# TITLE PAGE

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| Project title: | ILLU NAASULIK [house with plants] - growing families |
| Main theme: | Building in an arctic climate |
| Student: | Marianne Dalbøl Pedersen |
| Semester: | Thesis project, 10th semester,<br>Architectural Design<br>Department of Architecture, Design & Media Technology<br>Aalborg University |
| Project period: | 01-02-2011 - 31-05-2011 |
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| Technical supervisor: | Rasmus Lund Jensen<br>Department of Civil Engineering |
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Marianne Dalbøl Pedersen

# SYNOPSIS

This project focuses on a study of building design in an arctic climate in West Greenland. The project aims for a design of a family counselling centre in Uummannaq that relates to the cultural, topological and climatic context.
This aim is reached through a thorough analysis of the site and building tradition together with envestigations of arctic building technologies in general. Calculations on the energy consumption is integrated in the proces from the early design phase till the final detailing.

# INTRODUCTION

This folder is the presentation of the master thesis project by Marianne Dalbøl Pedersen specialized in Architectural Design at the Department
of Architecture and Design at Aalborg University.
Besides this folder is the program and process which describes the different phases of the project.

The project is a proposal for "Illu Naasulik" a family counselling centre in Uummannaq, West Grenland.

Family centres are presently planned in many Greenlandic cities as a result of social problems within families. The municipality of Quaasuitsup is planning a counselling centre like this, to be placed in Uummannaq.

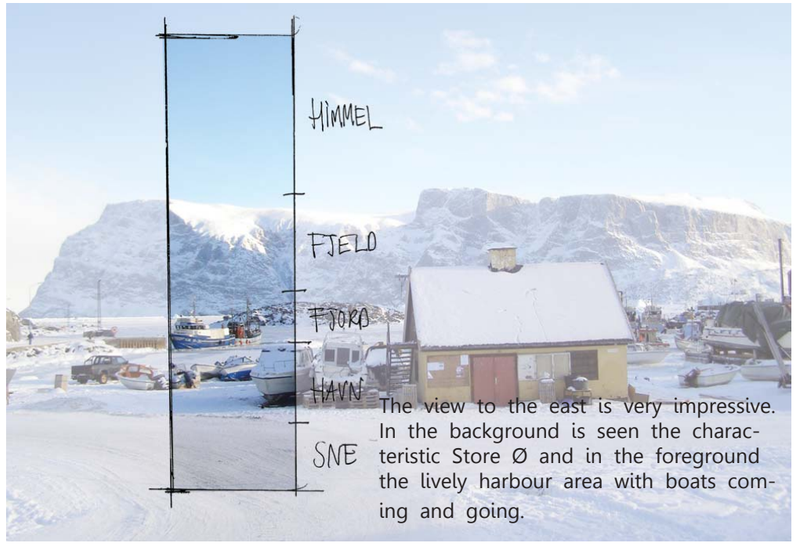
The project is based on a studytrip to Uumannaq and collaboration with Helga Nielsen manager of Health and Prevention in North Greenland, municipality of Quaasuitsup.
Uummannaq is like many other towns in Greenland subject to many social problems caused by poverty and unemployment. As it is a small and very isolated town (1281 people) there are no counselling offers for socially weak families. The problems therefore often continue from generation to generation. To be able to stop this cycle the "Illu Naasulik" should reach out for both children, young people and adults.
The house should therefore offer a flexible space which can offer space for larger meetings or arrangements and smaller more private consultations in one house.

The context (both cultural and climatic) is very different from the danish and to be able to make a design under such curcumstances a thorough analysis must be made. Both within the field of building technologies but also a more empatical analysis. It is nessecary to understand these people and the place to make a qualified and succesful design.
The building tradition has over time adapted to the climatic situation and a sort of archetype of the Greenlandic house has developed.
The proposal for the "Illu Naasulik" is based on an analysis of this building type but also introduces new ways of thinking when it comes to building in the arctic.

In a future perspective this proposal hopefully opens up the dicussion about this project and about what it should bring the town. Also it serves as an example for other proposed family counselling centres around Greenland.

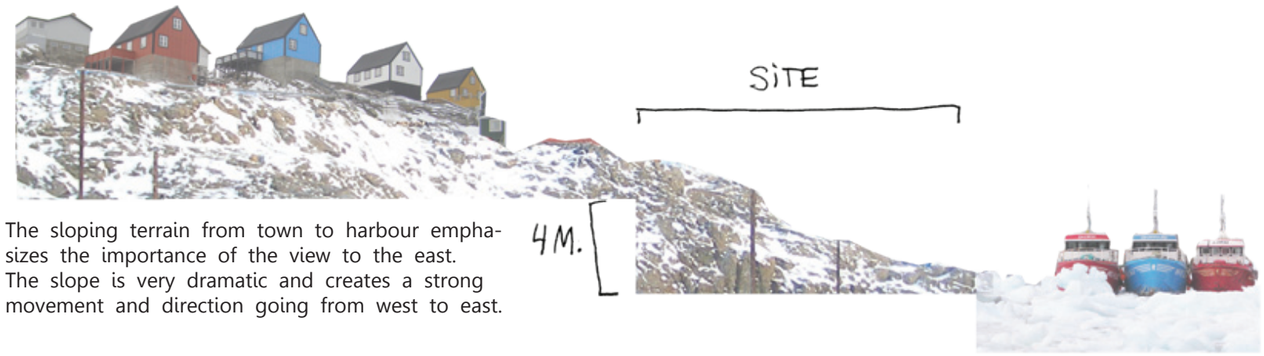
# THE THREE MAIN CHARACTERISTCS OF THE SITE

## THE VIEW OVER THE HARBOUR

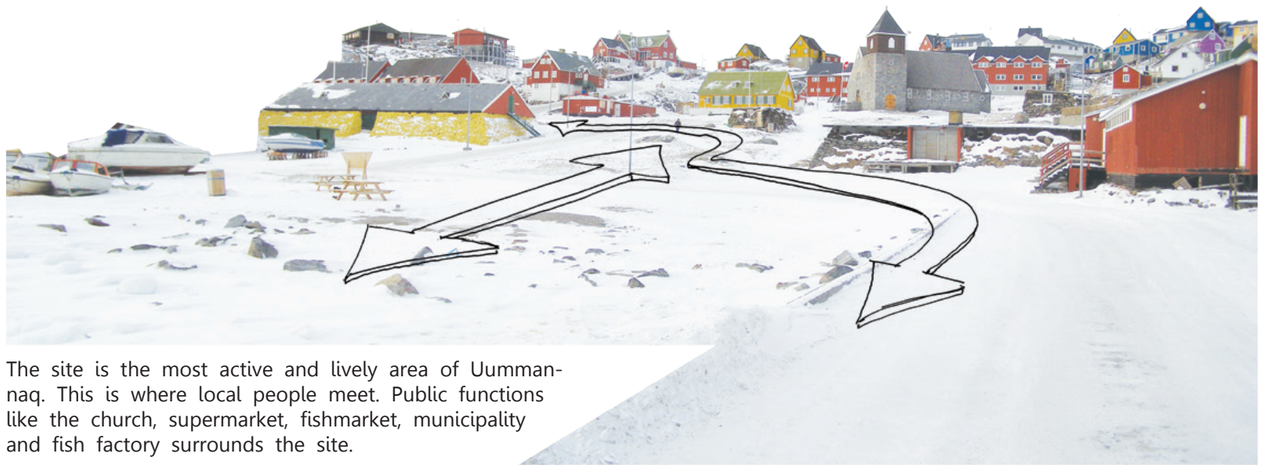



The view to the east is very impressive. In the background is seen the characteristic Store Ø and in the foreground the lively harbour area with boats coming and going.

## THE SLOPING TERRAIN




The sloping terrain from town to harbour emphasizes the importance of the view to the east. The slope is very dramatic and creates a strong movement and direction going from west to east.



The site is the most active and lively area of Uummannaq. This is where local people meet. Public functions like the church, supermarket, fishmarket, municipality and fish factory surrounds the site.

# LOOKING WEST


THE SUPERMARKET.
-SOCIAL MEETING PLACE!

HISTORICAL STONE HOUSE
- CURRENTLY USED FOR STORAGE

GRANITE CHURCH
- GRANITE FROM LOCAL QUARRY
- VERY BEAUTYFUL!!

HISTORICAL SOO HOUSES.
- CURRENTLY NOT USED.
- NOT USABLE AS LIVING SPACE!

# LOOKING EAST

THE GRILL BAR.
-VERY IMPORTANT SOCIAL MEETING PLACE.

ROYAL GREENLAND.
-THE SOURCE OF INCOME.

LOCAL FISHMARKET.

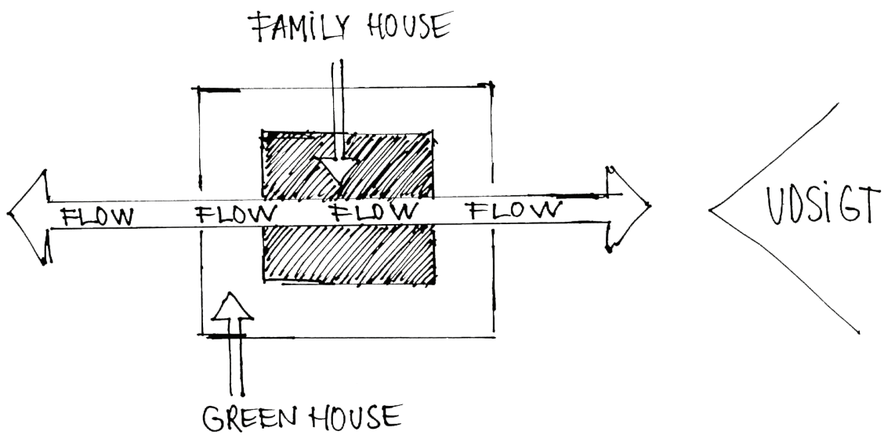
STORE Ø

WAREHOUSES

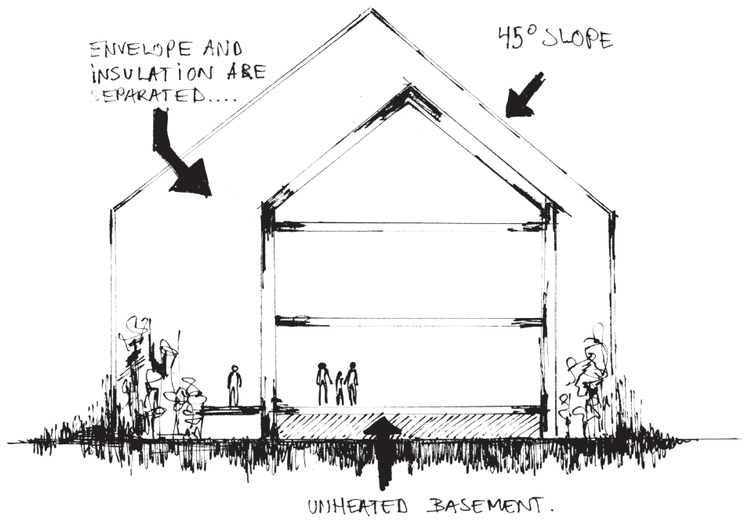
# THE CONCEPT

THE OVERALL CONCEPT SKETCH covers the idea of separating the insulation from the envelope. This is done by litterally building a house inside a greenhouse. The greenhouse is a public space open for everybody creating a new townspace for people to meet.
The children can get the experience of seeing a tree grow and tasting a homegrown tomato.
Apart from being a new green town space the greenhouse also reduces the energy consumption of the house inside by 30%.

The flow on the site is lead through the greenhouse and view towards east is emphasized.



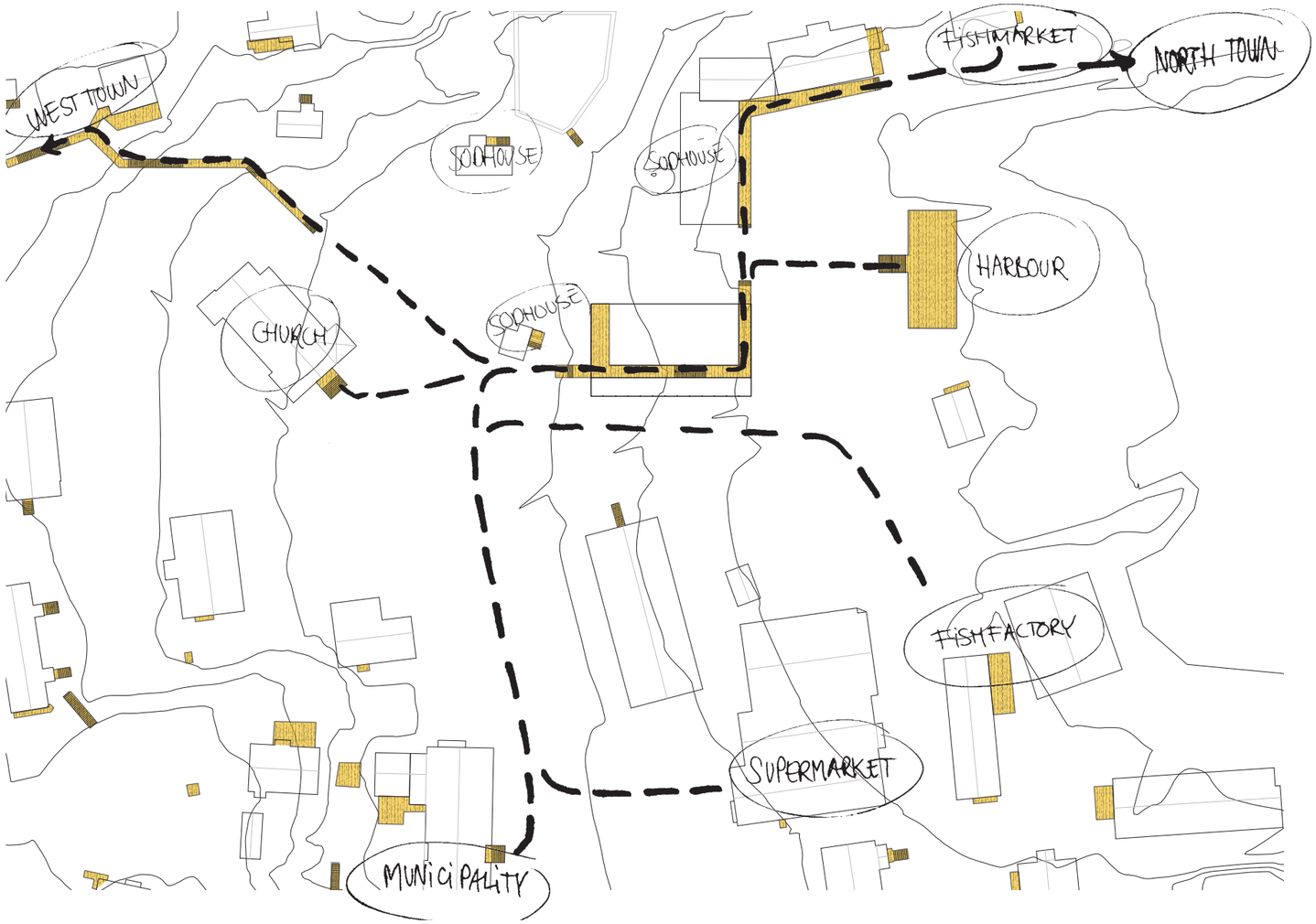

This section shows how the greenhouse creates a thermally protected townspace.
The family house makes use of the local building tradition and experience. The 45 degrees sloping roof prevents the snow from stressing the roof construction. As the Uummannaq is build on mountain ground the foundation must be raised creating an unheated basement which also prevents moist from penetrating the wood construction.



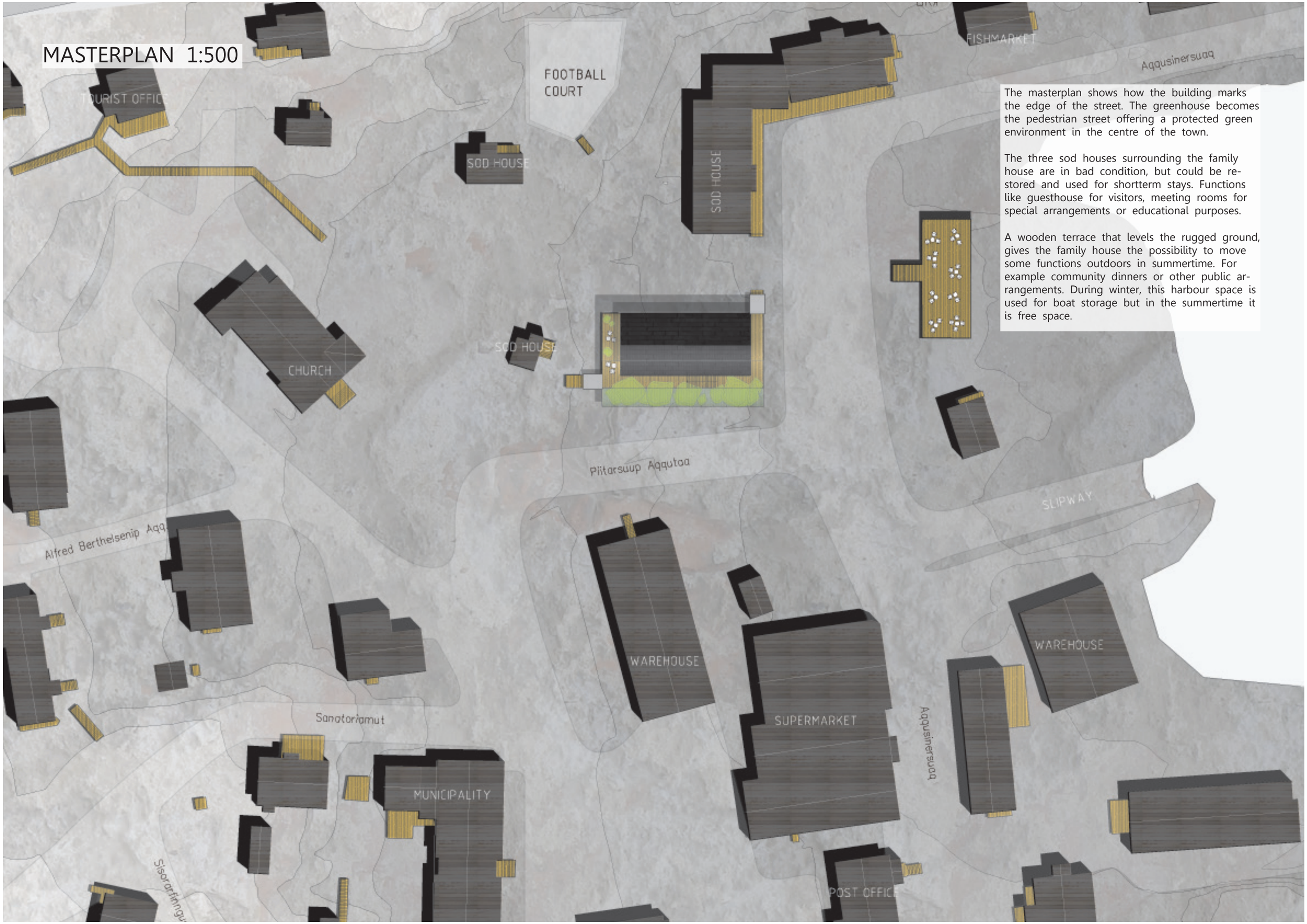

# EXTERIOR FLOW AND CONNECTIONS TO CONTEXT

The location of the family centre makes it an intersection of many paths in the town. Therefore it was important in the design, to keep this flow and to even strengthen and add value to it.

The wooden pedestrian pathways which creates a network separated from the roads, ensures the possibility to pass safely around the town. Even in winter where the snow covers the ground.
This network of wooden pathways is continued in the exterior flow through the family house.



# MASTERPLAN 1:500




The masterplan shows how the building marks the edge of the street. The greenhouse becomes the pedestrian street offering a protected green environment in the centre of the town.

The three sod houses surrounding the family house are in bad condition, but could be re-stored and used for shortterm stays. Functions like guesthouse for visitors, meeting rooms for special arrangements or educational purposes.

A wooden terrace that levels the rugged ground, gives the family house the possibility to move some functions outdoors in summertime. For example community dinners or other public ar-rangements. During winter, this harbour space is used for boat storage but in the summertime it is free space.

## ADAPTING TO THE SLOPING TERRAIN

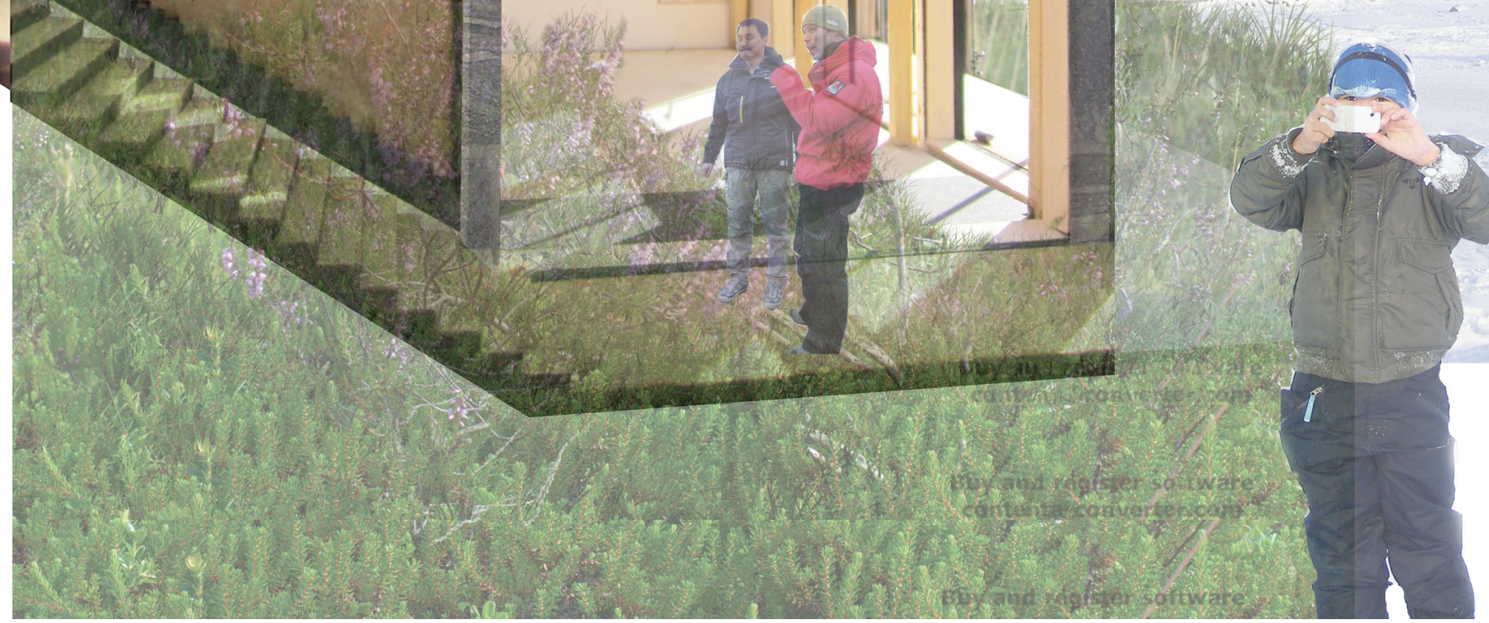
"Illu Naasulik" opens up towards east. The transparent expression of the greenhouse makes it a natural part of the movement and activity on the site. It becomes a pedestrian street that edge the street grid and leads you through a green townspace. Both the exterior and interior flow follows the 4 metres slope in the terrain.
On the first floor a small terrace pierce through the greenhouse and completes the interior flow with a undisturbed view over the east turned harbour.

The stone tiles in the facade gives the building a robust and grounded expression that matches the granite-stone townchurch. Also in scale it relates to the church. The size of the building represents its importance and express the public function.

The sloping terrain makes room for a full height space towards east with an interior view to the ridge and the three upper floors.

THE LARGE SOUTH TURNED WINDOWS fills up the community room with daylight, while allowing the sun to heat up the building during the day.
The windows follows the grid of the wooden structure, giving a sense of order in the seemingly random placed windows.
The lowest floors have the largest window opening while the upper floors are more protected from the public exposure.

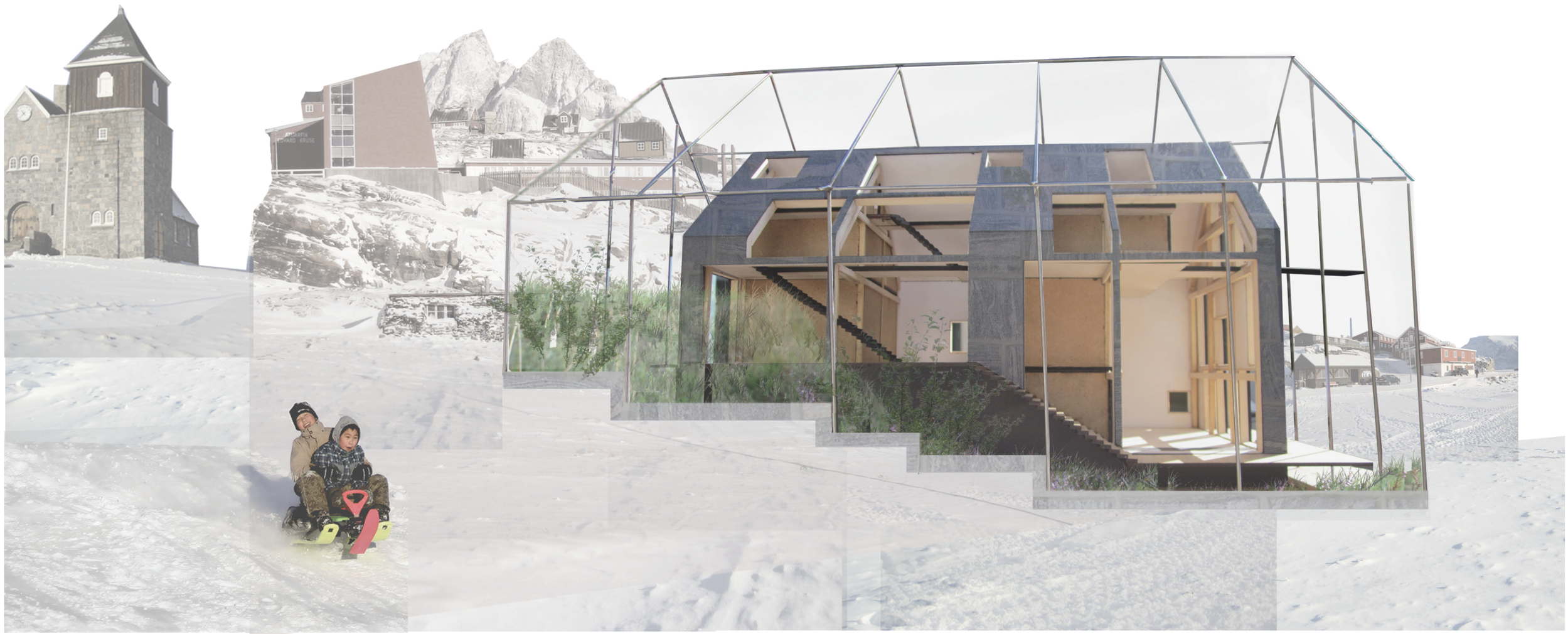
The greenhouse is the place for encounters. A part of the townspace which is open 24 hours for everybody.
Like the network of wooden pathways covering Uummannaq lets pedestrians climb the town safely, the pathways in the greenhouse also follows the curves of the terrain and gives a strong relation to the exterior.

THE GRADUATION IN PRIVACY is emphasized in the size of the window openings. The social rooms have the largest windows while the first and second floors are less exposed.

The green and luxuriant plants in the greenhouse is a strong contrast to the barren mountain ground outside. It lits up the town with a warm green light in the long winter nights. Offering a safe and protected home away from home.

The organisation of rooms are emphasized in the south facade. Two cores of more private functions continues on to the second floor dividing the two social rooms. This room organisation gives the social rooms view to the ridge and gives a clear division of private and public. The interior flow is placed towards the south facade as it is the most exposed facade.



THE NORTH FACADE is the only facade which is open directly to the outside. All meeting rooms and office spaces are turned towards north to get an undisturbed atmosphere with a soft indirect daylight.
All rooms have at least one window to the outside. This choice takes into account the psycological value of being able to open a window directly to the outside.
The decision of opening the north facade, also increases the heatloss from the surface. Therefore the window openings are kept to a minimum and placed solely from functional considerations and thus reflecting the interior room organisation.

The small amount of openings really emphasizes the monolithic expression of the family house.

Late afternoons can be enjoyed on the west turned terrace. The plants covers the wooden flooring, while the sun lets the last beam heat up the meeting room through the large window openings.

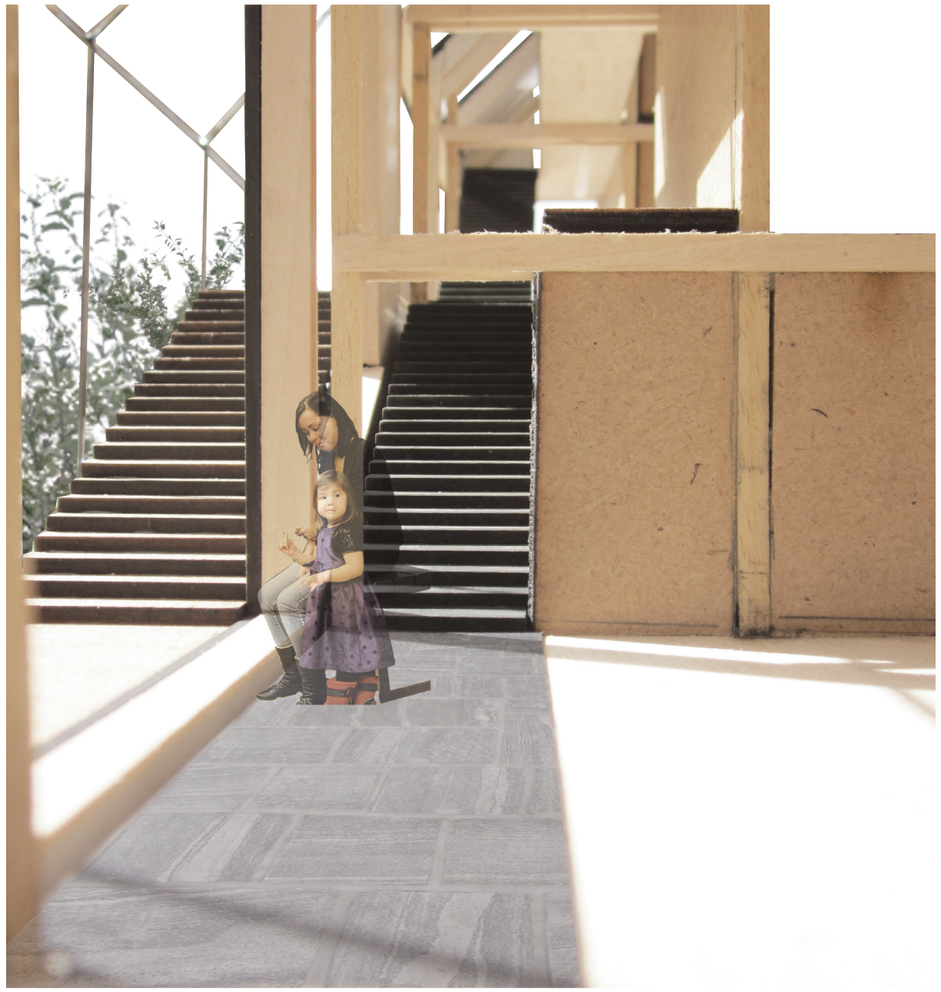
THE METAL CLADDED WINDLOCK lights up in the morningsun drawing attention to the raised entrance.
The full height community room disperse the heat from the morningsun to the rest of the house.

The town is full of life at the harbour. Trucks and snow scooters pass the house while fisherboats leave for the next catch. Children use the greenhouse for play in the breaktime and after school. The "Illu Naasulik" is a social meeting point for both young and older people as it provides a relaxed atmosphere and holds activities for all ages.

The sod house in the background, provides space for short term accomodation for guests from out of town, connected to the family centre.

IN THE EAST TURNED COMMUNITY SPACE the daylight enters the large window openings and spreds out to the upper floors. A narrow bridge crosses the room and continues through the greenhouse on an external terrace.
Just below the bridge people the main entrance from east welcomes visitors to one of the two social spaces.
This rooms holds space for community dinners and other similar activities. A small kitchen and a storage space offers the possibilty of having larger meetings in this room.
An elevator connects the community space with rest of the floors.

THE SOUTH TURNED ENTRANCE welcomes guests into the second social room of the building. This staircases and the lower room height makes this room more private and enclosed.
Large visible wooden beams reveals the layering of rooms and the structural system. The interior wooden walls gives a human scale and provides the house with a soft and homely atmosphere in contrast to the heavy and monolithic exterior.

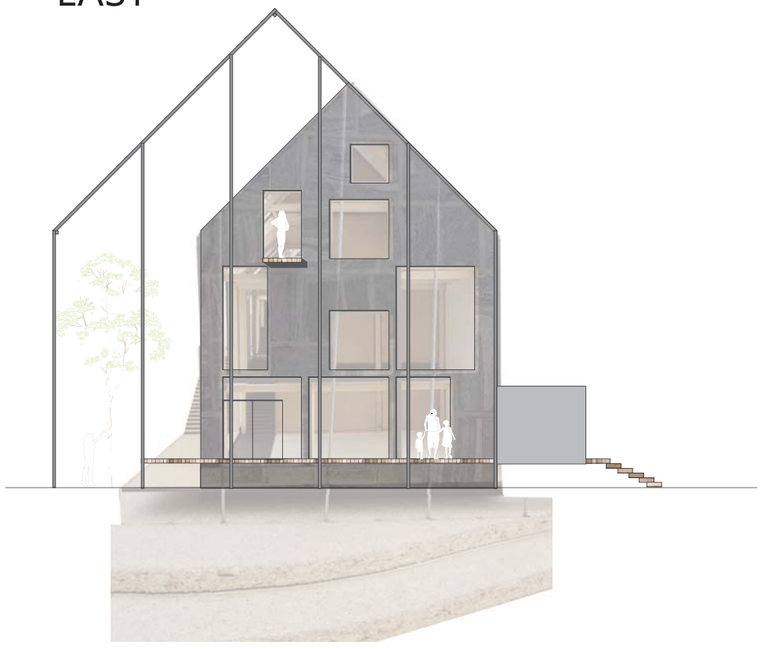


ENTERING THE BUILDING FROM THE EAST the stone tiles circulationspace, leads you along the south facade to the meetingrooms and offices. This circulation space also offers space for other social activity. It is closely connected to the exterior flow and the large window openings almost gives the feeling of being inside the greenhouse.
The stone tiles stores the solar heat and releases it to the house in the nighttime.

ON THE FIRST FLOOR the sloping roof encloses the space and makes it more intimate. This floor contains all office and conversation rooms distributed towards north. These offices are not disturbed by the direct sunlight and are not as exposed as the lower floors. A small recess towards south offers space for people to stay and have a look at the green plants in the greenhouse.
The circulation space overlooks both social spaces and continues as an exterior eastturned terrace.
A small staircase leads to two small appartments on the second floor. They offers a safe temporary home for those in need of it.

# FACADES 1:200

## EAST

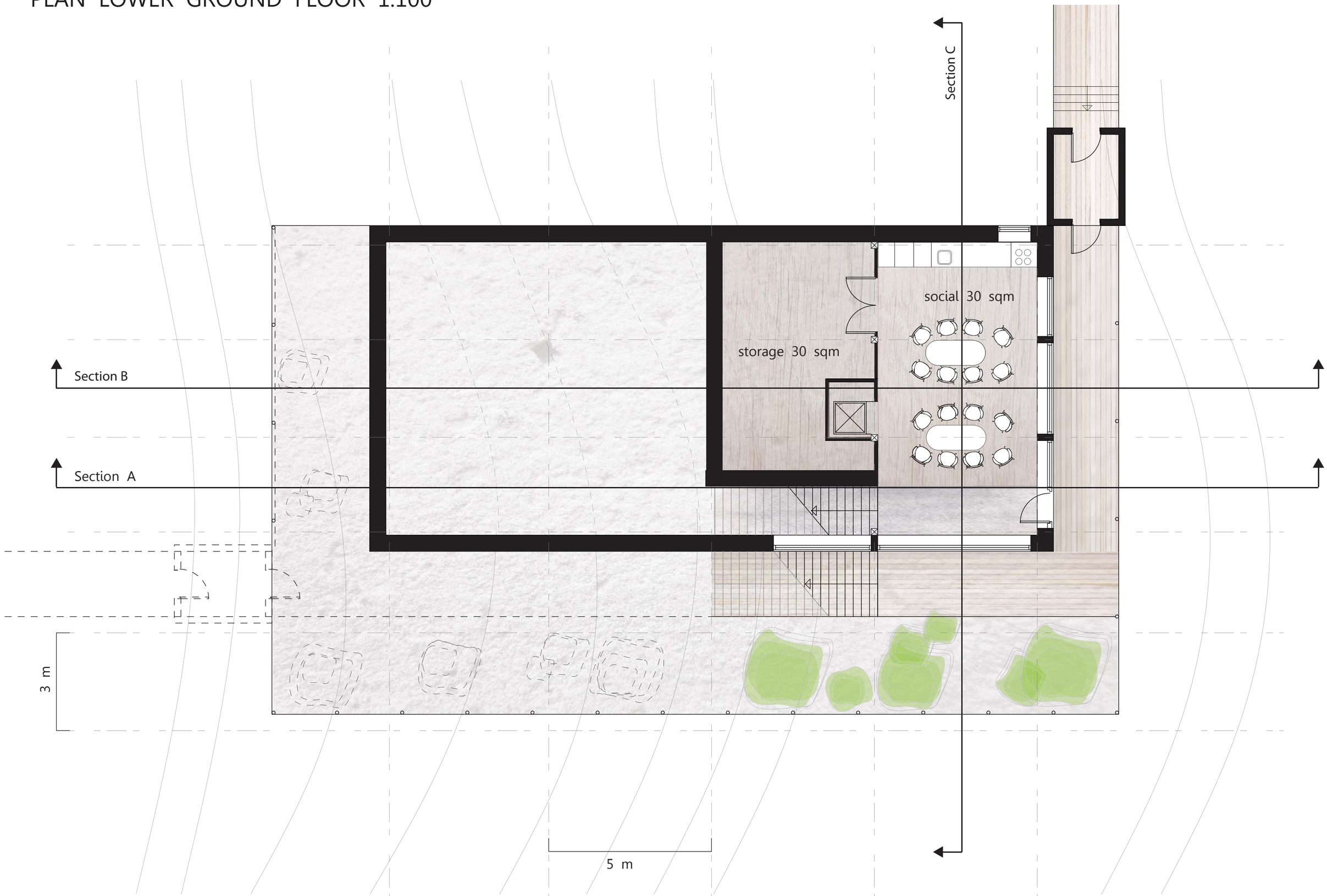


## NORTH

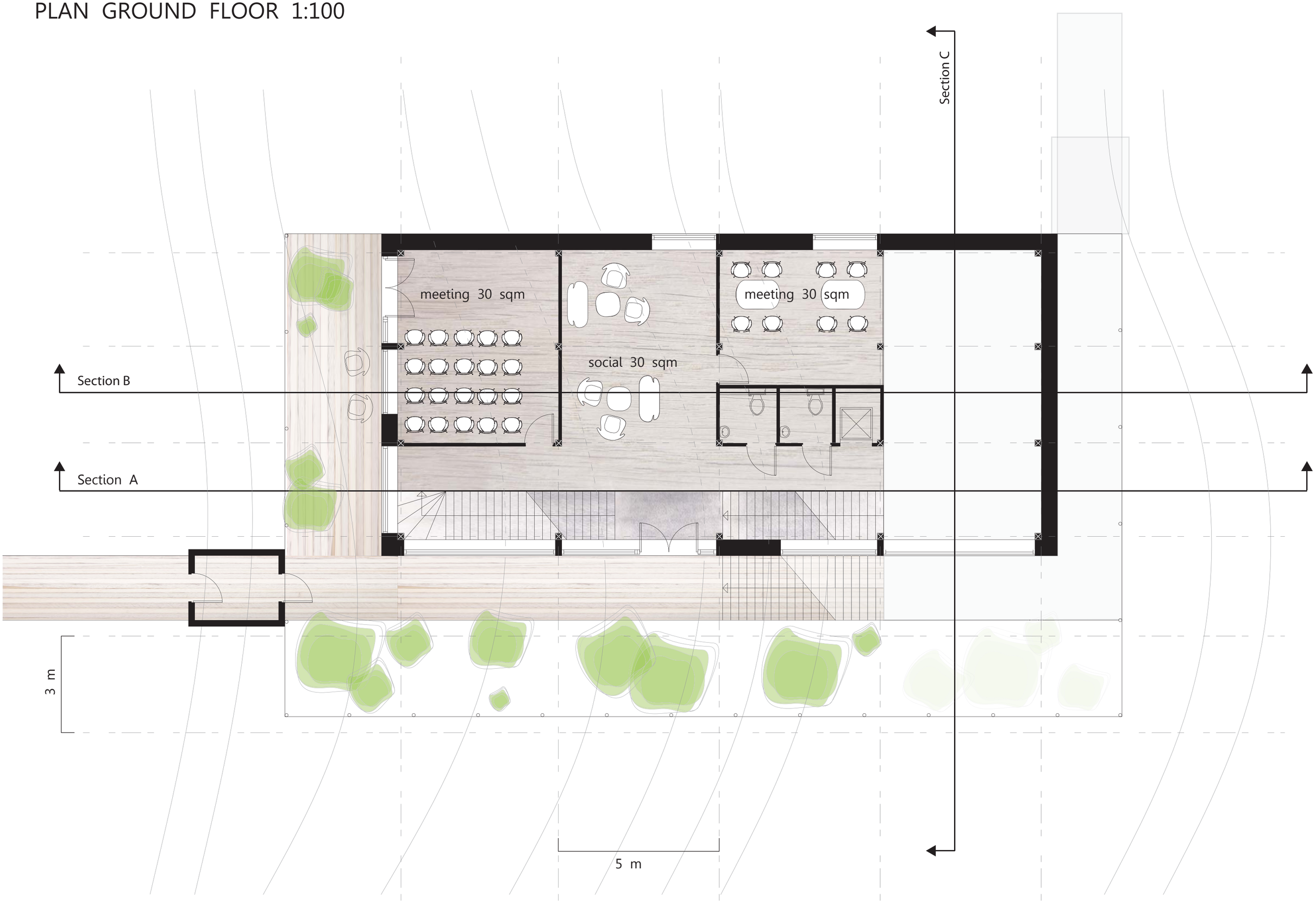
## SOUTH

## WEST

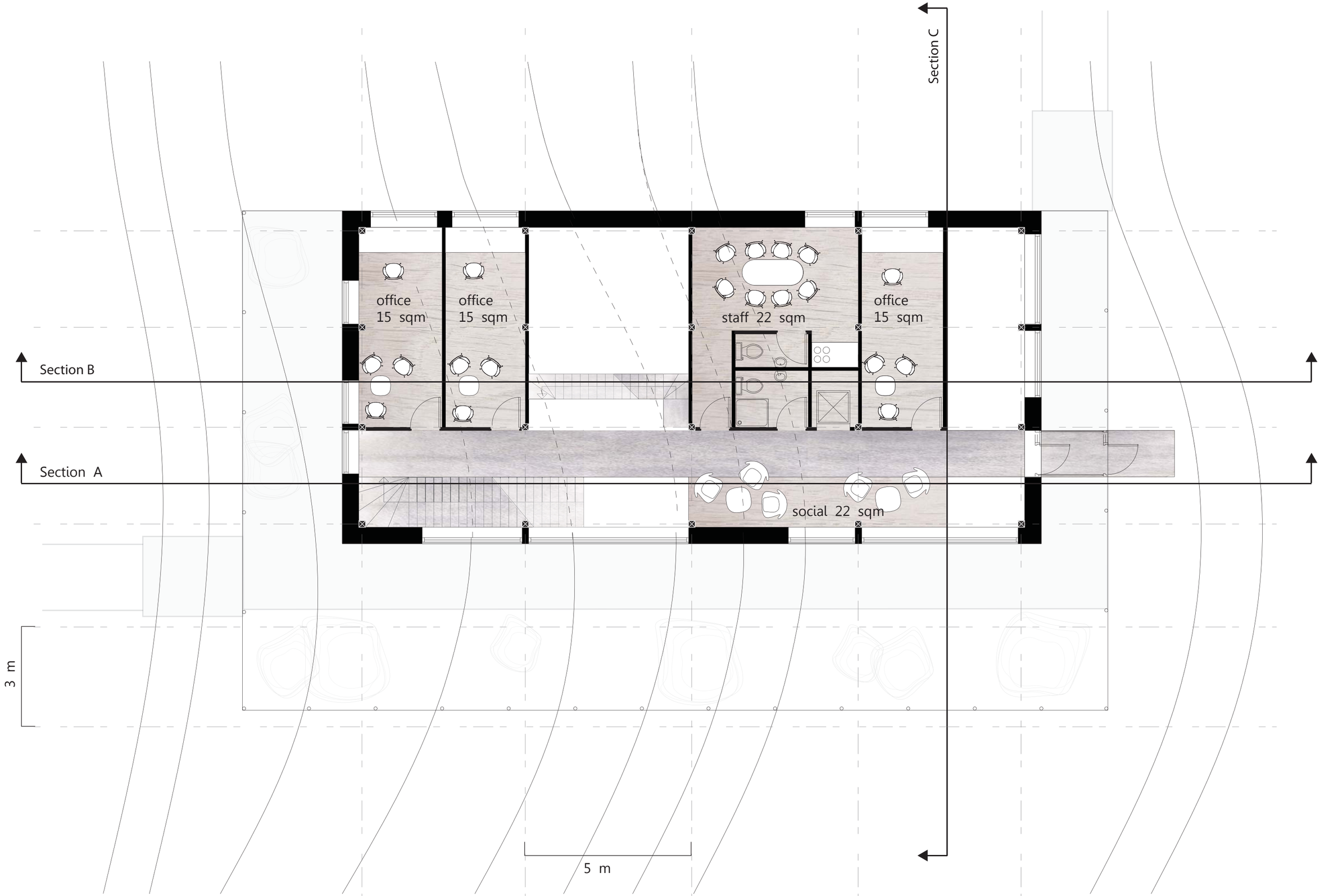
# PLAN LOWER GROUND FLOOR 1:100



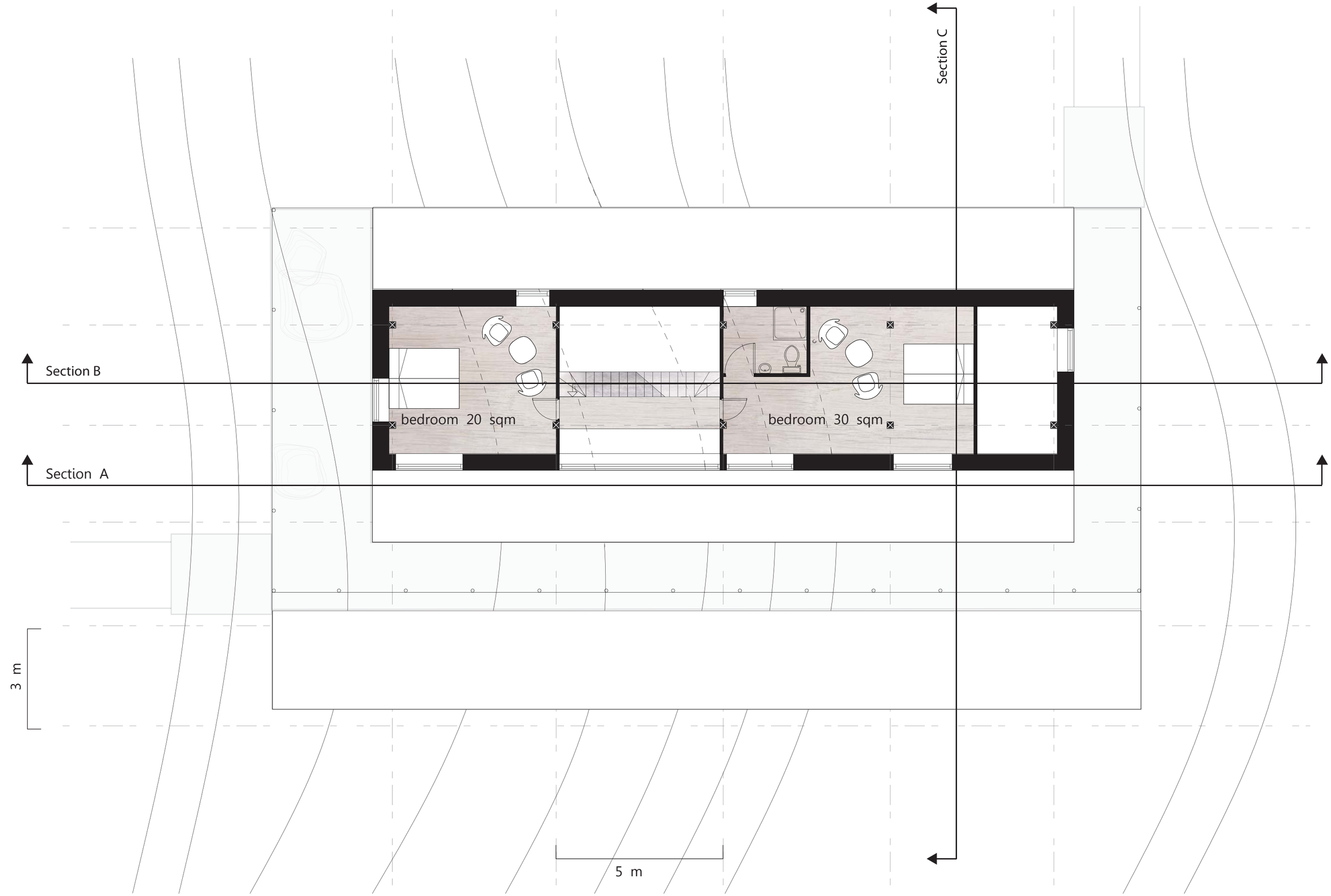
# PLAN GROUND FLOOR 1:100



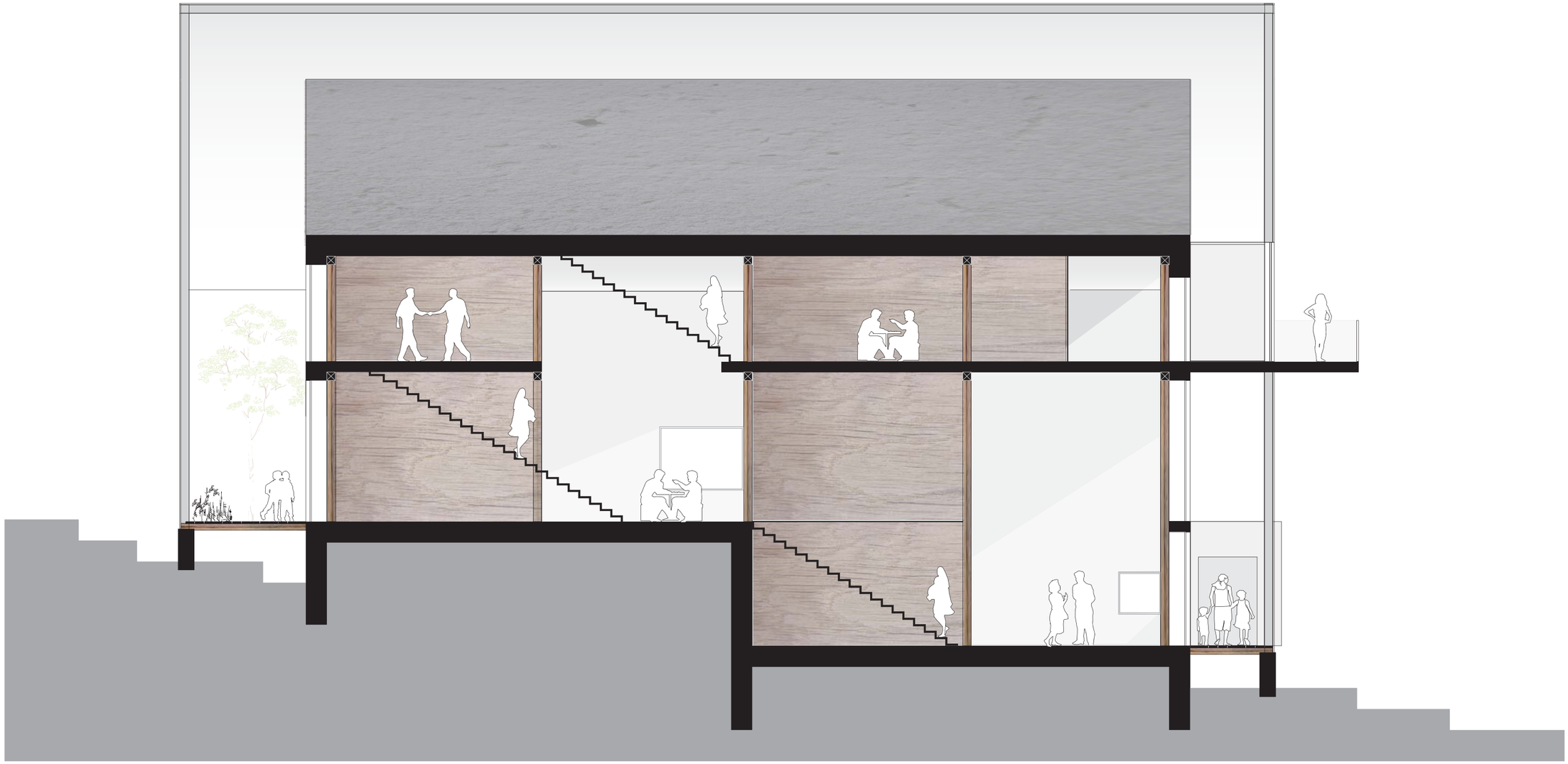
# PLAN FIRST FLOOR 1:100



# PLAN SECOND FLOOR 1:100



SECTION A 1:100



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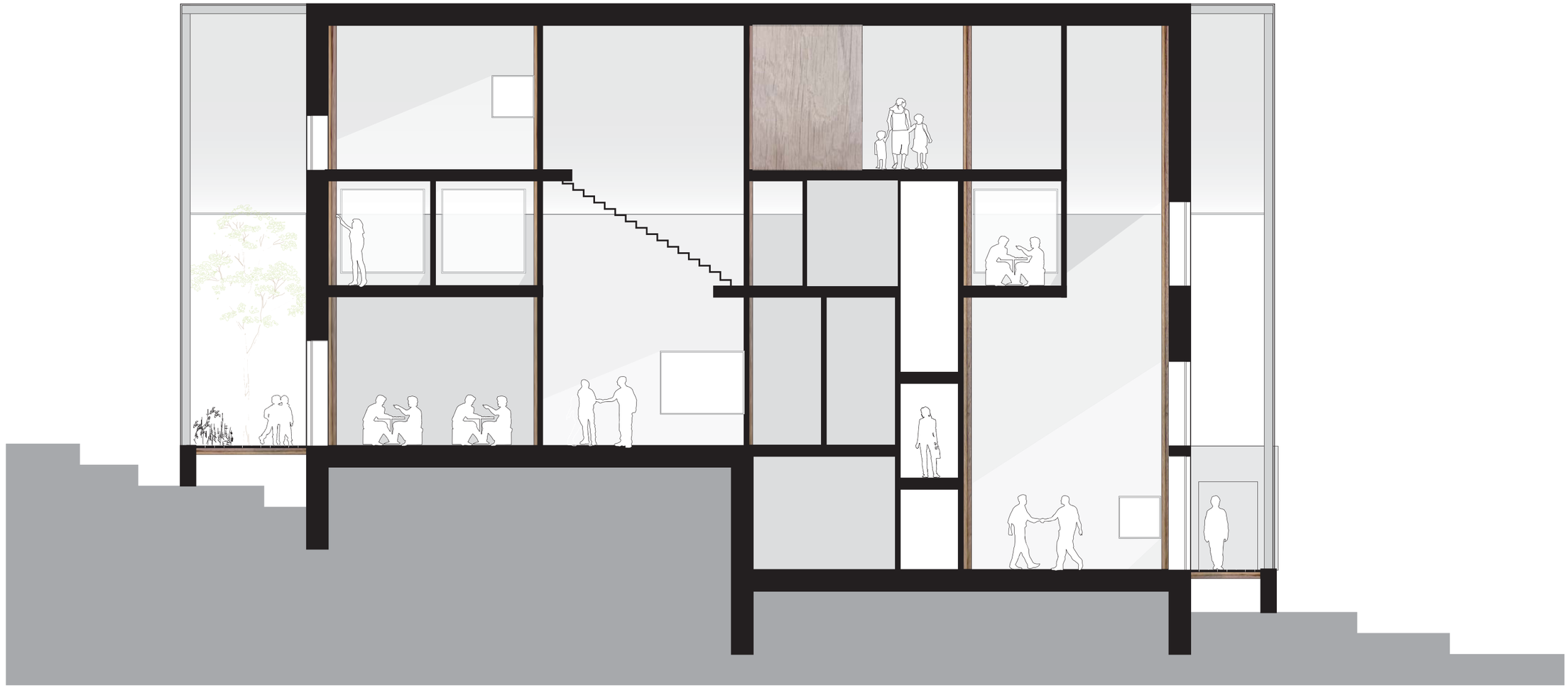
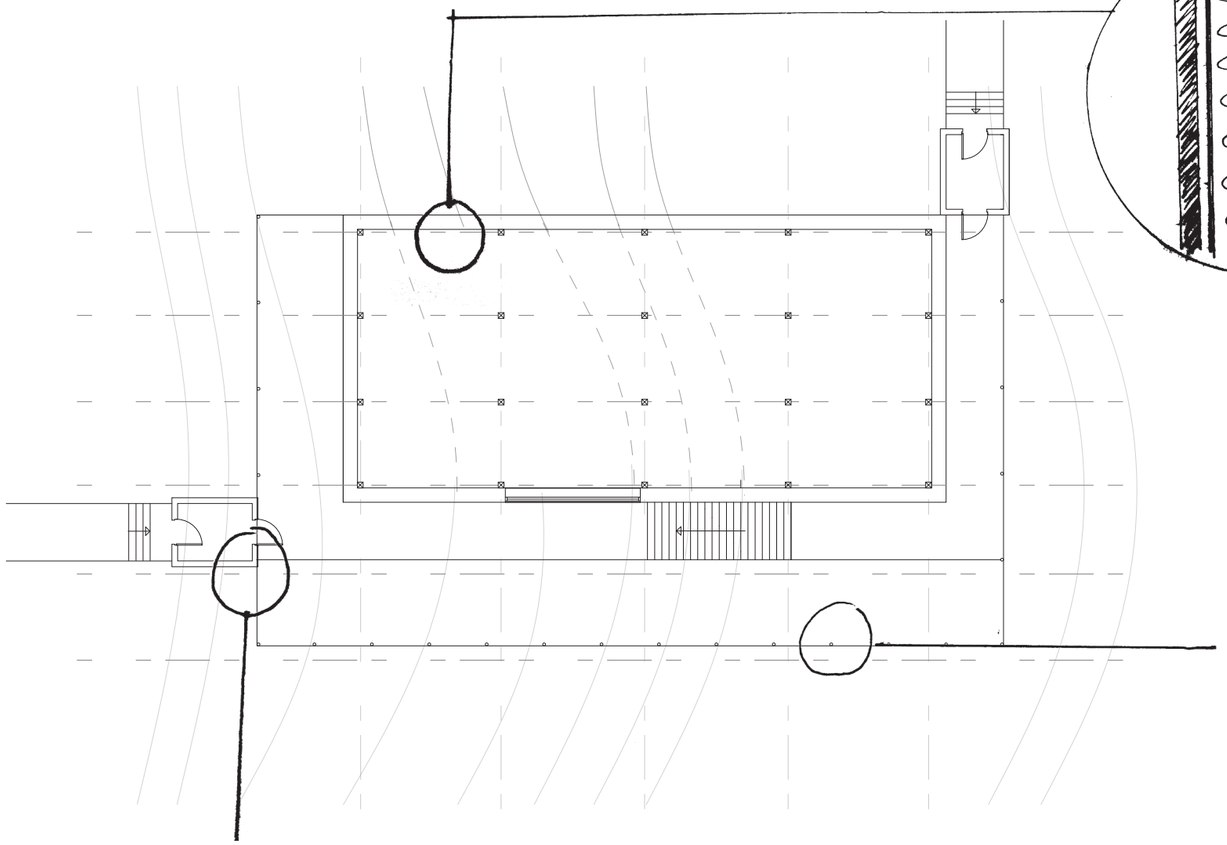
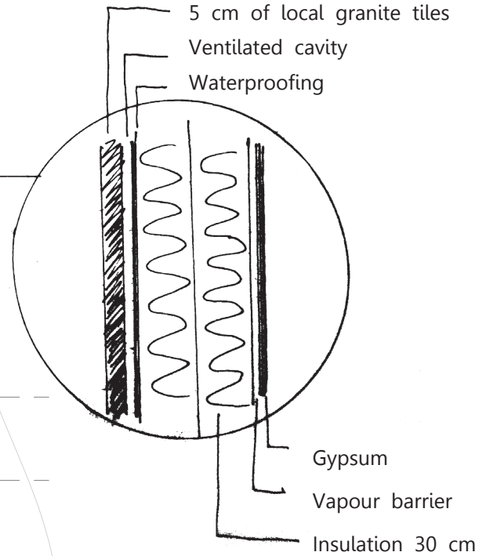
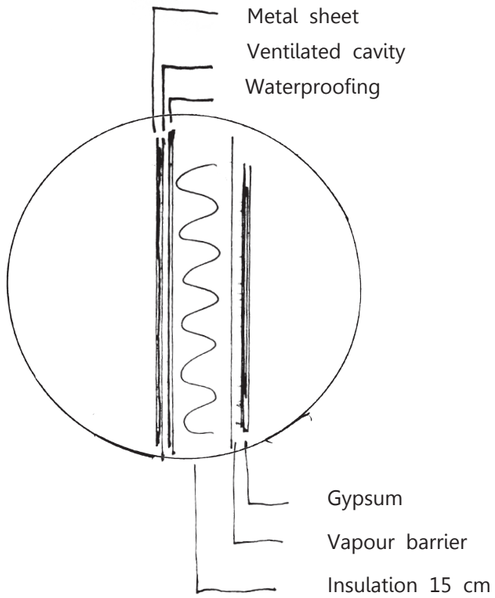


SECTION C 1:100

# DETAILING







*Ill 01 Local stone*

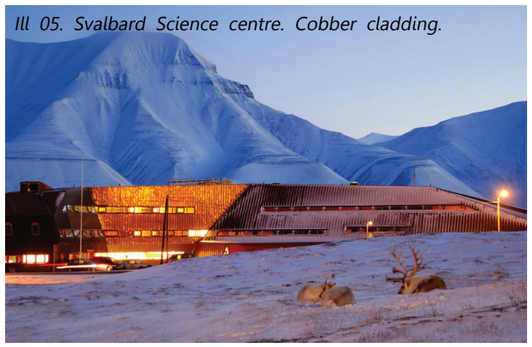

*Ill. 02. The church in Uummannaq is made from local granite.*

The outerwalls are wood constructions. Well insulated and cladded with tiles of local stone. The stone stores the heat from the sun during the day and release to the greenhouse over night. In this way the facade material helps raising the temperatur.
The stone cladding gives the building a heavy and robust expression. It gives a confident and grounded character that goes well with the function of the family house.
The choice of facade cladding relates the building to the church made from local granite.


*Ill 03. Torkild Kristensen, House in a greenhouse*

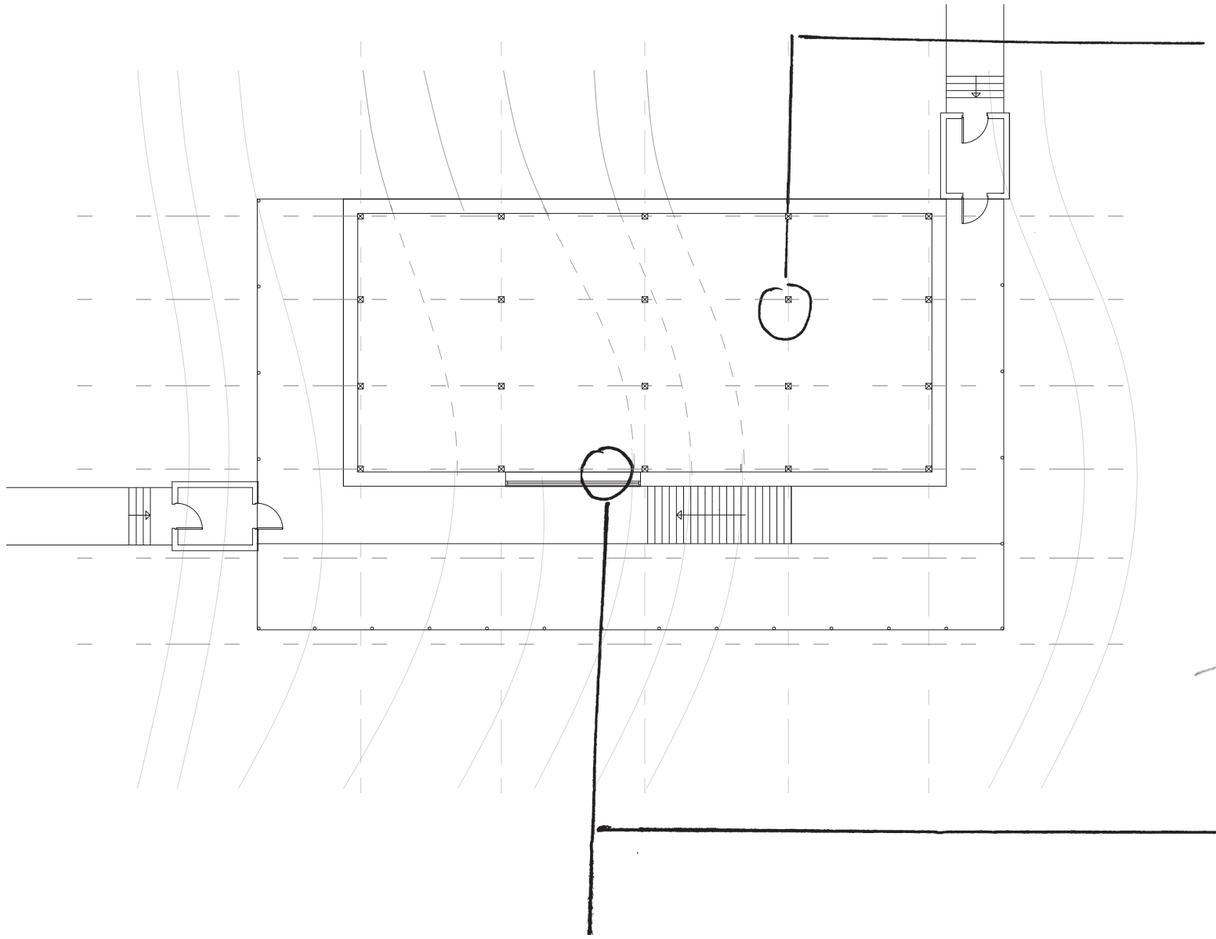
To minimize dimensions of the construction in the greenhouse, it is chosen to use steel frames. The construction should be minimized to let in as much solargain and daylight as possible.
Looking into the home of architect Torkild Kristensen (see chapter; Casestudies) his greenhouse is constructed like big industrial greenhouses with large 20X10 cm steel frames supported by cables to take the horisontal forces. The construction has automatic ventilation and shading system.

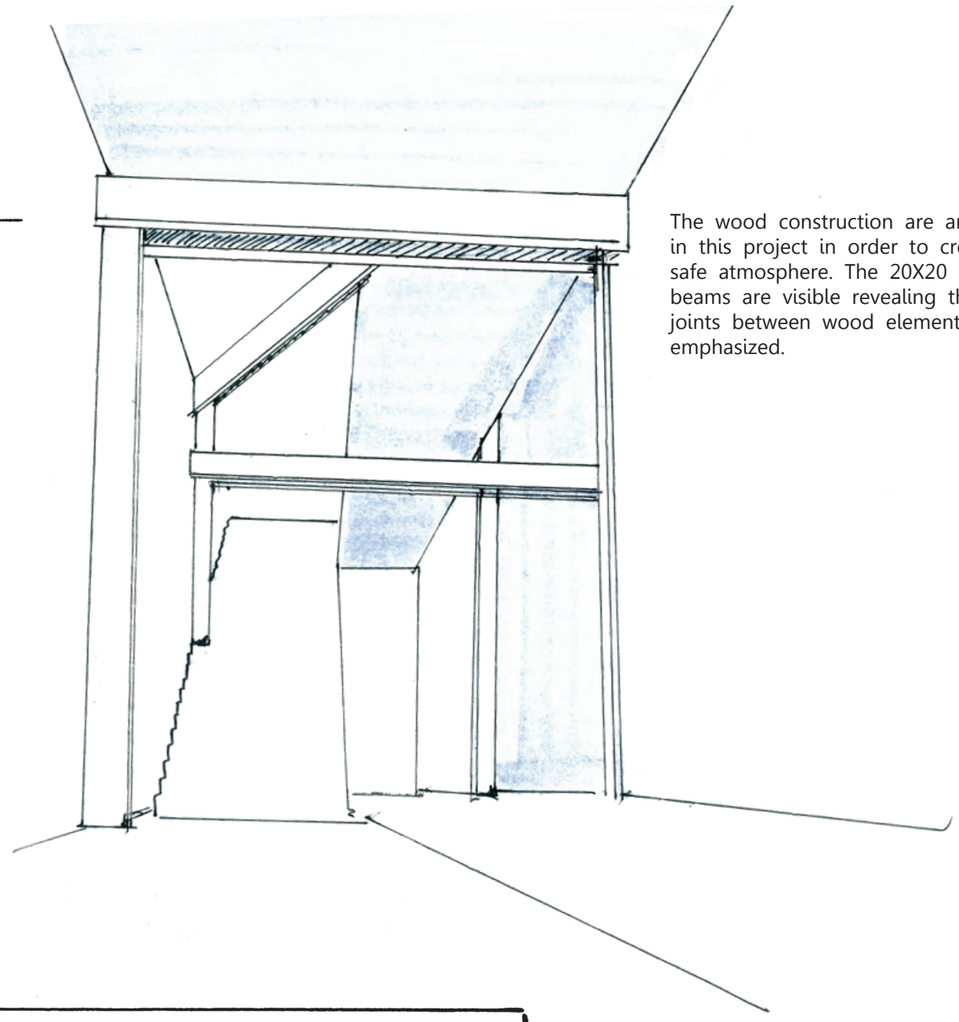

*Ill. 04. Governor administration building in Svalbard. Zinc cladding.*


*Ill 05. Svalbard Science centre. Cobber cladding.*

The windlocks are wood constructions covered with metal sheating. Metal is often used as cladding in arctic regions because of its strong windresistance [Images Publishing Group, 2003]. The metal mirrors the swiftly changing light and reflects the small amount of light in the long dark winterdays.

# DETAILING





The wood construction are an important element in this project in order to create a homely and safe atmosphere. The 20X20 cm columns and beams are visible revealing the structure. The joints between wood element are refined and emphasized.

*Ill 06. Atelier Martel, House in the Vosges mountains in France.*

*Ill 07. The wooden shutters lower the heatloss from windows during the night.*

Velfacs 200 Helo consist of inner wooden and outer frame in a composit material. The frame can be build into the wall leaving almost no frame visible in the facade. [WebXX]
The monolithic expression of the facade is thereby underpinned by the choice of windows. The windows are tested in Home for Life, a testhouse for low energy building technology.

Adapting to the changing conditions the window can be closed using shutters. For example in winter or during the night where the windows have no solargain, the shutters can lower the heatloss from window surfaces.

*Ill 08. Home for Life. Velfac Helo window.*

*Ill 09. Velfac 200 Helo window detail.*