

# The Thriving Paradise

"the paradise where one can connects with nature and oneself"

## ELEMENTS IN THE THRIVING PARADISE

- A THE WORKSHOP PAVILION**

This is the machine of the area and serves as an educational purpose where the new residents learn the tricks of the process of growing, harvesting and processing hemp into insulation blocks. The building is mostly used from May til October, wherafter the blocks can be stored or directly be implemented into the residence of that person.
- B OCCUPIED RESIDENCES**

This is where residents have settled. Together with the other residents they are part of the community and take care of the natural paradise and each other.
- C MEETING HUB**

The HUB is where residents and visitors meet up over a cup of coffee and have a chat. It serves as the heart of the area. From the public road the HUB can be reached via the green lane and allows people to discover the area through elevated pathways.
- D SPORTSFIELD/WATER BASIN**

Around the HUB lays the sunken sportsfield which collects water after a heavy rainfall and cleanses the water through biofilters scattered around the area. This allows the water to be re-used in fountains for the kids to play with, flushing the toilets, but moreover so the site supports the municipality.
- E LOOKOUT TOWER**

Here the user can have an overview of the area with the hemp field and workshop directly next to it. Further, a look can be given over the earth wall to the nearby road, Leypark and elderly residence.
- F GREEN LANE**

Serving as the entrance of the paradise, this green lane consists of a wide road with grass tiles, allowing only emergency vehicles to enter the area up to the meeting HUB to shorten the distance for help. The lane holds multiple tree species and holds the purpose to clear the mind from negative thoughts of previous activities.
- G VACANT PLOTS**

Certain plots will not become occupied by residents over the time period of 48 years, allowing the green paradise to stay in shape, heal itself and provide the calm and relaxing atmosphere while living here. With little interventions to attract species, the ecosystems present can become whole again.



## SITE SPECIFIC

**ORIENTATION**  
The site is oriented to the north with a small stream (the Leij) that runs along from the Wilhelmina canal.

**RESEARCH LAYERS**  
Because of the large surface area, the site lends itself well to grow and produce a bio-based building material like hemp to replace the raw to built homes with. The site holds no real on ground level but is therefore extremely suitable to serve as a clean canvas for the paradise.

**PROJECT LOCATION**  
67,000 m<sup>2</sup>  
The proposed site was chosen because of the large surface area and its position along the southern border of Tilburg that is recognized by the Kempenian and the south exit from the motorway A58/A6.

**RUNNING WATER FOR COOLING**  
Silt water from a stream can increase the heat island effect present at the site. In order for water to have a cooling effect it needs to run through the area and be playful like a fountain.

**NOISE DISTURBANCE**  
Presence of noise due to the constant presence of cars that drive over the concrete road to and from the motorway.

**PATH TO LA TRAPPE BREWERY**  
The Koningrijndijk is the road where you visit the beer brewery La Trappe, as well as the village of Moergestel. Making this a well used road for both residents and visitors.

**NO CONNECTION BETWEEN RESIDENCES**  
Due to the empty state of the plot, no connection between the buildings is present. By adding functions, the sense of a community can be restored.

**LACK OF RELIEF**  
The site holds no form of height differences.

**GREEN CORRIDOR**  
Along the exit of the motorway lies a already present line of vegetation which serves as a signpost.

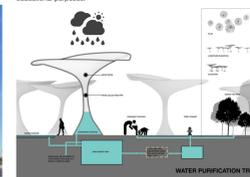


## STUDY & INSPIRATION

**WATER CHANCE TO COLLECT RAINWATER**  
A modern-day choice that expands during warm temperatures to provide shade, while collecting rainwater through the base structure.



**WATER PURIFICATION TREE**  
A modern-day choice that expands during warm temperatures to provide shade, while collecting rainwater through the base structure.



**FARMERS MARKET**  
The principle that multiple stands provide your fruit, vegetables, bread, and more, while the whole market foresees you with your groceries.



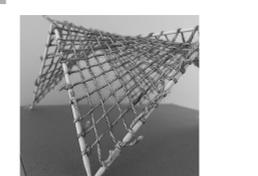
**WATERSQUARE BENTHELMPLEIN ROTTERDAM**  
Everyday opportunities that turn into a water basin after a heavy rainfall. It collects the rainwater and purifies most of it to re-use in the buildings.



**CABIN ANNA**  
Multiple models that allow daily life to move along with the weather. Only installations are fixed, the rest can move according to the user's needs.



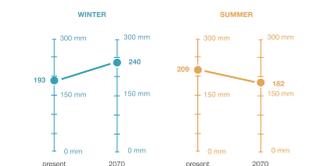
**MODELS ARCHITECTURE AND NATURE**  
The movable structure allows daily life to move along with the weather. Only work together with architecture.



The movable structure allows daily life to move along with the weather. Only work together with architecture.

## ARCHITECTURE AND THE CLIMATE

**WATER WILL BECOME A PRECIOUS SOURCE**

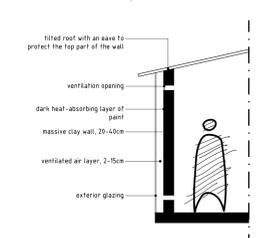


**RE-USE OF WATER**  
Water will become a more precious source and harder to manage due to the swings between wet and dry, resulting in drinking more substantial foods and fewer droughts. Collecting rainwater, purifying it and being able to re-use it within our homes or to maintain the paradise will become a main principle.

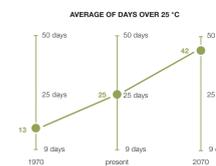
**INCREASE OF HEAT WAVES**  
A heat wave is a sequence of days with a temperature above 25 degrees that could result in an extreme period of drought for agriculture, plant life and the quality of air for our public health, which could result in higher death rates. By removing hard surfaces for vegetation in any way possible, flora and fauna can help decrease the urban heat island effect within cities.

**HEAT EVENTS IN SUMMER**  
Even small increases in the average temperature can significantly affect water resources, agriculture, infrastructure, but most of all how we experience our living situation. The amount of time spent indoors will shift as well as the time we spent at home. The hard border between inside and outside will fade, allowing only the most private function to be realized.

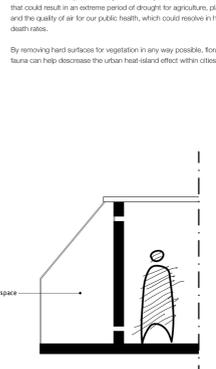
**TROMBE WALL | PRINCIPE HEATING**



**GREENING OUR ENVIRONMENT**



**STRUCTURE SHAPE | PRINCIPE VENTILATION**



**WATER BASIN | PRINCIPE WATER STORAGE**

**BOTH PUBLIC SPACE AND STORM WATER STORAGE**  
Two basins collect rain water: one undep basin for the immediate surroundings will receive water whenever it rains, the other deeper basin receives water only when it consistently keeps raining. Here the water is collected and runs into the basin via steel gutters. When it's dry, these places are fit for everybody on wheels and whoever wants to watch them doing their thing. The deep basin is a true sports fit, as well as a theatre to see and be seen.



# GROWING THE PARADISE

## STEP 01 | AMBITION

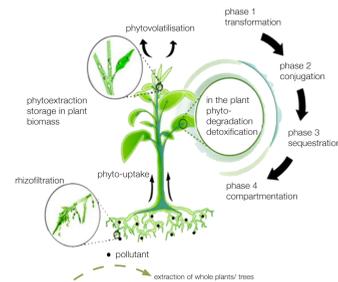
This project serves as a case study for the municipality of Tilburg to show how the vacant industrial plot, formerly known as the HaCas-Verschuuren area, located on the south side of Tilburg, can be transformed into a green and thriving environment where single-person households and starters can build their home. The case study will focus on the time period towards the year 2070, which will be a time difference of 48 years, with the accompanying climate pattern that is similar to Nocera Umbra, a city north of Rome, Italy.

The project stands for creating a strong community with like-minded people who thrive in green areas and want to be surrounded by flora and fauna in order to become fully connected with nature and oneself.

## STEP 02 | PHYTOREMEDIATION

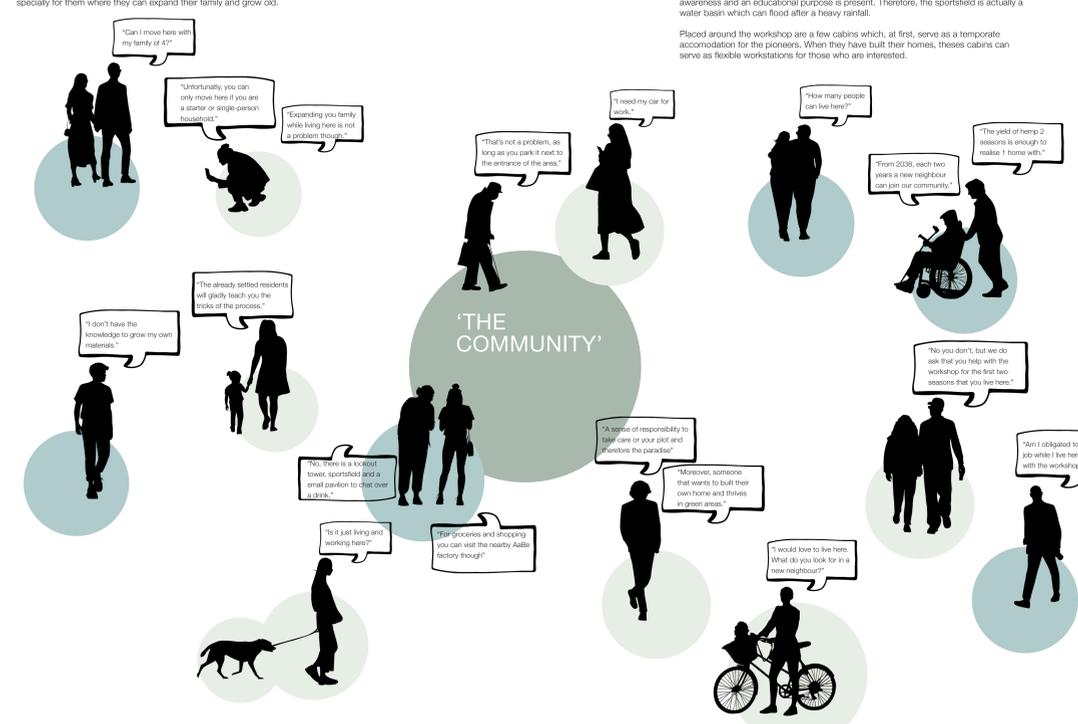
However, this area cannot be occupied with homes directly due to the presence of contamination in both soil and groundwater. The cleansing process via plants, called 'Phytoremediation', is the perfect method to remove contamination while forming the base of the paradise that will be filled with mixed species of flora and fauna.

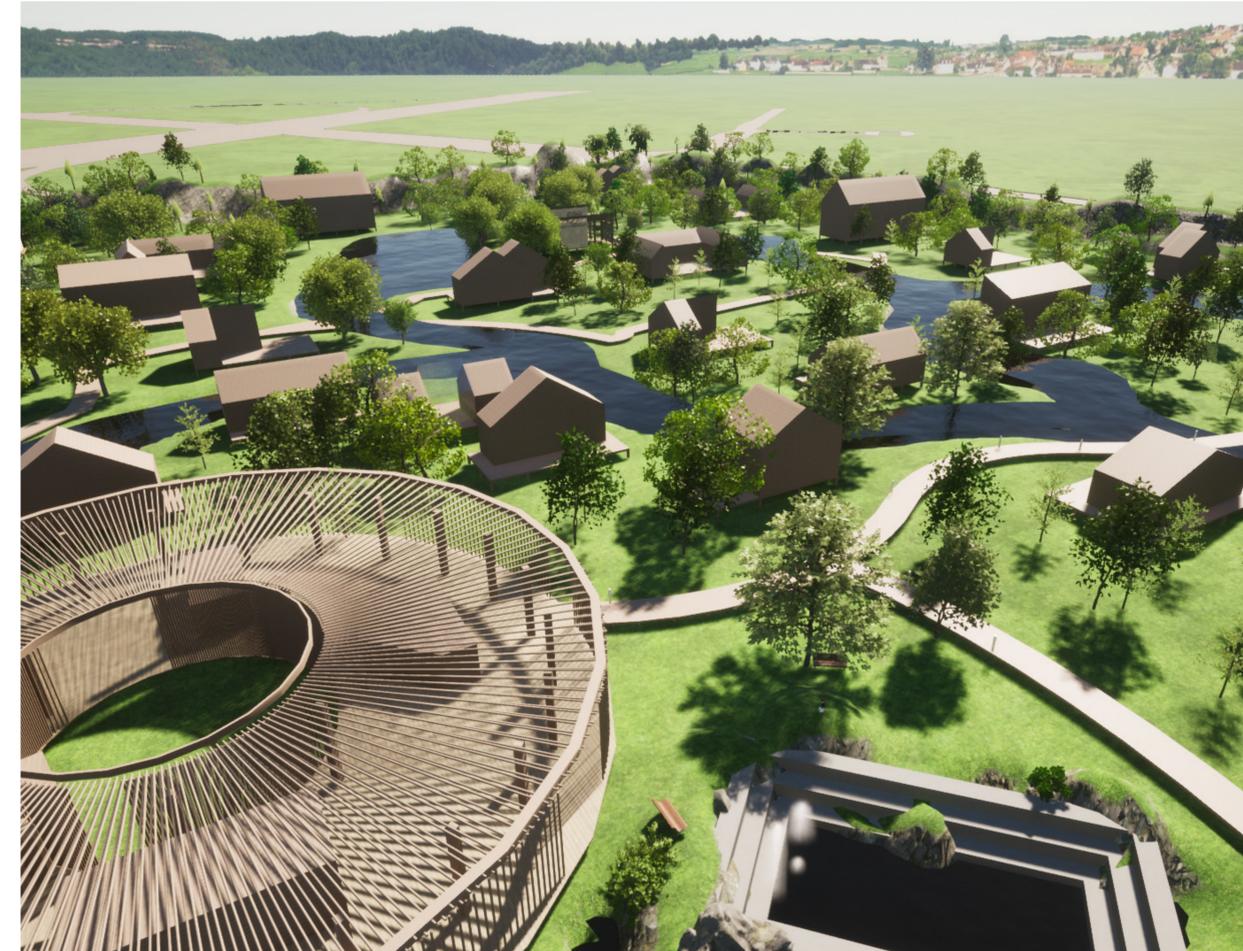
Phytoremediation is a plant-based approach which involves the use of plants to extract and remove elemental pollutants or lower their bioavailability in the soil. Within the first ten years most present mineral oils and pesticides can be cleared out of the soil. The seven to fifteen years that follow are needed to remove petroleum, like BTEX and PAH's. However, the heavy metals need a couple of decades before there are fully cleansed from soil and groundwater.



## STEP 04 | RESIDENT'S PROFILE

Currently a specific group on the housing market struggles to find suitable, affordable housing, namely the starters and the single-person household. The case study focuses on realising a community specially for them where they can expand their family and grow old.





HELOFYTE FILTER | PRINCIPLE RE-USE WATER

### DESIGNING THE AREA

#### MAIN PURPOSE CASE STUDY

Each location that will be transformed into a green paradise has the purpose of providing a social community between the residents as well as providing building materials for that site and its environment. By focussing on the single-person household and the starters the case study aims to decrease the problem on the housing market.

#### PHYTOREMEDIATION AS THE BASE

After the first ten years of the transformation process, most contamination is dissolved via phytoremediation, however, the next couple of decades are needed to completely remove the heavy metals that require more time. The vegetation that needs to be harvested provides open spaces for the program to be realized on.

#### GENERIC PROGRAM

Each case study will consist of individual homes made by the residents themselves and a workshop pavilion where a certain material will be grown, harvested and processed on site in order to become a local source of materials. For the chosen location the focus lies on the production of hemp as a bio-based insulation material which will be used along with a timber frame for the homes. The workshop pavilion is located on the northern part of the area and holds all spaces required for the indoor process of the hemp.

During the period that the pioneers are realizing their homes, a few temporary cottages are placed near the workshop which function as housing. After the pioneers are settled these cottages can be used as flexible working spaces for those who would like to use them.

#### SPECIFIC PROGRAM

The first step in creating a social community is teaching the new residents the tricks of the hemp process from settled residents. This dialogue continues over a cup of coffee at the social hub, which lies in the heart of the area and is reached via the green lane from the public road. The Hub facilitates pop-up spaces that can be filled by the residents to allow them to express their hobbies. Near the Hub lies a sports area which can collect rainwater after a heavy storm.

The green lane is the only path that is permanent and allows the emergency services to come up the terrain a bit further, because cars are not allowed to enter the area.

A lookout tower can be found near the earth wall and hemp field, allowing both visitor and resident to take a look over the area.

#### SAFETY AND EXPERIENCE

The area is closed off from the Kempenbaan and the motorway through a high earth wall along the west and south border of the site. This green wall has the purpose of protecting the area from unwanted visitors and becomes a part of the ecosystem and increase of the present biodiversity.

All the program is accessible through a wooden boardwalk which is elevated from the ground to avoid the destruction of the present vegetation by humans. At night, the solar powered lights will guide the user through the area and avoid accidents of people falling of the boardwalk.

#### ADAPTING TO THE CLIMATE

Not only on individual level, but as a whole, the community needs to learn how our climate is changing and what benefits or consequences it gives us.

The heavy rainfall can therefore be collected in the basin which functions as the sports area. This gives the sewage system time to adjust to the weather. In times of drought the stored water can be reused for the area, as well as through a fountain to cool off.

The excessive heat will be used by the trombe walls within the workshop and homes to heat the spaces. The sunlight will be captured through the solar panels and changed into electricity.

The heat-island effect will be decreased through the use of vegetation and the addition of running water through the area.

#### THE HOMES

Each (yearly) season provides 25 m<sup>3</sup> of hemp insulation blocks. The average need of blocks for a home is 50 m<sup>3</sup>, which means each two years a new home will be realized. The homes are meant for the single-person household and the starters on the housing market. However, the thought is that they can grow old here, so expansions of those families are allowed.



URBAN SECTION | KEMPENBAAN - AREA



THE EARTH WALL

1 3



THE WORKSHOP PAVILION

4



THE FLEXIBLE WORKSPACES

5



THE LOOKOUT TOWER

2



SITE PLAN | DEVELOPMENT

1: 2000

6



THE SPORTS PIT

6



THE GREEN LANE

7



THE LOOKOUT TOWER

8



THE HOME



THE SOCIAL HUB

# THE WORKSHOP PAVILION



BIRDVIEW | FROM THE HEMP FIELD



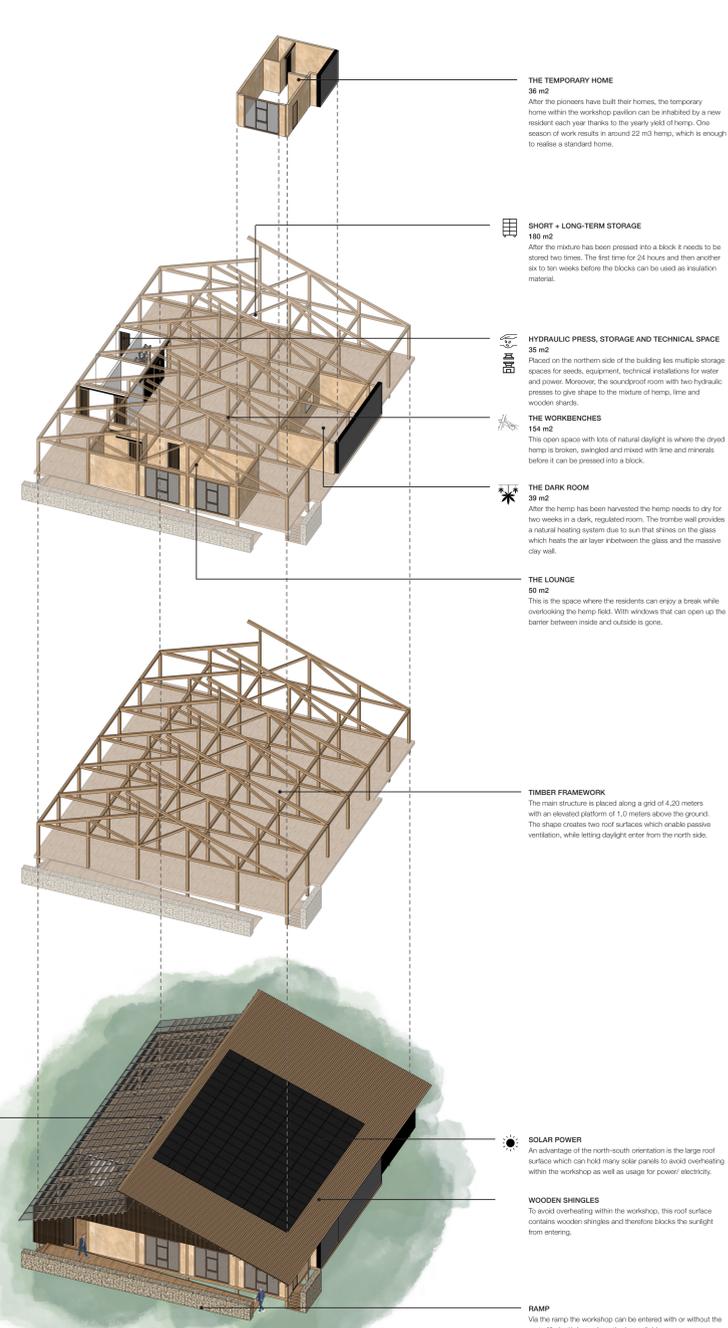
BIRDVIEW | SECTION



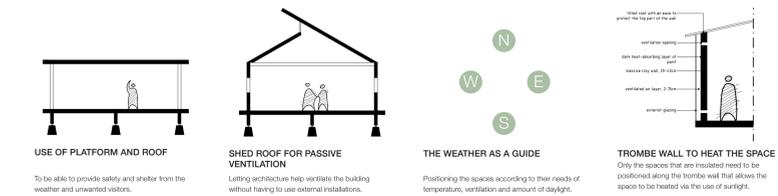
BIRDVIEW | FLOOR PLAN

**TRANSLUCENT POLYCARBONATE ROOF**  
The northern roof surface creates the illusion that the roof is open and rain could enter the building. However, through the use of a translucent polycarbonate plate on a wooden structure the roof is in fact closed.

## THE STRUCTURE



## BASIC PRINCIPLES



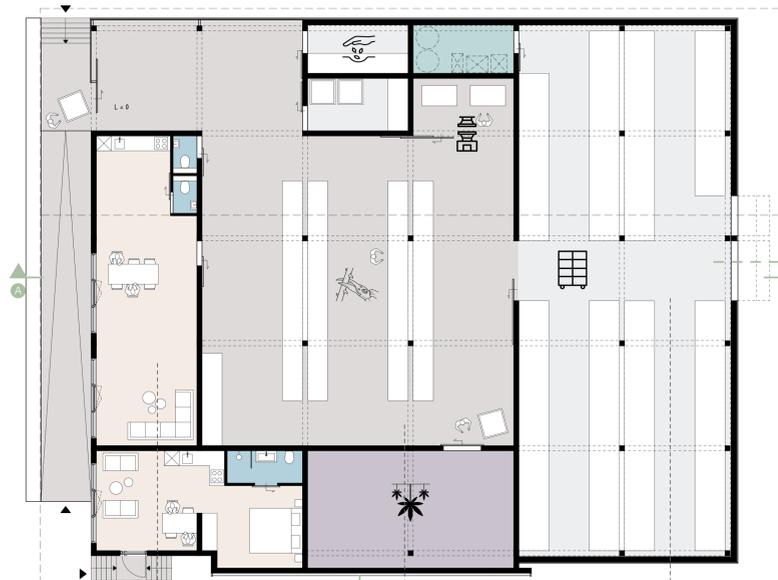
## THE WORKSHOP PAVILION

Located on the northern part in the thriving paradise is the workshop pavilion. The pavilion is the machine of the area where settled residents teach the new neighbours the tricks of growing, harvesting and processing hemp into insulation blocks to implement into their homes. Within the pavilion multiple spaces represent the different phases of the process after the hemp has been harvested from the field. In the right order, there is a dark regulated room where the hemp can dry, an open floor with workbenches to break and sieve the dried hemp, a soundproof space with a hydraulic press to mold the mixture into blocks, storage space to dry the mixed blocks further before they can be used into the homes.

The purpose of the workshop is to provide locally made bio-based building materials, like insulation from hemp, to spread knowledge on ways to become more sustainable through learning. So in other words, the workshop has an educational role. Even when residents move to other locations, the knowledge will stay with them and hopefully will be passed on to others.

The pavilion is constructed out of an elevated platform and two shedded roof surfaces to provide safety and shelter from unwanted visitors and the weather. Through the opening between both roof surfaces, passive ventilation is enabled. Not all walls are insulated, only those that require a regulated indoor temperature.

The building has a north orientation providing natural daylight to enter through the roof, while keeping the storage spaces along this facade cool. On the east side are the short- and long-term storage positioned. Through the hatch small trucks can unload the doors, window and timber frames for the homes, as well as load the hemp for whenever it will not be used for this area. The south side contains the dark room and temporary home which have the need of a suitable indoor climate being enabled via the trombe wall from clay. The west side holds the ramp that serves as the entrance to the building, as well as the lounge from where the residents can have an overview of the hemp field while enjoying their break.



## IMPRESSION | LOUNGE



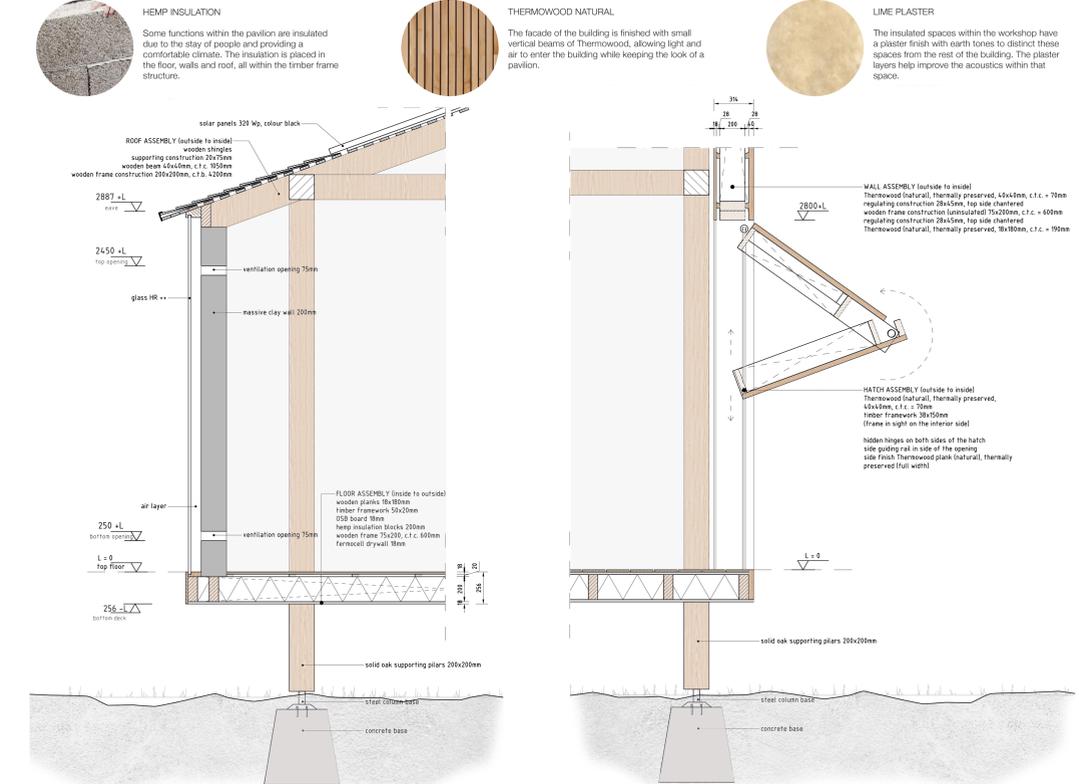
## IMPRESSION | WORKBENCHES



## IMPRESSION | STORAGE SPACE

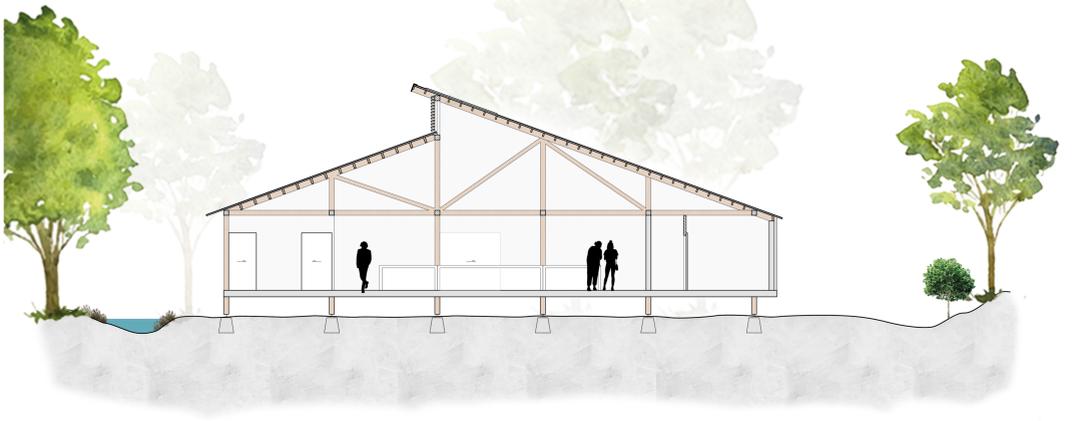


## MATERIALISATION & DETAILS



## SECTION A-A | WORKBENCHES

1:100



# THE LITTLE PARADISE



BIRDVIEW | FROM THE PATHWAY

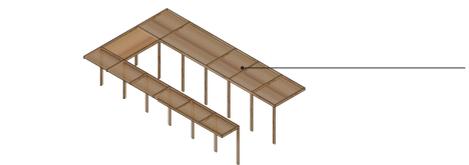
BIRDVIEW | SECTION

BIRDVIEW | FLOOR PLAN

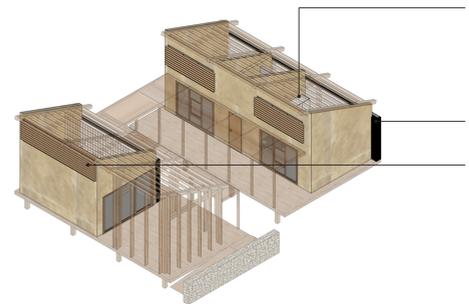
**ADJUSTABLE SCREENING**  
The north orientated windows let daylight enter the bedroom. By making the screens adjustable, the resident can close them at night to avoid light within the space when going to sleep. Furthermore, they provide some privacy from residents along the boardwalk.

**OVERGROWN MESH**  
The open 'living room' is secluded from the environment by its own green corridor. The overgrown mesh allows the resident to use the private outdoor space while having a sense of privacy.

## THE STRUCTURE



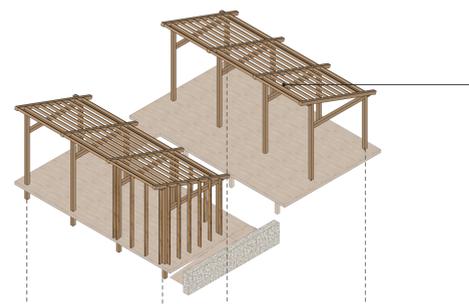
**PERGOLA**  
The open pergola has a double purpose when implemented in the home. It provides shade from the sun while serving as a connecting element between the two building elements.



**SLEEPING QUARTERS**  
An advantage of the north-south orientation is the large roof surface which can hold many solar panels to assist overheating within the workshop as well as usage for power electricity.

**TROMBE WALL**  
Both building elements are faced south to let the trombe wall heat the space through the heated air layer by using the sun.

**STUDY NOOK**  
The high ceiling allows the resident to built a platform above the kitchen to create a cozy study or hobby nook that looks out over the area.



**TIMBER FRAMEWORK**  
The structure is placed on a grid of 3,2 meters and uses a shed roof surface with a north orientation. The ground floor uses an insulated platform which is elevated from the ground and can be adjusted if construction wise necessary.

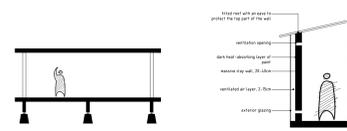


**WOODEN SHINGLES**  
To avoid overheating within the workshop, this roof surface contains wooden shingles and therefore blocks the sunlight from entering.

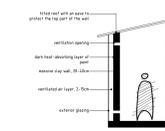
**SOLAR POWER**  
Due to the large solar surface on the workshop's roof each resident can add solar panels on their roof to add their part into the energy circuit.

**RAMP**  
Via the ramp the workshop can be entered with or without the crate sled with hemp from the hemp field.

## BASIC PRINCIPLES



**USE OF PLATFORM AND ROOF**  
To be able to provide safety and shelter from the weather and unwanted visitors.



**TROMBE WALL TO HEAT THE SPACE**  
No steel or brick will be insulated need to be positioned along the trombe wall that allows the space to be heated via the use of sunlight.



**TIMBER - GLASS - HEMP**  
No steel or brick will be used for the homes. The timber frames and glass will be ordered and kept storage at the workshop pavilion, while the hemp is being grown on site.

**ONLY PRIVATE IS INSULATED**  
Implementation of the changing climate allows only the private functions like the bath- and bedroom to be insulated.

**DIY LOFTSTYLE**  
On site, each resident will built their home themselves which must be in the style of a loft to make sure each home becomes a compact home.

## THE LITTLE PARADISE

One of the homes that will be realised is called the Little Paradise and can be found in the south of the area near one of the smaller lakes. Like all homes, it is south orientated to optimum use of the Trombe wall. It is made of a wooden framework, an elevated platform, and the shed roof, which can hold solar panels and is made of timber frame construction, hemp insulation and wooden window and door frames.

The southern building holds two bedrooms and a bathroom. Both bedrooms have a wide with the accompanying window with adjustable shutters to let daylight enter or not if going to sleep.

This specific home is divided into two buildings but share the same construction shape and are connected via an open wooden pergola. The northern building contains a private outdoor area with a sense of privacy thanks to the overgrown mesh. Indoor lies the open living space with a small void that can serve as a study or little reading nook. Next to the kitchen is a space reserved for the required installations to become self-sufficient.

To become self-sufficient, those installation consists of 6 pv panels, 8 small batteries with a backup motor, a water tank and a water filter to perform reverse osmosis, a water treatment process that removes contaminants from water by using pressure to force water molecules through a semipermeable membrane. The contaminants are filtered out and flushed away during this process, leaving clean, delicious drinking water.

The roof is made of wooden shingles and has a wide over the facade. Here the top of the facade is protected, while nesting boxes underneath help the biodiversity of swallows, bees, birds and butterflies. All facades are finished with lime plaster, for which the resident can choose the colour. These plaster layers improve indoor acoustics and protect the wall from the weather.



PLAN | GROUND FLOOR  
1: 100

PLAN | FIRST FLOOR  
1: 100



SECTION A-A | BEDROOMS  
1: 100

## MATERIALISATION & DETAILS

### SELF SUFFICIENCY IN POWER AND WATER

To be self-sufficient, each home contains the following installations in order to provide power and drinking water. A closed-off space within the home must reserved specifically for these.



**SOLAR PANEL**  
6 pv panels of 320 Wp

**ROLLS BATTERY**  
8 Rolls of 605Ah batteries

**BACKUP MOTOR**  
1 Honda EU 700w motor as a backup for the batteries

**REVERSE OSMOSIS**  
1 SolarHO mini 150 water motor to turn raw water into drinking water.

**WATER TANK**  
1 water storage tank to collect and store rainwater.

### TO CHOOSE BY THE RESIDENT



**WOODEN SHINGLES**  
A low-tech method that works perfect on both roof and facade surfaces



**THERMOWOOD CLADDING**  
A vertical or horizontal wooden cladding that can be used for both facade as roof finish.



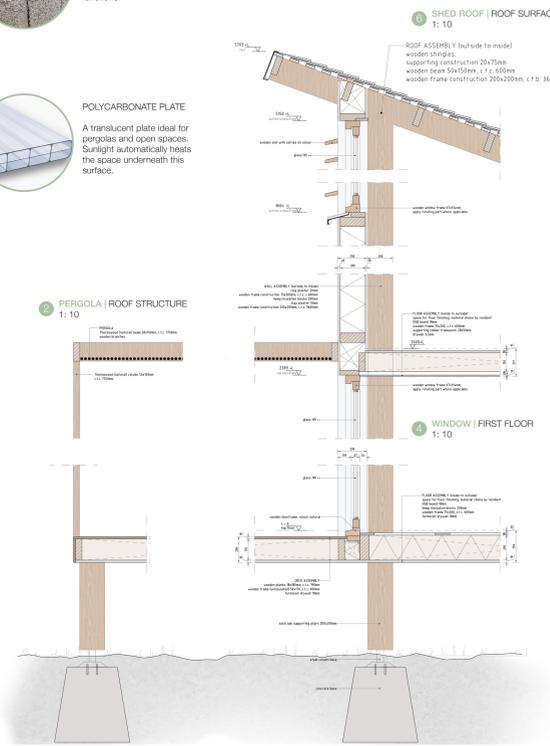
**POLYCARBONATE PLATE**  
A translucent plate ideal for pergolas and open spaces. Sunlight automatically heats the space underneath this surface.



**LIME PLASTER**  
To provide an acoustic improvement and aesthetic pleasing surface, each hemp wall will be finished with a lime plaster for which the resident can choose the colour.



**HEMP INSULATION**  
Hemp provided by the workshop pavilion is used to insulate only the private functions.



2 PERGOLA | ROOF STRUCTURE  
1: 10

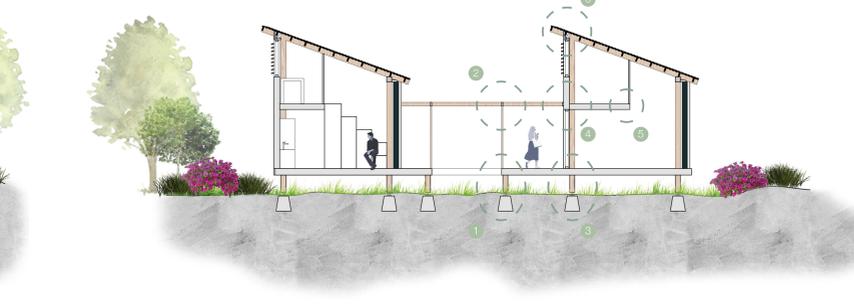
1 PERGOLA | FOUNDATION  
1: 10

1 SHED ROOF | ROOF SURFACE  
1: 10

3 WINDOW | FIRST FLOOR  
1: 10

5 HOME | FOUNDATION + DOOR  
1: 10

4 BALUSTER | FIRST FLOOR  
1: 10



SECTION B-B | SHED ROOF  
1: 100