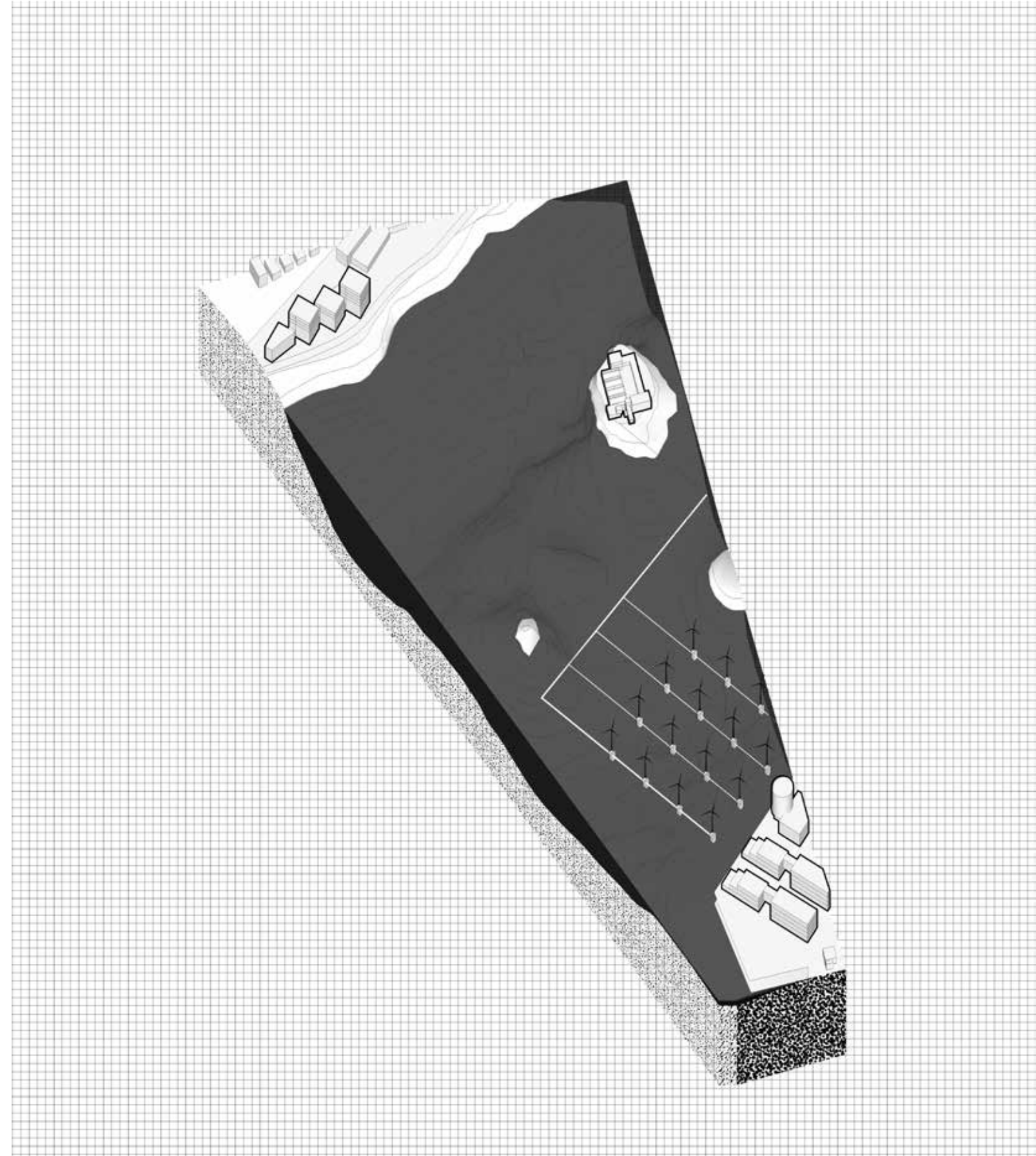




Existing structures on site: Petroleum company, oil factory almost abandoned, large vacant brown field;

Transformation strategies: multi-functioning of business building, redevelopment of brown

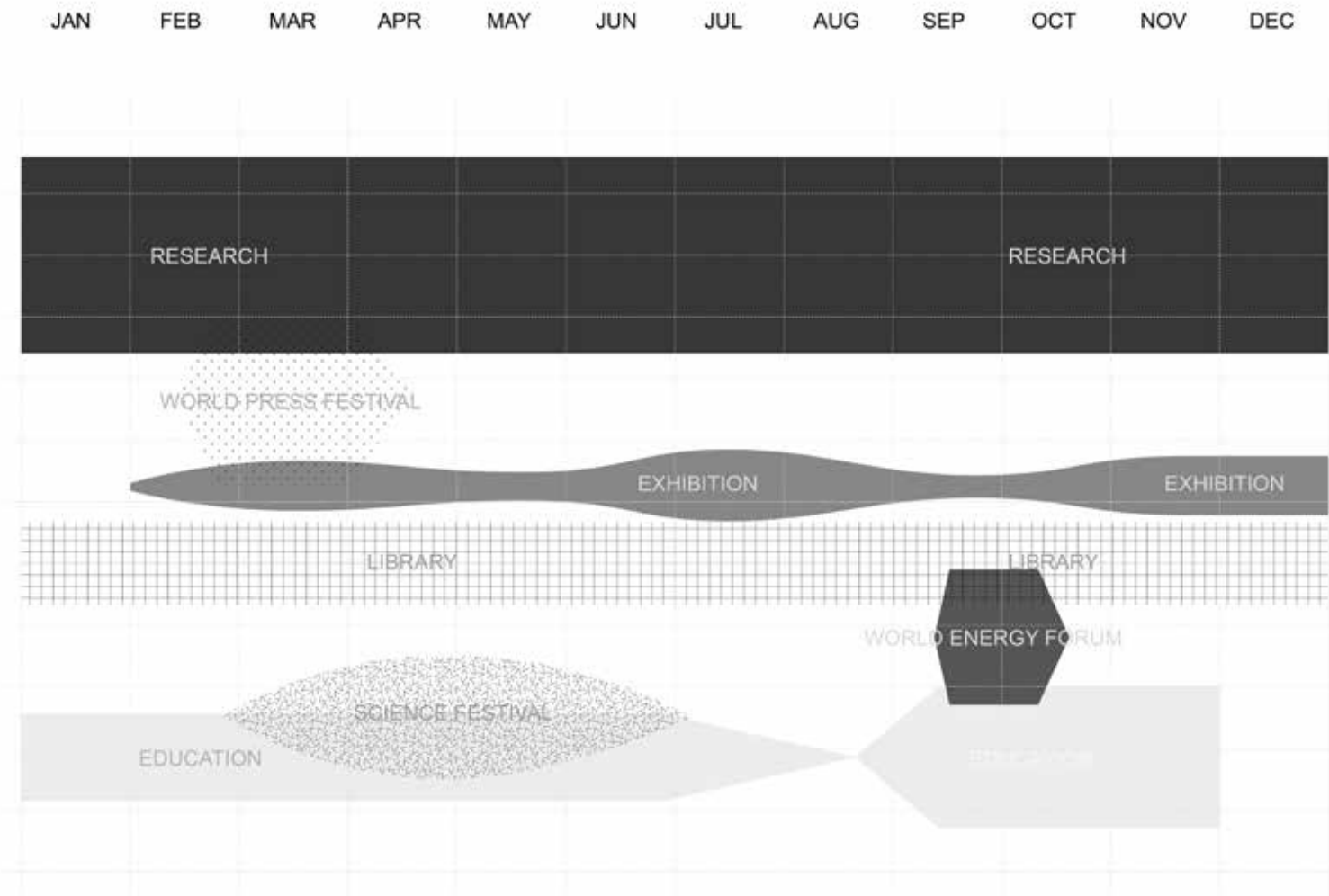
field, transformation of traditional energy processing combining with research and clean energy production, seabirds research center on “new land”, clean energy storage hub on “new land”.



ENERGY/SCIENCE BELT

SAMPLE SCALE

EXPECTED EVENTS



ENERGY/SCIENCE BELT

SAMPLE SCALE

STORIES ABOUT INHABITANTS



Researcher/Programme developer
Bernard

Where do you come from?
USA

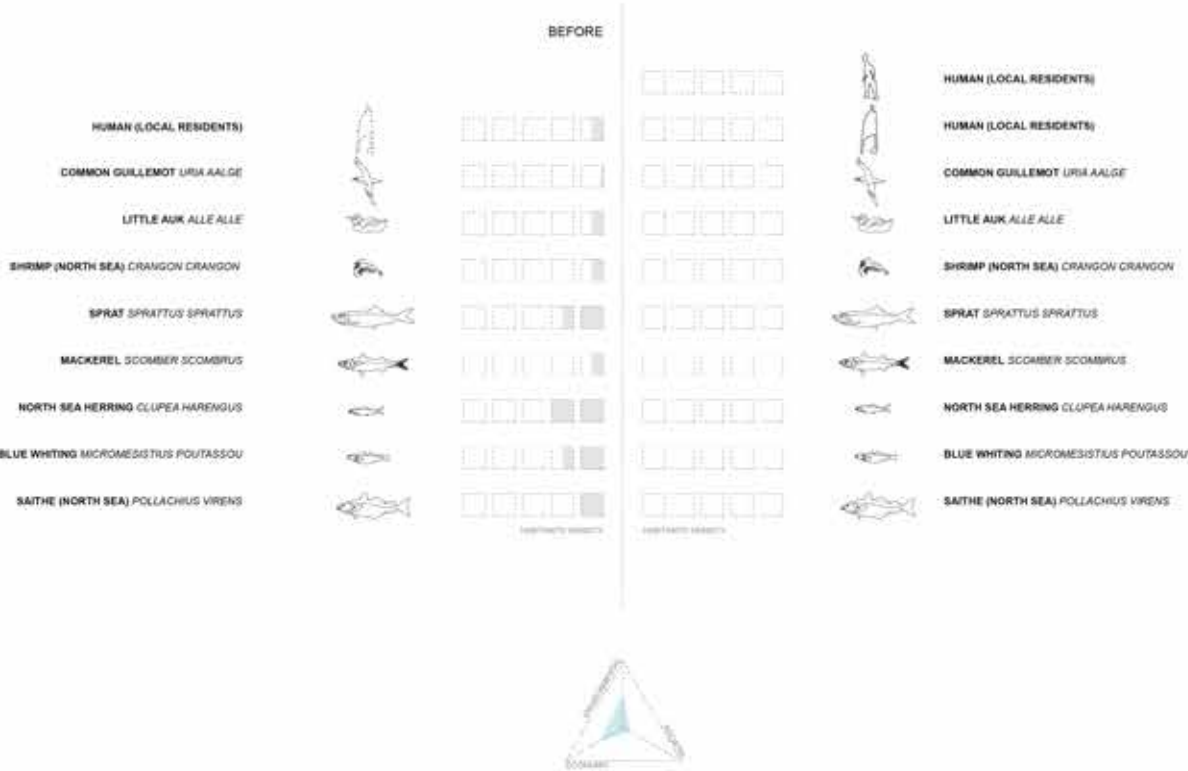
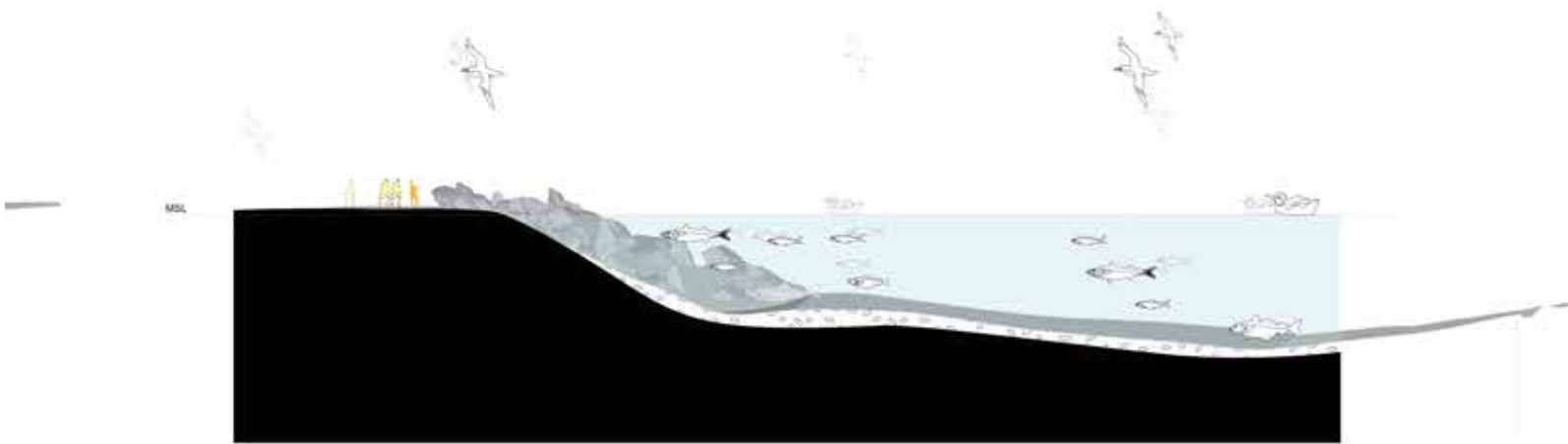
How about your life in Stavanger?
There is an sponsored international cooperation project on clean energy exploitation in Stavager, and the research centre could provide me with the best facilities to carry out my experiment. That's why I decided to come here.



ENERGY/SCIENCE BELT

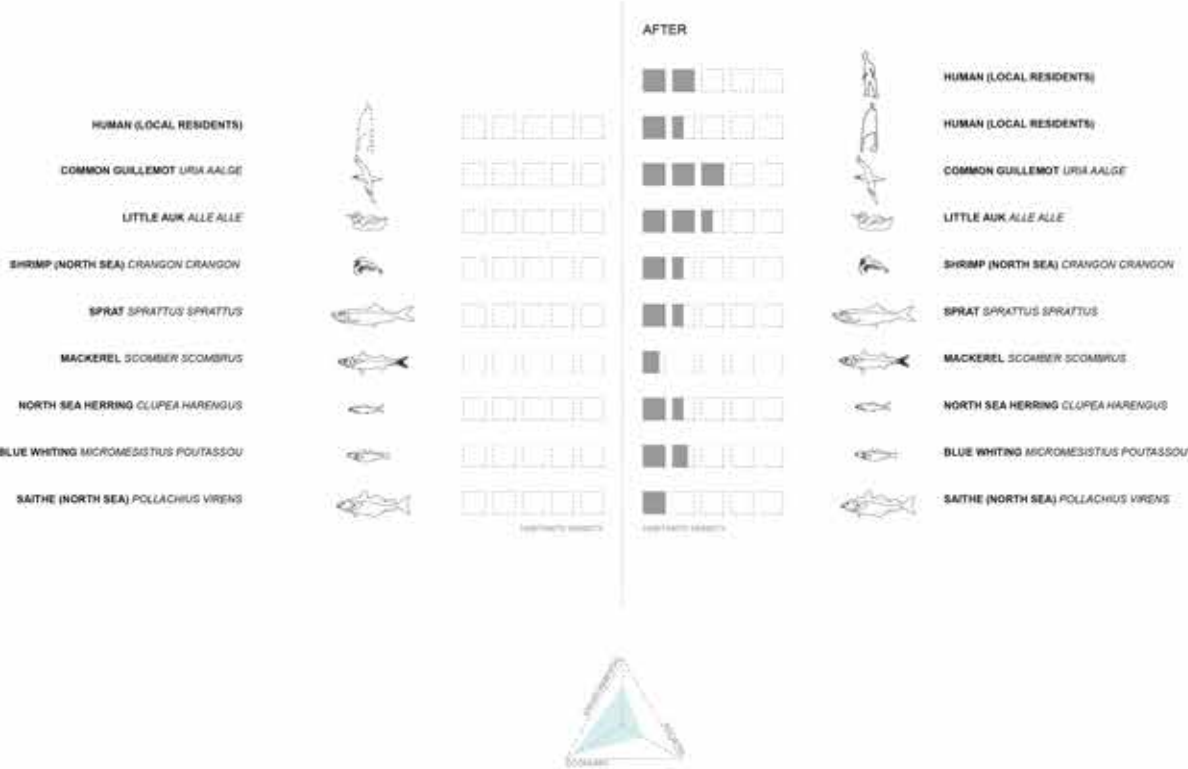
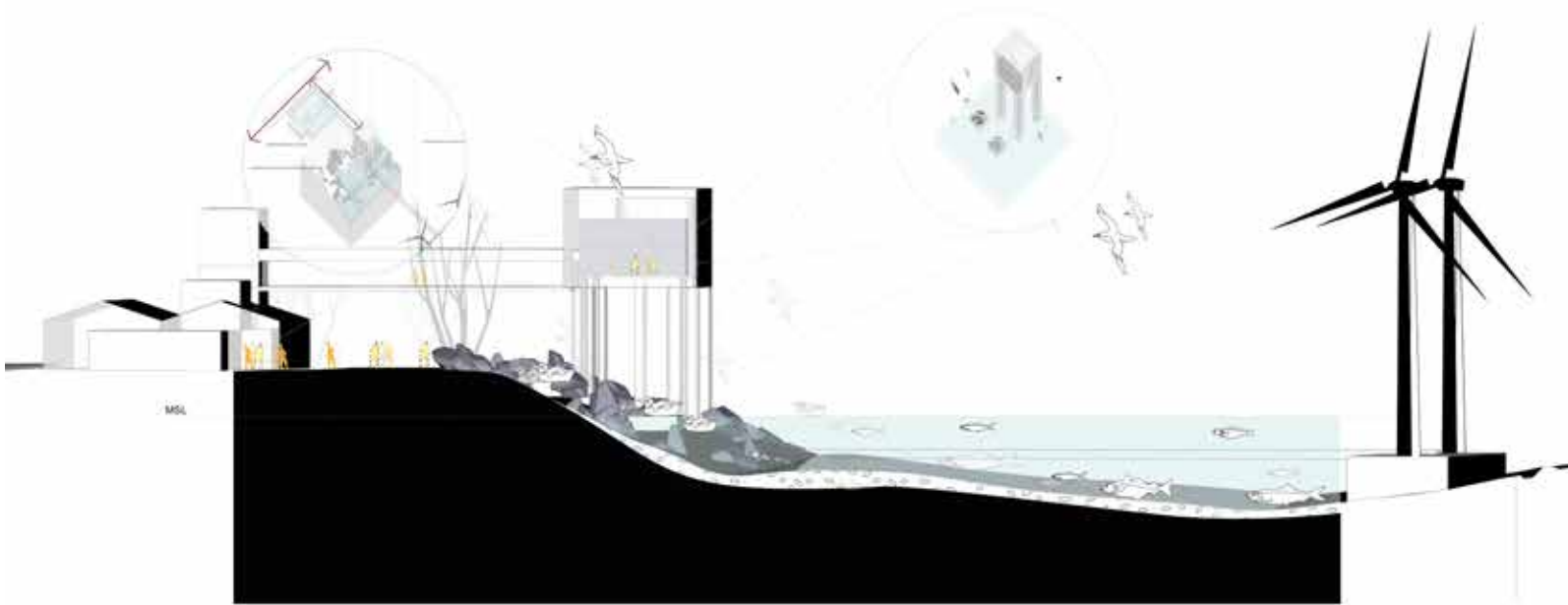
SAMPLE SCALE

EVALUATION



Existing structures on site: Petroleum company, oil factory almost abandoned, large vacant brown field;
Transformation strategies: multi-functioning of business building, redevelopment of brown

field, transformation of traditional energy processing combining with research and clean energy production, seabirds research center on “new land”, clean energy storage hub on “new land”;



ENERGY/SCIENCE BELT

SAMPLE SCALE

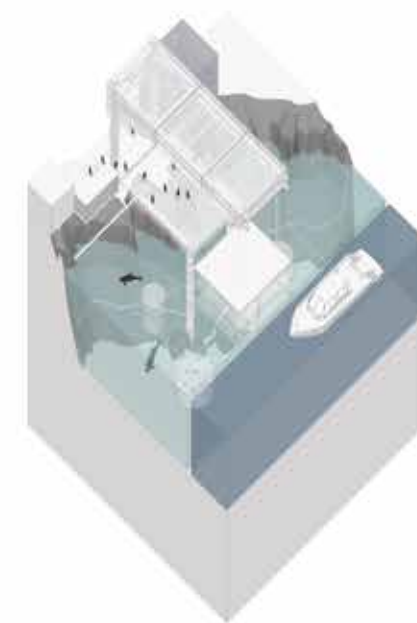
SPATIAL QUALITY



AMPHIBIOUS PATTERNS & COMPONENTS

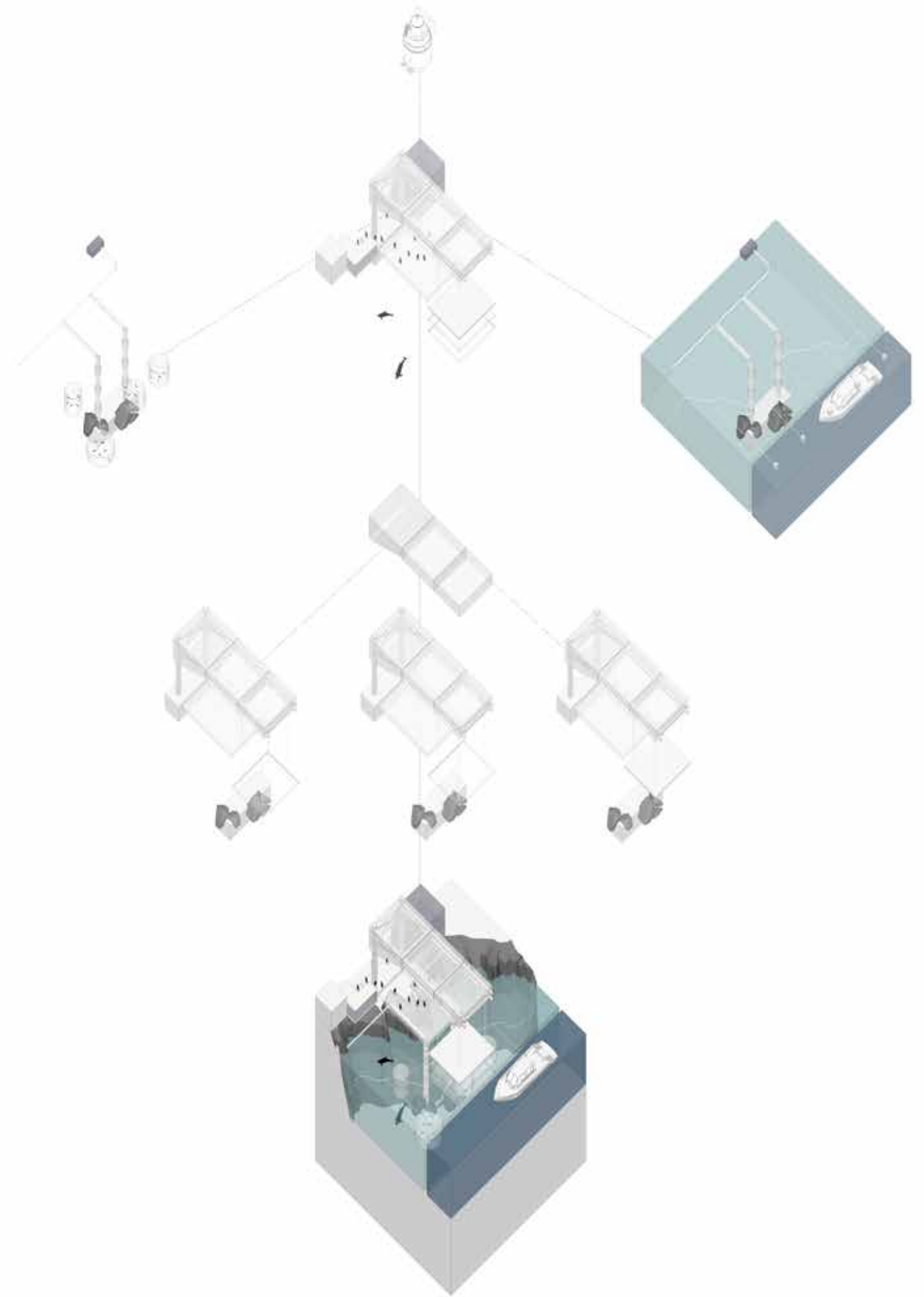
FLOATING PIER

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?



There are 4 main components in this pattern which are the height-controlled hanging pier, the fishery facilities attached to the underwater

structures, the pollution collection devices and the controlling center that could be transformed from cultural heritage.

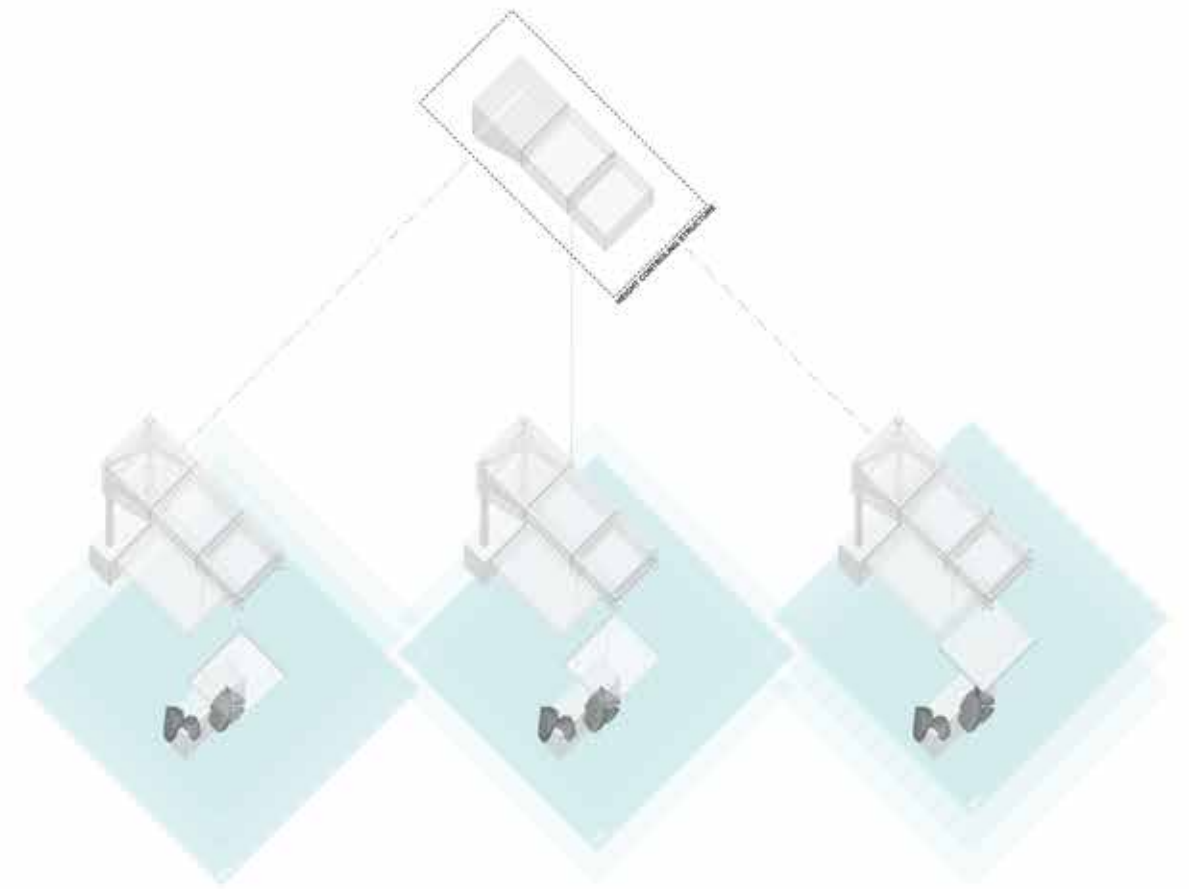


The infrastructure for human mobility in the future should have the quality of taking people to

different water level.



SOURCE: OLAF STAPLEDON «THE DIVERSITY OF WORLDS — CHAPTER V 1917 — 2017»



Abandoned lighthouses on the North Sea Road, most of them are out of use these days. With the sea level dropping, the fine ports for small fishing along coastal areas are replaced by a narrow strip of marsh land, which means these

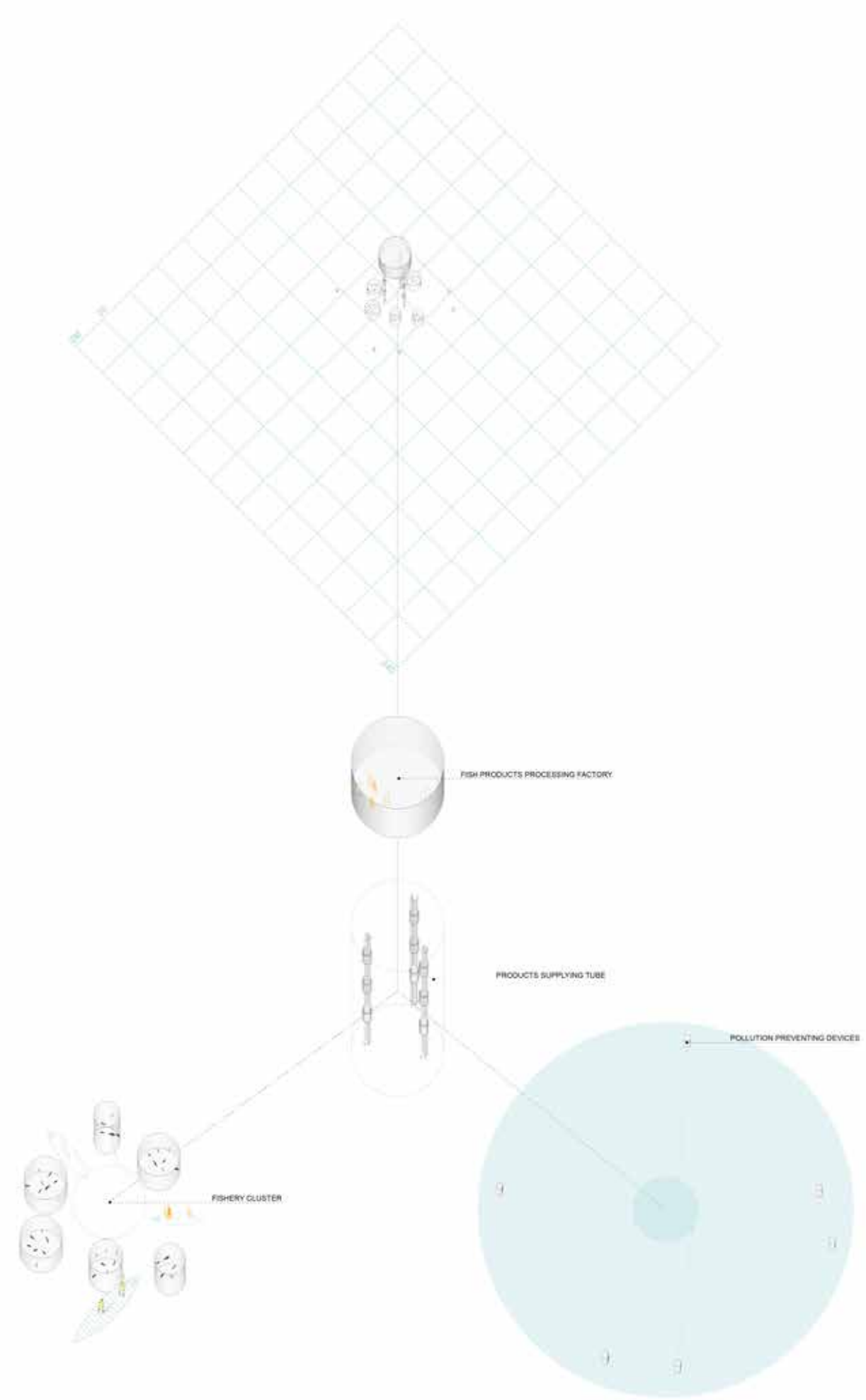
lighthouses could not function as before. a transformation of these lighthouses into a controlling center for fishery and floating pier would be a perfect renovation of cultural heritage.



SOURCE: PHOTOGRAPHED BY FELIN ZHANG, NORWAY, 2017



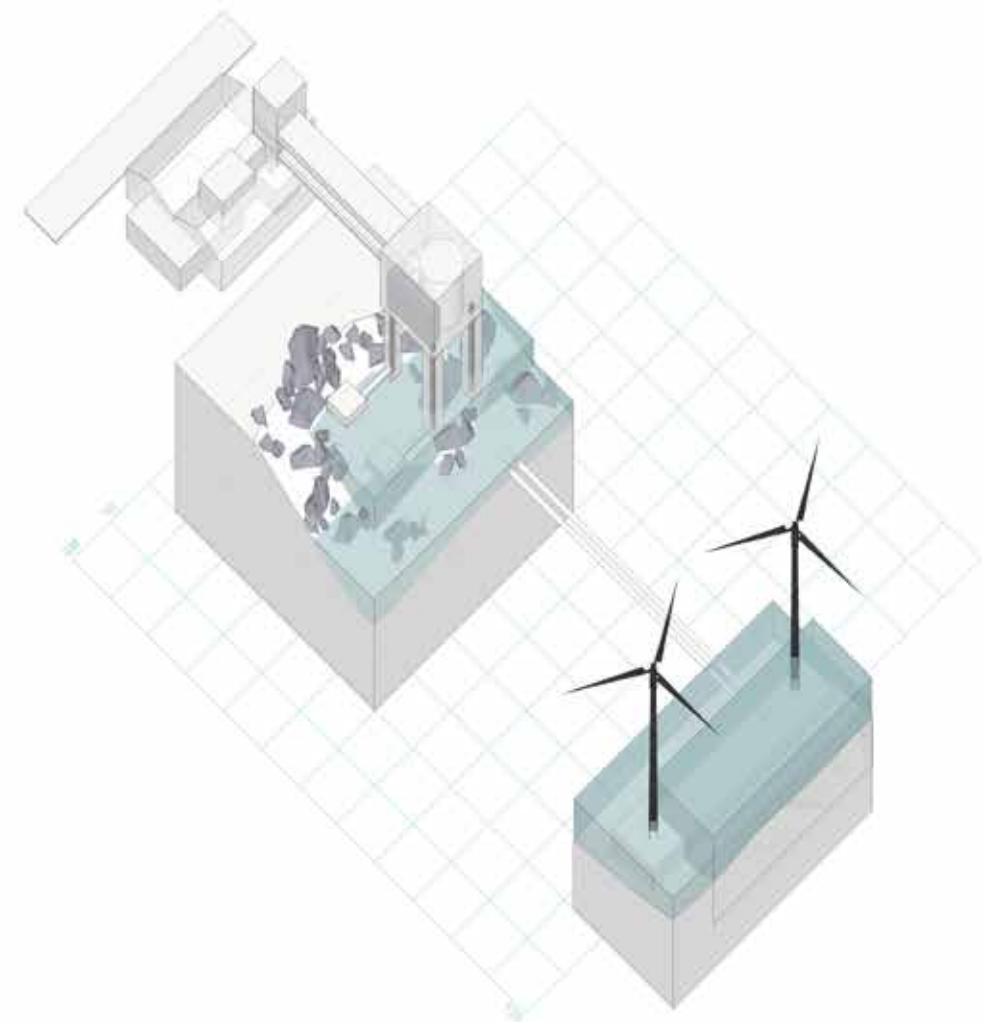
In each fishery unit, there are fishery parts pol-
lutions preventing and collecting parts, transfer-
ing parts and fish products processing part.



AMPHIBIOUS PATTERNS & COMPONENTS

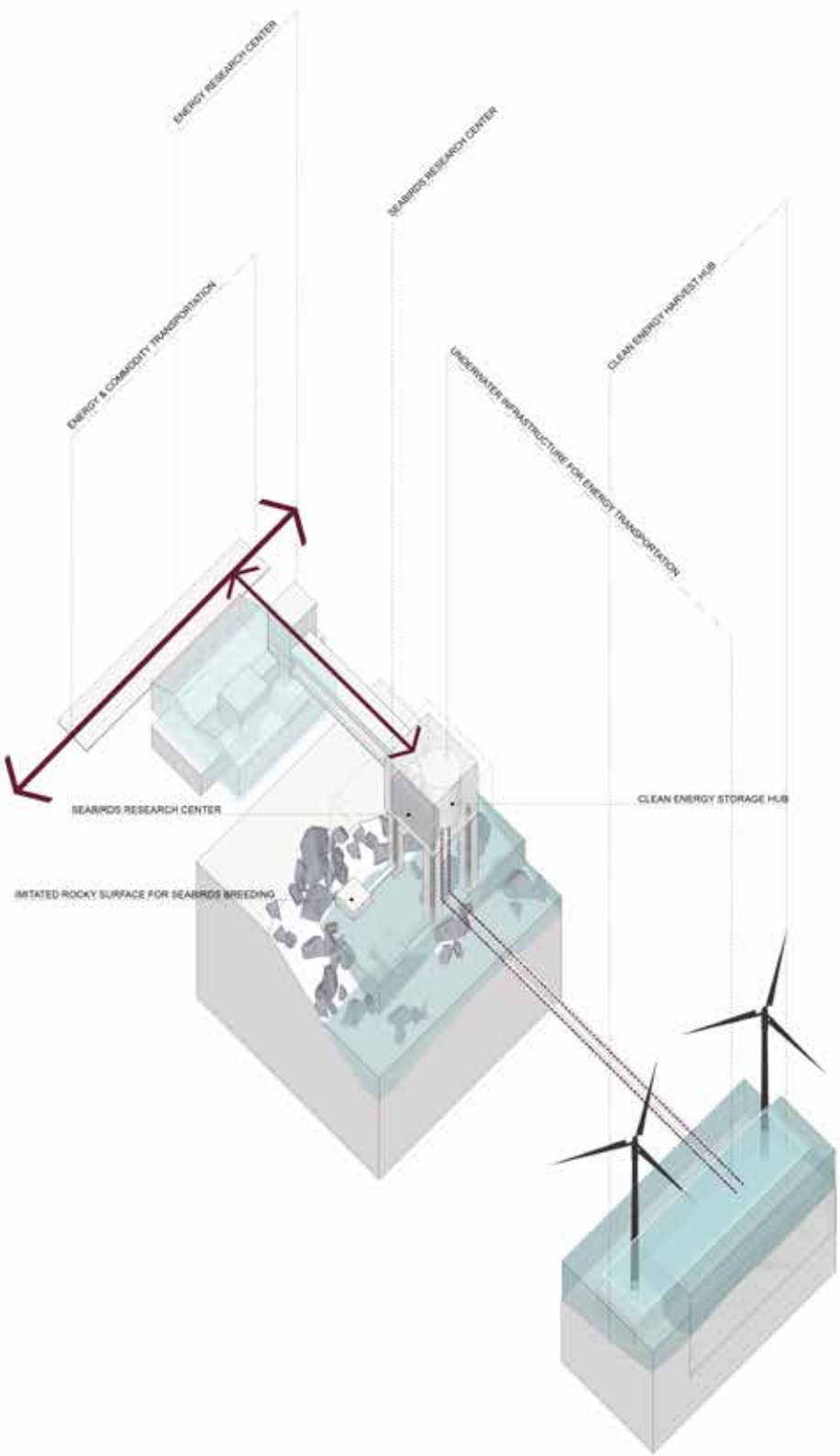
RESEARCH CENTER

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

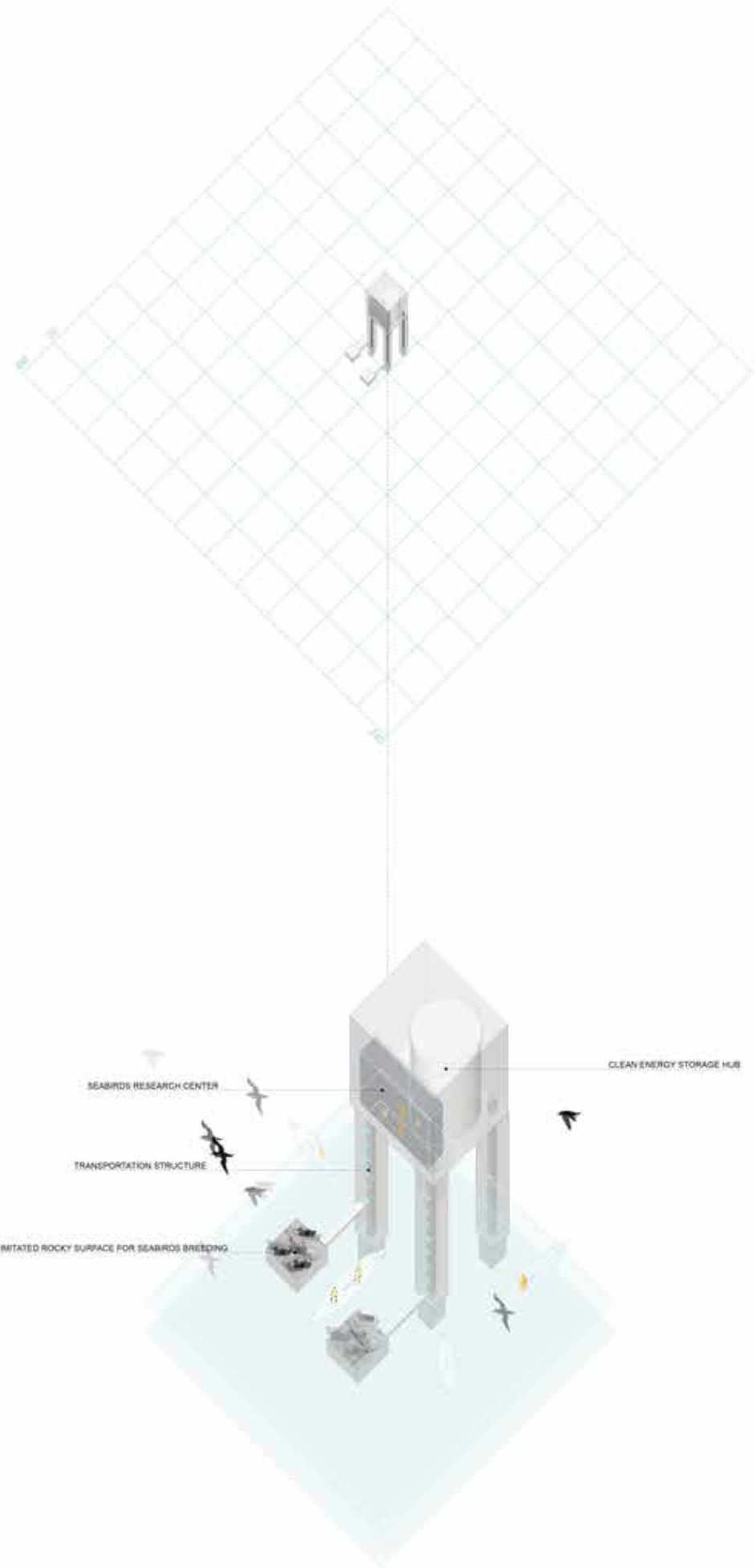


There are 4 main components in this pattern:
the clean energy generating part, the seabirds
breeding and researching center, the clean

energy collection and storing hub and energy
transportation infrastructures.



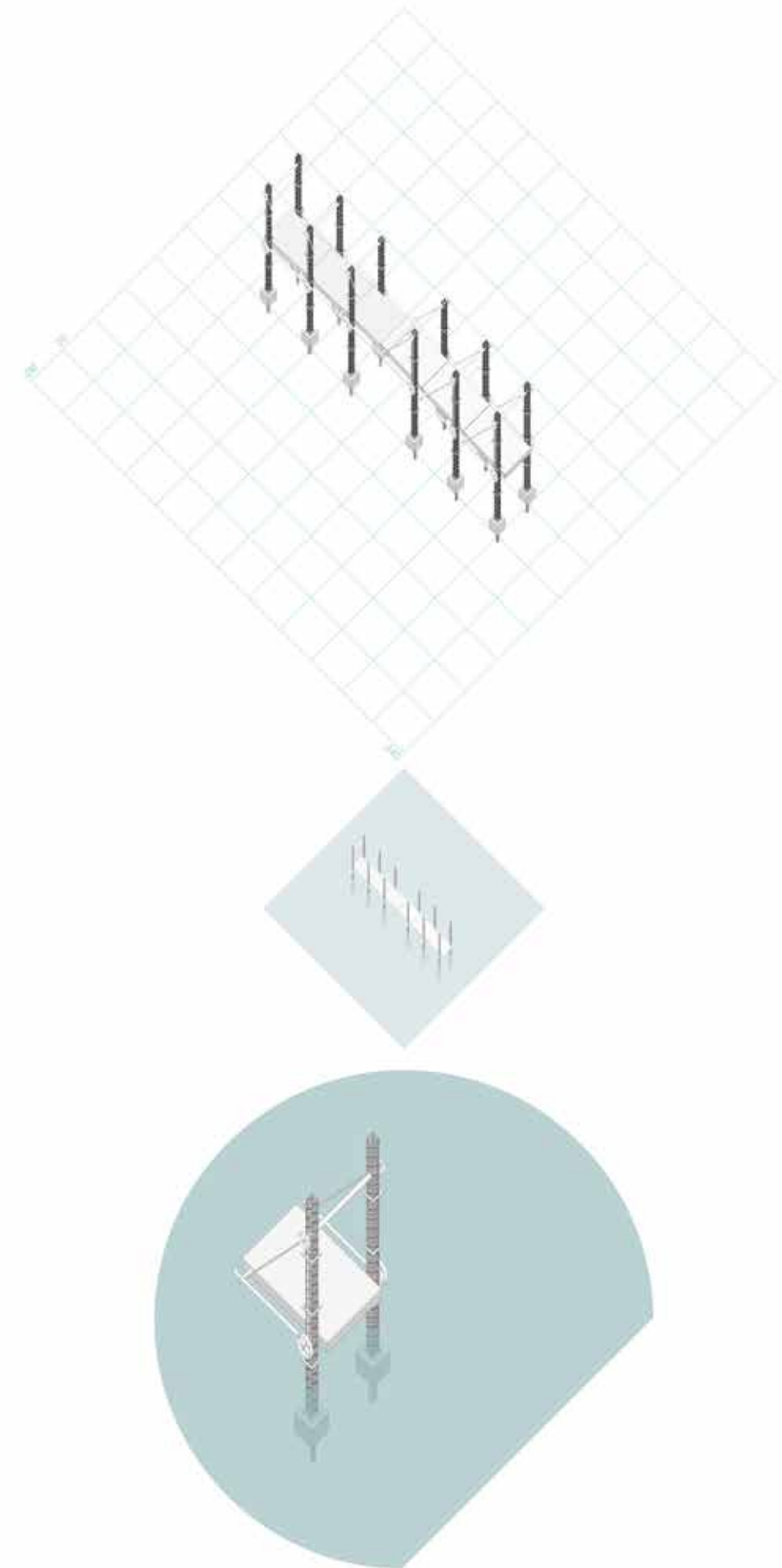
The most important single factor affecting seabird populations is probably food shortages. It is uncertain how strongly commercial fisheries and climate change are implicated in the reduction in the food available to seabirds.



OTHER DETAILS ON SITE

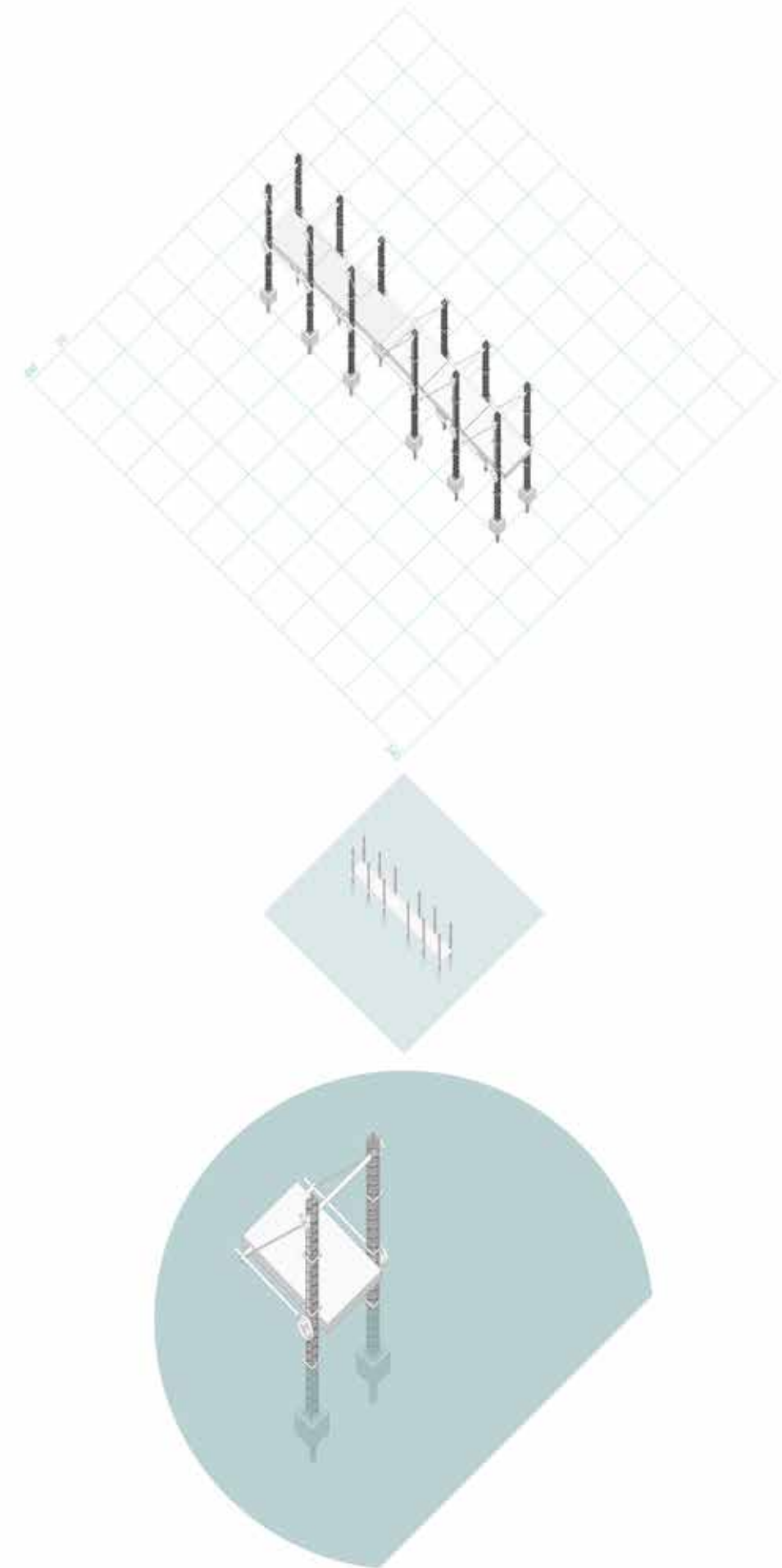
AMPHIBIOUS BRIDGE

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?



The angle and height of each deck on the amphibious bridge could be controlled through digital devices. And datas of sea level could be

collected and transferred to the controlling devices of the bridge. This kind of amphibious will be achieved by advanced technology.



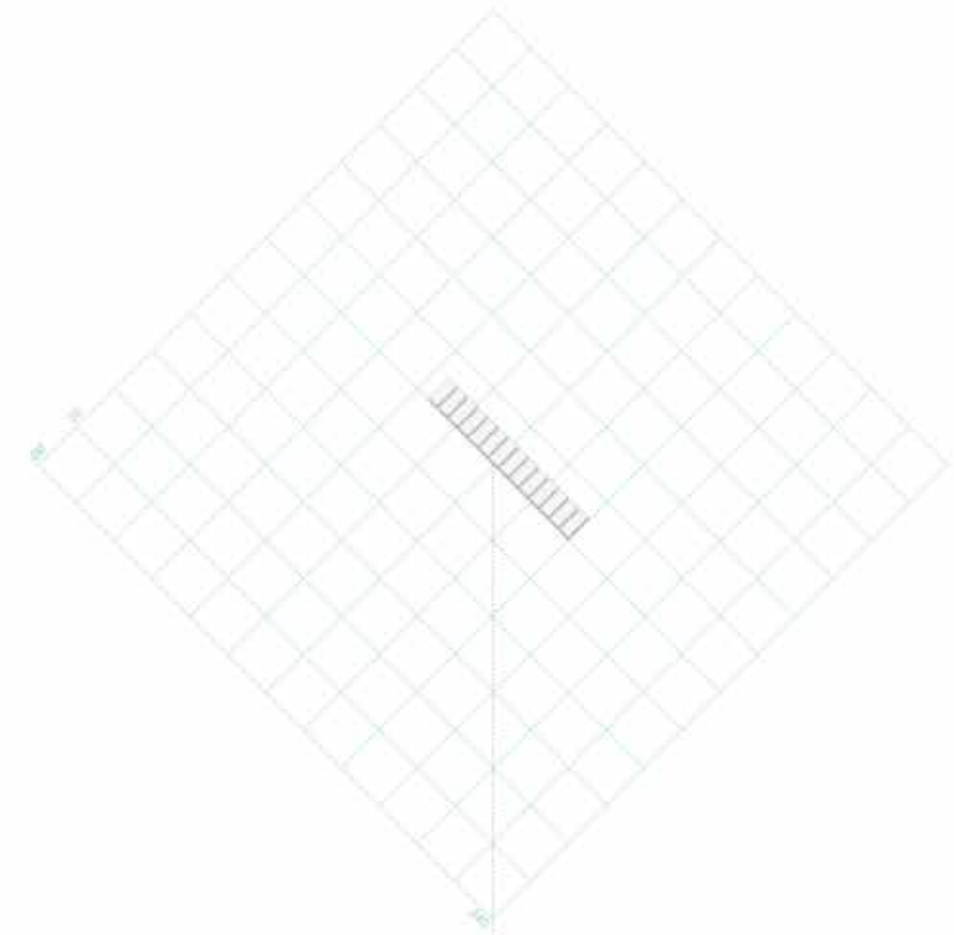
OTHER DETAILS ON SITE

FLOATING PATH

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

This could be transformed into different forms of connection depending on technology. And at certain points, this could even be translated into

a biennial installation art which be floating on water and linking different destinations.



[HTTPS://WWW.VISITLAKEISEO.INFO/EN/VIVI-IL-LAGO/ARTE-E-CULTURA/FLOATING-PIERS](https://www.visitlakeiseo.info/en/vivi-il-lago/arte-e-cultura/floating-piers)
FOTO: LINDOLMOSTUDIO.IT

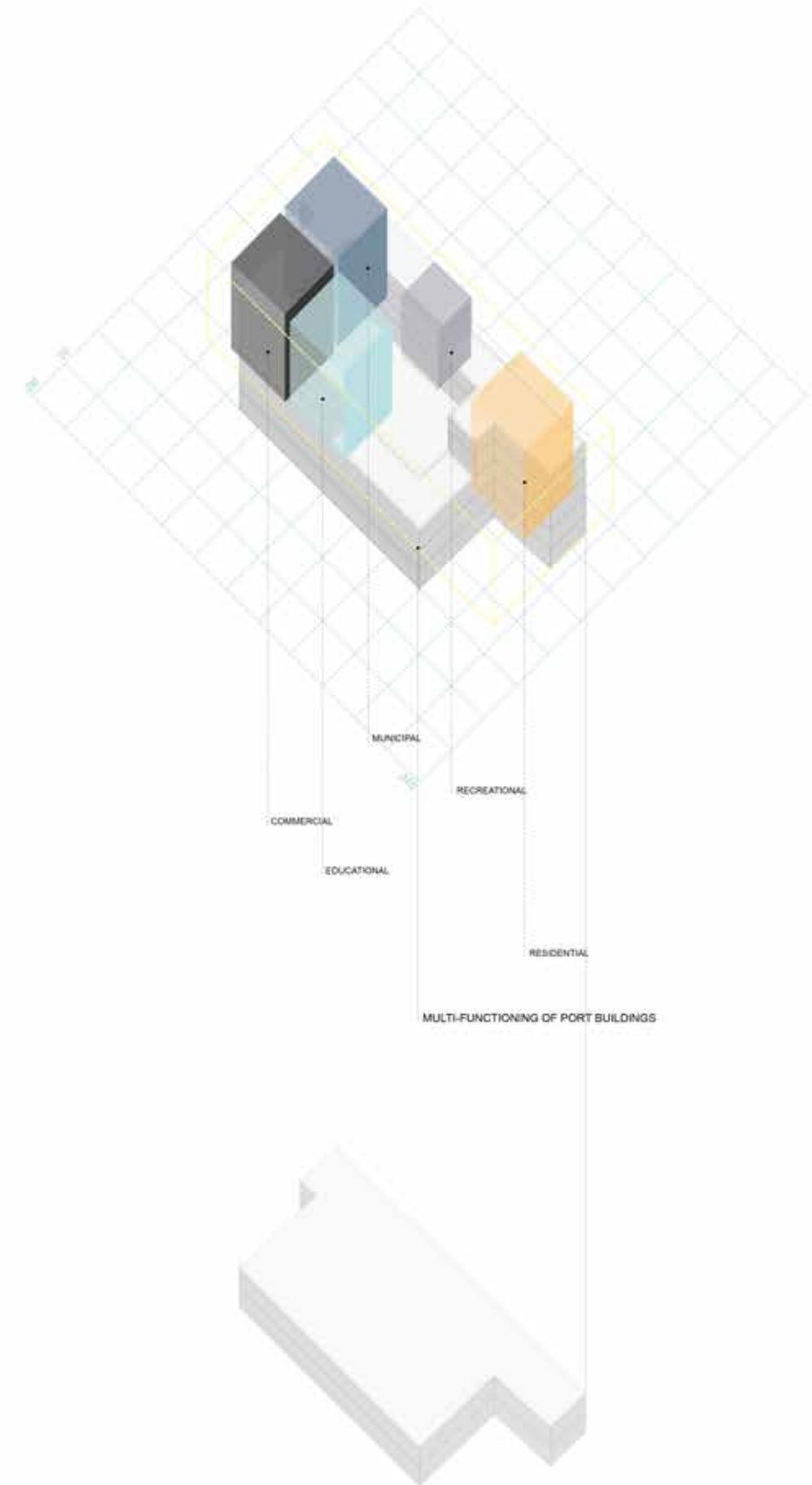
OTHER DETAILS ON SITE

MULTI-FUNCTIONING OF PORT BUILDINGS

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

With the amphibious urbanization on “new land” boosting local economy, the surrounding buildings would be transformed into multi-functional to accommodate more residents, or in other

words, more labour force. And more commercial functions would help contribute to the development of local industry.



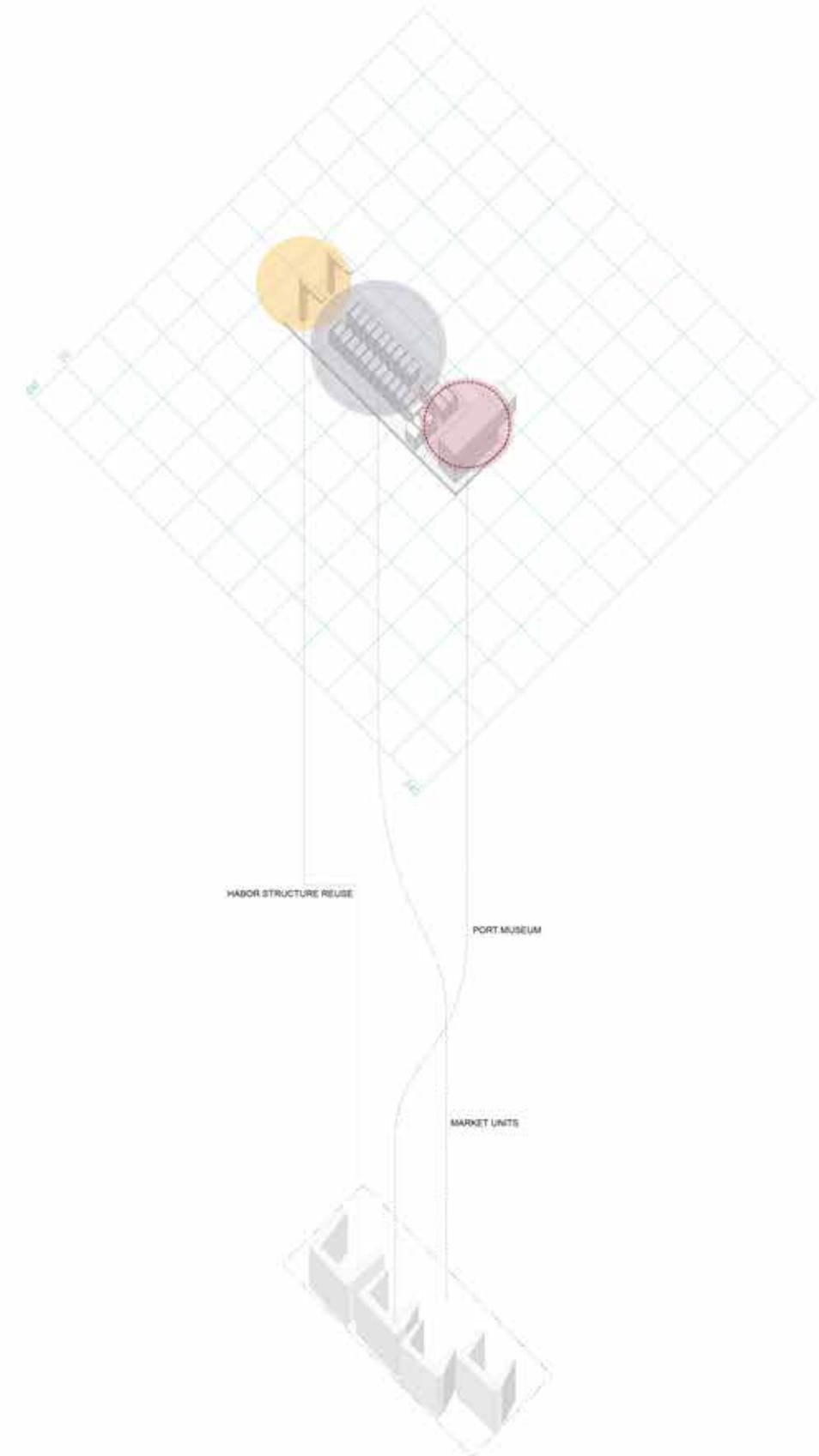
OTHER DETAILS ON SITE

PORT CONSTRUCTION HERITAGE

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

On certain points where there are abandoned port structures, there will be several transfor-

mation and regeneration project to add more vitality to the site.



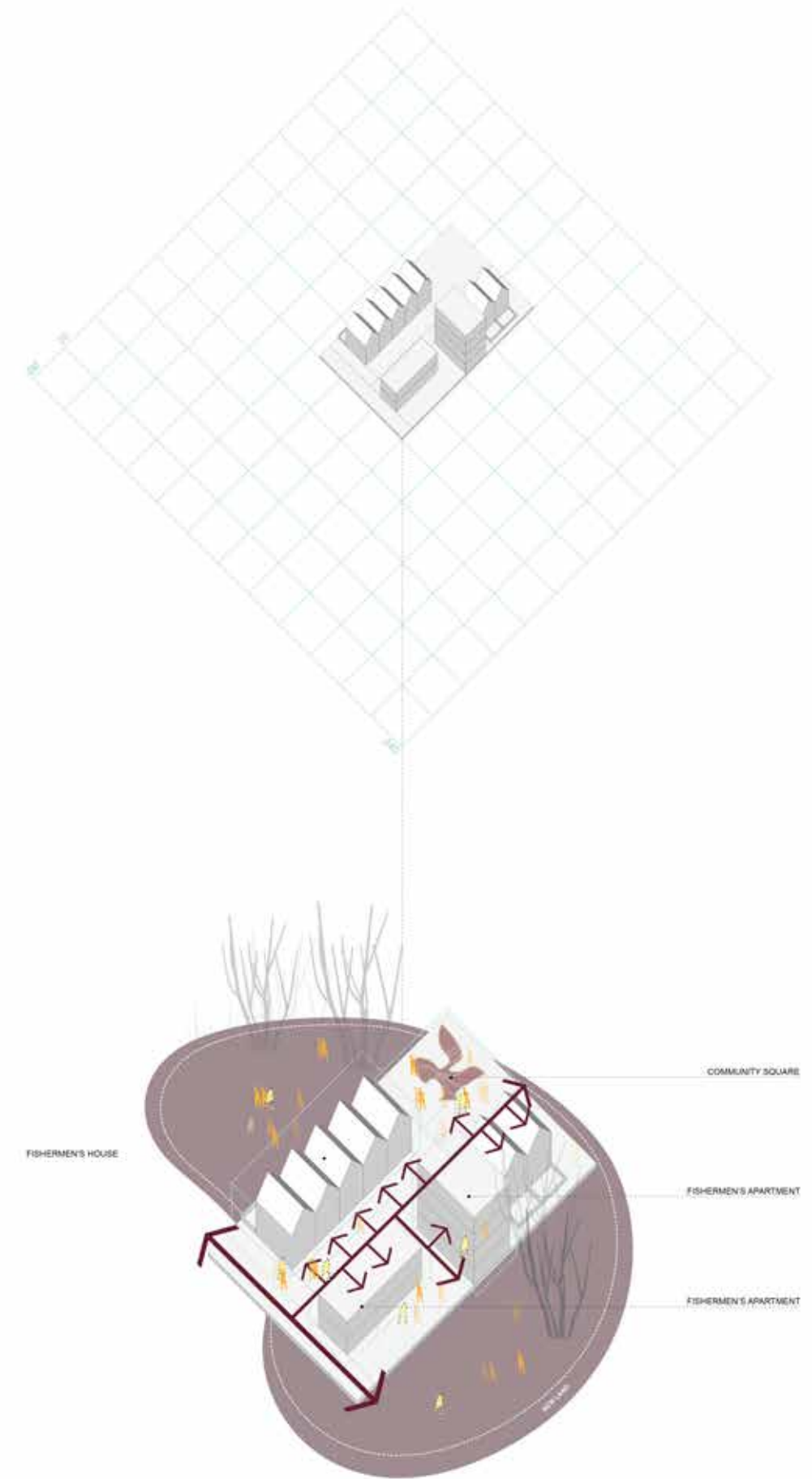
OTHER DETAILS ON SITE

FISHING COMMUNITY ON 'NEW LAND'

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

The scale of urbanization on “new land” will depend on the scale of “new land”. And basic residential and retail functions would be essen-

tial, not to mention the accessibility from main-land to “new land”.



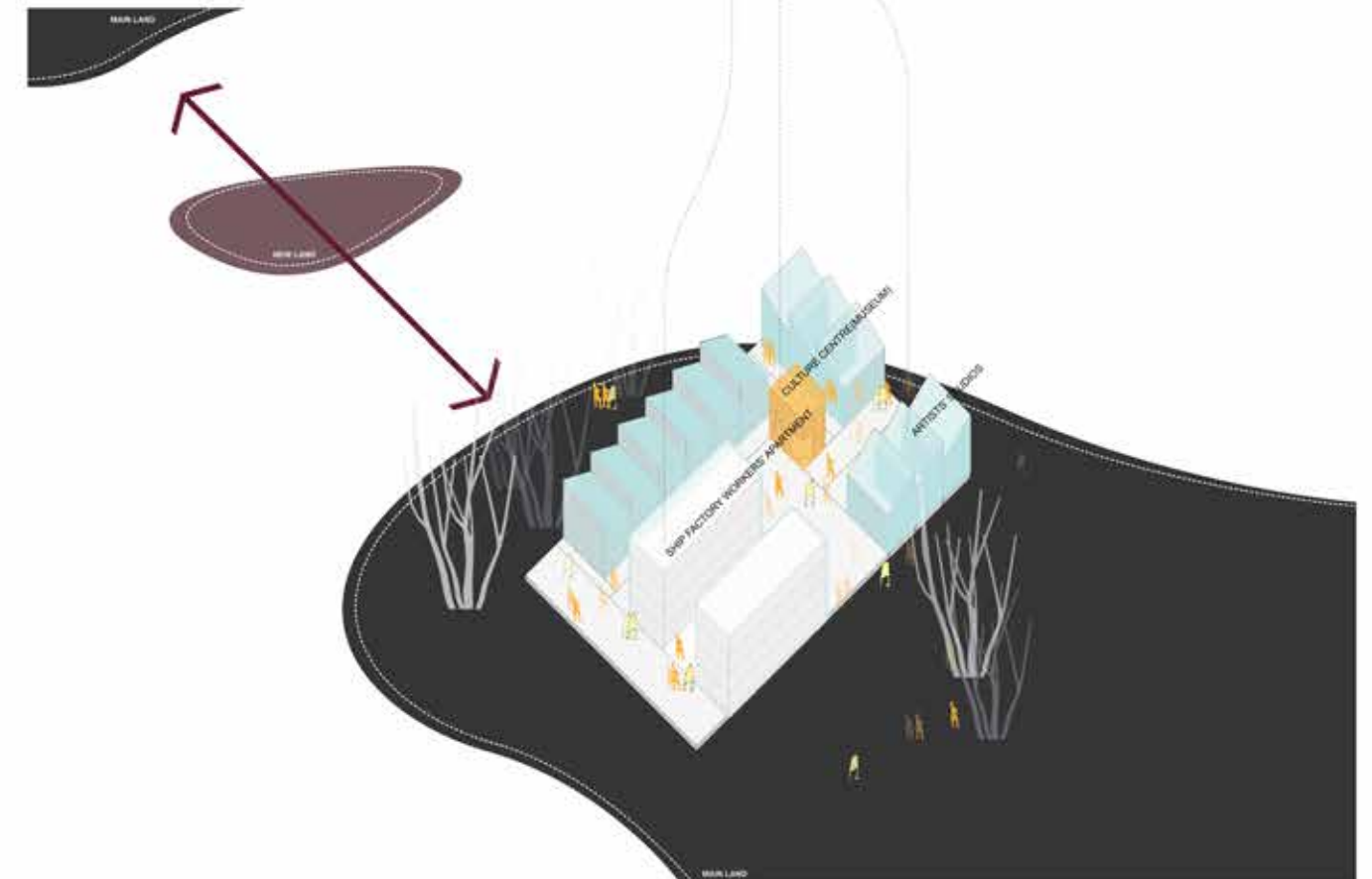
OTHER DETAILS ON SITE

PORT CONSTRUCTION HERITAGE

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

To respond to the amphibious urbanization on “new land” and achieve a synergetic development on mainland, there will be new commu-

nities to accommodate migration on the joint areas where large vacant land could provide an opportunity of urbanization.



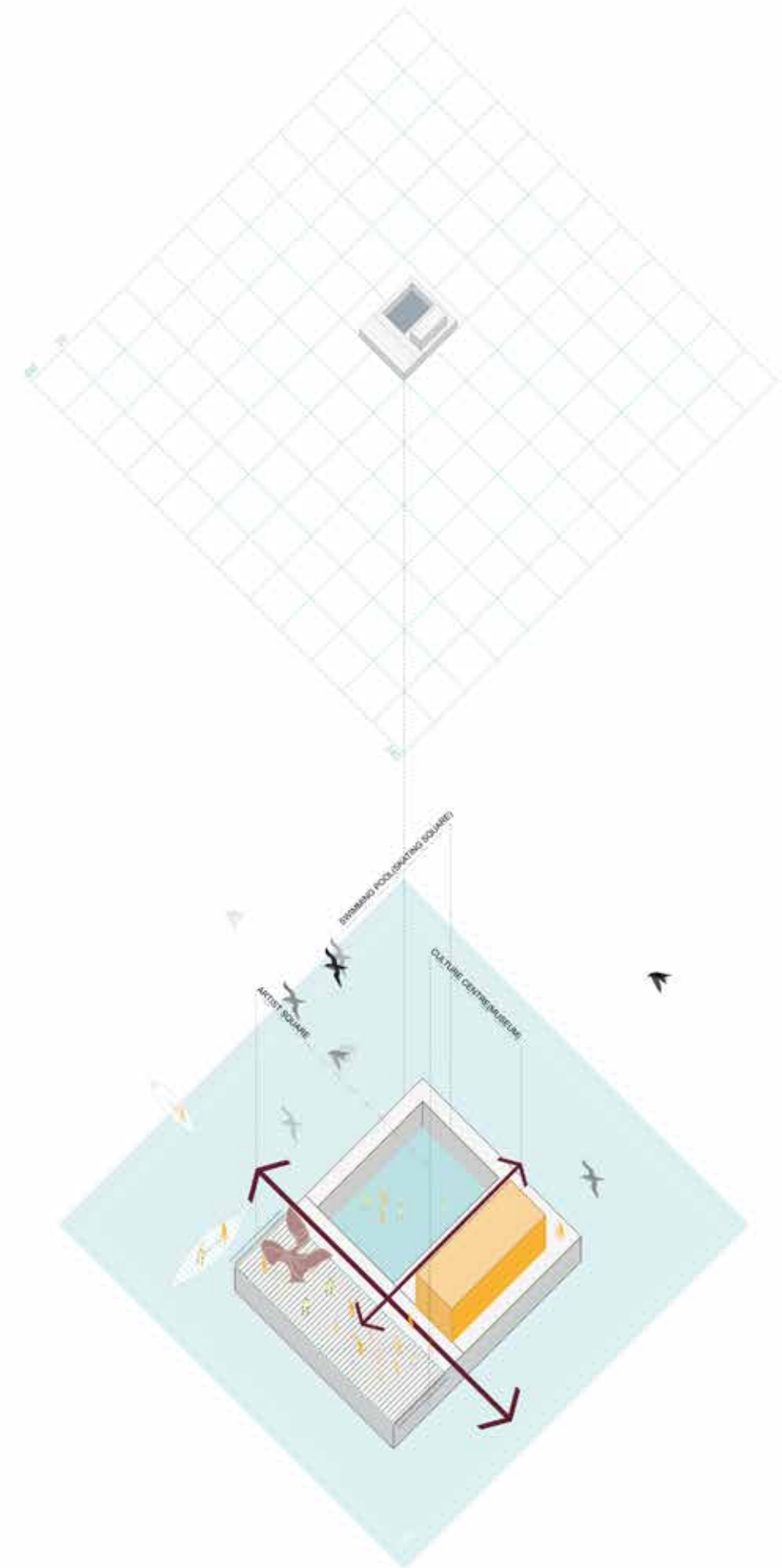
OTHER DETAILS ON SITE

FLOATING ACTIVITY CENTER

HOW TO ACHIEVE AMPHIBIOUS THROUGH DETAILS?

The floating activity center could hold various activities in different seasons, for example swimming pool in summer could be turned into

skating square in winter. And indoor activities and out door activities could both be fulfilled through architecture or sculptures on squares.



PHASING IMPLEMENTATION

HOW TO ACHIEVE LANDSCAPE OF CO-EXISTENCE ON SITE THROUGH TIME?

To achieve amphibious urbanization and holistic transformation on chosen site in order to boost local economy towards 2097, the whole project could be implemented sequentially. The process and representative projects could be divided

into 4 general categories which would be: the landmarks on mainland, amphibious infrastructures to achieve accessibility, amphibious urbanization on “new land”, related transformation projects on mainland.



LANDSCAPE OF CO-EXISTENCE

FINAL VISION

The vast SEA which breeds all the creatures on earth, that is where we belong.

Human intervention will only show respect
and try to take advantage of the NATURAL SUCCESSION process and make its society prosper with least
impact.



APPENDIX

SHARING FLUID GROUND

THE LANDSCAPE OF CO-EXISTENCE BETWEEN HUMAN AND NATURE ON THE “NEW LAND” OF STAVANGER PENINSULA

AR3U022 Theory of Urbanism

Abstract – With the sustained impacts of climate change, and the corresponding effects of post-glacial rebounding, a persistent sea level change continues to affect the countries within the North Sea region. These changes could indicate new threats or opportunities to human society. According to the synthesised datas of historical and current mean sea level from satellite altimetry, and projected sea level in the Fifth Assessment Report (AR5) of the Intergovernmental Panel for Climate Change (IPCC), in the specific case of Norway, people may not worry too much about the influx of sea water to their community. For the vertical uplifting of Earth’s crust after the melting of continental glaciers released the loads is even more decisive than the rising rate of sea level. Although, the changes in projected relative sea level until 2100 are different, depending on different locations, the report also addressed that there are lots of uncertainties lie in the trends of sea level change, especially in such a long period. Take one of the many scenarios as a precondition, which would be the sea level along the coastline of Norway keeps on dropping until the next century, a long and narrow area of marshland which connects the sea and inland mountainous areas revealed. In the circumstance that most countries in the North Sea region are busy dealing with flooding from the sea, this spectrum of ‘new land’ seems more precious. It could be a new opportunity for human settlements, but in the mean time, it is definitely not just living space, or potential urbanisation field for humankind. The land which used to be washed and filled with sea waters was a habitat for maritime species, and good harbour for small fishing vessels of fishermen is now dominated by rocks, salty marsh vegetations, organisms, seabirds, and occasionally visited by human beings. Thus, I wish the city we live in could act like a crocodile, she should have the quality of the amphibious. In this case, the boundary of ‘land’ and ‘sea’ blurs in a harmonious scene of sharing the same space among all the species through time. Time would be the witness of this natural succession on this ‘fluid ground’.

Keywords: Climate Change, “New Land”, Migration, Urbanisation of Land and Sea, Co-existence.

1 Introduction

With the sustained impacts of climate change, and the corresponding effects of post-glacial rebounding, a persistent sea level change continues to affect the countries within the North Sea region. These changes could indicate new threats or opportunities to human society. According to the synthesised datas of historical and current mean sea level from satellite altimetry, and projected sea level in the Fifth Assessment Report (AR5) of the Intergovernmental Panel for Climate Change (IPCC), in the specific case of Norway, people may not worry too much about the influx of sea water to their community. For the vertical uplifting of Earth’s crust after the melting of continental glaciers released the loads could somehow exceed the rising rate of sea level. However, this report as mentioned above, also points out that there are lots of uncertainties lie in the future, especially in such a long period as until the 2100. And the changes in relative sea level can be different among different locations. And in the case of coastal city of Stavanger, the futuristic sea level will probably be rising in a slight rate. However, considering the unique and vital location of this city which is the key link on the North Sea Road from Bergen to Kristiansand which could be indicated in figure 1, in order to seize every possible opportunity for the environmental, societal and economical development in the future, I would like to take one of the many scenarios as precondition, which is the relative sea level along the coast of Stavanger Peninsula would drop until the next century. As a result of the dropping of sea level, a spectrum of long and narrow “new land” along the coastline of Stavanger Peninsula which is delimited by the Gandsfjorden, Boknafjorden, Byfjorden, and the North Sea at present, and consists of the municipalities of Stavanger and Randaberg, and parts of Sandes and Sola would emerge due to the shallow depth of seawater around the Greater Stavanger Region. Although, this might not be a quite stable status within the coastal area, given the circumstance that a lot of countries around the North Sea region are suffering from flooding risk, this possibility could be a more valuable scenario to discuss. This futuristic geographical change would probably redefine the spatial qualities within this

region. And along with it, series of seismic shifts would take place in both natural environment and human society.

2. Research questions

Thus, the main purpose of this paper is to review on supportive theories and methodologies regarding the potential template of utilisation on this “new land”. All the following discussions will revolve around one main research question: How would the potential “new land” which emerges with the changing sea level accommodate the migratory human, flora and fauna populations, thus reshape the landscape of co-existence on the coastline of Stavanger Peninsula? To make it more specific and tangible, and with the intention of focusing on certain key elements for the development of this area, I would split the main research question into several sub-research questions categorised in the following three dimensions:

2.1 Environmental changes

Within this dimension, I would mainly research on:
First, the climate-related questions:
What are the main environmental driving forces for the changes in sea level in Norway?
As one of the many driving forces, what are the changing trends in the temperature of sea water until the next century?
What are the changing trends in the flow of air which would affects wind and tide and bring storm surge to the Stavanger Peninsula?
What are the changing trends in the precipitation amount in the city of Stavanger which is the most populous area in this region?
Second, the geographical questions:
What is the status of the submarine topography in the Stavanger Peninsula and its meaning to the coastal municipalities?
What are the soil conditions which includes PH value, moisture content physical state and construction capacity, etc. along the coastline of Stavanger Peninsula?
Finally, the ecosystem-related questions:
What are the status and changing trends of the occupation of vegetation within this area?
What are the status and changing trends of the maritime species within these waters?

Second, the geographical questions:

What is the status of the submarine typography in the Stavanger Peninsula and its meaning to the coastal municipalities?

What are the soil conditions which includes PH value, moisture content physical state and construction capacity, etc. along the coastline of Stavanger Peninsula?

Finally, the ecosystem-related questions:

What are the status and changing trends of the occupation of vegetation within this area?

What are the status and changing trends of the maritime species within these waters?

What are the changing trends in the migration of flora and fauna in the Stavanger Peninsula?

How would the “new land” emerged in the Stavanger Peninsula accommodate the migratory flora and fauna?

2.2 Societal changes

In the societal dimension, the emphasis will be on the migration of the population driven by climate change directly or indirectly:

If they are going to settle on the “new land” in Stavanger Peninsula, where are they come from?

If the local residents are moving out of this region, what are the reasons that push them away?

How would the “new land” emerged in the Stavanger Peninsula accommodate the immigrating human population?

2.3 Economical changes

In the economical dimension, I would focus on the pillar industry of Norway which is fishery, and it is essential and inevitable that the transition in this industry has an intense interaction with the migration of people who involve in this industry.

So the question would be: what is the changing trends in the fishing industry and how does that relate to the changing in environment and society?

2.4 Reactions

Based on all the changeable conditions, how would the city and ecosystem react to that? What kind of new urban form or landscape will reveal itself to us?

3 Theoretical framework

In the last section, series of questions related to the

utilisation of the emerged “new land” in the Stavanger Peninsula are put forward. And in this section, some relevant literatures and works would be presented and discussed to explore the potential developing direction of the projected area.

There is a study in European Parliament “set out to examine the legal and policy aspects of climate and environmental related displacement. It assesses to what extent the current EU framework for immigration and asylum in general and the specific instruments in regard to asylum in particular already offer adequate response to climate induced displacement and how the legal framework could evolve in order to provide an improved response to the phenomenon of environmentally induced migration” (Albert, et al., 2011). And this was after the American director Michael Nash released his documentary Climate Refugees. People have become more and more aware of the impacts that climate change would bring to human society.

However, in the global setting, Norway will probably not join the group of countries which are threatened by the rising sea level, at least for the next decade.

It's common consensus that the topography near the coastline is quite steep which makes the famous and unique fjord-scape in the coastal areas of Norway, and the rock types also make the coastline resistant to erosion. In addition to this, the glacial isostatic adjustment(which was once called post-glacial rebounding) process caused by the melting large ice sheet results in the ongoing uplift of land surface. It seems quite reasonable that this uplift process will act to compensate the rising rate of future sea level which would suggest that Norway has a generally low physical vulnerability to sea level rise (Aunan and Romstad, 2008). Even if this general perception may be true, there are still several reasons to gain more information about the changing trends of future sea level and their associated risks. Firstly, not all parts of the coastline of Norway could escape from the rising of sea level, as highlighted in a national vulnerability assessment, some low-lying coastal areas of Norway like Stavanger will probably face double flooding pressure from both the sea and the sky. And considering their important cultural and economic value, human interventions would

rise (Aunan and Romstad, 2008). Even if this general perception may be true, there are still several reasons to gain more information about the changing trends of future sea level and their associated risks. Firstly, not all parts of the coastline of Norway could escape from the rising of sea level, as highlighted in a national vulnerability assessment, some low-lying coastal areas of Norway like Stavanger will probably face double flooding pressure from both the sea and the sky. And considering their important cultural and economic value, human interventions would be required to preserve what needs to be preserved (Aunan and Romstad, 2008). Secondly, it is prudent to take the trends of changing climate into account in planning, adaptation design or policy making process. We note that many of Norway's major cities are located along the coast and, more and more if they are seeking for an extended urbanisation opportunity towards the sea nowadays which may not only literally mean the urbanised area on “land”, but means the circulation of oil, commodities and data that are using the ocean space to bind our world together. (Neil and Christian, 2011) Thirdly, even if Norway may be at low risk comparing to other countries, setting up a framework for how to apply the IPCC projections on local scale is crucial and may also provide a practical example. (Matthew, et al., 2015)

The “new land” given back to the all the creatures on land by the sea would be salt marshes which is an important element in coastal systems, providing habitat to certain specific vegetation species and invertebrate communities (Irmiler et al. 2002), and also providing ecosystem services like hosting large numbers of migratory birds (Van Eerden et al. 2005; Laursen et al. 2009) and contributing to the coastal defence against flooding from the sea (Moller 2006; Temmerman et al. 2013; Moller et al. 2014).

The potential natural performance is there to behold. What about human society? Can we manage to co-exist in a harmonious way with all the other species in natural environment? Can this “new land” actually provide a sense of belonging (Jack, 2017) to the inhabitants who are probably migrants from somewhere else on this territory?

Well, Ian McHarg would suggest human beings to abandon their sad arrogance of ignorance and introduce a mood of reasonable inquiry, then circumspection will temper our indictment and we can reinterpret the stories. (Ian, 1969)

The editor in chief of Harvard Design Magazine, Jennifer Sigler (2014) has a very interesting and inspiring opinion:

If we are surrounded by water as swimmers and made of water as humans, why do we collectively “fight” water's power? How can we unlearn our binary, dichotomous relationship with the ocean? To let wet matter... “Wet Matter” began as a conversation about a continent. Why, asked Pierre Bélanger, is land always expressed as an absolute shape—a figure situated in the void of “not land”? Why this insistent focus on the dry, when in fact, the wet world with which land lives is itself matter, and the boundaries between the two are dynamic and evolving?

The above saying could possibly make us think more about the potentials lie within the sea and the relationship between land and sea. Lots of architects and urbanists have been working on the imaginary projects such as the floating city. Now, since the “new land” could possibly present itself to us, why couldn't we design a city which has the quality of the amphibious and could act like a crocodile adapting to the changing sea level in the future?

4 Methodology

Design with climate and corresponding changes requires a series of systematic methods :

The first and basic step would be system analysis. By collecting and organising physical and geographical informations and datas of the site through several systems, a relatively profound understanding of the context should be achieved.

Then observing and interviewing are also important. In this specific project which estimated to take place in Norway, I prefer cycling, photographing and interviewing along the whole southwest coastline from Bergen to Kristiansand, so that the first-hand information regarding the life style in these coastal municipalities could be collected.

After that basic understanding of the project site, I could understand more profoundly about the physical condition of the intervention site through modeling, both physical and digital.

In the whole process, literature reviewing and case studying to learn more about the historical and cultural contexts of the site will always be necessary.

Only after all these processes above, I may begin with the design part which would consist of five steps in a gradually developing sequence: brainstorm, conceptual design, schematic design, developed design and finalised design. Maps can be one of our most powerful tools in changing humans' understanding of the ocean. By depicting the Earth as an interconnected ecosystem, with land and ocean mutually dependent,

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The final step would be implementation feasibility analysis which would help to test the implementation feasibility of the whole design project.

5 Conclusion

On the JACOBIN magazine's official website, an article called If We Fail written by Christian (2017) says:

In the near term, perhaps starting in the 2020s or 2030s, the foremost problem will probably be a new climate-driven urban crisis of disinvestment, abandonment, and depopulation caused by rising sea levels and large inundating storms that will leave rotting urban infrastructure. As the water rises and the floods increase in severity and regularity, the once posh shoreline will be the new ghetto.

This sort of worry may be quite common in the circumstance of the incremental frequency in climate-related catastrophes. What we as human beings ought to do is to implement more and more environmental-friendly gestures in our daily lives. Everyone should play a role in control damage and reduce consumption. As an urbanist, I would like to respect the natural processes and in the mean time ensure the living quality would improve for human and the other species as well.

Thus, ideally, the urbanisation towards the sea would be a brand new mode which could be adaptable to future sea level and provide a sense of belonging to the groups of living creature who habitat within.

6 Recommendations and further research

After all the reviews and discussions above, I would continue exploring on the alternative design of amphibious urbanisation and landscape of co-existence along the coastal areas. With the rapid development

in technology, the boundary between land and sea is blurring which means we should open our mind and seize every potential for future existence.

APPENDIX REFERENCE

The main intention of the Delta Intervention graduation studio 2017-2018 is to research on the landscape and built environment in transformation within the special context of North Sea, to build with changes, to breakthrough limits, to explore projects. The North Sea is more than just a vast area of waters, but also a potential field for the events of human and non-human existence.

CLIMATE CHANGE & SEA LEVEL

With the sustained impacts of climate change, and the corresponding effects of post-glacial rebounding, a persistent sea level change continues to affect the countries within the North Sea region. These changes could indicate new threats or opportunities to human society. According to the synthesised datas of historical and current mean sea level from satellite altimetry, and projected sea level in the Fifth Assessment Report (AR5) of the Intergovernmental Panel for Climate

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Change (IPCC), in the specific case of Norway, people may not worry too much about the influx of sea water to their community. For the vertical uplifting of Earth’s crust after the melting of continental glaciers released the loads is even more decisive than the rising rate of sea level. Although, the changes in projected relative sea level until 2100 are different, depending on different locations, the report also addressed that there are lots of uncertainties lie in the trends of sea level change, especially in such a long period.

CLIMATE CHANGE & MIGRATION

Think about butterfly effect, even one sole simple change would have enormous effects, not to mention the rising temperature brought by global warming. In the specific case of Norway, the rising temperature in sea water has become the driving force of the migrating of certain fish species which are used to habitat or spawn in colder water. Furthermore, the migration of these species could cause the migration of other fauna and human communities.

SEA LEVEL & NEW LAND

Take one of the many scenarios as a precondition, which would be the sea level along the coastline of Norway keeps on dropping until the

next century, a long and narrow area of marshland which connects the sea and inland mountainous areas revealed. In the circumstance that most countries in the North Sea region are busy dealing with flooding from the sea, this spectrum of ‘new land’ seems more precious. It could be a new opportunity for human settlements, but in the mean time, it is definitely not just living space, or potential urbanisation field for humankind.

NEW LAND & NEW MODE OF URBANISATION

The land which used to be washed and filled with sea waters was a habitat for maritime species, and good harbour for small fishing vessels of fishermen is now dominated by rocks, salty marsh vegetations, organisms, seabirds, and occasionally visited by human beings. Thus, I wish the city we live in could act like a crocodile, she should have the quality of the amphibious. In this case, the boundary of ‘land’ and ‘sea’ blurs in a harmonious scene of sharing the same space among all the species through time. It could accommodate the migrating populations properly and provide them a sense of belonging. Time would be the witness of this natural succession on this ‘fluid ground’.

APPENDIX SOCIETAL & ETHICAL PARAGRAPH

According to reliable source of information(UDI), the number of asylum seekers arriving in Norway drops by 95% since 2016 which they called refugee crisis. This fact has already caught the attention of certain human right organisations. It seems like this country is becoming more and more inhospitable to immigrants. But, the paradox is that the whole country is now facing a severe problem of minus growth in population.

The ageing population results in a shortage in labour force. Maybe the growing frequency in terrorism has lead to Norway's harsh immigration policies. But simply shut down its open gate to immigration won't do good to anybody. Not to mention that immigrants does not equal to terrorists. A mature reviewing mechanism towards immigration would certainly have positive effects on social stability.

APPENDIX REFLECTION

— What does the memory of a site mean to me?
What is the limitation of expansion and renovation?

When I was cycling along the North Sea Road, on my way from Stavanger to Egersund, I came across a billboard on which says “ A sandy ridge extending from Harabekken north to Bringsvagen once provided a welcome harbor for small boats. The sandpit, rising 3-4 meters above sea level, offered a natural breakwater. Inside, following many centuries of sinking seas and encroaching vegetation, the original shallow lagoon has become a marsh...” For me, the memory of this site builds upon a sole visit, a single message i got from this place that there used to be a harbor but replaced by marsh land, the rocky coast and weeds slope that extending for miles on the gravel salty marsh I captured. For other campers, this place may reminds them of a happy or frustrating experience with families and friends. For local fishing communities, the sea is their spirit. The changes in coastal environments means a changing of lifestyle to them, a life style that passed through generations of fishermen living in this region, the stories that been told by their ancestors. For the seabirds, it is where they nest and feed and meet with other creatures on earth. Even if there are uncertainties lie in the status of the

coastal area, the relationship between land and sea is changing all the time, those memories of the human and other fauna populations who used to live here or passed by will haunt this space like a spirit. For human beings, those memories contribute to the sense of belongings to one place.

I keep on asking myself one question while doing this project: do we really have to extend our living space on water? Do we really have to colonize this fluid territory? Then I realize that maybe I have placed an attitude too negative on this matter. I don't have to let the building technology today become a limitation on exploring futuristic possibilities. With the developing in technologies, as long as we are clear about what kind of effects we want to achieve, living on fluid ground and sharing with other species could not be just an imagination. It is kind of similar to how we live at the beginning of civilization in a primitive society when human hold in awe and veneration in front of nature, less invasion of urbanization towards nature has taken place. Maybe in the future, with the help of advanced technologies, we could have a chance to reverse the harmful explorations we did on earth and go back to where we were, to live with nature.

APPENDIX

PHOTOGRAPHY SERIES

LANDSCAPE OF EMPTINESS

V *a* *s* *t* ,
V *a* *c* *a* *n* *t* ,
S *i* *l* *e* *n* *t* ,

Sometimes I could feel this overwhelming solitude on my way cycling along a void shoreline, across wild woods, passing by a deserted lighthouse or cottage.

CHAPTER 1 REMOTE HOMELAND

DET ER DEN DRAUMEN

Det er den draumen me ber på
at noko vedunderleg skal skje,
at det må skje —
at tidi skal opna seg
at hjarta skal opna seg
at dører skal opna seg
at berget skal opna seg
at kjeldor skal springa —
at draumen skal opna seg,
at me ei morgonstund skal glida
inn på ein våg me ikkje har visst um.

It's the Dream

Drops in the East Wind, 1966

Translated by ROBIN FULTON

It's the dream we carry in secret
that something miraculous will happen,
that it must happen —
that time will open
that the heart will open
that doors will open
that the rockface will open
that spring will gush —
that the dream will open,
that one morning we will glide into
some little harbour we didn't know was there.

---- by Olav H. Hauge

Norwegian Poet







CHAPTER 2 BLUR

Don't come to me with the whole truth

Don't give me the whole truth,
don't give me the sea for my thirst,
don't give me the sky when I ask for light,
but give me a glint, a dewy wisp, a mote
as the birds bear water-drops from their bathing
and the wind a grain of salt.

---- *by* Olav H. Hauge
Norwegian Poet







CHAPTER 3 DESERTED BELONGINGS

“**Being at home** has different definitions nowadays—both within domestic settings and in the spaces defined by national boundaries—under these global regimes of circulation grounded in changing geographical relations, the uneven developments of neoliberalism, and the expansion of media technologies.”

--<*After Belonging*>

Our recognition of belonging is always bound by homeliness objects or familiar scenes.







CHAPTER 4 URBAN SHELTER

Everyday

Drops in the East Wind, 1966

Translated by ROBIN FULTON

You've left the big storms
behind you now.
You didn't ask then
why you were born,
where you came from, where you were going to,
you were just there in the storm,
in the fire.
But it's possible to live
in the everyday as well,
in the grey quiet day,
set potatoes, rake leaves,
carry brushwood.
There's so much to think about here in the world,
one life is not enough for it all.
After work you can fry bacon
and read Chinese poems.
Old Laertes cut briars,
dug round his fig trees,
and let the heroes fight on at Troy.

---- by Olav H. Hauge
Norwegian Poet





