SEEK

Research Report

Familiarizing the unknown

How to interact with a changing water environment and (re)imbrace its natural power

Research Report

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Transitional Territories Studio 2018-2019
North Sea: Landscapes of Coexistence
Altered Natures and the Architecture of Extremes

Under supervision of

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TO MY PARENTS
for raising me to believe that anything is possible
Hi Dad! Thank you for broadening my horizons!
Hi Mom! Thank you for being my biggest fan!

TO MY TEACHERS
for making everything possible
how many times will he ask me to change my project once again?

TO MY BROTHER
to prove him that impossible is possible
Świat jest Twój, Młody!

TO MY FRIENDS
for showing me impossible
cheers!

CONTENT

INTRODUCTION

Before you start enjoying the research book which is the first one from the series of three booklets, presenting the story of 'Familiarizing the unknown: How to interact with a changing water environment and (re)imbrace its natural power'. Familiriazing the unknown is my graduation project done in the Transitional Territories graduation studio as a final part of the Master of Architecture studies at the Faculty of Architecture and the Built Environment at TU Delft.

The project took 1 year, 2 semesters, 4 quarters, 311 days, all of which were supervised and guided by my irreplacable team, consisting of dr. ir. Taneha Bacchin, ir. Stefano Milani, dr. ir. Nicola Marzot and ir. Sjap Holst The graduation project, which you are holding in your hands, has been a challenging process, full of unexpected situations, decisions and late nights. It was difficult in educational terms, but also in personal life.

I think I did, and I would like to thank my tutors for their support. To Stefano for showing me inapparent solutionsn and inspirations (he even tried to convince me to metal rock!). To Nicola for his calmness, poetry, metaphorical design decisions and experience of his Italian soul (and not only!). To Sjap, always requiring me to do and design more (and more!). And to Taneha, the queen of the studio, for encouraging me to keep the aim at taking the project to the highest level (as Taneha would say it „taking the beautiful project to even more beautiful level ;)).

I would like to thank my parents for their unconditional support in mulitple ways.

And of course thanks to all of my friends that were (and still are!) there all these months. Last two years would not be so incredibly amazing without you! You helped me to ventilate my feelings and experiences over all the dinners, parties and prosecco nights.

Thank you very much and I hope you enjoy these readings.
Aleksandra Gwardiak / Alex / Ola /Lu

LETTER

Ambassador of Water Spirits
Aleksandra Gwardiak
5R5X+4X Shetland
Scotland

North Sea Parliament
Berlagezalen
Julianalaan 134
2628 BL Delft

Dear Fellow Ambassadors, dear all,

I would like to tell you a story. A story about the time of myths legends and mystical creatures. When the North Sea has been considered as the edge of the world and its people could not imagine going further than the coastal waters. The grey, cold and rough sea was seen as an evil in itself, a physical and a mental border. However, civilizations embraced these unknown and addressed it in their culture. These were Vikings - explorers, travelers and heroes - always in search of new lands. They were the only ones brave enough to travel through the seas at a time when people feared it. Within their mythology, they used symbols for strength, mediation and hope. The Brooch placed on the front of their ships as their symbolic armory against the force of nature.

Why is this story so important? Why should we remember the class we got in the past?

Today, we consider ourselves as the masters of the sea. Greater than its power. We have developed techniques and methods to control it and fortify to protect ourselves against the power of the sea.
Though this is sufficient today, it does not mean that it will be applicable in the future. We are currently reading reports about the sea level rise, storms which becoming more powerful and the issue of the man who can no longer sufficiently predict what is next installed for us. We are losing control.

We need a Brooch, situated at the top of the North Sea. Location of the Shetland Islands where two sea edges meet, the North Sea and the Norwegian sea, is a transitional territory, separated at low tide but merged together at high tide. The Shetlands act as a space of connection, a new realm that blurs the sea's geographical edges.

I want us to create a space to rediscover, feel and honor the power of the sea. While looking to the past, we can understand its demons, just as the Vikings did. Following them, human needs to relearn these lessons, to connect nature's power with man's advancing technology. We should overlay all the historical traces which has created our current world, in order to understand our tomorrow. This results in one intervention placed on land and one on the water, neither can exist without the other in order to thrive harmoniously.

We can bridge these two realms, to create a meaningful environment for our future generation.

Yours sincerely,

Aleksandra Gwardiak

RESEARCH REFLECTION

A number of research methods were employed during the course of my graduation project, varying to the scales being undertaken. When dealing with the North Sea in its entireness, mapping was my main tool of investigation as it capably visualizes different forms of information in a coherent format. In addition, the overlaying of these maps was a useful analytical exercise, revealing information that would not have been apparent in remained as data sets. The overload of information was initially a limiting factor in this process but due to reading literature such as Mohsen Mostafavi's Cartographic Grounds I understood that the power of the map as not just a research tool but also as a tool for design.

The site research helped to grasp the vast differences in the landscape along the islands' coastline and indicated the dynamics of water shaping, influencing and characterizing the site. Moreover, personal investigation, interviews with locals and photography helped to precise the local issues of the site.

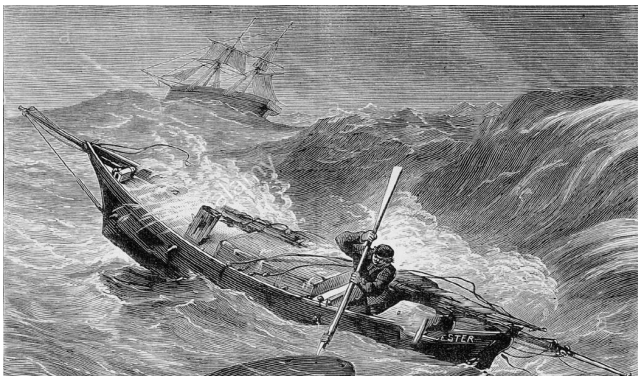
At the scale of the theoretical research, the attention was focused on historical and qualitative research strategies. Within the historical design, I conducted extensive archive research of the mythology in marinescape, detailed stylistic analysis of all the practices of Vikings and their habits, and an artefactual inventory of the archaeological findings – including Vikings ships. Focusing on the historical research, I identified with the poststructuralist school of thought, which sees material products of culture and history as parts of a larger immanent discourse, especially socio-cultural. By trying to understand the historical phenomenon of translating the power of nature into demons and the personification of gods, we could consider this historical period as a web of discourses which have contributed to our modern, transcultural reality.

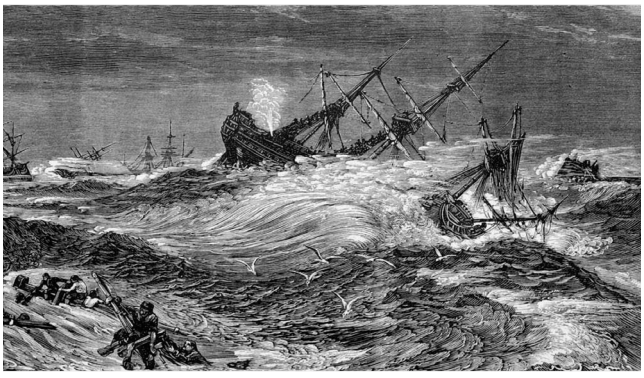
Through simultaneously interweaving qualitative research design within my thesis, I gave an overview of the changing relationship between a man with the power of nature in this area of the North Sea. The research revealed the transition, and this is illustrated in the architectural intervention. Phenomenological studies seek to focus on existential studies, to make up of essences of the experience that transcends individual subjectivity, this brought my research from a pure data analysis about the current conditions within this area to a deeper examination of socio-cultural aspect, in the vision of rising seawater and its connection to the historical aspect of the sea as the edge of the world. Moreover, the tidal power plants and harbour serve as the basis for the typological research of structures gaining energy from the water. By interpreting the power of the plants and harbour, a better sense of what these structures are as a whole, their components, their function, their stories, is achieved and provided an insight into what the architectural intervention of the project will become.

At the scale of the architectural project, the focus shifted from mapping, theoretical research and analysing into a more intuitive way of working. I found that remaining within the rational and precise realm of analysing and visualizing cannot create anything new, therefore I experimented with a series of imagined hand-drawn impressions, plans and sections. Though not yet architectural, my sketches and paintings led to more experiential design method that I was more satisfied with. Crucial in this process was the exposure to multiple reference artworks, sculptures and music which inspired me visually and helped me to realize the extent of what my design could be, such as drawings by Hans Dieter Schaal, Nancy Holt or Richard Serra.

The idea of an experiential path, formed the essential part of my intuitive research, it also helped me to design at the architectural scale. The two major functions of my project consisted of a harbour which would allow the local residents to reach the 'new island' and a tidal power plant which provided electricity for a third of the residents of the Shetlands. Finding a way to link these two totally different functions by a simple path, required testing out in sketch plans as there was a need to balance the design objective with experiential aspect. Breaking down the program into this path divided into stages allowing me to develop a design which combined the metaphorical past with the future unknown. By separating major functions to the ends of the path, the circulation between them emphasizes as a mean of ritualizing the process – creating a moment of stability amidst the unpredictability of the powerful nature – water.


I NORTH SEA





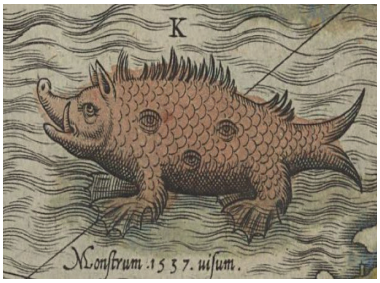
The Sea as the Edge of the world (1822)[1]
Cutty Surk Storme (1599)[2]
Big Sea Wave (1596) [2]
Flat Earth British, Defoe's Super Storm (1703) [3]

HISTORICAL PRECEDENTS

Over centuries, the North Sea has been considered as the edge of the world and its people could not imagine going further than its coastal waters. The sea was seen as an evil in itself which created a physical and mental border to pass. The fear of the power of water was evident. Because of its extreme natural power, water had to be treated with a certain respect, to get an opportunity to achieve all it has to offer.

The North Sea, the home of a number of legends, myths and mysterious histories, has for centuries been seen as The Edge of the World. Civilizations in the Middle ages could not imagine going further than its coastal waters, because the sea was seen as an evil in itself. Its grey, cold waters were a formidable obstacle, a barricade surrounding the main lands. It was not only a physical barrier but also a mental one, where Leviathan and the sea gods lived. In those times, all forces of nature were characterized by mythological or humanized characters, in the form of gods and demons. Only people with a certain fearless respect or love for the sea would venture out into and beyond its waters. These were the Vikings, who could translate the symbolism and behavior of water and treat it as a treasure.

The process of discovering the mysterious borders of the North Sea started with the Vikings. Through the layers of time, it has now become the focal point of Western Europe. As a geopolitical center of the continent, its waters connect the most powerful nations of Europe and are a source of food, energy and money. Nevertheless, there are still some places where time seems to have stopped: edged around the sea are remote lands that still exist in a past way of life.



Jonah
Theatrum orbis terrarum
Abraham Ortelius
1570

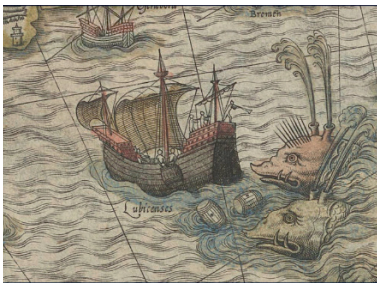
Jonah being cast overboard to the sea monster, from Ortelius's map of the Holy Land in his Theatrum orbis terrarum. There is a similar image on John Speed's Canaan, As it was Possessed Both in Abraham and Israel's Days (London, 1595). (British Library, Maps 9.Tab.9., map 97).

Ichthyocentaur
Theatrum orbis terrarum
Abraham Ortelius
1573

It plays a viol on a map of Scandinavia from the 1573 edition of Ortelius's Theatrum orbis terrarum. The sea surrounding Scandinavia showed sailing ships and this traditionally peaceful ichthyocentaur, perhaps suggesting safe passage.

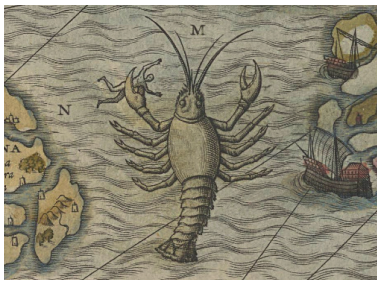
Sea pig
Carta Marina
Olaus Magnus's
1539

This sea pig, which was compared to heretics that distorted truth and lived like swine, lived in the North Sea on Olaus Magnus's 1539 Carta Marina, a lushly illustrated map that inspired many after it.



Monster whales
Carta Marina
Olaus Magnus's
1539

Two whales attack a ship as sailors try to scare them away by tossing barrels and playing a trumpet on Olaus Magnus's 1539 Carta Marina.

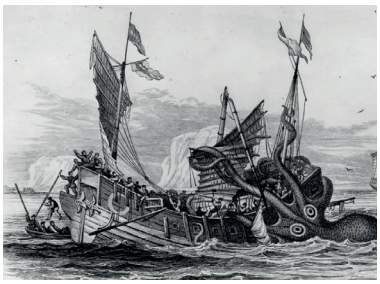


Polypus
Carta Marina
Olaus Magnus's
1539

Polypus (meaning "many-footed") was used to describe many animals, from the lobster to the centipede to the octopus. While Olaus Magnus (1539) drew a giant lobster here, his text describes an octopus, showing the true confusion about what lived in the sea.

Sirens
-
Pierre Descelie
1550

A siren admires herself in a mirror—a sign of her vanity—amongst ships in the North Sea on Pierre Descelier's map from 1550. Other monsters can be seen on the surrounding land.



Kraken
Carta Marina
Olaus Magnus
1539

It is a legendary cephalopod-like sea monster of giant size that is said to dwell off the coasts of Norway and Greenland. Authors over the years have postulated that the legend originated from sightings of giant squids that may grow to 13–15 meters (40–50 feet) in length.

THE ATLAS OF THE MONSTERS OF THE SEA

The sea has been the stage for monstrosities and strange tales since antiquity. Unlike land, the ocean is constantly shifting and moving, with currents that could carry a ship off course and storms that threaten wrecks. Even the substance itself, seawater, is often cold and dark, and deadly to drink in quantity. So, what of the creatures that were thought to live there? The sea monsters that populated European medieval and renaissance imaginations—fierce-toothed animals battling in the waves, long serpents wrapped around ships, torturously beautiful sirens and a wide assortment of chimeric beings.

In the sixteenth century, everyone told stories about Renaissance sea monsters, the terrifying creatures that attacked sailors. In 1539, a Swede named Olaus Magnus tried to explain the mysterious creatures of the North Sea to a group of Italians in a detailed map called the Carta Marina. Magnus filled the water with strange and imaginative creatures people believed in during the Renaissance.

From the sea pig to the enormous sea serpent, Magnus's sea monsters were terrifying to sailors. On the map, they smash ships and crush sailors. But some of Magnus's sea monsters, like the "sea rhinoceros," definitely qualify among the most inaccurate historical drawings of animals. And other sea monsters were clearly made up sea creatures people really believed in, like the sea cow, which looks more like a drowning ox.

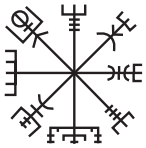
Sea monsters can be horrifying, but they can also seem pretty silly, like the sailors who mistook a whale for an island and lit a fire on his back. Here are the most terrifying, strangest sea creatures that Olaus Magnus promised lived in the ocean.

A SIGNALS
B GROWTH
C OPENING
D BREAKTHROUGH
E MOVEMENT
F POSSESSIONS
G PARTNERSHIP
H DISRUPTION
I STANDSTILL
J HARVEST
K OPENING
L FLOW
M THE SELF
N CONSTRAINT
O SEPARATION
P INITIATION
R JOURNEY
S WHOLENESS
T WARRIOR
U STRENGTH
W JOY
X OPENING
Y DEFENSE
Z PROTECTION

LUCK
LONGEVITY
SPIRITUAL STRENGTH
DIVINE ENERGY
PROTECTION
JUSTICE
SPIRTUAL ATTAINMENT
SUCCESS
PEACE
FERTILITY
RISKS

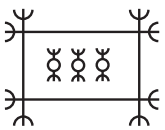
STRENGTH
GRACE
ENERGY
WISDOM
HOPE
HEAST
PROTECTION FROM EVIL MAGIC
BINDING
WRITING
PROSPERITY
LUCK

PROTECTION
IRRESTIBILITY IN BATTLE



RUNIC COMPAS
PREVENT GETTING LOST

GINFAXI
SUCCESS IN COMBAT



BREAK LOCKS & FETTERS
GET FREE FROM BINDINGS

VIKINGS

Vikings were Norse seafarers, mainly speaking the Old Norse language, who during the late 8th to late 11th centuries, raided and traded from their Northern European homelands across wide areas of Europe, and explored westwards to Iceland, Greenland, and Vinland.

Viking Runes

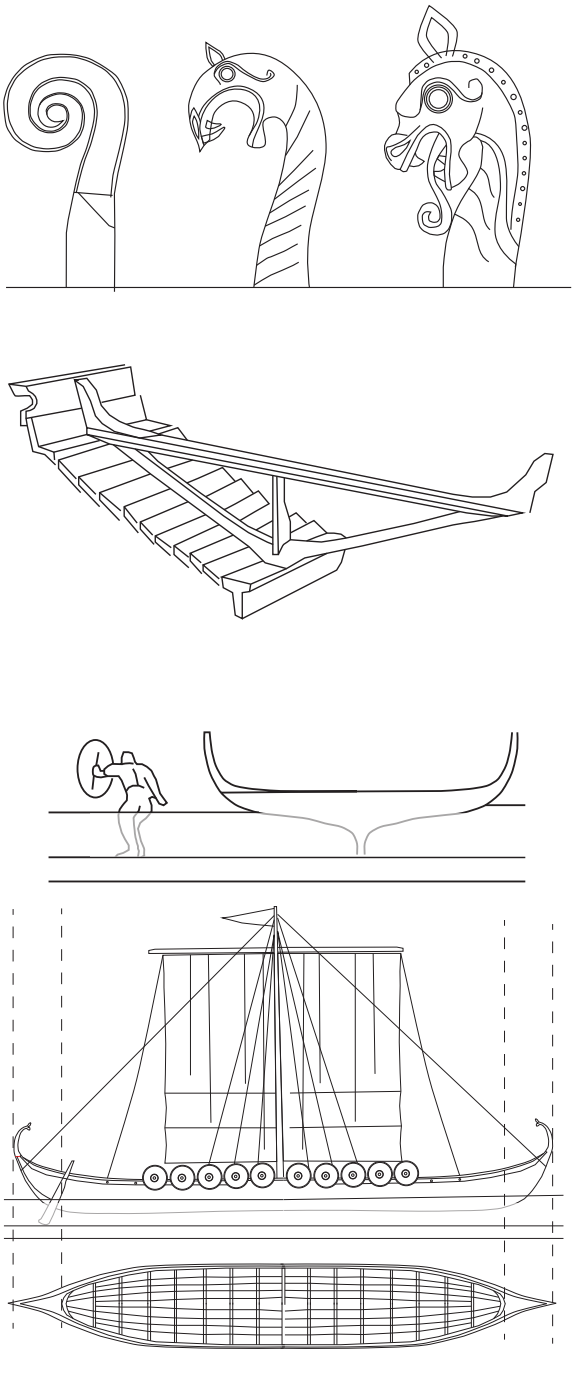
„In Norse lore, the god, Odin, impaled his heart with his own spear and hung on the world tree, Yggdrasil, for nine days and nights all to perceive the meaning of the runes. The runes were symbols that sprang from the Well of Urd – the source of fate – and the Norns used these runes to carry that fate up the trunk and branches of Yggdrasil to the nine worlds amidst its boughs. Odin made his sacrifice at great anguish and risk to himself because he knew that the runes conveyed deep meaning, and if he could understand their meaning he would gain profound wisdom and power." [5]

From this story how the Vikings thought of runes not merely as letters but as having potent virtues within themselves of a metaphysical or even magical nature. The Norse and other Germanic peoples wrote with runes since at least the first century. However, they did not use this writing the way we do now, or even the way Mediterranean and other neighboring cultures did then. Instead, runes were for inscriptions of great importance. They could be carved into rune stones to commemorate ancestors and mark the graves of heroes. Because they had inherent meaning, they could be used as a means of communication between the natural and supernatural, and could thus be used as spells for protection or success. It is obvious to see how many of these runes were an influence on our English letters used today, such as the T, O, F and S seen in these pendants.

Vegvisir

The Vegvisir (Icelandic Vegvísir, "That Which Shows the Way;" pronounced "VEGG--vee-seer") is a symbol described only in one modern Icelandic collection of spells, the so-called Huld manuscript. That book has nothing more than this one sentence to say about it: "If this sign is carried, one will never lose one's way in storms or bad weather, even when the way is not known." [6]

The Vegvisir, also known as the runic compass or the Viking compass made of eight Viking rune staves, is a symbol of protection and guidance believed to be used as a compass by Vikings. The word vegvisir means 'wayfinder' and 'sign post' in Icelandic language. Although it is commonly known as the Viking compass and associated by some people with the voyages Vikings made around the World during the Viking Age, there is quite a bit of a debate regarding the origin of the Vegvisir. There are two sources mentioning the Vegvisir: the Huld Manuscript compiled by Geir Vigfusson in 1880 and The Galdrabok, another manuscript which is essentially a grimoire – 'a textbook for magic'.



The Brooch
The dragonhead should scare away enemies. It also had magical functions: It would provide protection for ships and crew – and it should ward off evil spirits both on land and sea. The Icelandic law code Grágás says that the dragonhead should be taken off the ship when the Vikings returned to their homestead, not to intimidate the spirits of their native land. (Grágás was used from about 930 and written down about 1117)

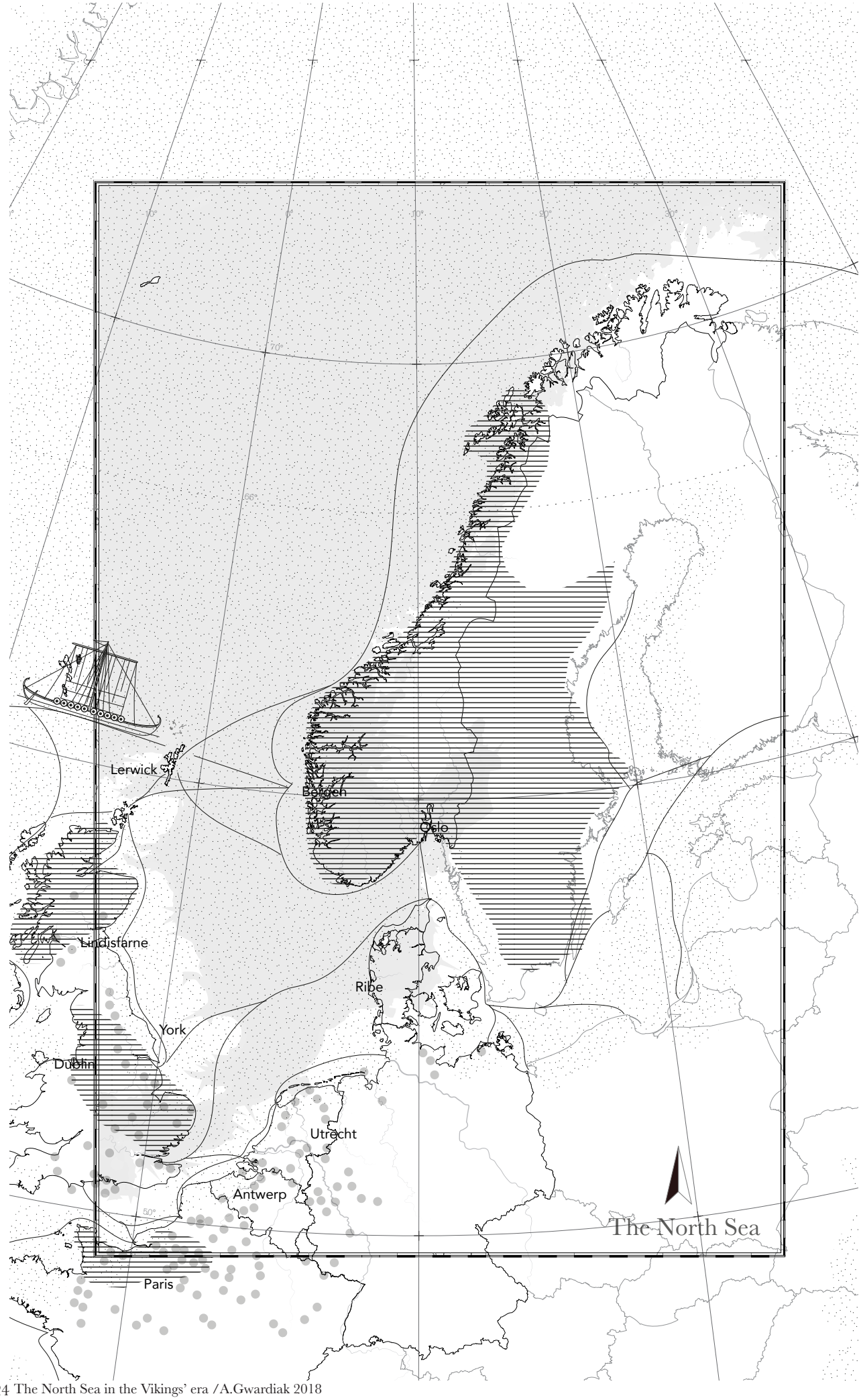
The dragonhead made it easy to recognize a certain ship. It clearly shows who the leader is and where the leader is in battle. The symbolic function of the dragonhead is enhanced by the fact that ships often were named after the magical animal that graced it's prow.[7]

Viking ships
They were marine vessels of unique structure, built by the Vikings during the Viking Age.The boat-types were quite varied, depending on what the ship was intended for,but they were generally characterized as being slender and flexible boats, with symmetrical ends with true keel. They were clinker built, which is the overlapping of planks riveted together. Some might have had a dragon's head or other circular object protruding from the bow and stern for design, although this is only inferred from historical sources. Viking ships were not just used for their military prowess but for long-distance trade, exploration and colonization.

In the literature, Viking ships are usually seen divided into two broad categories: merchant ships and warships. These categories are overlapping; some kinds of merchant ships, built for transporting cargo specifically, could also be used as warships. The majority of Viking ships were designed for sailing rivers, fjords and coastal waters, while a few types, such as the knarr, could navigate the open sea and even the ocean.

Viking ships varied from other contemporary ships, being generally more seaworthy and lighter. This was achieved through use of clinker (lapstrake) construction. The planks from which Viking vessels were constructed were rived (split) from large, old-growth trees—especially oaks. A ship's hull could be as thin as one inch (2.5 cm), as a split plank is stronger than a sawed plank found in later craft.

Working up from a stout oaken keel, the shipwrights would rivet the planks together using wrought iron rivets and roves. Ribs maintained the shape of the hull sides. Each tier of planks overlapped the one below, and waterproof caulking was used between planks to create a strong but supple hull. Remarkably large vessels could be constructed using traditional clinker construction. Dragon-ships carrying 100 warriors were not uncommon.

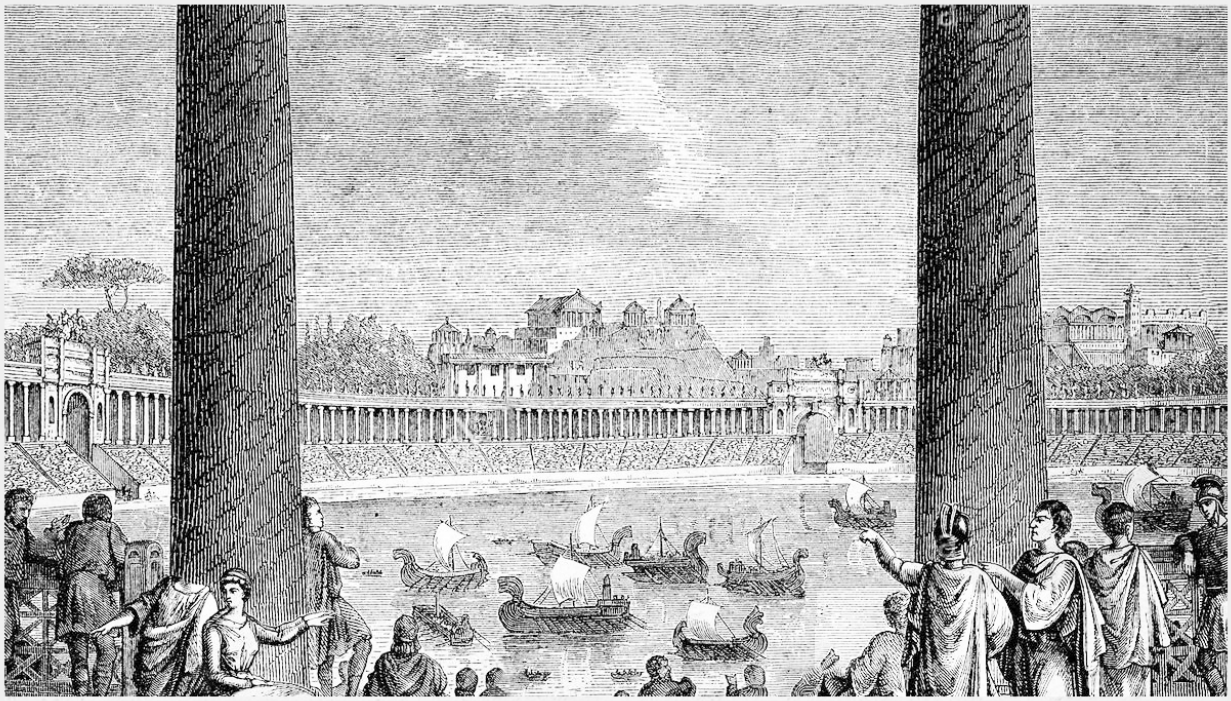

Lerwick
Bergen
Oslo
Lindisfarne
Ribe
York
Dublin
Utrecht
Antwerp
Paris
The North Sea

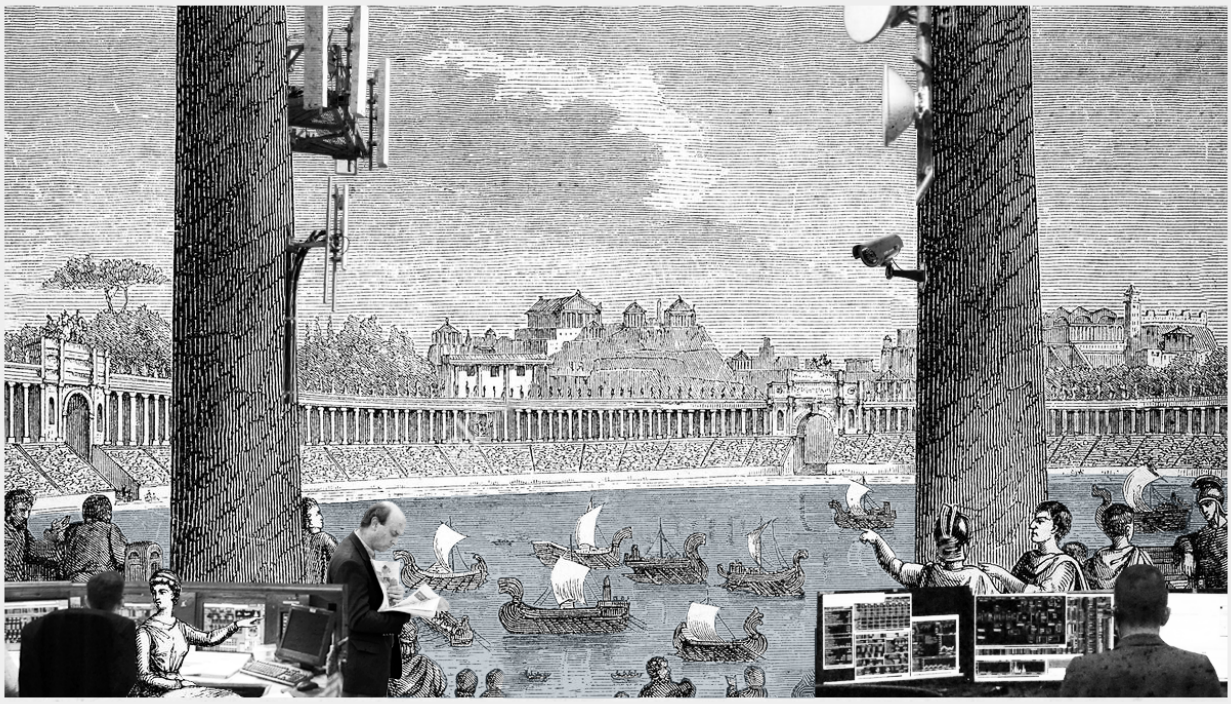
VIKINGS AS SAILORS OF THE NORTH SEA

Vikings at Sea
The Baltic Sea, the North Sea and the North Atlantic were the Vikings' super-highway. These are some of the world's most difficult waters to sail upon, even with the Viking Ships.

The Vikings most often sailed along the coasts, but they were the only European seafarers at the time to dare travel so far that they lost sight of land. It was important for the Vikings that they understood the weather that each season brought as they could then plan their voyages whether long or short

They didn't have any of today's modern navigation instruments, but during the Viking era they developed navigational aids that all seafaring peoples in Europe used until the invention of the sextant in the 1700's.





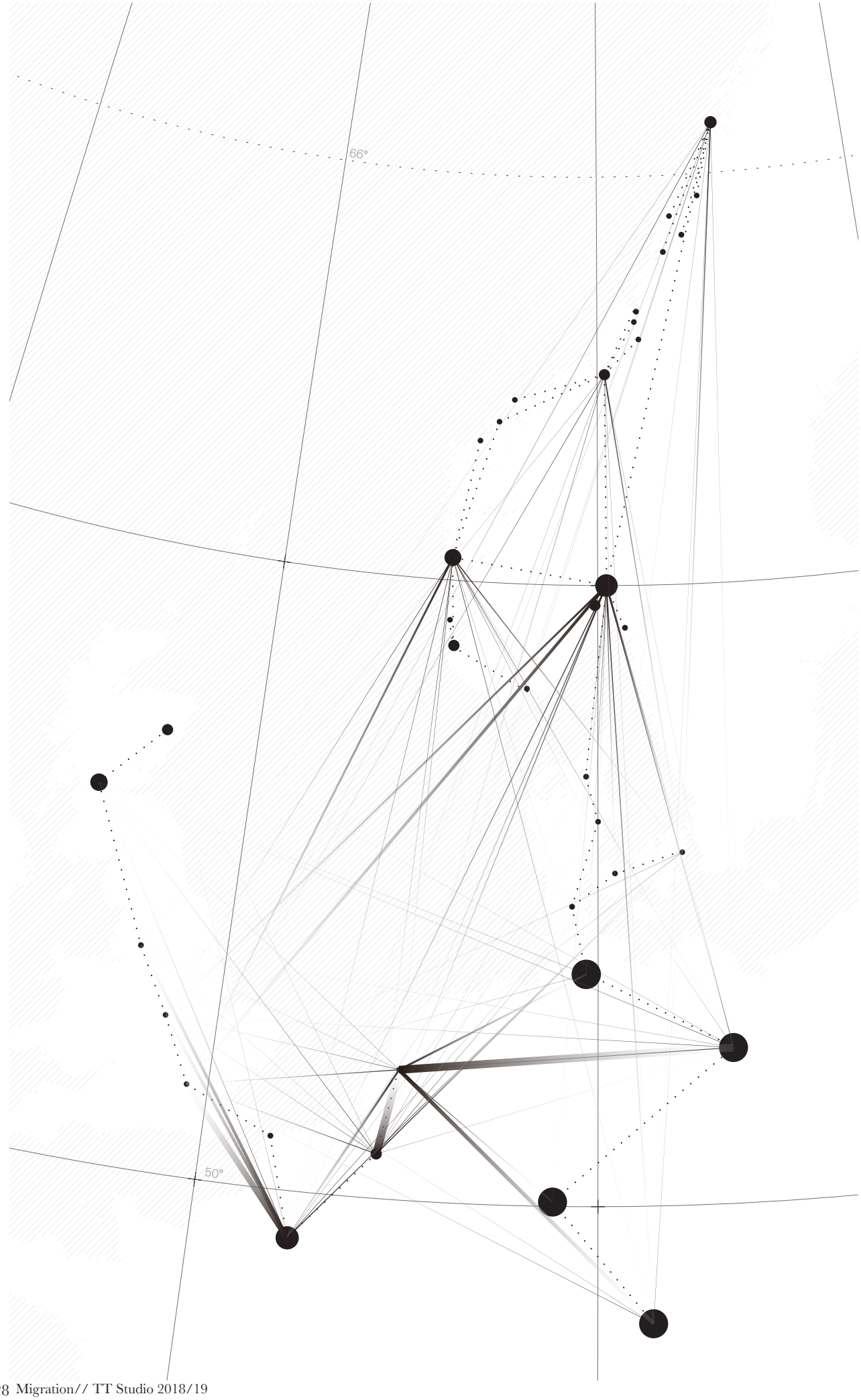
SAILING ECONOMY

European understanding of science was growing, and the printing press made the spread of realistic images easier. “As technology advanced, as our understanding of the oceans and navigation advanced, more emphasis was placed on human’s ability to master the watery element: to sail on it and conduct trade on it,” Van Duzer told Lapham’s. “And thus images of the dangers of the sea, while they certainly did not immediately disappear from maps in the 17th century, became less frequent over time, and images of ships became more common.”

There were still illustrations on maps, but they were far more pragmatic. Ships indicated areas of safe passage, while drawings of fish and whales showed good fishing areas. On one map from the early 17th century, vignettes illustrated how to kill and process a whale. “Whales, the largest creatures in the ocean, are no longer monsters but rather natural marine storehouses of commodities to be harvested,” wrote Van Duzer. Some of the mystery is gone as the sea becomes another resource rather than a churning darkness to be feared.

Past - Present
Similar to the past, the North Sea can still be considered the edge of the world today. The North Sea and its surrounding coastal countries gathered around it, they are (and will be) experiencing the sea level rise. Climate change, has been accelerated (partly) from industrial processes and interventions in the North Sea, subsequently the arctic glaciers are melting. As the water level starts to rise, we are once again confronted with the same barricade that medieval civilizations faced. In this way, the sea is regaining its historical dimension of being an unfamiliar territory which will bring the unknown, by once again becoming a moving edge of the world.

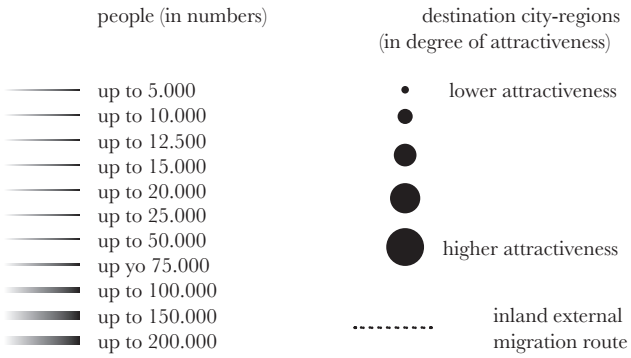
As a result of the past and present, we will be in position to remove ourselves from waters of the North Sea, to protect our way of living from flooding with engineered walls and barriers. The separation of people from the sea seems to be inevitable. However, the forecasted sea level rise will not stop us from new ways of benefitting from the sea. People will not stop considering it as an open resource, we have lost a certain form of respect for the sea and its hidden power. The circle closes again.


66°
50°

NORTH SEA IN MAPS

Historically, the North Sea has been a contested territory. While bordering the mainland Europe it has been often turned into a platform for geopolitical affairs with the UK as well as the Nordic countries. Such strategic role has manifested itself in various military, religious, economic, and social ties and divides, which has consequently made the North Sea a confliction common ground. The ongoing refugee crisis or the Brexit are only very recent examples of such a long history. As a result, the sea is not seen anymore a periphery of Europe but rather a central territory and a point of departure through which the idea of Europe would be defined or challenged. Therefore, in the North Sea: Landscapes of Coexistence Studio we would celebrate these controversial aspects of the sea, not anymore as an extra-territorial space and a limit to the land, but rather as the main point an autonomous entity through which the political, environmental, economic and societal questions could be addressed. In this way any spatial proposition, whether landscape, urban or architectural, would be challenged and revisited through the lens of the North Sea as a referenced territory for new spatial interventions. Students are encouraged to redefine the role of the territory of the sea and particularly its land borders/ coastal cities, addressing the complex, yet not so visible, spatial, juridical, environmental and geopolitical natures of the North Sea.
(https://deltaurbanismtudelft.org/)

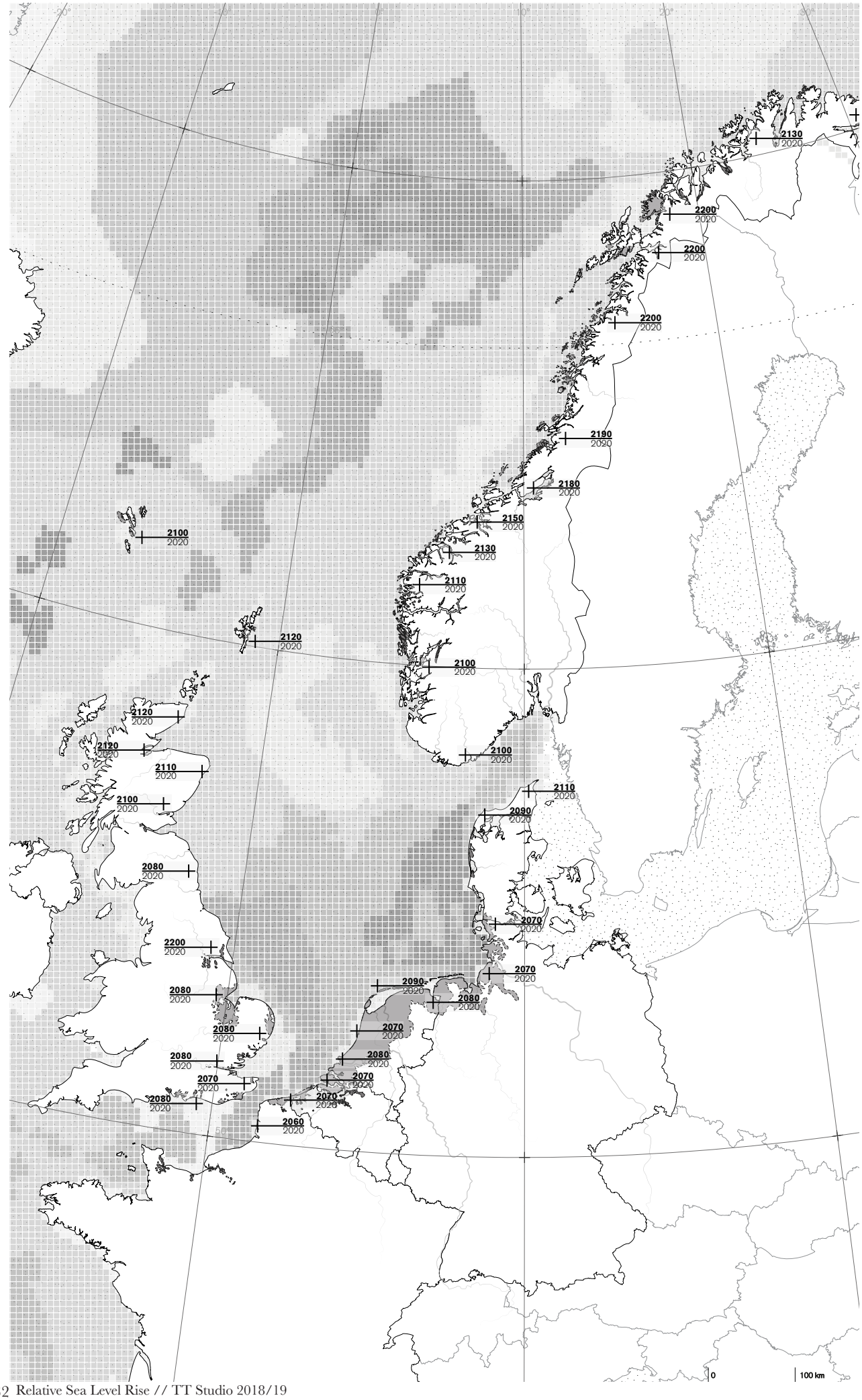
Map 1
The map shows the potential patterns of migration that could develop across the territory of the North and Norwegian seas. Two types of information are combined: 1. external immigration toward the territory (refugees and immigrants originating outside the territory and the EU) and 2. internal migration within the territory (economic or other migrants). The speculation is based on the following criteria: 1. current trends, 2. potential changes in the level of importance of regional and national economies and 3. existing legislation, initiatives and political environment relating to labour protection, R&D and economic kick-start, to provide an overview of probable attractive regions and countries, on the one hand, and, on the other, regions and countries that could probably experience a drop in living quality and, therefore, a wave of emigration. The superimposition of the two different types of migration is done in order to evaluate their degree of correspondence and speculate on demographic composition. Evidently, this projection is primarily characterized by a shift in the movement of people toward Norway, by a relative increase in the attractiveness of France, by a profound decrease in the attractiveness of the UK, while the other countries exhibit similar figures compared to what occurs nowadays. Overall, an evident shift toward the northern and north-eastern parts of the territory is set to occur.



NORTH SEA - ALTERED LOGISTICS FLOW

The map shows the projection model for logistic flows in 2150 in the North Sea. Dredging of the major harbors in the South is not feasible anymore. New cargo and vessel transfer ports are now located towards the North in Norway. With the opening of the North Arctic Sea route, new ports were openend into the sea on the edge of the fjords where the waterbed is deep enough for future ships. Due to the hard Brexit, the United Kingdom was forced to increase their port capacities across the island. Most distribution enters from the Norwegian ports.

- harbor growth (fast)
- harbor growth (slow)
- shipping flows - density
- small harbor
- oil/gas platform
- service harbor - platform s
- service routes - platform s
- protected areas
- train infrastructure
- train stations

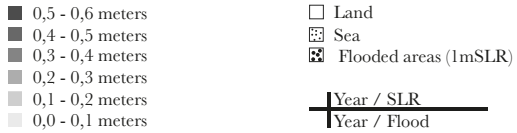


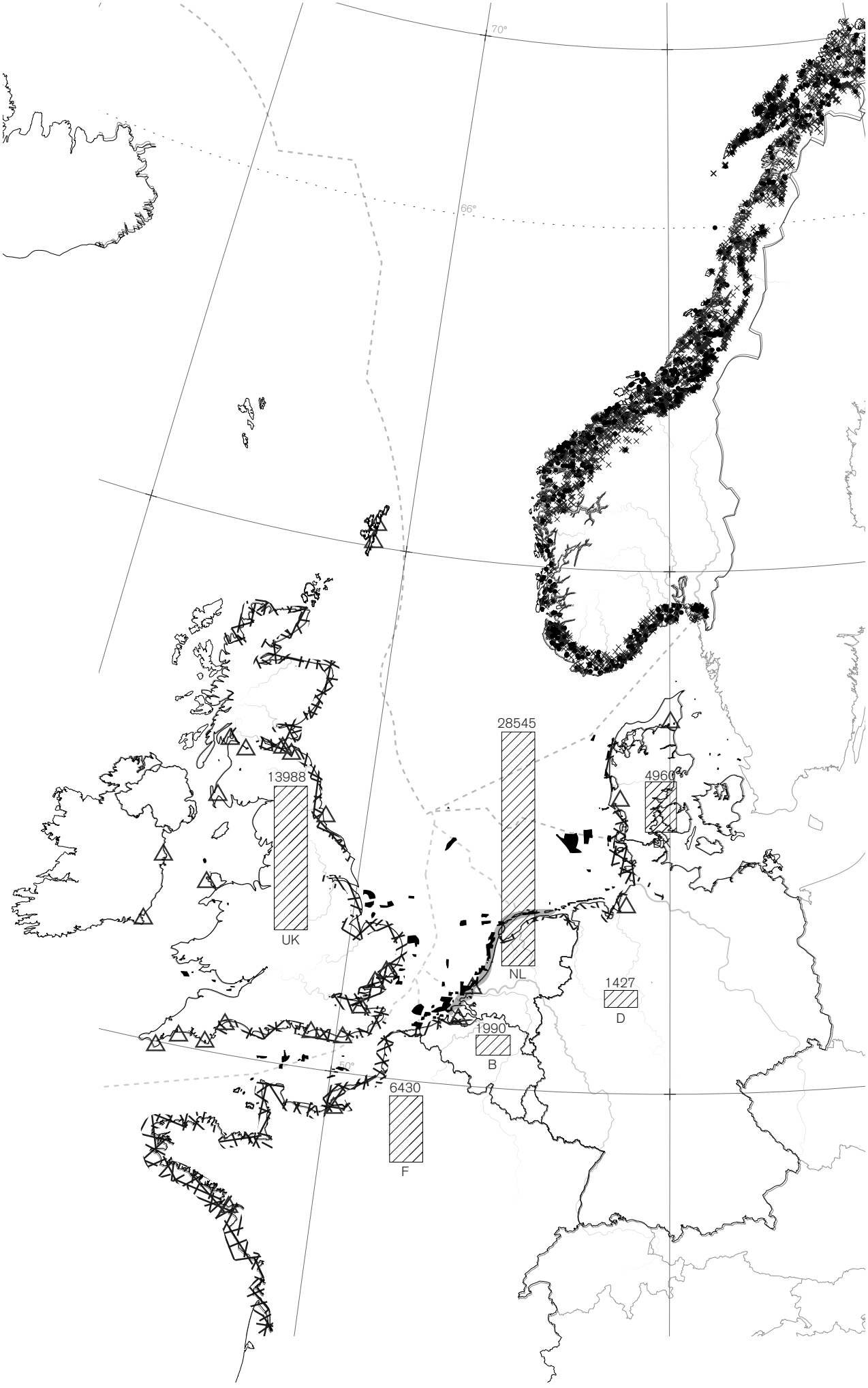
- Familiarizing the Unknown -

NORTH SEA & ITS HIDDEN POWER

The strategy of using the world as the open resource has its consequences. The most visible consequence around the North Sea is its water level rise because of the melting glaciers in the North of the Norwegian Sea. The Sea as a natural force shows its power again

This map illustrates the extreme effect of the climate change in case of +1m sea level rise (SLR) in regard to 8.5 RCP scenario and in the absence of action. The sea projection depicts a prediction for the relative sea level rise in the period 2081-2100. The map renders the flood risk areas in the North Sea region and provides information about when those events are expected to be formalised: as extream event (Flood) or constant condition (Sea Level Rise). In the aftermath of relative sea level rise, the huge part of the coastline shall be recon - sidered in terms of water defence systems and urban strategy. The entire seascape is expected to fully reshape, where most vulnerable countries to those changes are Netherlands, Germany, Denmark, but also part of England. The increasing amount of sea water will affect many aspects of the human habitat, like for instance the entire primary sector of the economy, the appearance of the wide maritime areas etc.



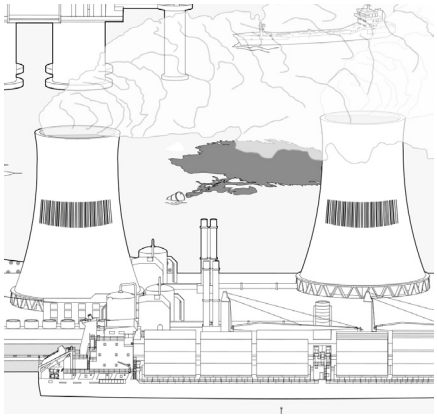

70°
66°
28545
13988
4960
UK
NL
1427
D
1990
B
6430
F

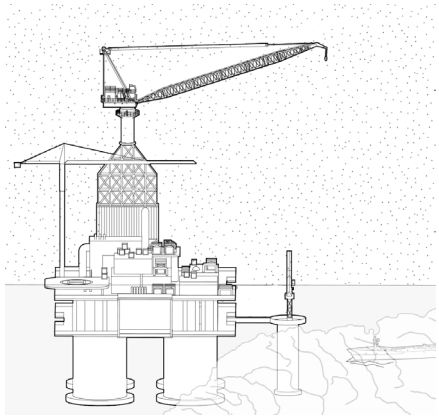
NORTH SEA & ITS HUMAN BORDERS

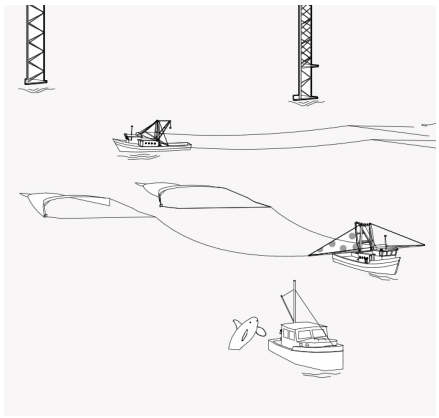
The unknown is coming
As a result of the past and present, we will be in position to remove ourselves from waters of the North Sea, to protect our way of living from flooding with engineered walls and barriers. The separation of people from the sea seems to be inevitable. However, the forecasted sea level rise will not stop us from new ways of benefitting from the sea. People will not stop considering it as an open resource, we have lost a certain form of respect for the sea and its hidden power. The circle closes again

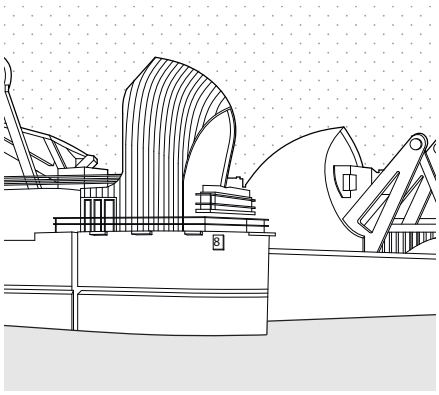
Artificial structures construction activities in the North Sea area.

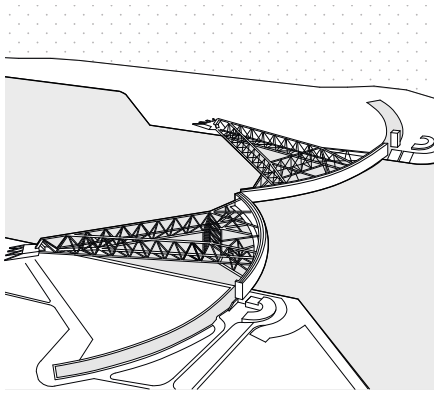
△ Land reclaimation projects
⊟ Hard defenses
■ Soft defenses
■ Marine sediment extraction area in 2007
● Aggregates withdrawal in Norway
× Sand and gravel withdrawal in Norway
▨ Total volume of extraction of sand, maerl and gravel in 2007 (thousand m^3)











NORTH SEA - PROBLEM STATEMENT

The progress of technological devel-opment brought has us back to the point of being at the edge of the world. This is visible in the climate change issue; it brushed us aside from understanding the hidden power of nature, so well understood and embraced by our ancestors of the North Sea.

The project tries to tackle a complex problem, which has been progressive-ly developing over the years. It can be divided into multiple time and place aspects:

1. Past - The North Sea as the Edge of the World

Over centuries, the North Sea has been considered as the edge of the world and its people could not imag-ine going further than its coastal wa-ters. The sea was seen as an evil in itself which created a physical and mental border to pass. The fear of the power of water was evident. Be-cause of its extreme natural power, water had to be treated with a certain respect, to get an opportunity to achieve all it has to offer.

2. Present – The North Sea and the loss of control

Similar to the past, the North Sea can still be considered the edge of the world today. The North Sea and its surrounding coastal countries gath-ered around it, they are (and will be) experiencing the sea level rise. Cli-mate change, has been accelerated (partly) from industrial processes and interventions in the North Sea, sub-sequently the arctic glaciers are melt-ing. As the water level starts to rise, we are once again confronted with the same barricade that medieval civ-ilizations faced. In this way, the sea is regaining its historical dimension of being an unfamiliar territory which will bring the unknown, by once again becoming a moving edge of the world.

3. Future – Taking back control

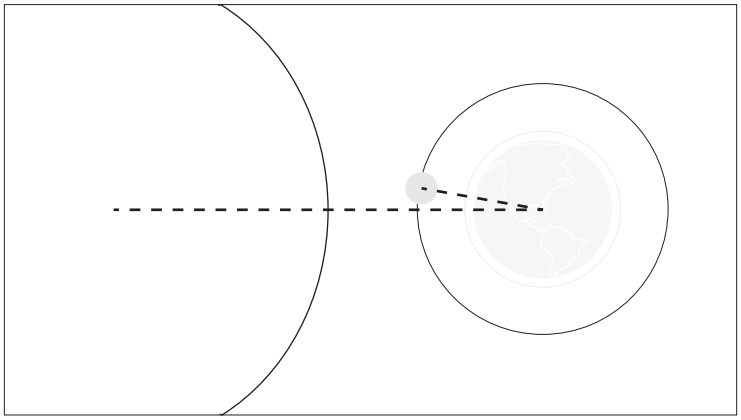
As a result of the past and present, we will be in position to remove our-selves from waters of the North Sea, to protect our way of living from flooding with engineered walls and barriers. The separation of people from the sea seems to be inevitable. However, the forecasted sea level rise will not stop us from new ways of benefitting from the sea. People will not stop considering it as an open re-source, we have lost a certain form of respect for the sea and its hidden power. The circle closes again.

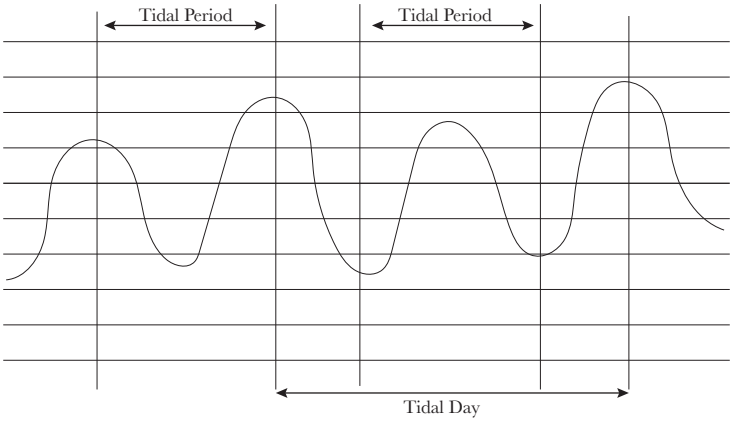
4. Research Questions

How to reconnect man and nature with water, to break the physical and mental border of the sea as the edge?

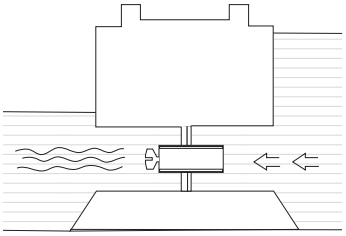
How to coexist with the power of water and not to be cut off from it because of the fear from flooding?

subquestions:
How to use the power of water to keep a cerrain respect?
How the power of water was used in the past and is used now?
How to reunite people with water?
How did we live within the sea?
Does technology protects us from water or connects us with it?





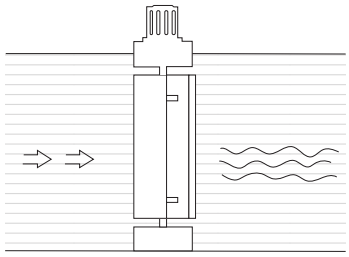
kinetic



TIDAL BARRAGE

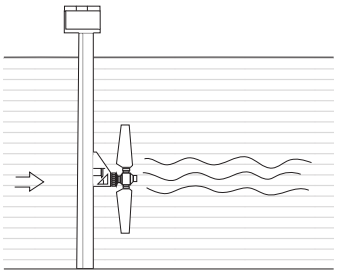
- the most efficient
- 1 turbine per every 30 meters
- 1 turbine = 10 MW

kinetic + potential

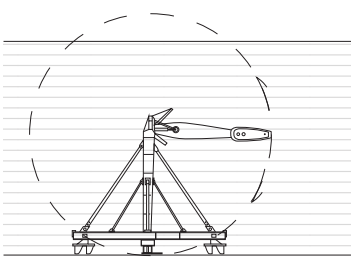


TIDAL FENCES

- array of vertical axis tidal turbines
- no effect on tide levels
- 600 MW peak
- less environment impact than a barrage



TIDAL TURBINE



OSCILATING HYDROFOIL DEVICES

Tidal Power Plants
Tidal Energy or Tidal Power as it is also called, is another form of hydro power that utilises large amounts of energy within the oceans tides to generate electricity. Tidal Energy is an “alternative energy” that can also be classed as a “renewable energy source”, as the Earth uses the gravitational forces of both the moon and the sun everyday to move vast quantities of water around the oceans and seas producing tides.

As the Earth, its Moon and the Sun rotate around each other in space, the gravitational movement of the moon and the sun with respect to the earth, causes millions of gallons of water to flow around the Earth’s oceans creating periodic shifts in these moving bodies of water. These vertical shifts of water are called “tides”.

When the earth and the moons gravity lines up with each other, the influences of these two gravitational forces becomes very strong and causes millions of gallons of water to move or flow towards the shore creating a “high tide” condition. Likewise when the earth and the moons gravity are at 90o to each other, the influences of these two gravitational forces is weaker and the water flows away from the shore as the mass of water moves to another location on the earth, creating a “low tide” condition. This ebbing and flowing of the tides happens twice during each period of rotation of the earth with stronger weekly and annual lunar cycles superimposed onto these tides.

Tidal Energy Convertors
Energy can be harnessed from the tides in two ways: using the change in height of the tides (potential); and using the flow of the water (kinetic). The fast sea currents are often magnified by topographical features, such as headlands, inlets and straits, or by the shape of the seabed when water is forced through narrow channels. The tidal stream devices, which utilise these currents, are broadly similar to submerged wind turbines and are used to exploit the kinetic energy in tidal currents. Due to the higher density of water, this means that the blades can be smaller and turn more slowly, but they still deliver a significant amount of power. To increase the flow and power output from the turbine, concentrators (or shrouds) may be used around the blades to streamline and concentrate the flow towards the rotors.

I have identified four main types of Tidal Energy Convertors (TEC):

Tidal Barrage
A Tidal Barrage is a type of tidal power generation that involves the construction of a fairly low dam wall, known as a “barrage” and hence its name, across the entrance of a tidal inlet or basin creating a tidal reservoir. This dam has a number of underwater tunnels cut into its width allowing sea water to flow through them in a controllable way using “sluice gates”. Fixed within the tunnels are huge water turbine generators that spin as the water rushes past them generating tidal electricity.

Tidal Fences
A Tidal Fence is another form of tidal stream technology, which directly exploits fast flowing underwater ocean currents for energy generation. In many ways, a tidal fence installation is a cross between a tidal barrage and a tidal turbine stream system. Unlike submerged tidal turbines which are individually positioned around the oceans floor, tidal fences are composed of individual vertical-axis turbines that are mounted together within a single fence.

Tidal Turbine
Tidal Turbine Generation system reduces some on the environmental effects of tidal barrages by using turbine generators beneath the surface of the water. Major tidal flows and ocean currents, like the Gulf Stream, can be exploited to extract its tidal energy using underwater rotors and turbines. Tidal stream generation is very similar in principal to wind power generation, except this time water currents flow across a turbines rotor blades which rotates the turbine, much like how wind currents turn the blades for wind power turbines. In fact, tidal stream generation areas on the sea bed can look just like underwater wind farms.

TIDAL POWER PLANT REFERENCES

A. Strangford Lough

MeyGen project (Phase 1A) involves the deployment of 4 No. 1.5MW turbines installed on gravity turbine support structures as part of MeyGen's "deploy and monitor strategy", and will act as a precursor to the development of the remaining consented 86MW project. The project will demonstrate that the development of tidal array projects is both commercially viable and technically feasible, with the invaluable lessons drawn from the construction, installation, operation and maintenance of this phase (of the project) fed into subsequent phases.

Each turbine is located on an individual foundation weighing between 250 and 350 tonnes, coupled with 6 ballast blocks weighing 1,200 tonnes that provide horizontal stability over the lifetime of the turbine. Each turbine has a dedicated subsea array cable laid directly on the seabed and brought ashore via a horizontal directionally drilled borehole within the foreshore bedrock.

The turbines feed into the onshore power conversion unit building at the Ness of Quoys, where the low voltage supply will be converted to 33kV for export via the 14.9MW grid connection into the local distribution network. On completion this phase of the tidal array will generate sufficient electricity to supply 2,600 homes.

B. Sihwa Lake Tidal Power Station

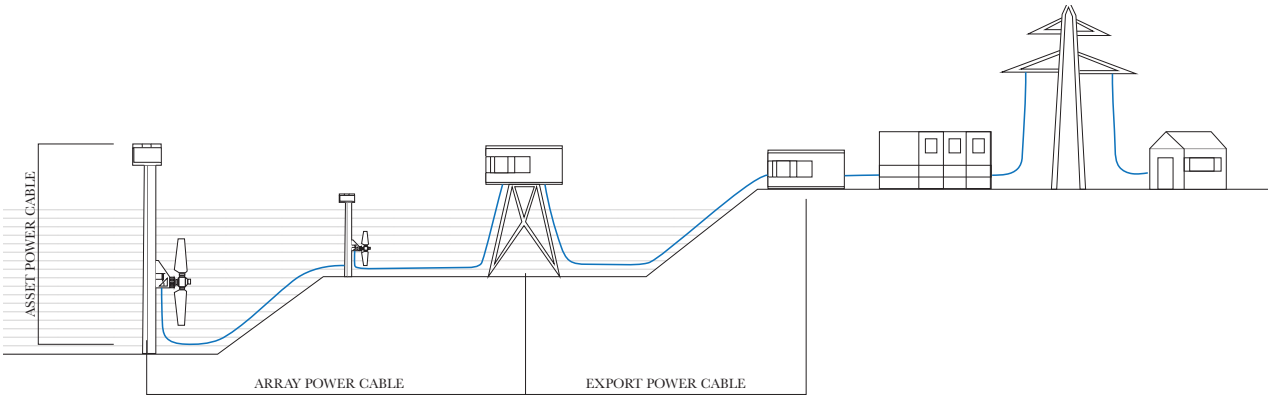
From space, the 12.7-kilometer (km) Sihwa Lake tidal barrage that houses a 400-meter (m)-long tidal power plant looks like a delicate strand stretched across one of many bays and inlets characterizing the craggy coastline of Gyeonggi Bay in the Korean Peninsula's northwestern region. On site, however, there is no question that the 254-MW tidal power plant designed to reap energy from the highest tides in the vast Yellow Sea is a marvel of engineering.
- Tidal Turbine
- Oscilating Hydrofoil Devices

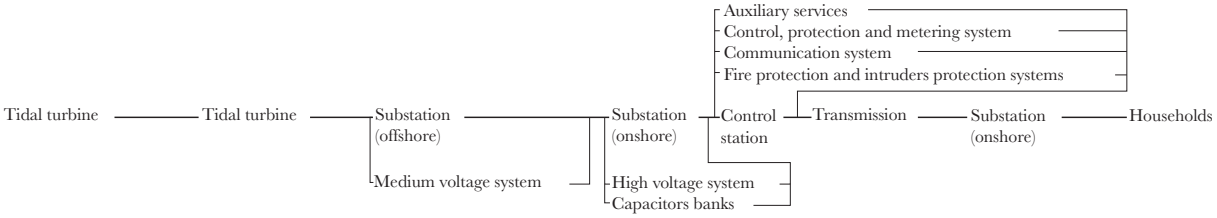
C. Tidal Lagoon Swansea Bay

Swansea Bay Tidal Lagoon will be the world's first tidal lagoon power plant. A tidal lagoon is a 'U' shaped breakwater, built out from the coast which has a bank of hydro turbines in it. Water fills up and empties the man-made lagoon as the tides rise and fall. We generate electricity on both the incoming and outgoing tides, four times a day, every day.

Due to the incredible tides on the West Coast of Britain, by keeping the turbine gates shut for just three hours, there is already a 4m height difference in water between the inside and the outside of the lagoon. Power is then generated as the water rushes through 60m long draft tubes, rotating the 7.2m diameter hydro turbines.

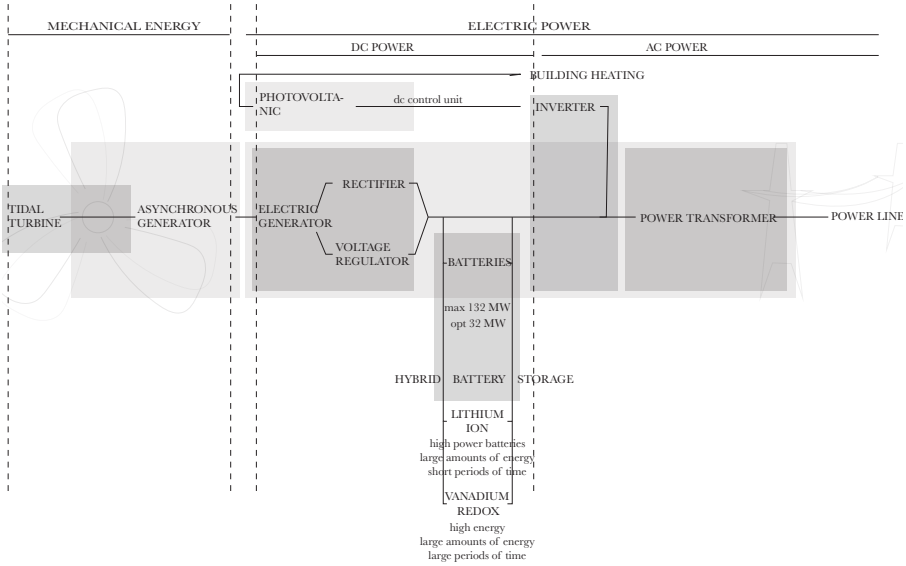
The project was awarded a Development Consent Order in 2015 and is primed for construction. It will comprise 16 hydro turbines, a 9.5km breakwater wall, generating electricity for 155,000 homes for the next 120 years. Its major delivery partners include Atkins, General Electric, Andritz Hydro, Laing O'Rourke and Alun Griffiths Ltd.

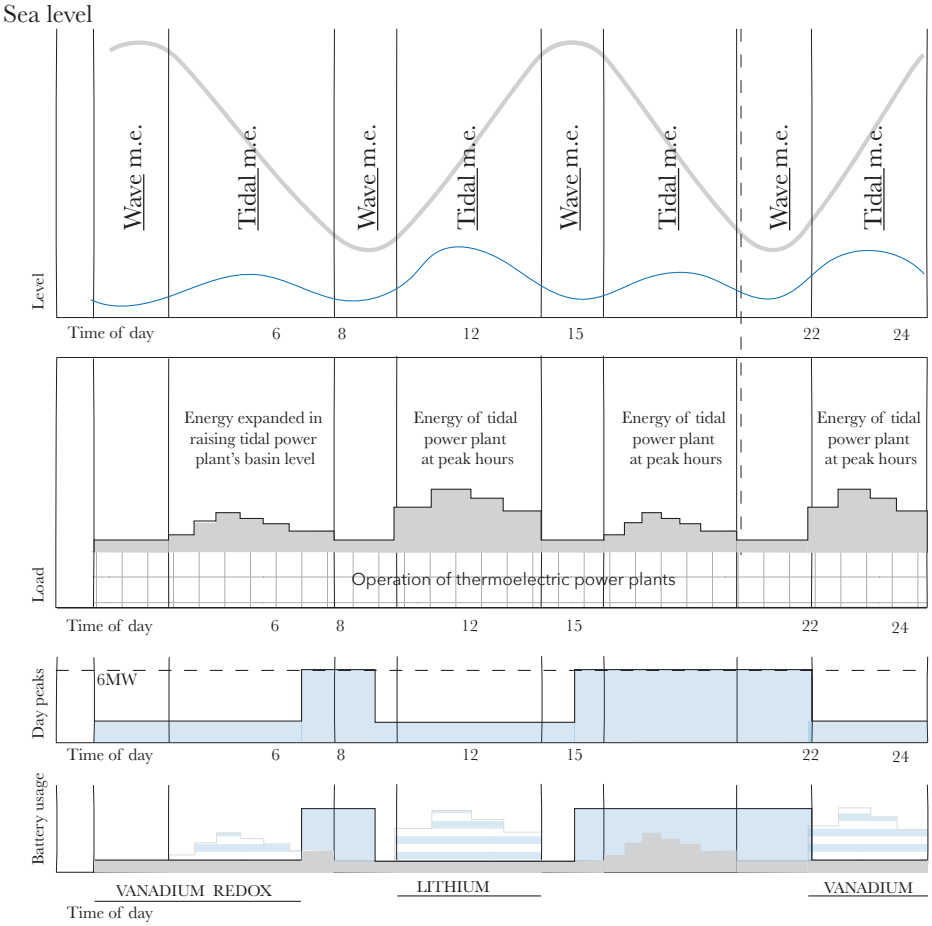

ASSET POWER CABLE
ARRAY POWER CABLE
EXPORT POWER CABLE


Auxiliary services
Control, protection and metering system
Communication system
Fire protection and intruders protection systems
Tidal turbine
Tidal turbine
Substation (offshore)
Substation (onshore)
Control station
Transmission
Substation (onshore)
Households
Medium voltage system
High voltage system
Capacitors banks

TIDAL POWER PLANT SCHEME

a) Tidal Turbine
b) Substation (offshore/onshore) and Control Station
High voltage system is made of one or more transformers, together with earthing reactance, surge arresters, current transformer, voltage transformer, circuit breaker and disconnector with earthing switch.
Capacitors banks are installed to comply with the grid requirements regarding active and reactive power.
The auxiliary services supply energy both in AC/DC current, and count with a group of battery that can generate energy for several hours to operate the substation in case of emergency, a rectifier and often a backup diesel generator, with a tank big enough to provide energy for 3 days.
Control, protection and metering system allows the correct operation of the tidal farm according to local regulations and grid requirements. Basically they are protection relays for the switchgear and power transformers
The communication system, must guarantee the correct communication with the adjacent substations and with the grid owner control center, in order to make possible the correct operation of the wind farm substation.
Fire protection system is normally composed by optical or infrared detectors, fire extinguisher, external bells or siren, while te intruders protection system are normally a fence plus a closed circuit TV.
c) Transmission
d) Substation onshore
e) Households


MECHANICAL ENERGY
ELECTRIC POWER
DC POWER
AC POWER
BUILDING HEATING
PHOTOVOLTA-
NIC
dc control unit
INVERTER
RECTIFIER
TIDAL
TURBINE
ASYNCHRONOUS
GENERATOR
ELECTRIC
GENERATOR
VOLTAGE
REGULATOR
POWER TRANSFORMER
POWER LINE
BATTERIES
max 132 MW
opt 32 MW
HYBRID BATTERY STORAGE
LITHIUM
ION
high power batteries
large amounts of energy
short periods of time
VANADIUM
REDOX
high energy
large amounts of energy
large periods of time


Sea level
Wave m.e.
Tidal m.e.
Wave m.e.
Tidal m.e.
Wave m.e.
Tidal m.e.
Wave m.e.
Tidal m.e.
Level
Time of day
6
8
12
15
22
24
Energy expanded in raising tidal power plant's basin level
Energy of tidal power plant at peak hours
Energy of tidal power plant at peak hours
Energy of tidal power plant at peak hours
Operation of thermoelectric power plants
Load
Time of day
6
8
12
15
22
24
6MW
Day peaks
Time of day
6
8
12
15
22
24
Battery usage
VANADIUM REDOX
LITHIUM
VANADIUM
Time of day

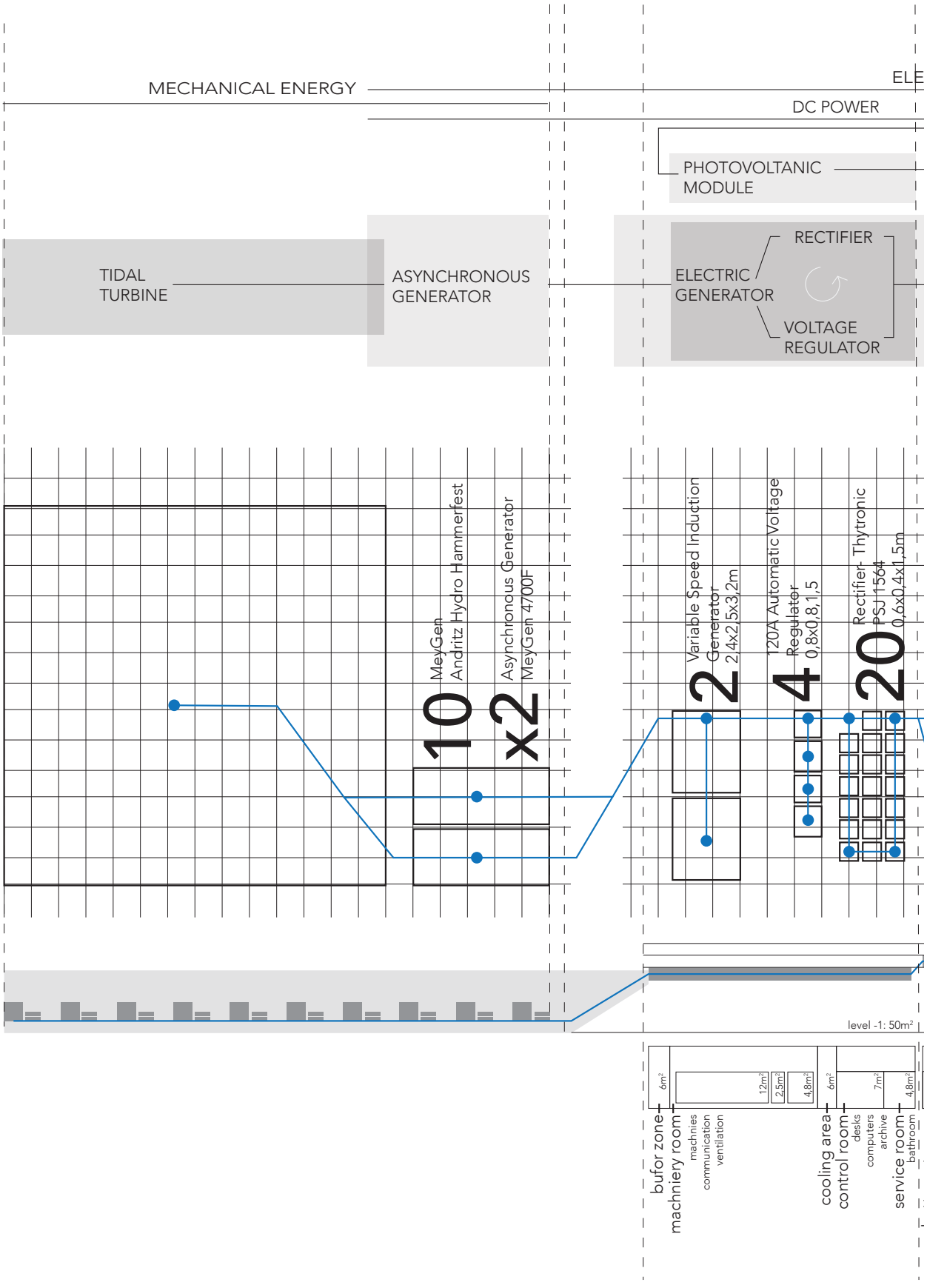
TIDAL POWER PLANT - ENERGY STORAGE

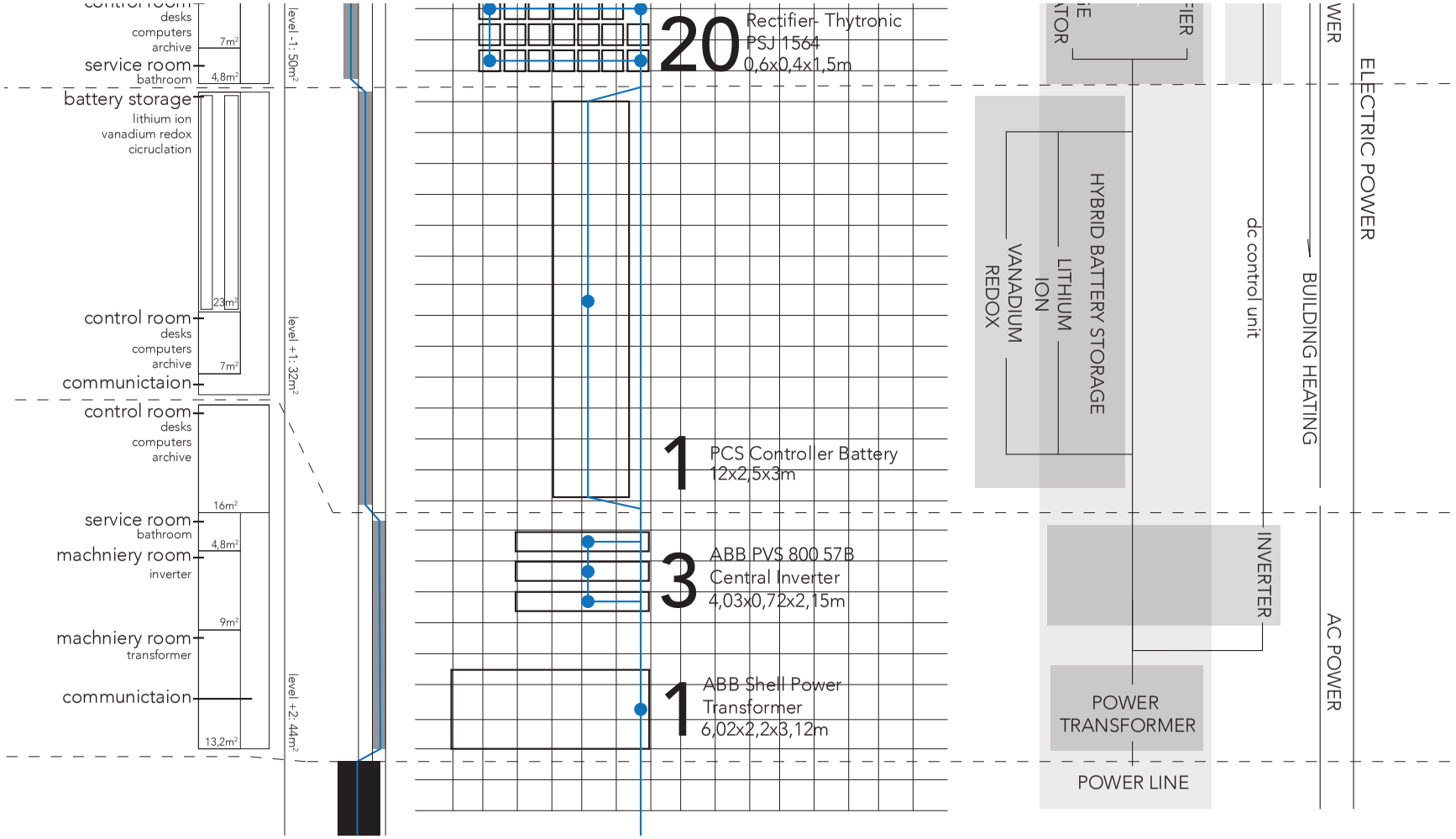
A battery storage power plant is a form of storage power plant, which uses batteries on an electrochemical basis for energy storage. Unlike common storage power plants, such as the pumped storage power plants with capacities up to 1000 MW, the benefits of battery storage power plants move in the range of a few kW up to the MW range.

The storage system is usually connected to the local community power park (up to 20 MW installed capacity). Depending on wind/solar power/waves strength and charging status of each battery a system developed by Bosch distributes the energy generated by the wind turbines to the right battery. In case of a network congestion the batteries buffer the energy of the power plant and feed it back into the grid at a convenient time later. With this method, a shutdown of tidal turbines can be avoided during times of network congestion so that the energy of the wind is not wasted.

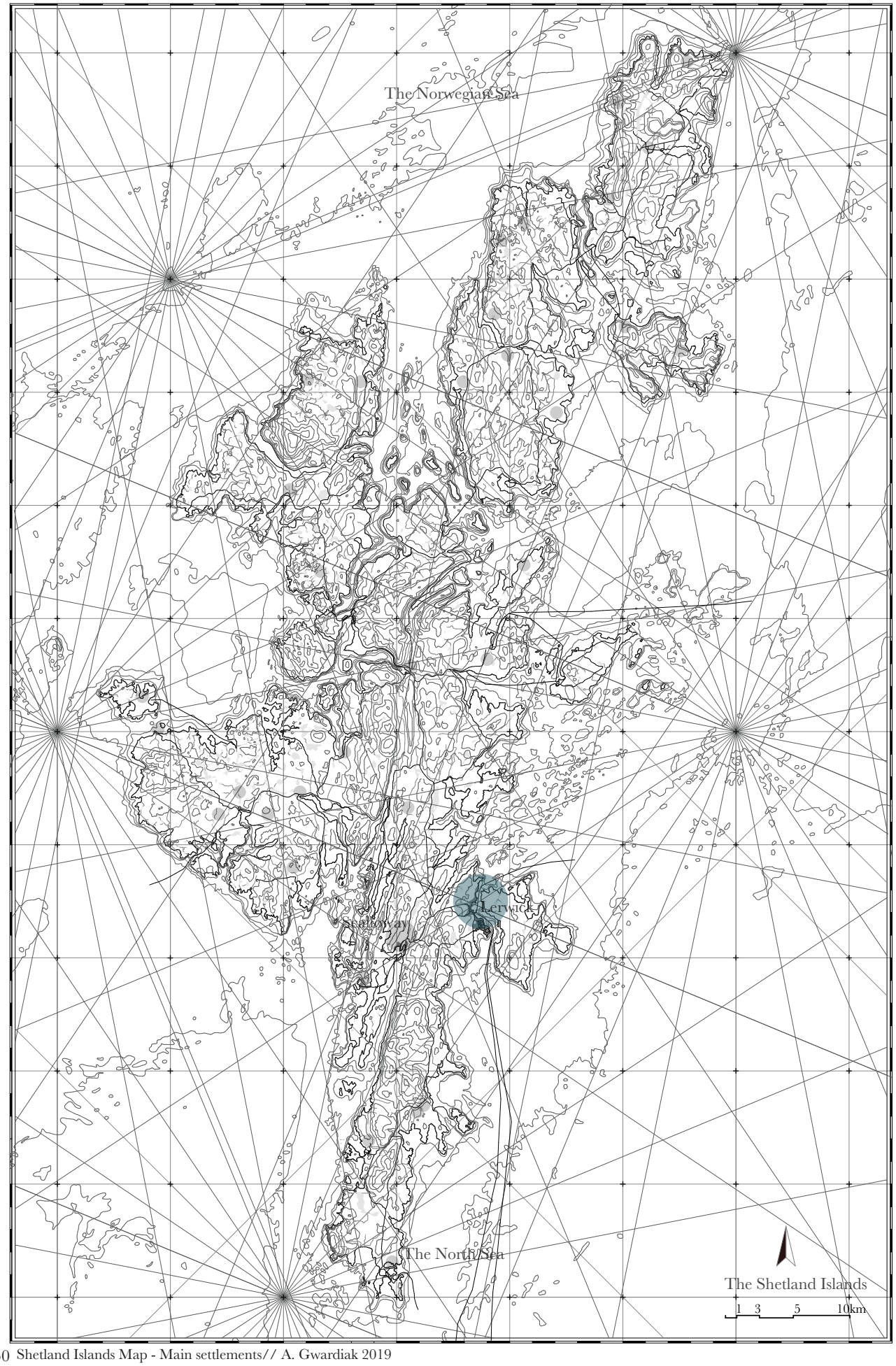
The system is combined from two hybrid betteries One is a lithium-ion energy storage unit with a capacity of two megawatt hours and an output of two megawatts. The other is a vanadium redox flow battery with a capacity of one megawatt hour and a peak output of 325 kilowatts.

Lithium-ion batteries are sometimes called “high-power batteries” because of their ability to absorb and release large amounts of electrical energy over a short period of time, while vanadium redox flow, or “high-energy” batteries store large amounts of energy very efficiently over long periods of time. We use both technologies in a roughly equal share in Braderup.lower what brings us to the question if the storage of the energy is possible?


MECHANICAL ENERGY
ELE
DC POWER
PHOTOVOLTANIC MODULE
TIDAL TURBINE
ASYNCHRONOUS GENERATOR
ELECTRIC GENERATOR
RECTIFIER
VOLTAGE REGULATOR
10 MeyGen Andritz Hydro Hammerfest
x2 Asynchronous Generator MeyGen 4700F
2 Variable Speed Induction Generator 2.4x2,5x3,2m
4 120A Automatic Voltage Regulator 0,8x0,8,1,5
20 Rectifier Thytronic PSJ 1564 0,6x0,4x1,5m
level -1: 50m²
bufor zone
machniery room
machnies
communication
ventilation
cooling area
control room
desks
computers
archive
service room
bathroom


desks
computers
archive
7m²
service room
bathroom
4,8m²
battery storage
lithium ion
vanadium redox
cicruclation
23m²
control room
desks
computers
archive
7m²
communictaion
control room
desks
computers
archive
16m²
service room
bathroom
4,8m²
machniery room
inverter
9m²
machniery room
transformer
communictaion
13,2m²
level -1: 50m²
level +1: 32m²
level +2: 44m²
20
Rectifier- Thytronic
PSJ 1564
0,6x0,4x1,5m
1
PCS Controller Battery
12x2,5x3m
3
ABB PVS 800 57B
Central Inverter
4,03x0,72x2,15m
1
ABB Shell Power
Transformer
6,02x2,2x3,12m
HYBRID BATTERY STORAGE
LITHIUM ION
VANADIUM REDOX
dc control unit
INVERTER
POWER TRANSFORMER
POWER LINE
BUILDING HEATING
AC POWER
ELECTRIC POWER

II SHETLAND ISLANDS


The Norwegian Sea
Lerwick
Scalloway
The North Sea
The Shetland Islands
1 3 5 10km

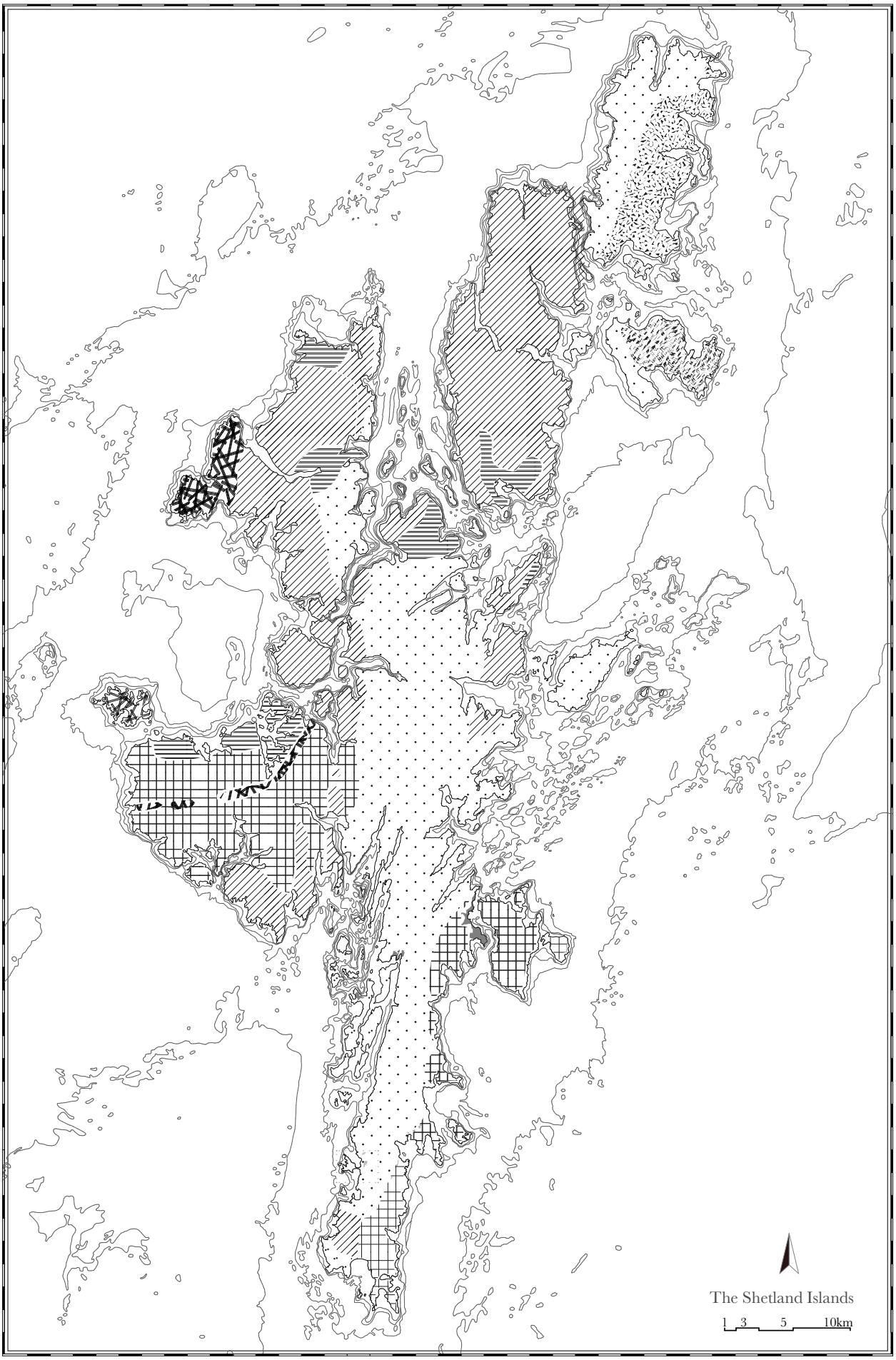
SHETLAND ISLANDS

One of these places, where the past is still visible through its traces, are the Shetland Islands. Their inhabitants and local industries still fully accept the conditions given by nature and its rhythm of annual cycles. The beauty of the place is definitely visible by the way of getting well with its nature. People take from it whatever it gives, take care after traditions and local family industries. These Islands seem to have learnt from the past of their land dominated by Vikings,and know how to treat the power of nature with a certain respect. They remember this lesson by now. Moreover, all the historical traces, which the local culture is based on, are still clearly visible and connected to the modernity of these lands.

Shetland (Scots: Shetland), also called the Shetland Islands and formerly Zetland, is a subarctic archipelago of Scotland that lies northeast of Great Britain. The islands lie some 80 km to the northeast of Orkney, 168 km from the Scottish mainland and 280 km southeast of the Faroe Islands. They form part of the division between the Norwegian Sea to the west and the North Sea to the east. The total area is 1,466 km2, and the population totalled 23,210 in 2011. The islands' administrative centre and only burgh is Lerwick, which has also been the capital of Shetland since taking over from Scalloway in 1708. The Islands are partially dependent on the import from the Mainlands like Norway and Scotland. Nevertheless, the energy is being gathered by local residents - almost every household has its owne enrgy generator e.g. wind turbinre.

More than half of the Shetland catch by weight and value is mackerel. Today, the main revenue producers in Shetland are agriculture, aquaculture, fishing, renewable energy, the petroleum industry (crude oil and natural gas production), the creative industries and tourism.

However, the location of the Shetland Islands is not as calm as their local life. Over the time it became the new Edge of the World. It is the transitional territory, a gateway between the North and Norwegian Seas, the latter being the source for one of the largest geographical uncertainties Europe will experience: sea level rise. Because of climate change, partially caused by industrial processes and interventions in the North Sea, arctic glaciers are melting. With the elevating water level, we are once again confronted with the same sea barricade that medieval civilizations faced. In this way, the sea is regaining its historical dimension of being an unfamiliar territory, by once again becoming a moving edge of the world. This new mentality restored to it a depth which had been forgotten.

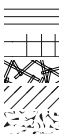

The Shetland Islands
1 3 5 10km

SHETLAND ISLANDS GEOLOGY

The geology of Shetland is complex, with numerous faults and fold axes. These islands are the northern outpost of the Caledonian orogeny, and there are outcrops of Lewisian, Dalradian and Moine metamorphic rocks with histories similar to their equivalents on the Scottish mainland. There are also Old Red Sandstone deposits and granite intrusions. The most distinctive features are the ultrabasic, ophiolite, peridotite and gabbro on Unst and Fetlar, which are remnants of the Iapetus Ocean floor.

Much of Shetland's economy depends on the oil-bearing sediments in the surrounding seas. Geological evidence shows that in around 6100 BC a tsunami caused by the Storegga Slides hit Shetland, as well as the rest of the east coast of Scotland, and may have created a wave of up to 25 metres (82 ft) high in the voes where modern populations are highest.

Geological map



Oceanic /Metamorphic rocks (500 mya)
Gneisses (2900 - 1500mya)
Devonian Sandstones (394 - 384 mya)
Volcanic rocks (394 -384 mya)
Granophire (450-350 mya)
Dalranian Sandstones & Volcanics (730 - 580 mya)

SHETLAND ISLANDS IDENTITY

The expanding population of Scandinavia led to a shortage of available resources and arable land there and led to a period of Viking expansion, the Norse gradually shifting their attention from plundering to invasion. Shetland was colonised during the late 8th and 9th centuries, the fate of the existing indigenous population being uncertain. Modern Shetlanders have almost identical proportions of Scandinavian matrilineal and patrilineal genetic ancestry, suggesting that the islands were settled by both men and women in equal measure.

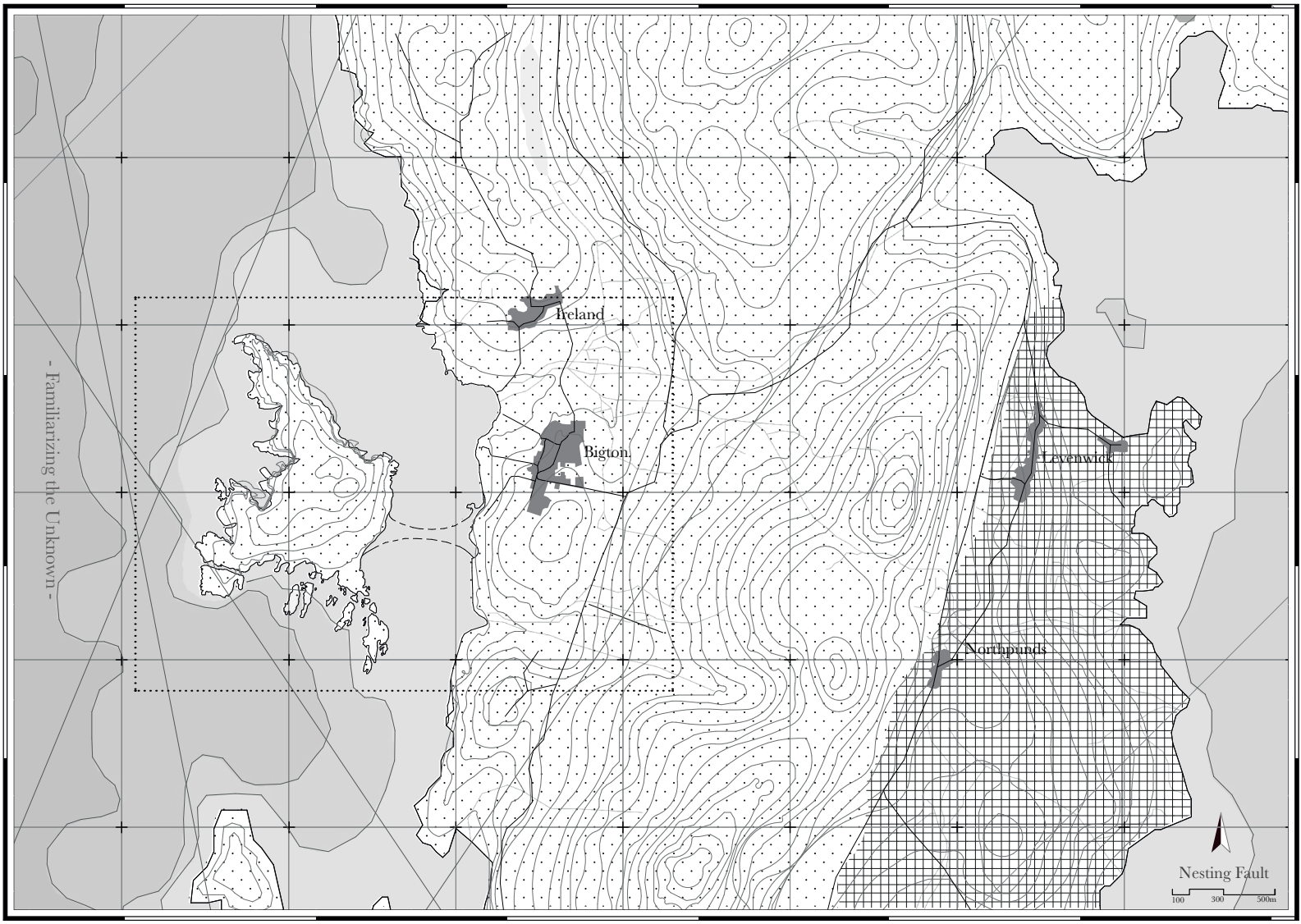
Vikings then used the islands as a base for pirate expeditions to Norway and the coasts of mainland Scotland. In response, Norwegian king Harald Hårfagre („Harald Fair Hair") annexed the Northern Isles (comprising Orkney and Shetland) in 875. Rognvald Eysteinsson received Orkney and Shetland from Harald as an earldom as reparation for the death of his son in battle in Scotland, and then passed the earldom on to his brother Sigurd the Mighty

Up Helly Festival - History
The current Lerwick celebration grew out of the older yule tradition of tar barrelling which took place at Christmas and New Year as well as Up Helly Aa. Squads of young men would drag barrels of burning tar through town on sledges, making mischie. Concern over public safety and levels of drunkenness led to a change in the celebrations, and saw them drawing inspiration from the islands' Viking history. After the abolition of tar barrelling around 1874–1880, permission was eventually obtained for torch processions. The first yule torch procession took place in 1876. The first torch celebration on Up Helly Aa day took place in 1881. The following year the torchlit procession was significantly enhanced and institutionalised through a request by a Lerwick civic body to hold another Up Helly Aa torch procession for the visit of Alfred, Duke of Edinburgh. The first galley was introduced and burned in 1889. The honorary role of the 'Jarl' was introduced to the festival in the early twentieth century. In reality, despite many sources claiming these ancient origins, the festival, and many like it, were products of Victorian do-goodery. The Lerwick Up-Helly Aa was first established by the Total Abstinence Society in the 1870s to give the young men who would otherwise drink themselves silly something to do. The name itself derives from Upholiday, the lowland Scots word for Twelfth Day, and was brought by them to the Shetland Islands in the 19th century.

Up Helly Festival - Currently
There is a main guizer who is dubbed the "Jarl" (pron. "yarl"). There is a committee which a person must be part of for 15 years before one can be a jarl, and only one person is elected to this committee each year. The procession culminates in the torches being thrown into a replica Viking longship or galley. The event happens all over Shetland and is currently celebrated at eleven locations – Scalloway, Lerwick, Nesting and Girlsta, Uyeasound, Northmavine, Bressay, Cullivoe, Norwick, Waas, the South Mainland and Delting. After the procession, the squads visit local halls (including schools, sports facilities and hotels), where private parties are held. At each hall, each squad performs its act, which may be a send-up of a popular TV show or film, a skit on local events, or singing or dancing.

SHETLAND ISLANDS SITE VISIT

III ST NINIAN ISLAND

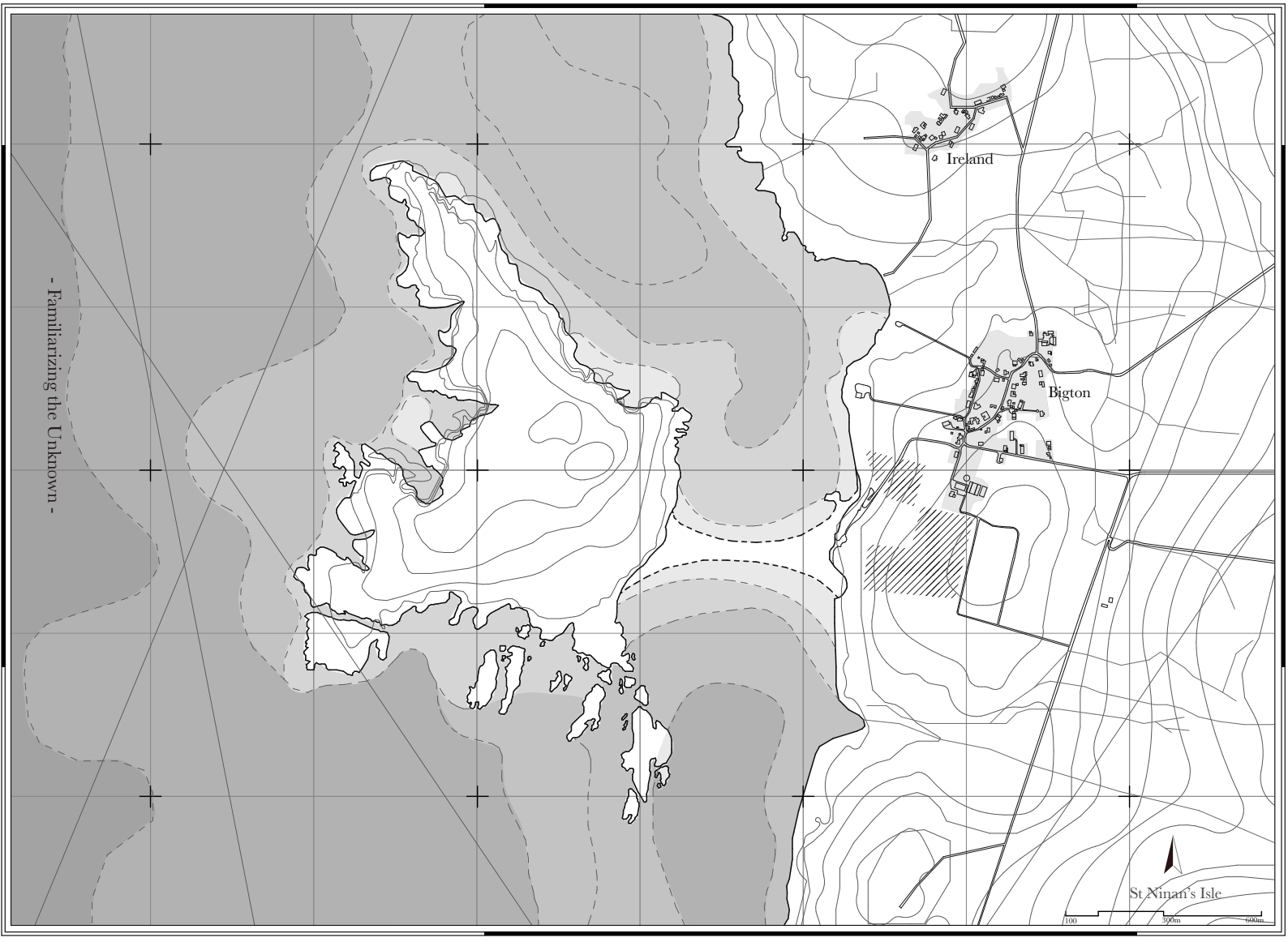


60 Nesting Fault Region Map//A. Gwardiak 2019

NESTING FAULT REGION

The Nesting Fault region is located in the Southern Part of the Shetland Islands. The region is focused in its economy on sheep farming.

Water
Dalranian Sandstones & Volcanics (730 - 580 mya)
Devonian Sandstones (394 - 384 mya)
Settlements
Land use


- Familiarizing the Unknown -
Ireland
Bigton
St Ninan's Isle
100
300m
600m

ST NINIAN ISLAND

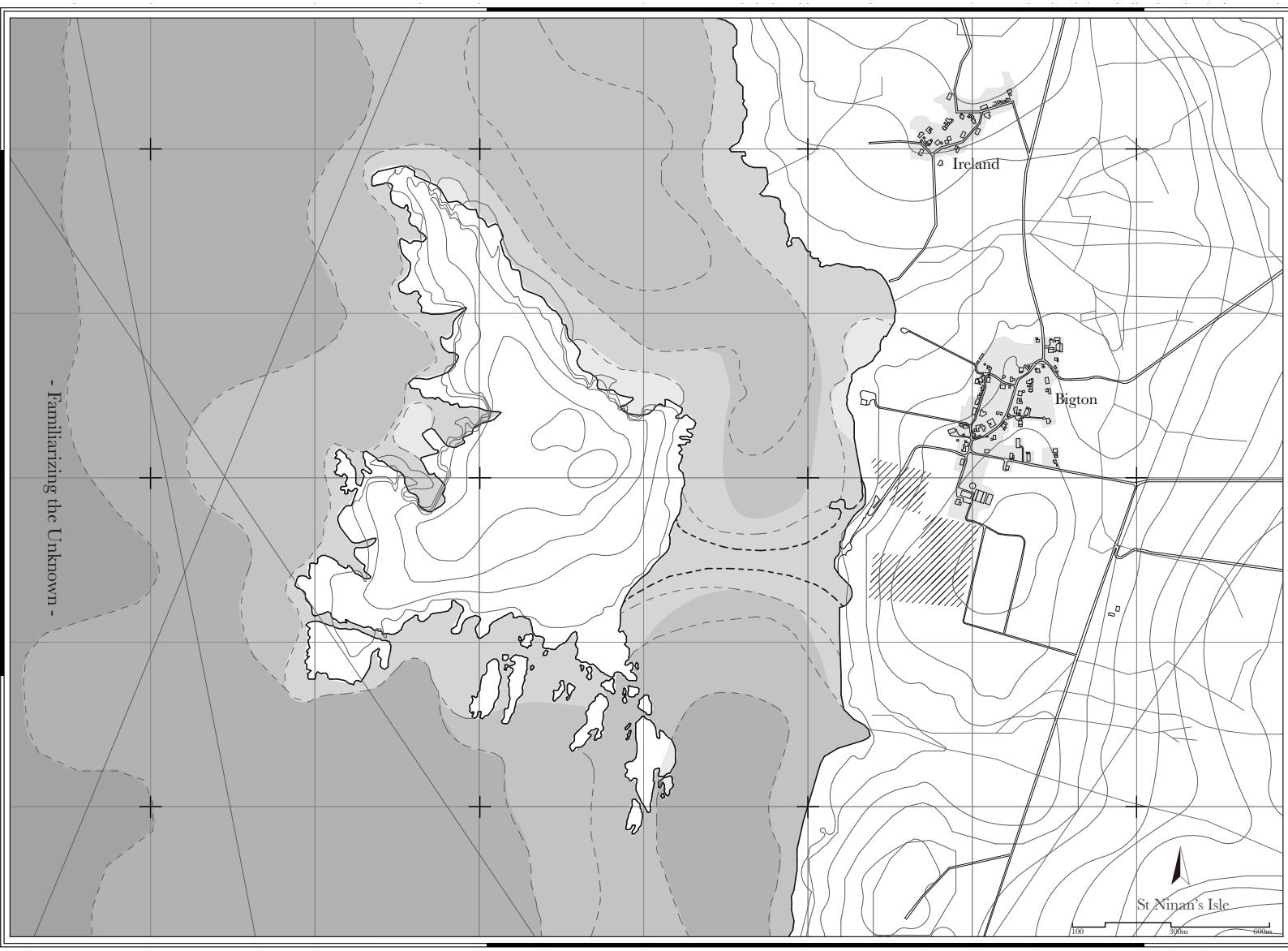
St Ninian's Isle is a small tied island connected by the largest tombolo in the UK to the south-western coast of the Mainland, Shetland, in Scotland. It is part of the civil parish of Dunrossness on the South Mainland. The tombolo, known locally as an ayre from the Old Norse for „gravel bank", is 500 metres long. During the summer the tombolo is above sea level and accessible to walkers. During winter, stronger wave action removes sand from the beach so that it is usually covered at high tide, and occasionally throughout the tidal cycle, until the sand is returned the following spring. Depending on the definition used, St. Ninian's is thus either an island, or a peninsula; it has an area of about 72 hectares. The nearest settlement is Bigton, also in the parish of Dunrossness. The important early medieval St Ninian's Isle Treasure of metalwork, mostly in silver, was discovered under the church floor in 1958. Many seabirds, including puffins, visit the island, with several species nesting there.

As its name suggests, the island has ecclesiastical connections, which may like others in the Northern Isles, Hebrides and Faroes have connections to the Culdees or papar. However, the island's history is far older than Christianity, and Neolithic graves have been found within the walls of the chapel (formerly beneath the floor).

The ruins of a 12th-century chapel can still be seen near the end of the tombolo. The dedication is to Shetland's patron saint, the enigmatic Saint Ninian of Galloway, who is also widely venerated on the nearby Orkney Islands, and may be commemorated in the name of North Ronaldsay. In 1958, an excavation found a hoard of 8th century silver in the chapel grounds under a stone slab in a wooden box, which caused a renewed archaeological interest in the island. It was suspected to have been buried to hide it from, or stolen in, a Viking raid. The remains of a pre-Norse chapel were also found, which may indicate some kind of Culdee presence.

The last family to live on the island, that of Henry Leask, left the island in 1796. Henry Leask was married twice and had 13 children.

The St Ninian's Isle Treasure was discovered under a cross-marked slab in the floor of the early St. Ninian's church, on 4 July 1958 by a local schoolboy, Douglas Coutts. Coutts was helping visiting archaeologists led by Professor A. C. O'Dell of Aberdeen University at a dig on the isle. The silver bowls, jewellery and other pieces are believed to date from approx. 800 AD.
(https://en.wikipedia.org/wiki/St_Ninian)


- Familiarizing the Unknown -
Ireland
Bigton
St Ninan's Isle
100
300m
600m

ST NINIAN ISLAND

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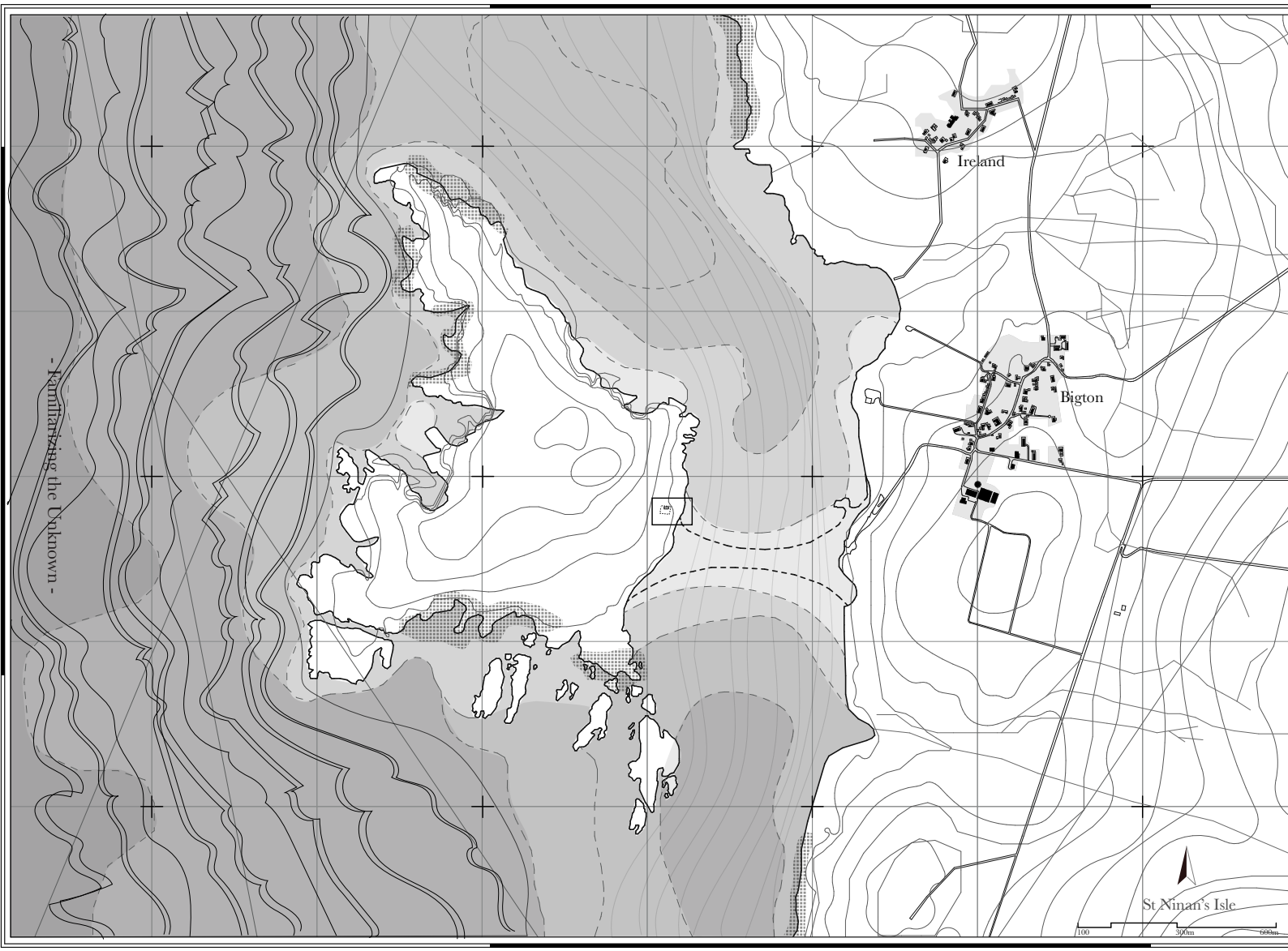
- familiarizing the Unknown -
Ireland
Bigton
St Ninan's Isle
100
300m
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ST NINIAN ISLAND

The church
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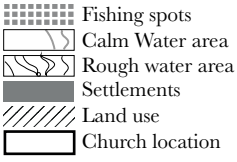
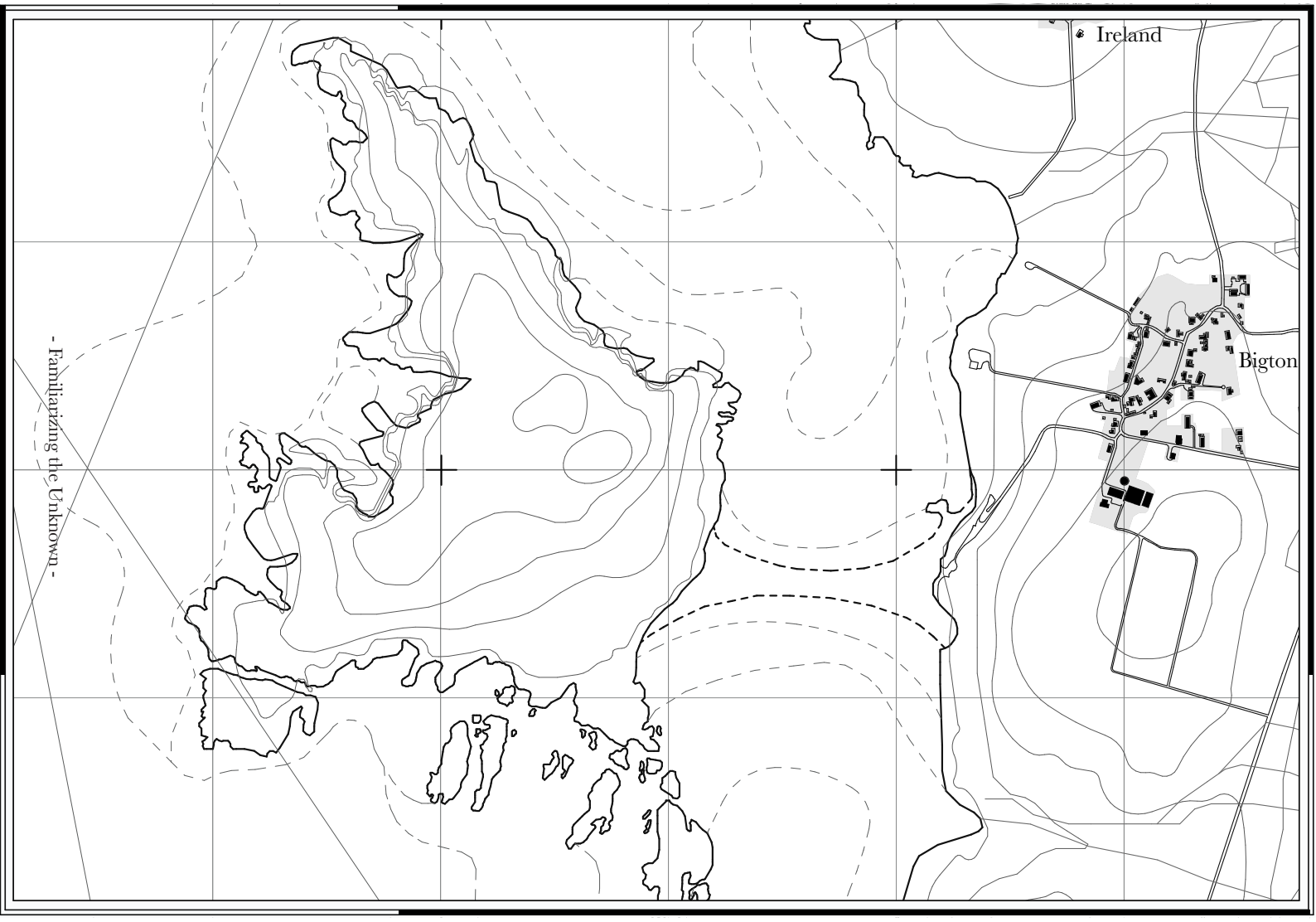
St Ninian's Island

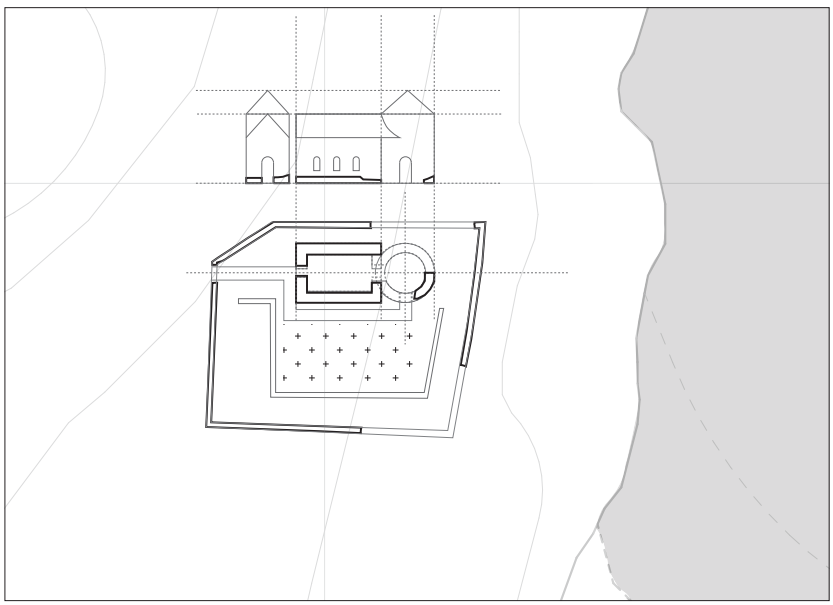


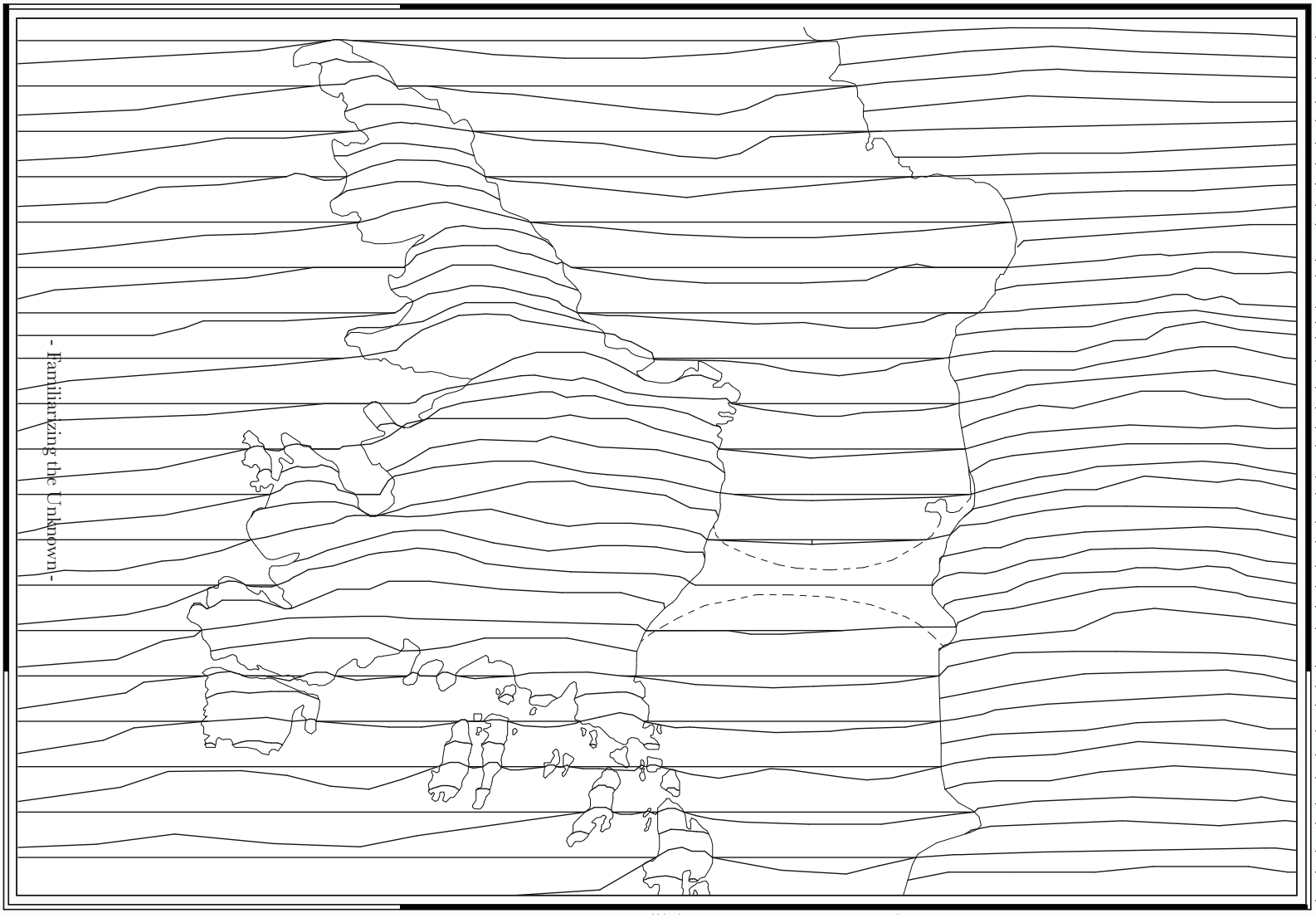

Ireland
Bigton
- Familiarizing the Unknown -

ST NINIAN ISLAND

St Ninian's Island's Church

Possible floor plan
Remaining ruin outlines
Possible are of the cementary
Axis
Water




- Familiarizing the Unknown -

ST NINIAN ISLAND

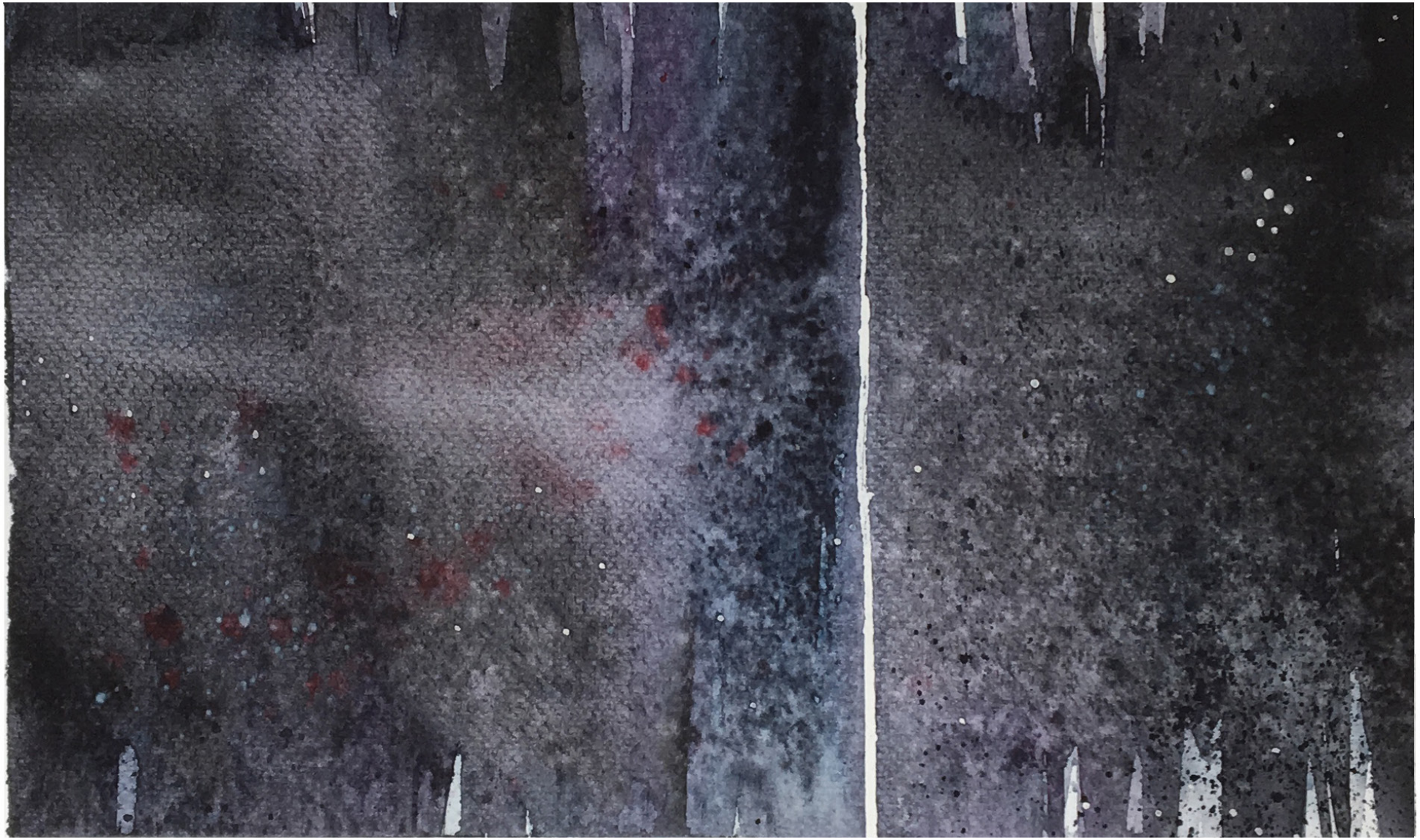
„When we lived in Shetland 35 years ago the island was in better shape than it is now. An absolute disgrace. The sand tombolo joining the island to the mainland is of major geographical significance, and it's being churned up by quad bikes doing wheelies. All sorts of washed up rubbish. On the island itself, where the St Ninian's treasure was found in 1958 the chapel is an absolute disgrace - overgrown, falling apart and with dangerous steps. I know it's in private hands and money is tight, but a case for the amenity trust and the SIC to get involved. It should be an important visitor attraction and local resource, and it's going down hill."
Jonh H. 2015

III St Ninian Island

ST NINIAN ISLAND

III ST NINIAN ISLAND

III Lost in the sea



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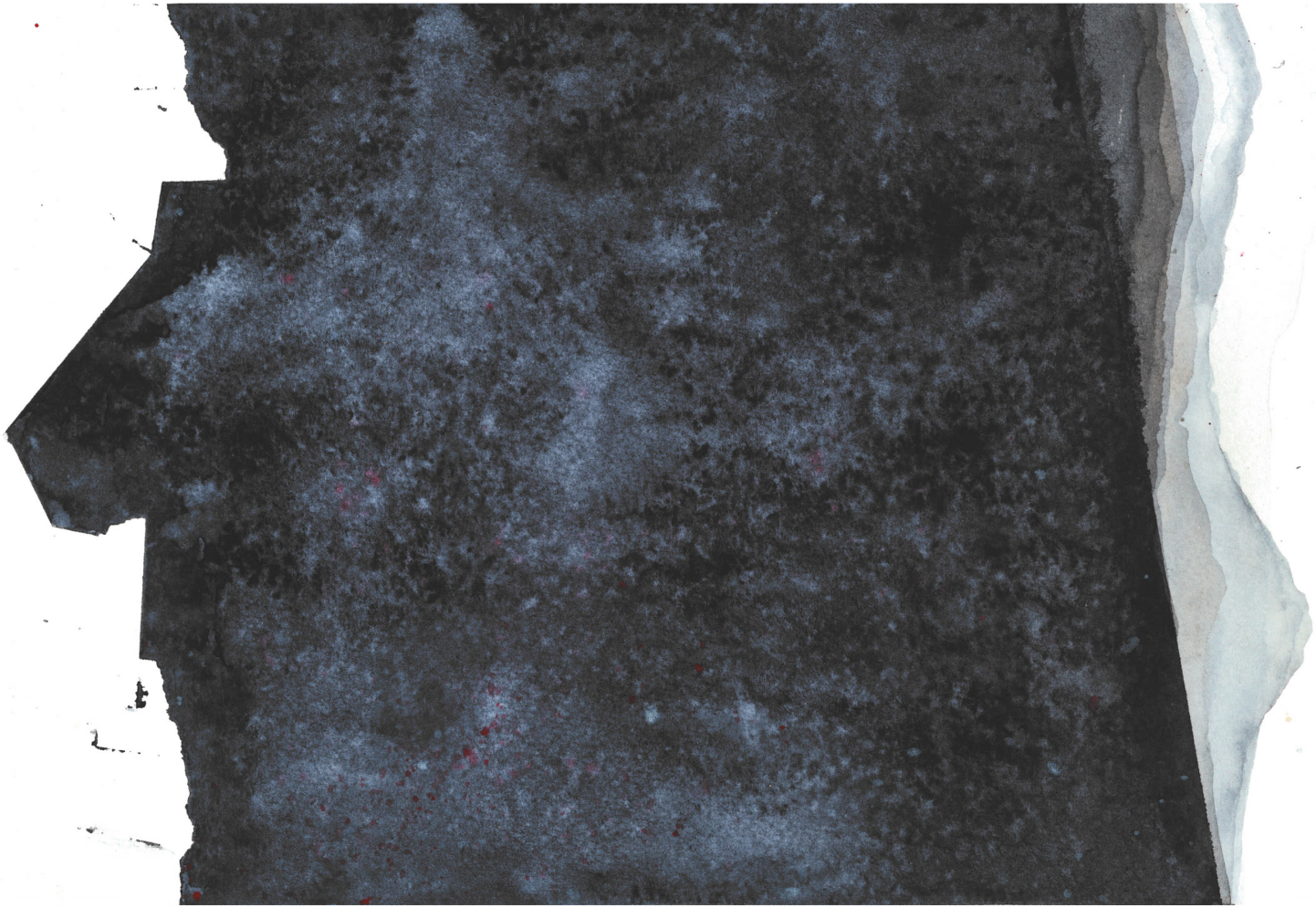

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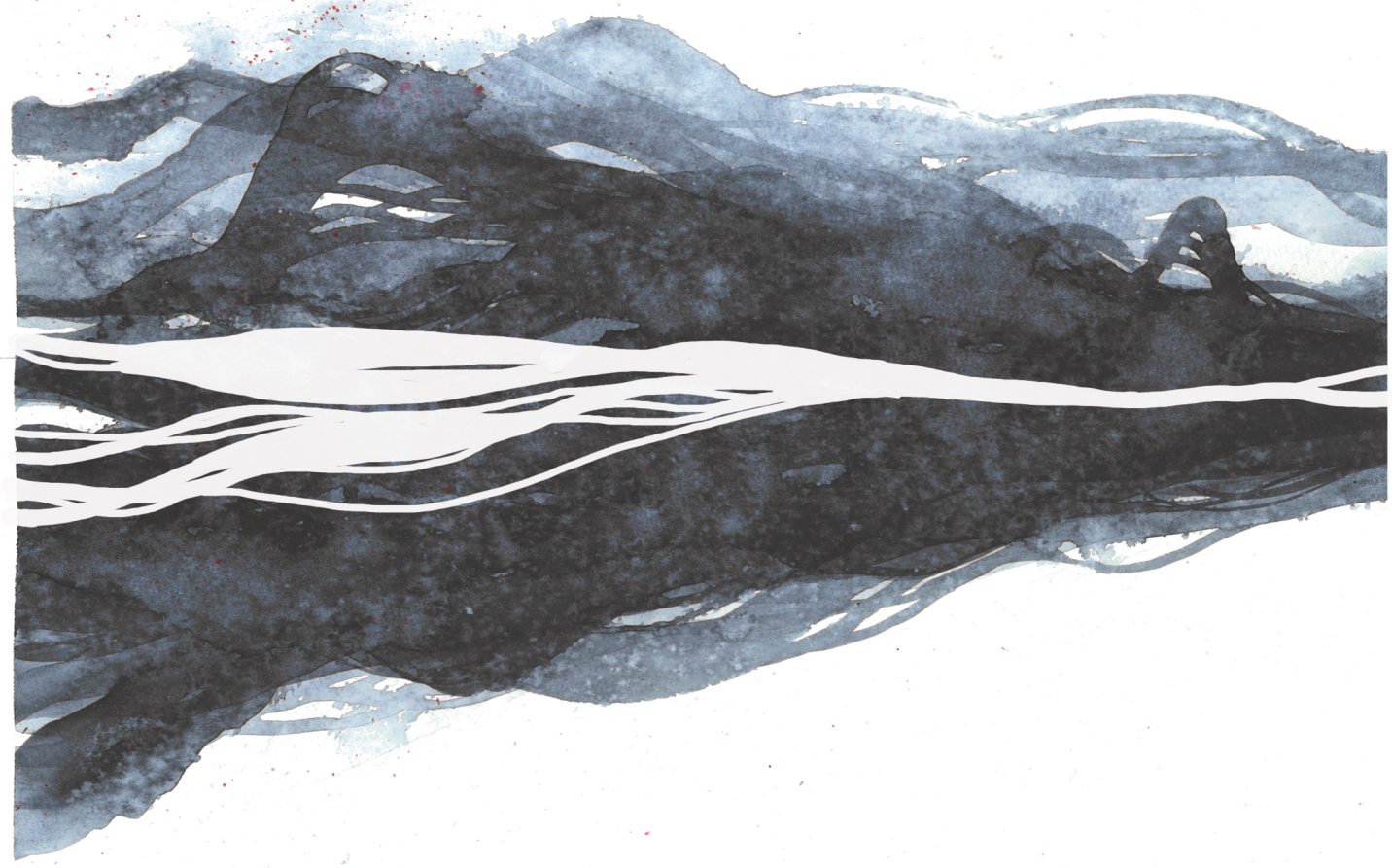

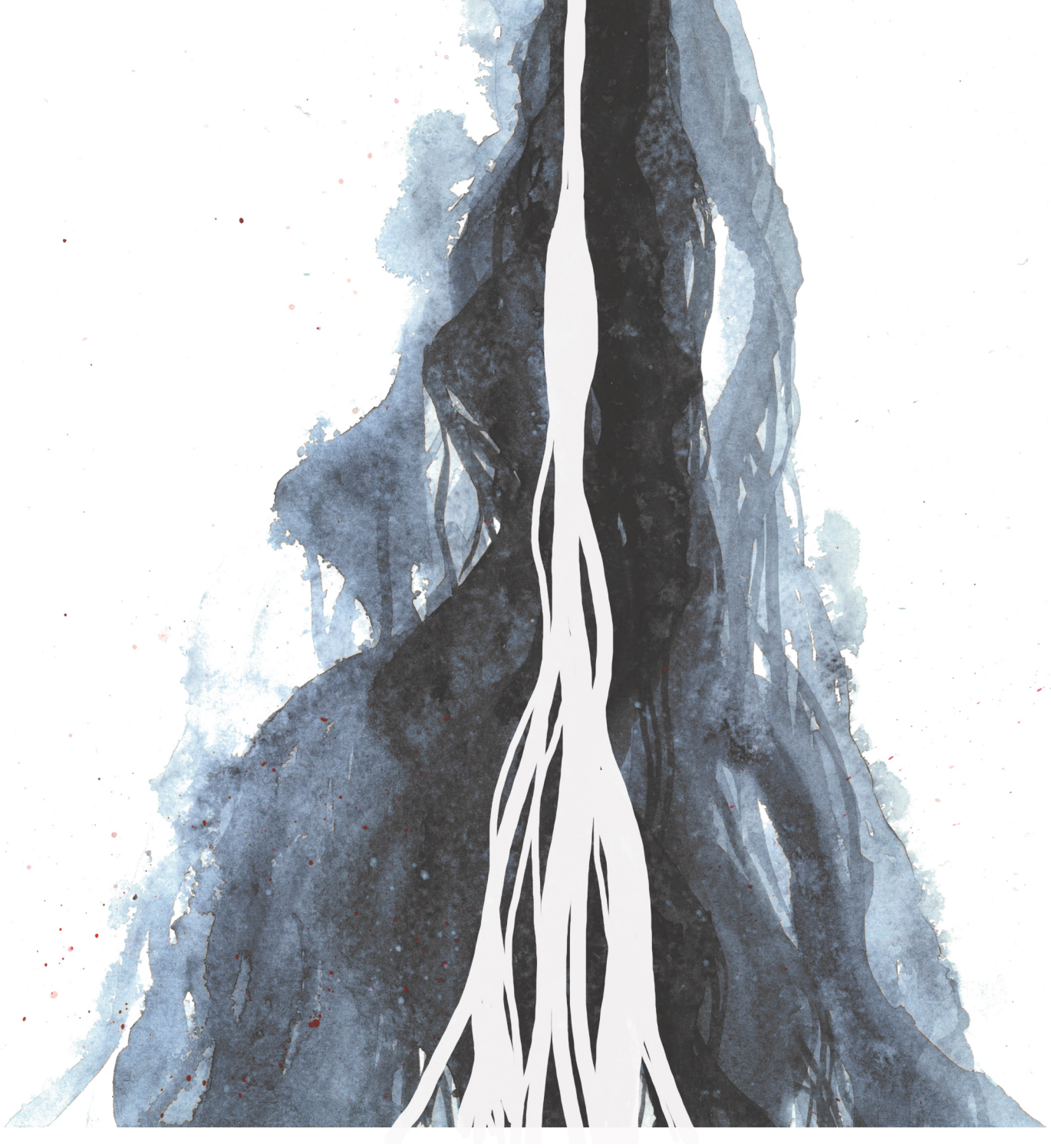

III Lost in the sea

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