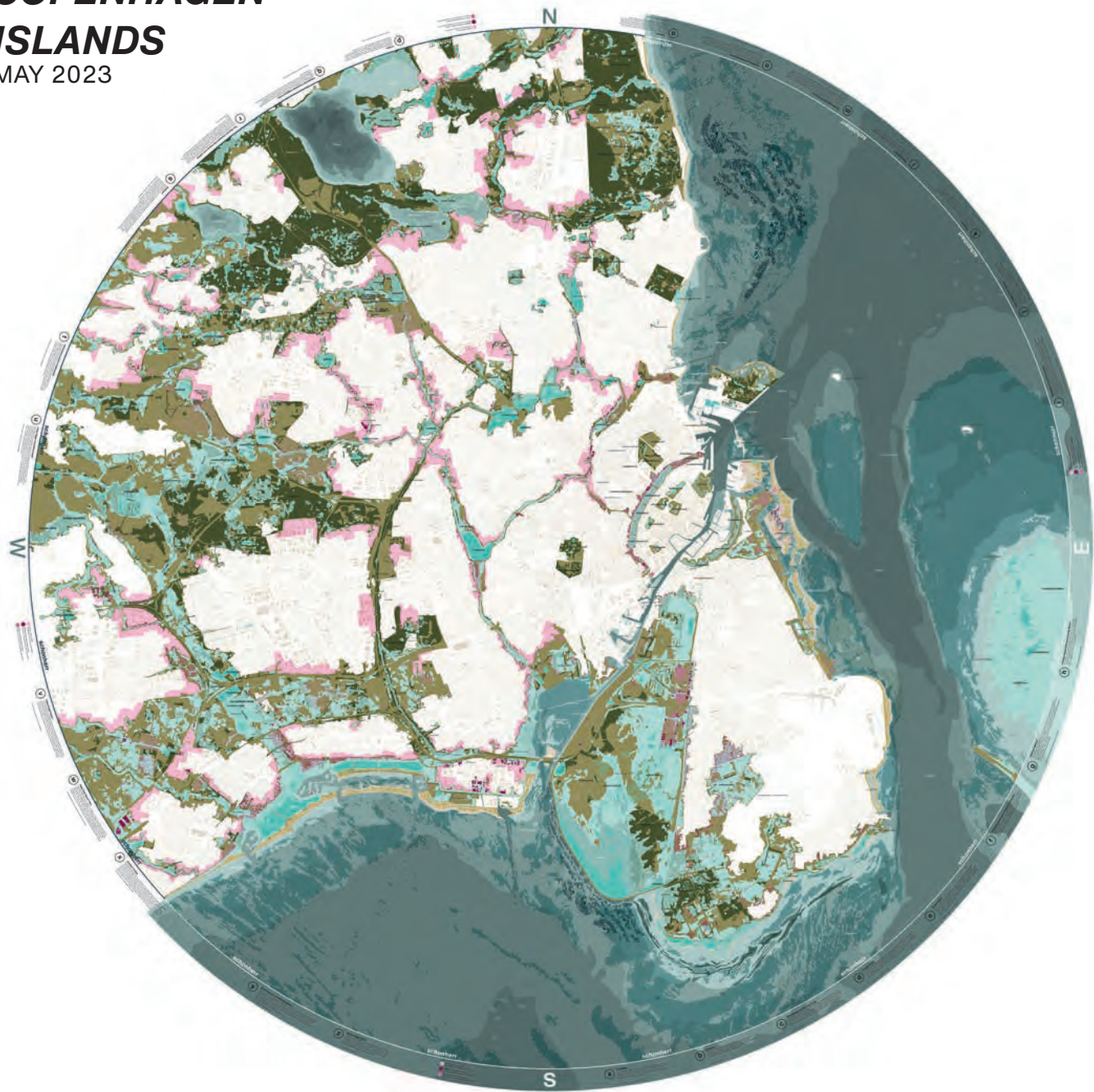


COPENHAGEN
ISLANDS
MAY 2023



*Topography informs our understanding
of both nature and the urban fabric,
- challenges and potentials*

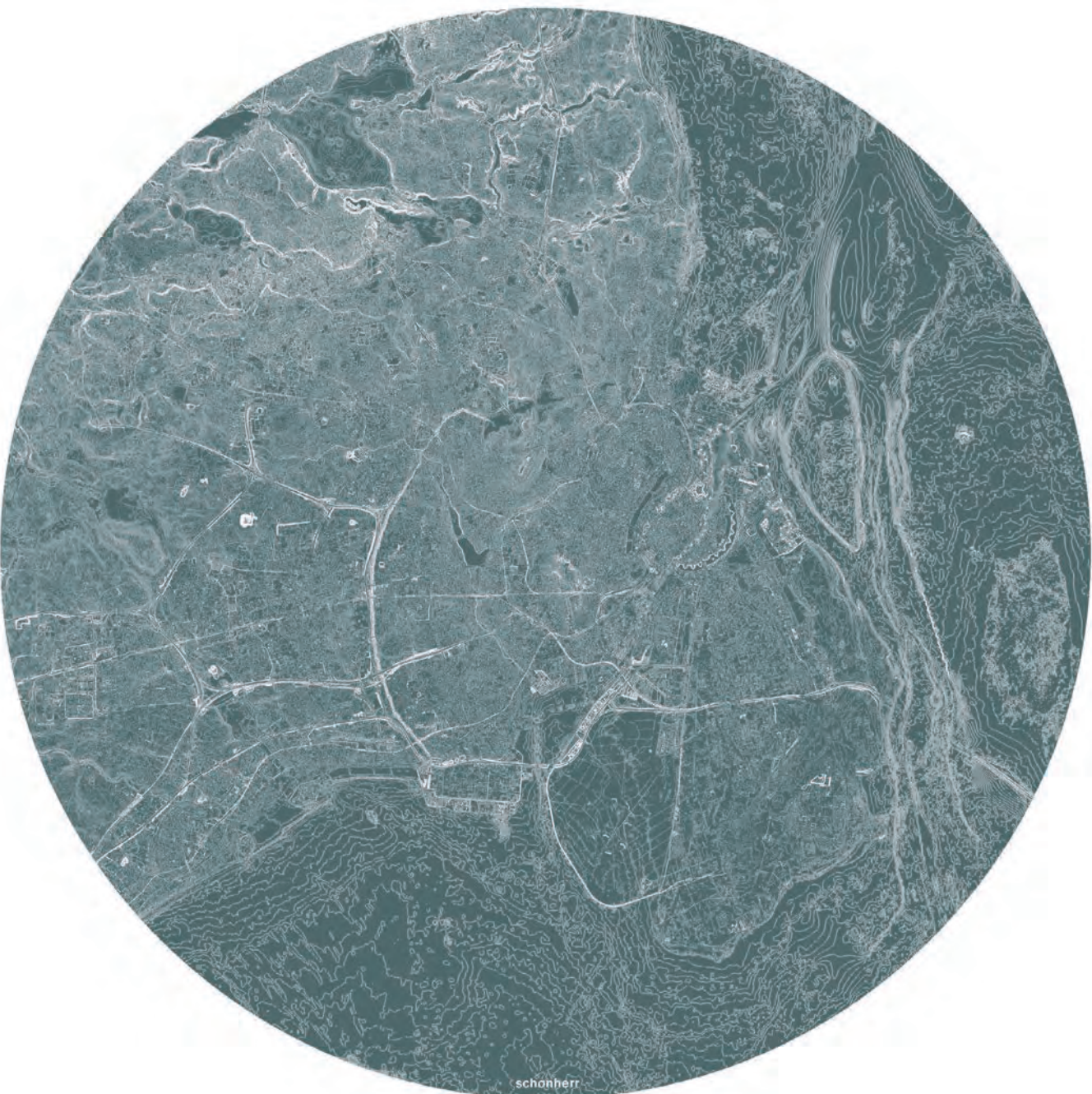
LANDSCAPE IS THE FOUNDATION OF ALL THINGS

Copenhagen is known as one of the world's best cities to live in. The character filled districts, the blending of old and new, the beautiful urban spaces and parks, the feeling of safety, the culture, the cycling and the functioning collective traffic are all reasons that nearly all Danes love their capital city. Therefore, it grows.

In 2022 alone, new buildings in Copenhagen represented half of everything newly built in Denmark. Many of these projects were expensive homes built close to the harbour and Øresund, city center swimming facilities, water sports facilities and cultural hotspots.

In Copenhagen living near the harbour is still reserved for the privileged, but the question is, if future investments are worth placing here?

Something is beginning to change. The surrounding nature and climate changes have begun to rock the foundations of the welfare capital of Copenhagen that, as all other cities around the world, has been created from the underlying and nearly forgotten landscape.



schönherr

The Sea, I

*...I rise up again, I hurl myself forwards,
I stretch myself between continents,
I am without beginning, without end,
and it is not restlessness, when I rend your sleep.
I am in constant motion,
regardless of the changing light, regardless of the air.
I bear my icebergs, I form my coral reefs,*

*I conceal amphora and floating forests of seaweed,
seethe like boiling tar or lie rockingly quiet,
snake shiny as obsidian in the evening sun,
softly whispering like the smallest children,
who at a distance from the older ones
have come together to play.
Sound my depths and listen to me,*

*my knowledge stems from the time when
the water under the sky was gathered into one place,
so that the dry land came into view.
I exist from first light until the day darkens,
I brood black at night, lie outstretched
from one end of the world to another.*

*Above me and all the wellsprings of the earth,
its rivers and streams, its smallest rivulets,
watches the moon, I rise and fall.
Come to me, or I will come to you,
you will not escape me,
just as you cannot be free of the air you breathe,
or hide from the shadow
that follows you as the writing obeys the pen.*

Translated by David McDuff from Queen's Gate by Pia Tafdrup (Bloodaxe Books, 2001)

COPENHAGEN ISLANDS, AN INTRODUCTION

For the Venice Architecture Biennale 2023, as a part of the curated exhibition Coastal Imaginaries, Schønherr and a wide range of researchers present a new and alternative strategy for Copenhagen. We call it Copenhagen Islands, and by this we are asking fundamental questions to the existing planning paradigms.

Both the climate and the world as we know it now are changing rapidly and the Danish Capital faces new challenges. The seas are rising, the groundwater table is rising, storm surges are pressing in, cloudbursts are becoming stronger and more frequent, and the structure of the 'Finger Plan' has fallen short. The historical, inner harbor and large urban areas will eventually be flooded by seawater, while other parts of the urban fabric will be swamped by rising groundwater. Rainwater, coming from large parts of Zealand, will lack the space required to be led out to the coast.

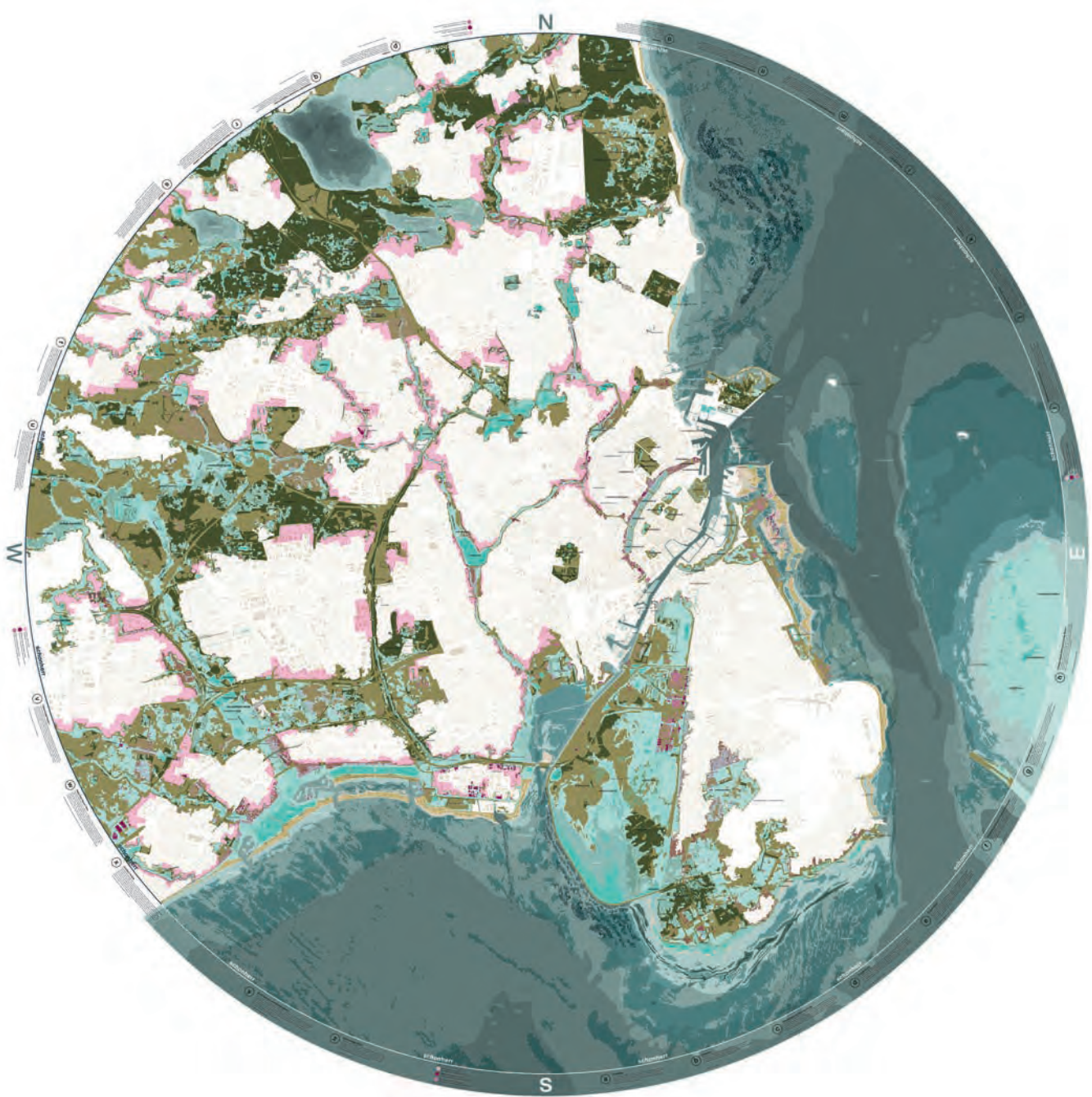
Copenhagen Islands is a research-based future scenario for a long-term and robust shift in direction for the capital, where the gaze is turned towards nature and the city's encounters with it. It is with nature's own forces that we find the space to - slowly and over time - solve the city's climate-induced problems and demographic challenges.

Over the next 100 years we must, step by step, change the city's relationship with nature. The coast must be developed from being a physical and administrative line, to being a spongy zone that can absorb water when there is too much and release it when there is too little.

Copenhagen Islands is a vision. It does not contain any clear predictions of future population compositions or future mobility and infrastructure. We do not know if streams of climate refugees from the south will cause population growth to increase wildly. We do not know how we will control or transport our wares in the future. However, we can predict that the critical infrastructure, based on climate protection, will be as important for the development of the good city as roads, streets and the electricity in our sockets are today. The inherent forces of the landscape are our greatest allies.

Copenhagen Islands must be negotiated and transformed by other forces than those of landscape architects, urban planners and researchers. However, this development must be guided by a loving hand, considering the many possibilities in challenging technology and allowing a vibrant capital to flourish in Øresund at the edge of Denmark.

This would be the natural solution.



Since 1947 Denmark's capital has been shaped by the 'Finger Plan' which combined urbanization with a radial commuter-train system and large green interspaces for agricultural and recreational use. Despite the success of the 'Finger Plan', it has created a monocentric city with great economic, social and spatial pressure on the city centre. The suburbs are underdeveloped and lack both cultural foundation and tax revenue which form the growth basis for the capital's centre.

Today approximately 2.1 million people live in Greater Copenhagen – more than a third of Denmark's total population.

< Construction of new land in Øresund, 1893

> View of Copenhagen's inner harbour, ca. 1950's

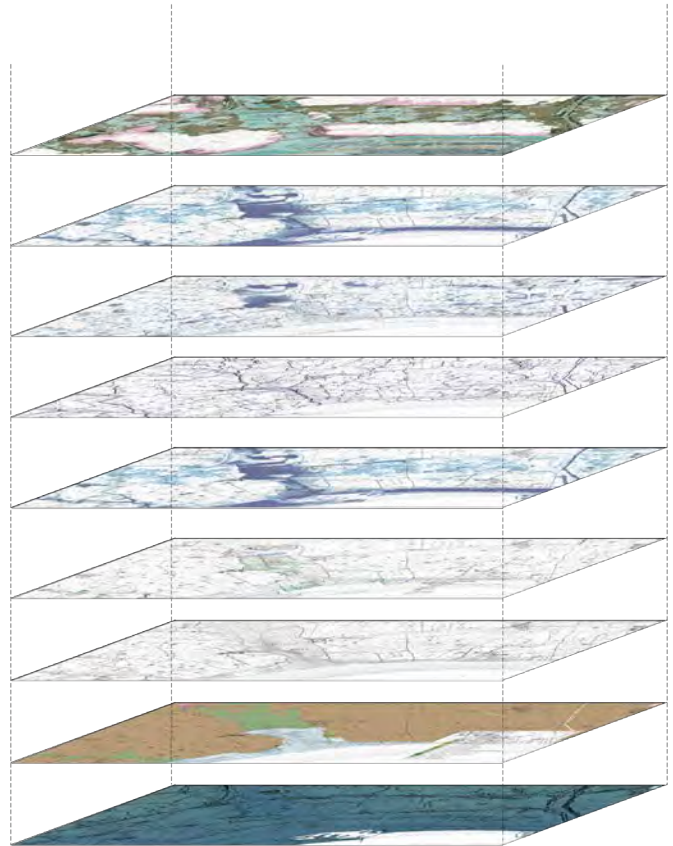


COPENHAGEN IN SHORT

Copenhagen lies in the East of Denmark and has been the capital city since the 15th century. The city has developed along the coast, on islets and in a low-lying moraine landscape. It has slowly and organically grown into a large and significant city, first through trade and fishing and, in the last century, through knowledge and production.

All good cities must have a plan to manage their growth in significant directions – and some achieve this before others. Copenhagen has had several different strategies for both growth and protection, all of which have left their mark on the city's foundations.





LARGE SCALE PLANNING

To create a vision, one must identify the challenges.

Most decisions are non-binary, and there are usually better answers waiting to be found if we look beyond the challenges and involve other people's knowledge. Copenhagen Islands is not the answer to a problem, but rather a new question, based on a series of investigations under themes such as topography, growth, value, infrastructure and social balance.

CHALLENGES



*Copenhagen is originally built on islets and flat land.
Over time, technological land reclamation has made
the land less dependent on the underlying landscape.
Climate change is now challenging the technological
premises on which the city's development has been based
over the past several years.*

*Can the city regain the connection with the underlying
landscape?*

TOPOGRAPHY



Since 1600, the city has continuously expanded into the sea, on reclaimed seabed and in drained marshes and bogs - despite the fact that these areas are exposed to rising sea levels, storm surges, cloudbursts and rising groundwater. Urban development with a vision for a much longer future lifespan is needed.

Can the existing expansion strategy be reversed?

GROWTH



CLIMATE

Storm surge water levels can rise to 5m around Copenhagen by 2100. Along the coast, the rainwater from Copenhagen's large hinterland is drained in relatively few points. When the sea level rises, the rainwater will flow more slowly, and instead pile up along the flow paths. Increased rainfall and less pumping of drinking water causes the high levels of ground water to rise even further, at the same time as the rising sea water pushes into the subsoil from the coast.

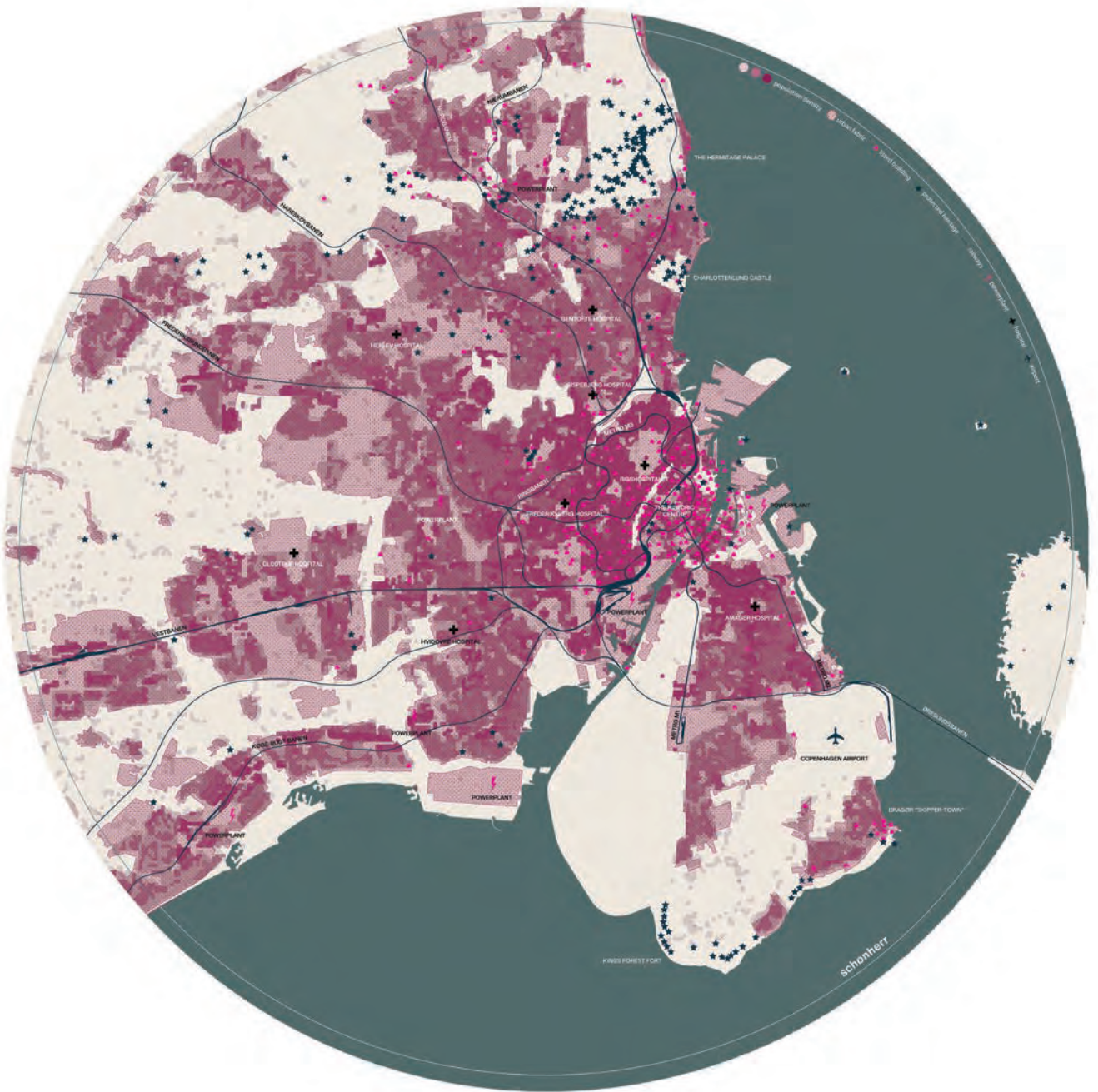
Where do we find space for the rising sea water, groundwater, and rainwater?



VALUE

50% of all real estate investments in Denmark, were placed in the capital city area in 2022. The city contains many important functions, cultural heritage, housing for 1/3 of the Danish population and critical infrastructure – many of which are threatened by climate change, and some will be more expensive and complex to protect than others.

Which values are absolute in a long-term perspective?



INFRASTRUCTURE

Road traffic will increase by 160% between 2020 and 2040. The motorway network around Copenhagen has been continuously expanded, the traffic load has followed suit, and the congestion is only increasing.

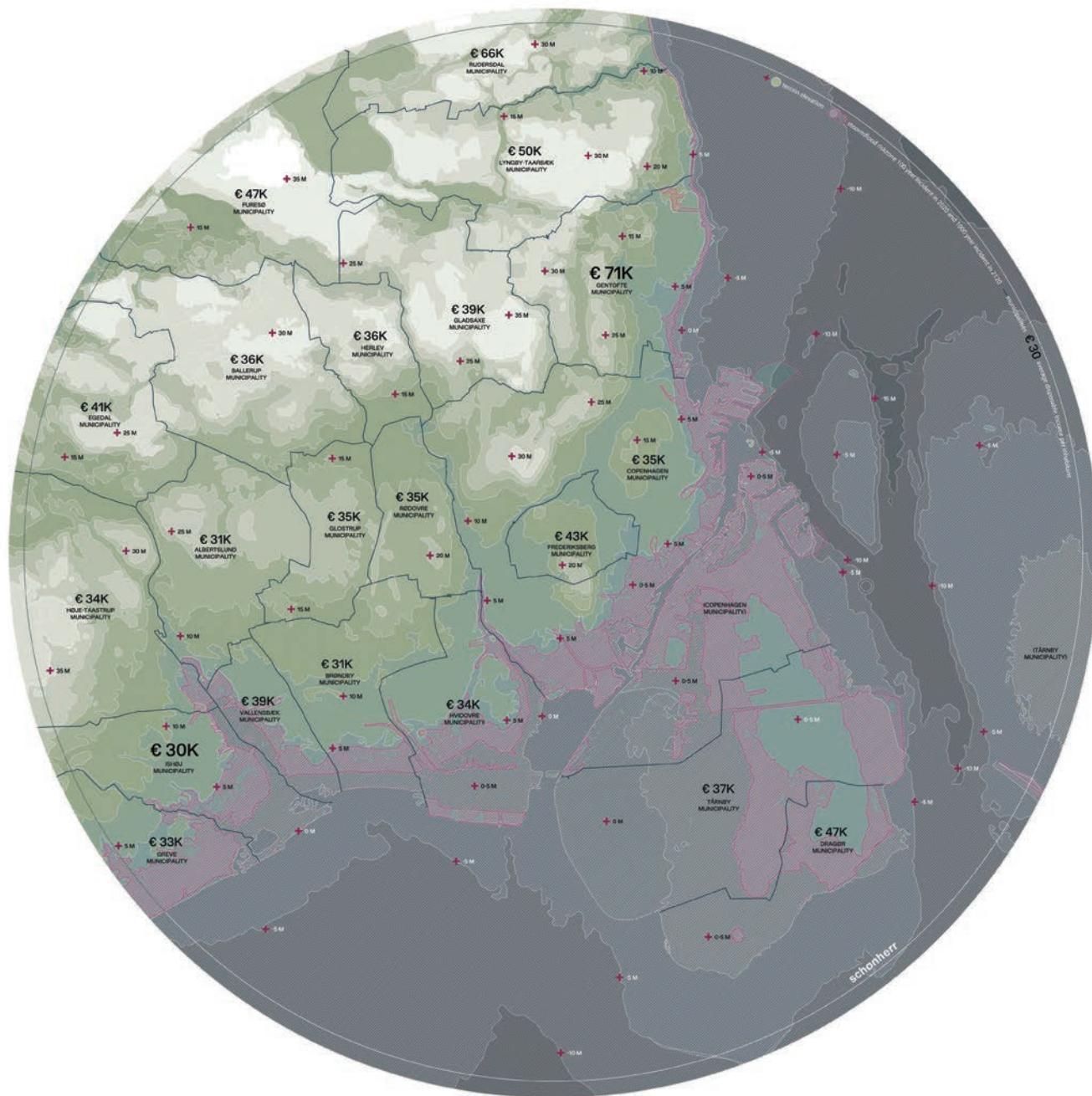
Many of the major traffic arteries are in Copenhagen's green areas. This fragments the biological connections within these large natural areas and at the same time destroys the enjoyment people experience here, with noise, air pollution and poor access conditions.

Should grey infrastructure still dominate the green in the future city?

EQUALITY

In the past 10 years, the gap between rich and poor has risen by 27% in Copenhagen. The rising sea levels have very uneven effects on the various municipalities. The poorest municipalities are generally the lowest in the terrain, on the poorest soils, and will be hardest hit by rising sea levels. The richest municipalities are generally located at the highest point in the terrain and will be least affected.

How does a welfare state share the costs and benefits of climate adaptation?



a. THE DANISH CAPITAL

Located in eastern Denmark, Copenhagen has served as the nation's capital since the 15th century.

b. AN OLD COASTAL CITY

Gradually spreading along the coast, across islands and low-lying moraine landscapes, the city grew thanks to a prolific trade, fishing and farming.

c. THE 'FINGER PLAN'

1947 saw the introduction of the Finger Plan, which combined urbanization with a radial commuter-train system and large green interspaces between the fingers.

d. MONOCENTRIC DEVELOPMENT

Despite the Finger Plan's obvious success, it has created a monocentric city with a huge economic, social and spatial pressure on the city centre.

e. CHALLENGED BY WATER

Rising sea water, groundwater levels and increasing amounts of rainwater from its hinterland, pose new challenges for the Finger Plan.

f. A PERIPHERY OF SOLUTIONS

If we move focus away from the urban core and towards nature and the urban periphery, we can find new solutions for the city's various challenges.

g. READING THE LANDSCAPE

Working WITH the natural forces, terrain and hydrology can form a resilient basis for Copenhagen's development as a city.

h. A BLUE-GREEN CAPITAL

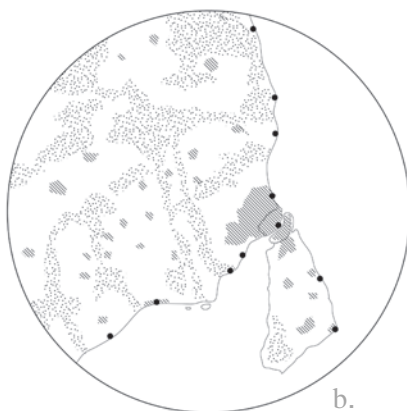
Copenhagen can become a blue-green, polycentric capital with selfsupporting districts that operate in synthesis with nature and each other.

i. COPENHAGEN ISLANDS

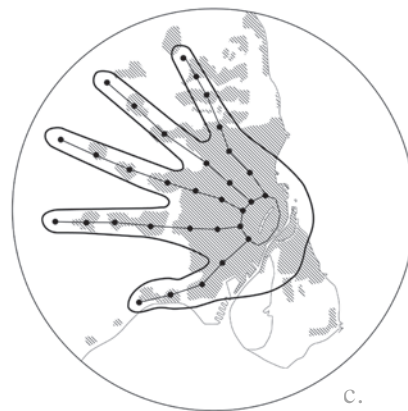
It is time to say goodbye to the Finger Plan and investigate a new sustainable development framework through Copenhagen Islands.



a.



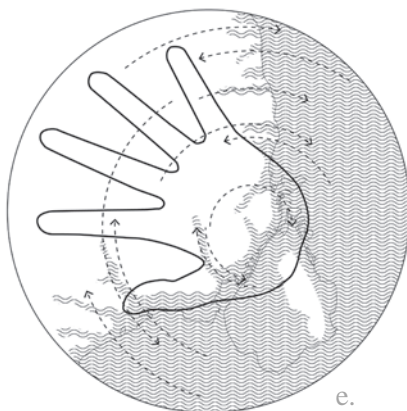
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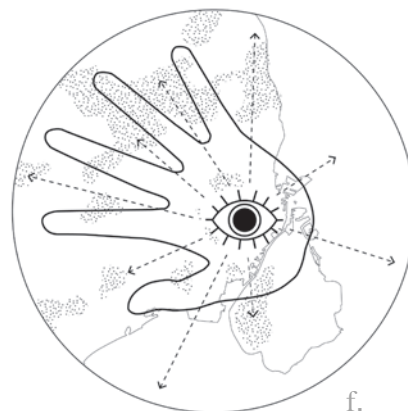
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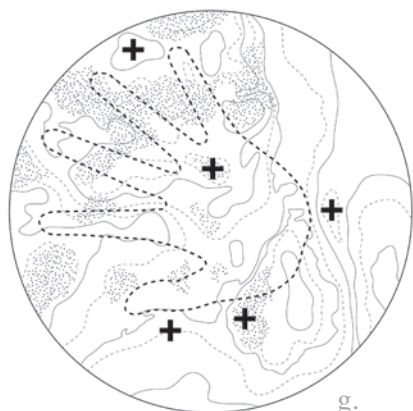
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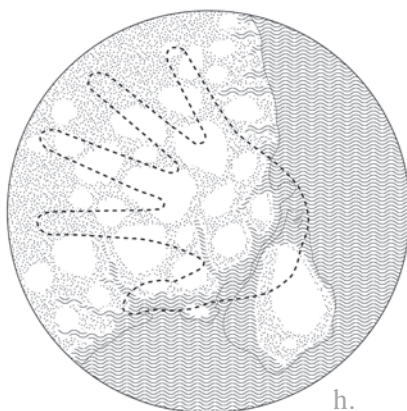
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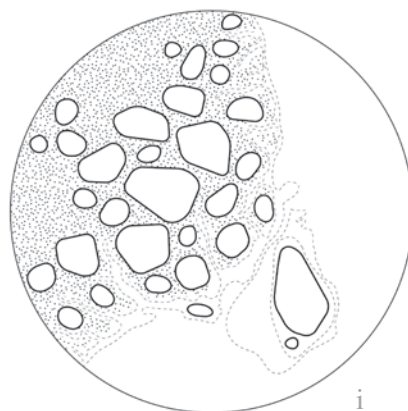
f.



g.



h.



i.

***NATUREBASED
SOLUTIONS***



*The natural engineering methods behind Copenhagen Islands are what professionals call nature-based climate adaptation. The plan is, roughly speaking, based on seven methods identified by researchers **Anna Aslaug Lund** – Landscape architect and assistant professor KU, **Gertrud Jørgensen** – Architect and professor KU, **Ole Fryd** - Urban planner and associate professor KU, **Iisa Eikaas** - Architect and PhD student KU*

The seven methods can be combined in countless, hybrid forms and can, in reality, be interpreted as tools for climate adaptation in completely different parts of the world, societies and with nature types that unfold differently from those we know in Denmark.



*No matter where on earth we live, we all - politicians, city planners, developers and ordinary citizens - must first of all recognize the necessity of the method, which is all about the **RETREAT** of the city from the water. 'Retraction' is climate-adapted urban planning, which develops the city by gradually - over several years - phasing out buildings in flood-prone areas, and creating new districts and densifications of existing suburbs in safer and higher-lying areas in the hinterland - i.e. the exact opposite of the continued expansion of port areas and other forms of coastal urban development, which Lynetteholmen is an expression of.*



*Instead, we must make way for the development of coherent **WETLANDS** and different landscape types. These can form a water-absorbing 'sponge' that ranges from salt marshland (for example from Kofoed Enge south of Dragør), over the re-establishment of former bog landscapes (which we have allowed ourselves to build on), to dense mangrove forests that, with the trees' tightly tangled roots in the transition zone between land and water, ease the pressure from both storm surges and rising water levels in the form of both salt and fresh water.*



*We can protect the districts and cultural landscapes that we decide to preserve through local **ELEVATIONS**, where the terrain is raised and shaped as a protective barrier around an existing building. Contrary to narrow, high dykes as we know them from the Dutch 'bathtubs', the uplifting of the land is part of a wide and naturally shaped earth fill, and an integral part of the accessible nature of the area.*



*In the areas where, for various reasons, we still want to build and live close to the water, we must develop an architectural typology that can be called **AQUATIC URBANISM**, where houses on stilts and columns will stand above the city's coastal landscapes and wetlands, and where floating residential structures follow changing water levels.*



*Along the coastal zone, **DUNES** are established and protect against the rising seawater and erosion. Dune landscapes are formed through the continuous feeding of the beach with sand, or through conscious control of where the sea's natural sediment transport is deposited - in the Netherlands this is called a 'sand engine'. In this way, nature's own dynamics are used to create wider beaches and higher seabeds.*



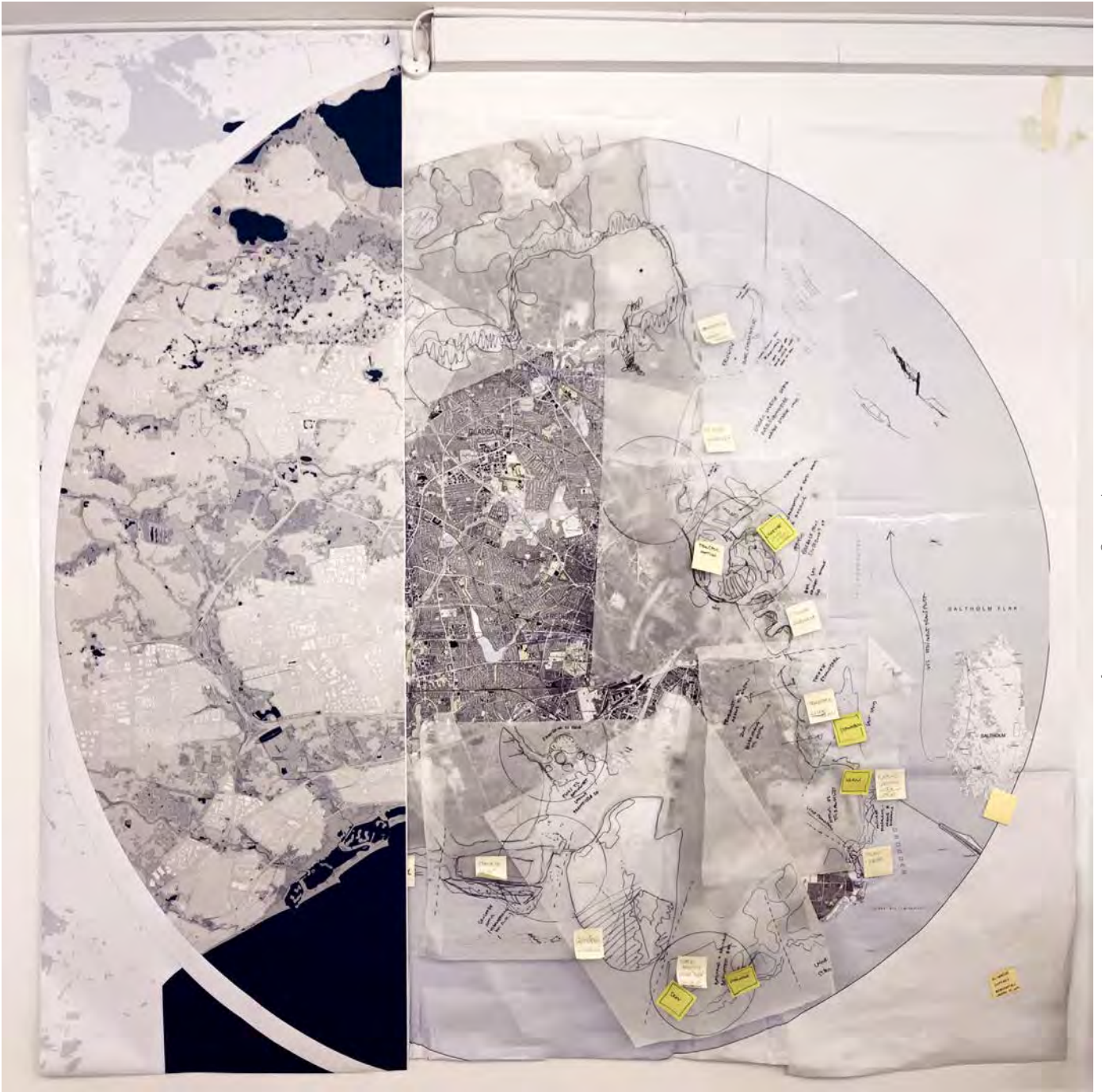
Off the coast, **BARRIER ISLANDS** can be established, these are islands of sand and stone that form outside the coastline and which, together with underwater rock reefs, act as buffer zones against storm surges as they both lower the speed and height of the waves. Rock reefs, together with the planting of large eelgrass forests under the sea surface, will create significantly better conditions for life in Øresund and the marine nature park, which could become Copenhagen's most beautiful neighbour.



*In the wide zones between land and water, **FLOODPLAIN LIVELIHOODS** can arise, where aquaculture, wetland agriculture and pond systems can supply Copenhageners with mussel and oyster farms, seaweed and many other foods that we will see much more of in the future. The delta landscapes, like other wetlands, can also absorb groundwater, rainwater and seawater, and protect the residential areas behind them from flooding.*

By reading the landscape in this way and using it as a tool for urban climate adaptation, we are, in short, reuniting Copenhagen with its displaced landscape, its forgotten foundation.

COPENHAGEN LANDSCAPE

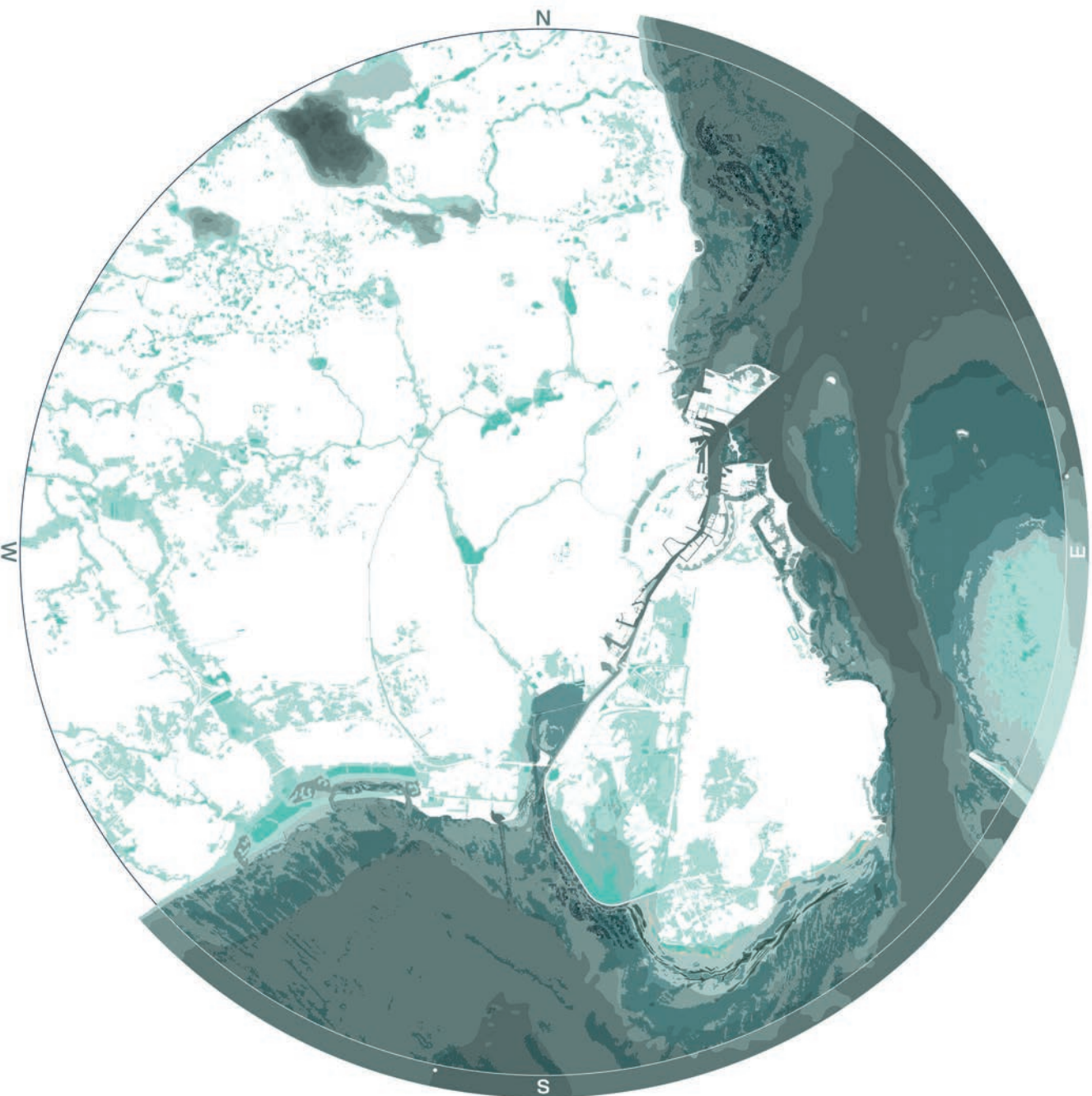


The coastline must be developed from being an administrative line, to being a spongy ZONE that can absorb water when there is too much and release it when there is too little.

In this wide, coastal zone, areas are returned to the habitat types they once were, such as marshes, salt meadows, swamps, rock reefs and eelgrass forests that must break the waves, absorb CO₂, provide large recreational areas for both people and animals, and at the same time protect the city from storm surges and flooding.

COPENHAGEN BLUE

Copenhagen's coastline, beaches, creeks, streams and lakes together form a rich ecosystem which is the foundation for the city's very existence. The city was originally formed on the basis of the laws of nature which demonstrate that water flows both downwards and at the same time forms part of an osmotic and fog-saturated system of groundwater, seawater and rain. The city of Copenhagen is low-lying and large parts are built on sandbars, islets and filled seabed areas in the Baltic Sea. From the island's large hinterland, Zealand, rainwater seeks the sea through a fine meshed delta crossing the entire city of Copenhagen.



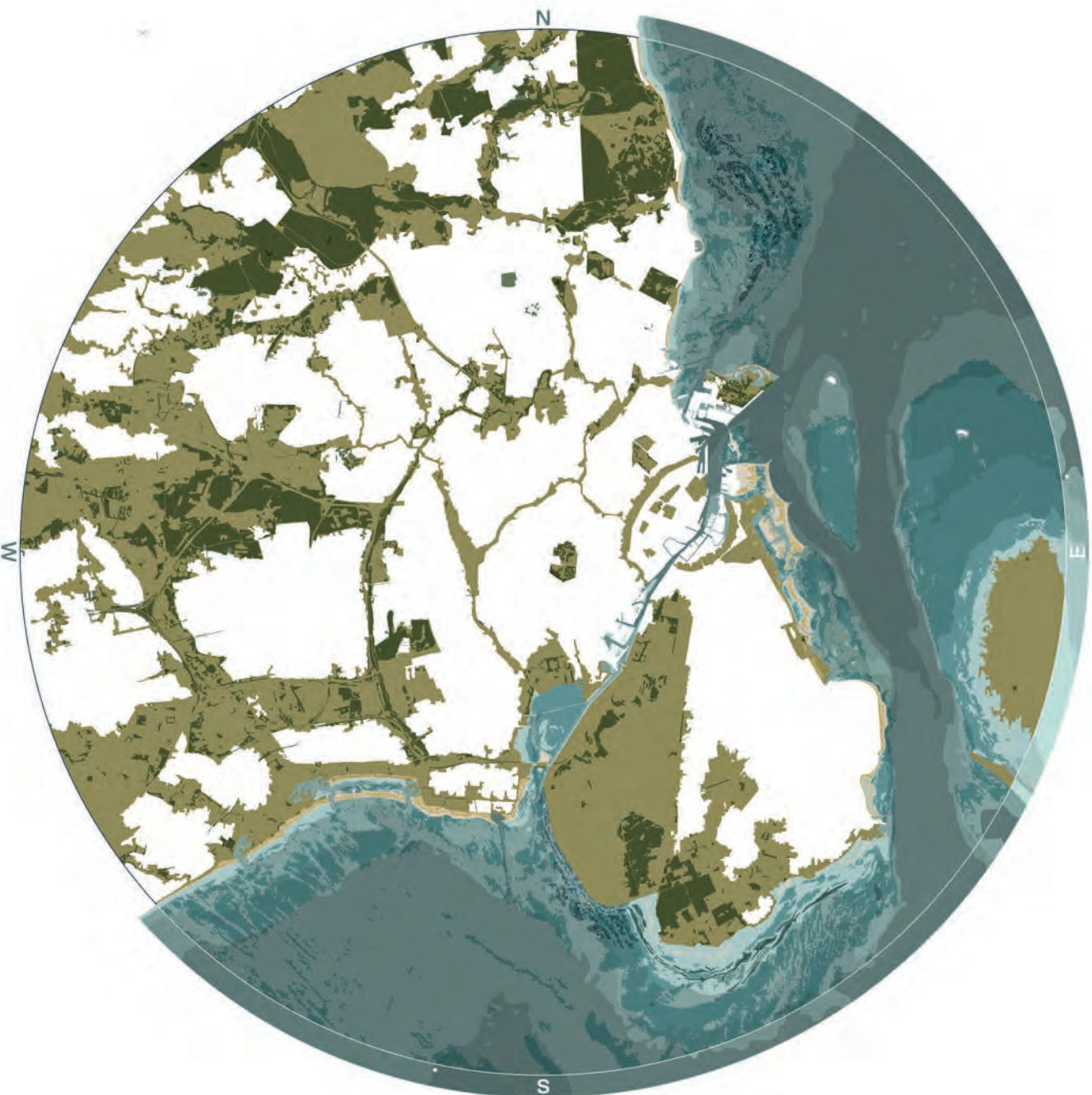
COPENHAGEN GREEN

The world's most compromised connection is that between nature and culture.

You cannot run from one and choose the other without perishing.

Nature is our lungs, just as the city is our heart chamber. The city is a mind-boggling network of contradictions and interlinked dependencies. Like a root zone network in a forest, tangled together with civilization's widely branched, digital data.

The Finger Plan's current green interspaces must, together with the reopening of Copenhagen Islands' delta of watercourses and flow paths, grow and make room for the bogs and marshes, forests and grasslands which today are completely on their way out of the Danish landscape. Nature in and around Copenhagen must be given space completely in its own right. Copenhagen residents can then visit these landscapes while respecting their delicate ecosystems. Slowly they will get to know the individual parts of nature, overcome their plant blindness, become friends with the ants – recognize the existential community.



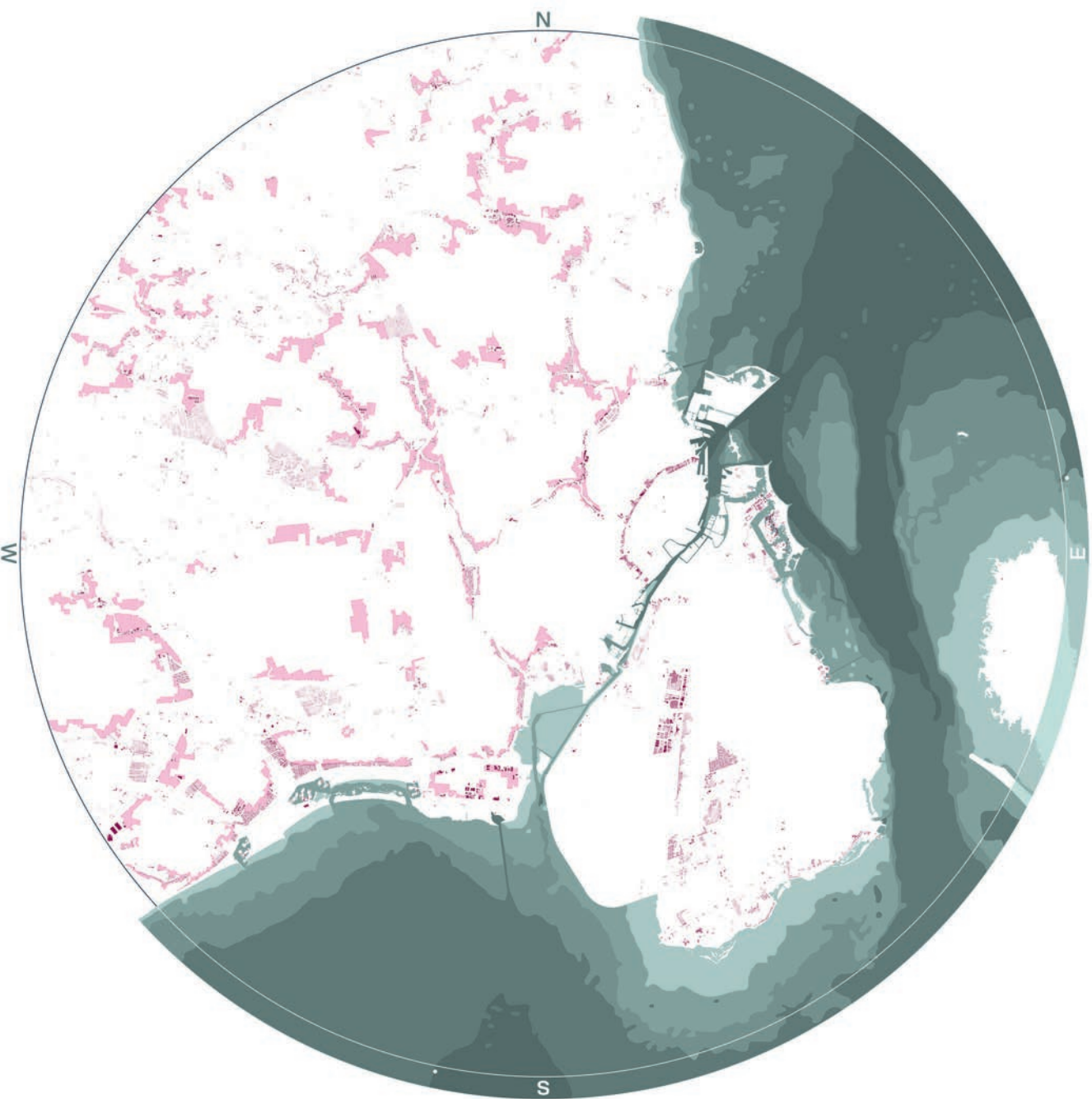
COPENHAGEN URBAN STRUCTURES

With this vision, a viable city is created where we plan based on a closer connection to nature, in a polycentric urban structure based on the new opportunities that arise in the periphery when we let water take the space it needs.

Over time, the city retreats to the hinterland, what is today called the suburbs. Along the green edges of the delta, the suburbs are densified with new urban developments and family homes - closer to nature and with their own cultivation possibilities, away from the dull and uneventful centers of the suburbs.

In Copenhagen's exit zones, buildings must be demolished at the end of their lifespan and the areas gradually converted into broad zones of 'natural sponges'.

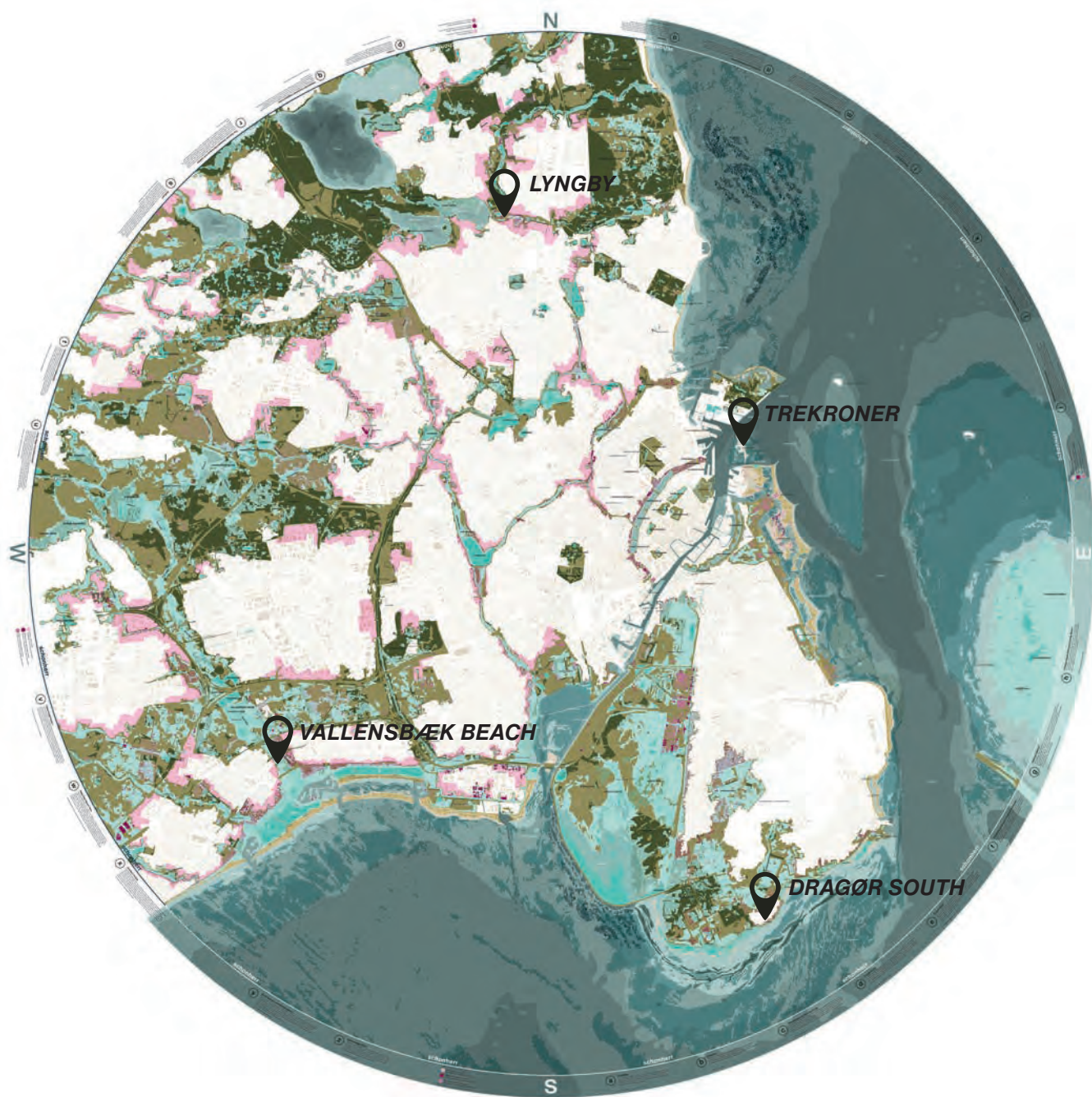
In other areas, in the future, buildings must be built differently and in harmony with the water when the building mass is rebuilt - raised on stilts, built on landscape islands or with open ground floors where water can freely pass under apartment blocks and homes.



TRANS FORMATIONS

IN SELECTION

The following is a selection of places extracted from the big map shown in the introduction. The selection illustrates the past, present and potential futures of four locations within Greater Copenhagen.





VALLENSBÆK BEACH

A substantial part of the single-family homes at Vallensbæk Beach are built on what used to be bog and salt marshes just a hundred years ago. Groundwater levels are high here, and water from Store Vejleå river flows into Køge Bay while the rising sea water pushes in from the coast. This calls for a long-term transformation, in which buildings and settlements are raised and the landscape is transformed to allow for more water and new types of nature.

RETREAT, WETLANDS, AQUATIC URBANISM



250 m



Wetland transformation zone

Retreat or relocation of existing urban fabric



Future urban front

Revitalization of existing urban fabric



250 m



Existing terrain







TREKRONER

The historic sea fort sits right in the middle of the entrance to Copenhagen's historic harbour and city centre, whose great values are very vulnerable to flooding. To protect city and harbour, the sea fort will be reinforced with a new green apron, supplemented by flood gates – later locks – on either side at Kronløbet and Lynetteløbet to keep water levels down.

BARRIER ISLANDS

250 m



Wetland transformation zone
Retreat or relocation of existing urban fabric



Future urban front
Revitalization of existing urban fabric



250 m



Existing terrain



Aerial photo, 2022

DRAGØR SOUTH

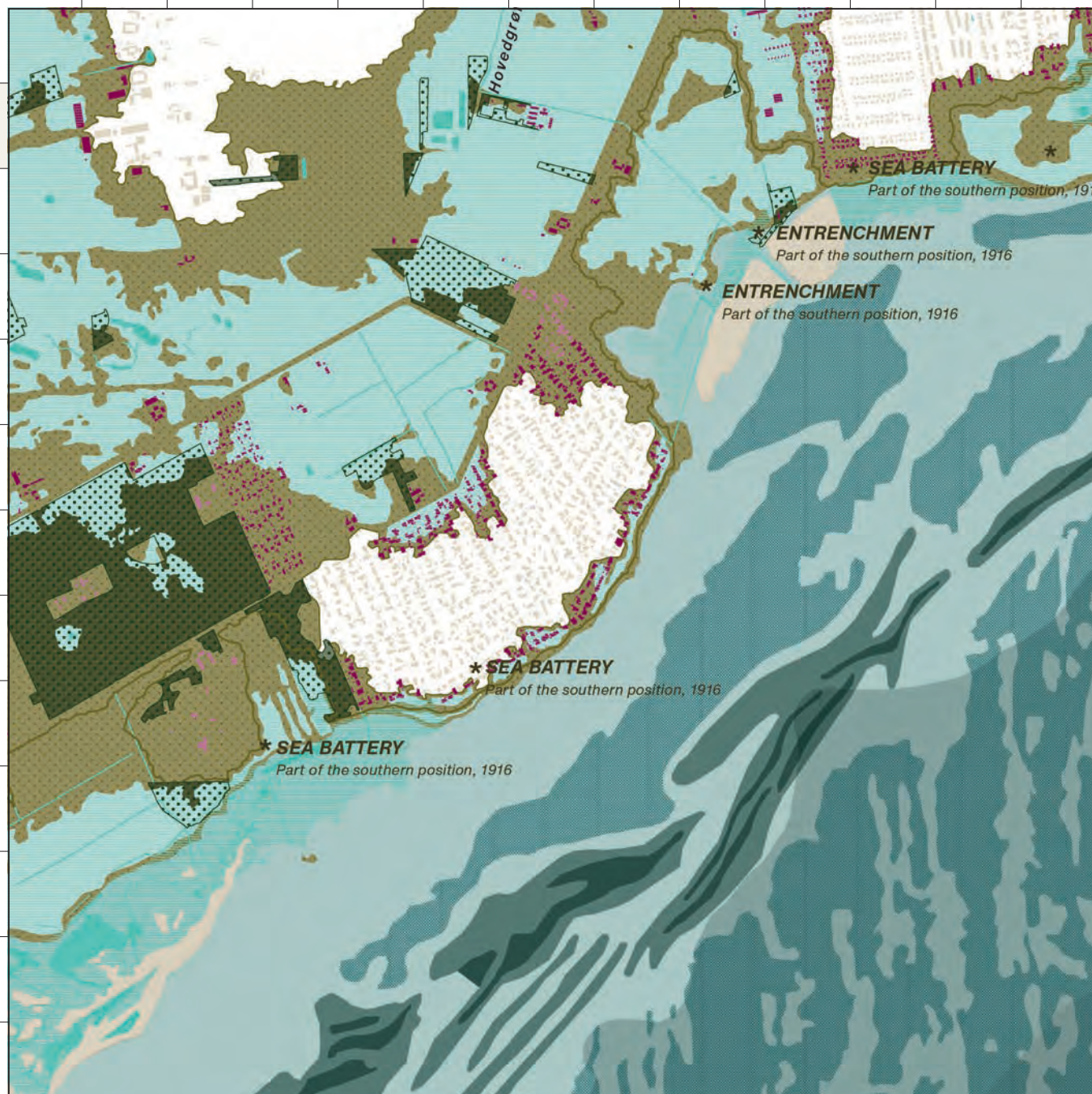
In low-lying Dragør South, the only thing that stands between the residential areas and the rising sea is a low dike with salt marshes in front. New landscape-integrated dikes will therefore be constructed, and new sand added to the existing underwater banks to preserve the marshes and their stabilizing effect – and thus ensure the effectivity of the low dike. However, the settlement will have to be transformed and elevated at some point to keep it safe.

ELEVATIONS, DUNES, WETLANDS





250 m



Wetland transformation zone
Retreat or relocation of existing urban fabric



Future urban front
Revitalization of existing urban fabric



250 m



Existing terrain





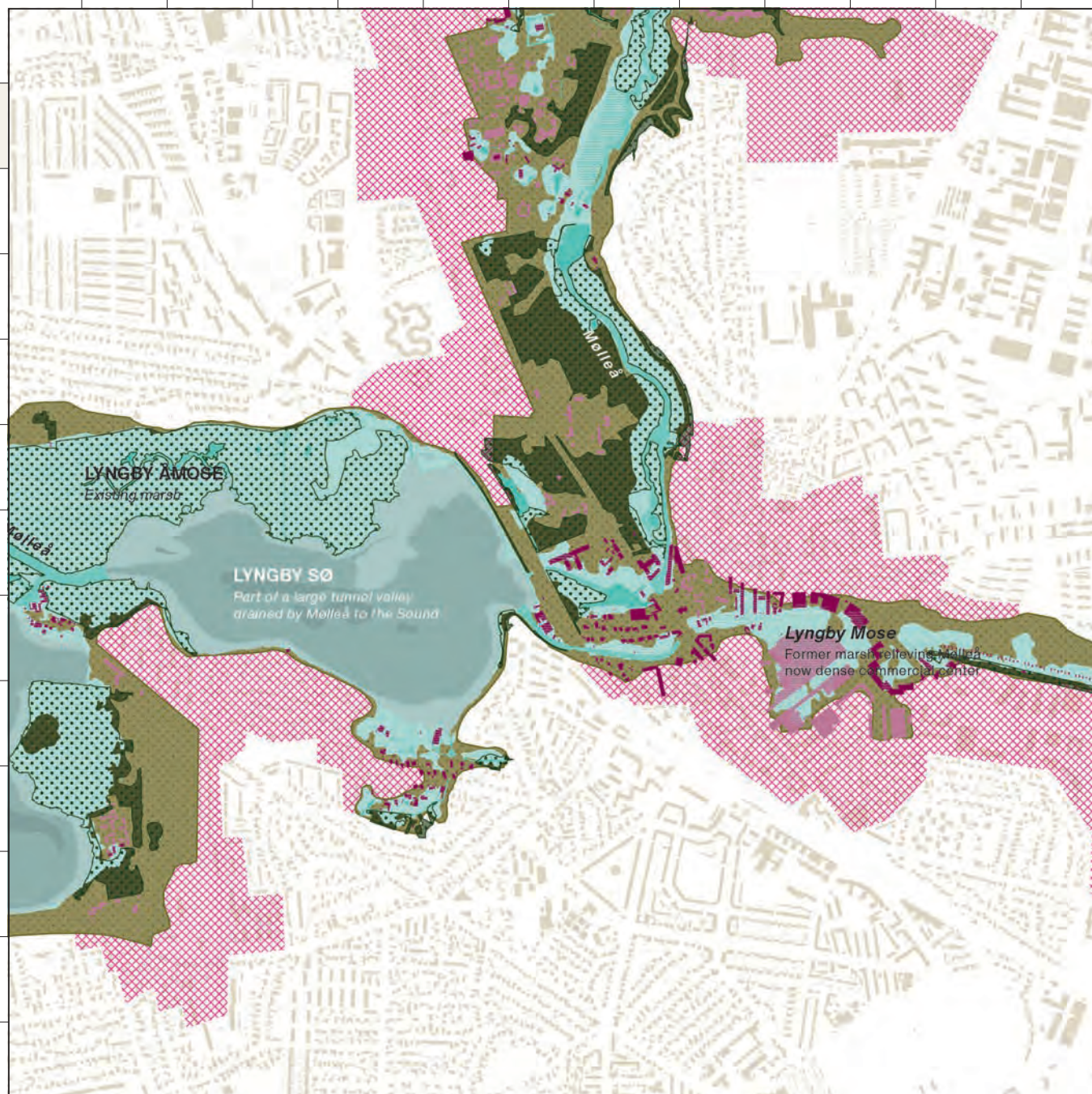


LYNGBY

The densely populated North Zealand commercial hub occupies a dip in the landscape by the old bog where Lyngby Lake meets Mølleåen River, north of Lyngby, and a complex system of streams, springs, dams, ponds and bogs east of Lyngby. This whole landscape will have to be transformed and the dense urban structures modified to make room for the water.

RETREAT, AQUATIC URBANISM, WETLANDS

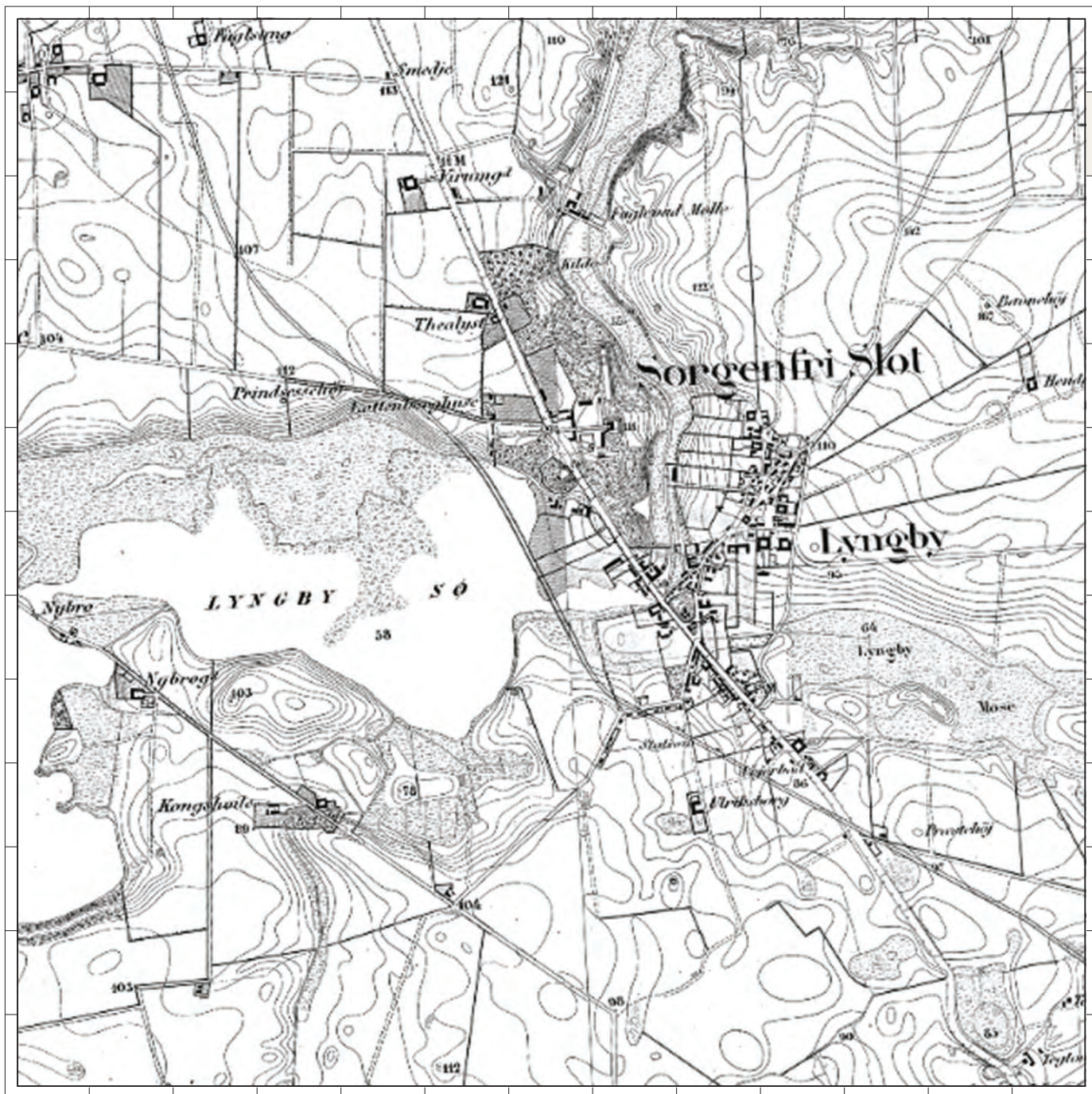
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Wetland transformation zone
Retreat or relocation of existing urban fabric



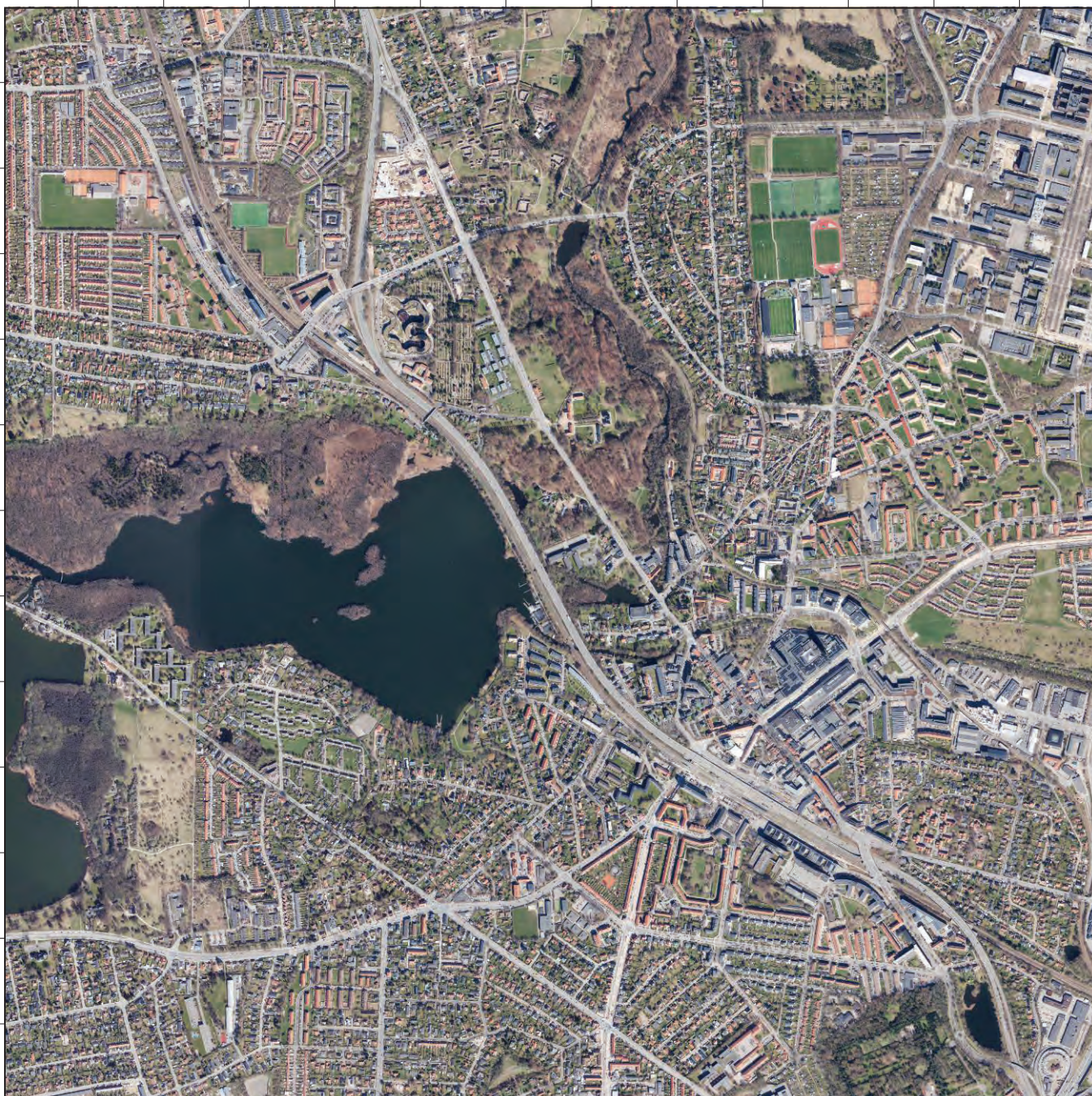
Future urban front
Revitalization of existing urban fabric



250 m



Existing terrain



schönherr

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Iisa Eikaas – Architect and PhD student KU

Photos

Anna Aslaug Lund, p. 28-32

Jianyi Dai / GLAHS, p. 33

Schönherr; p. 11, 27, 35, 45, 51, 57, 63

Kbh billeder; p. 8-9

Excerpt and reproduction of poem (p. 4-5):

Pia Taftrup: HAVET, JEG fra Dronningeporten, Gyldendal

Translated by David McDuff from Queen's Gate by Pia Taftrup

(Bloodaxe Books, 2001)

Maps used

Geodatastyrelsen: GeoDanmark, Danmarks Højdemodel, Danmarks

Dybdemodel, Københavns Omegn 1857 af Generalstaben, Høje

Målebordsblade, januar 2023

Scalgo: Havvandsstigning, Skybrudskort og Terrænnært grundvand

(HIP), januar 2023

Marine Vegetation DHI: Marin vegetation, januar 2023

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Realdania

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