EYES OF RUNAVIK

How can we create an innovative, sustainable living environment and a new architectural typology that has a steep slope as a crucial living condition?

In other words - can we establish an architectural concept for a sloped terrain so strong that it simply would not work on flat terrain?
And in doing this finding an unique faroese architetural language.

NORDIC BUILT
Made in collaboration across three Nordic countries, this proposal to the Vertical Challenge has been developed in the spirit of Nordic Built.

We are a multidisciplinary team of architects, an engineer specialised in building in extreme landscapes, a sustainability expert and a landscape architect. Merging urban life with nature in a sustainable building concept, the proposal answers the dream of many modern families to obtain a sustainable lifestyle, and a new quality of life, based on Faroese tradition and modern technology.

TEAM

Main contractor:	
Architect & Urban Planner	White Arkitekter, Copenhagen
Sustainabilty & Landscape Architect	White Arkitekter, Stockholm
Sub-contractor:	
Structural engineer	DIFK, Oslo
Sustainability engineer	Rambøll, Denmark
Modular construction	JNESpace

SUMMARY / CHALLENGE & AMBITIONS

CONTEXTUAL INNOVATION
For us minimal impact starts with understanding - understanding the conditions, accepting them as they are, and getting the absolute best out of this understanding - not by compromising the identity of 'the place', but by making it stronger!

This has been our goal from the very beginning.

We asked ourselves - how can we create a living environment and an architectural typology that has a steep slope as a crucial living condition?

In other words - can we make a architectural concept for a sloped terrain so strong that it would not work/simply fall apart without the slope on a flat terrain?

Actually changing the perspective on the slope from being annoying and a problem into it being a absolute living condition for the architecture.

And in doing this finding a unique faroese architectural language.

EYES OF RUNAVIK
The Eyes of Runavik is a new and innovative landmark building typology adaptable to a variety of steep terrains and specifically designed for the climatic conditions of the Faroe Islands.

Aiming to achieve the 'lightest touch' possible on the natural landscape, the project is a low impact and highly sustainable development. The project aims to achieve high standards of economic, social and environmental sustainability and become a landmark for future constructions.

ECONOMIC SUSTAINABILITY
The row house typology is much more cost efficient than building single villas, due to the small footprint and less thermal envelope. Prefabricated modules will have mass-production benefits. Effort has been put into reducing the amount of materials needed, which benefits both economic and environmental sustainability.

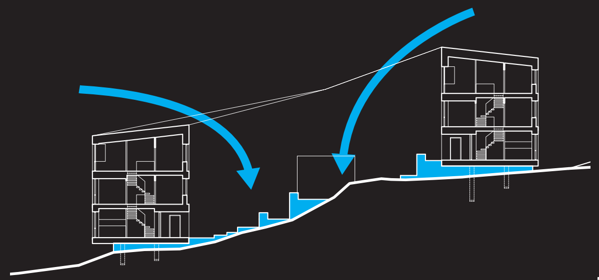
ENVIRONMENTAL SUSTAINABILITY
Choosing renewable resources for construction, insulation and energy production, and reusing water, the environmental impact is minimized. With almost no blasting or excavation, nature is preserved in the highest amount possible and the original biodiversity is promoted.

SOCIAL SUSTAINABILITY
Being surrounded by nature and natural materials, resident's health is promoted through fresh clean air, daylight and excellent indoor and outdoor climate.

The communal bøur and green houses provide socially sustainable common spaces to meet and gather. The layout of the masterplan inspires a healthy and active lifestyle, with feet as a means of transportation and possibilities to interact with neighbours and friends.

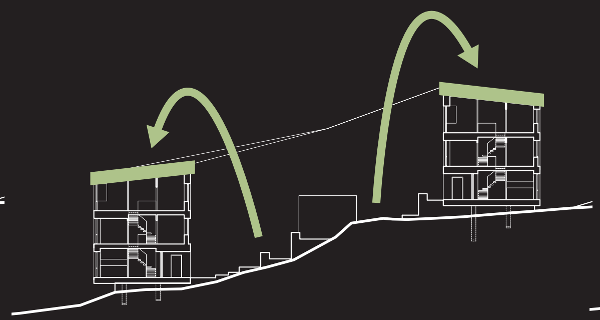
CONCEPT / BUILDING FROM THE CONTEXT

BASALT ROCK



Reclaimed basalt rock is taken from the local building sites and used, alongside metal spikes, to create the stepped landscape within the bøur. A similar technique is used for the road construction.

MOSS

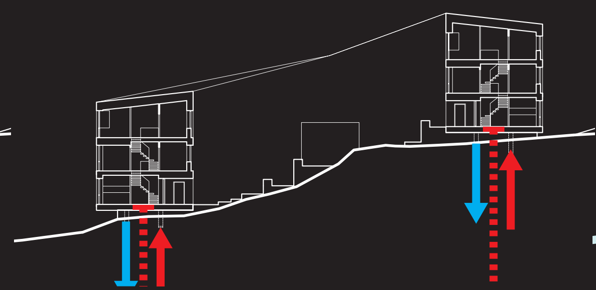


Local moss and grass is used as a roof cladding material to create a unified ring around the structure. Echoing historic local building traditions the moss aids with insulation whilst capturing rain water.

SHEEP

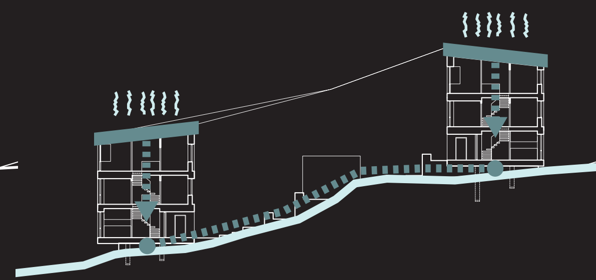
Local sheep's wool is used as a sustainable and high performance insulating material for the façades of the dwellings.

BEDROCK



Geothermal cores are bored into the ground of the building, thus minimising the impact on the landscape whilst bringing the heat directly up into the service core.

WATER



Harvesting the water from the streams at the steepest point of the slope and running it through the core to provide grey water for the dwellings. Additionally rain water is harvested from the roofs of the dwellings.

Sustainable solutions are closely linked to the context.
In most cultures, learning from pre-industrial traditional building style is a good lead on what would be sustainable in these exact conditions. In this Runavik proposal, these contextual findings are merged with modern knowledge and technology to meet the demands of society and create the smart, sustainable and liveable city of the future.

Buildings within the Faroe Islands are traditionally placed on stone foundations, to simultaneously counteract the steep slope whilst allowing the heavy rain water to flow through off the mountains and below the buildings. Our proposal employs new construction techniques with minimal foundation, providing attributes similar to the traditional method, whilst allowing the nature to flow underneath the structure.

A NEW LANDMARK TYPOLOGY BETWEEN SETTLEMENT AND OUTFIELD

Drawing inspiration from traditional Faeroese agriculture, the project explores historical modes of farming and settlement, where the outfield, 'hagi', is used for summer grazing, whilst the cultivated land, 'bøur', is generally used for growing crops.

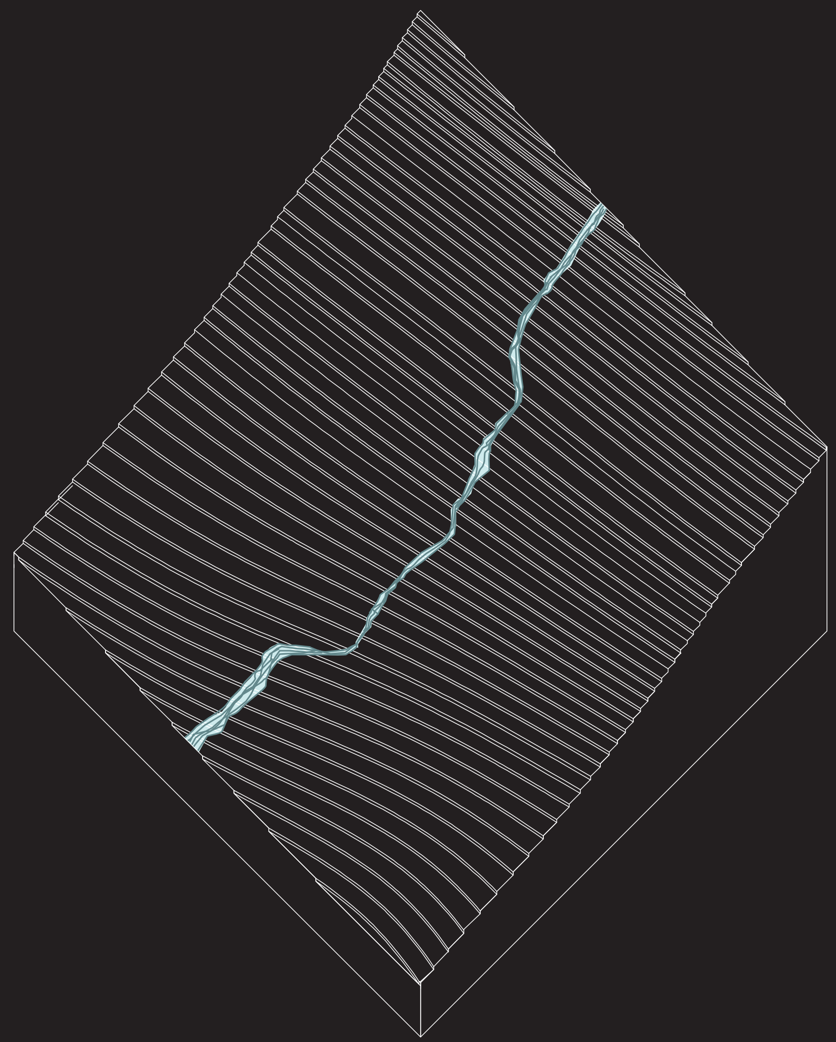
The project applies these concepts of land usage to establish a harmony between nature and the man made. Each building ring - or 'eye' - can be seen as a settlement in itself, with the outfield 'hagi' as the wild landscape all around, and the infield 'bøur' as the cultivated microclimate in the centre that serve a new kind of social space for people on the Faroe Islands.

MAKING USE OF THE EXISTING SITE

The proposal is a direct composition of its local context. By making use of the local resources (basalt rock, water, wind, geothermal heat, vegetation and sheep wool), the buildings and road infrastructure become highly sustainable; they are harmonious with both the local architecture and the surrounding nature.

CONCEPT / SETTLEMENT

INVESTIGATE

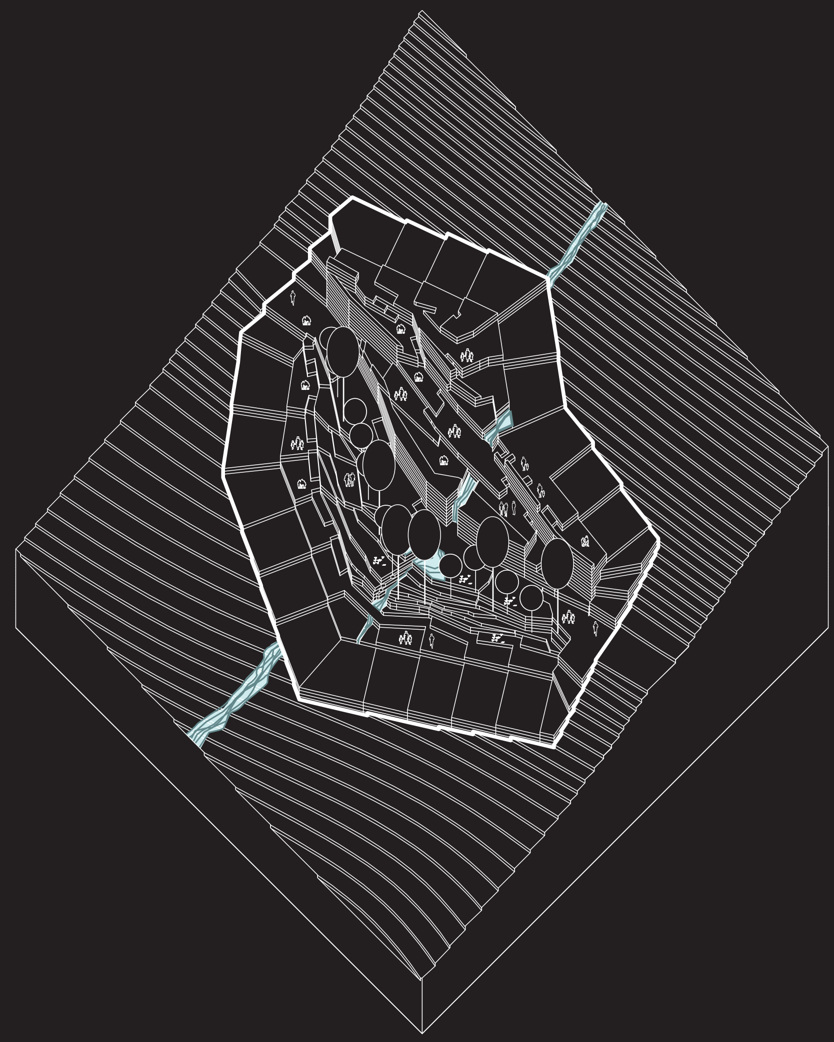


HAGI

BETWEEN THE ‘HAGI’ AND THE SETTLEMENT
The project simultaneously draws from the vastness of the wild landscape and the inherent singularity of the individual dwelling, thus generating a new building typology that lies between hagi and settlement.

By grouping the singular dwellings together and wrapping them under one elevated green roof, the project fits seamlessly within this in-between zone. In contrast to the interior microclimate, the outside of the settlement is left as untouched as possible, letting the wild nature envelop the settlements and come all the way to the front door.

CULTIVATE

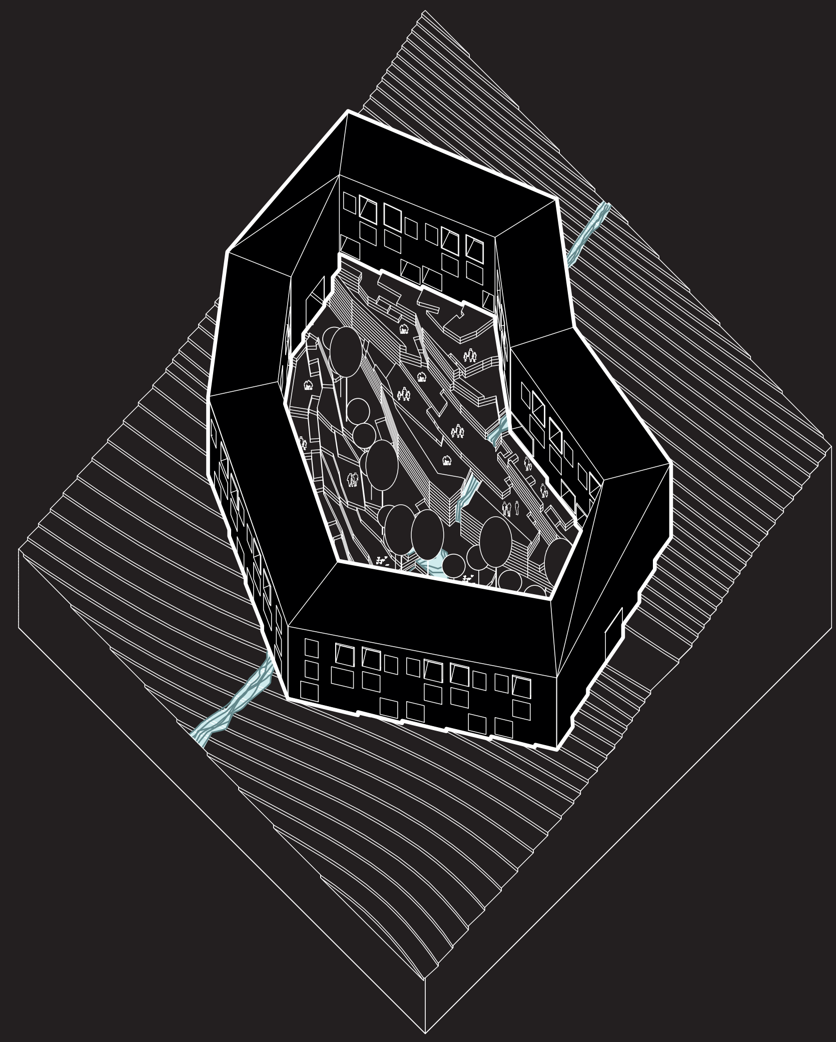


BØUR

CONTAINED MICROCLIMATES - THE ‘BØUR’
Trees and crops generally have poor conditions on the Faroe Islands, but locally, where housing is dense, trees can grow in gardens where the microclimatic conditions are present.

This is the starting point from our proposal of groups of houses around a central space, which can be lush and have fruit trees and crops in contrast to the vast landscape, hagi on the outside.

PROTECT

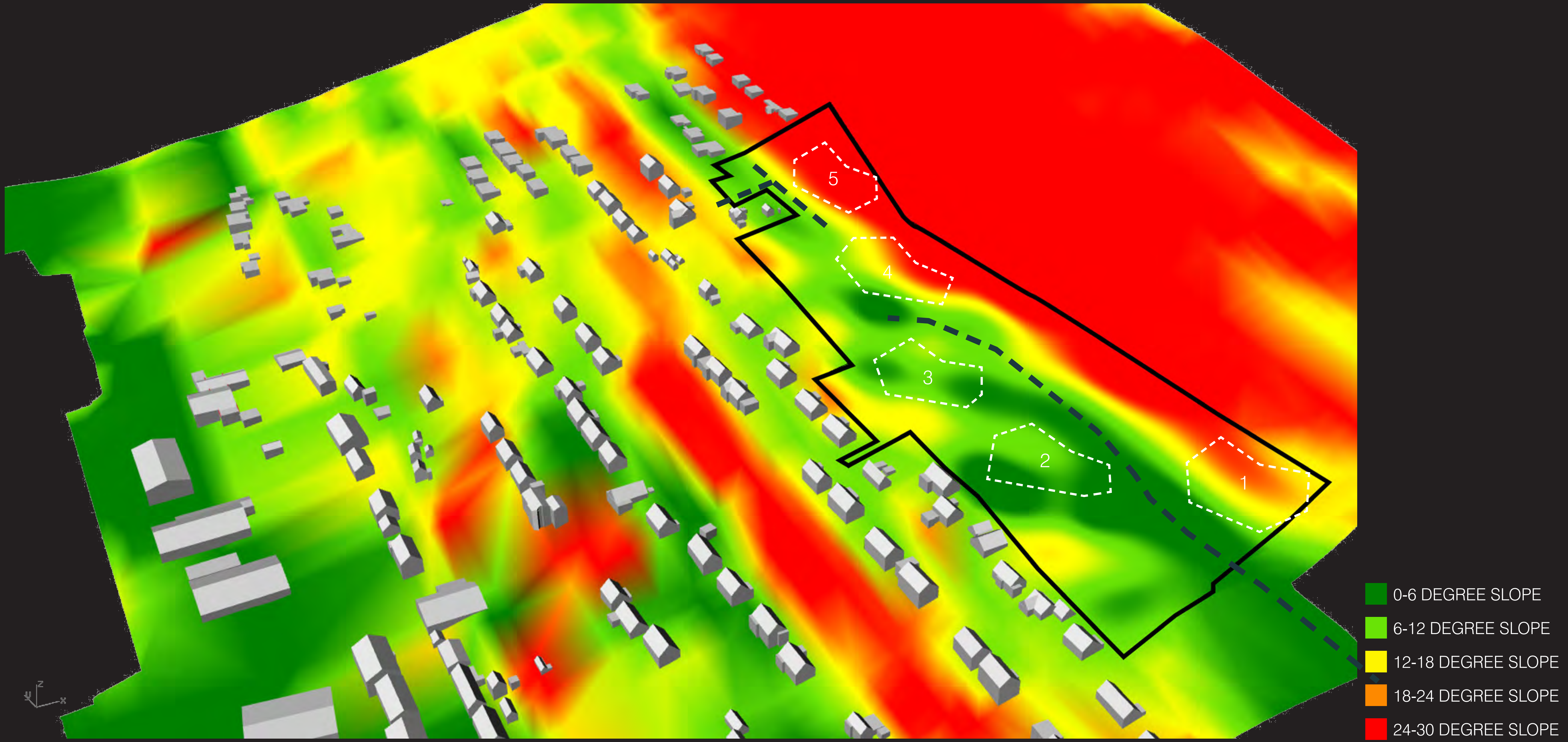


SETTLEMENT

SOCIAL INNOVATION
Single row house dwellings are grouped together, creating a greater density, and formed into the shape of an eye, generating the protected ‘bøur’ on the inside.

These internal microclimates become a new type of active spaces for social interaction and enable daily life for the residents to take place in an environment protected from the harsh winds on the Faroe Islands.

CONCEPT / SLOPE ANALYSIS



KNOWING THE TOPOGRAPHY
Planning the site will start with a 3D scan of the terrain and geometrical analysis of the plot, to find the optimal road path that creates the least impact based on excavation, backfill, ground conditions and underlying sewage pipes.

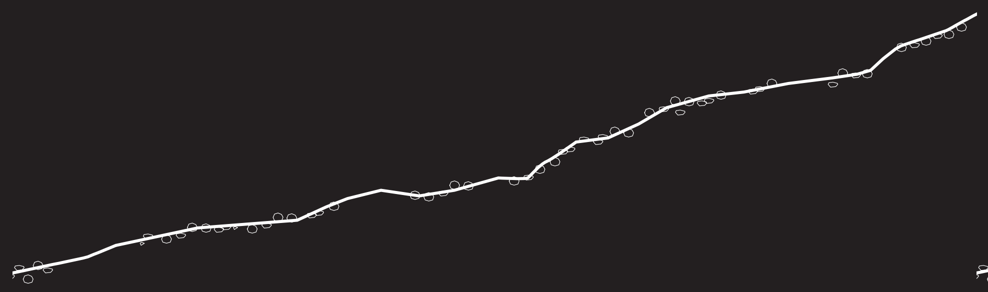
The aim is to minimize excavation and explosion, but of course considering that a minimum steepness and minimum curve radius need to be maintained for safe traffic.

After the least impact path is found, the situation of the dwellings is defined, and will in this way adapt directly to the hillside.

Consequently, arranging the dwellings and roads within the landscape is a result of the slopes and ground conditions to minimize rock excavation.

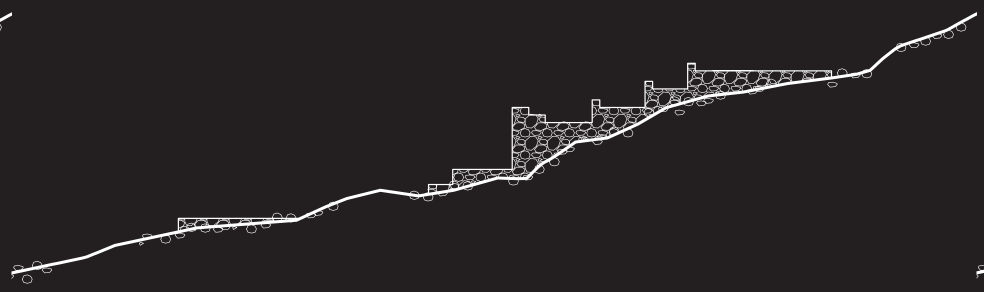
The layout follows optimisation with respect to the terrain. Generally speaking, roads and circulation stay to areas with small slopes and housing is placed in areas with steeper slopes.

CONCEPT / MINIMAL IMPACT



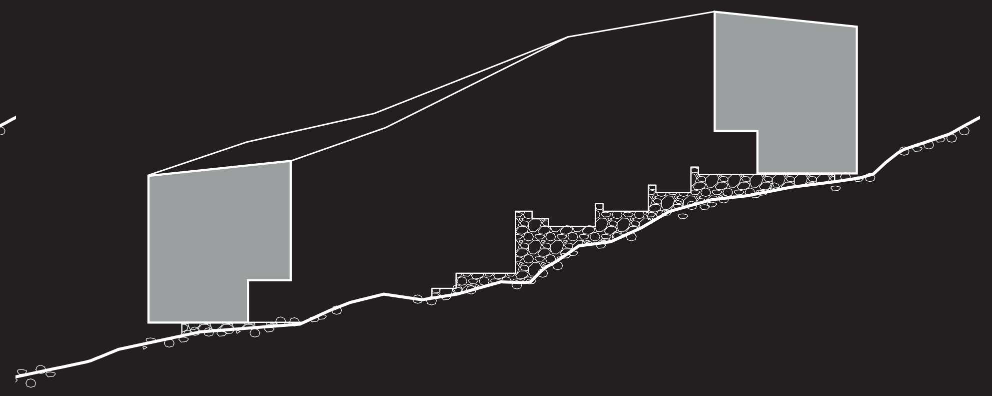
NATURAL LANDSCAPE

MOSS & TOPSOIL OVER BASALT ROCK



CULTIVATED LANDSCAPE

BASALT ROCK LAYERS



THE EYE

WOODEN RING

MINIMUM EXCAVATION OR EXPLOSION
The construction method for the dwellings allows them to cope with the terrains steepness.

The levels of the dwellings can be adapted to the steepest land-scape within the plot. Excavation below the dwellings will not be necessary at large and is limited to trenches for utilities.

BASALT ROCK
The project makes use of the excess waste basalt rock which is a by-product of blasting on the local construction sites.

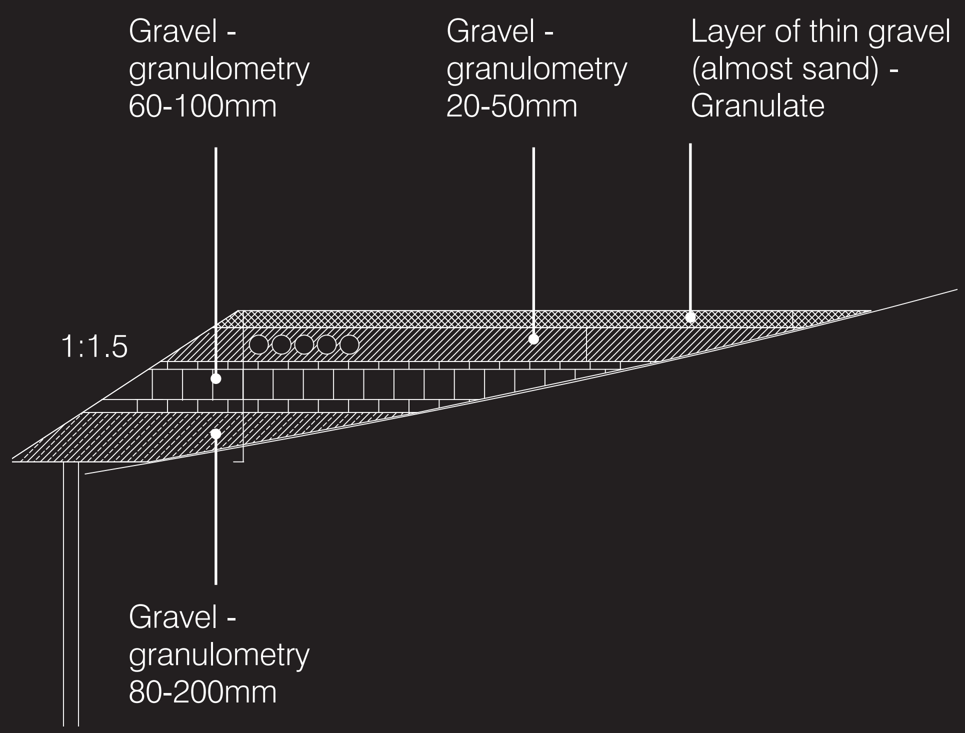
All over the Faroe Islands you can find large piles of left over basalt rock from other excavations. The rocks are used for roads, pathways and for soundproofing the wooden slabs in the buildings.

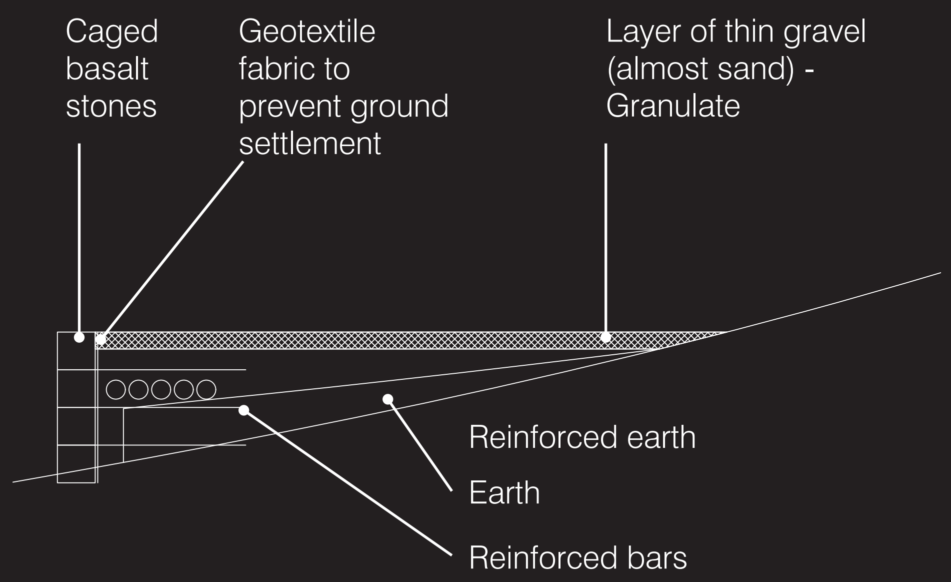
WOODEN RING
The enclosure is formed out of a light wooden element, with warm tones blending seamlessly into the natural landscape. The wooden element, provides a contrast to the heavy basalt rock on which it is placed.

ROADS & PARKING
Road principles are based on minimum environmental impact as well and two main road profiles could be used.

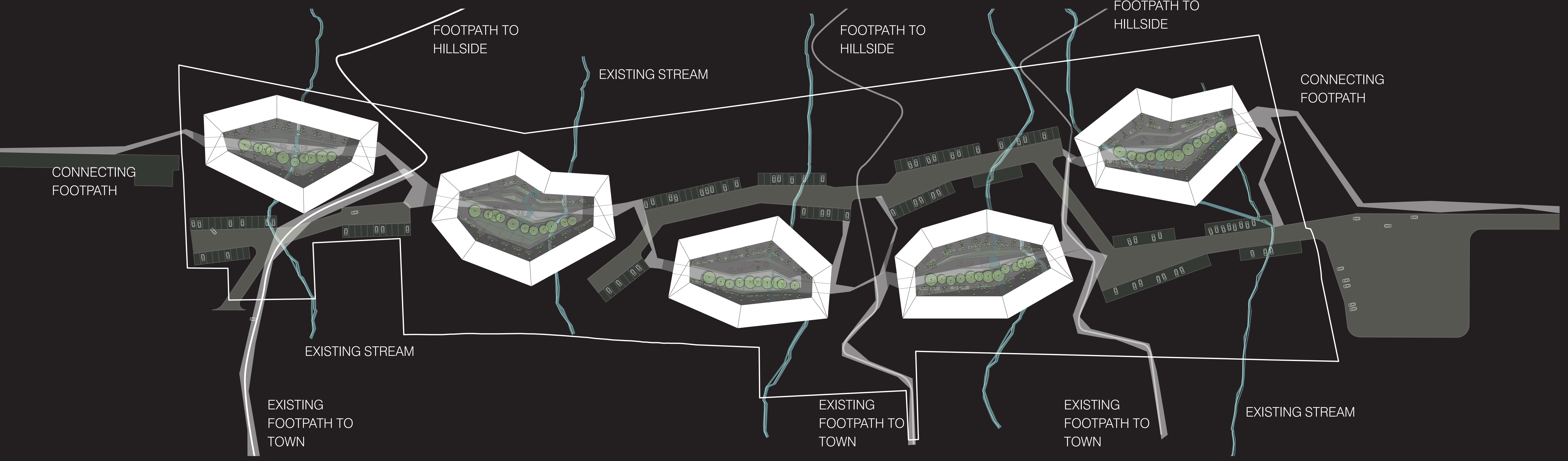
The first one in cheap and easy to build but needs space. It consists of a talus process using a 1:2 slope ratio. Road is built on top of several gravels layers with different granulometry.

The second one can be used in steep locations when space is miss-ing. Basalt caged stone are used to have a vertical wall. Here the road is standing on top of reinforced earth and a geotextile is used to prevent ground settlement in case of heavy rain.

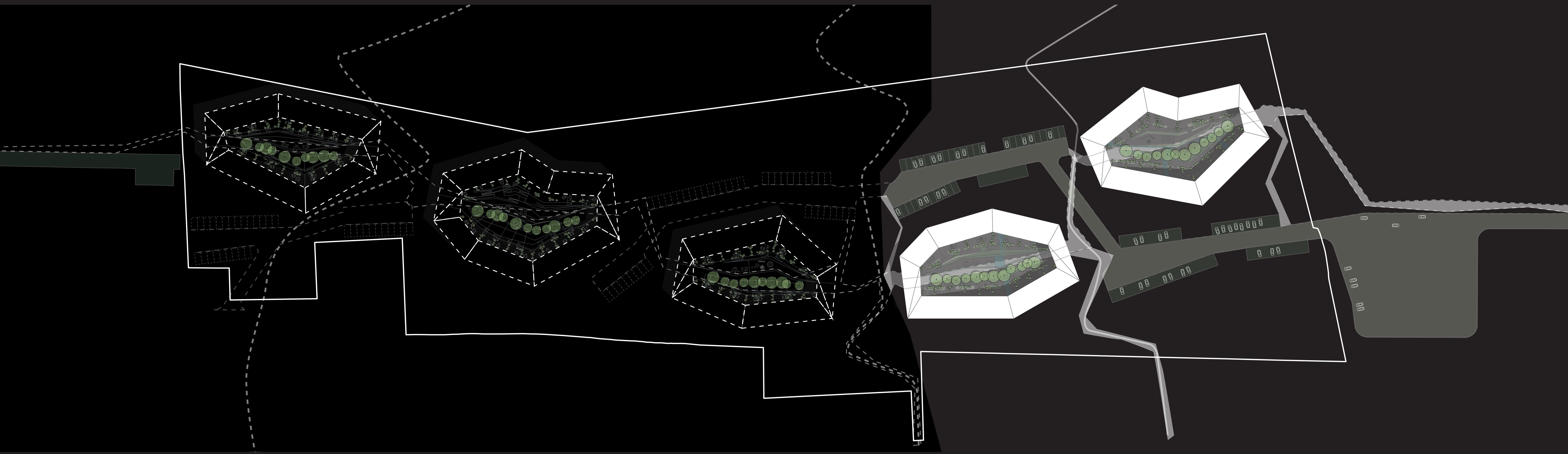




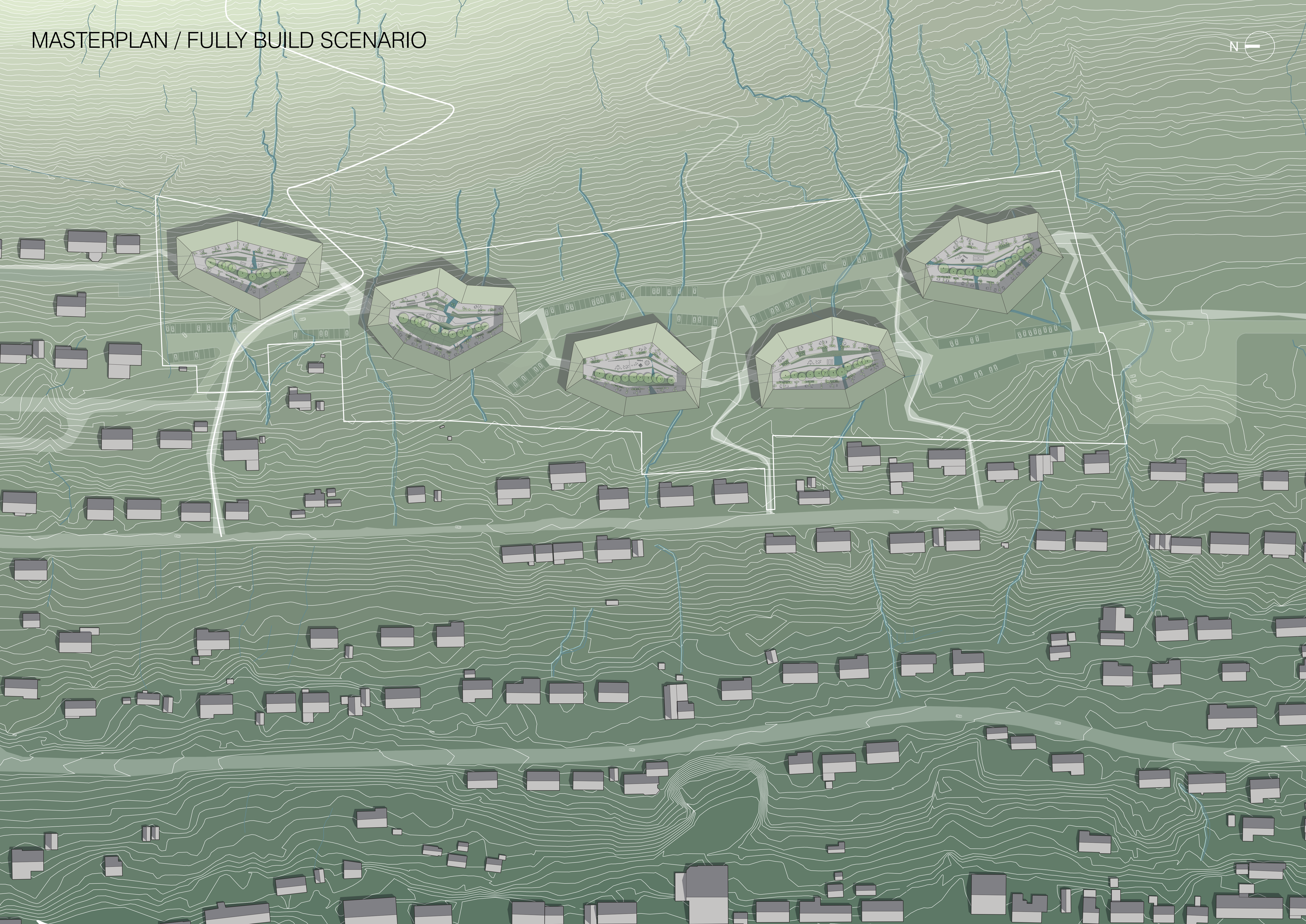
MASTERPLAN / CONNECTIONS



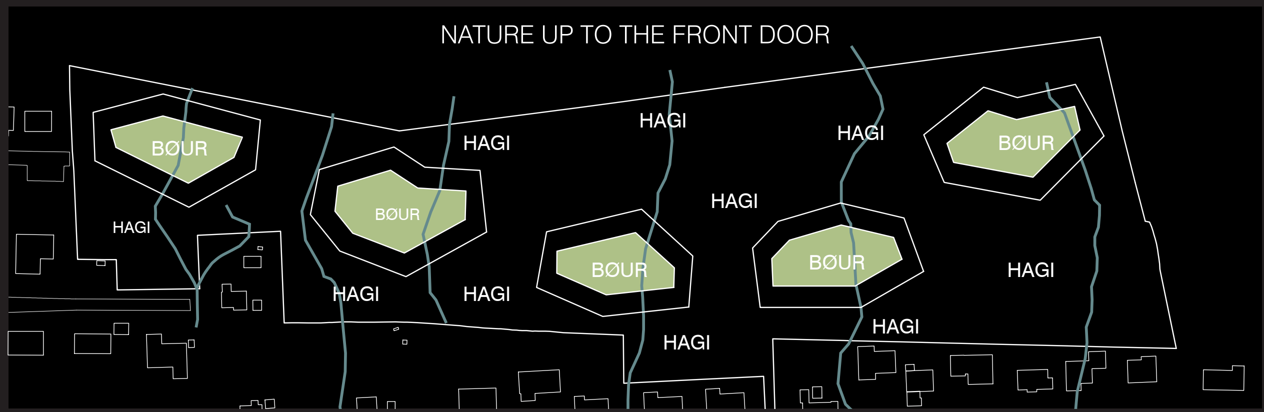
MASTERPLAN / BUILDING PHASES



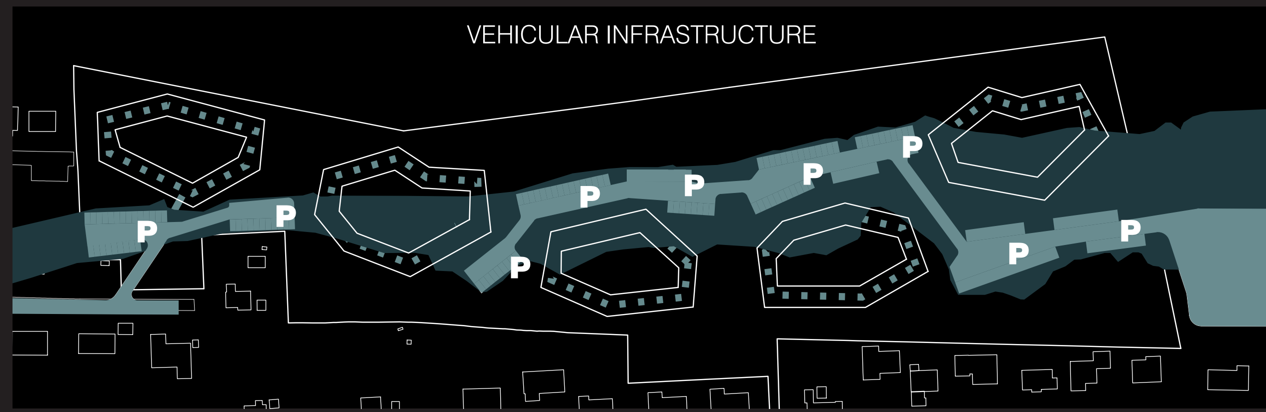
MASTERPLAN / FULLY BUILD SCENARIO



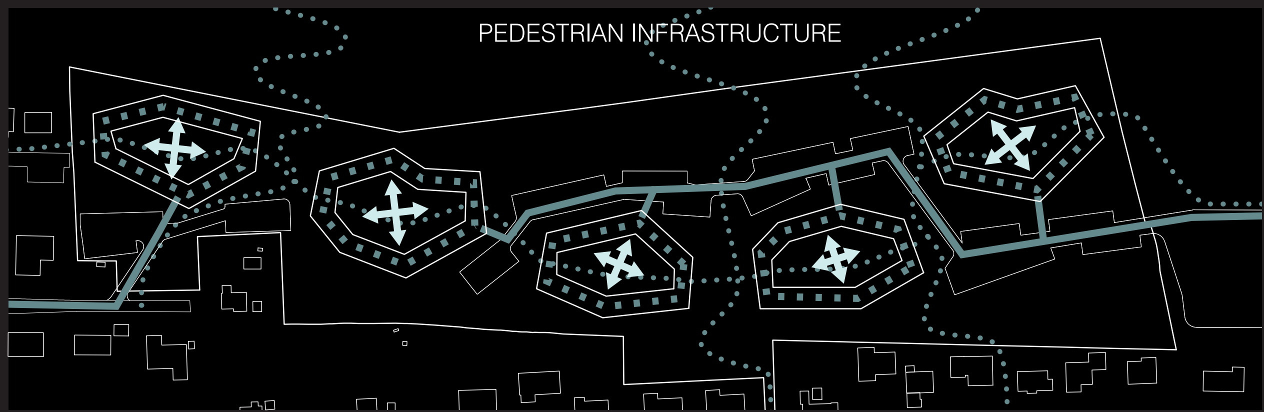
MASTERPLAN / CONCEPT



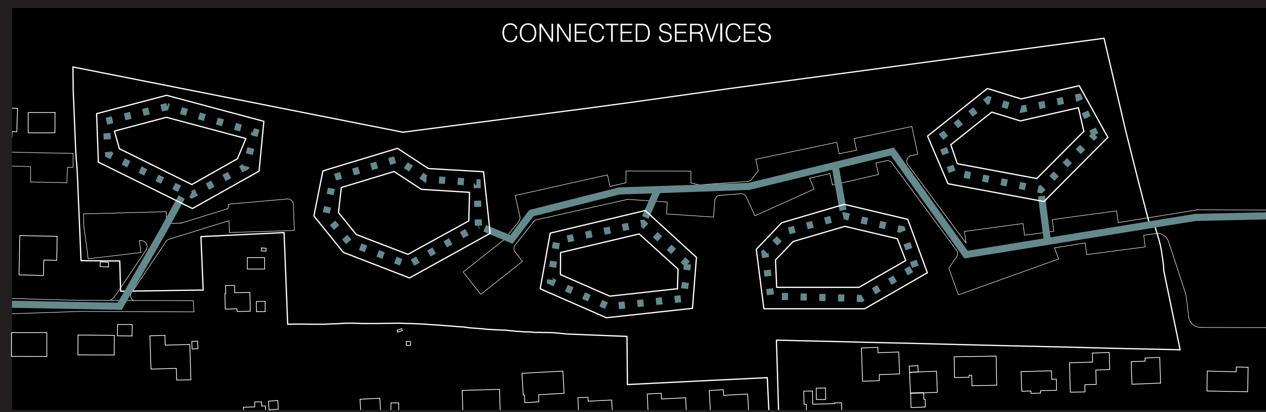
Enclosed ecosystems (bøurs) on the inside of the settlement, wild nature (hagi) on the outside.



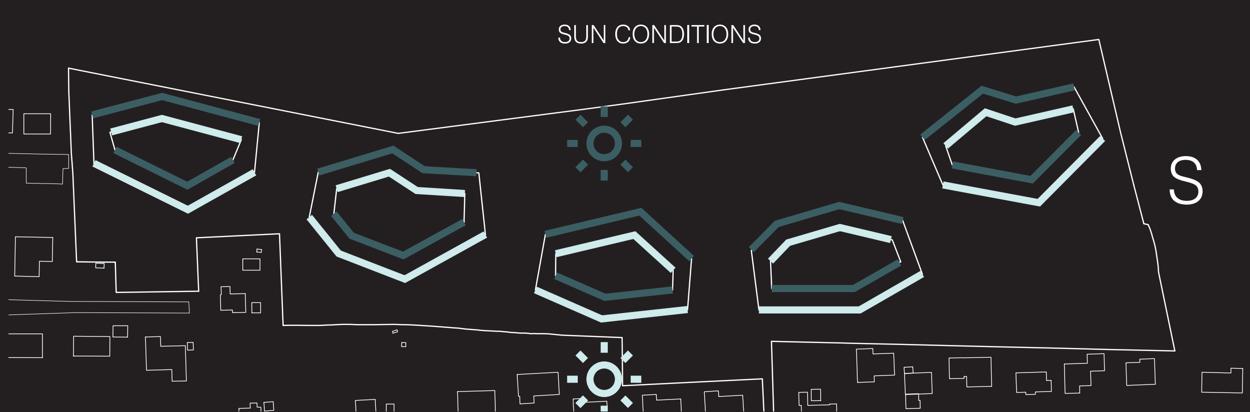
The shallowest part of the slope is assessed (grey) and the roads and parking are built within these limits to minimise excavation and backfill. Access from the North and South.



A continuous pedestrian route connects the interiors of all the settlements with the adjacent parking spaces and the city beyond.



Combined building services buried under the road (continuous line) and within the building core (dotted line).



All 5 rings are orientated so that both dwellings and all the Bøur gets optimal sun conditions.

All the rings have community spaces and greenhouses between on another that also serve as public nodes for Runavik

PATHWAYS AND ACCESSIBILITY
The main axis of the project is the pedestrian path connecting the five bøurs. This route creates notions of connectivity, as you enter on the same path as your neighbour.

The walkway also connects to downhill paths offering direct short-cuts towards the town centre. Together with the creeks, this enhances the social cohesion between the new settlements and the existing town of Runavik.

Common parking space is placed to encourage car sharing - the closest one always being the electric pool car.

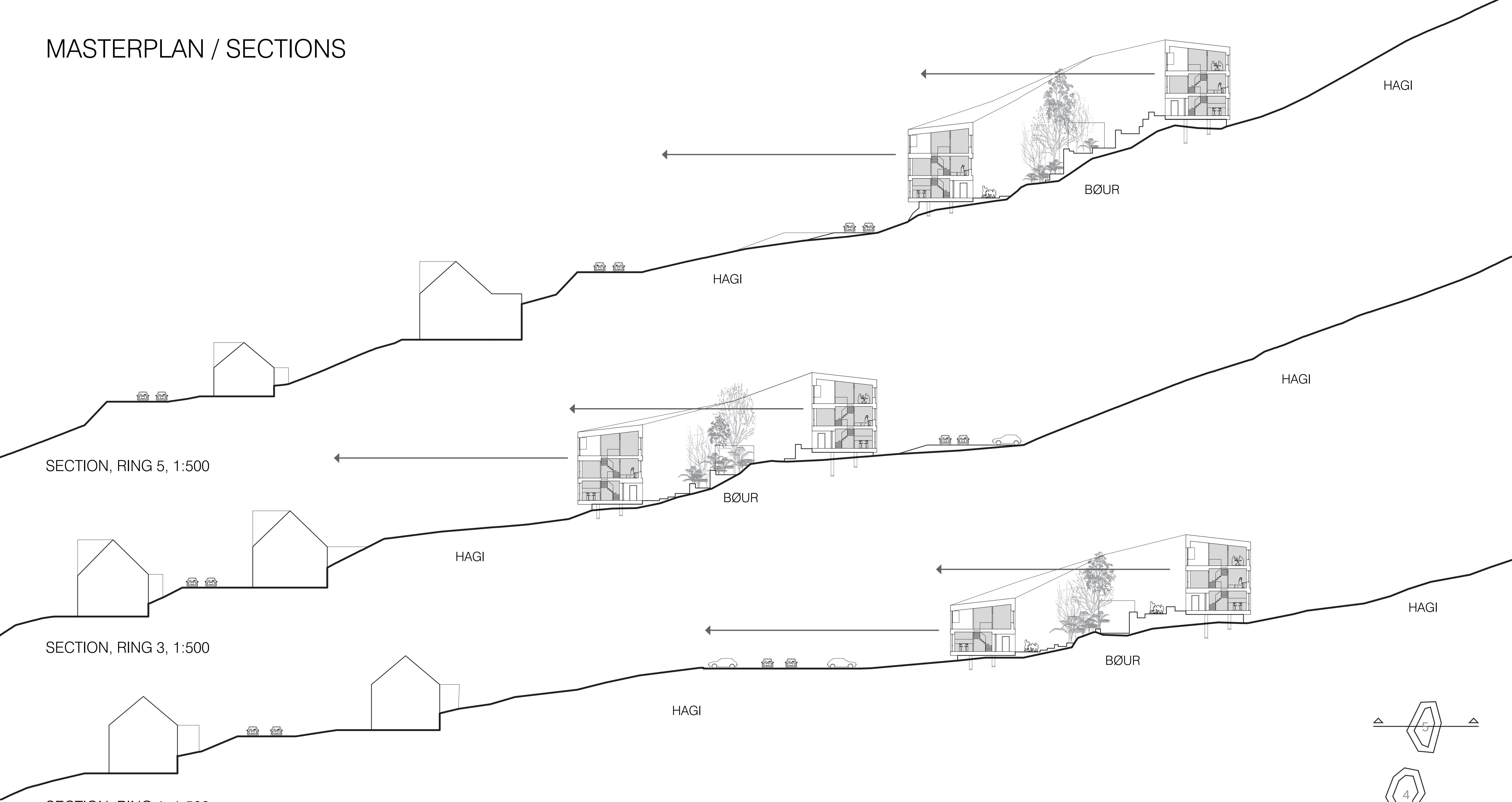
The walkway does enable car deliveries and fire rescue vehicles but not the storing of vehicles, as this would interfere with the activities around the living areas. The parking infrastructure has been designed so there is access from the dwelling to parking spaces directly adjacent to the settlement.

EYES OF RUNAVIK
At night the Eyes will overlook the Fiord with a warm glow showing the warm and comfortable interior social space with every dwelling enjoying the vast view over the Fiord.

The project brings a strong identity to the city of Runavik both in it's architectural layout and in the way it performs within building technology, sustainability and from the aspect of respect for minimal impact with this beautiful landscape.

It balances tradition and innovation bringing forward an innovative way of inhabiingt the characteristic landscape around a whole new and much needed focus on social sustainability and interaction.

MASTERPLAN / SECTIONS



SECTION, RING 5, 1:500

SECTION, RING 3, 1:500

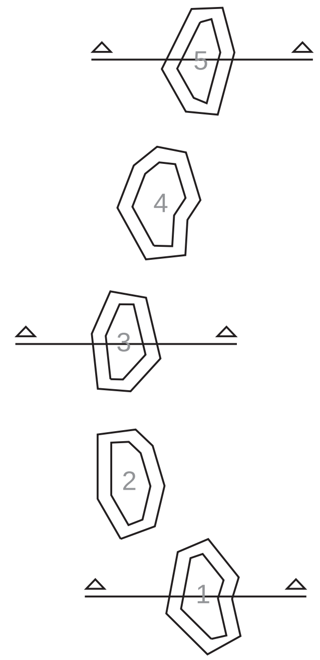
SECTION, RING 1, 1:500

THE SETTLEMENT
The buildings sit seamlessly in the natural landscape, the elevation of the green roofs directly reflecting the contours of the terrain below.

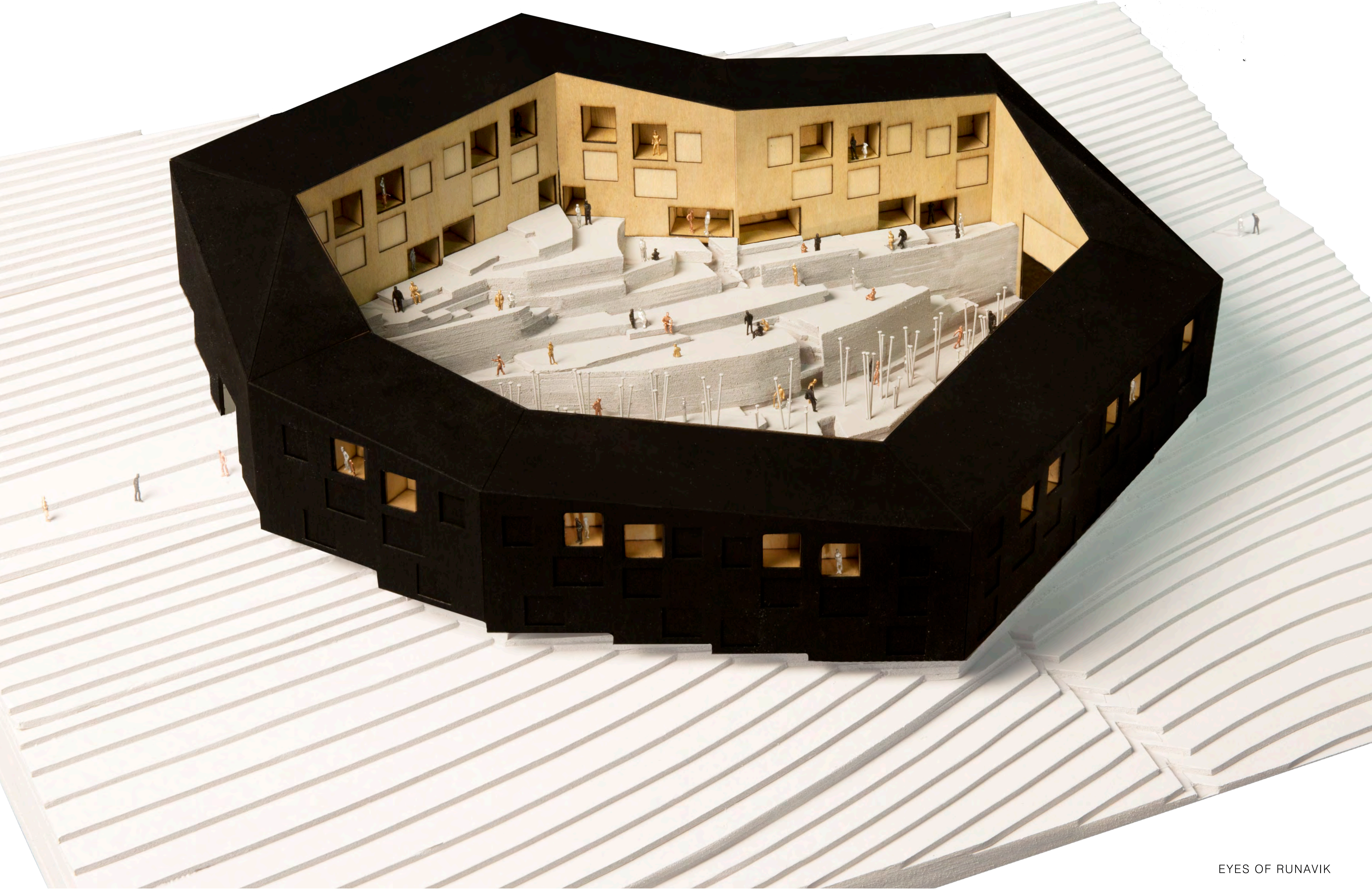
The 'eyes' simultaneously draw from the rich history of Faroese architectural aesthetics and traditions, whilst applying them to a contemporary form and construction techniques in order to create a new building typology which is deeply rooted within its local context.

The circular settlements emerge from the wild Faroese landscape, transforming into eye shapes as they individually respond to the typology of the terrain below them and the prevailing wind.

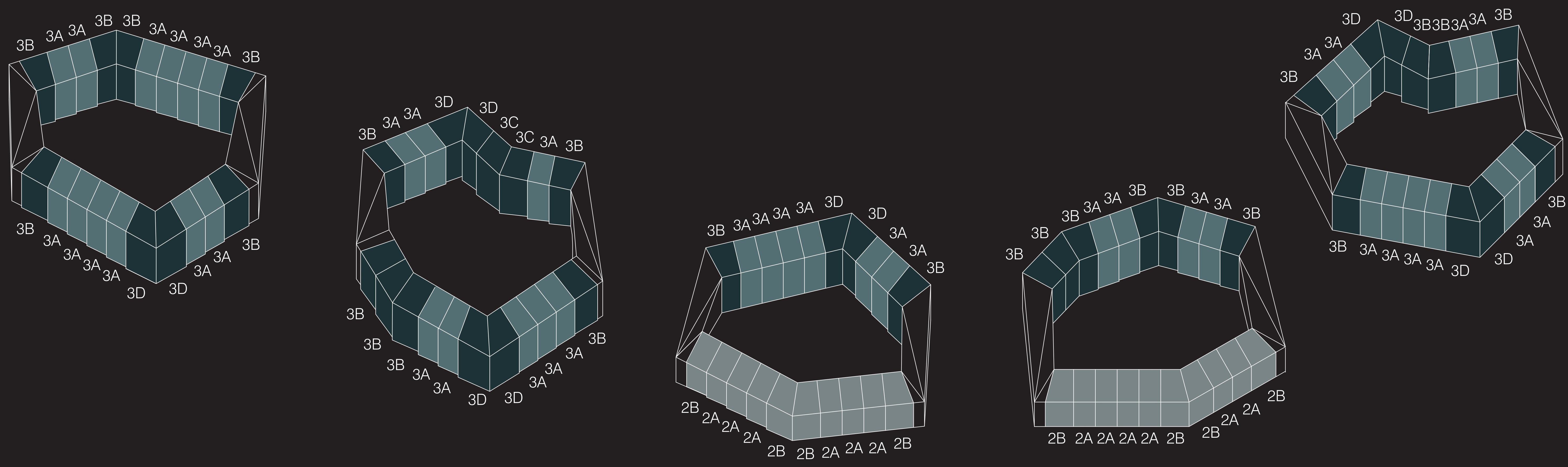
The proximity to the steep terrain gives each dwelling a stunning view over the fjord, whilst simultaneously having a vista of the hagi on the outside and the bøur to the inside.



SETTLEMENT



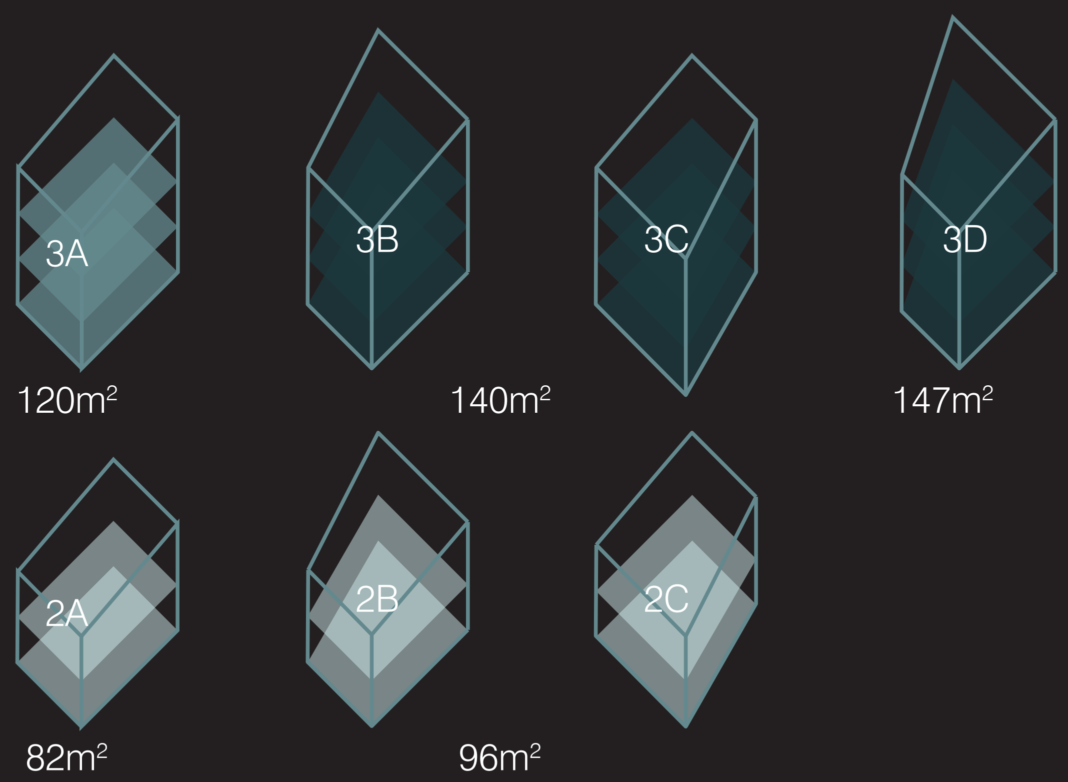
SETTLEMENT / ORGANIZATION



STANDARD MODULE　15 DEGREE ANGLE　30 DEGREE ANGLE

3 STOREY

2 STOREY



SMALL MODULE

MEDIUM MODULE

LARGE MODULE

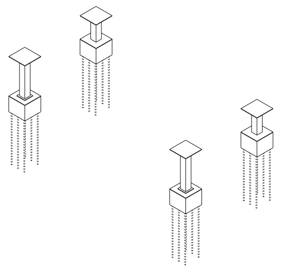
THE MASTERPLAN

The general masterplan strategy is to develop five dense settlements, located minimum 20m apart, in order to allow for the untouched hagi to surround the settlements.

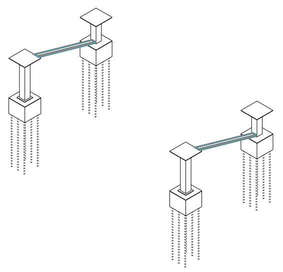
Each eye contains 20 row houses. Two access roads join the existing infrastructure to the north and south of the site, and communal parking is strategically located alongside the road, and in between the settlements.

Number of dwellings	100 row houses
Large unit (140-147 m2)	40
Medium unit (120m2)	40
Small unit (75-85m2)	20
Car parking spaces	170
TOTAL BUILT AREA	17,550m²
TOTAL SITE AREA	45,000m²
BUILDING PERCENTAGE	39%

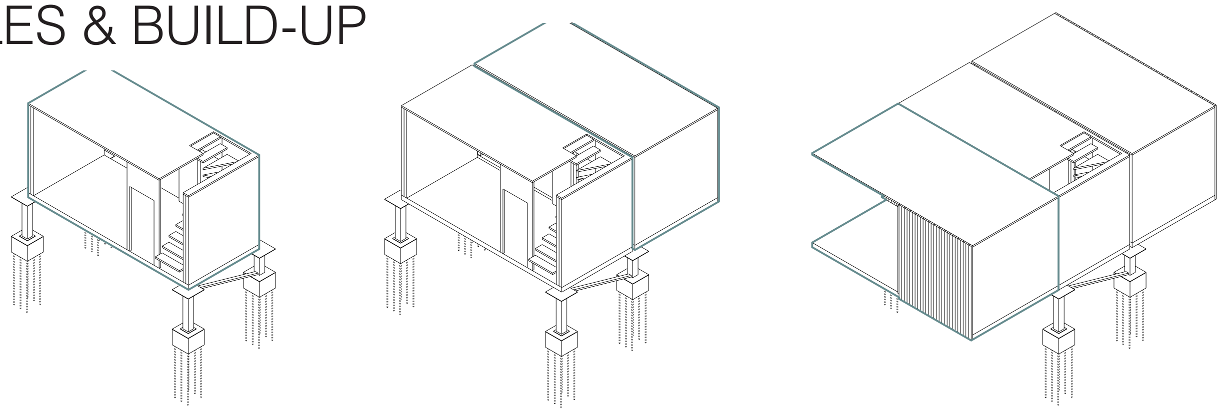
SETTLEMENT / CONSTRUCTION PRINCIPLES & BUILD-UP



A - Concrete supports with folded reinforced bars anchored in the bedrock.

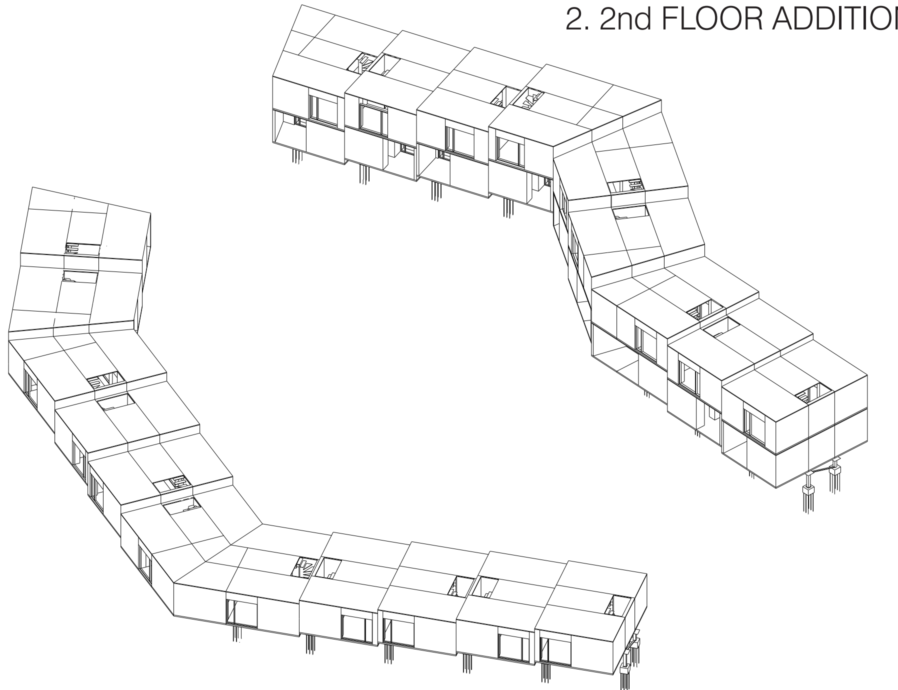


B - Bracing cross are used to stiffen the foundations working both in compression and tension.



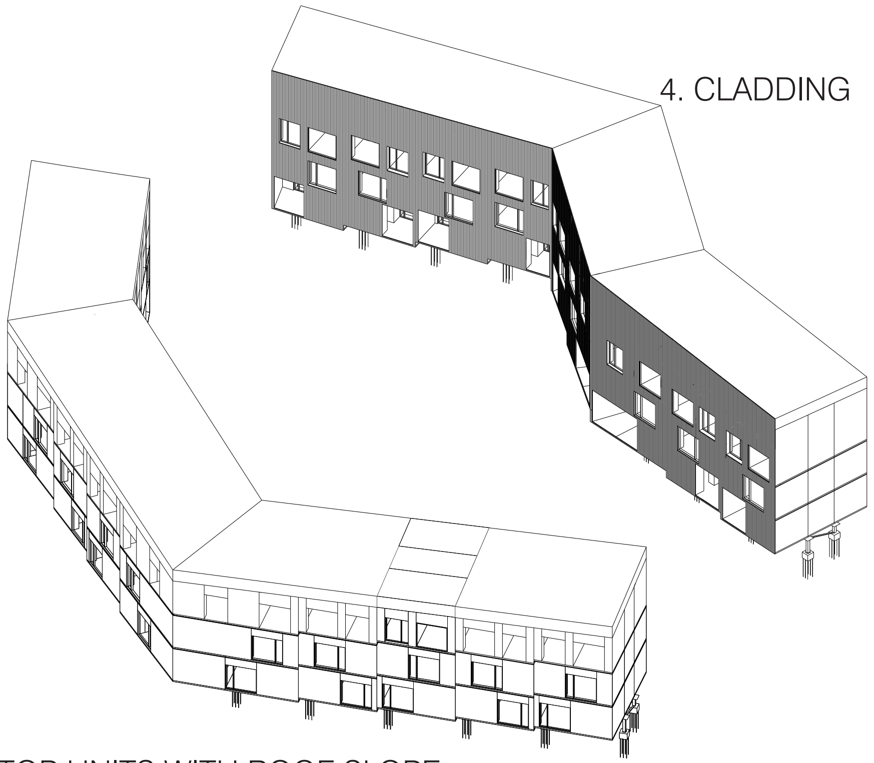
C - First floor of prefabricated units (Cross Laminated Timber – CLT): 6x3x3m. The module's span is 6m and goes from one shear wall to the other.

EXAMPLE OF RING BUILD-UP - RING 4:



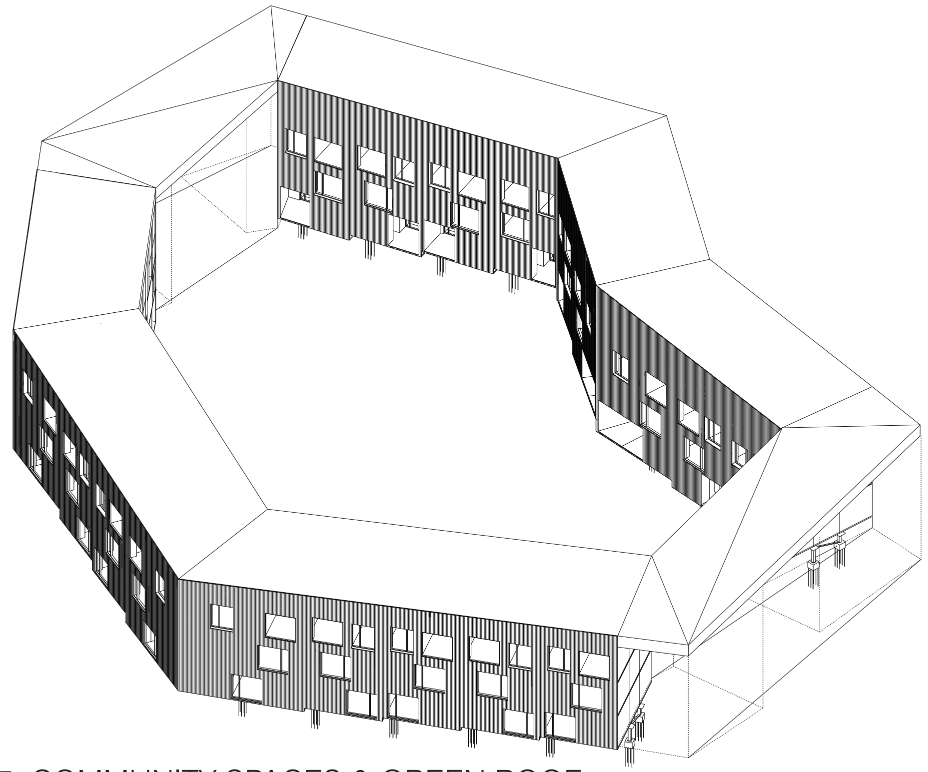
2. 2nd FLOOR ADDITION

1. 1st FLOOR FIXATION



4. CLADDING

3. TOP UNITS WITH ROOF SLOPE



5. COMMUNITY SPACES & GREEN ROOF

FOUNDATIONS

Due to the proximity of the bedrock, pile foundations can be avoiding by using concrete supports and reinforced bares that are anchored in the bedrock. Then foundations can be built with very little impact compared to equivalent foundation construction.

Equipment will be chosen according to the local ground and rock conditions. With favourable conditions, it is even possible to use hand operated equipment to minimise impact on the landscape.

These foundations are usually made of steel, mortar and/or concrete, and dimensions will be minimised to reduce environmental impact. There is very limited excavation necessary to install these light foundations.

CONSTRUCTION OF LOAD-BEARING SYSTEM

The aim is to minimize the amount of resources needed for construction and installation, and at the same time to achieve a long service life.

After foundation works are completed, a frame system will be installed. Typically, steel is used for similar frames, but timber is an alternative and is suggested for this project, because of its sustainability features and the possibility to protect it from rain under the dwellings. The geometry of the frame system is defined by the 3D scan of the terrain earlier in the design process, and only minor adjustments at site are necessary.

The extensive use of timber, even more than necessary for the building process, is encouraged to store CO_2 and prevent it from entering the atmosphere at once.

PREFABRICATED MODULES

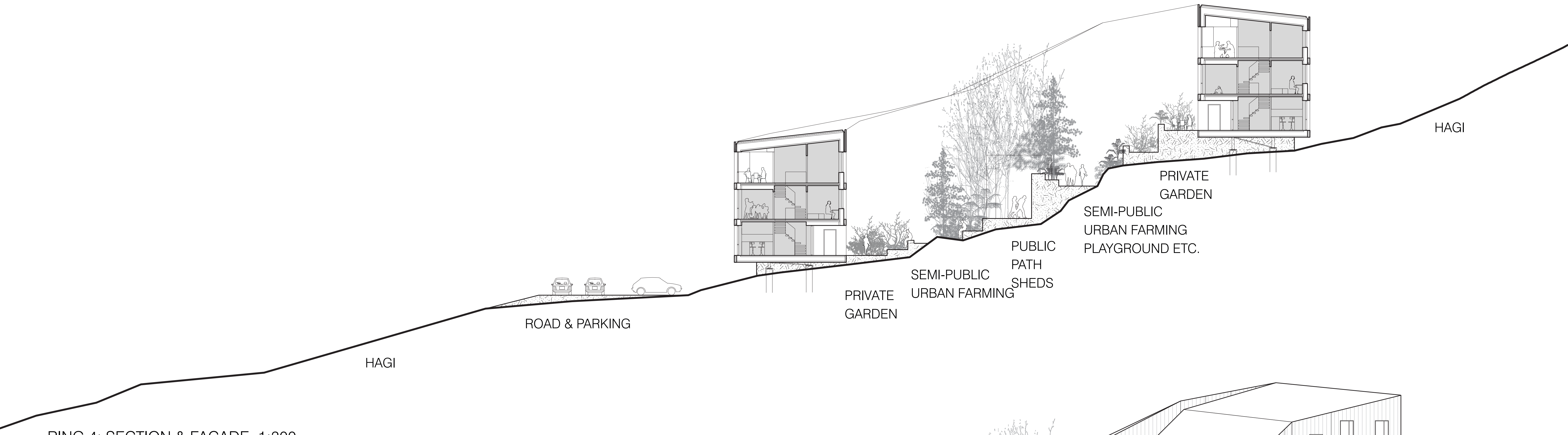
Prefabricated modules are built in CLT. Due to its structure (three or five layers oriented in 0 and 90 degrees), the CLT is an efficient material which works in compression and can stiffen the building.

Finished modules of large dimensions can be transported by sea to Runavik. Dimensions will be optimized to allow environmentally friendly and safe transportation.

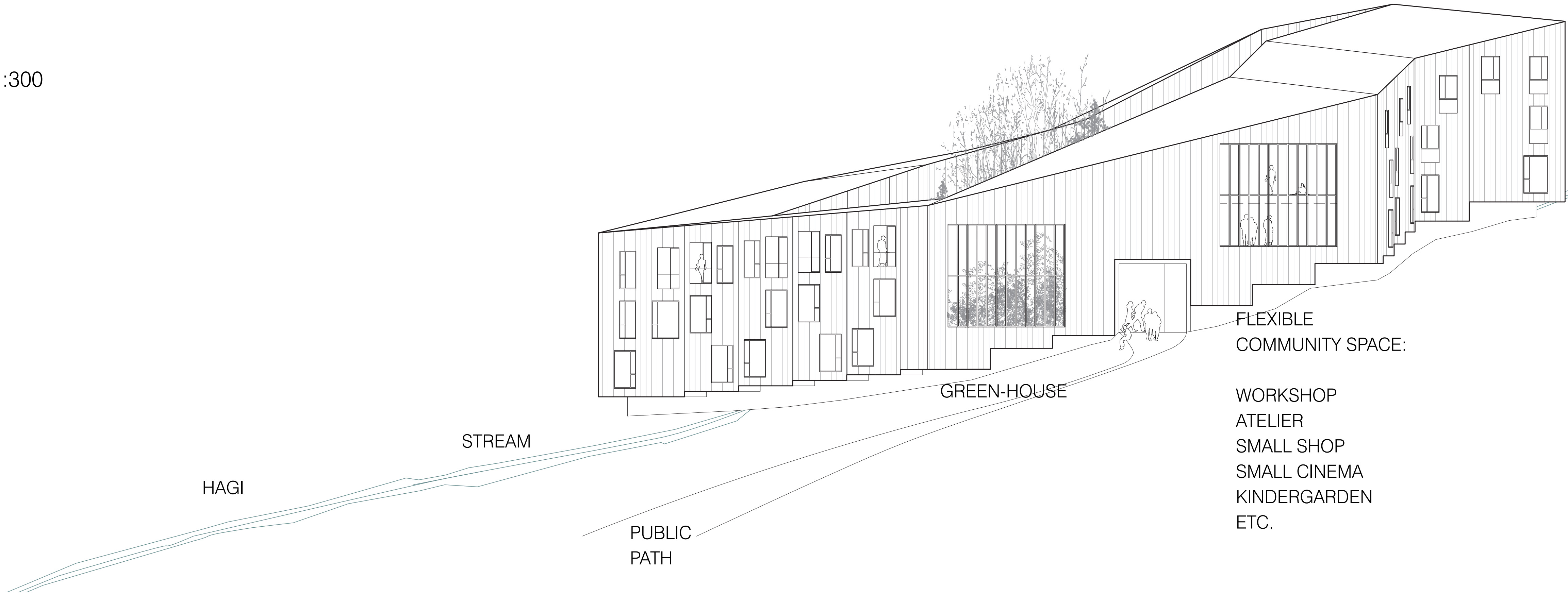
This allows for fast progress, less installation time at site and better quality, since construction in the harsh conditions of the site is minimized.

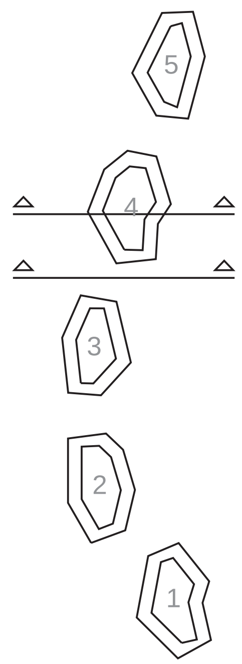
To minimize the waste from the cutting process, the cut-outs can be reused for inside furniture.

SETTLEMENT / SECTION & FACADES



RING 4: SECTION & FACADE, 1:300



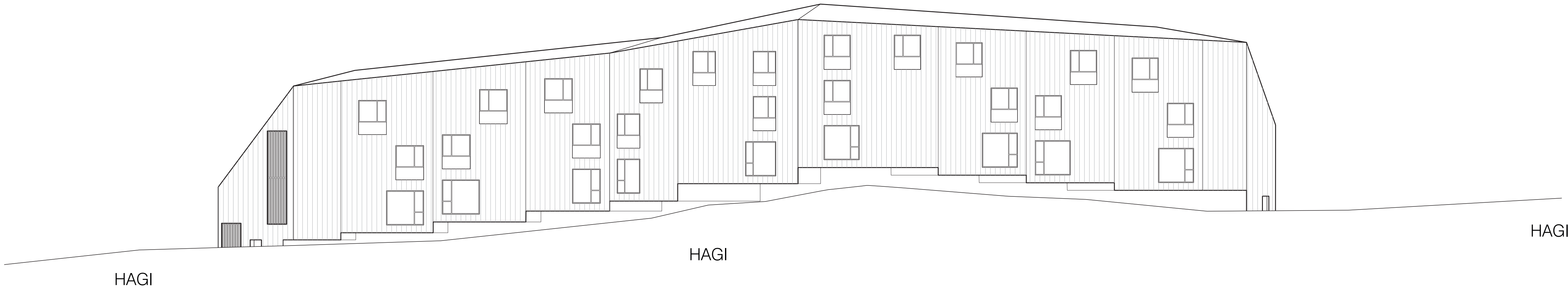


THE SETTLEMENT
Each settlement has a semi-outdoor space outside the thermal envelope, the greenhouse.

These “conservatories” can be booked by all residents as an extended living room, when you want to gather all your friends.

The other community-areas can be a public node in the area and an extra addition to the social aspect of the rings.

SETTLEMENT / SECTION & FACADES



RING 4: FACADES, 1:300


Cedar wood
Shou-sugi-ban - Different leves of burn
Used on the exterior facade


Cedar wood
Non-burned
Used o the interior facade

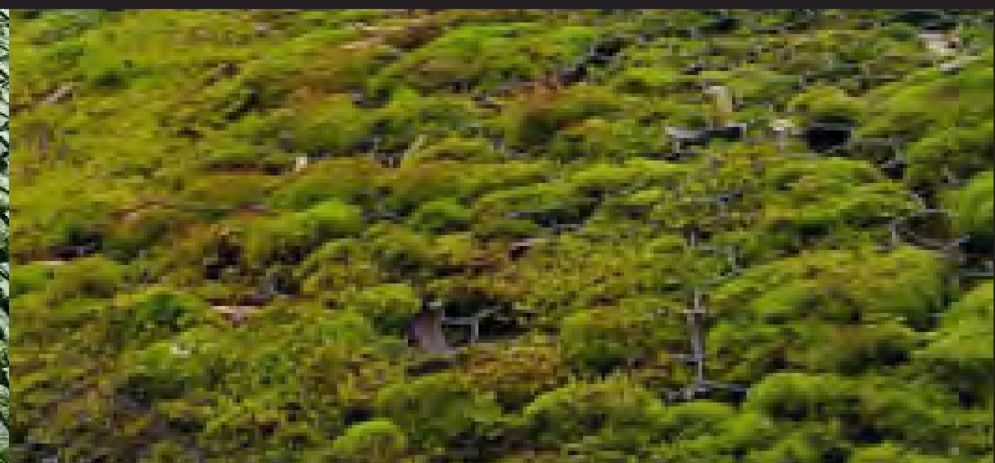

Basalt rock - XL
Irregular left-over cutpieces
Used for pathways in the Bøur


Basalt rock - L
Irregular left-over stone
Used for build-up in the Bøur


Basalt rock - M
Gravel
Used for playgrounds in Bøur

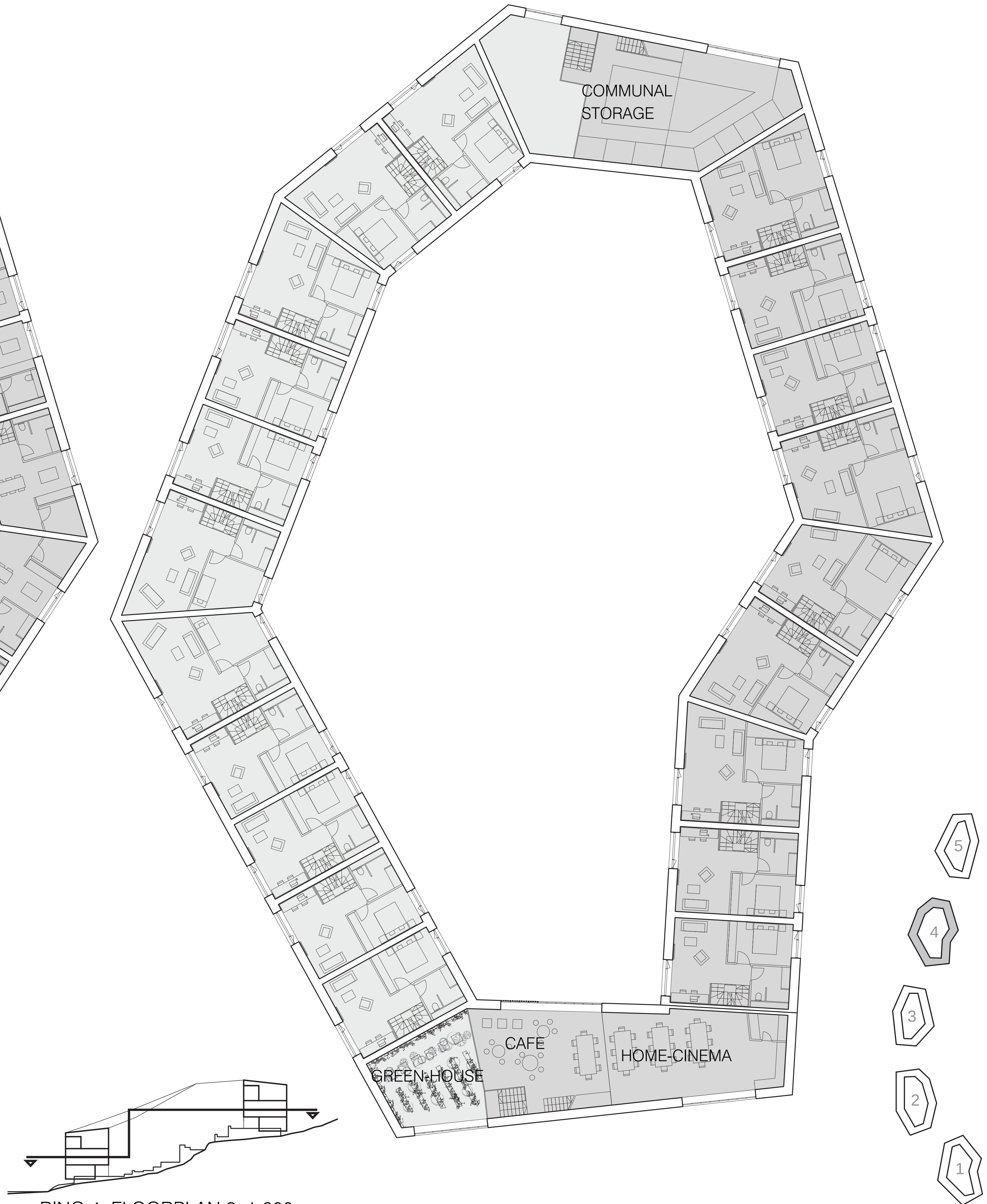

Basalt rock - S
Sand
Used for sandboxes in Bøur


Different densities of tructured grass
Used for parking, roads and paths in the Hagis


Moss
Used on roofs

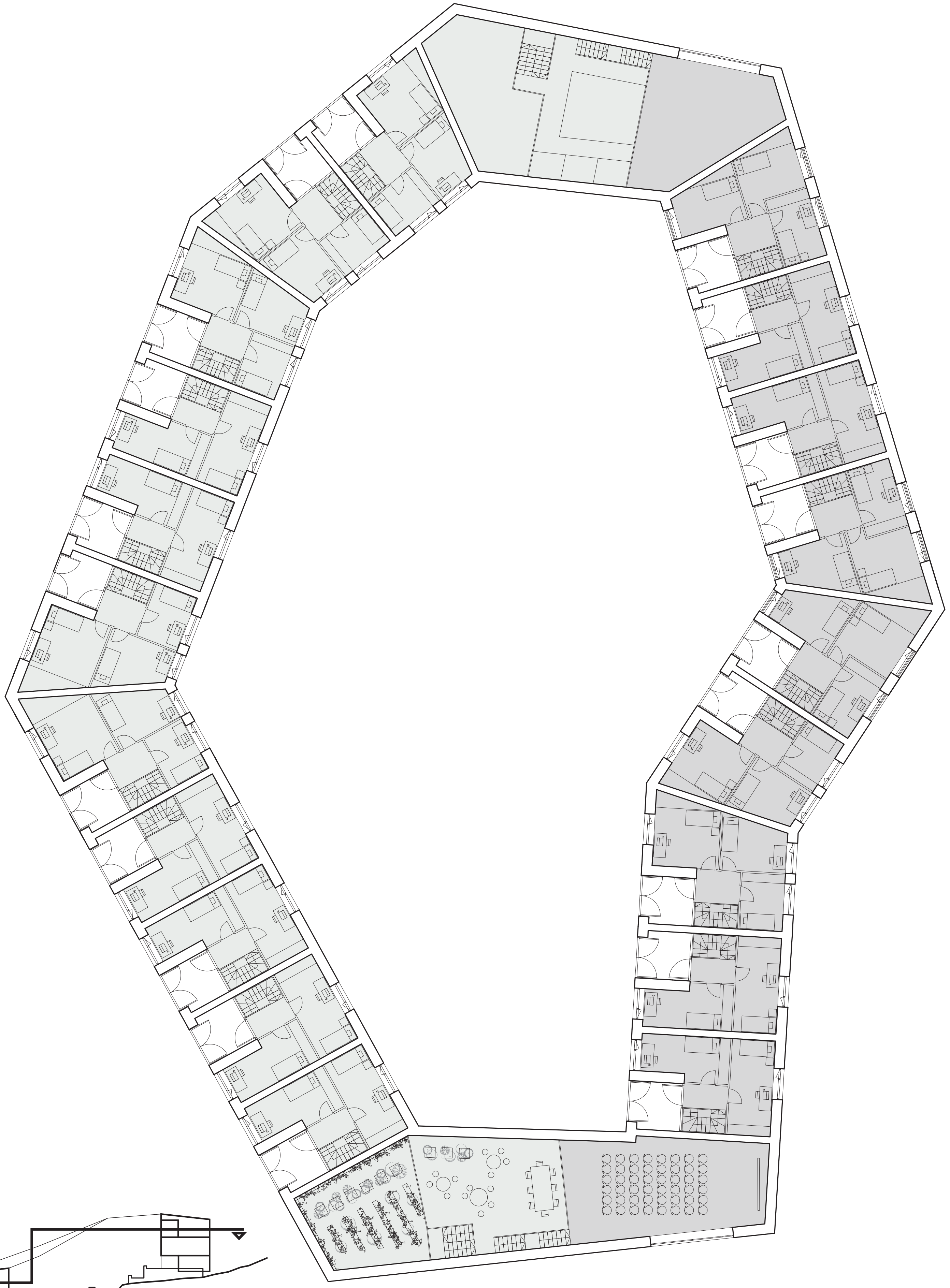
SETTLEMENT / FLOOR PLANS

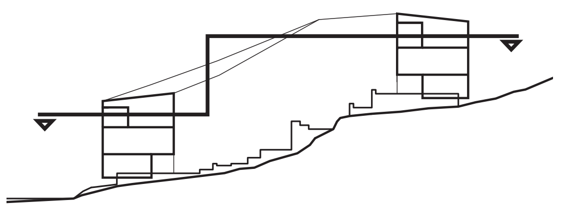
RING 4: FLOORPLAN 1, 1:300



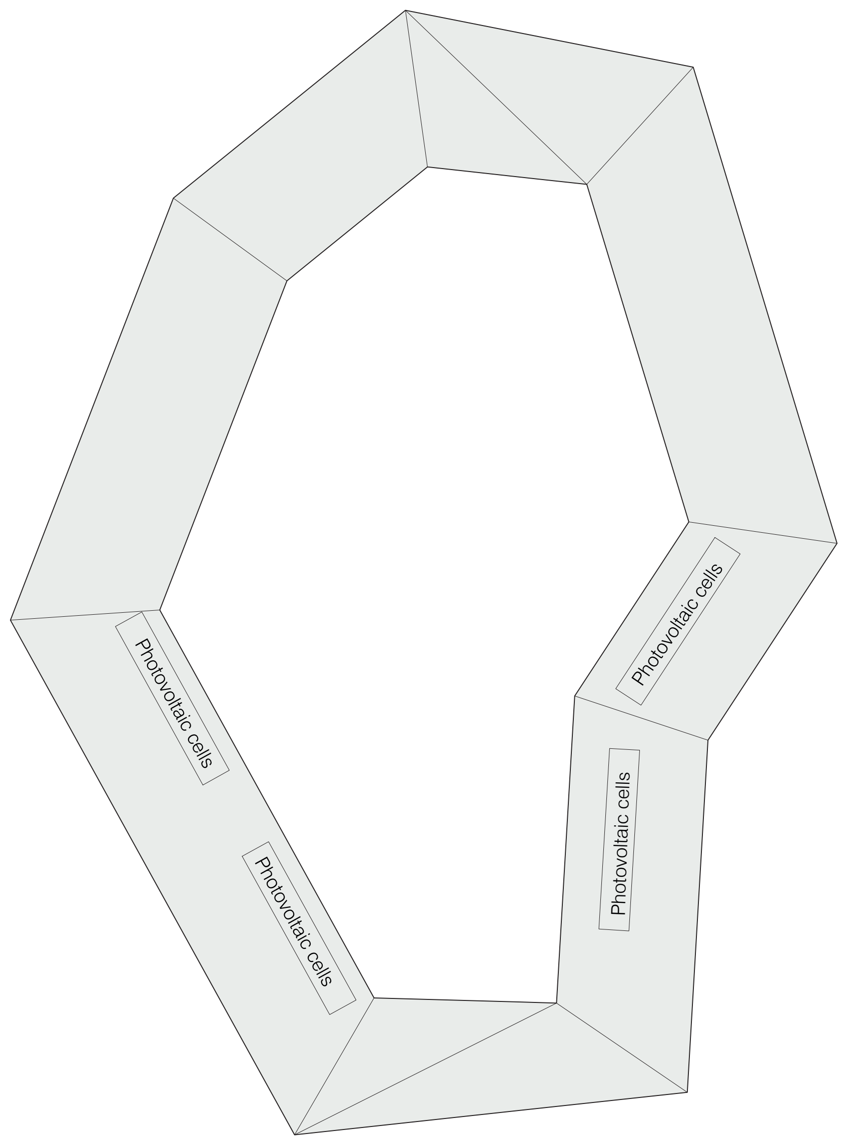
RING 4: FLOORPLAN 2, 1:300

SETTLEMENT / FLOOR PLANS



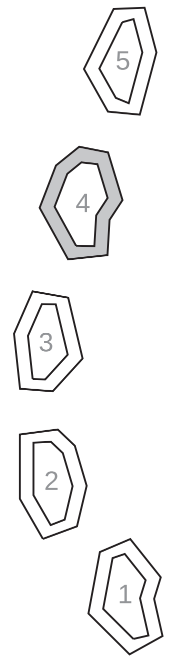


RING 4: FLOORPLAN 3, 1:300



Photovaltics
40% of the electricity on the Faroe Islands is from non-renewable sources and photovoltaics are integrated within the architecture in an attempt to reduce this figure.

Despite Runavik's northern position, the climate allows an annual yield of solar cells that is as high as 75%, when compared to Copenhagen. The project ustilises 10% of the roof area as well as the upper portions of the large green house windows for the photovoltaic cells. The annual yield will correspond to the amount needed to heat the buildings.

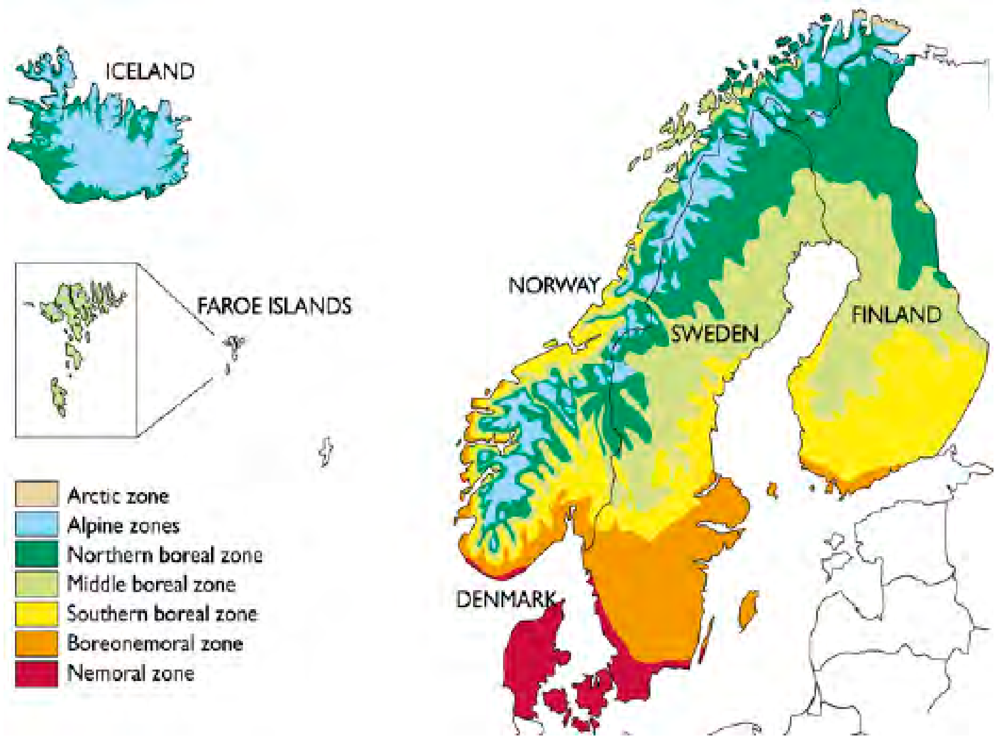


BØUR

SOCIAL MICROCLIMATES
Each of the Bøurs become their only social microclimate; protected gardens that catch your curiosity. Located along a winding path, the Bøurs are a series of sheltered outdoor spaces which become the social hub of Runavik. The enclosure formed by the settlements shelters the Bøurs from the harsh winds of the Faroe Islands and provides a new and unique social situation; the ability to meet your neighbours in a temperate outdoor environment.

ENGLAND
THE REFINED CULTURE OF THE WALLED GARDEN

DENMARK
THE SHELTERING FARMHOUSE TYPOLOGY



THE CLASSIC WALLED GARDEN
The shelter provided by enclosing walls can raise the ambient temperature within a garden by several degrees, creating a microclimate that permits plants to be grown that would not survive in the unmodified local climate.

The walled garden is protected from sudden changes in weather conditions and from harsh wind conditions from all sides.

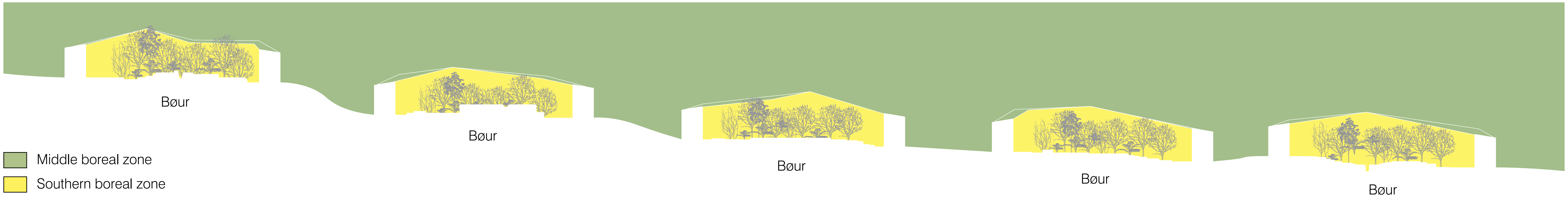
SHELTER FROM THE WIND
One of the main advantages of the eye shape is the sheltered outdoor space - the Bøur.

The wind is an eternally present natural power on the Faroe Islands, constantly sweeping over the hillsides, plains and slopes from shifting wind-directions. The eye-shape and configuration of the settlements make the best of the extreme conditions and protects from wind from all sides.

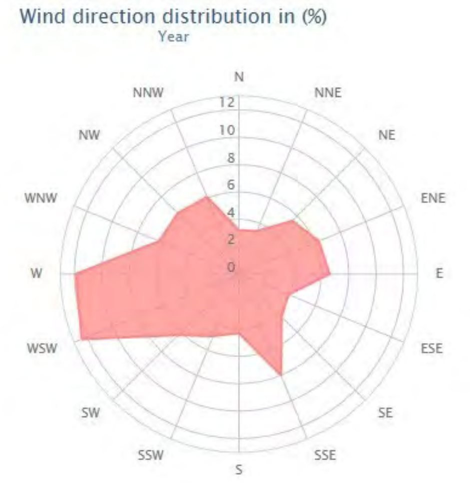
Wind analysis have been carried out throughout the whole design process. After studying monthly variations three wind directions have been simulated; the West, South and North winds.

WIND AND VEGETATION
The map of the vegetation zones in the Nordic Countries show that the Faroese is mainly in the Middle boreal zone (with some highland in the Alpine zone). The wind has quite a big impact on the classification - and with good shelter, you can actually grow plant species that usually only thrive in the Southern boreal zone.

Stepping in to the Bøur's of our project, one will be taken with the contrast to the surrounding rugged landscape. Beside allowing for more "exotic" vegetation, the milder microclimates of the Bøur's will mean that what can naturally grow in the Faroese will be a bit bigger, blossom a bit earlier in the season around a calm and engaging, social space.



BØUR / WIND SIMULATION

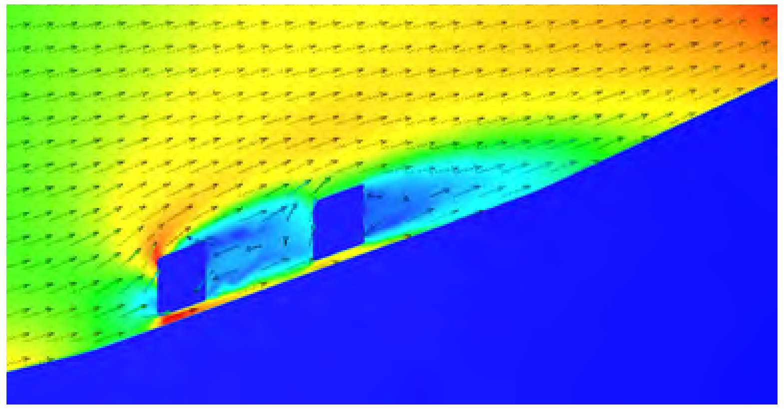


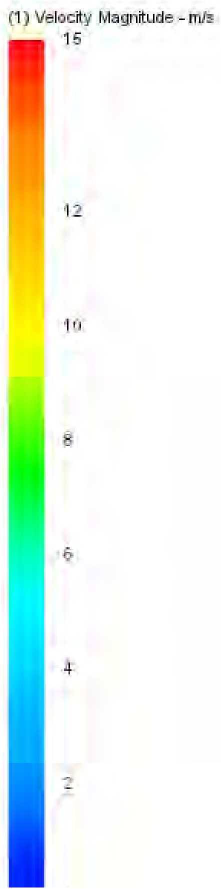
WIND STUDIES
The software used for wind analysis is Autodesk CFD which uses Computation Fluid Dynamics to compute wind velocities, pressure and turbulence in a great number of points.

The experience from people living in Runavik is that the north wind is frequent and strong. Thus a simulation from the north wind with a strong wind of 15 m/s have been carried out. The west and south winds have been simulated with 7 m/s which is close to the average wind speed.

COMFORT CRITERIA
The wind simulations can be connected to comfort criteria. Simplified, one can say that you can walk and bike in green coloured areas (6-9 m/s), make short stops for meetings and conversation in light blue areas (3-6 m/s) and make longer stops and sitting activities in the blue areas (0-3 m/s). In the yellow areas it starts to get quite windy.

PROCESS
Throughout the design process there has been different design strategies. In an integrated way different shapes and ideas have been discussed and evaluated from a wind climate point of view.

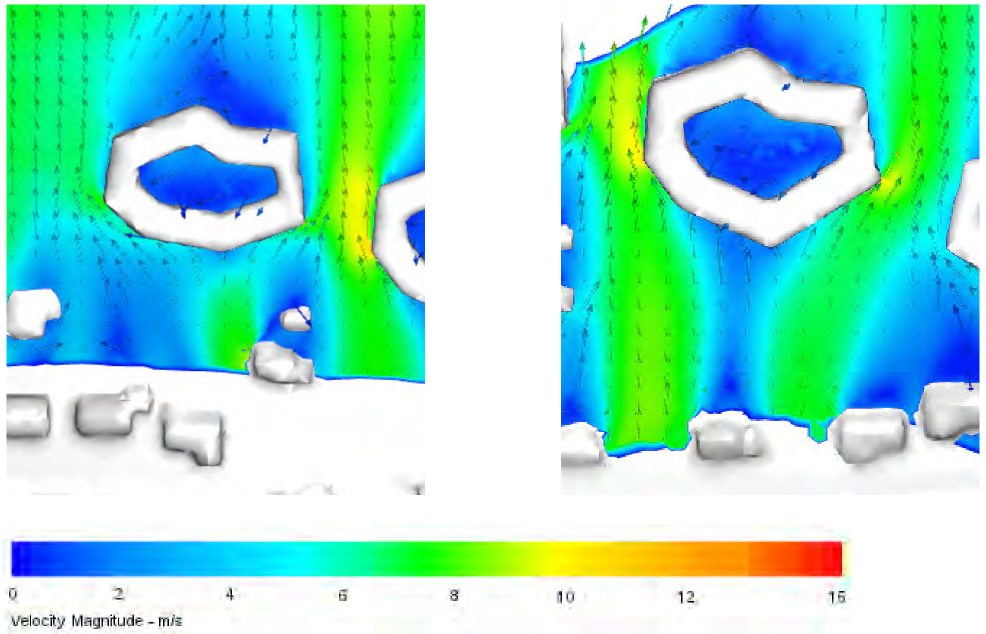




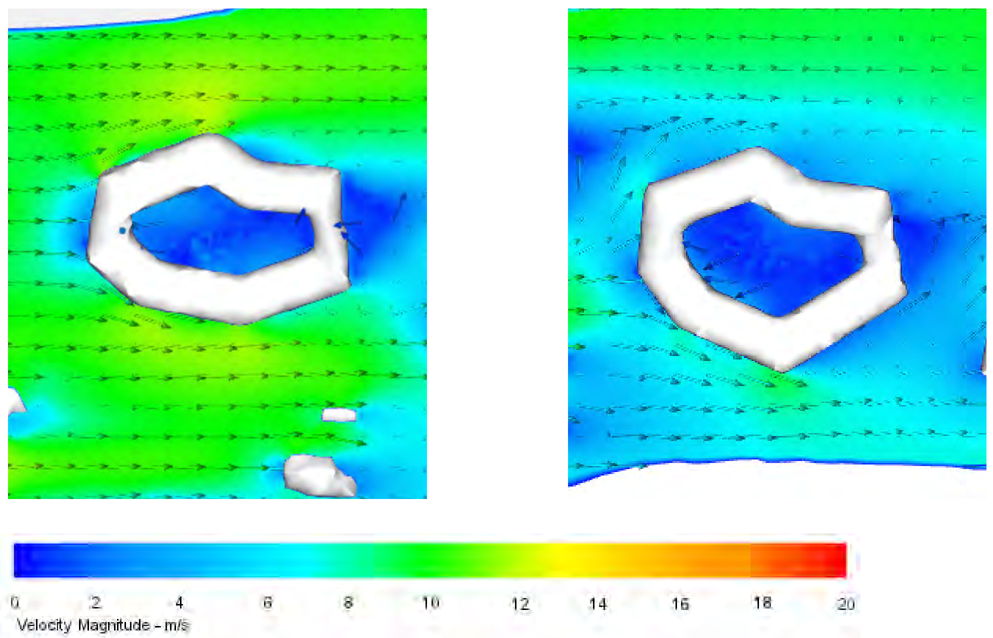
At an early stage in the houses where raised from the ground creating a small space for the wind to pass under. Analysis however showed that the courtyards became quite windy. This sample image shows a simulation of a western wind of 7 m/s.

Different roof types and slopes have also been tested. On different facades different types have been used to create wind protected areas.

All five settlements have been simulated in plan and section, but here we only show plans of the two most northern, as this is the most critical situation. The plan view is shown slightly above the ground, representing pedestrian street level.



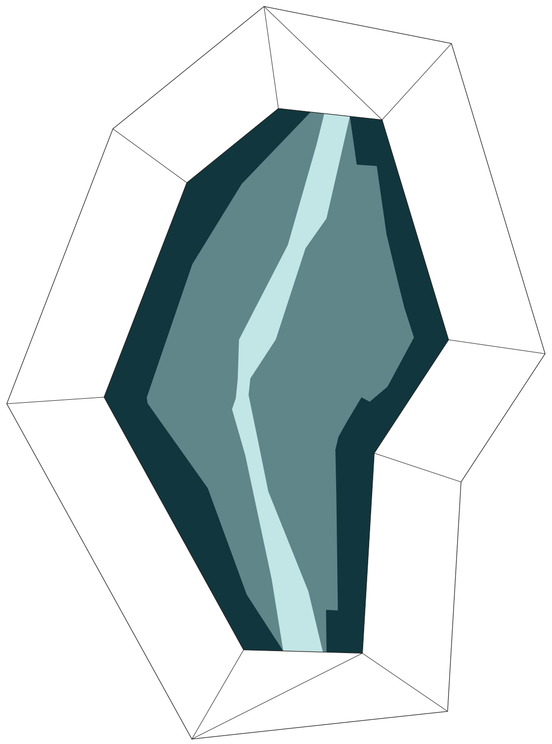
West wind - 7 m/s (average wind speed)
The west wind is the prevaling wind in the area (blowing from the bottom in the picture). All settlements have calm courtyards. Depending on how the neighbouring settlements and the adjacent existing single houses are standing as protecting units in the prevailing wind direction, there is more or less calm areas also outside the proposed building rings. This contributes to low wind speeds close to the facades.



North wind - 15 m/s (strong wind speed)
The wind is blowing from the left in the pictures. Observe that the wind speed legend differs from the west wind.
Since Faroe islands is a windy place in general, the project has also tested in a strong wind from the north. The pictures show quite clearly that the most northern settlement faces a lot of wind which is due to lack of obstacles in the north. However, the rest of the settlements are more sheltered.

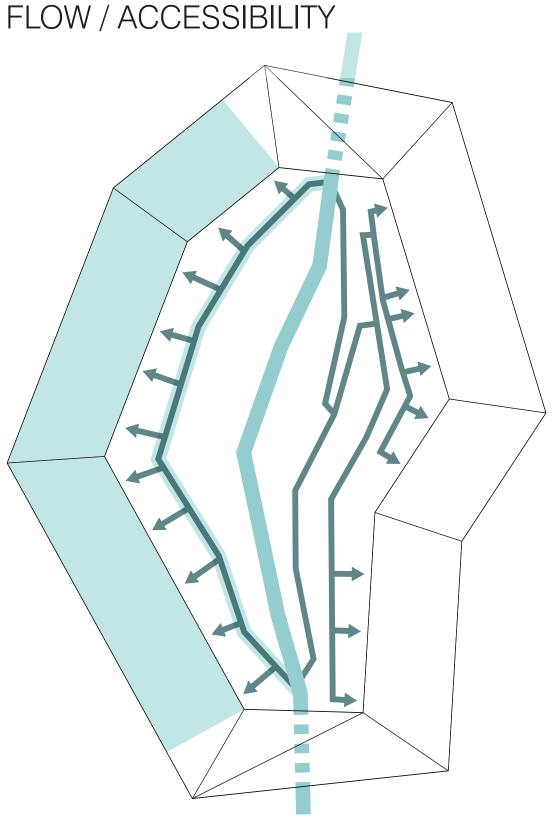
BØUR / SOCIAL FUNCTION & ACTIVITIES

PUBLIC / PRIVATE



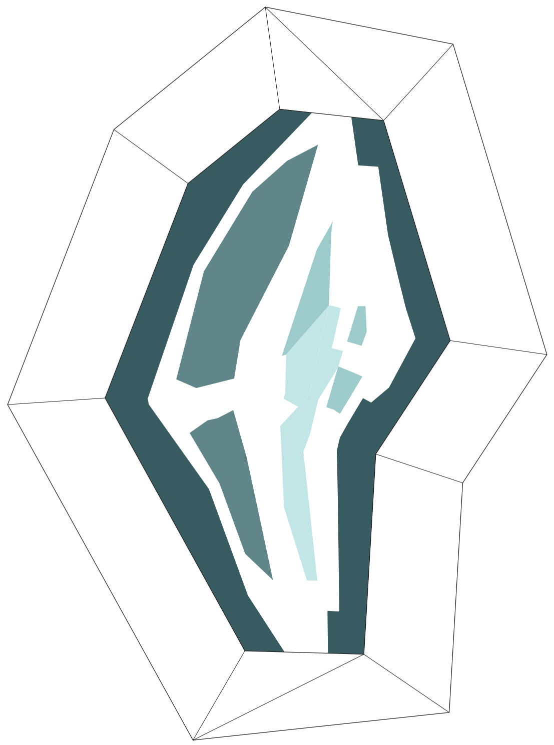
Public
Semi-Public
Private

FLOW / ACCESSIBILITY



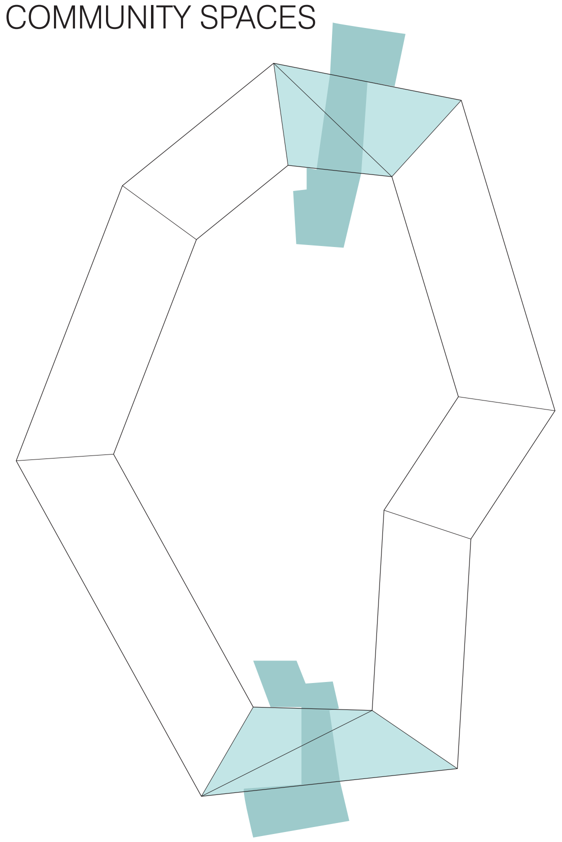
Main public route
Access to dwellings

ACTIVITIES

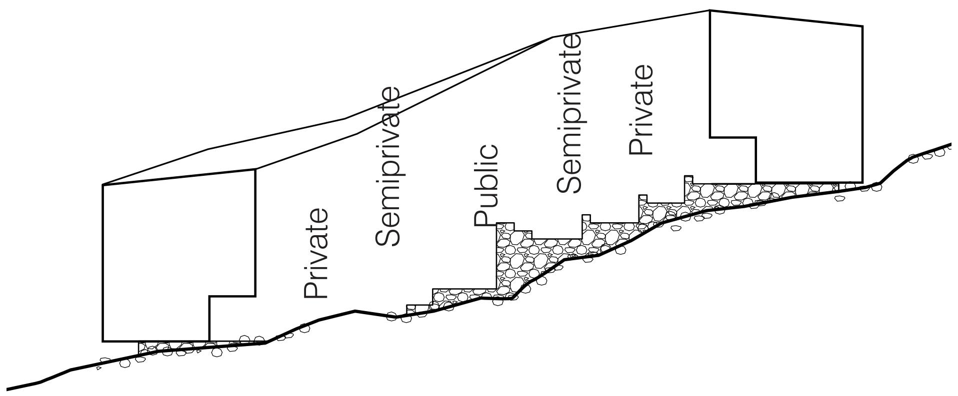


Terrace
Playground
Urban Farming
Private Gardens

COMMUNITY SPACES



Community spaces
Communal terrace



PROVIDING FOR DIFFERENT NEEDS
The bøur provides public and private amenities for the residents. Outdoor livingspace is valuable for all - but people have very different needs and expectations. Depending on where you are in your life, the preferences for activities change. Some may be very content with a quiet place, looking at kids playing or watching the flowers grow. Others will be more energetic, and would want the possibility to exercise or dig in the soil.

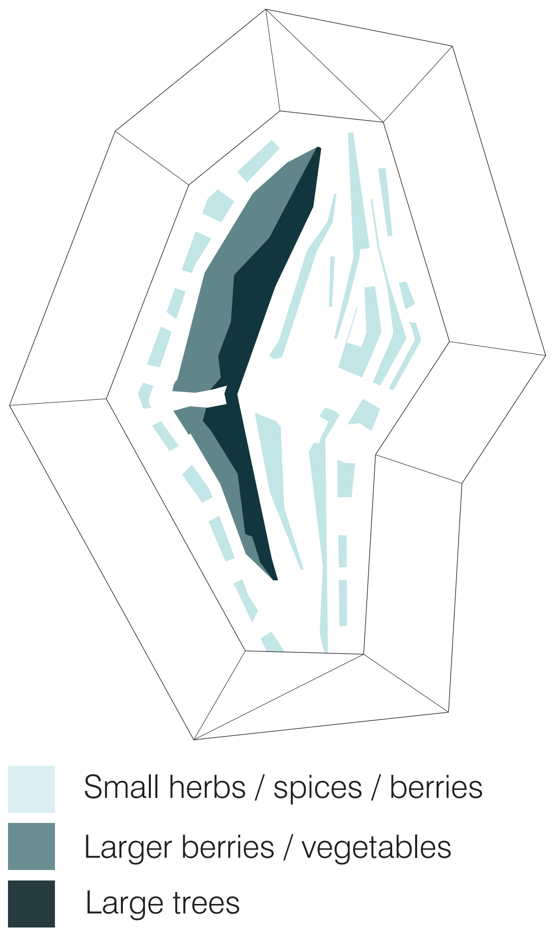
DIFFERENTIATING THE ZONES
The courtyards are layed out with the overall concept of Private/Semiprivate/Public in mind, with private areas closest to the dwellings and the public pathway furthest away.

A DEMOCRATIC PROCESS
We imagine, that the future residents of each Bøur will take part in a workprocess with the landscape architects and engineers, deciding which activities would be preferred and how they should be layed out in the semipublic areas.

PRIVATE GARDENS
Each dwelling has a private outdoor space in the Bøur. The terraced landscape separates these gardens without the use of fencing. Most of the private gardens are accessed directly from the dwelling, an element that itself can be used for hanging out with a cup of coffee.

BØUR / SOCIAL FUNCTION AND ACTIVITIES

PLANT SPECIES



VEGETATION
The partial change of climate zone (middle to southern boreal zone) increases the biodiversity of the site, due to a broader spectrum of microclimates. We suggest a foundation of relatively hardy vegetation, that will thrive in the common areas of the courtyards. Each bøur-community can then experiment with other, more exotic, plants after their individual liking.

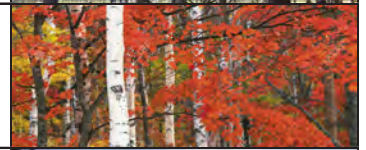
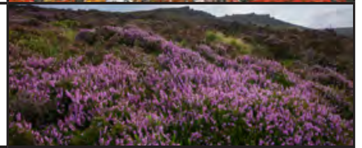
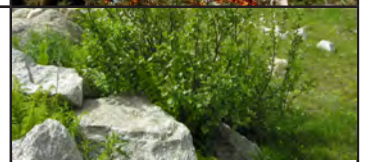
Soil depths in the courtyard will vary from 10 cm to 1500 cm. Kitchen gardens and shrubs can be established from around 60 cm of soil underlay, for trees at least 100 cm of soil is recommended.

URBAN FARMING
In the courtyard, the residents who want to grow their own vegetables can cultivate strips of land. They can collectively farm free-range hens for egg production. Where it is necessary for growing crops, the terrain is levelled out by building support walls with leftover basalt rock.

THE STREAM
The open streams, which run through the site, form an essential part of the projects layout. Each settlement is placed around a stream, allowing the water to run through the middle of the bøur. In careful interaction with nature, water from the streams become an amenity for the residents.

GEOTHERMAL HEAT
Harvesting geothermal energy is the obvious local solution for producing heating for the dwellings with a low CO_2 emission. Geothermal piles combine the pile foundations with a closed-loop ground source heat pump system. In effect, the thermal mass of the ground allows heat pumps to supply the heating needed.

Drilling the pipes into the ground in and alongside the pile foundations of the building minimises the impact on the landscape whilst bringing the heat directly up into the dwellings. There are two geothermal drillings per "eye" - feeding half a ring each.

Plant name	*Common name*	*Picture*
Alnus	Alder	
Amelanchier lamarckii	Snowy mespilus	
Betula papyrifera	White birch	
Calluna vulgaris	Heather	
Ceanothus	Wild lilac	
Chiliotrichum diffusum	Mata verde	
Crataegus monogyna	Hawthorn	
Hippophae rhamnoides	Sea-buckthorn	
Nothofagus antarctica	Antarctic beech	
Ribes nigrum	Blackcurrant	

* And the list could go on.

There is a wide variety of plantlife that will grow nicely in such an environment and it is just up to the inhabitants too decide the level of maintanence.

THE VISTA ROOM
Taking advantage of the magnificent views over the fjord, the vista room establishes a unique living condition for the residents, providing a semi enclosed space on the top floor of each of the dwelling.

In stark contrast to the enclosed and protected Bøur, the vista room enables the residents to rise up from the interior landscape and experience the vastness of the wild Faroese landscape beyond.

Residents can close the glass facade and sit in a temperate space, sheltered from the wind, or pull back the glass doors on warmer days.

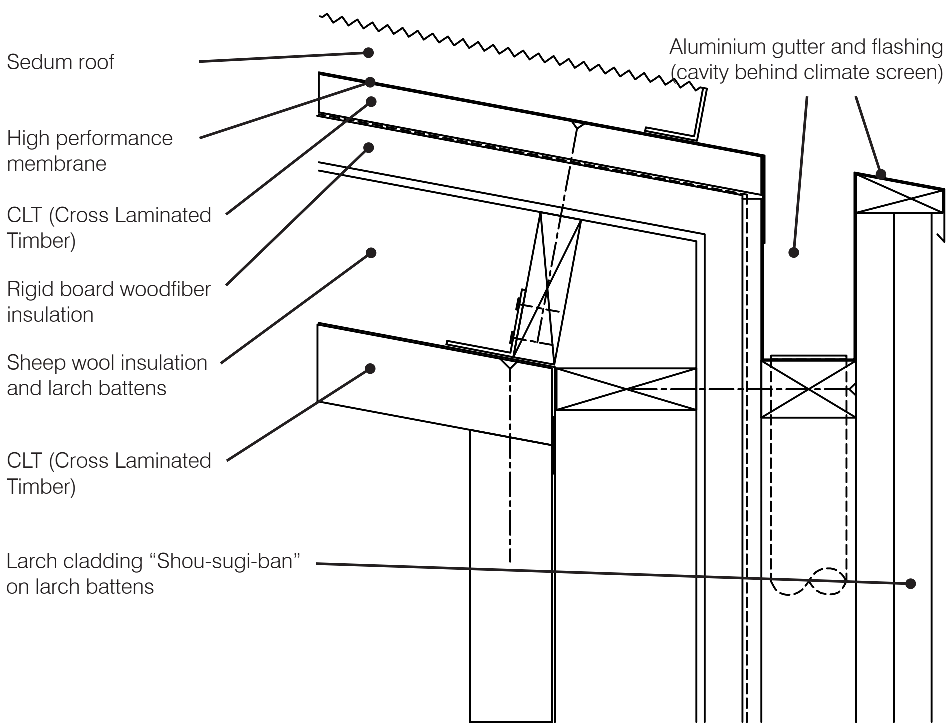
DWELLING / CONSTRUCTION AND ECOLOGY

CONSTRUCTION MATERIALS
Care has been taken to develop an honest and readable construction using solid materials and as few different materials as possible. The main construction consists of prefabricated massive wood elements attached to a steel/wood frame and lifted above ground. The indoor prefabrication of building elements as slabs and thermal envelope minimises the risks of humidity affecting sensitive insulating and organic construction parts.

THE SUSTAINABLE ASPECTS OF SHEEP WOOL INSULATION
Sheep are rarely farmed primarily for their wool; however, they need to be clipped annually to protect the health of the animal. The wool used to manufacture insulation is the wool discarded as waste by other industries due to its colour or grade. So the production of wool insulation can help up-cycle a bi-product.

Sheep wool insulation is 100% biodegradable. It can even be used as fertilizer on grass fields. As it is an organic product, it needs to be treated against pests, to avoid moth attacks. According to the German authorities (Fachagentur für Nachwachsende Rohstoffe e.V.) the use of problematic borax as a protective agent has been replaced by kalium hexafluorotitanat IV. Regarding fire safety, sheep wool has good flame retardant abilities, and only catches fire at 560°C. If it burns, it does not produce any toxic fumes.

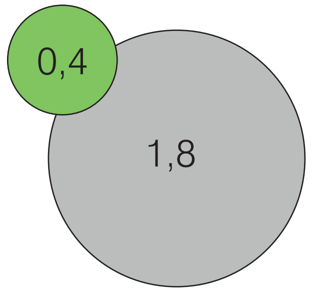
Finally, the wool fibers neutralizes toxic substances in the indoor environment, as formaldehyde and ozone. These two toxins reacts with the proteins of the sheep wool, and is permanently bound to its structure. Main source of information: http://www.wecobis.de/bauproduktgruppen/daemmstoffe/aus-nachwachsenden-rohstoffen/schafwolle-daemmstoffe.html.



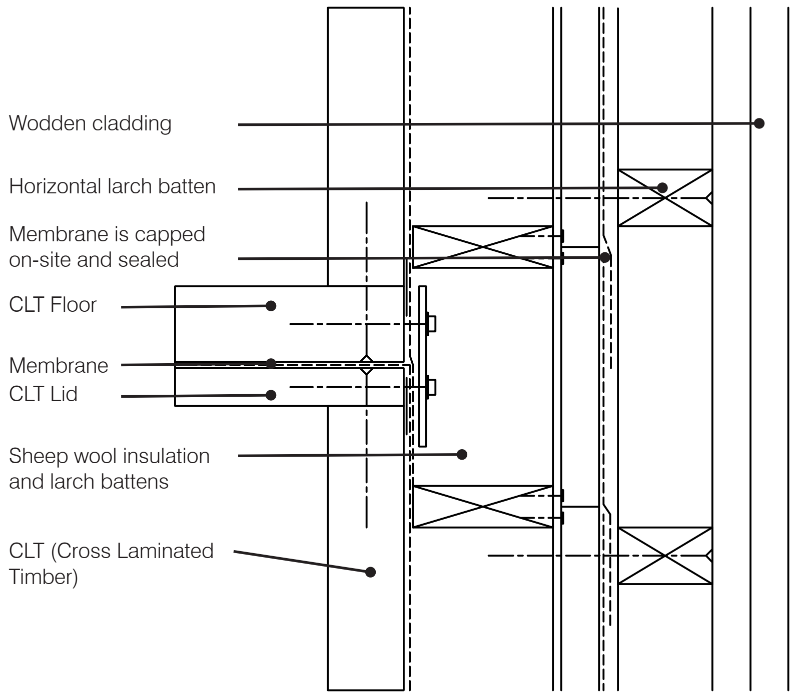
ROOF:
2 x 13 mm gypsum board
45 mm rock wool
350 mm wood construction w. rock wool
22 mm wood fiber board
2 layer roof membrane

Compared to:

220 mm concrete hollow core slab
400 mm rock wool
2 layer roof membrane



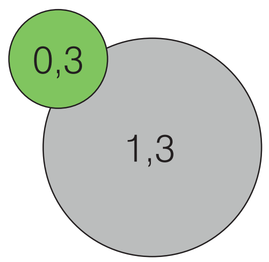
The Danish Building Research Institute (SBi) has calculated environmental profiles for different building components.
Below, you can se a comparison of typical wood and concrete solutions for roof and outer walls. The circles depicts the relative Global Warming Potential of 1 m^2 of building component in kg CO_2/m^2/year, at 80 years service life.



OUTER WALL:
2 x 13 mm gypsum board
45 mm paper insulation
300 mm wood construction w. paper insulation
8 mm fibercement board
Wood lattens
25 mm larch cladding

Compared to:

180 mm armed concrete element
300 mm steel construction w. rock wool
8 mm fibercement board
Wood lattens
25 mm larch cladding



None of the examples from SBi has sheep wool insulation, as there is no comprehensive EPD on sheep wool insulation so far. The roof example has rock wool, and the outer wall example paper insulation, so the numbers will differ from our construction - but the overall image of wood construction as the sustainable choice is the same.

MATERIALS AND SUSTAINABILITY
Regarding the choice of materials, the main objective of the team has been to come up with a concept for robust and durable materials and construction methods that has extraordinary low CO2-emissions. The use of cement, gypsum and virgin metals is very limited in the project; likewise, burnt bricks and rock wool or plastic insulation materials are avoided.

Both wood and sheep wool insulation has a very low global warming potential, wood is, in its essence, CO2 neutral, and emissions from sheep wool insulation are less than three times that of ordinary rock wool.
By using only wooden material in inner walls, instead of gypsum boards on metal mounting, a significant amount of greenhouse gas emissions are avoided.

SUSTAINABLE BUILDING MATERIALS
– A NEW BUSINESS OPPORTUNITY FOR THE FAROESE?
The Faroe Islands is a prosperous society, but the economy is small, and vulnerable to fluctuations in the price of fish, as fishproducts represents 91% of the export (2010). The Eyes of Runavik project makes use of several sustainable building materials, that could be developed into new export products.

Green roof vegetation
Awareness is on the rise, regarding the importance of securing biodiversity and protecting local natural habitats from invasive species. To grow a resilient and site-specific green roof, one must cultivate and propagate the appropriate plant-species. Green roof "nurseries" could be set up as local business. For more inspiration, look at Byggros UrbanGreen®, which is a concept for Danish biotopes.

Sheep wool insulation
Based on the Faeroese tradition for breeding sheep, nothing would be more natural than to insulate the housing with sheep wool. Sheep wool is a highly effective insulating material; sustainable, renewable and does not endanger the health of people or the environment. Untill local production would reach a scale big enough to set up a factory, the wool could be prepared in the Faroe and then shipped to e.g. northern England where there are manufacturers of wool insulation.

Burnt wood cladding (Shou-sugi-ban)
The process of applying heat and fire to the exterior of a wood product for a short period of time changes both the cellular structure and thermodynamic conductivity of the wood. The combination of attractive looks and good functional and sustainable properties, has made japanese Shou-sugi-ban very trendy. To our knowledge, there are no larger scale production in Europe, and therefore good possibilities to get a head start in know-how and volume of production.

DWELLING / ENERGY CONCEPT

OVERALL ENERGY SCHEME

The buildings designed according to Passive House criteria to minimize the energy requirements. The little heat necessary will be provided by a geothermal system. Every household has an individual heat exchange unit for the ventilation system.

ZERO EMISSION

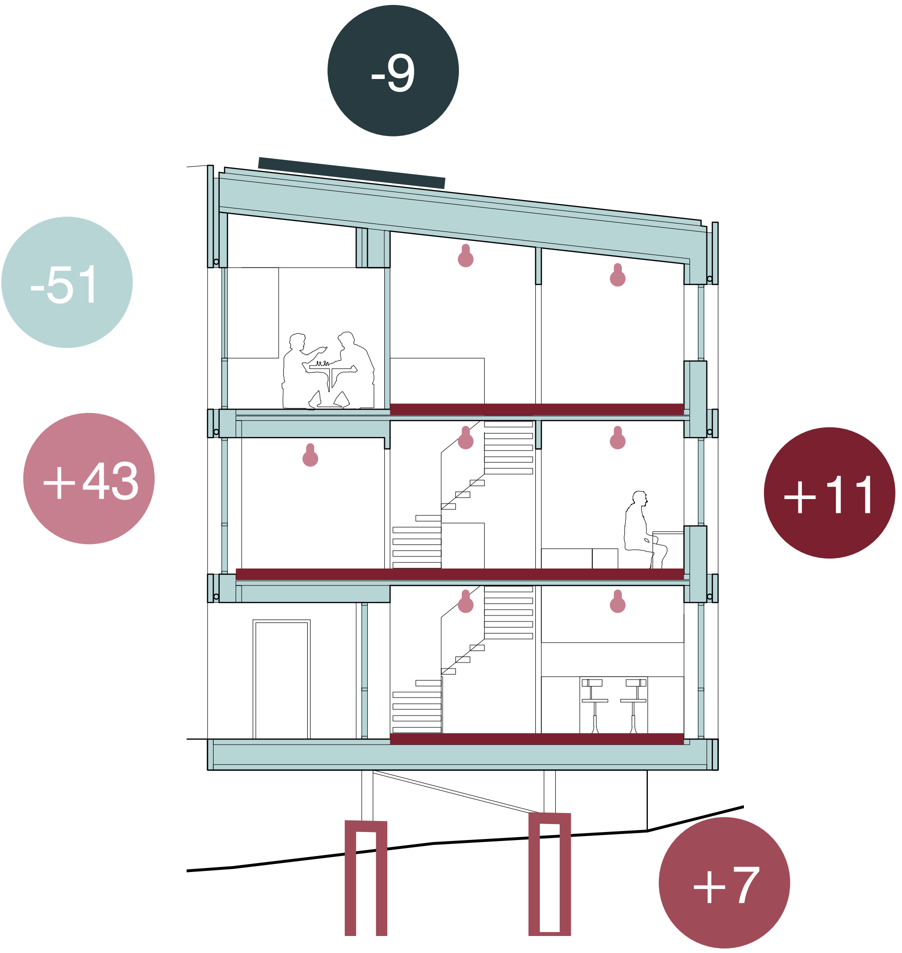
The project aims to establish buildings with a zero emission contribution over a 60 year cycle. Assessment calculations have been made for the global warming potential of building materials, operational energy and construction works of one medium sized residential unit.

The diagram below document how the proejct aims to reach the zero emmisions, CO2 Balance over the course of 60 years.

Exhaust:
household electricity +43
heating +11
foundation works +7

Savings:
building materials -51
photovoltaics -9

= Zero emission

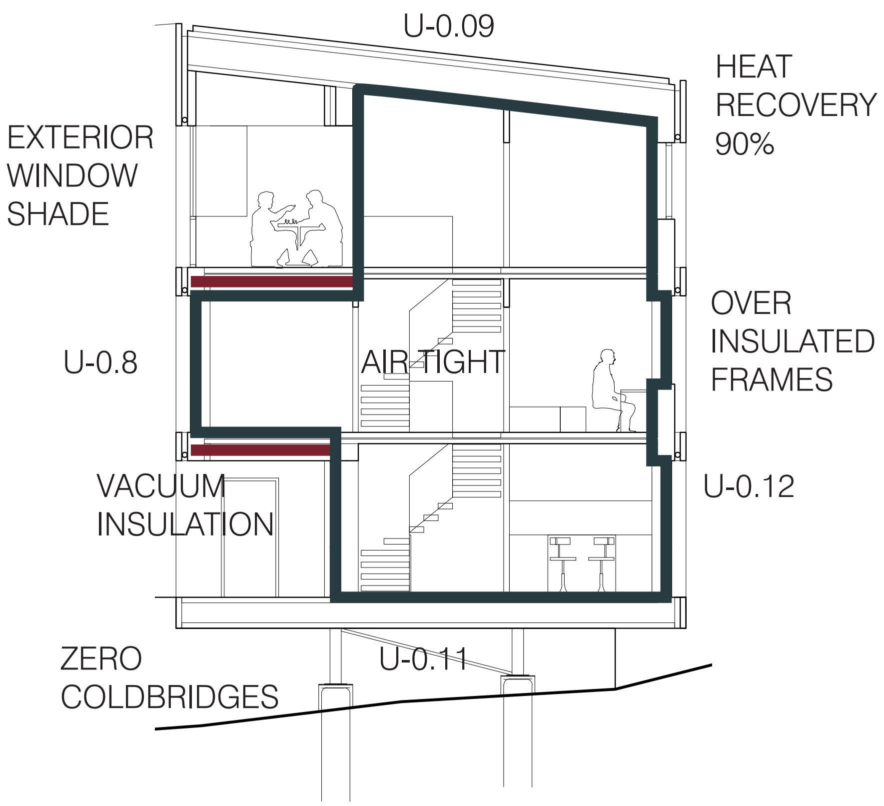


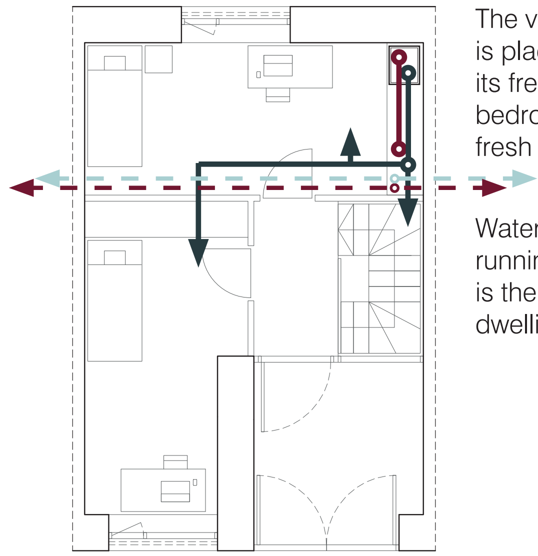
PASSIVE HOUSE TECHNOLOGY

The Passive House Planning Package (PHPP) has been used to ensure that the result is a housing area with excellent energy performance. With the PHPP as a complementary design tool, energy systems and architectural concept are developed in an iterative design process. In this project, each dwelling has an effective form factor; the ratio of the thermal envelope to the gross floor area in the typology is modest.

Living in a passive house is not only about saving energy but requires a good indoor climate and indoor environment. To achieve a low energy concept by using the passive house standard the key measures are: a well insulated thermal envelope, heat recovery of ventilated air, windows with very low u-values, minimized amount of thermal bridges and air tightness.

Well insulated walls and roofs with low u-values ranging from 0,09 to 0,12 are put together with high performance windows (u<0,8). Details like window mounting where insulation covers the frames from outside, and wood as a building material instead of concrete or steel, create an envelope almost free from thermal bridges.
A very air tight envelope with no “weak spots” and high performance windows give indoor surfaces with even temperatures providing comfort for the residents with no feeling of draft. Together with a minimum of thermal bridges this a guarantee for avoiding moisture. The investment cost of a passive house can be expected to be 5% higher than for a less well insulated building. This extra investment is balanced by the savings of a heat demand which can be as low as 1/5 of an ordinary building.

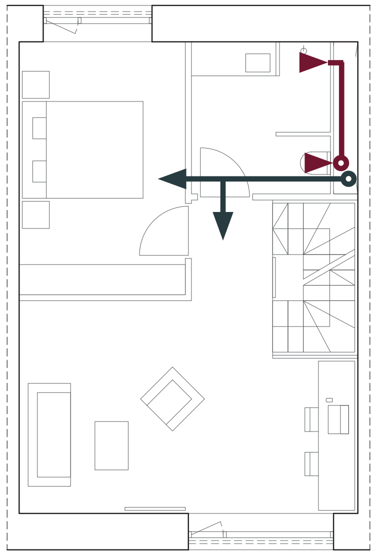




LEVEL 2

The ventilation unit and heat exchanger is placed in the upper level, and has its fresh air intake over the roof. The bedrooms on this level is supplied with fresh air.

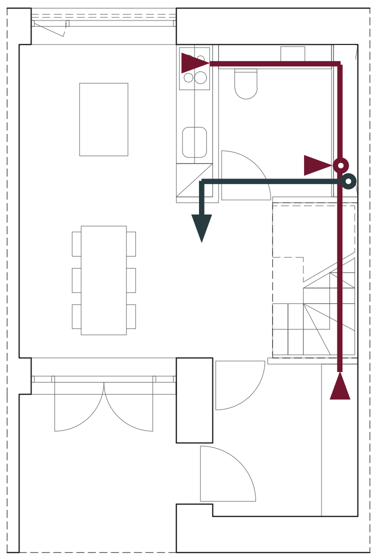
Waterboren distribution of heating is running under the roof. The heating is then distributed vertically in each dwelling.



LEVEL 1

On the first floor, the bedroom and living-room are supplied with fresh air. Used air is extracted from the bathroom.

The dwellings do, in general, not have suspended ceilings, exept from where ventilation and heating pipes run. With this layout, it can be limited to the bath-rooms and one bedroom in the upper floor.

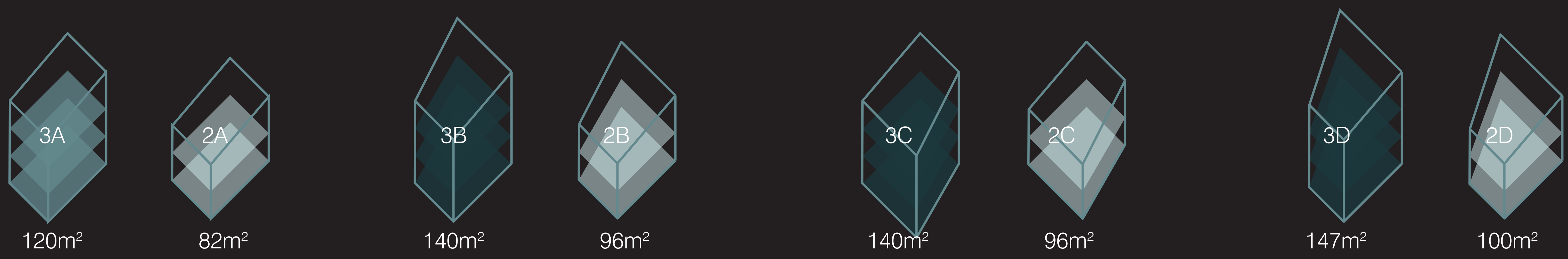


LEVEL 0

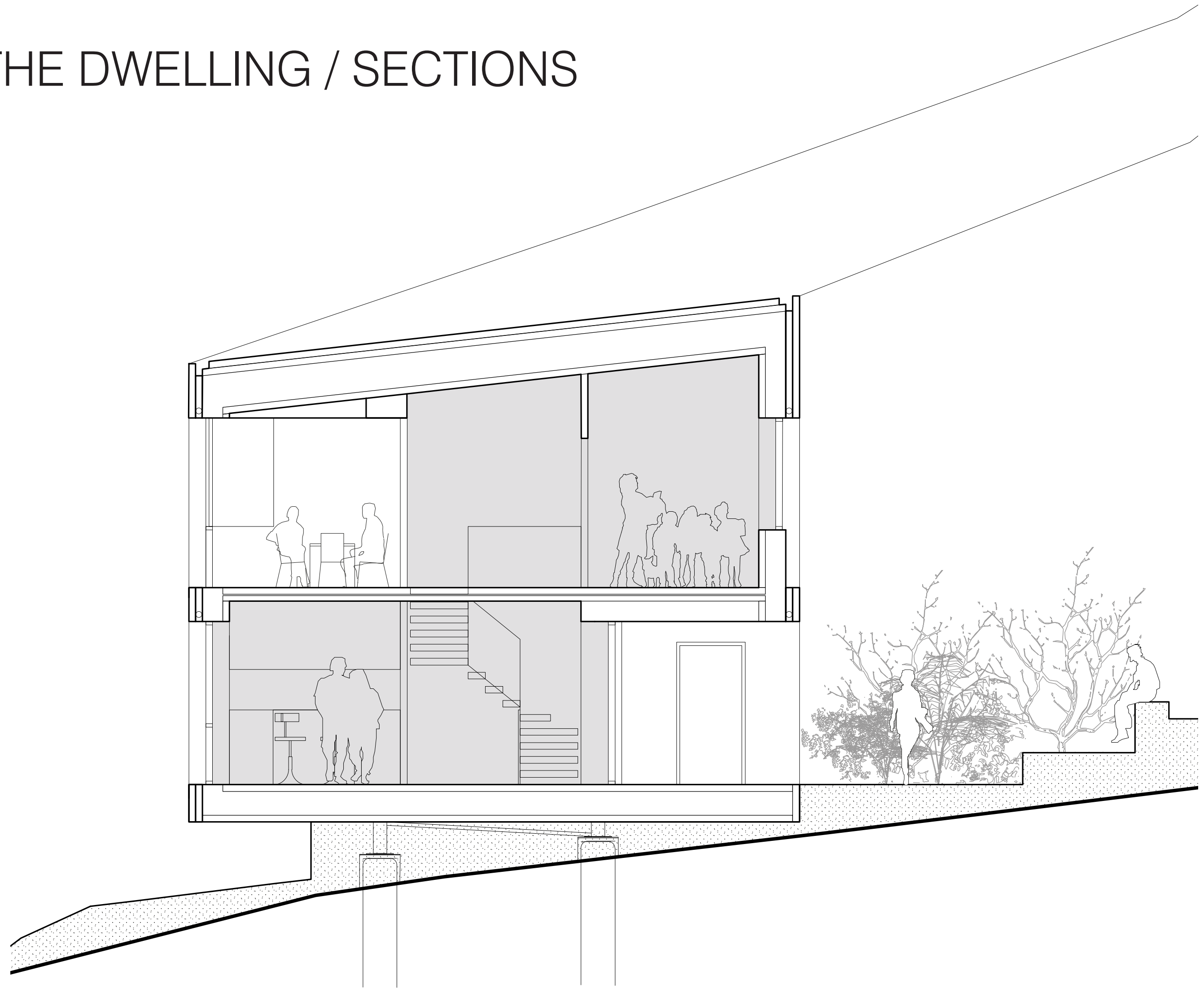
In the ground floor, fresh air is supplied to the livingroom. Air is extracted from the utility room (due to damp clothing etc.) and from the bathroom. The kitchen hood can either have its own filter, or connect to the ventilation system.

The bottom part of the staircase will be closed, and the ventilation pipe can run behind the stair to the utility room.

THE DWELLING / FLOOR PLAN TYPES



THE DWELLING / SECTIONS



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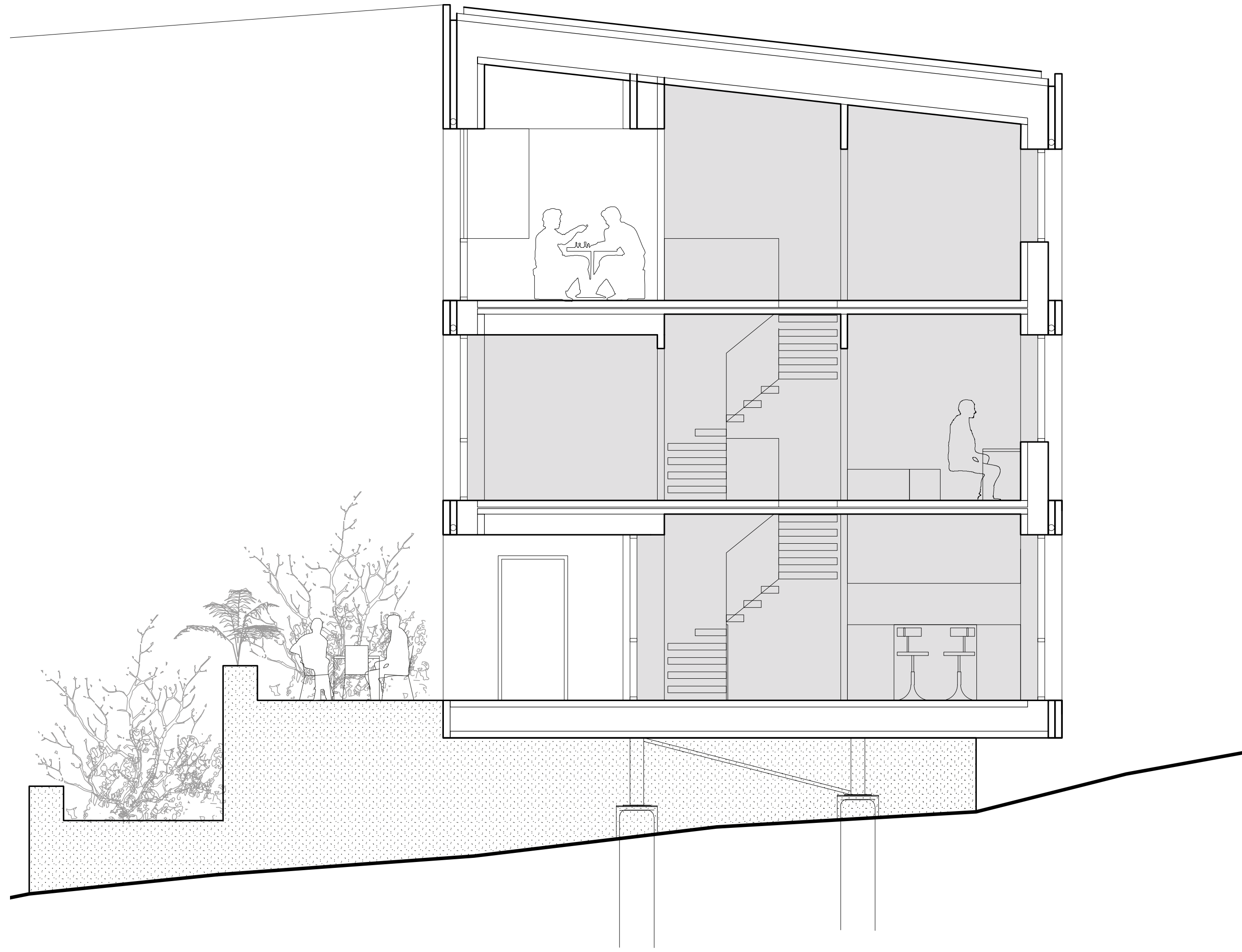

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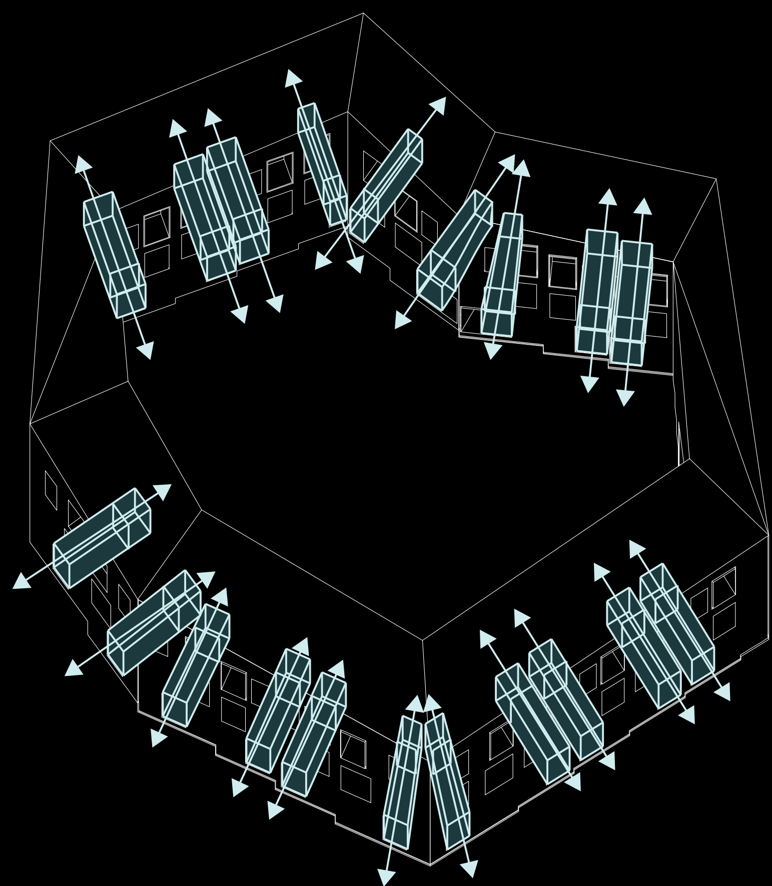
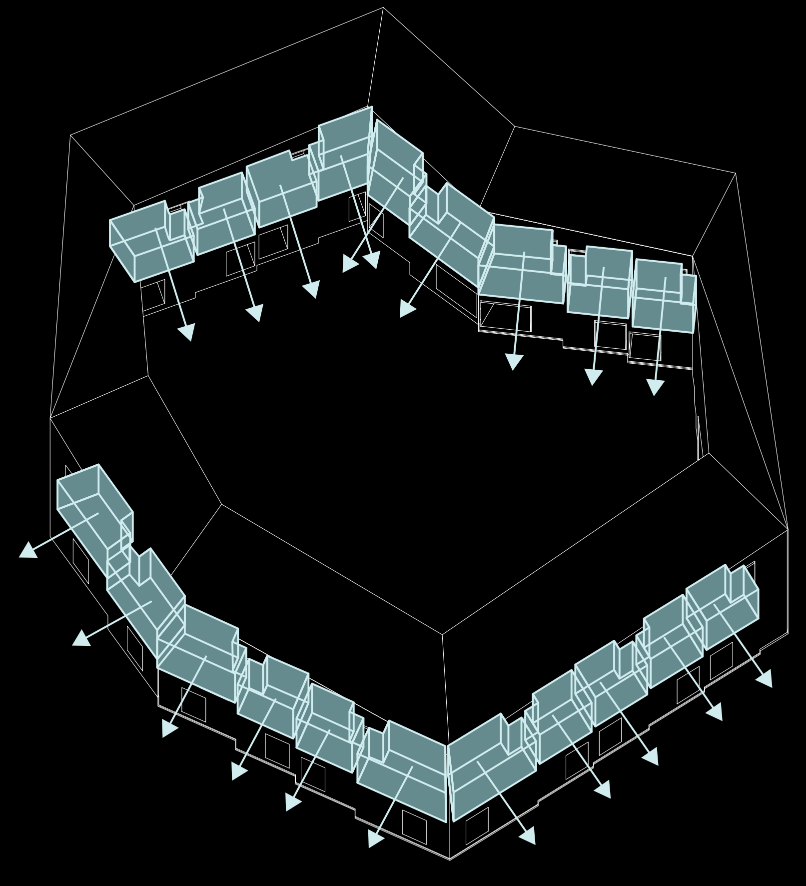
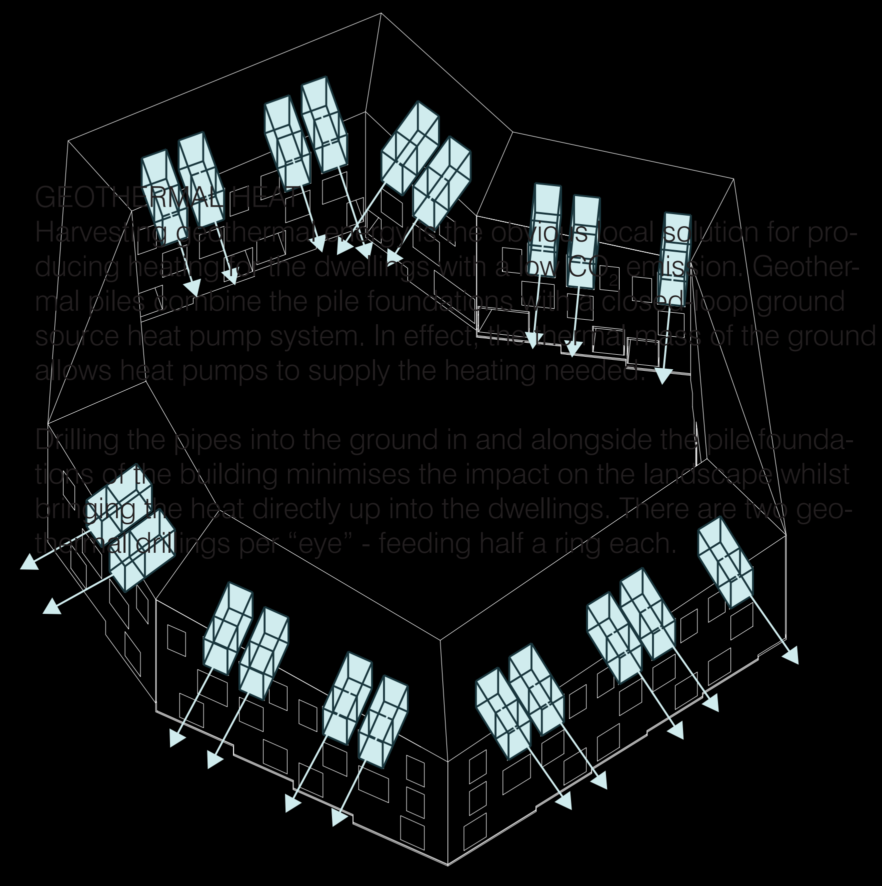


KITCHEN DINING ROOM



LIVING ROOM



THE VISTA ROOM