IN THE ARMS OF ANTARCTICA

A visitor centre on Deception Island exploring the interaction between human and nature

Anni Stockeld & Jessica Kos´

Master thesis at Chalmers Architecture, 2015

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Master Thesis
Chalmers Architecture
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CHALMERS

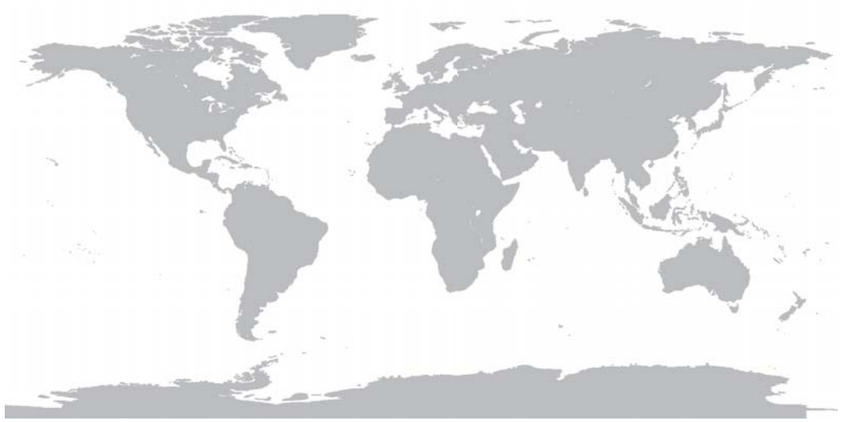
Abstract

The identity of Antarctica is in its wilderness and nature, in the subtle and calm and its great power. It is a setting that humans not have been able to conquer; with this comes its uniqueness. Nevertheless, the wilderness of Antarctica is destructible and a mirror of human activities.

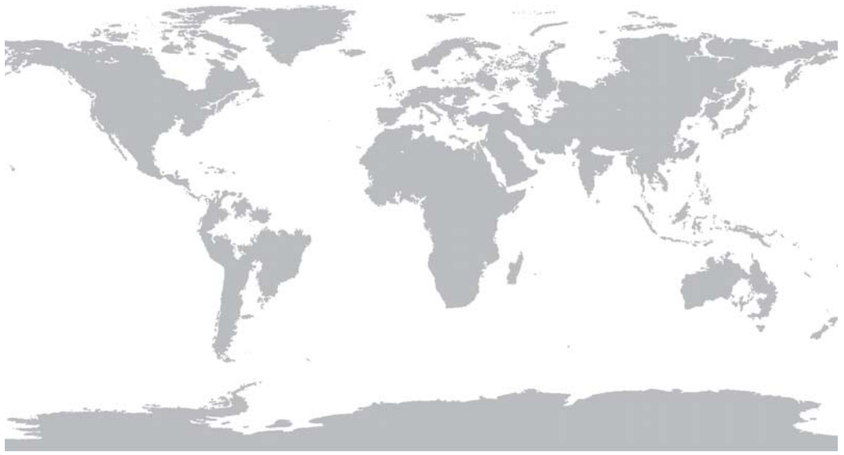
How can architecture be a tool for the connection between human and nature? This is explored through a visitor centre on Deception Island, where the aim is to enlighten and portray Antarctica and its environmental importance. The vision is to connect tourists to the Antarctic environment in order to evoke a will to preserve the area.

The visitor centre grows from the obstructions and qualities of its context. The ambition is a self-sufficient structure that leaves a minimal footprint throughout its lifecycle. The aim is to create an aesthetically stimulating place to visit by rendering nature through architecture. Nature sets the framework for the design. The structure is a tool to mediate nature, to represent nature and to engage the visitor's senses in order to preserve nature. It is a conscious play between inside, outside, shelter and openness. The result is a visitor centre that enriches the journey on Deception Island.

If all ice in the polar regions melted, the sea level would rise by 66 metres.[1]



Map of the world today.



Map of the world with sea level risen by 66 metres.

1 *National Geographic*, "If all the ice melted", available: http://ngm.nationalgeographic.com/2013/09/rising-seas/if-ice-melted-map, 2013, (retrieved 2015-03-09)

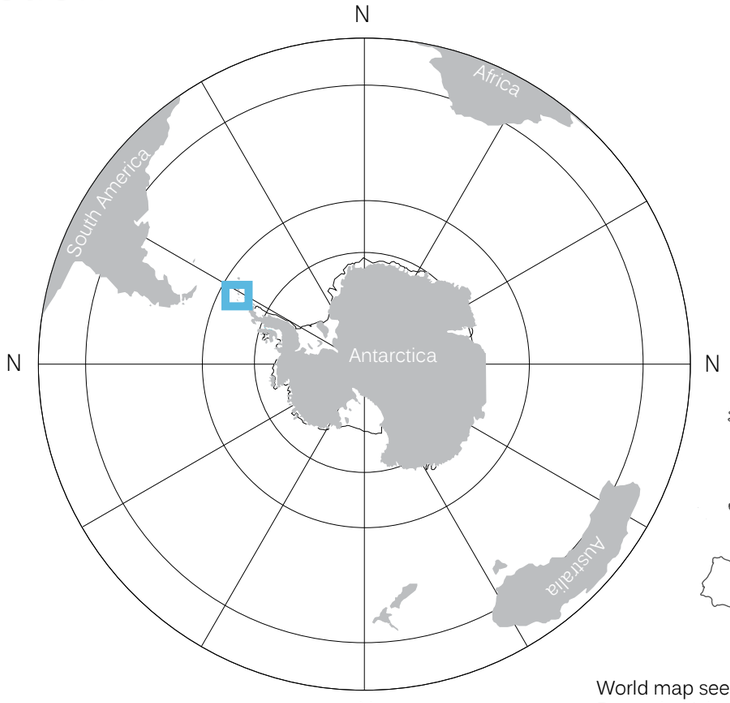
Table of content

INTRODUCTION

Antarctica is the last uninhabited continent on Earth, dominated by its wilderness. It is a setting that humans not have been able to conquer; with this comes its uniqueness.

The nature of Antarctica is destructible and a mirror of human activities. It is threatened by economic interests such as fishing and oil, as well as the global warming caused by how we live our everyday lives.

Introduction



World map seen from the South Pole
Deception Island
Size comparison with Europe

PURPOSE AND EXPLORATION

The thesis explores the connection between architecture, human and nature. It is done through a visitor centre on Deception Island where the aim is to enlighten and portray Antarctica and its environmental importance.

The vision is to reach out to tourists and create a connection between them and the Antarctic region, in order to evoke a will to preserve the area. The thesis is a visionary project but could potentially be realised and financed by nations cooperating to protect the Antarctic environment.

An architectural challenge is to explore how architecture can grow from the obstructions and qualities of an extreme context. The thesis seeks solutions for a self-sufficient design that leaves a minimal impact throughout its lifecycle. It explores possibilities to make an aesthetically stimulating place to visit by rendering nature through architecture.

QUESTIONS AND OBJECTIVES

// How can architecture be a tool for the connection between human and nature?

// How can a visitor centre exist on Deception Island without making a large footprint throughout its lifecycle?

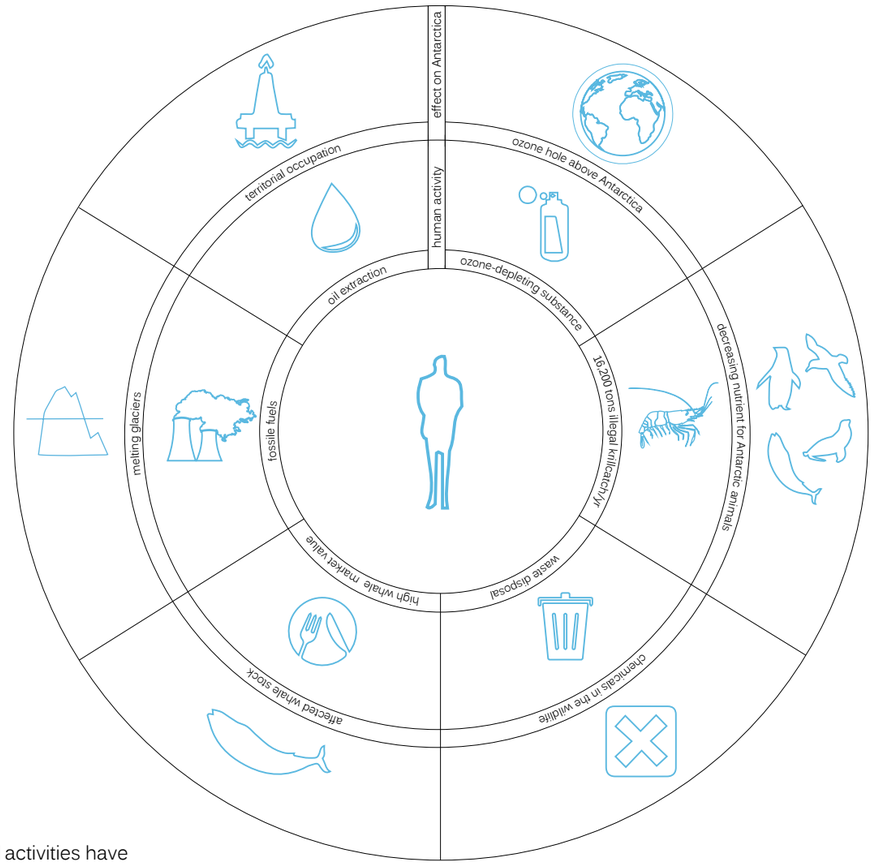
// How would the visitor centre contribute at a local level and in a global perspective?

METHOD

The thesis is conducted within the field of Research by Design. A challenge is to investigate how the project can relate to a setting where no architecture or culture have been fully established. This is researched through spatial models, interviews and sketches. Since the context is complex, the need for literature studies and knowledge gathering is crucial. Literature guides the creative design process forward and sets frames and strategies. Reference projects are of extra importance, studying them in depth clarifies the context and how it has been dealt with in reality.

READING INSTRUCTIONS

The report is written for readers from different disciplines including architects, students, tour operators, researchers and administrators. It covers the background of the chosen site, the design process, the finalised design and reflections of the work. To get a detailed insight of the project, it is recommended to read the complete thesis. To get a quick indication of the project, it is recommended to read the



Human global activities have a negative effect on Antarctica.

purpose, discourse, theory and the final reflections. The thesis is organised in a chronological order including: (1) introduction (2) site (3) process (4) project (5) conclusion. References can be found on each page and in the bibliography on page 89.

You are free to contact the authors in case the project raises any questions or curiosity.

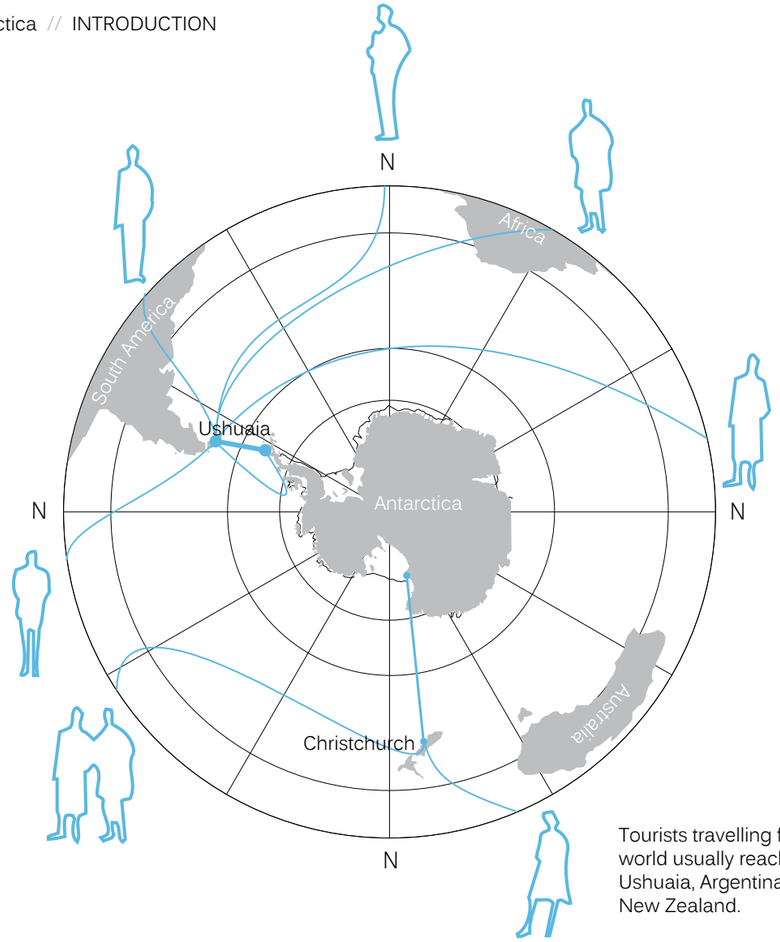
DISCOURSE

In 2008 one of the authors had the opportunity to work on a ship in Antarctica. During the journey it was evident how threatened the wilderness is. Research stations situated on Antarctic ground revealed figures of melting glaciers, decreasing fish stocks and a thinning ozone layer.[2]

One of the first sites visited was Deception Island, located about 100 km off the coast of the Antarctic Peninsula. The Island has the longest history of human activities in Antarctica. Since the first landing in the early 19th century, the main activities have been overfishing, overhunting and oil extraction from whales. Whale skeletons, cemeteries and oil tanks have been left as traces from that time.[3]

At present time, there are actors investigating the possibility to occupy Antarctic territory. Under the Antarctic Treaty 51 nations have agreed to prevent the occupation and use the continent only for peaceful and scientific purposes.[4] According to the Antarctic Treaty, no new territorial claims or enlargement of existing claims are allowed, in order to protect the continent's eco zone. The treaty works as a scientific cooperation. The research should contribute to knowledge of the Earth and the protection of the global environment. All results should be freely available to everyone.[5] The

2 *British Antarctic Survey,* "The Antarctic Treaty Explained", available: http://www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/explained.php, 2015, (retrieved 2015-01-20)
3 Smellie, John, "Deception Island" available: http://www.volcano.group.cam.ac.uk/volcanoes/deception-island/, 2015, (retrieved 2015-01-20)
4 *US Department of State,* "The Antarctic Treaty", available: http://www.state.gov/documents/organization/81421.pdf, 1959, (retrieved 2015-01-20)
5 *British Antarctic Survey,* "The Antarctic Treaty Explained", 2015.



Tourists travelling from all over the world usually reach Antarctica from Ushuaia, Argentina or Christchurch, New Zealand.

research performed and presented is often too intricate for everyone to comprehend. A broader outreach could create a will and an understanding of the need to preserve the nature in general and Antarctica in particular.

Deception Island Management Group is working under the Antarctic Treaty to protect the island's environment. The group has formed Deception Island Management Package with rules and regulations. The management package states the importance to *"educate visitors to understand, respect and care for the historic values of the site. Whalers Bay Historic Site (Deception island) is one of the most visited sites in Antarctica. Information on the historic significance of the site, and the need to conserve its values, will be made available to visitors."* [6]

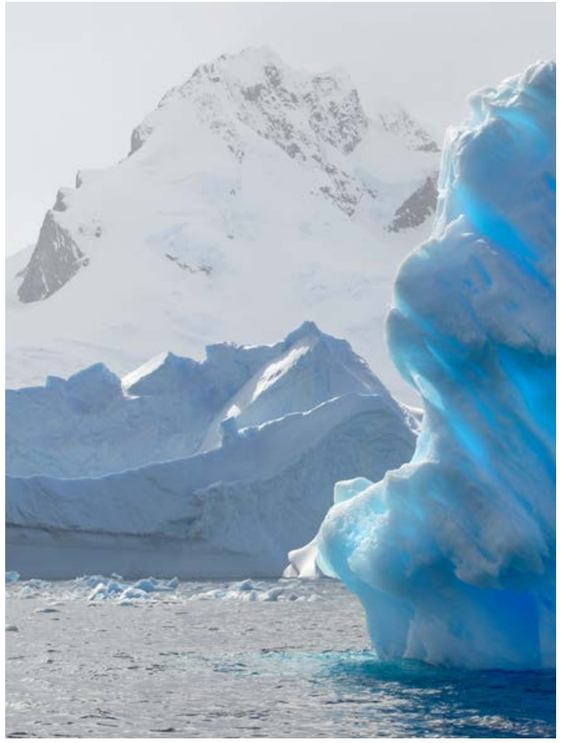
Tourism in Antarctica is growing. During the summer of 2007-2008 46 000 tourists visited Antarctica, which was more than four times as many as in year 1990.[7] A visitor centre on Deception Island focusing on Antarctica's environmental importance and dissemination of research findings could be a vital contribution to the tourist explorations. The vision is to show tourists what has happened, what is happening, what might happen and why it is happening in the region around Deception Island and Antarctica in order to motivate them to preserve the area. Antarctic tourists coming from all over the world spread the word of their experience and the information they gain from their unique visit.

A risk by establishing a visitor centre is to exploit the fragile natural habitat. Strict regulations set by Deception Island Management Group control the amount of tourists on Deception Island. No more than 100 visitors coming from cruise operators are allowed to be ashore on Deception Island at any time.[8]

A visitor centre would not be a contributing factor to the growth of tourism. Contrariwise, Antarctic tourism is a force that could protect the area from harmful economical interests. The guide book Lonely Planet Antarctica sees the increasing tourism as the continent's potential protectors: *"provided that visits are properly managed, tourists may turn out to*

6 Deception Island Management Group, *Deception Island Management Package*, 2005, p. 38.
7 *Secriteriat of the Antarctic Treaty* "The Antarctic Treaty", available: www.ats.aq/e/ats.htm, 2011 (retrieved 2014-12-10)
8 Deception Island Management Group, 2005, p. 59.

Contrasts between human and nature
Times square, New York City, USA



Antarctica

be one of the best assurances that this wilderness can remain as pure as the driven snow". [9]

Regardless of the visitor centre's improbable contribution to the growth of tourism, the establishment of a new physical structure could be a strain on the natural environment. The Antarctic Treaty acknowledges tourism as a legitimate activity in the polar region[10] and recognises that the unique character of the continent is an inspiration for protecting its values.[11] The treaty does however oppose permanent structures in Antarctica exclusively dedicated to tourism.[12] The program of the visitor centre could create a platform where research and tourism unifies. It could therefore be seen as a structure for research, corresponding to the regulations of the Antarctic Treaty. In addition, concepts such as temporality, limitation of footprint, movability, and self-sufficiency is explored in the thesis.

The extreme conditions in Antarctica can be seen as limitations when creating architecture, but could also be a unique source for inspiration and innovation. Developing strategies of how to build in extreme places, focusing on resilience and self-sufficiency could be an inspiration of how to build in other parts of the world.

Architecture in Antarctica is a discussion that is becoming more relevant and frequent. Buildings on the continent have so far mainly focused on basic needs. Today, there is a current discussion of how to equally consider aesthetics, sustainability and human needs in the design of Antarctic buildings. For example, in 2014 an Antarctic pavilion was for the first time a part of the Venice Biennale to explore and present opportunities in the polar region.[13]

9 Rubin, Jeff, *Lonely Planet Antarctica*, Singapore: Craft Print International Ltd, 2005, p.5.
10 *British Antarctic Survey,* "Tourism in Antarctica", available: http://www.antarctica.ac.uk/about_antarctica/tourism/, 2015, (retrieved 2015-01-20)
11 *US Department of State*, "TOURISM AND OTHER NON-GOVERNMENTAL ACTIVITIES", available: http://www.state.gov/documents/organization/15279.pdf, 1997, (retrieved 2015-03-09)
12 Head of Section at the Norweigan Polar Institute Birgit Njåstad, phone interview by Anni Stockeld and Jessica Kos´, 2015.
13 Rosenfield, Karissa, "Venice Biennale 2014: Antarctica to be First Continent Represented", available: http://www.archdaily.com/?p=509902, 2014, (retrieved 2015-01-20)

Installations in Antarctica by artist Andrea Juan. Her creations are based on scientific findings and draws attention to Antarctica's ecological tragedy underway.
Photo credit: Andrea Juan, Encapsulados I, 2015

THEORY

The identity of Antarctica is in its wilderness and nature, in the subtle and calm and its great power. Here, the human presence lies in the arms of nature. Can architecture entwine human and nature in this pristine environment? How can architecture be a tool for the connection between human and nature?

Ultimately nature sets the framework for existence. All matter and life originate from nature. As discussed in the book *Biophilic Design: the theory, science and practice of bringing buildings to life*, humanity has evolved as an adaptive response to nature. Light, weather, water, plants, animals and landscape have shaped our existence and continue to be vital contexts for human development.[14] As technique and science progress, this notion is sometimes lost and society becomes increasingly distant to nature.

There are movements, foremost within the artistic field, that try to reconnect to nature. Musicians, artists, writers and architects often reflect on the relationship between human and landscape. The expression has taken many forms. The art movement *"natural architecture"* explores the desire to reconnect to earth through the built environment. Their thoughts are often articulated through architectural installations in the landscape, using materials from the surroundings.[15]

In the Antarctic Artists and Writers Program artists are invited to visit the continent. They get inspired and influenced by the Antarctic environment and spread their experiences through their work, complementing the scientific research findings.[16] According to the philosopher Arne Naess, the emotional connection to nature is vital so that people grasp nature's true essence and form a sustainable and moral relation to nature and its resources. Naess means that facts and figures do not affect us as profoundly.[17]

The Swedish Naturum and the Norwegian tourist route project are initiatives by the countries governments aiming to highlight the nations' nature and make it more accessible to visitors. The

14 Kellert, Stephen et al, *Biophilic Design: the theory, science and practice of bringing buildings to life*, Hoboken: John Wiley & Sons, Inc, 2008, p. vii.
15 Rocca, Alessandro, *Natural Architecture*, New York: Princeton Architectural Press, 2007.
16 Rejcek, Peter, "NSF program lifts the arts to equal standing with science in Antarctica", *The Antarctic Sun*, 2007-11-29, available: http://antarcticsun.usap.gov/features/contentHandler.cfm?id=1285 (retrieved 2015-05-01)
17 Bengtsson, Staffan, *Design by nature*, Stockholm: Arvinius Förlag AB, 2011. p. 7-8.

Photo credit: Andrea Juan, New Species XXI, 2008

purpose of the Naturum, a visitor centre in Sweden, is to describe, explain and build an understanding of the values of an area and the importance of its preservation.[18] It should show the way into nature and inspire people to spend time there.[19] A visitor centre should not take over the natural experience and beauty of the site; it should utilise, enhance and complement it. In *Naturum Visitor Centres in Sweden* Claes Caldenby discusses how architecture balances on the slash in nature/culture, or perhaps that it is the slash.[20] Architecture could be an element that creates a stronger connection between people and nature. A visitor centre could enrich the experience of the natural setting, both through providing knowledge but also through emphasising elements in the surroundings. This could be done by using and contrasting natural elements; light, sound, water, temperature and views. The elements define and enrich the architecture, creating a mutual relationship where both gain from each other's qualities;

"Building is a brutal confrontation between nature and culture, and in that confrontation one can find balance and beauty " - Sverre Fehn [21]

In a place like Antarctica the balance between nature and culture is crucial. The relation becomes extreme since the nature is grand and at the same time challenging to humans. To be able to exist in Antarctica people need to shelter themselves from the natural elements. A complexity of creating a visitor centre in such a location is to create a space that protects the visitors from the forces of nature while it embraces and portrays it. Structures in the polar regions show a great variety, from simple shelters to research stations reminiscent of isolated space capsules. The range of shelter and protection derives from different challenges at specific locations, as well as from the permanence and program of the structure. The key is to explore, understand and challenge these aspects to be able to find the balance and decide how the visitors will interact with the Antarctic environment.

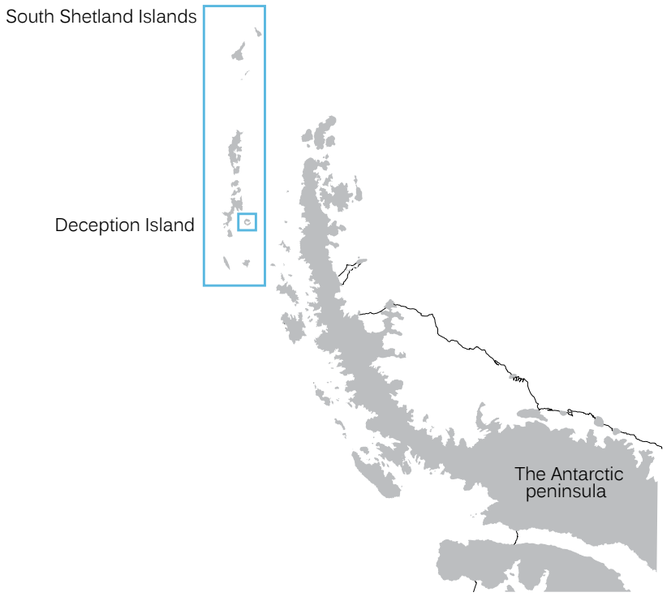
18 Naturvårdsverket, *Naturum Visitors Centres in Sweden. National Guidelines.* Stockholm, 2009 (Report 5939), p. 5.
19 Naturvårdsverket, 2009, p.8.
20 Lauri, Tomas, Isitt, Mark. and Caldenby, Claes, *Sveriges naturum*, Stockholm: Arkitektur Förlag, 2013, p.15-16.
21 Fehn, Sverre cited in Lauri, 2013, p. 15

DECEPTION ISLAND

10 000 years ago a volcano erupted in the Southern Ocean. The volcano summit collapsed and formed Deception Island's horseshoe formation and its flooded interior, Port Foster. [22]

Deception Island

62°58'37"S 60°39'00"W



Area: 72 km²
Diameter: 12 km
Population: 0
Penguin population: 200 000
Highest peak: Mount Pond, 542 mamsl.

Deception Island is located about 100 km off the coast of the Antarctic Peninsula and is a part of the South Shetland Islands. The islands are the first part of Antarctica that you reach when coming by boat from Argentina. It makes the destination popular to visit and has resulted in a long history of human settlement. Today, the only operating permanent establishments are two summer research stations in Fumarole bay.[23]

Deception Island is considered to be one of the safest natural harbours in the world, due to its shape and the surrounding elevations protecting Port Foster.[24] In the southwest and east the terrain reaches about 500 metres above sea level. These parts of the island are covered in glaciers while the rest is lava rock. Deception Island is volcanic, which creates rising ground and water temperatures with hot thermal pools around the island. Eruptions have occurred during two periods in the 20th century, between 1906 and 1910 and 1967 to 1970.[25]

CLIMATE

Antarctica has a harsh and cold climate. The weather condition is caused by the continent's polar location, vapour atmosphere, high elevation and permanent ice cover which reflects about 80% of the sun's radiation back to space. During winter, complete darkness is prevailing and during summer the sun is shining 24 hours a day.[26]

The climate on Deception Island is milder than the weather on the Antarctic mainland. The temperature shifts between -28°C to +11°C and the mean annual temperature is -3°C. The weather is generally humid all year round, with a precipitation of 500-1000 mm per year. Prevailing wind of 5-7m/s comes from northeast and west.[27]

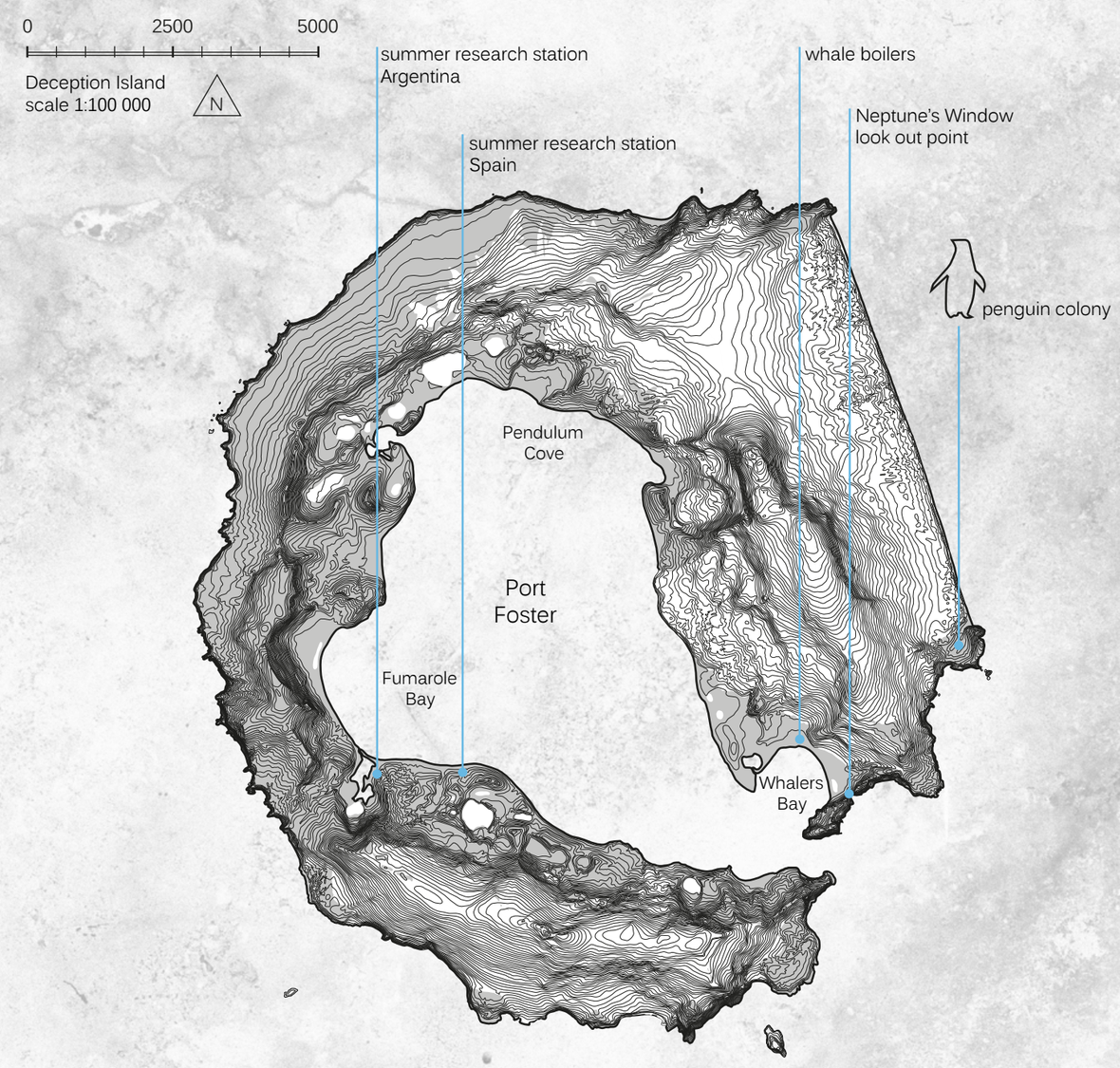
WILDLIFE

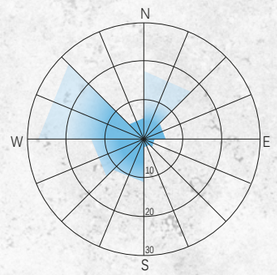
Deception Island with its caldera is the habitat of a broad wildlife with elephant seals, leopard seals, adélie penguins, gentoo penguins, whales and seabirds.[28] The island is inhabited by the world's largest colony of chinstrap penguins. Around 200 000 penguins nest by its coast.

TOURISM

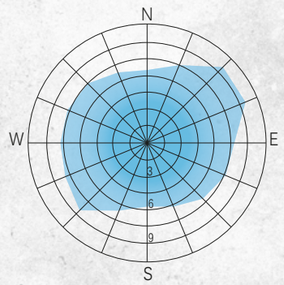
Tourism is increasing in Antarctica where Deception Island is a popular destination. Each year about 20 000 tourists visit the island.[29] The destination is remote and a visit must be earned through long and expensive travels that are depending on Antarctica's shifting weather. Visits are only possible during the summer months between November and early March. During winter the pack ice extends 1000 kilometres around most of the continent, making it difficult to access. Visits are managed by strict regulations and guidelines of how to behave in the pristine environment. On Deception Island a maximum number of 100 visitors are allowed at a time, in order to protect the nature and its wildlife.[30]

22 *Deception Island Antarctic Specially Managed Area,* "Volcanic Activity", available: http://www.deceptionisland.aq/volcanic.php, 2005, (retrieved 2015-01-18)
23 Deception Island Management Group, 2005, p. 29.
24 *lonely planet,* "Introducing Deception Island", available: http://www.lonelyplanet.com/antarctica/deception-island, 2015, (retrieved 2015-01-18)
25 *Deception Island Antarctic Specially Managed Area,* "Volcanic Activity", 2005.
26 Rubin, 2005, p.278.
27 *Deception Island Antarctic Specially Managed Area,* "Climate", available: http://www.deceptionisland.aq/climate.php, 2005, (retrieved 2015-01-18)
28 *Deception Island Antarctic Specially Managed Area,* "Flora and Fauna", available: www.deceptionisland.aq/flora.php, 2005, (retrieved 2015-01-18)
29 Smellie, 2015.
30 Deception Island Management Group, 2005, p. 59.

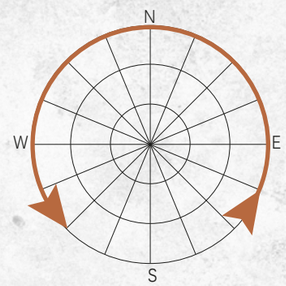




Wind - Whalers Bay
Wind frequencies in percentage



Wind - Byers Peninsula (South Shetland Islands)
Mean wind speed in m/s



Sun - Solar path

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Average temp (°C)	1	1	0	-2	-4	-7	-8	-8	-5	-2	-1	0
Average precipitation (mm)	50	50	60	50	5	10	10	20	20	100	90	50
Average length of day (hours)	24	16.7	13.4	10.3	7.6	6.1	6.9	9.4	12.4	15.6	24	24

Tourist season :

Whalers Bay

When entering Port Foster through Neptune's Bellows you approach Whalers Bay. The bay has been recognised as a Historic Site or Monument by the Antarctic Treaty.[31]

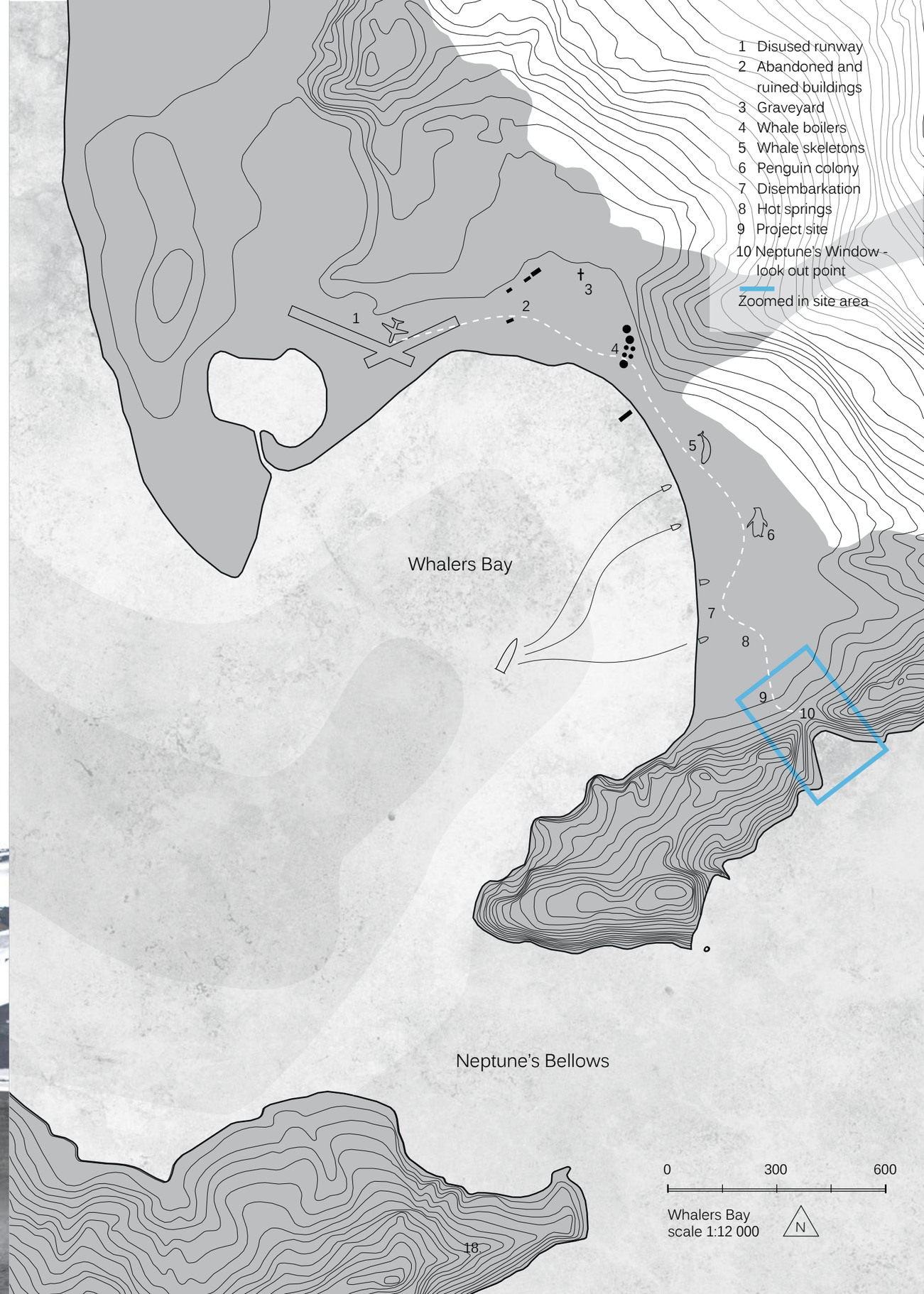
HISTORY

Deception Island is believed to first have been discovered in the 1820's.[32] In the early 1900's Whalers Bay was a bustling Norwegian and Chilean whaling base, followed by British science and mapping activities. Today it is a derelict ghost site with abandoned airplane hangars, whale boilers and weathered sheds. The only remaining residents are the men buried in the cemetery. The remnants of their lives from when they lived on Deception Island are still evident. The site has mainly remained as it was left in the 1970's, when a volcanic eruption forced the whalers to desert the island.[33]

ACTIVITIES

Visitors coming to Deception Island and Whalers Bay are usually arriving with tour ships or sailboats. From the large ships they enter the island on smaller inflatable boats. There is no set program of activities but an ordinary visit begins with a hike along the bay experiencing the historical remainings. The hike continues to the penguins and elephant seals resting on the lava beach. A climb up to Neptune's Window gives a panoramic view of the island and the surrounding ocean with its passing icebergs. Another popular activity is to dig a hole in the gravel on the beach and have a bath in the hot springs heated by seismic activity.

31 Secriteriat of the Antarctic Treaty, *Conservation Strategy for Historic Site and Monument No. 71, Whalers Bay, Deception Island,* 2005, p.1.
32 Smellie, 2015.
33 Hitchcock, Corina, "Spotlight on Deception Island: Ghosts of Adventurers Past", available: http://blog.quarkexpeditions.com/spotlight-on-deception-island-ghosts-of-adventurers-past, 2014, (retrieved 2015-01-20)



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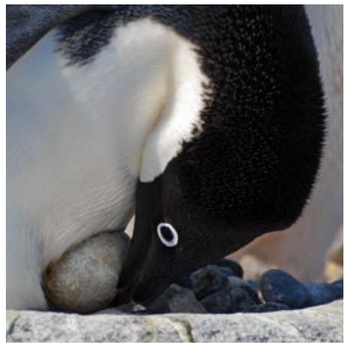
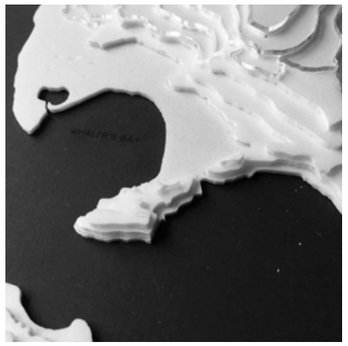
4 

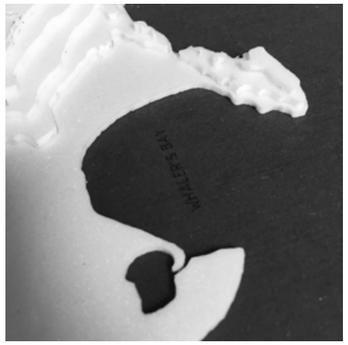
5 

6 

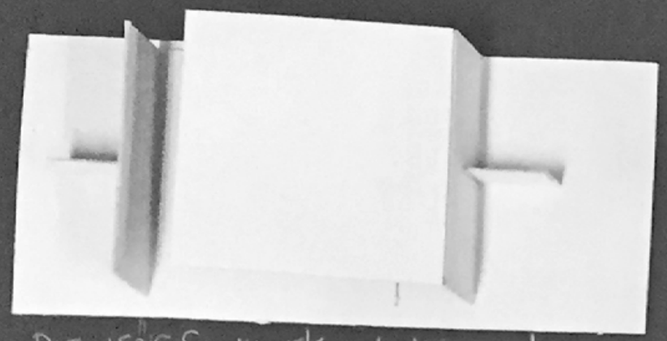
PHOTOS FROM WHALERS BAY
1 Derelict buildings
2 Whale boilers
3 Whale skeletons
4 Adélie penguin
5 Neptune's Window, look out point
6 Climb up to Neptune's Window

1 

2 

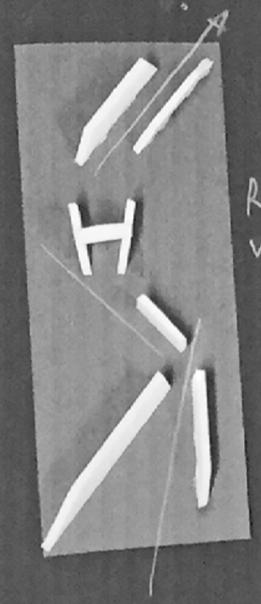
3 

MODEL PHOTOS
1 Deception Island
2 Whalers Bay seen from south
3 Whalers Bay seen from east

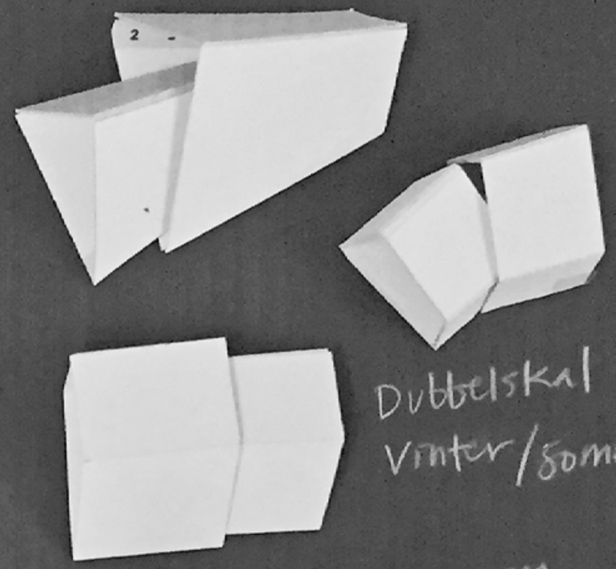


Dra isär. Se mark och himmel.

Halvslutet?
Vindriktning?

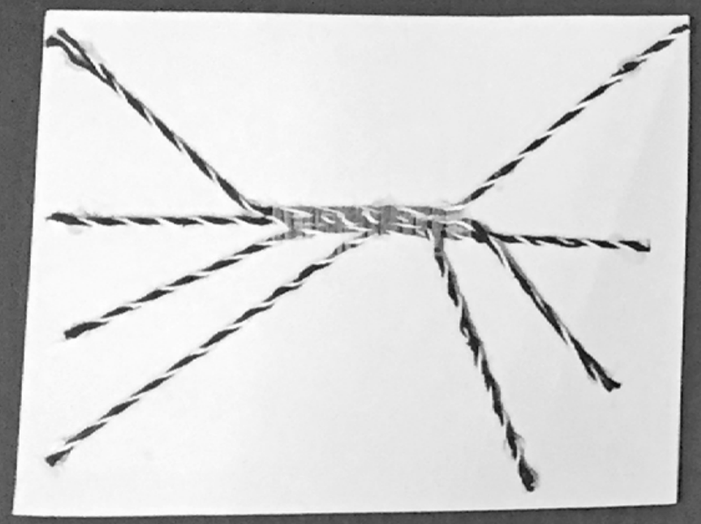


Riktade vyer

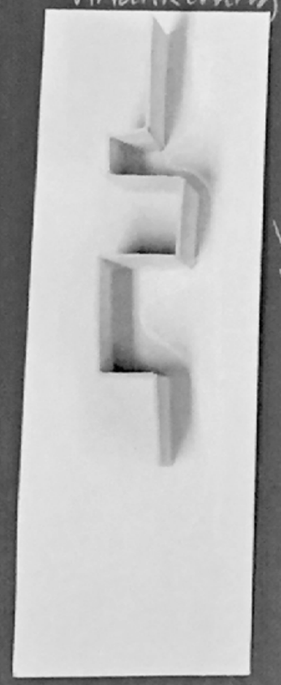


Dubbelskal
Vinter/sommar.

Vandring
Olika
alternativ
flera
vägar.
Olika
mellan-
rummen

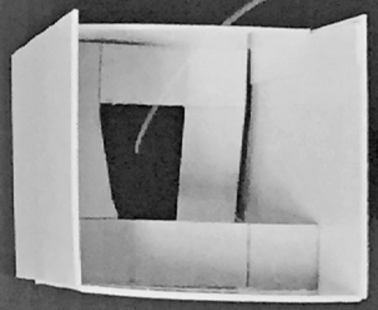


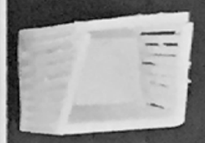
Trapphus, samlingspunkt. Nås från många håll



Varierad vandring

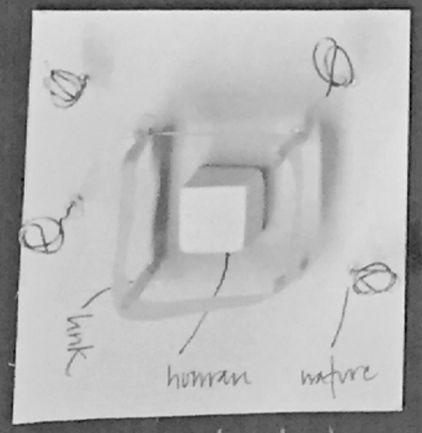
mellanrum



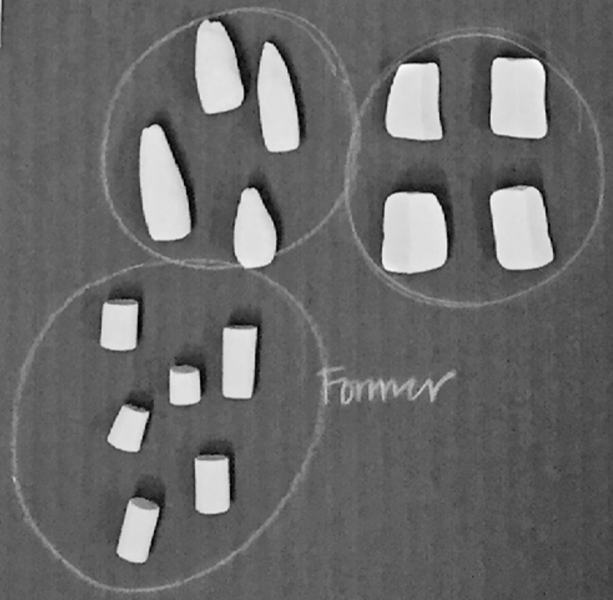


Transparens

Lager på lager,
olika grad av
skydd.



Skyddande skal,
mellanrum för rörelse,
kärna



Former

Utvidga yta på sommar
skydda på vinter.

THE PROCESS

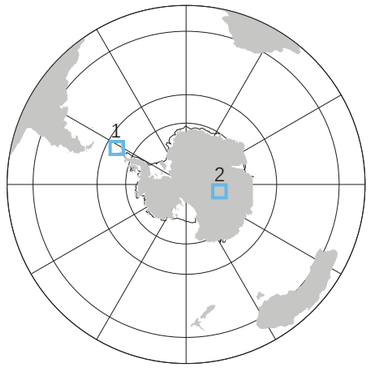
THE CREATIVE PROCESS

1. This is awesome
2. This is tricky
3. This is shit
4. I am shit
5. This might be ok
6. This is awesome

Skissmodeller.

Framing the project

The project is a small-scale visitor centre in Whalers Bay, receiving tourists visiting Deception Island and Antarctica. It will be run by four people working and living at the centre. It will operate during the Antarctic summer which is when tourists visit the area. The following chapter includes aspects that set the frames for the project.



1 Deception Island

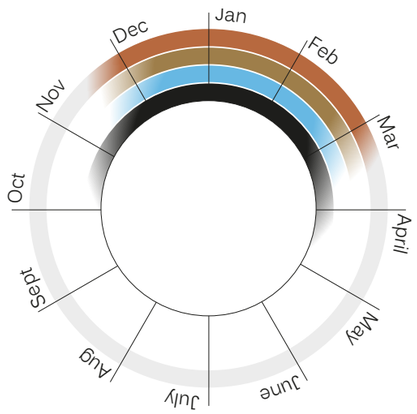
2 Vostok Station

CLIMATE

Comparing the weather on Deception Island with the climate at Vostok Station, located in the centre of the continent, it is significantly milder and more humid. A visitor centre on Deception Island does not have to withstand as harsh conditions as Vostok. It will however be exposed to natural elements and work with features such as wind, snow and freezing temperatures.

SEASONS

The Antarctic year only consists of two seasons with approximately eight months of winter and four months of summer. The summer coincides with the tourist season, which is the period when a visitor centre will receive potential visitors. During this period the weather conditions are more favorable for human habitation, with higher temperatures and more insolation and precipitation.



Summer season

Winter season

Tourist season

Visitor centre open

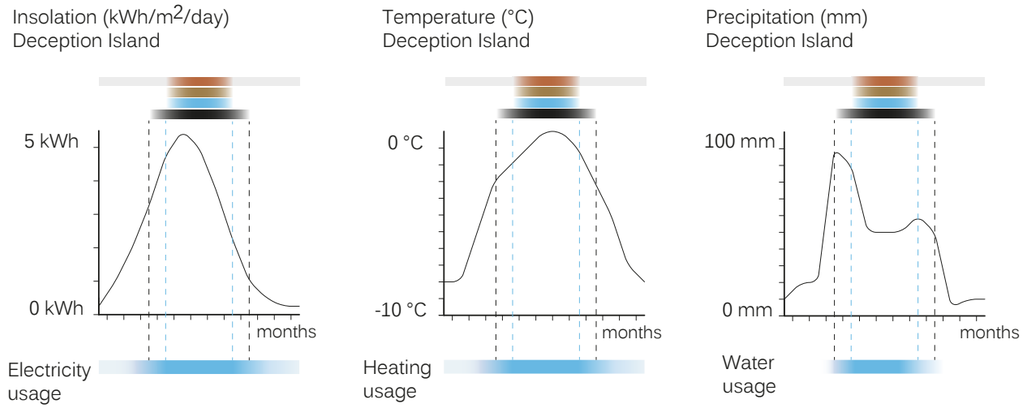
Workers season

1. Deception Island 62°58'37"S 60°39'00"W

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Average temp (°C)	1	1	0	-2	-4	-7	-8	-8	-5	-2	-1	0
Average precipitation (mm)	50	50	60	50	5	10	10	20	20	100	90	50
Average length of day (hours)	24	16.7	13.4	10.3	7.6	6.1	6.9	9.4	12.4	15.6	24	24

2. Vostok Station 78°27'50"S 106°50'15"E

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Average temp (°C)	-35	-44	-54	-62	-63	-66	-67	-70	-67	-59	-44	-33
Average precipitation (mm)	0,1	0	0,7	0,5	0,4	0,5	0,6	0,7	0,3	0,2	0,1	0
Average length of day (hours)	24	24	16,8	4,6	0	0	0	1,5	12,6	24	24	24



ISOLATION
The biggest challenge when designing for the Antarctic context is the harsh climate and the long winters. Remoteness and isolation are other obstructions challenging the design and the logistics.

SELFSUFFICIENCY
Due to the lack of infrastructure the visitor centre reach for a high level of self-sufficiency. It will tie on to local resources such as sun, geothermal energy and precipitation. The concept of using the nature's resources should not be hidden. It will be visible to the visitors and a part of the structure's design and identity.

CONSTRUCTION, LIFE CYCLE AND FOOTPRINT
To limit the footprint on site and simplify the transportation and construction, it is favorable to construct the centre out of prefabricated elements. The elements will be shipped in containers and assembled on site, which allows temporality. The whole or parts of the visitor centre can be disassembled and moved to other locations, without leaving permanent structures behind. The only traces of the centre will be holes in the rock from where the pillars used to stand.

Circumstances

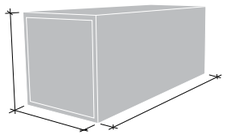
Easy transport

Small footprint

Low maintenance

No infrastructure

Design strategies



Modules that fit in a container

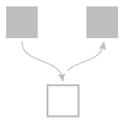
Prefabricaded elements

Materials easy to repair on site

Self-sufficiency

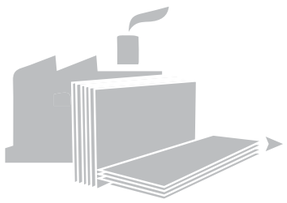
Light weight

Lift the building

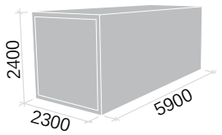


Possibility to replace a module

Fire safety
Division into cells



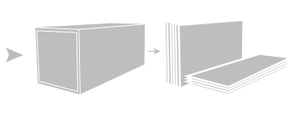
Prefabricated modules



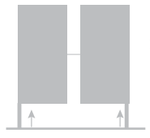
Load modules in containers

Ship to Deception Island

Helicopter transport to site

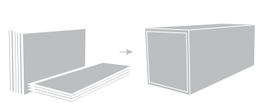


Unload modules

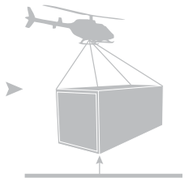


Install on site

Structure life span



Disassemble and load



Move to other destination

References

The visitor centre is both a space for guiding tourists into nature as well as a home for people living and working on site. Within both fields there is a great range of ways to approach the task, from simple and primitive to advanced and elaborate.

LIVING IN COLD CLIMATES

Living and surviving in cold climates is dealt with in several ways depending on the function, size and permanence of the structure and its habitants. It spans from a small tent with a layer of canvas as protection to large high tech research stations with thick walls. Alpine pods and research stations in the size of a container also work as living space for shorter periods.

The visitor centre will be the home and workspace for up to four people. They stay for several months, mainly during the milder Antarctic summer. The demands are not as high as if they were to stay all year around. Since it is a temporary home it can be small-scale and compact, however still safe and durable.

1. Tent, Antarctica
   Photo credit: NASA ICE, CC-BY-2.0
2. Igloo
   Photo credit: Ansgar Walk, CC-BY-2.5
3. LEAP s1, refuge Gervasutti
   Valferret, Italy, 2011
   Leap factory
   Photo credit: Gughi Fassino
4. Svea, research station (SWE)
   Heimefrontfjella, Antarctica, 1987
   Photo credit: Carl Lundberg
5. Iceberg Living Station
   Arctic research
   MAP Architects/David Garcia
   Photo credit: MAP Architects/David Garcia
6. Halley VI Antarctic Research Station
   Brunt Ice Shelf, Antarctica, 2012
   Designed by Hugh Broughton Architects and AECOM and constructed by Galliford Try for British Antarctic Survey.
   Photo credit: Antony Dubber

Shelter


1


2


3


4


5


6

Capsule

VISITORS IN NATURE

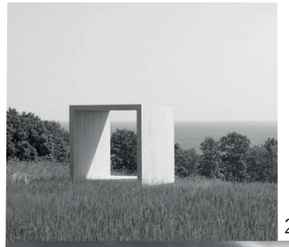
Addressing and receiveing visitors to an area can be done in many manners, from a simple sign to a large tourist resort. In between these two extremes there is a range of architectural spaces that aim to highlight the surrounding nature. There is the simplicity of an installation or pavillion framing a setting, which is set in contrast to a 750 square meters naturum, the visitor centre Laponia in the north of Sweden.

The visitor centre in Whalers Bay should be a dignified way to address the increasing amount of tourist visiting Deception Island. It should be done without taking over either the site or the experience. Since the tourists are only ashore for a few hours, the nature experience should be in focus and the visit to the centre should be a natural part of it. An exhibition space is central and there is no need for other areas such as reception, café or shops.

1. Sign
2. Installation at Kivik Art Museum
   Kivik, Sweden, 2007
   Snøhetta
   Photo credit: Gerry Johansson
3. Tverrfjellhytta, Reindeer pavillion
   Hjerkinn, Norway, 2011
   Snøhetta
   Photo credit: © diephotodesigner.de
4. Laponia, visitor centre
   Stuor Muorkke, Sweden, 2014
   Wingårdhs
   Photo credit: Jann Lipka
5. Antarctic Port for tourism and research, vision
   Antarctica, 2014
   Studio Hadid Vienna and Sergiu-Radu Pop
   Photo credit: Sergiu-Radu Pop

Sign

Nature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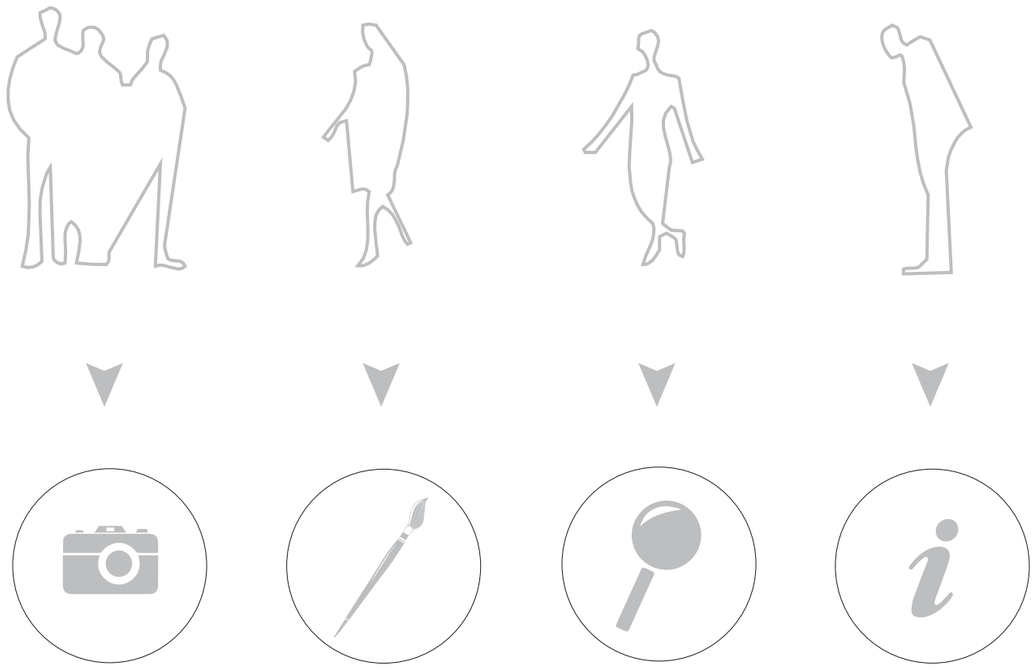
Resort

Users



TOURISM
Adventure seekers from various nations visit Antarctica. Most tourists go on a two weeks route from Ushuaia to Deception Island and the Antarctic peninsula. All tourists visiting Antarctica by tour operators need to be in a good physical health due to the lack of healthcare in the physically demanding environment.[34]

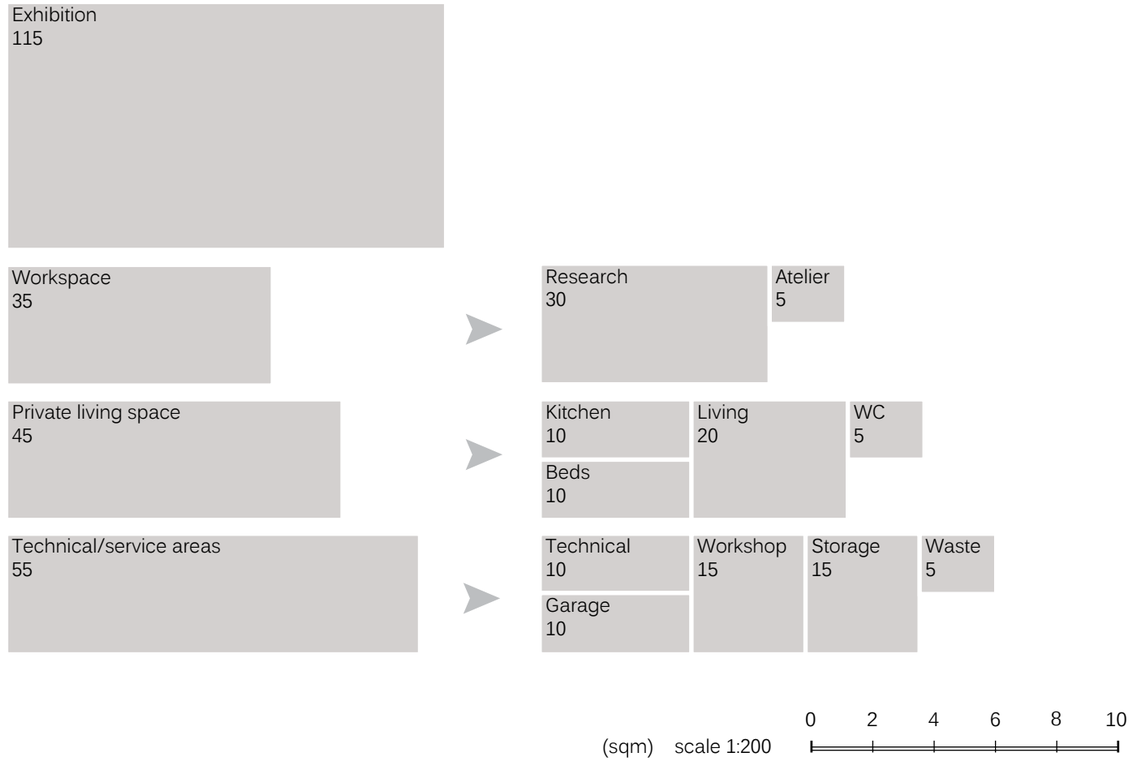
ART
Every year, artists are encouraged to visit Antarctica in order to inform about the remote location through their work. For the same reason, artists will be invited to live at the visitor centre. The artwork will be showcased in the exhibition.

RESEARCH
The people living at the visitor centre will parallel to their work with the visitors be able to conduct smaller research projects. The research unit is a place where researchers under the Antarctic Treaty can share scientific findings. The idea is to improve the Antarctic Treaty's policy to make research available to everyone.

GUIDE
Research and tourism will come together on Deception Island. It is vital that the researchers are available to the tourists, to give them an accurate picture of Antarctica's environmental situation.

34 *Quark Expeditions*, "Terms and conditions", available: http://www.quarkexpeditions.com/en/terms-and-conditions, 2015 (retrieved 2015-05-10)

Program



Based on the references and the user's needs the total area of the program is delimited to 250 square metres. It is divided into exhibition, workspace, private living space and technical/service areas. The zoning of the program is based on grouping of activities, levels of privacy and the need for technical systems and heating.

The public exhibition space will highlight the surrounding nature and inform about its vulnerability. The visitor will be taken through the wilderness of Antarctica and the brutal history of human actions on Deception Island. The material exhibited is a combination of scientific information and artistic pieces, appealing to all senses.

Ongoing Antarctic research will be available to the visitors. The work unit and research space will be integrated in the visitor's movement. Hence, the research space is situated in between the exhibition area and the housing unit, easily accessible for both habitants and visitors. In connection to the work space, a small atelier has been programmed for the visiting artists.

The space for living is compact. The dwellings are separated from the exhibition and research area to provide space for privacy.

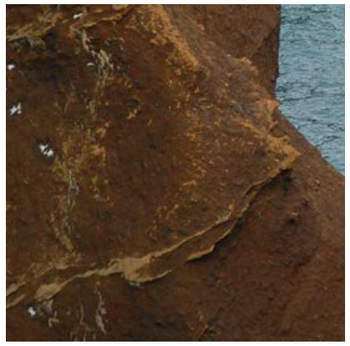
The structures need to be maintained. A workshop has been programmed to uphold the condition of the buildings.

The storage has been divided into cold and warm storage space. The goods that require cold storage are placed in uninsulated or unheated rooms. The technical space is constantly heated and consists of a heat pump, ventilation system, solar cell battery, station control unit and an Imhoff water tank.

Conceptualise site

An exploration of how to link the structure to the site's conditions.

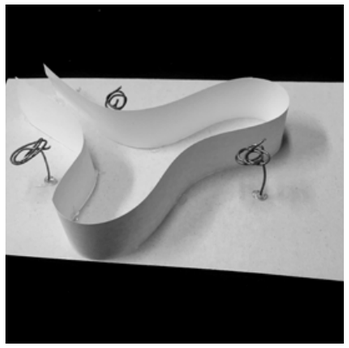
Shifting layers of materials, seasons, colours, terrain and landscape.

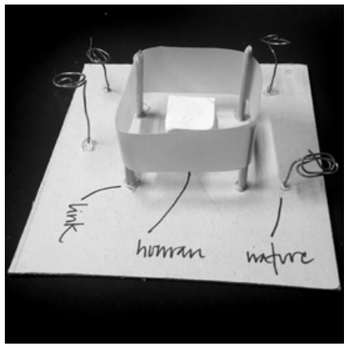


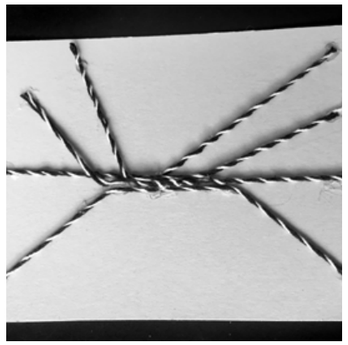
SHIFT
Deception Island is a place in constant movement. A day of stillness and sunshine can suddenly switch to snowstorm and blast. The mild summer is light most hours of the day while the winter mainly is dark and cold. The materiality of the site contrasts from warm lava rock to cold glaciers. How can the visitor centre reflect the shifts and contrasts in the surroundings?

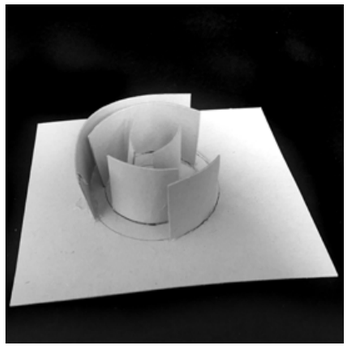
NATURE
The nature of Whalers Bay is grand, mystical and desolate. A walk on Whalers Bay takes the visitor to densely placed leaning whale boilers resting on heated sand. The journey continues across the humid black lava beach where penguins and seals are resting and up the hill to Neptune's Window, where waves are smashed against sharp cliffs. How will the visitor centre relate to the natural setting?

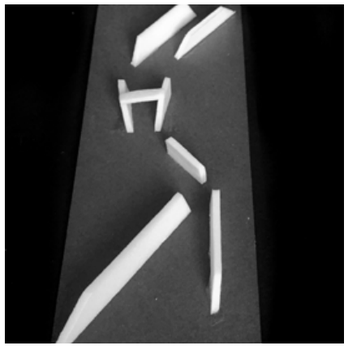
CONNECT
Visitors have been coming to Deception Island for decades. There is an existing pattern of movements on the site, focusing on a walk along the beach. How can the visitor centre connect to the existing activities? How can it help mediating the story of the present and the past?

1 

2 

3 

4 

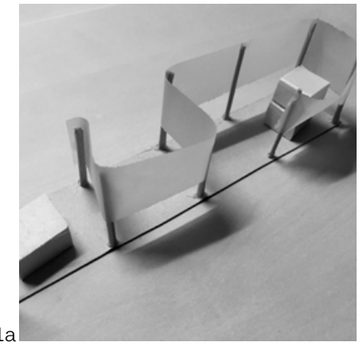
5 

6 

CONCEPT MODELS
1 Following formations of nature
2 Structure as a link between human and nature
3 Connecting to existing paths
4 Shifting grades of shelter
5 Structure framing the surroundings
6 Public path connecting structures

Site study

A study of where to situate the visitor centre at Whalers Bay.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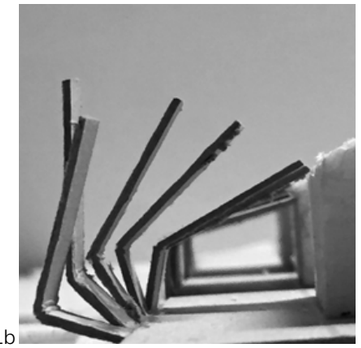
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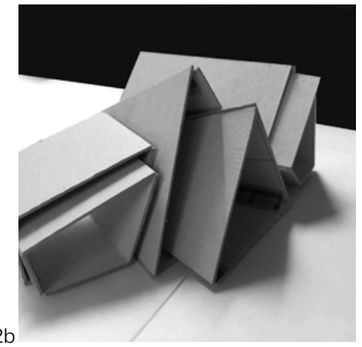
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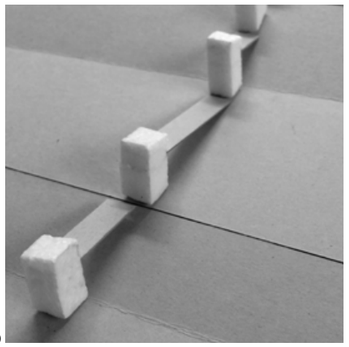
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MODEL PHOTOS
1a Structures with shifting shell
1b Opening exterior creates exhibition space

2a Open units create shifting light, space, views, exhibition and shelter
2b Closed structure provides an extra layer of insulation

3a Modules framing the path to Neptune's Window
3b Staircase exhibition working with the shifting levels

1 STRUCTURE ON THE WATER
Deception Island is a stopping point before the tourists visit the Antarctic mainland. Thus, Deception Island could be the informative gate to Antarctica. Since only 100 people are allowed to be ashore at the same time, passengers sometimes have to wait for their turn to access the island. A structure on the water could operate as a waiting area, where the tourists obtain an experience while waiting to go ashore. A negative aspect of the water location is that the structure would be parted from the island and not integrated with the context.

2 STRUCTURE ON THE BEACH
A structure situated on the beach would become a part of the route from the whale boilers to Neptune's Window. It would have a strategic position by the landing site and an immediate connection to the seismic activity. A negative aspect of the location is that the structure would stand as a solitude on the vast flat surface and disturb the wildlife on the beach. The foundation is unsteady and the structure would be threatened by rising sea levels.

3 STRUCTURE IN THE SLOPE
A benefit of situating the visitor centre on the hillside towards Neptune's Window is the solid foundation. The location could ease the vertical movement towards Neptune's Window, while the hill would protect the structure from strong winds. Situating the visitor centre on the edge of Whalers Bay is a humble attempt not to take over the site.

Site selection

Structure in the slope


1


2


3

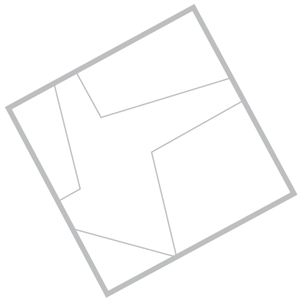
PHOTOS OF NEPTUNE'S WINDOW
1 Model photo
2 Neptune's Window seen from the ocean
3 Neptune's Window seen from the beach

The slope leading to Neptune's Window is the selected site due to the solid foundation, the wind protection from the hill, the overview of the area and the embracement of the natural path from the whale boilers to Neptune's Window.

The elevated position provides panoramic views of the local context while the hillside creates a close connection to the immediate nature.

Architectural concepts

Concepts evolving around the theme *design with nature*.



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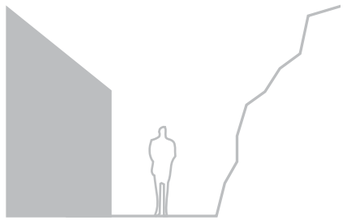

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5

INTERACT WITH THE SURROUNDINGS
Let the surrounding nature help shaping the visitor centre and be a part of it. Create spaces together with the landscape and work with the sloping terrain. Let natural elements such as wind, sun views and precipitation shape the buildings.

SHIFTING ELEMENTS
Let the visitor interact and be aware of the surrounding nature through gradations and contrasts in elements. Adapt the ambiance after the program and work with different grades of shelter, light, sound and temperature.

CONNECT TO THE HIKE ALONG WHALERS BAY
Incorporate the visitor centre in the natural movements already existing on site.

CONCEPT DIAGRAMS
1 Uniform outer shape redirecting wind
2 Volumes protecting an inner zone
3 Rooms with nature
4 Grades of shelter
5 The structure becomes part of the existing activities

1

2

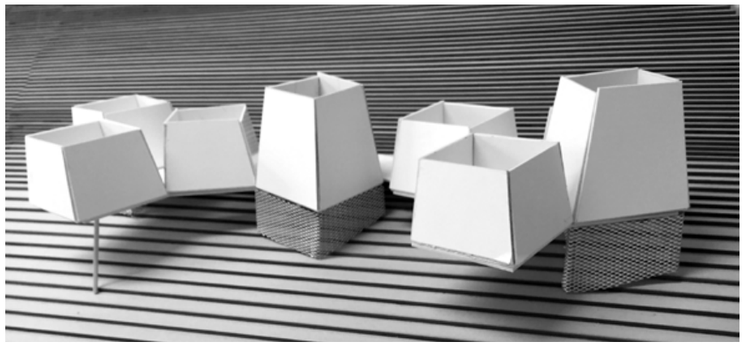
3

CONCEPT PHOTOS
1 Structure following the terrain
Rørvikfjellet, Norway, 2008
Reiulf Ramstad Arkitekter
Photo credit: Reiulf Ramstad Arkitekter
2 Falling water
Palmyra House, India, 2007
Studio Mumbai
Photo credit: © photo Enrico Cano
3 Light and shadow
Koshino house, Japan, 1984
Tadao Ando
Photo credit: Sarah Han

Shaping the buildings

Model studies developing the concepts.


1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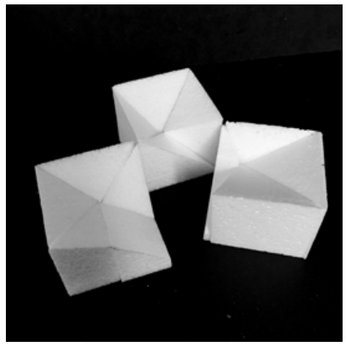
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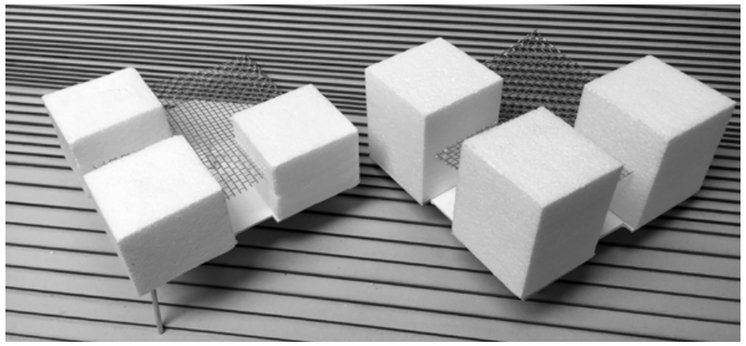
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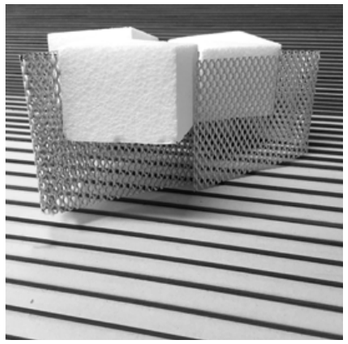
When translating the architectural concepts into buildings and volumes local conditions such as solar radiation, wind direction, snow loads and precipitation were taken into consideration. A concept of the centre divided into separate modules developed. The division blurs the boundary between nature and structure and allows the landscape to be an active part of the centre. Together the building volumes create a protected central outdoor space and the experience becomes a walk between inside and outside. The modules help to divide the program and give the project flexibility and possibilities for different future scenarios. It allows gradations with technical systems as well as with shelter, light and sound.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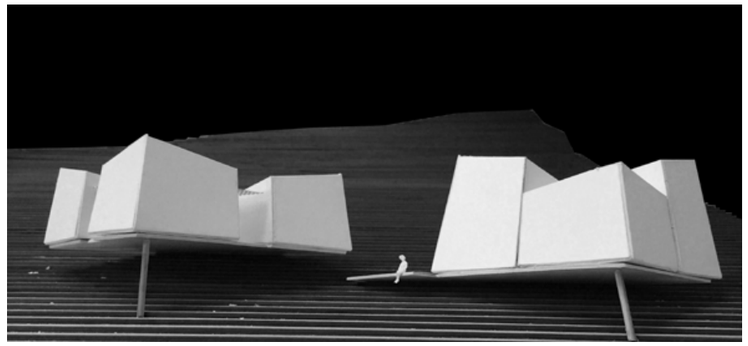
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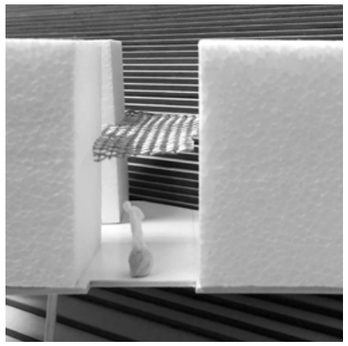
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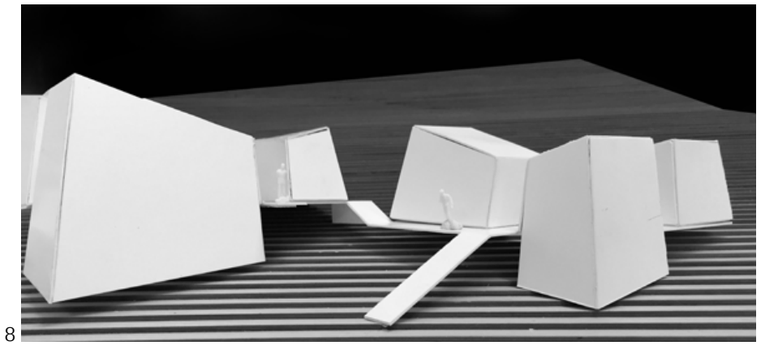

8

SKETCH MODELS

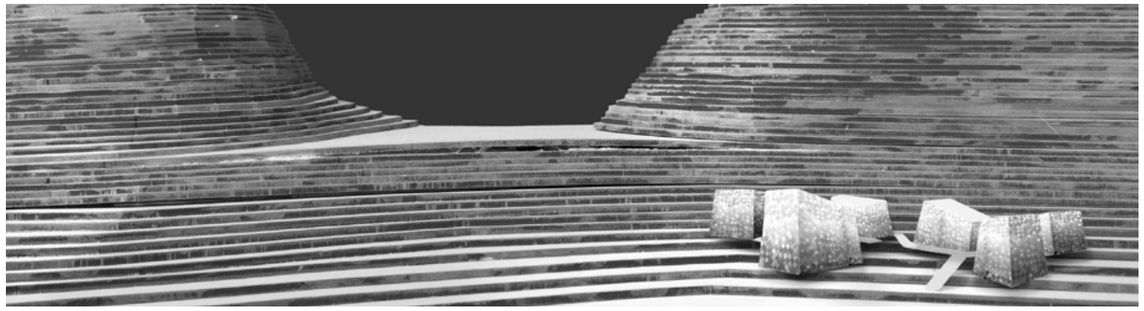
1 Volumes angled after the sun
2 Conglomeration of buildings on the hillside
3 Volumes shaped to collect water
4 Separation of private and public activities
5 Grades of shelter behind walls and permeable screens
6 Using the terrain to divide the program in different levels
7 Shelter in between volumes
8 A walk between indoor and outdoor spaces

THE PROJECT

"What all ultimately comes down to is that there must grow in us and in our children - the new generation - an insight that all organisms are dependent on each other, so that we can form a realistic idea of the role that human beings play in existence. (...) With that attitude, people will no longer go out into nature; they will simply go into it."

- Lennart Rådström, In i Naturen, 1977

Photo credit: Richard D. Deverell, modified by the authors



0 25 50 100

Neptune's Window
scale 1:1000

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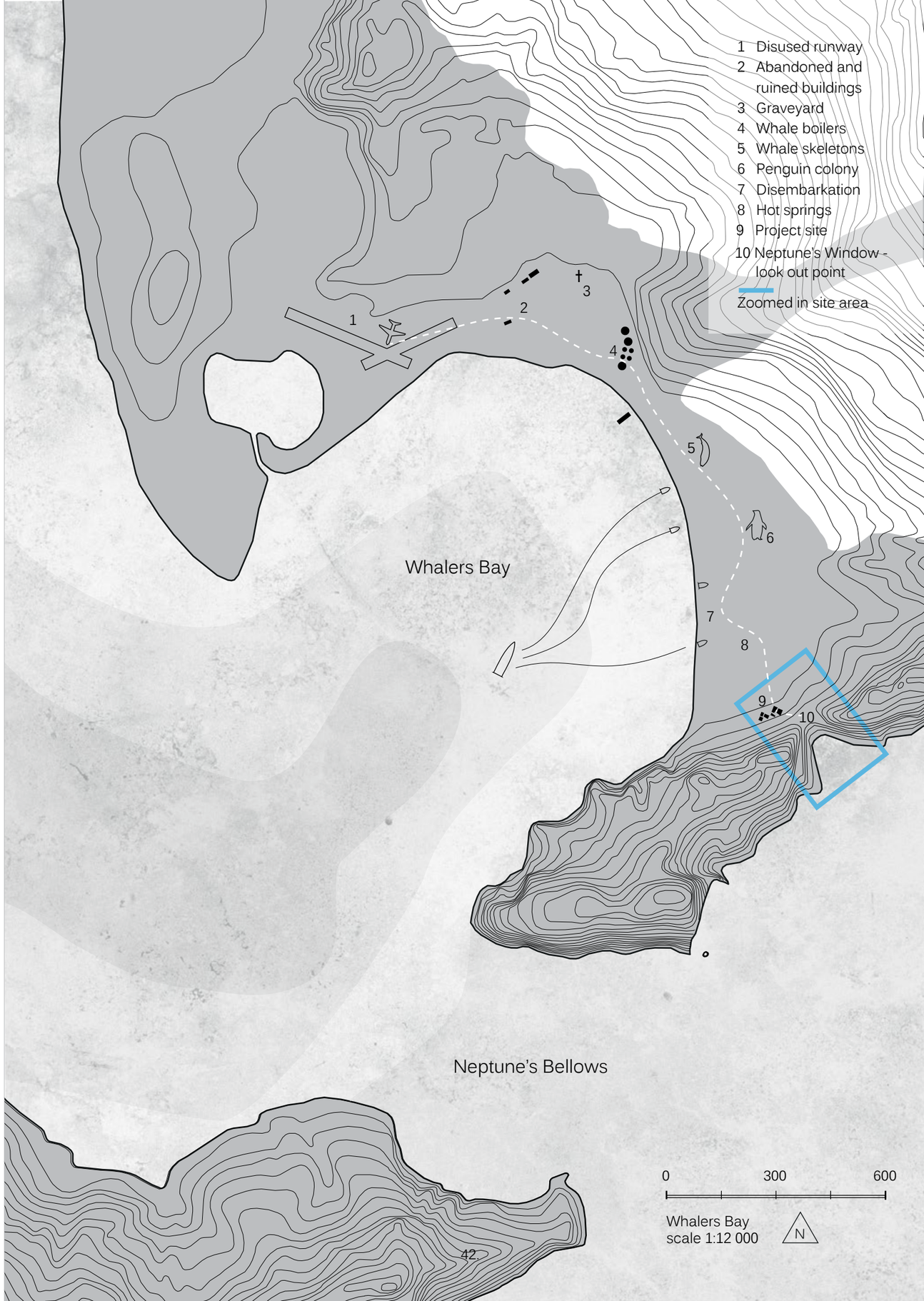
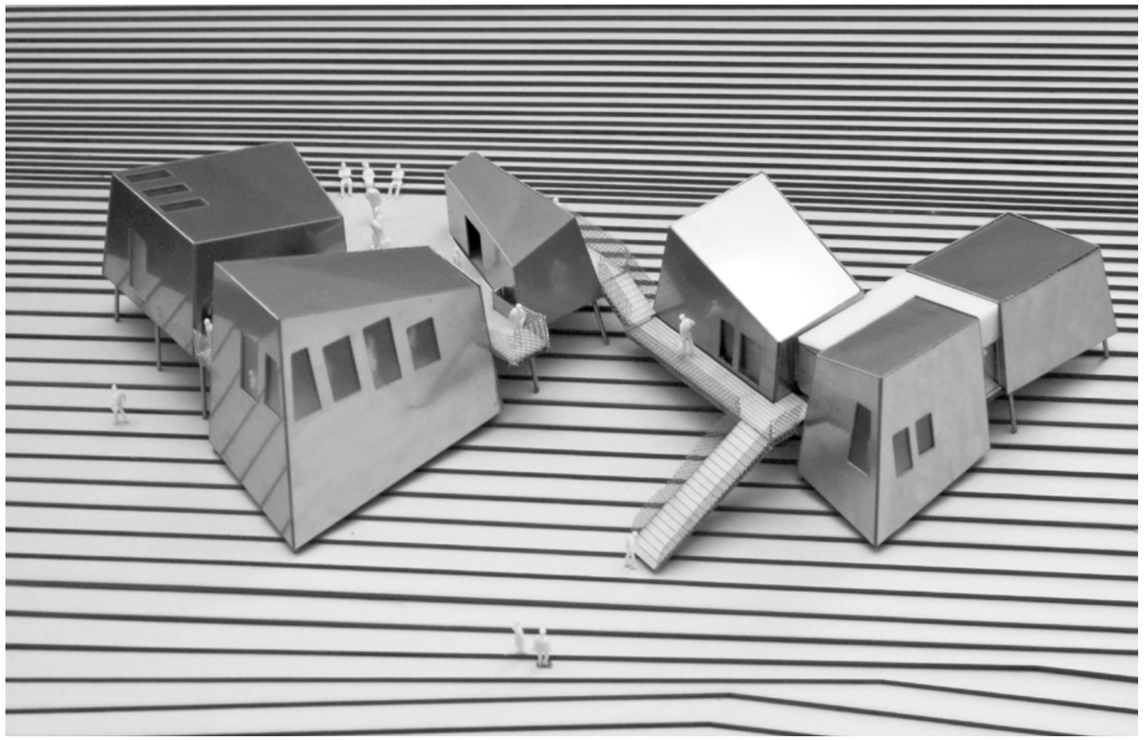


The visitor centre in the beginning of the summer when tourists start to arrive.



The visitor centre in the sloping landscape.

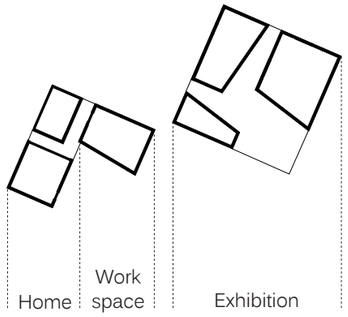
A visitor centre on Deception Island

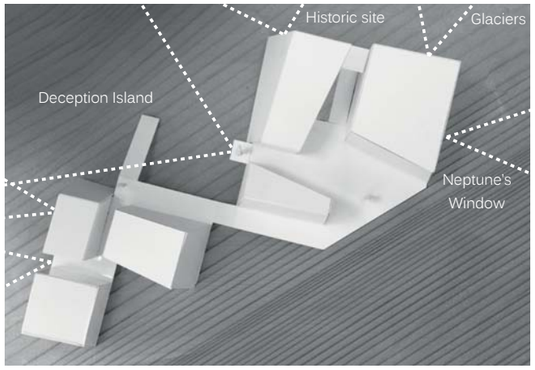
At the edge of Whalers Bay the visitor centre welcomes its guests. Sheltered from the ocean by the hillside, the centre lies protected with views of Deception Island.

Climbing up the terrain, the structure is divided in level and volume into a private space for living and working and a public exhibition space.

Connecting to the existing path along Whalers Bay, the exhibition becomes part of the hike to Neptune's Window. The visitor is lead through a series of indoor and outdoor spaces, experiencing changes in volume, light, temperature and shelter.

Together with the mountain the building volumes create a protected central square. A room in nature where one can sit and enjoy the sun.





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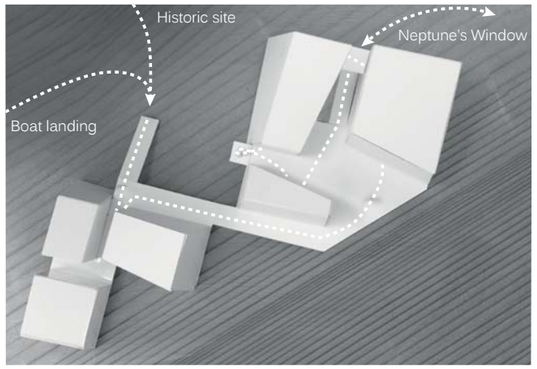

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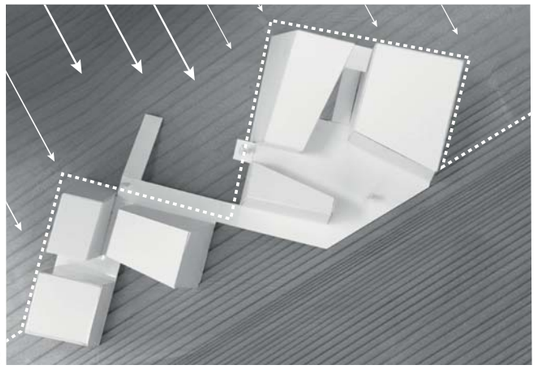

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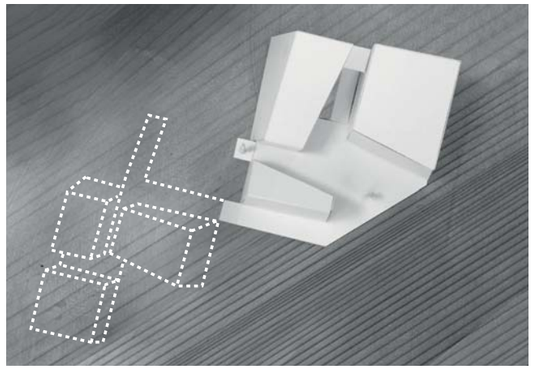
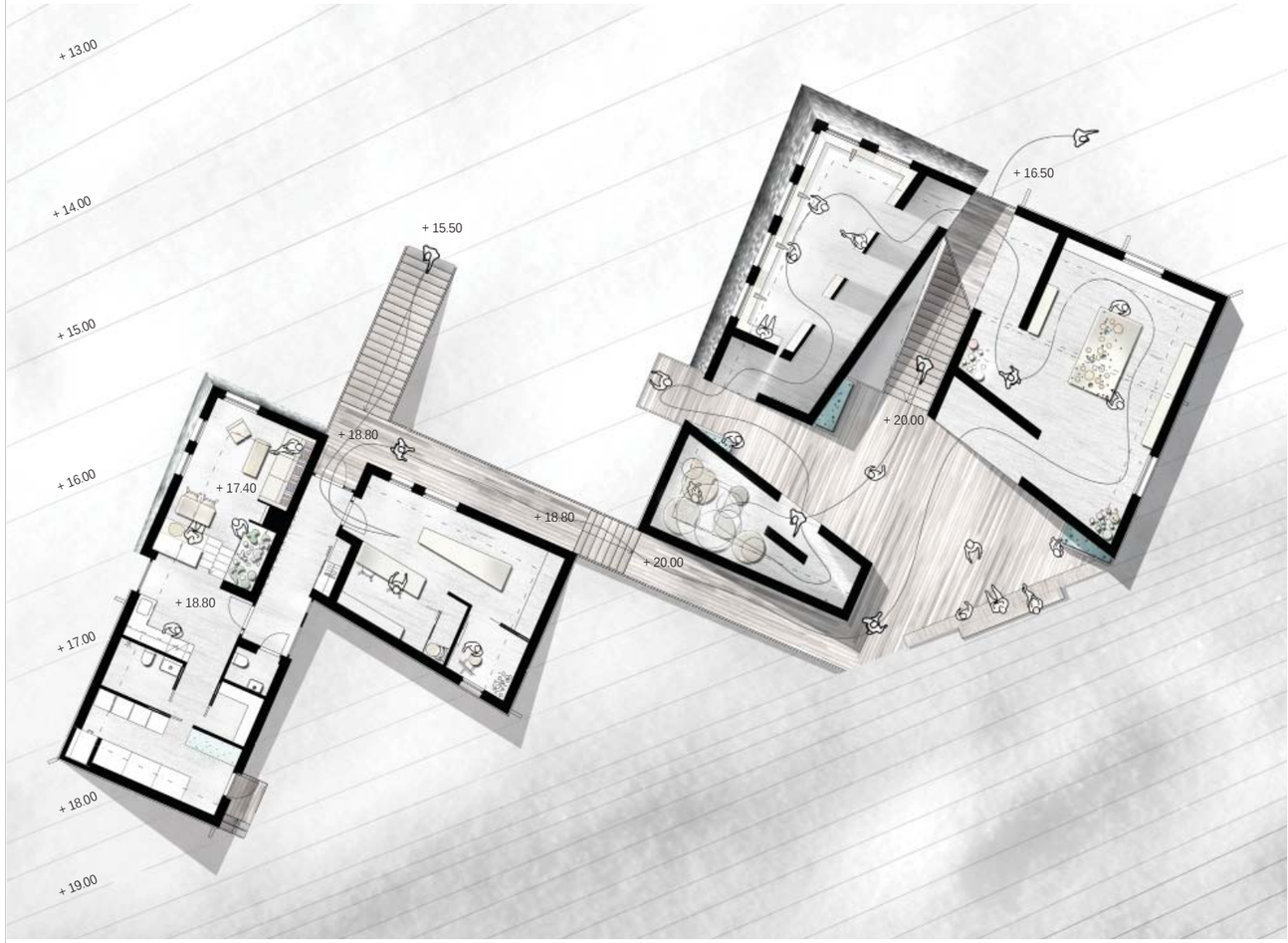
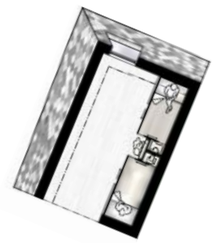
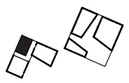


4

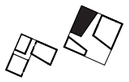
DIAGRAMS
1 Views in the surroundings
2 Connecting to existing movements
3 Protected zone between mountain and building
4 Possible future scenario in case the living unit gets removed and the exhibition would function as a unit on its own







Floorplan (above)
Sleeping loft
scale 1:200



Floorplan (below)
Storage area
scale 1:200

Floorplan
scale 1:200

0 2 4 6 8 10

Areas:

Exhibition	120 sqm
Home	60 sqm
Workspace	45 sqm
Storage area	45 sqm
Outdoor space	90 sqm

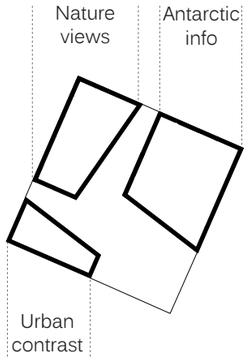
Exhibition

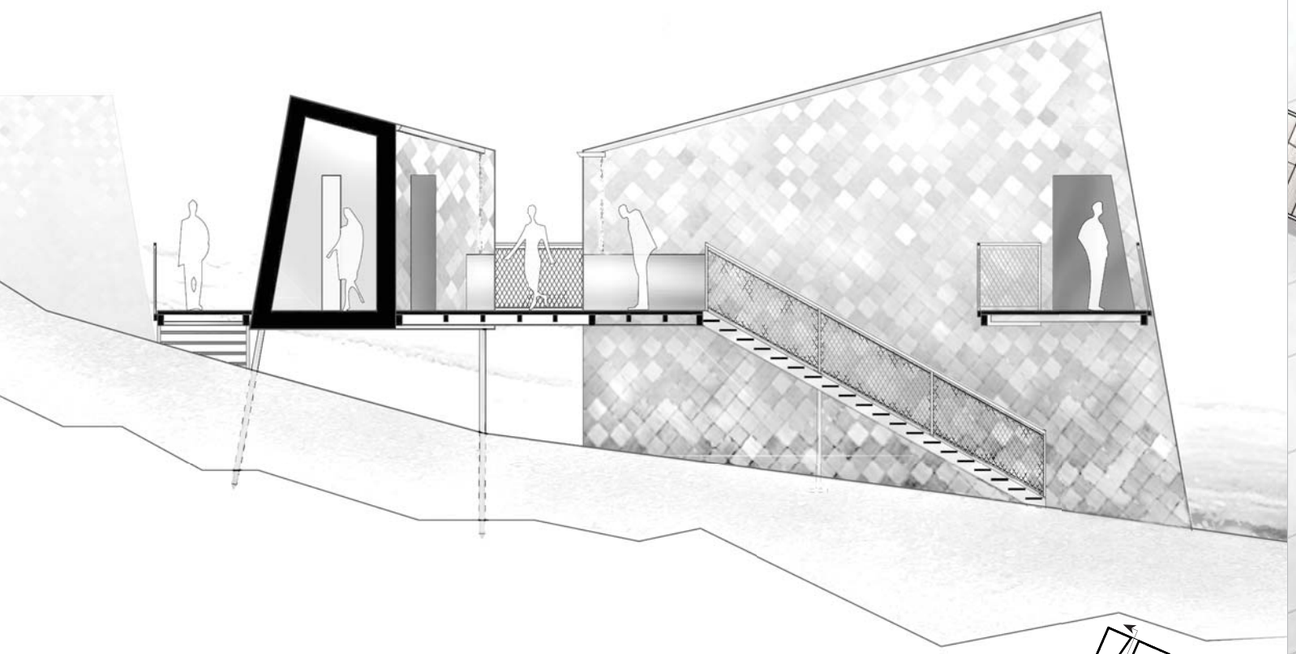
The exhibition extends over several building volumes integrating the outdoor environment in the experience. The program is divided amongst three buildings, each with a seperate theme; Antarctic Info, Nature Views and Urban Contrast.

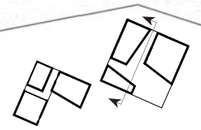
In Antarctic Info general information about the Antarctic environment is being presented. The exhibition is showcased through a mixture of artwork, physical showpieces and informative panels, appealing both to the visitors mind and emotions.

The unit for Nature Views portrays the local area by framing views of the island. Examples of directed views are the historic whaling site, the glaciers and the caldera.

The unit for Urban Contrast draws the existing distinction between man and nature. Urban setups and human behaviour is put in contrast to the Nature Views unit. Visitors get an overwhelming noise and visual experience of urban turbulence before they continue to the natural setting of Neptune's Window.







Section
scale 1:100

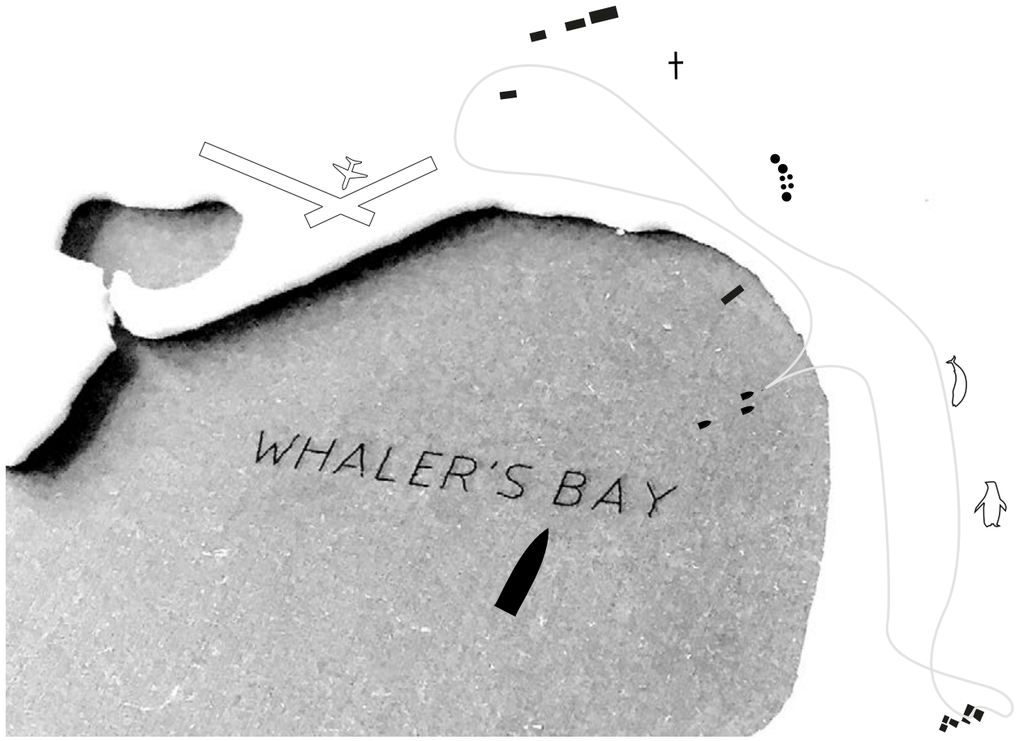
0 1 2 3 4 5

Floorplan
scale 1:100

0 1 2 3 4 5

The walk

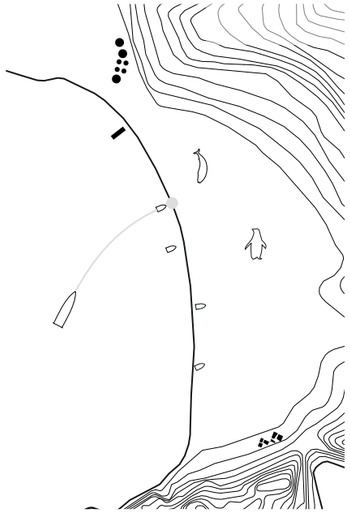
The journey at Whalers Bay.

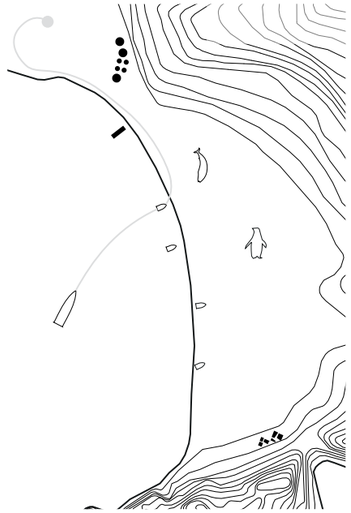


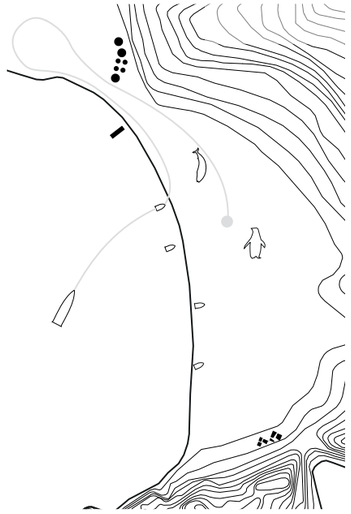
Zodiacs take the visitors to the heated lava bay where the exploration starts.

The trip continues to the remainings from the brutal whaling industry. Whale boilers, whale skeletons, abandoned houses and a cemetery take the visitors back in time.

Seals and penguins are resting along the beach towards Neptune's Window and the visitor centre. It is possible to dig a hole and take a bath in the hot springs on the beach.

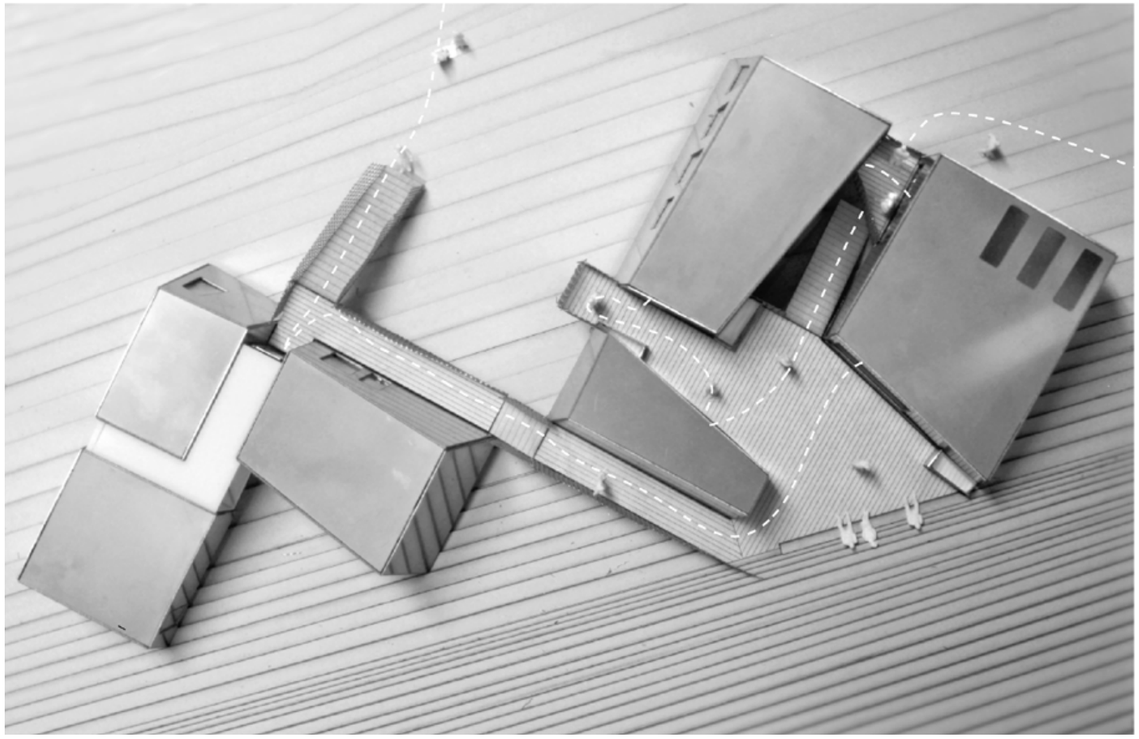


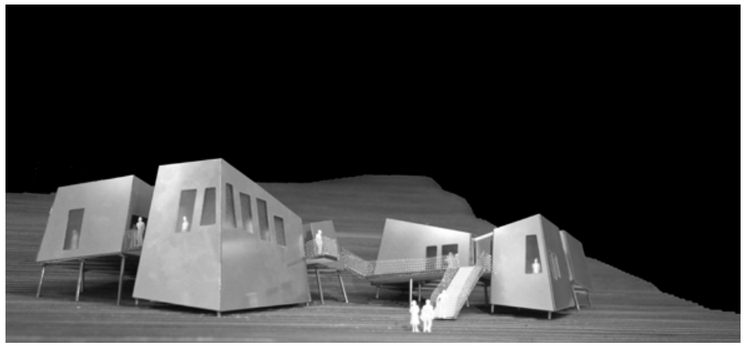




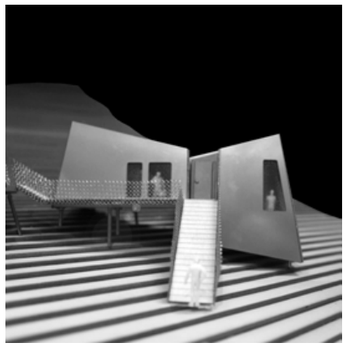
The walk

The journey through the visitor centre.

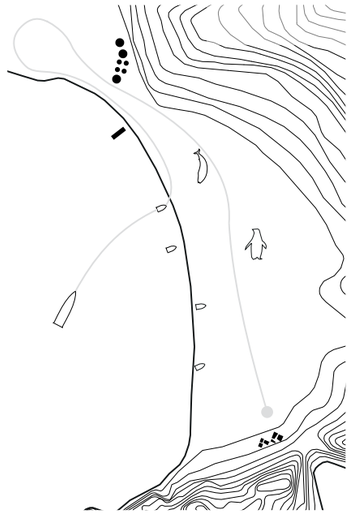


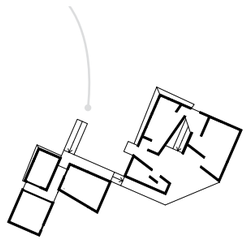


When hiking up the hill the visitor approaches a cluster of buildings on the mountainside. The central stair signals where to enter.



After ascending the stair the visitor can enter the office and interact with the workers or continue straight to the exhibition.





Section
scale 1:100

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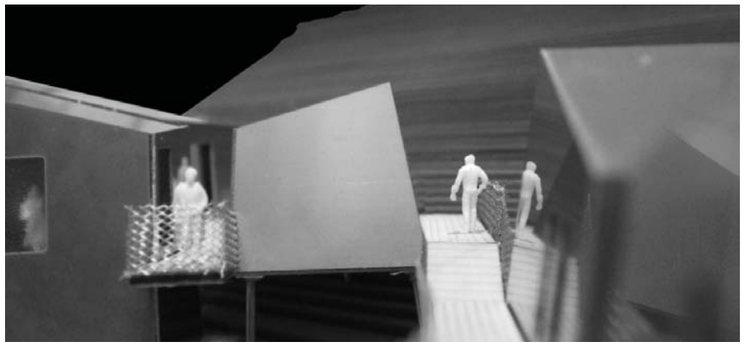
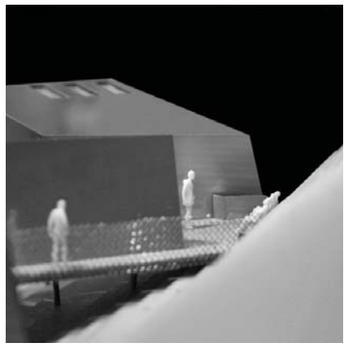
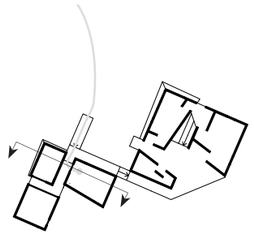


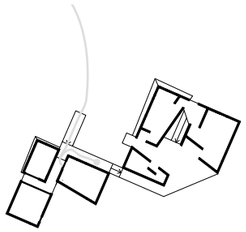
The office functions as an informal reception, where the visitors are greeted and get an insight into the ongoing research in the region.

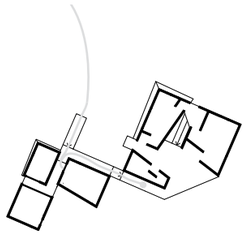


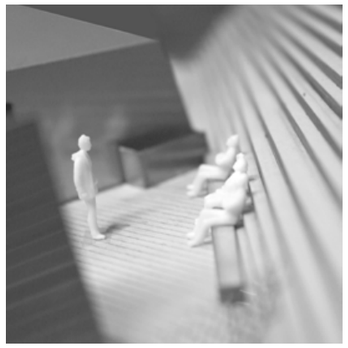
The walk continues along a boardwalk, leading the visitor between the buildings towards the exhibition.

At first the visitor is exposed to wind but gets sheltered by the buildings after taken a few steps up to the exhibition platform.

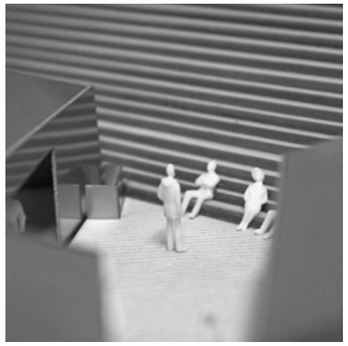






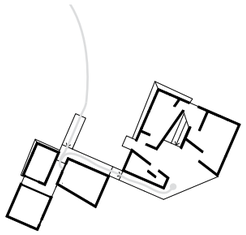


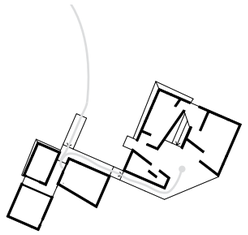
Rounding the corner a square opens up.

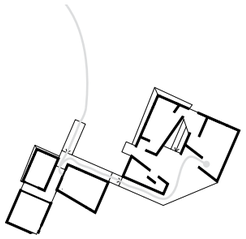


Framed by the mountain and the buildings the protected square becomes the core, connecting to all exhibition areas. Here one can sit in the sun and enjoy the view.

From the square the visitor enters the first exhibition room. It becomes quiet and slightly tempered, heated by the people and the lighting in the room.



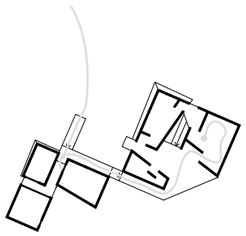


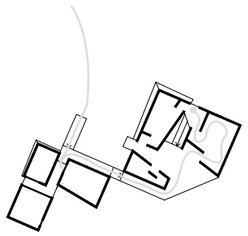


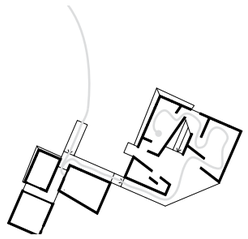
Light from the openings guides the visitor through the exhibition.

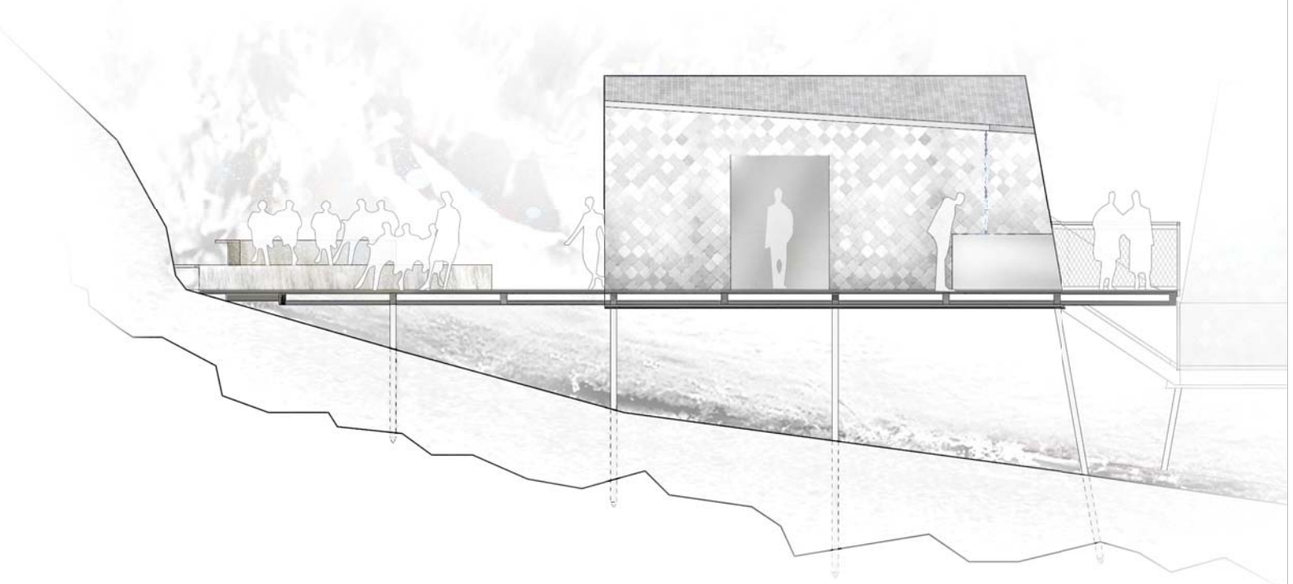
Before entering the next room a gap between the buildings exposes the visitor to the surroundings.

The visitor enters a dark corridor where slots of light guide into the open room. The panoramic view captures the surrounding landscape and frames views from all around the island.







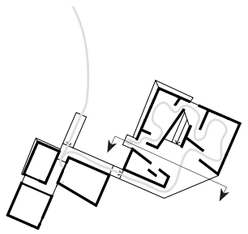


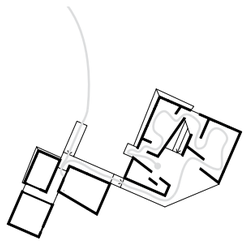
Section
scale 1:100

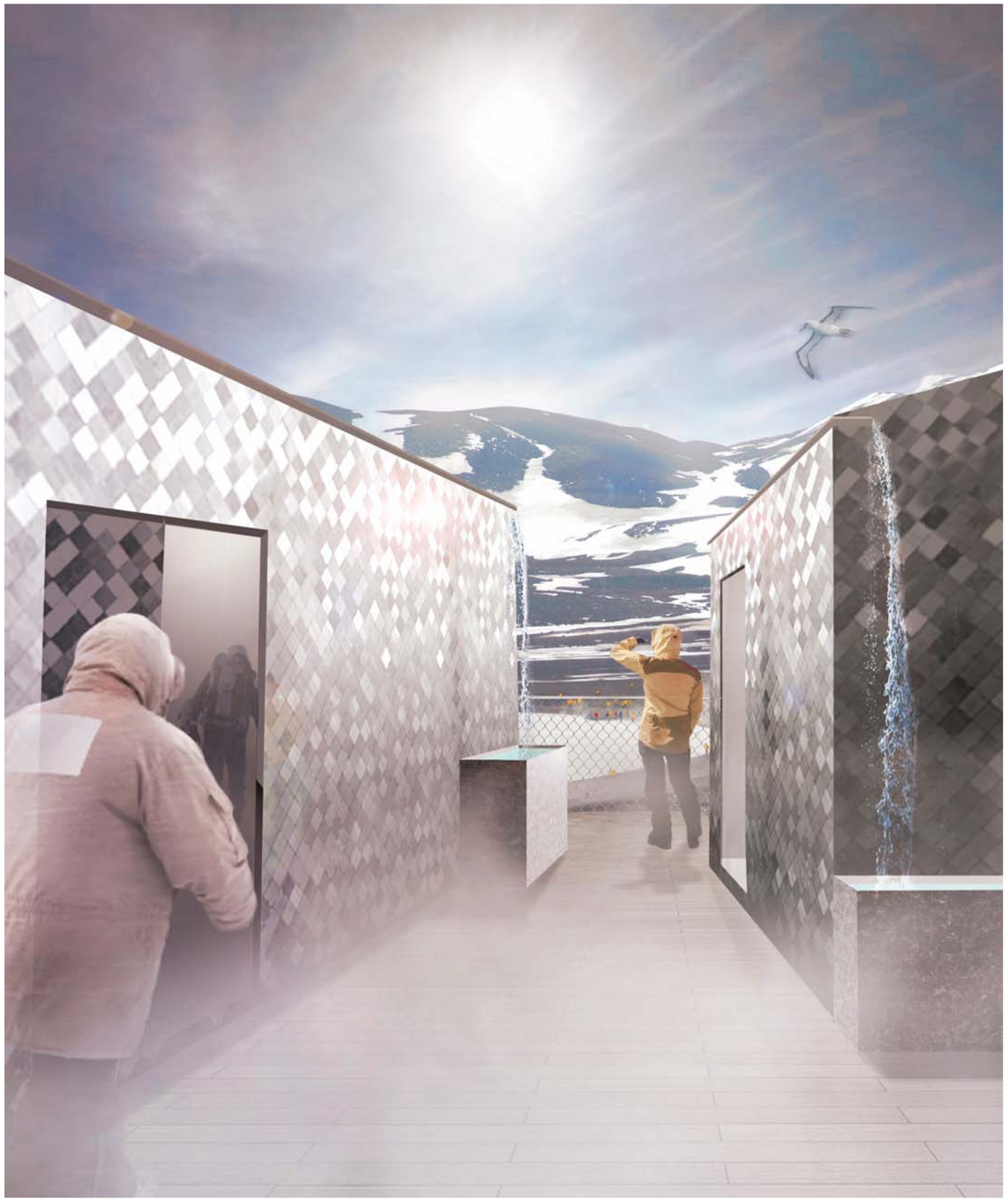
0 1 2 3 4 5

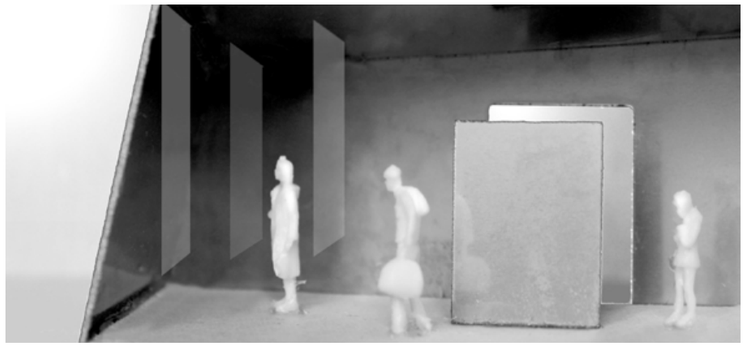
The visitor is lead to a look out point where the island's grand scenery is exposed. The look out point gives an overview of the entrance area and how the visitor centre relates to the surrounding landscape.

The precipitation that is harvested in water basins provides clean ant-arctic water.

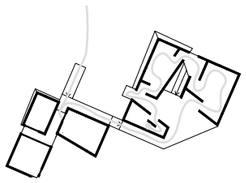




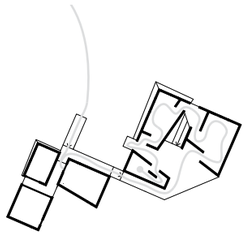




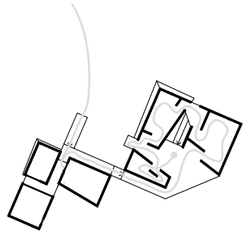
The visitor goes into the final exhibition room through a dark narrow passage and gets a recall from the urban world.

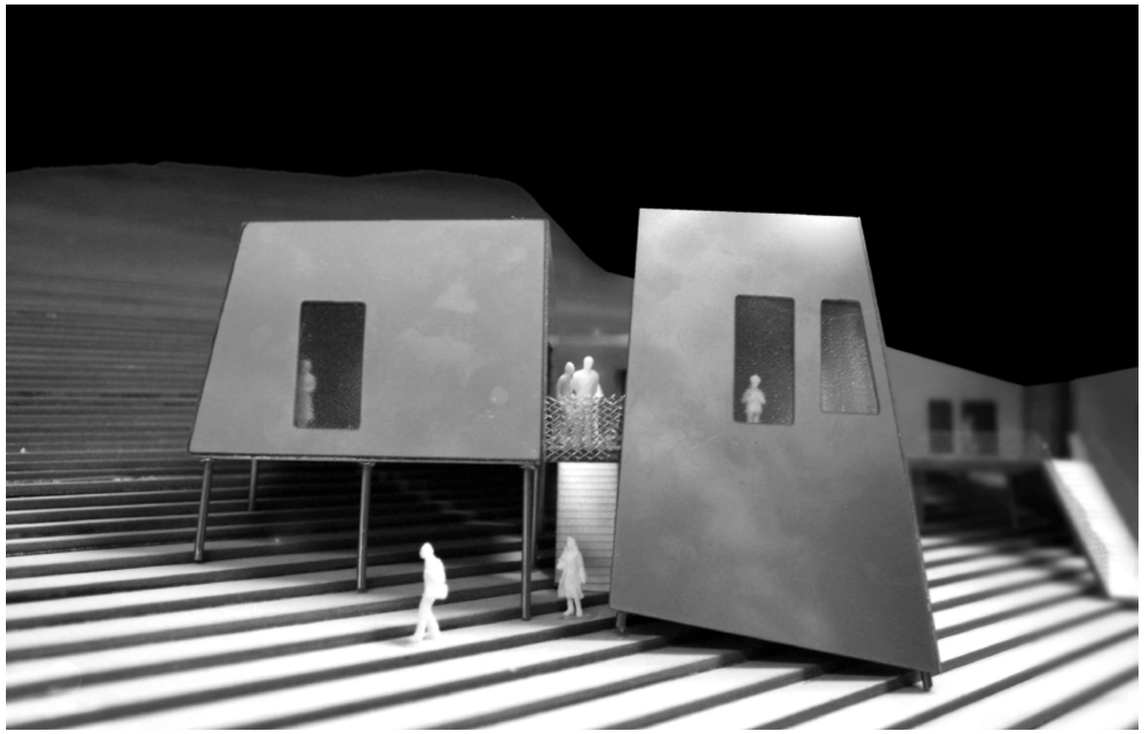


In the urban exhibition room the wilderness is set in contrast to the urban setting, urging for a moment of reflection.

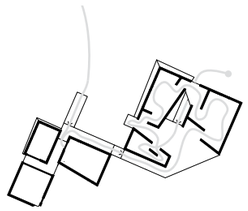


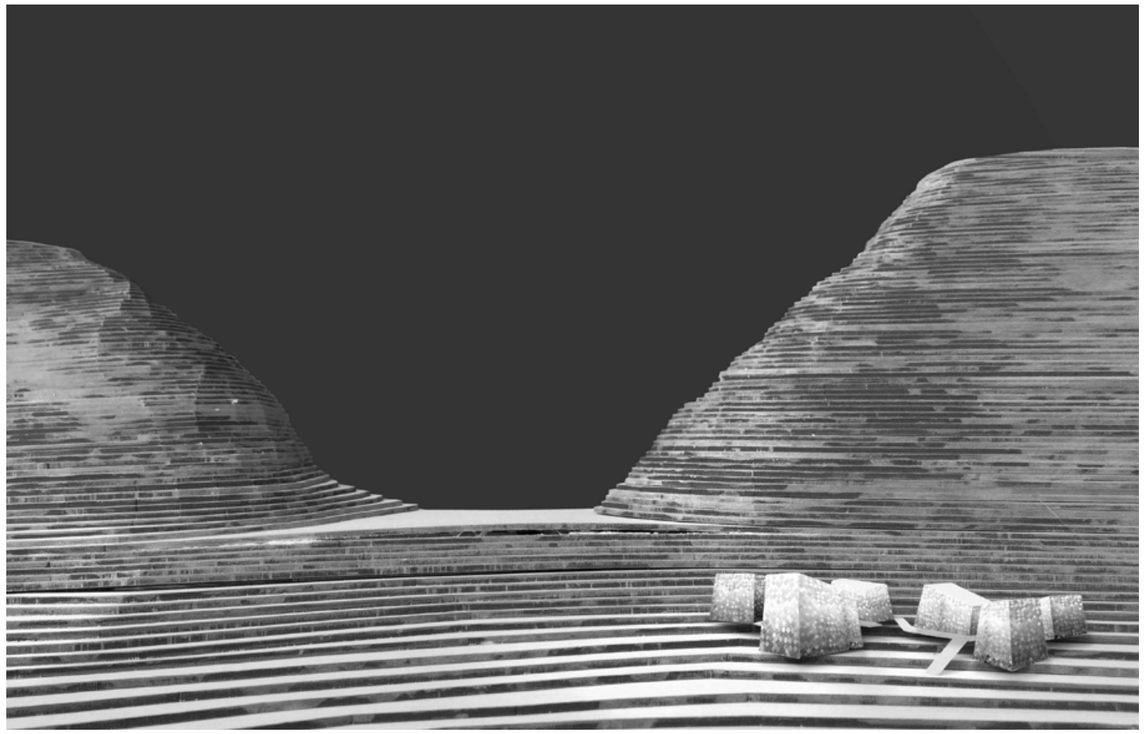
The visitor exits the visitor centre through a narrow sheltered passage between the buildings before returning to the unprotected wilderness.





The exit reconnects to the hiking trail where the journey continues up to Neptune's Window.





From Neptune's Window the visitor gets a spectacular view of the Southern Ocean and the passing icebergs.

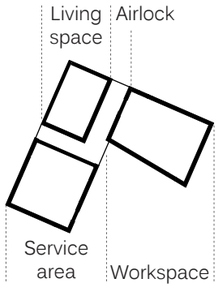
Living and working

The home of the four workers is gathered in a cluster of three building volumes. The private living space is separated from the semi-public workspace through a corridor, also functioning as an airlock. Here the tourists can hang their outerwear before entering the office.

The workspace functions as an atelier and an office as well as an informal reception and meeting place for the workers and the visitors. The open area can be used as an exhibition space for ongoing research as well as for meetings and lectures. During off-season, it can be used by the workers as an indoor area for exercise.

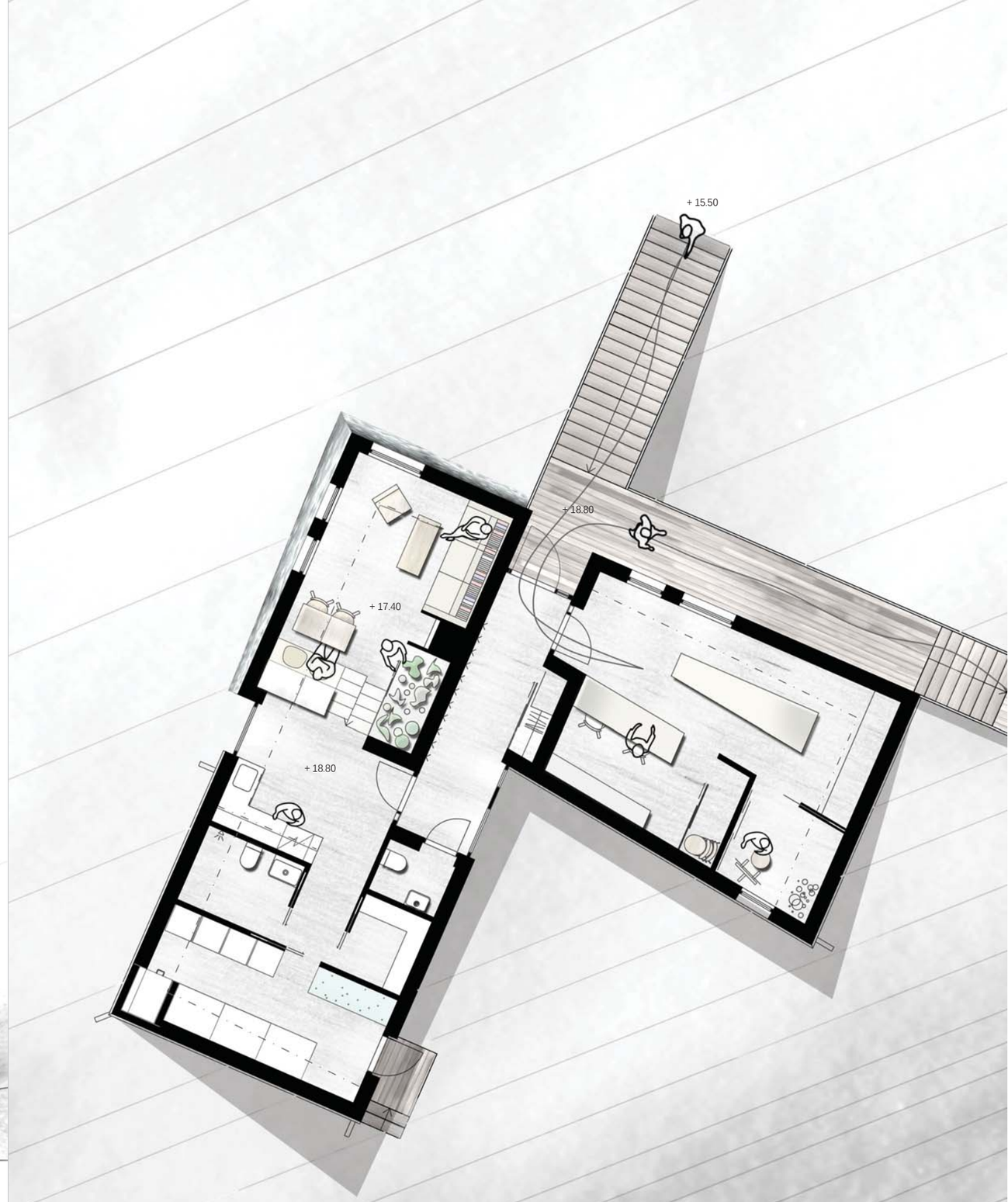
The living space is small and compact but the ceiling height and openness in plan create a spacious feeling. The open area functions as kitchen and living space. From the living space a latter leads to four sleeping nooks. The nooks can be closed for privacy and silence and contain beds and shelves for storage. There is a growth chamber that brings greenery to the barren setting and provides the workers with vegetables.

The plant room and storage are gathered in the back of the house. This unit contains all appliances and functions that require water, such as kitchen and bathroom.



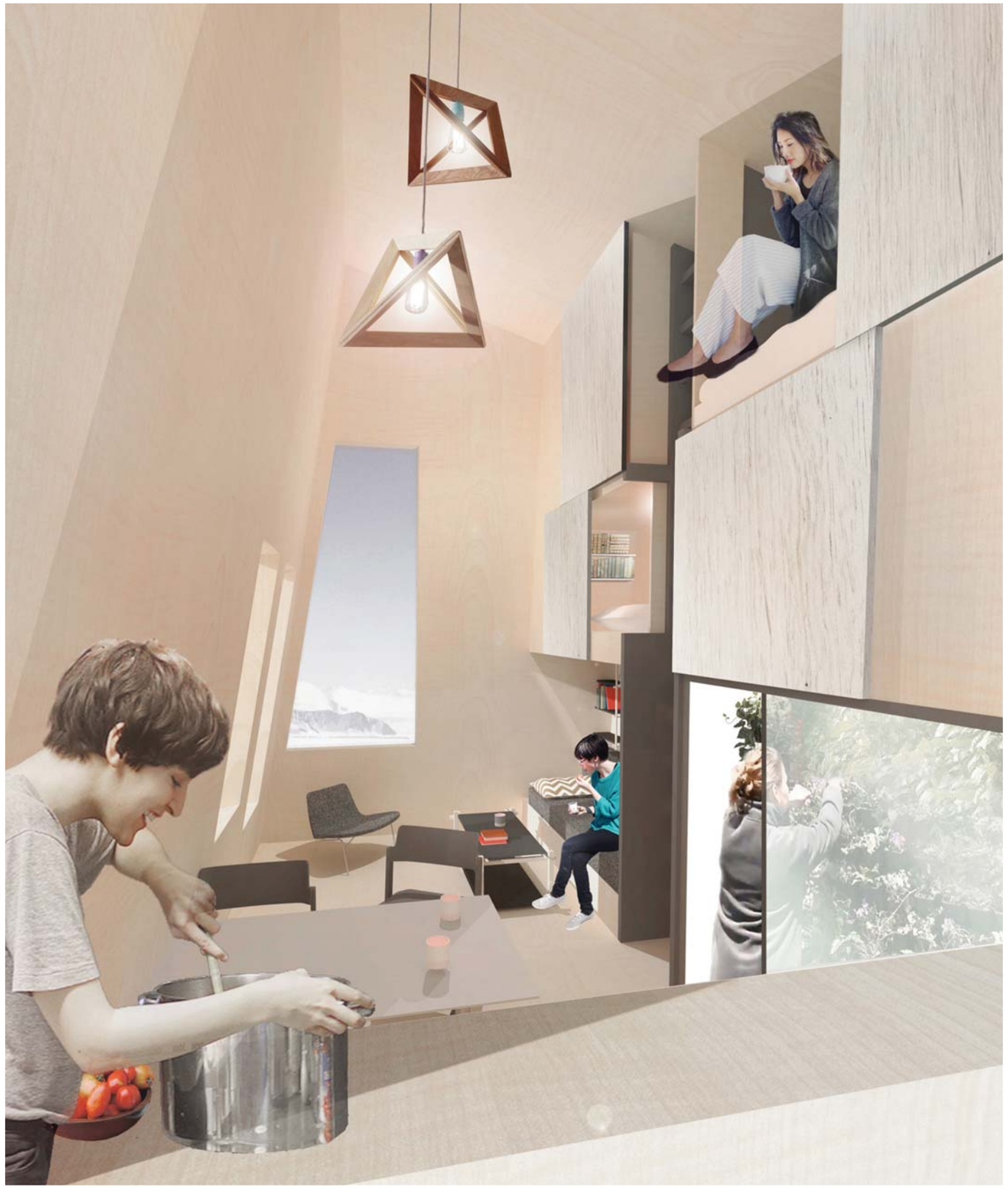
Section
scale 1:100

0 1 2 3 4 5

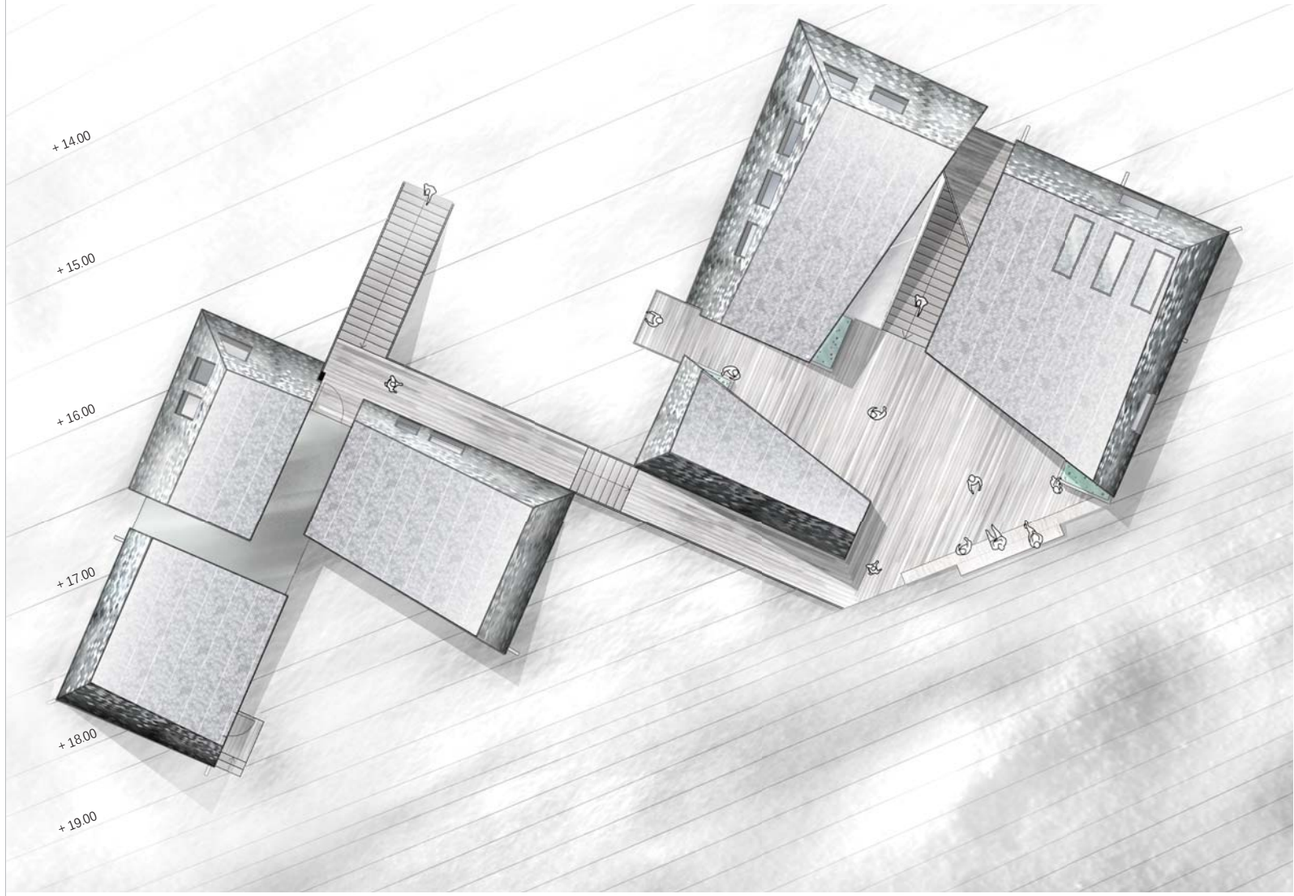


Floorplan
scale 1:100

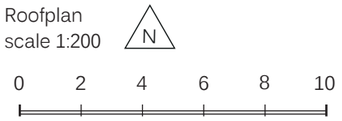
0 1 2 3 4 5



The vertical living space utilises the height of the room.



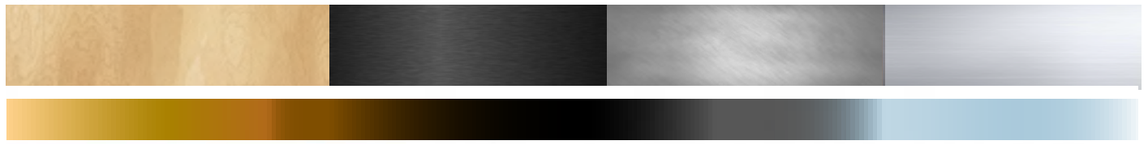
Roofplan
scale 1:200



Facades and materials

Pine

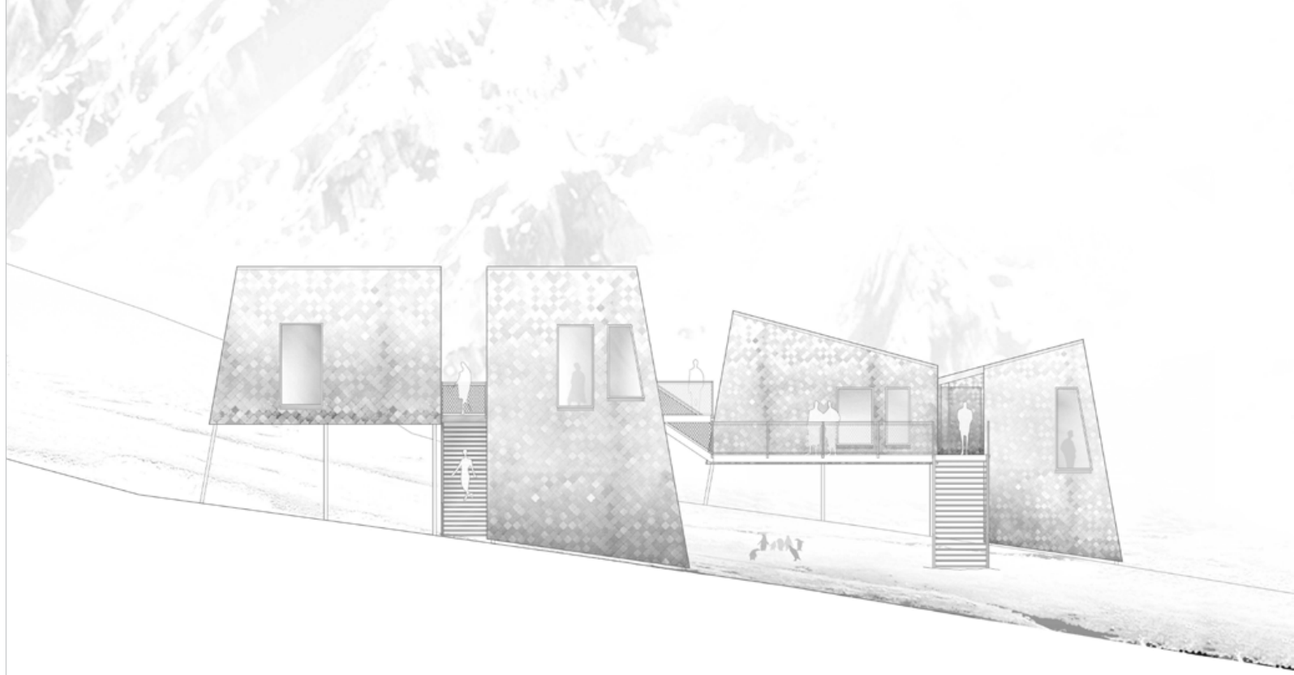
Steel scales



The colour palette on Deception Island shifts from dark red to lava black in the summer, which is hidden under a snow cover during the wintertime. When the snow melts, tones of grey and icy blue appear before the landscape reveals its lava colours again.

The facades reflect the shifting appearance of the setting. Steel scales in different tones interact or differ within the landscape. The reflective scales of steel mirror the season's surrounding tones while matte scales of steel blend in to the constant ice covered mountains.

Wood is covering the inner shell to create a welcoming and warm atmosphere. Plywood panels are comfortable to touch and prevent echo by absorbing sound.



Northeast facade
scale 1:200

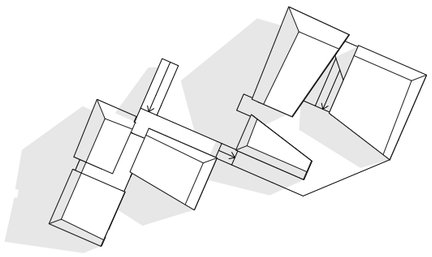
0 2 4 6 8 10

Northwest facade
scale 1:200

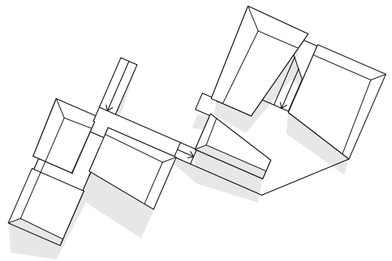
0 2 4 6 8 10

Interacting with nature

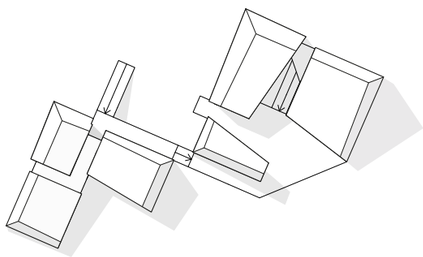
The surrounding nature has moulded the shape of the buildings.



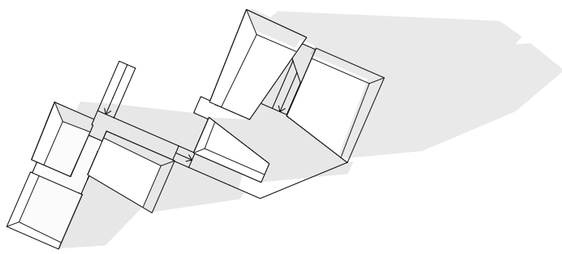
Solstice 21/12 9 o'clock am



Noon

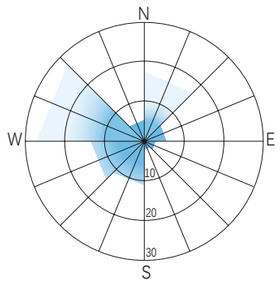


3 o'clock pm

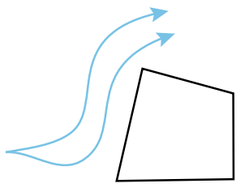


6 o'clock pm

SUN
During the summer when the centre is open, it is light 24 hours a day. The central square is exposed to sunlight throughout most hours of the day. The roofs are not shaded, which makes them suitable for solar cells.
Data source: Google Sketchup

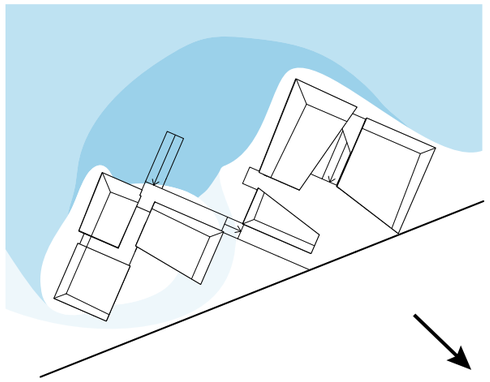


The prevailing winds come from northwest and northeast

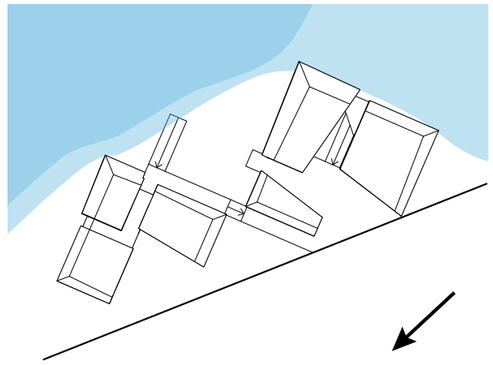


The walls facing the bay slant to reduce wind pressure

WIND
The configuration of the buildings forms a united exterior towards the bay. It creates a central wind-protected zone.
Data source: Autodesk Vasari

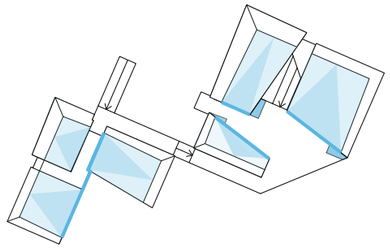


Wind coming from northwest



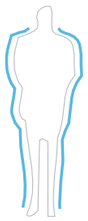
Wind coming from northeast

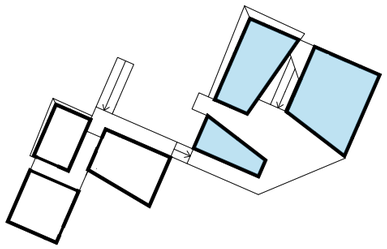
Strong Calm



Water is harvested on the slanting roofs

PRECIPITATION
The centre is shaped to collect water from the roofs. The precipitation is lead to heated gutters and collected in water tanks. The roofs slant to avoid snow from being accumulated. The buildings are lifted from the ground to make a small footprint and to allow snow moving under the structure.

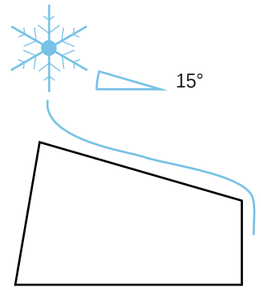




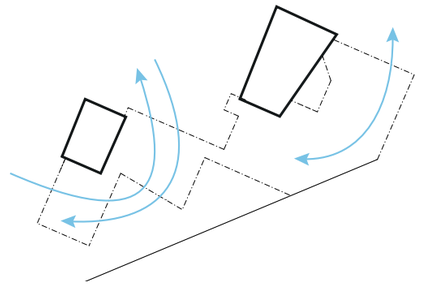
Heated
Unheated

TEMPERATURE
The centre is divided into outdoor space, weather protected space and heated indoor space. When moving around the exhibition the vistors become their own heat source in their polar gear.

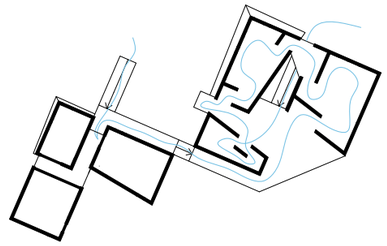
In the exhibition, parts of the facade slide inwards to create protected entry points. When the centre is closed the walls slide back into position and the centre becomes completly sealed.



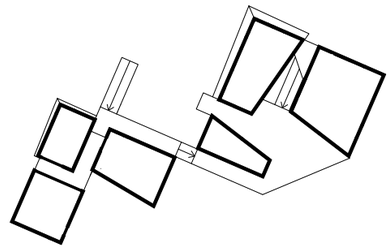
The roofs are angled 15° to allow snow to slide off



Snow can move under the elevated buildings



Open



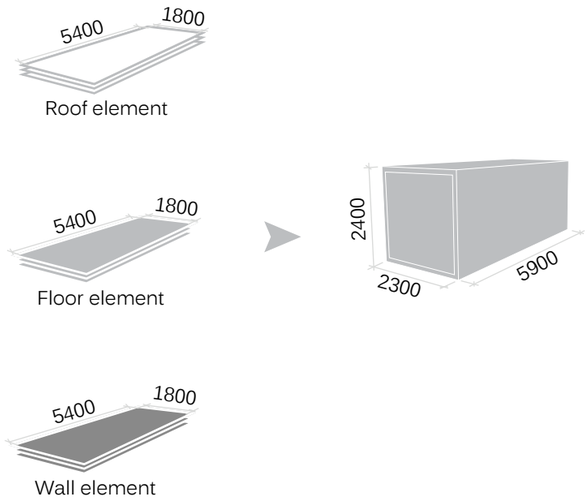
Closed

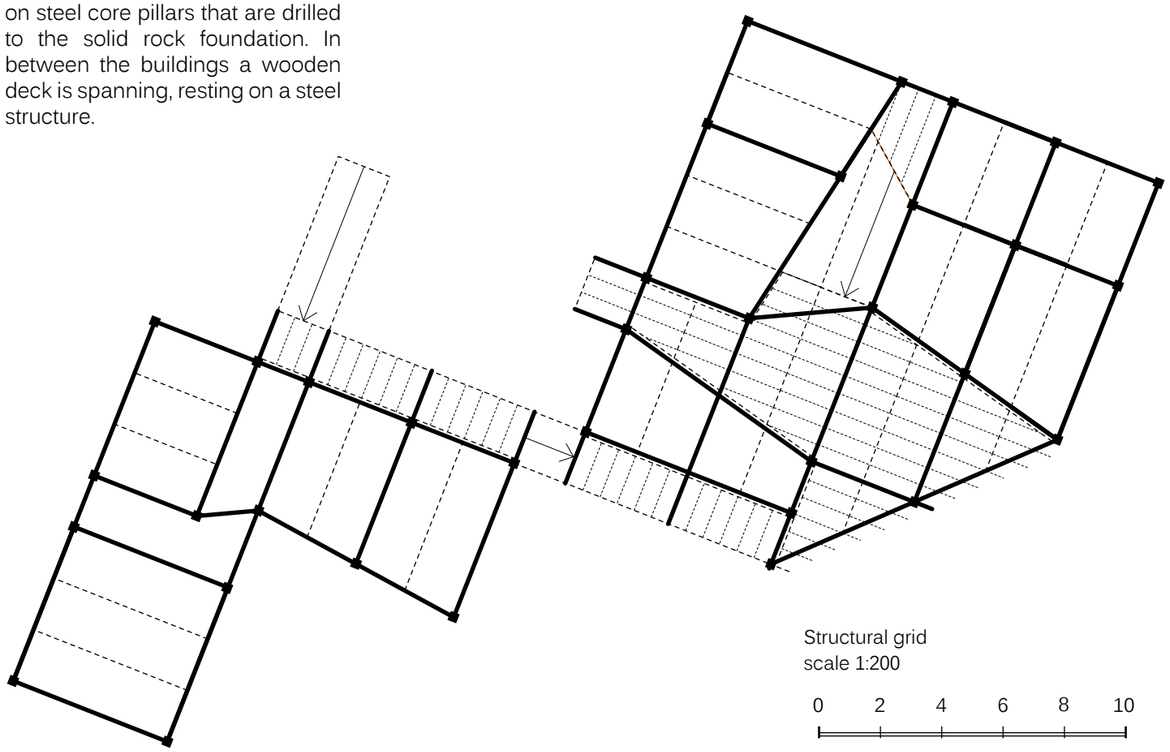
Construction

Limit in time for assembly, lack of infrastructure and size regulations for transport have set the frames for the construction. The visitor centre will be made of prefabricated elements, to improve the speed of construction on site and assure the quality of the components.

The sizes of the elements are shifting due to their specific positions and purposes. They are based on the dimensions of 1800 mm x 5400 mm, to fit in an ordinary container with extra space for loading and unloading. The elements are divided into floor slabs, pre-nailed walls and roof units.

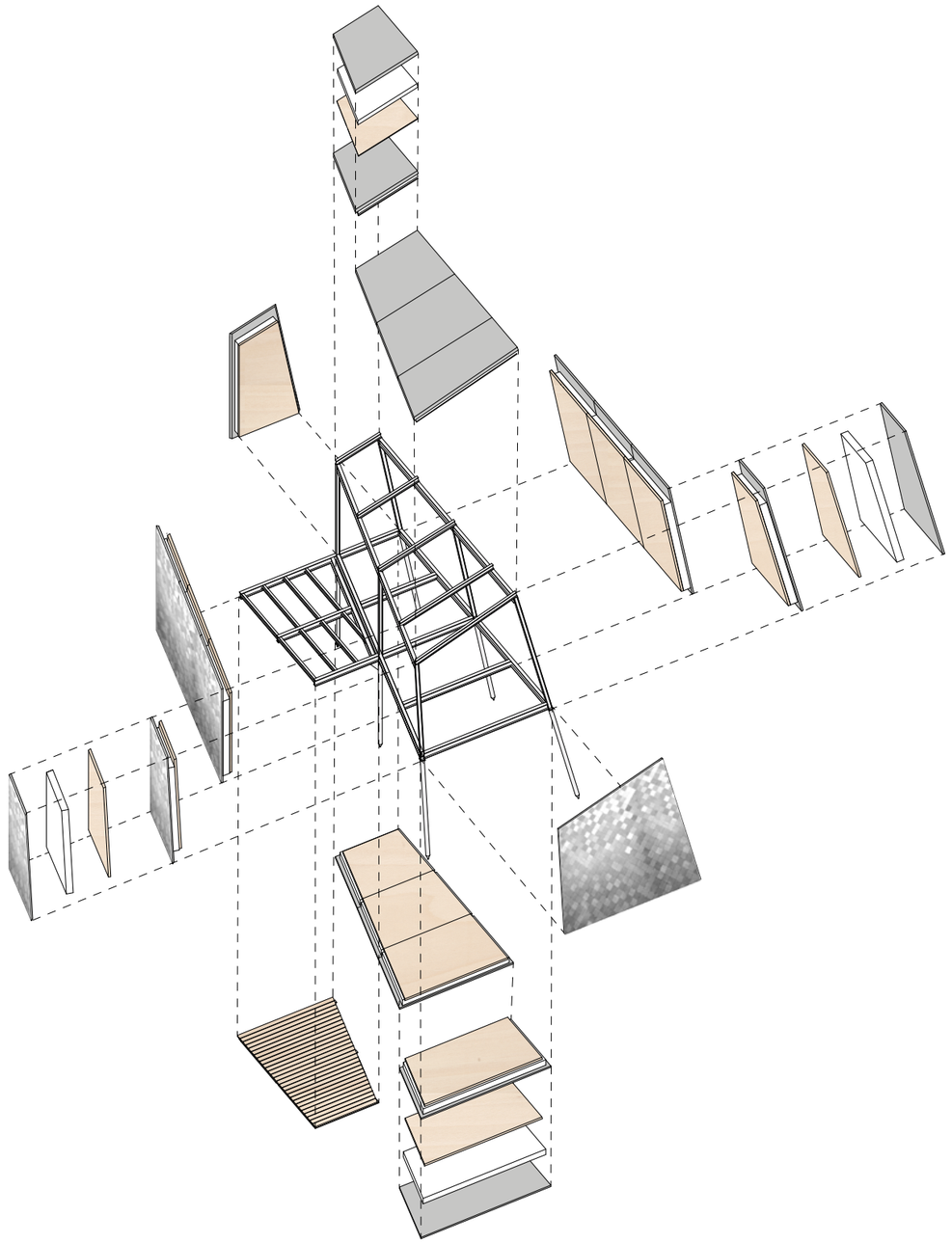
The structural grid explains the division between the prefabricated components. The components are connected to steel frames. The frame is built up by I-beams resting on steel core pillars that are drilled to the solid rock foundation. In between the buildings a wooden deck is spanning, resting on a steel structure.





Structural grid
scale 1:200

0 2 4 6 8 10



Exploded axonometric view,
building principle

Details

The visitor centre needs to be water and air tight to achieve efficient heat transfer and energy use in the cold climate. All the layers of the construction have their own significant function.

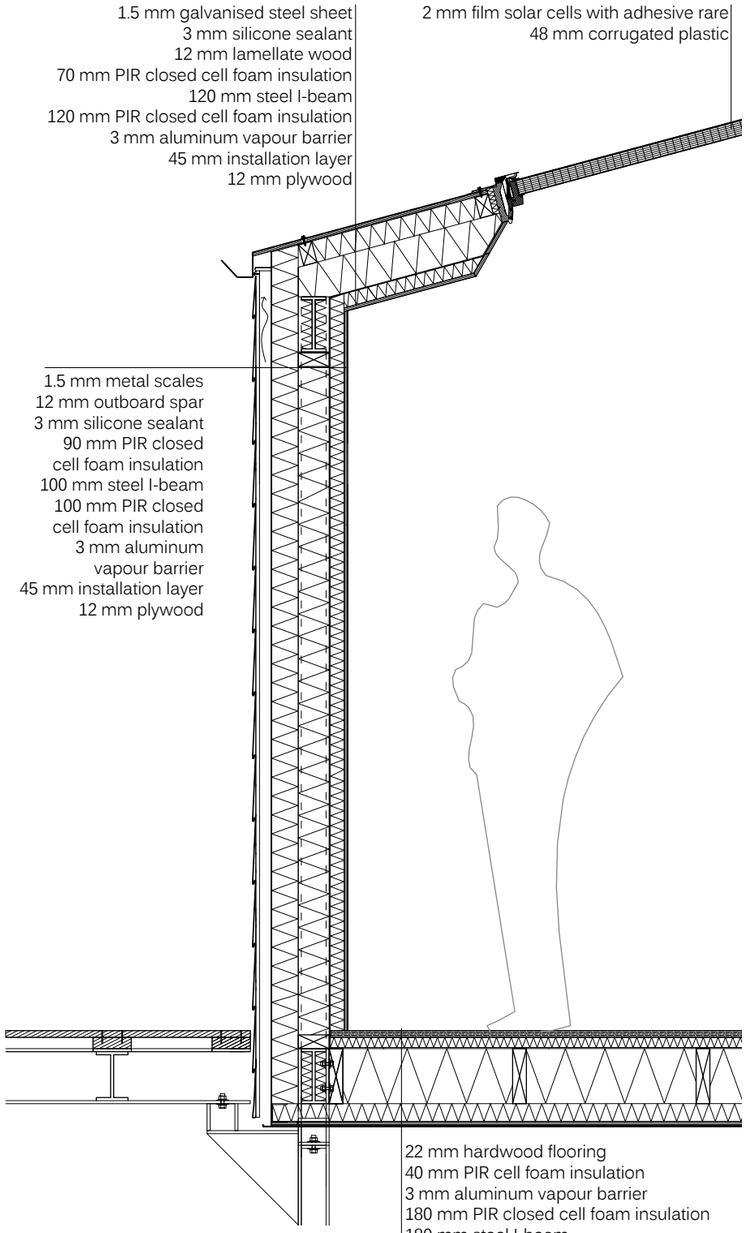
STAINLESS STEEL SCALES
Stainless steel is resistant to hard weather conditions and blends with the shifting colors in the landscape.

SILICONE SEALANT
Silicone is a tear resistant and tensile material. It is resistant to low temperatures and ultraviolet light. The layer of silicone sealant keeps the visitor center air and water tight.

PIR CLOSED CELL FOAM
PIR is a lightweight insulation that can withstand low temperatures without losing its insulating power. PIR has a high fire performance and does not melt. It does not absorb water or gets permeated by air which makes the material suitable for Deception Island's shifting climate.

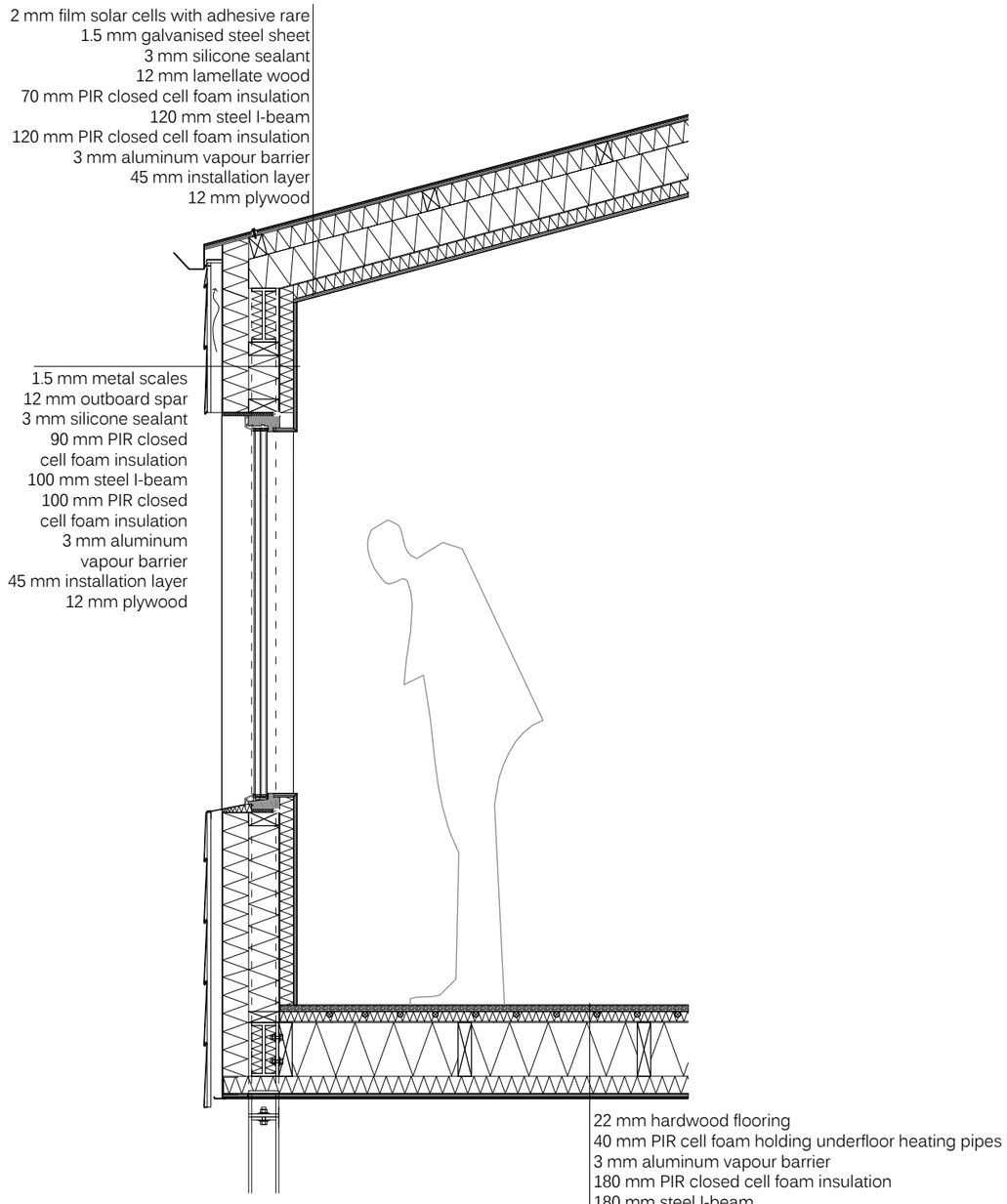
ALUMINUM VAPOR BARRIER
The aluminum barrier covers the entire structure. It protects the centre from vapor and gives structure to the building elements.

PLYWOOD
Plywood made from Argentinian pine is cladding the internal walls. The layering of the material makes it resistant to warping and is durable and easy to work with on site.



Vertical section, skylight and deck
scale 1:20

0 0,2 0,4 0,6 0,8 1,0



Vertical section, window
scale 1:20

0 0,2 0,4 0,6 0,8 1,0

Technical systems

Local resources and technical systems.

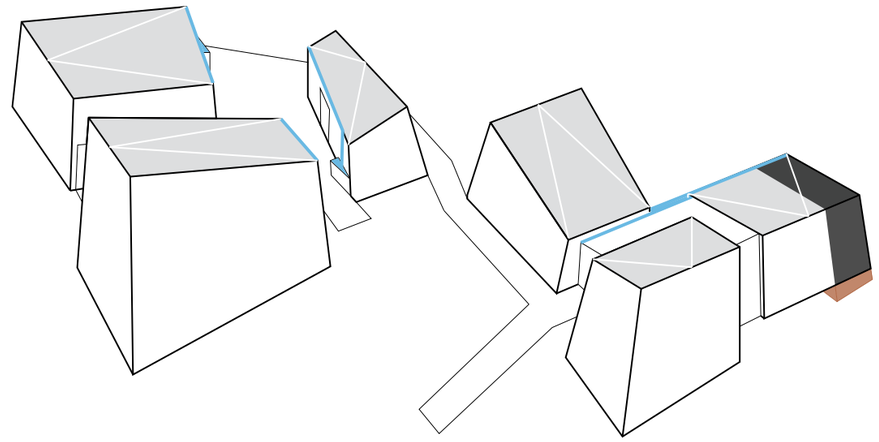
The aim is a visitor centre that is self-sufficient and benefits from local renewable energy sources. Deception Island's geological condition brings opportunities for geothermal energy. It will foremost be used for heating but could potentially be used as a source to generate electricity.

Electricity comes from photovoltaics. The high amount of sun hours during the tourist season provide a good opportunity to usilise solar power.

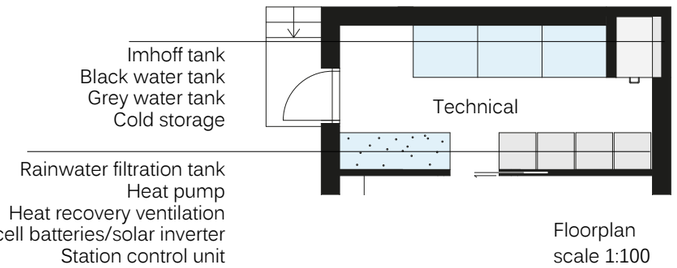
The clean precipitation creates possibilities to utilise the water. Snow and rain harvesting on the slanting roofs provide the centre with fresh water during the months when it is open.

All waste other than human and domestic liquid waste needs to be removed from Deception Island.[35] It is also prohibitied to introduce new biological material to the area.[36] These regulations make it difficult to take care of waste on site, since it eliminates the possibilities for composting and spreading the soil. The centre needs to rely on waste to be removed from the island through a coorporation with the tourist boats frequenting the area. There is a large garbage room where waste can be sorted and stored.

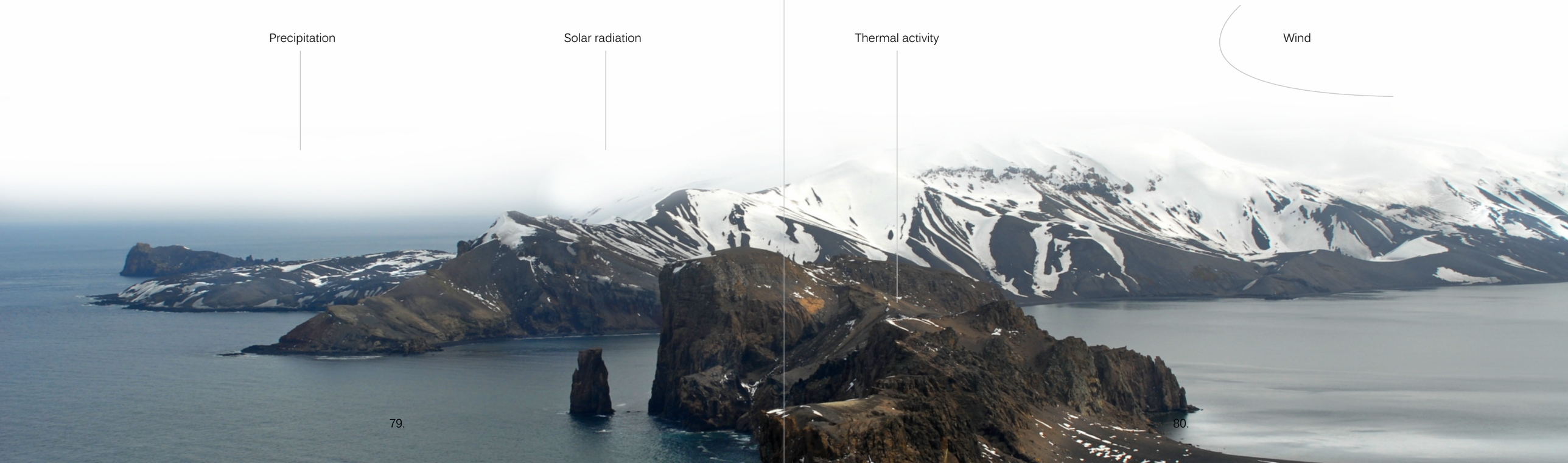
35 Deception Island Management Group, 2005, p. 10
36 Deception Island Management Group, 2005, p. 60



Geothermal heating
Photovoltaics
Water harvesting
Technical room



Floorplan
scale 1:100



Technical application

Strategies are presented as schemes of the technical systems. The calculation of the solar cell requirement is an approximate figure of the solar cell need on Deception Island.

Electricity and heat requirement

	Exhibition 120m²	Living area 105m²
Electricity	424 kWh/yr	2880 kWh/yr
Heatpump driven by electricity	-	4600 kWh/yr
Energy recovery ventilation system	-	600 kWh/yr
Hot water	-	486 kWh/yr
Heating	-	9530 kWh/yr
Total electricity need	424 kWh/yr	8080 kWh/yr
Total heat need	-	10 016 kWh/yr

Solar cell requirement

Calculation: [37]
Average insolation sun hours/year (kWh/yr/m²) x solar cell efficiency (%) = annual production kWh/yr/m²

Insolation Deception Island [38]	876 kWh/yr/m²
Solar cell efficiency [39]	10 %

876 kWh/m² x 0.1 = 87,6 kWh/yr/m²

1 m² solar cell produces 87,6 kWh/yr/m²

Annual electricity consumption	8500 kWh/yr
Solar cell need	97 m²

ENERGY REQUIREMENT

The energy requirement is based on the Swedish Energy Agency's calculation program.[40] The consumption is calculated on an energy efficient living pattern in a 105 sqm household with four occupants. The exhibition area will be insulated but not heated, other than from the visitors' body heat. The exhibition area will require electricity for lighting and apparatus of 425 kWh/year. The annual electricity requirement for the entire settlement is 8500 kWh/year and the annual hot water and heating requirement is 10000 kWh/year. During the winter time areas will be shut down for energy saving and tempered areas will be kept at low temperatures above 10° Celsius. The use of a high performing building envelope and a limited window area also saves energy. In the living unit the window area is less than 15 % of the floor area, which complies with passive house standards.

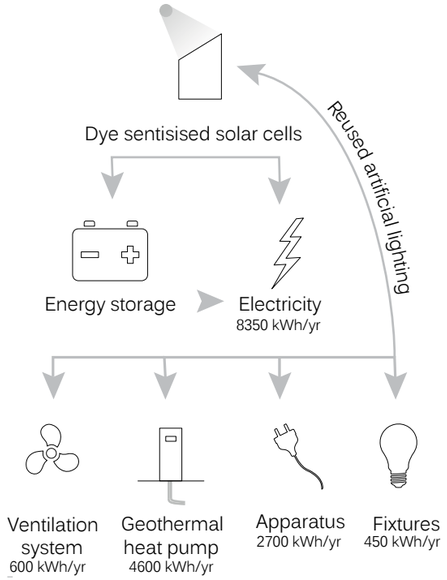
SOLAR ENERGY

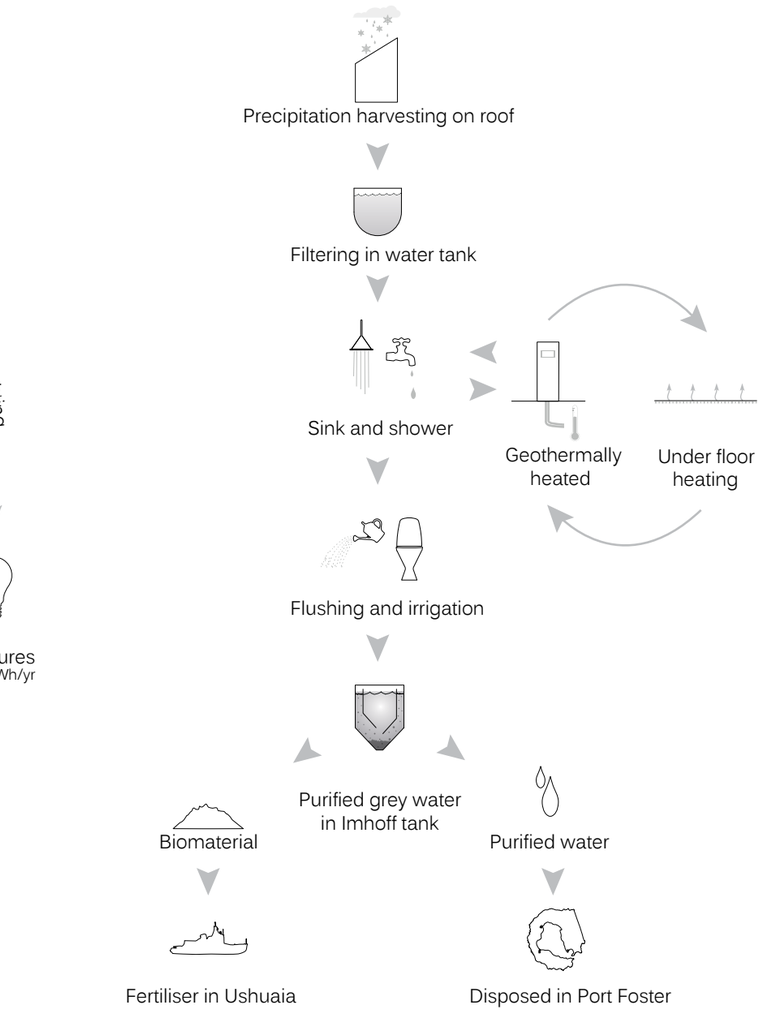
To meet the energy requirements the estimated need of photovoltaics is an area of 100 sqm. The roof area of 160 sqm is therefore covered by light weight thin film PV cells. The PV cells are dye sensitised solar cells, a technique that is developing. The dye in the cells mimics the photosynthesis, capturing the photons from the light and uses their energy to animate the electrons. The cells work in a wide array of light settings and are suitable during shaded and diffuse light conditions, without suffering from angular dependence of sunlight. They allow flexiblity regarding direction and roof angle.[41] It makes them suitable for the weather conditions on Deception Island. The electricity can either be used right away or stored in batteries in the technical room.

HEATING

The high degree of volcanism and shallow ground temperatures enable production of heat and power.[42] The heat is utilised through a ground source heat pump. Horizontal closed loop pipes run below the frost line to use the heat in the top layer of the earth's crust. Water and antifreeze is pumped through the pipes to the heat pump. The water is distributed through an underfloor heating system and pumped back to the heat source to reheat.[43]

37 Bengts nya villablogg, "Solceller - svar på vanliga frågor" available: http://bengtsvillablogg.info/2013/02/10/solceller-svar-pa-vanliga-fragor/, 2013, (retrieved 2015-04-15)
38 *NASA Surface meteorology and Solar Energy*, RETScreen Data, available: https://eosweb.larc.nasa.gov/cgi-bin/sse/retscreen.cgi?email=rets%40nrcan.gc.ca&step=1&lat=-62&lon=-60&submit=Submit, 2015, (retrieved 2015-04-15)
39 *GCell*, "Efficiency of DSSC", available: http://gcell.com/dye-sensitized-solar-cells/advantages-of-dscc/efficiency, 2015, (retrieved 2015-04-15)
40 *Energimyndigheten*, "Energikalkylen", available: http://energikalkylen.energimyndigheten.se/, 2015, (retrieved 2015-05-10)
41 *GCell*, "Advantages of DSSC", available: http://gcell.com/dye-sensitized-solar-cells/advantages-of-dscc, 2015, (retrieved 2015-04-15)
42 *Ecology global network*, "Geothermal Could Incite A Green Power Revolution", available: http://www.ecology.com/2014/05/16/red-hot-renewable/, 2014, (retrieved 2015-04-15)
43 *Department of Energy*, "Geothermal Heat Pumps", available: http://energy.gov/energysaver/articles/geothermal-heat-pumps, 2012, (retrieved 2015-04-15)



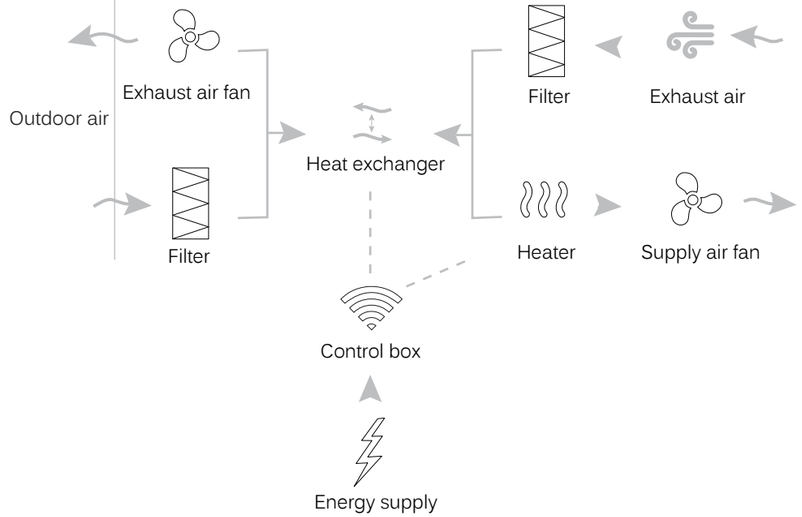


VENTILATION

The indoor climate is controlled by an energy recovery ventilation system. The air to air heat exchanger creates a cross flow between the outbound and inbound air. The entrance area in between the workspace and living unit functions as an airlock, keeping the indoor temperatures and air flow under control.

WATER HARVESTING

The slanting roofs direct precipitation into heated gutters and transport it to the watertanks. Water heated by the geothermal heat source is used for sinks and showers. The grey water is then used for flushing and growth chamber irrigation. Finally the water is purified in an Imhoff tank, where the biomaterial is seperated. The purified water is then disposed in Port Foster. The water supply might be scarse, but through water saving systems such as water saving taps and showers the need for water is reduced.



CONCLUSION

"Nature's themes are endless,
variety simply countless
Yet, the impact is singular
Thy pulses are thine alone "

- Ravi Panamanna,
Upon the lap of nature, 2010

Conclusion

// How can architecture be a tool for the connection between human and nature?

The visitor centre is interplaying with the presence of nature. Spaces are created for the visitor to observe certain views, to get sheltered by a hillside, to get guidance by light, to receive drinking water from precipitation, to move through contrasting natural elements and to get wind protection with transparent boundaries to nature. The series of architectural decisions along the exhibition are entwining human to nature.

// How can a visitor centre exist on Deception Island without making a large footprint throughout its lifecycle?

The issue is highlighted primarily in the construction and the technical systems of the buildings. The prefabricated elements facilitate and speed up the assembly. It will be easier to disassemble and move the elements after the building has served its purpose on Deception Island. Raising the structure on pillars minimises the physical footprint in the landscape. The day the building is removed the only traces left will be the holes from where the pillars used to stand. The use of sustainable and renewable resources provided by nature also reduces the structures impact on the site.

// How would the visitor centre contribute at a local level and in a global perspective?

On a local level, the visitor centre is a dignified way to reach out to the increasing amount of tourists visiting Deception Island and Antarctica. It contributes to the experience on site by giving the visitors a deeper understanding of the context. The visitor centre raises consciousness and attentiveness to elements in the surroundings, which otherwise might not have been noticed. The centre blends in with existing activities and movements on site, enriching the experience and the journey on the island.

In a global perspective the visitor centre informs about Antarctica's environmental importance and ongoing research within the field. The hope is to reach out to the tourists and engage them in preserving the area. As a result, the visitors may spread their experiences and knowledge further. Dissemination of information is an important tool for change. The information originating from the visitor centre will not alone ensure Antarctica's future, but it is one way to address the issue.

A potential satellite extension of the visitor centre is discussed in the following reflection.

REFLECTION

Despite the presence of tourism, Antarctica is a no-man's land where humans have to obey the power of nature. The absence of urbanity, culture and population make the addition of a structure to a sensitive subject. The sustainable and moral relation to nature has been a vital aspect throughout the project. The avoidance of leaving a large physical footprint while utilising local renewable resources have been fundamental factors integrated in the final design.

The moral relation to the site is expressed through the appearance of the structure. For architecture to act as the connection between people and nature, the structure must aid as an uniting part between them. The role of the visitor centre is to communicate nature to those who engage with the structure. The result is a conscious play between inside, outside, shelter and openness. The building is receding into its surroundings, as light changes with the seasons, time of day and weather. The projecting deck becomes a platform for a room in nature, where the side of the hill becomes a protective wall. Nature has set the framework for the design.

The blending with nature does not eliminate the risk of negatively affecting the site by the building's physical presence. The act of designing a structure in this desolated region is questionable, due to the impact of human existence in a setting ruled by wildlife. Perhaps the visitor centre could have been situated in another location, avoiding establishing a footprint on Antarctic ground. Conceivably architecture may be redundant to connect man to nature. The question has no unequivocal answer. Tourism has deteriorated other authentic locations when economical interests have been supplied. The visitor centre is inferior the natural experience and has not been designed as an architectural icon that would attract more tourists to the continent. It is designed to showcase the natural experience without outdoing its identity. It is primarily a tool to mediate nature, to create a representation of nature and to engage the visitor's senses in order to preserve nature. The visitor centre is calling the attention to what always have existed on site, but few might have sensed or noticed. It is vital that actors working to protect Antarctica's genuineness run the visitor centre. Furthermore, it is important that the regulation of the amount of tourists allowed to visit Deception Island is upheld.

FUTURE VISION

The vision of the visitor centre is to re-establish an emotional connection between man and nature. Despite the increasing number of tourists visiting Antarctica, there are still few people who have the economical possibility to travel to the continent. It is important to give the limited amount of visitors a comprehensive and holistic picture of the location for them to spread further. Still, the limited visitors who are spreading awareness of the continent might not reach out to a broad global perspective. A future complement could be to spread awareness through pavilions, having a similar function as the visitor centre but strategically positioned globally on urban public spaces. It would highlight the presence of the polar regions and eliminate the need to travel far. They would spread hard facts from Antarctic research stations and mediate senses through artwork and live streaming from Deception Island. Similar to the visitor centre, the vision would be to generate consciousness and potentially help reducing the increasing emotional distance to nature.

METHOD AND PROCESS

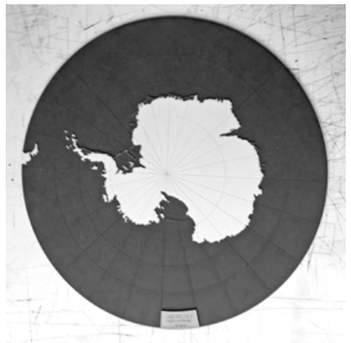
The thesis has been the focus of our attention for several months. Our minds have been on the other side of the Earth. The choice of making a master thesis based on a project in an unfamiliar context has been a challenge as well as a motivation. It has generated interesting discussions, readings, explorations and experiments. Research has not consistently been translated directly into material for the report, but has played an important role in the process and the design. We have learnt a lot by challenging ourselves and by talking to people from different proficiencies. The unique location has resulted in an insight of fields that previously were unknown to us.

When we started the project we could not have imagined the final result. A part of the process has been to shape and program the assignment. Exploring and understanding the site has been crucial in order to decide what would be suitable and possible at the location. The process has not been linear. The project has altered many times, from a shelter to an 800 square metres research station. It would have been more undemanding to start with a specific site, task and program. If that would have been the case, we might have reached further into detailing aspects that are presented as strategies in the thesis. However, the process and project would probably not have been as dynamic.

Working with Research by Design means that the design process has been put in focus. We have used the physical model as an important tool in all stages of the design. It has been an efficient way to visualise, process and discuss ideas, especially when working in pair. Design approaches and strategies that we learnt through research and literature have been tested, evaluated and modified in the design. Further on in the process, they have been crosschecked back to the initial source, making us do well-founded decisions. Through this method we wanted to connect to the site and its natural elements. Aspects such as wind, sun and precipitation have been incorporated in the design as well as in the technical systems of the building.

Throughout the process we have faced situations where different factors have contradicted each other. The most material and energy efficient alternative would be to build a spherical building with little connection to the outside. This was not our aim. The main question has been to explore the connection between man, nature and architecture. Design decisions based on this exploration has sometimes been at the expense of other factors. The project could have been based on a technical approach, focusing on systems and technical solutions. We wanted to put the architectural experience in focus, with strategies regarding construction and technical systems as complements. The intention has always been to find a balance between these aspects.

Even though the probability of us designing a project in Antarctica in the future might be limited, we have learnt valuable lessons to use in our future work as architects. When challenging ourselves and approaching the unfamiliar and extreme context of Deception Island we have been forced to constantly question our usual way of thinking. This will be important in forthcoming work when approaching tasks to find new creative solutions.



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IN THE ARMS OF ANTARCTICA

A visitor centre on Deception Island exploring the interaction between human and nature.

The identity of Antarctica is in its wilderness and nature, in the subtle and calm and its great power. It is a setting that humans not have been able to conquer; with this comes its uniqueness. Nevertheless, the wilderness of Antarctica is destructible and a mirror of human activities.

How can architecture be a tool for the connection between human and nature? This is explored through a visitor centre on Deception Island, where the aim is to enlighten and portray Antarctica and its environmental importance. The vision is to connect tourists to the Antarctic environment in order to evoke a will to preserve the area.

The visitor centre grows from the obstructions and qualities of its context. The ambition is a self-sufficient structure that leaves a minimal footprint throughout its lifecycle. The aim is to create an aesthetically stimulating place to visit by rendering nature through architecture. Nature sets the framework for the design. The structure is a tool to mediate nature, to represent nature and to engage the visitor's senses in order to preserve nature. It is a conscious play between inside, outside, shelter and openness. The result is a visitor centre that enriches the journey on Deception Island.