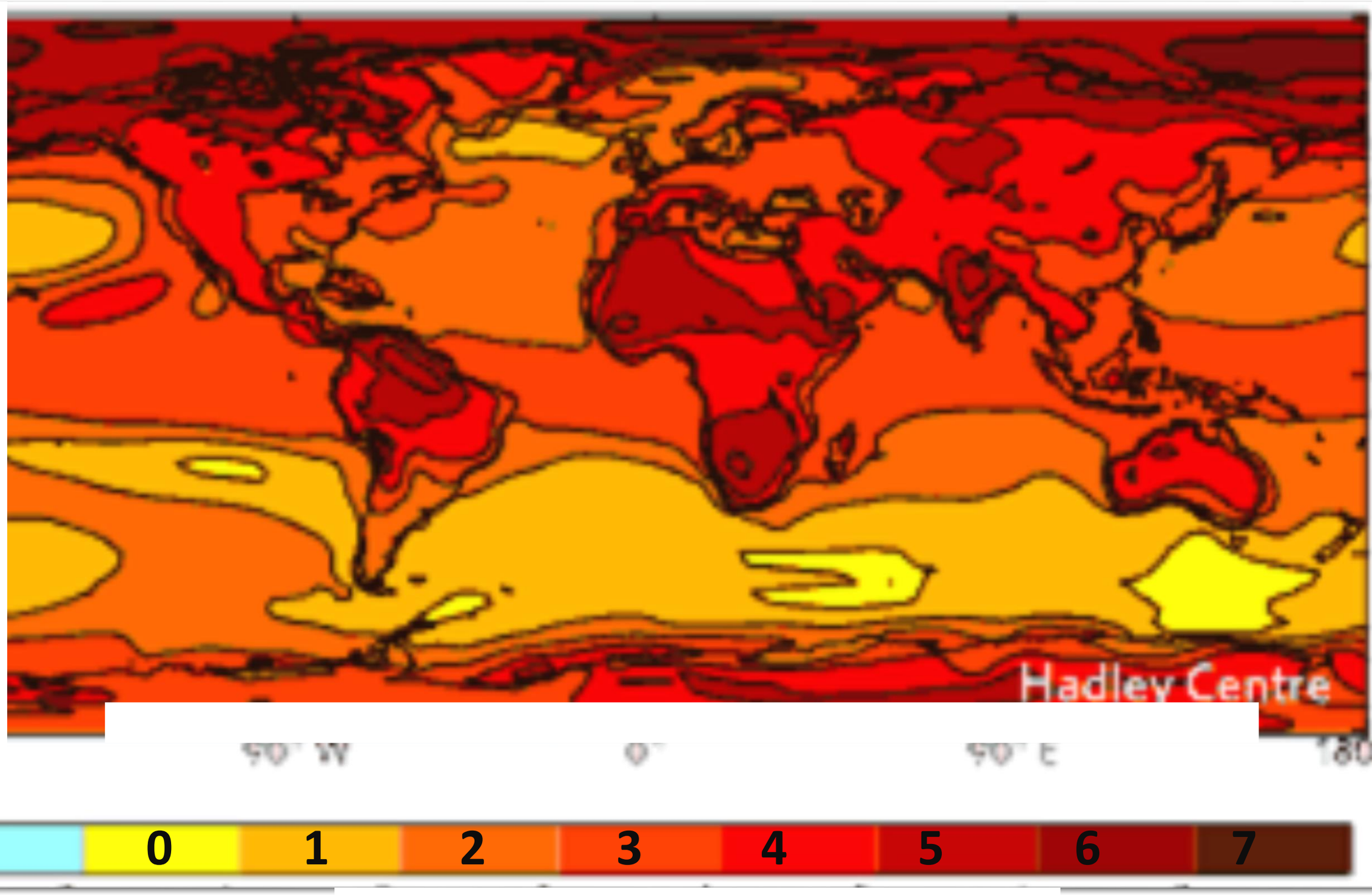
VOCATIONAL TRAINING CENTRE -CHAD

REESTOR LTD - INSUN CHA(REE)

ZEDFACTORY LTD



Predicted 2080 Temperature rise (˚C)


광주시


좌 회 전 시
보행신호시
4318





The rapid destruction of forests - every year an area the size of England is lost - not only harms forest-dwelling wildlife but also adds to the growing danger of climate change and feedcrop land each year



- **15-37% of species committed to extinction by 2050**





UN May Cut Aid During Hunger Crisis

Rising food costs force agency to rethink relief plan

Feb 25, 2008 6:54 PM CST

- **2.5° warming in average Earth temp. puts 45-55 million extra people at risk of hunger by 2080**
- **3° - 65-75 million (or 3.3-5.5 billion),**

- **EVERY 3.6 SEC SOMEONE DIES OF STARVATION (12960 / hr)**

Due to increase in urban population and attendant residential pressures especially in developing countries, energy consumption is projected to rise in buildings especially in fast growing cities such as N'Djamena, Chad.

Subsidised energy prices in developing countries have provided no incentives to pursue energy efficient building
Energy price to rise due to depletion of resource and growing demands.

It is important to address the challenges of unsustainable building practices by adopting more sustainable building and designing sustainable life style to pave way for the sustainable future of not just Chad but other similar developing countries.

Challenges

-The limited availability of building materials,
-The poor level of local craftsmanship
-General limitations in the construction process- lack of equipments/ tools/skills , quality control
-Cost

The vision of the project

To encourage growth and development in the region by providing people with access to learning and by facilitating the necessary training

- **It will provide technical and vocational training for the unemployed locals that would enable them to be self- employed or gain wage employment.**

- **Provide learning platform for the students**

- **establish a sustainable foundation for the locals to become self-sufficient**

- **The money generated by proposed café/ takeaway shop is to help to support other socio- economic projects and humanitarian works**

- **The goal is that with time, the centre is to be able to continue to function independently and without financial support from donations**
- **To provide a good case study for a sustainable buil**

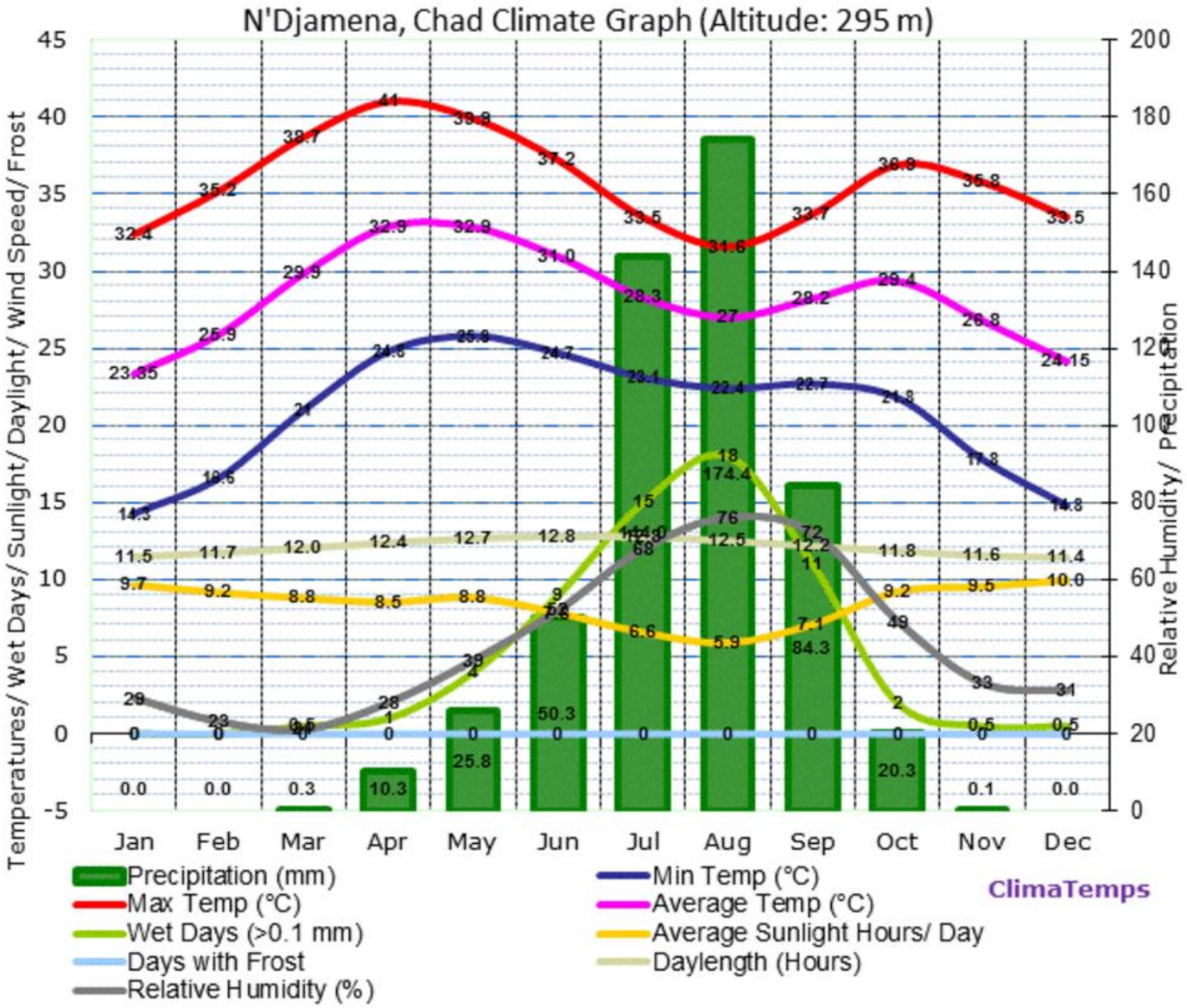
Integrated approach in building design

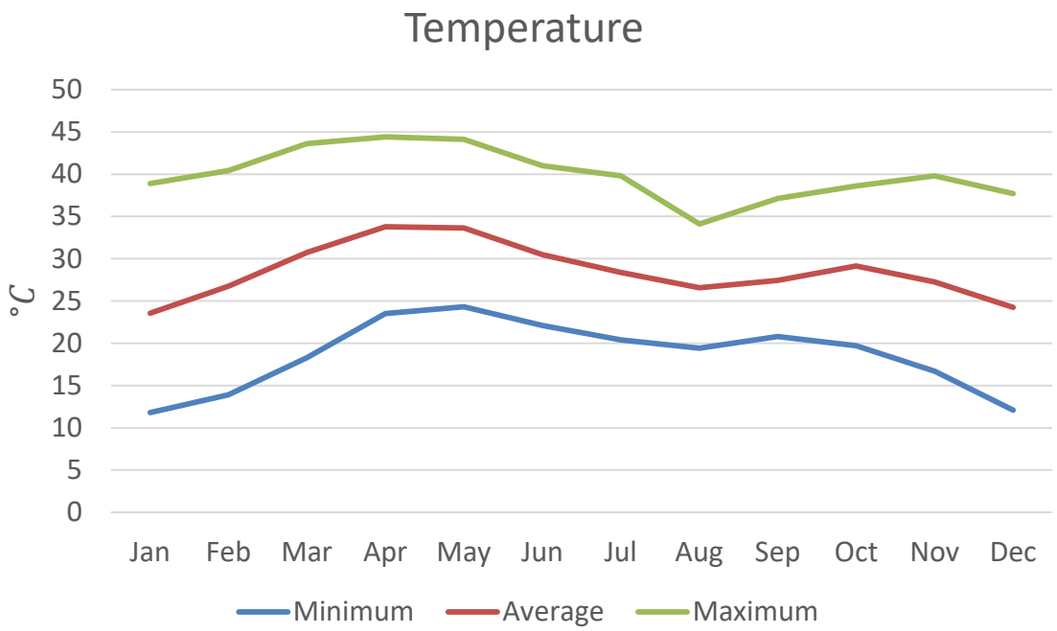
-low energy building design, where climatic conditions determine the design of the building.
-It is aimed to prioritize local building material- i.e. hand made clay bricks/ clay render/
-low-tech practical solutions over imported high – tech material.
- wide overhanging double roofs designed to resist the rain during the wet season and allow passive air circulation and cross ventilation to cool the building.
- Building raised up off the ground to enhance air movement under the building ,cooling the building from beneath and possibly draw the pre cooled air to ventilate the building
-It is aimed so that energy is to be sourced by renewable energy
-Sustainable life style will be promoted.

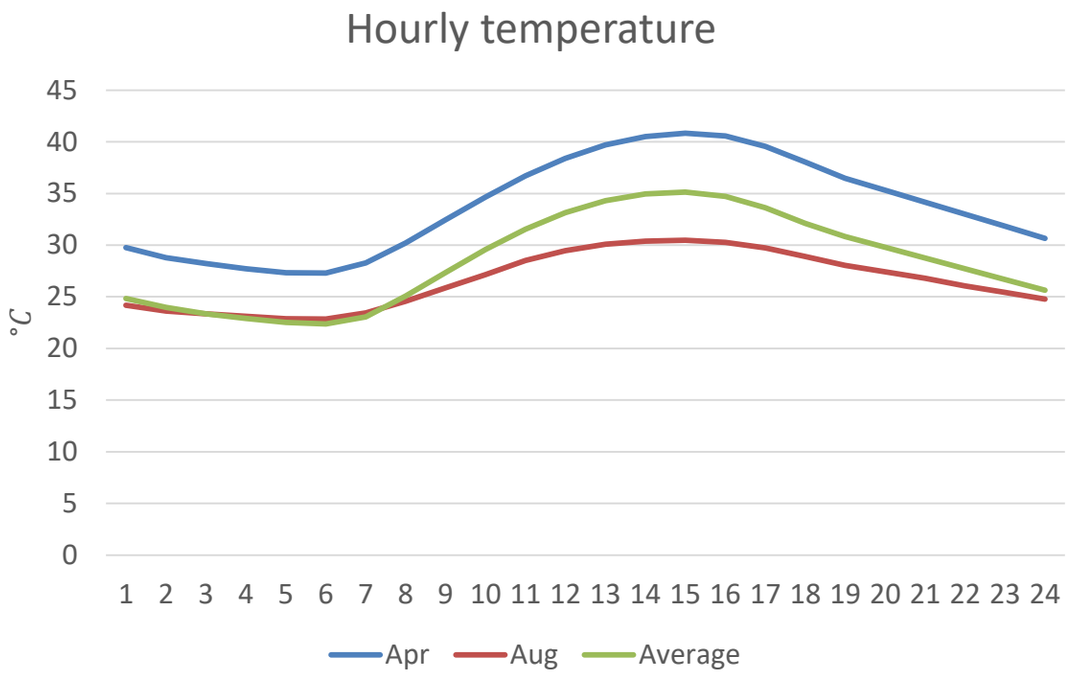
1

CLIMATE

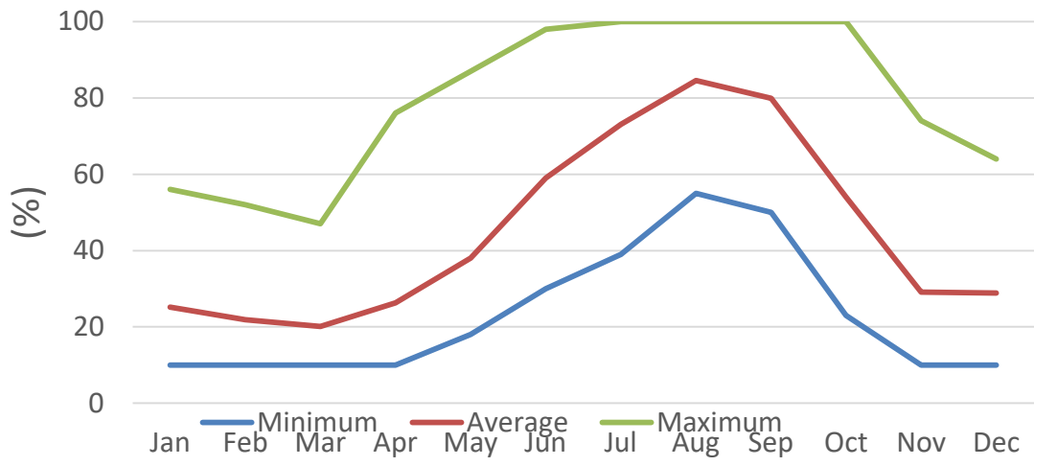
•According to the Holdridge life zones system of bioclimatic classification N'Djamena is situated in or near the **tropical very dry forest biome**.

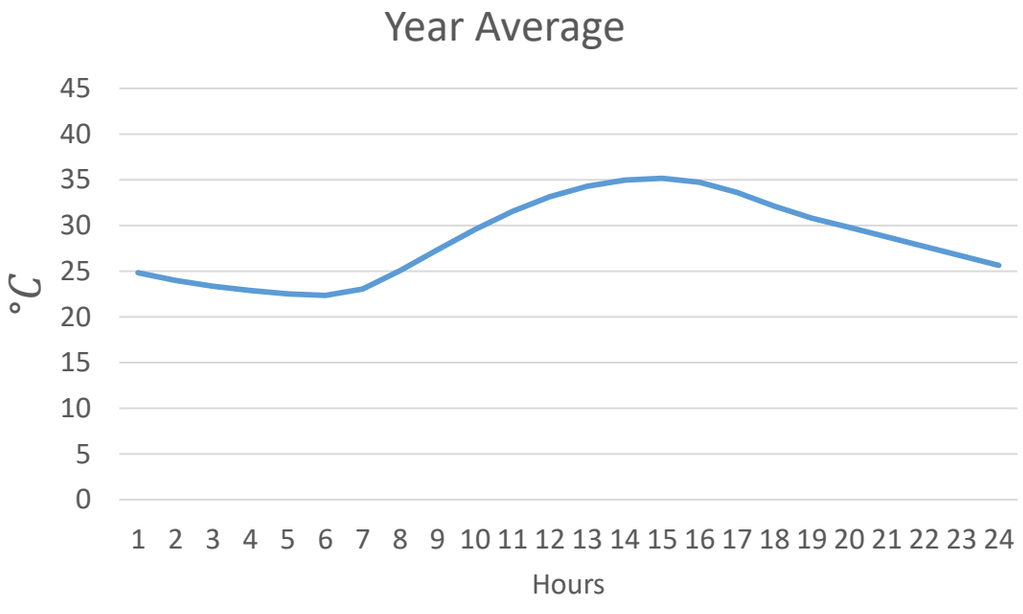


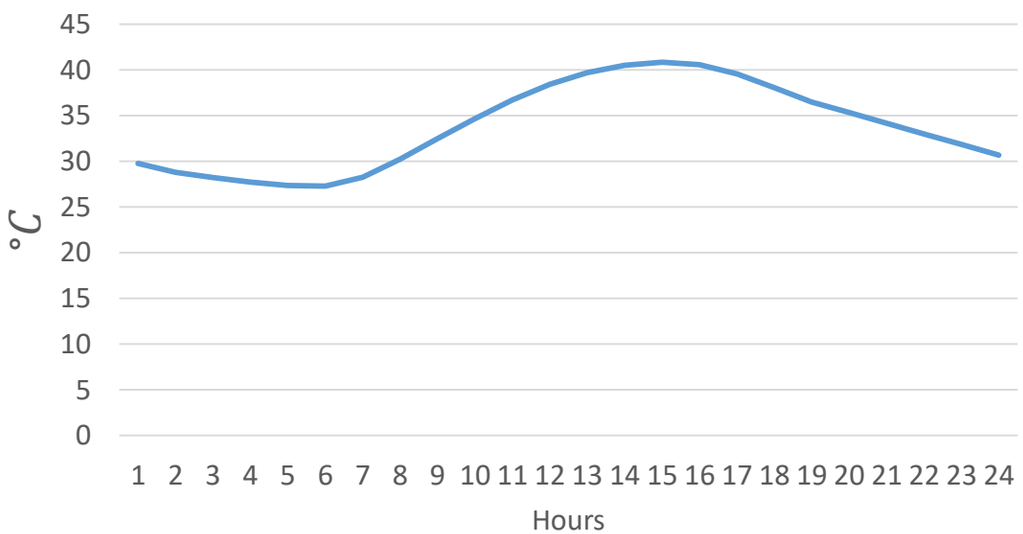


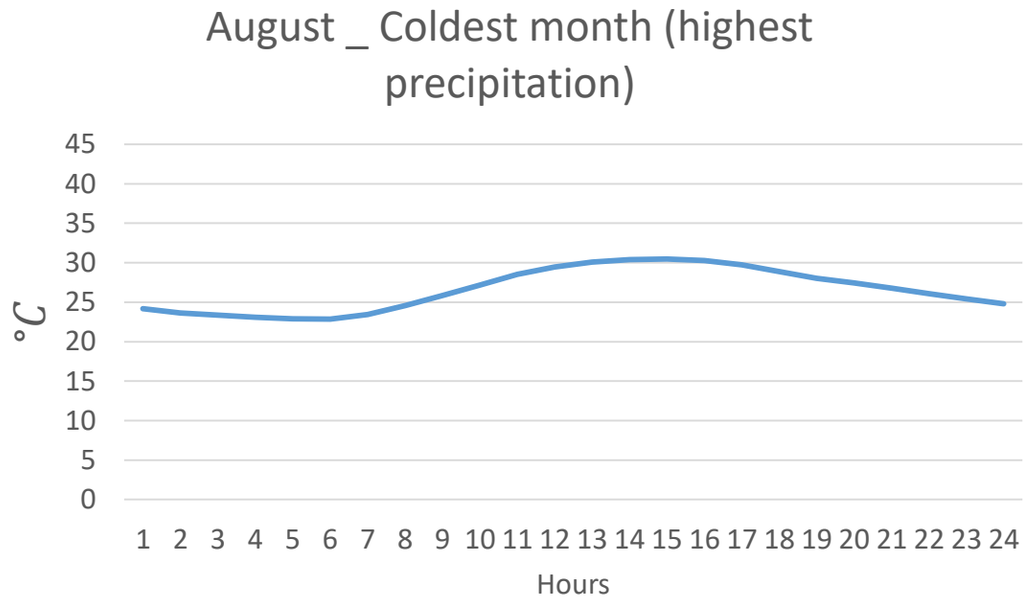


Relative Humidity




Year Average
°C
45
40
35
30
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours

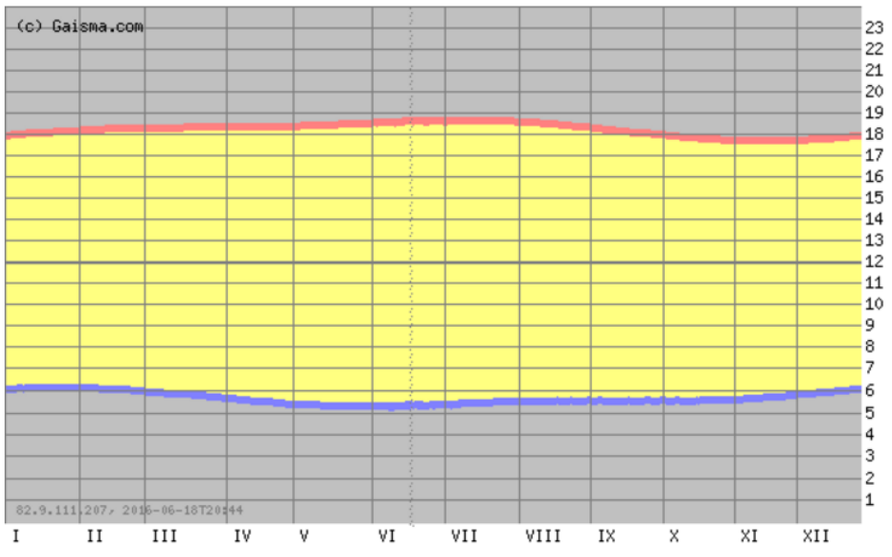

April _ Hottest month
°C
45
40
35
30
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours


August _ Coldest month (highest precipitation)
°C
45
40
35
30
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours

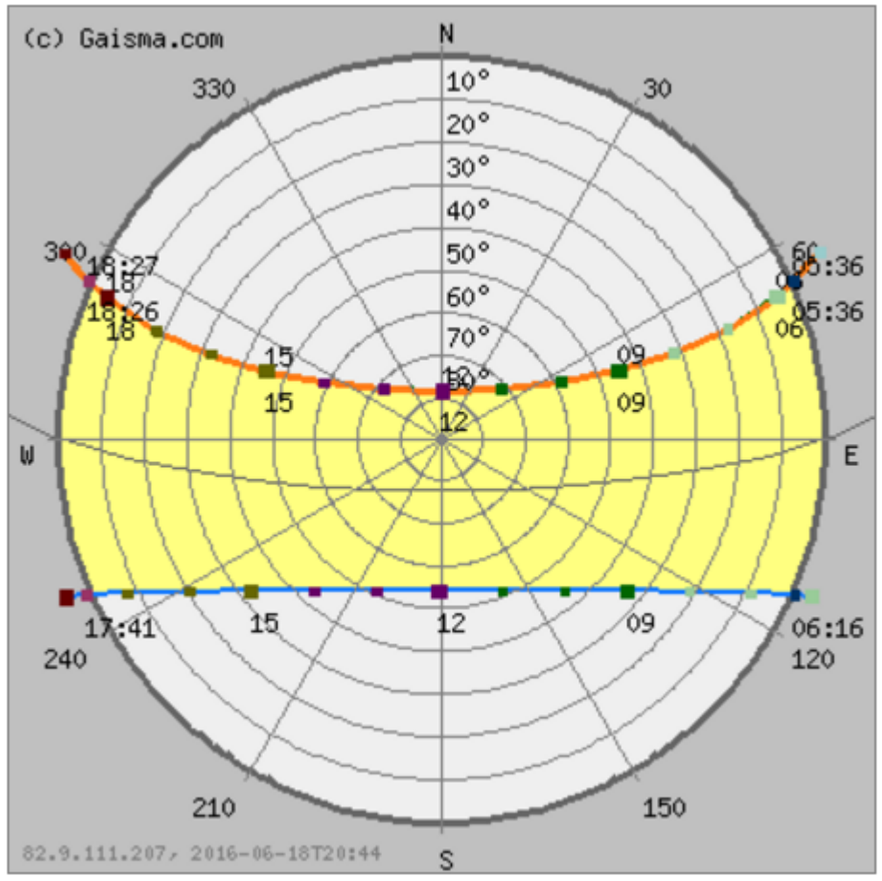
Solar angle at noon



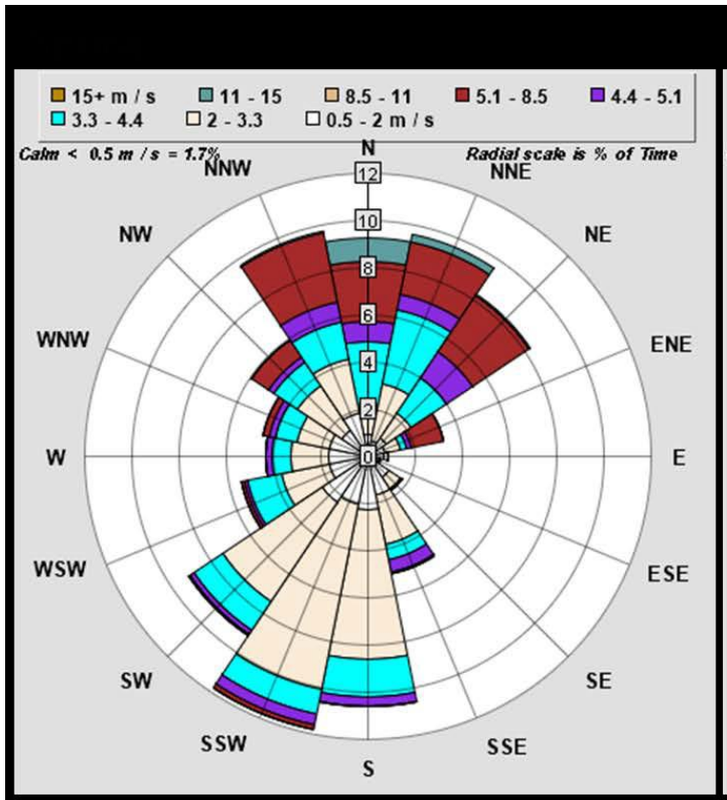
Sun rise and set time



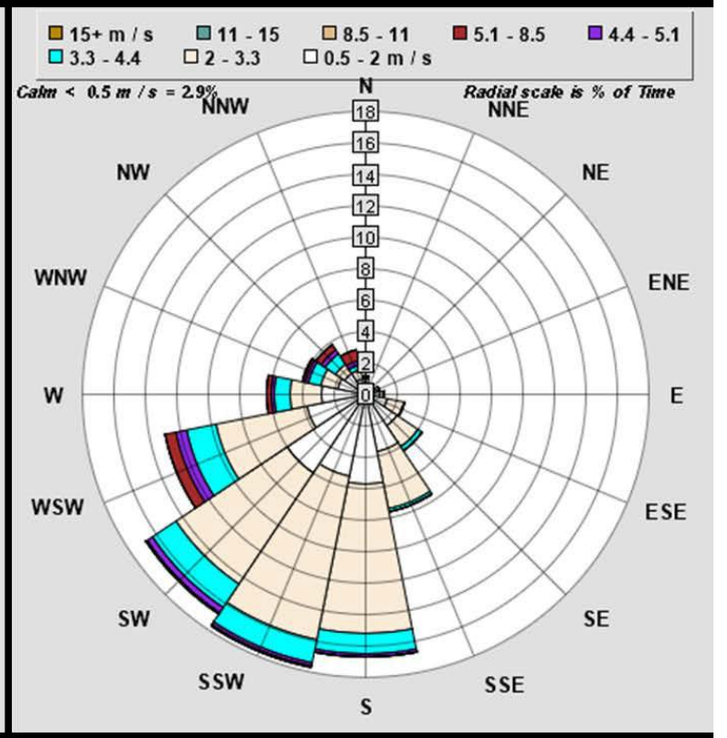
Sun path diagram



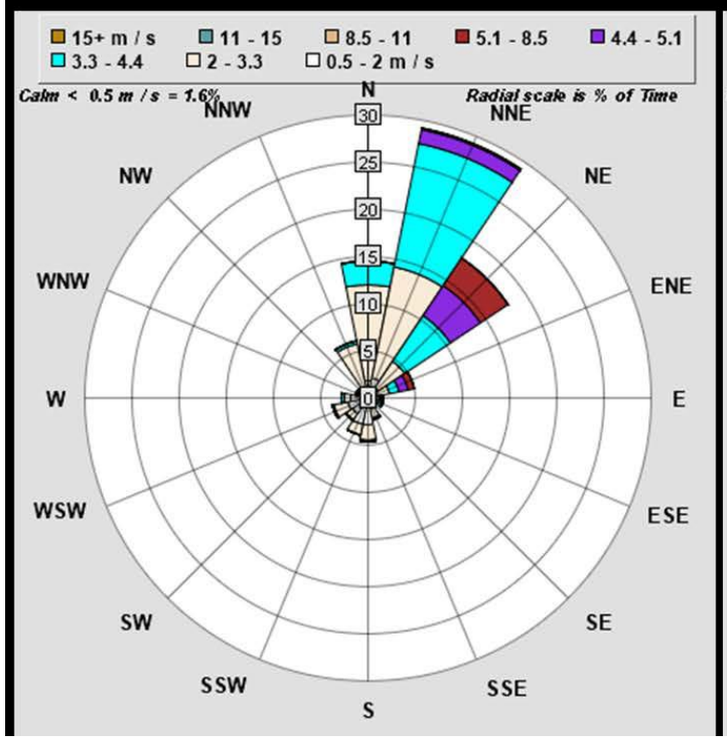
Spring



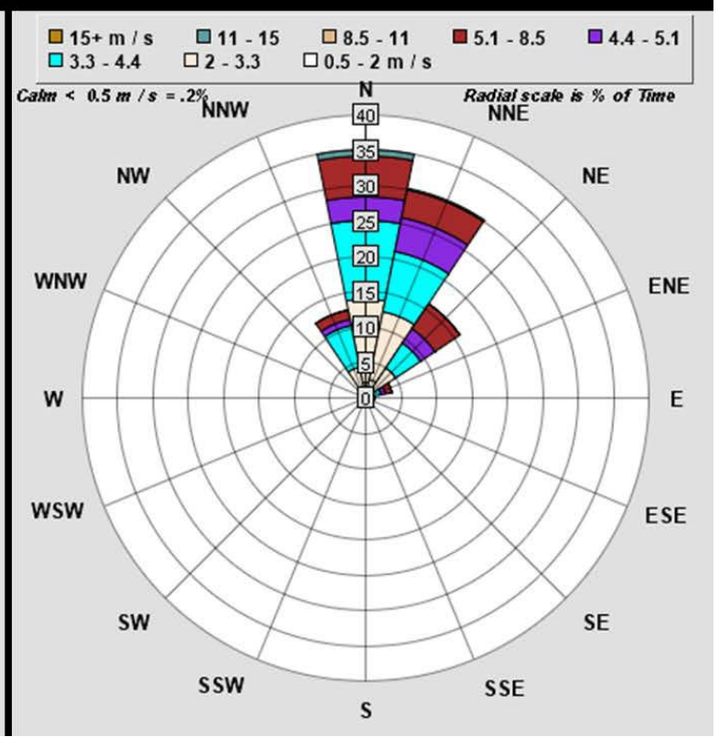
Summer



Autumn



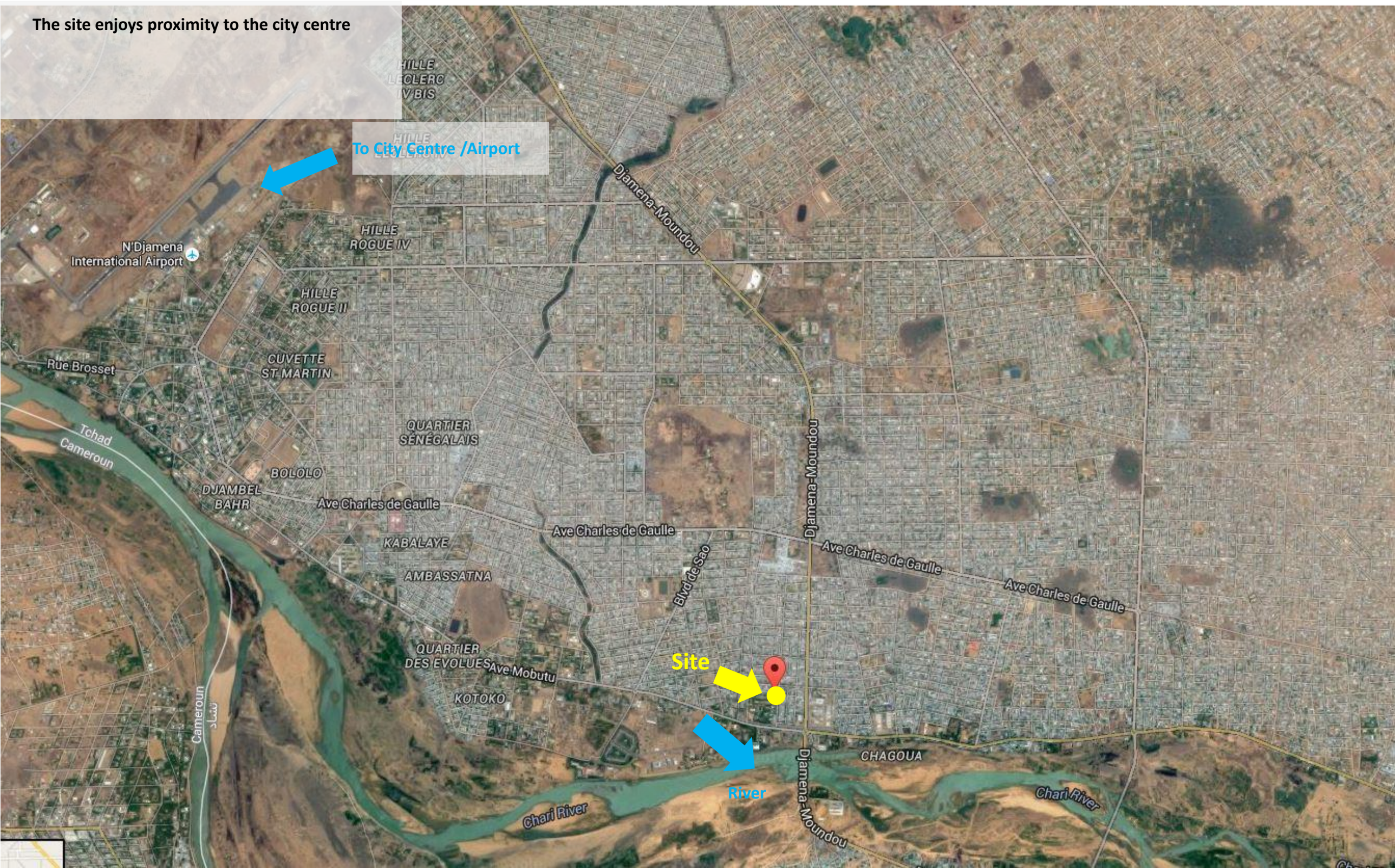
Winter



2

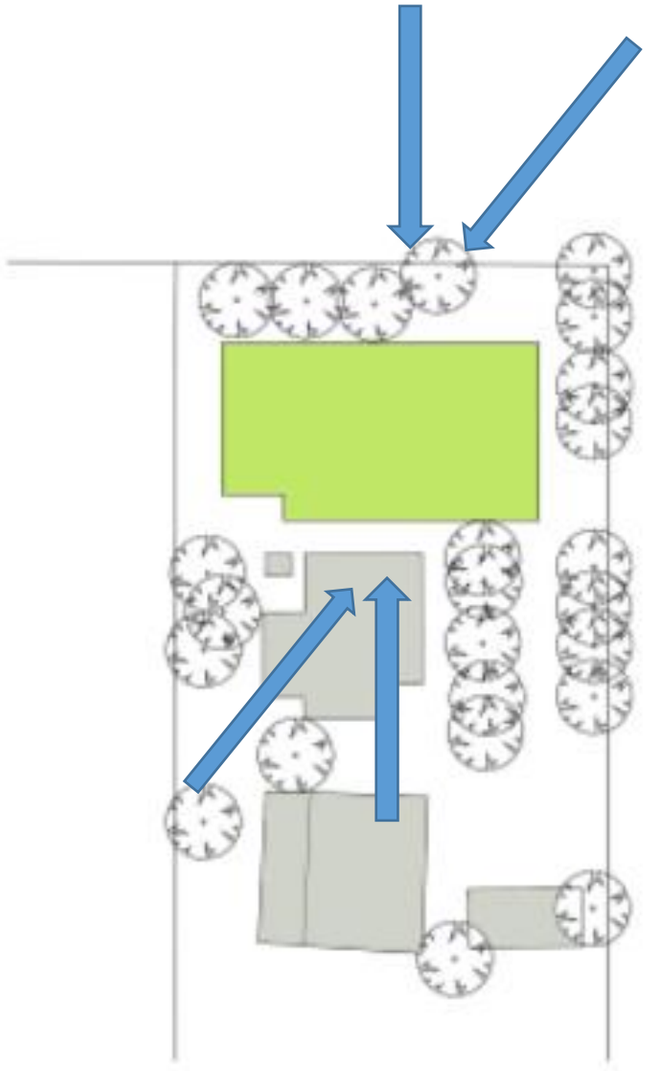
SITE ANALYSIS

Site location




Single or two story housing around the site
Mature tress around the site to be maintained
Site
Access to site
High school
Minor high way
Single or two story housing around the site
Major high way

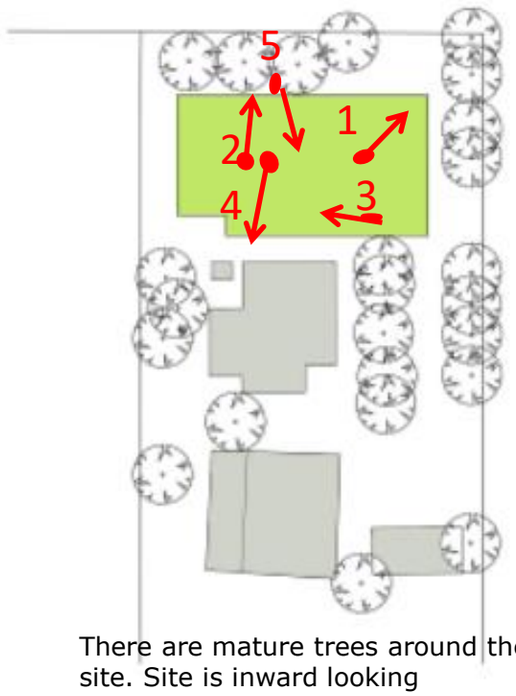
Prevailing wind – dry season



Prevailing wind – wet season



Site Visit Jan 2015



There are mature trees around the site. Site is inward looking

1



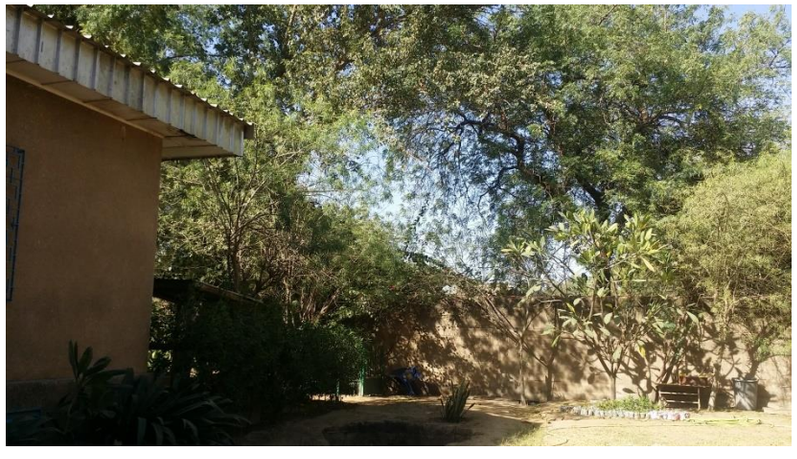
2



3



4



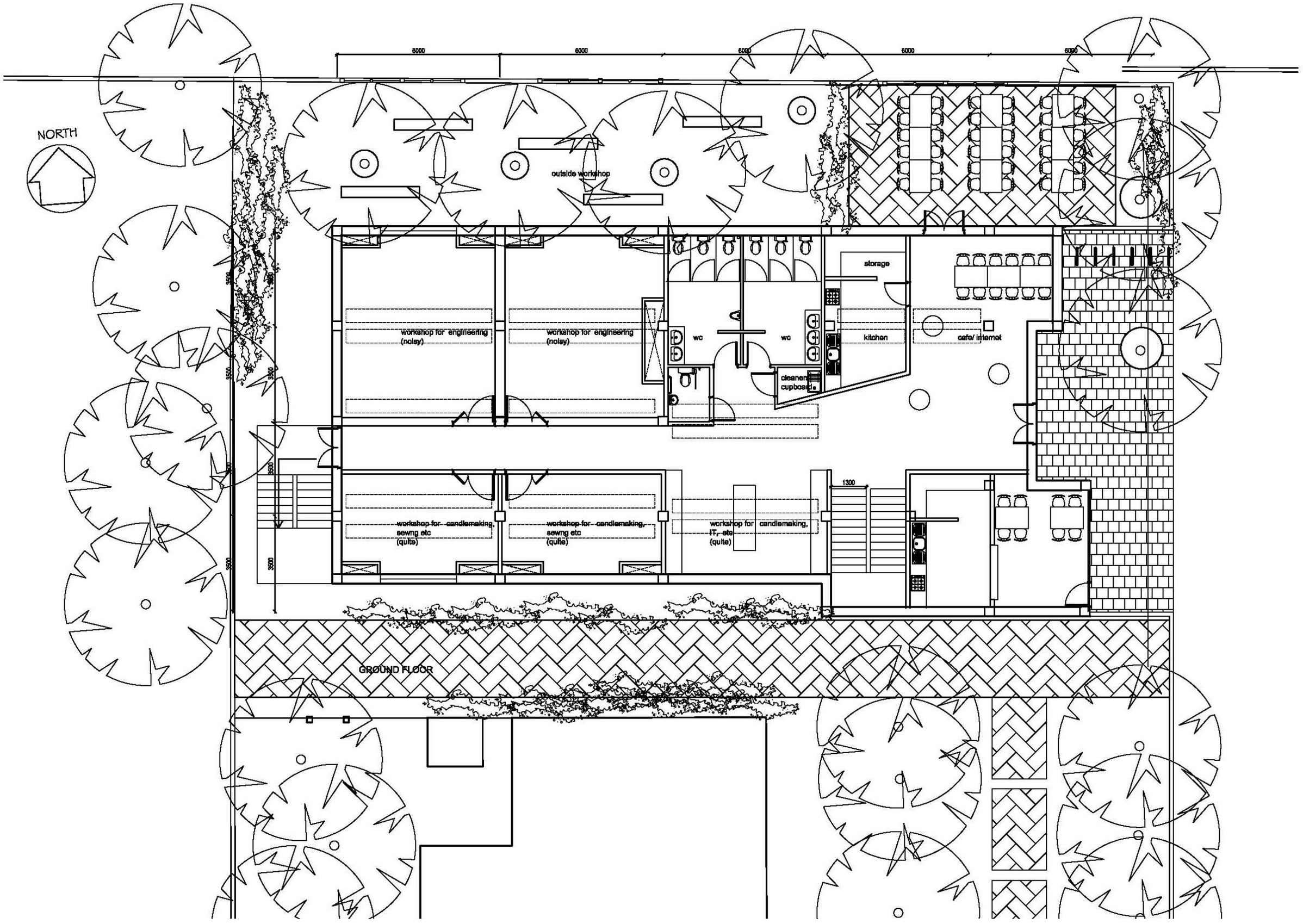
5



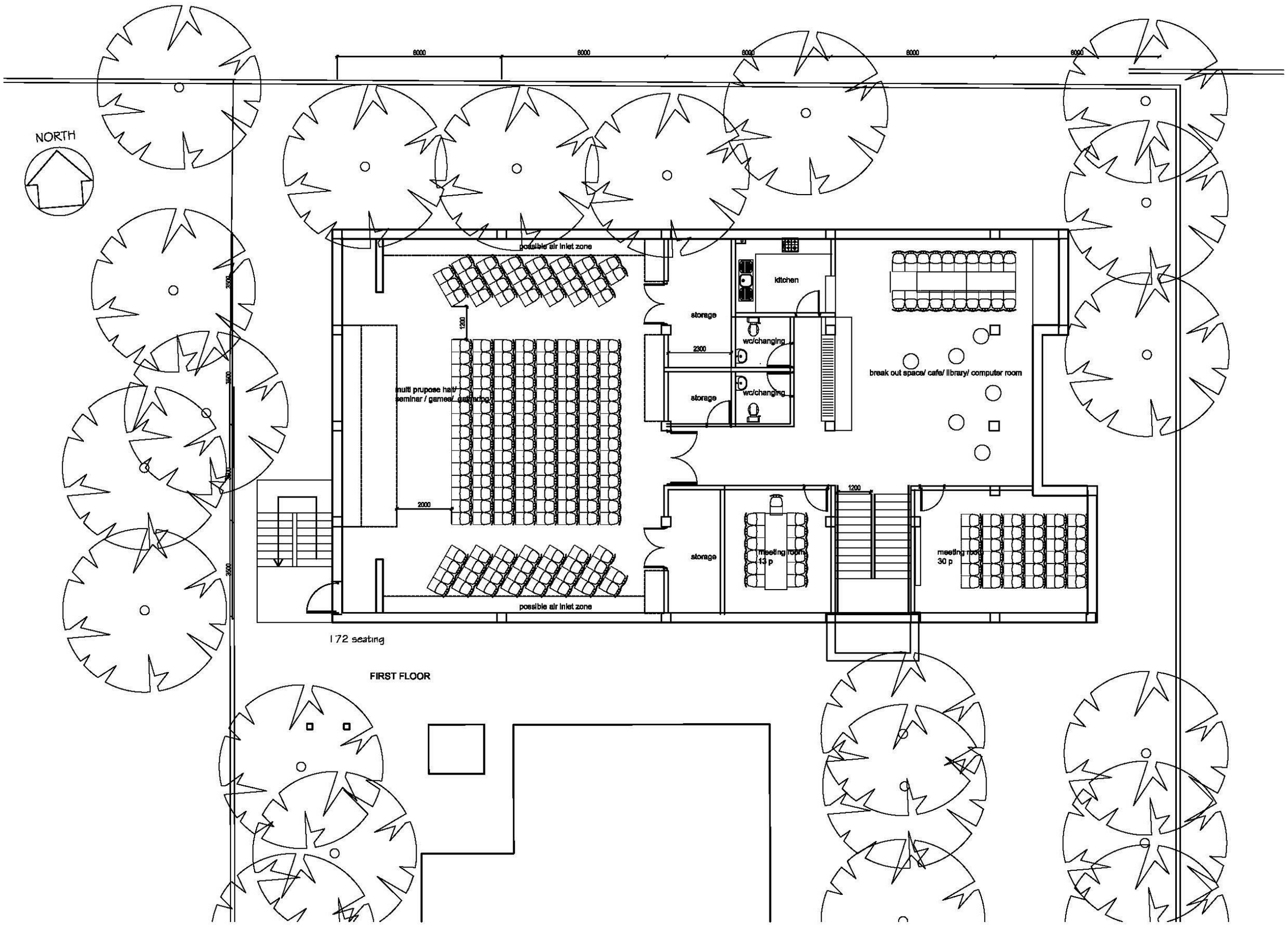
3

PLAN

Ground floor plan



First floor plan



4

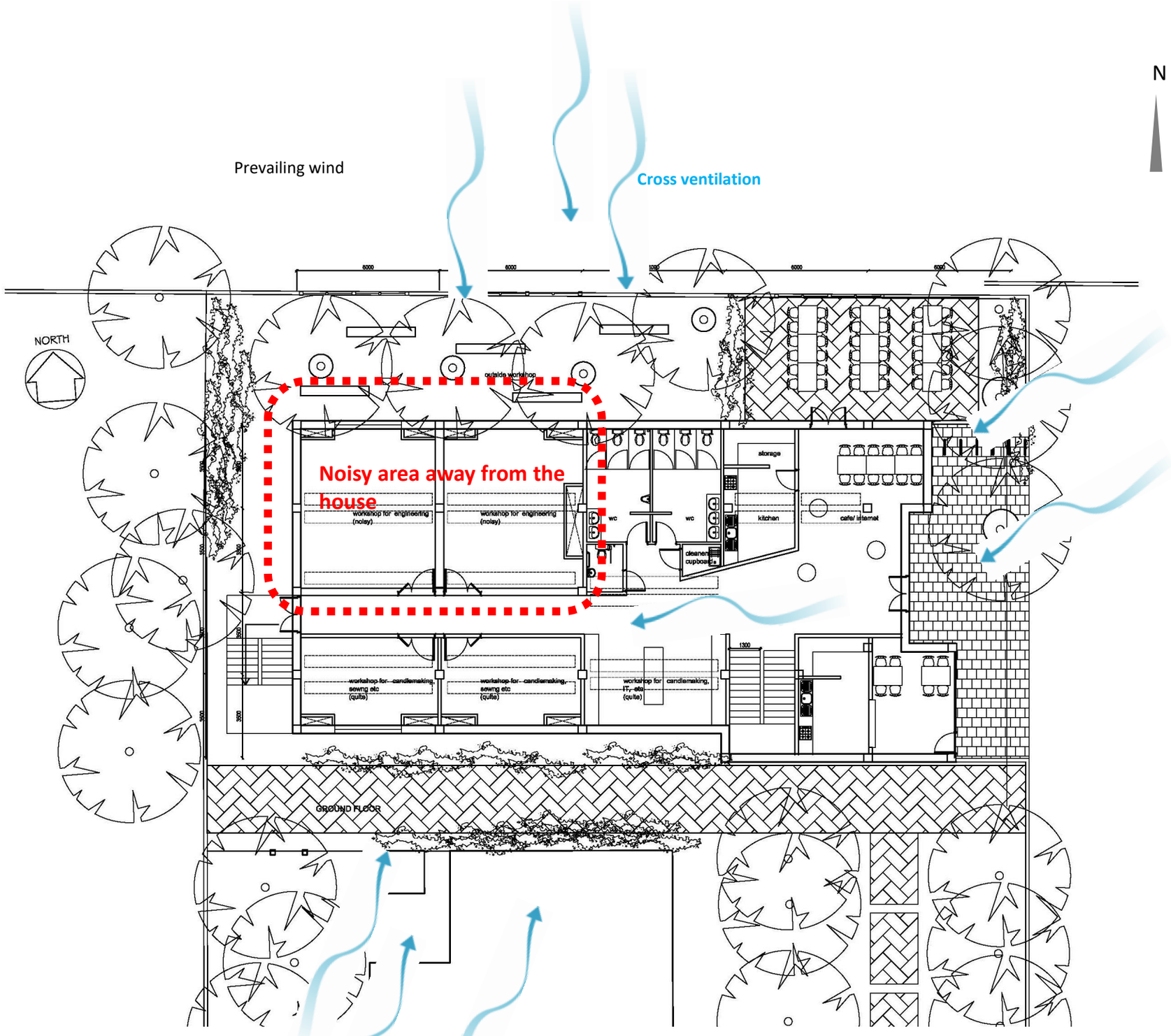
ENVIRONMENTAL STRATEGY

Orientation_ Sun Direction

Building is orientated east and west to minimize the cooling loads of building.

The orientation of the block enhances natural cross ventilation by prevailing winds through out the season within the center .

Shading of external walls to minimize heat gain.



Section

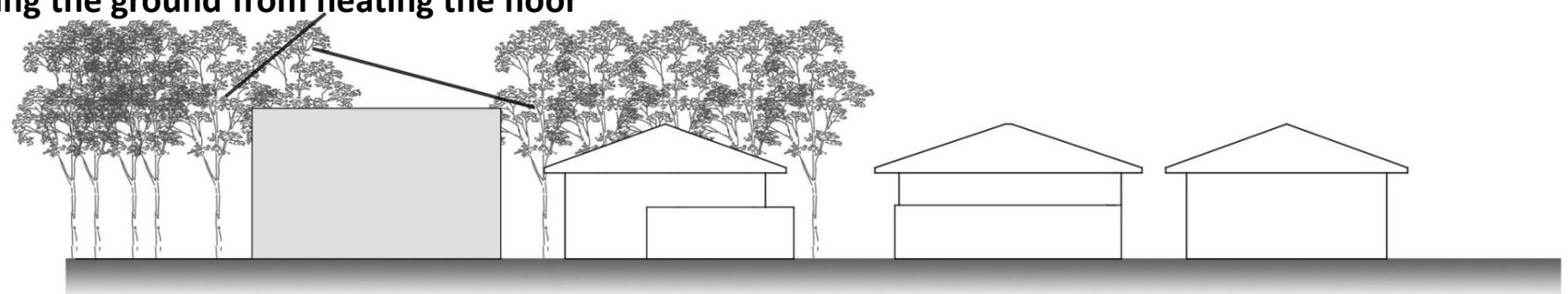
-The pitch of the roof is determined by the sun path.

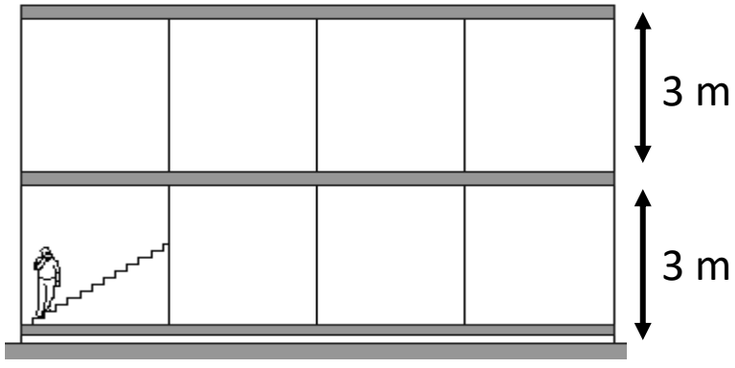
-Double roof construction ensures natural ventilation. And prevents heat gain to internal space via solar radiation.

-Hot air within the roof void to be exhausted through openable grills, driven by the buoyancy effect or cross ventilation.

-Large sloped south facing roof surface will provide a large area of solar panels

-The building is raised off the ground, allowing the air to enter under the building and preventing the ground from heating the floor





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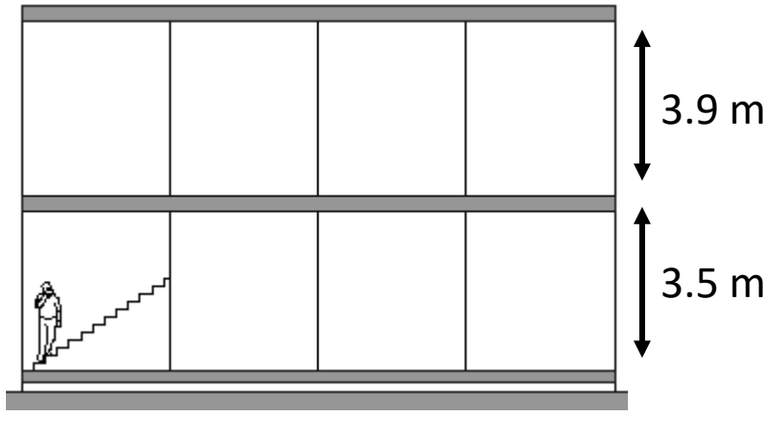
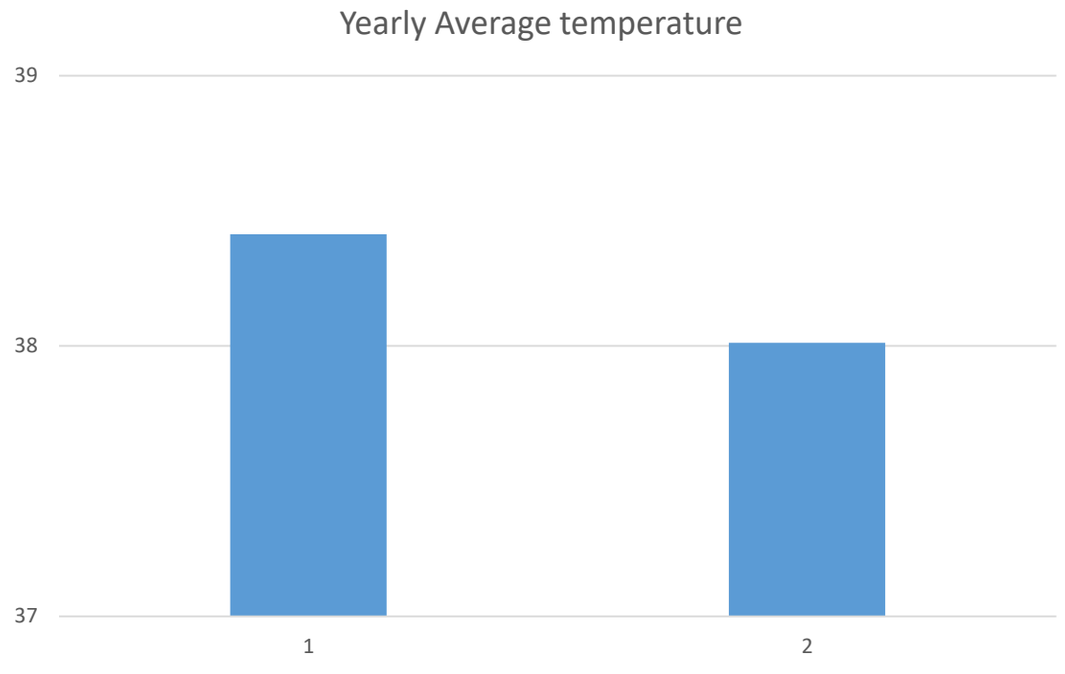






Q.HOME+

ROOF TOP SOLUTION WITH INTEGRATED ENERGY STORAGE – CLEAN AND RELIABLE POWER SUPPLY AROUND THE CLOCK.



Q.PRO-G4 Solar modules with SAMSUNG SDI

All-in-one unit:

- Inverter with lithium-ion battery storage without memory effect
- VDE tested battery
- More durable and uses less space than traditional batteries with lead technology
- No need for coordination between different components / inverters
- Easy and fast installation
- No active ventilation is required
- Extensive services (remote maintenance / remote access / automatic software updates)
- Web monitoring

SAMSUNG SDI SAMSUNG

2014

LI-ION BATTERY SOLUTION FOR HOMES

All-in-one solution for homes

Meet SAMSUNG SDI's newest All-in-one energy solution that can be directly connected to your PV system.

All In One
- PV Inverter
- Battery Inverter
- Lithium-Ion Battery

With SAMSUNG SDI's All-in-one energy solution, you can save space to optimize power consumption and significantly reduce maintenance cost with SAMSUNG SDI's monitoring system that can detect errors in advance and be controlled remotely.



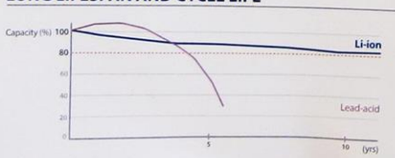
SPECIAL FEATURES

COMPACT DESIGN
- 3 Functions (PV & battery inverter + lithium-ion battery)
- Simple installation
- Remote maintenance

PROACTIVE A/S
- Prior malfunction sensing
- Web& Mobile monitoring for remote maintenance

SAFETY
- Battery cell approved for EV use
- VDE tested lithium-ion battery and inverter

LONG LIFESPAN AND CYCLE LIFE



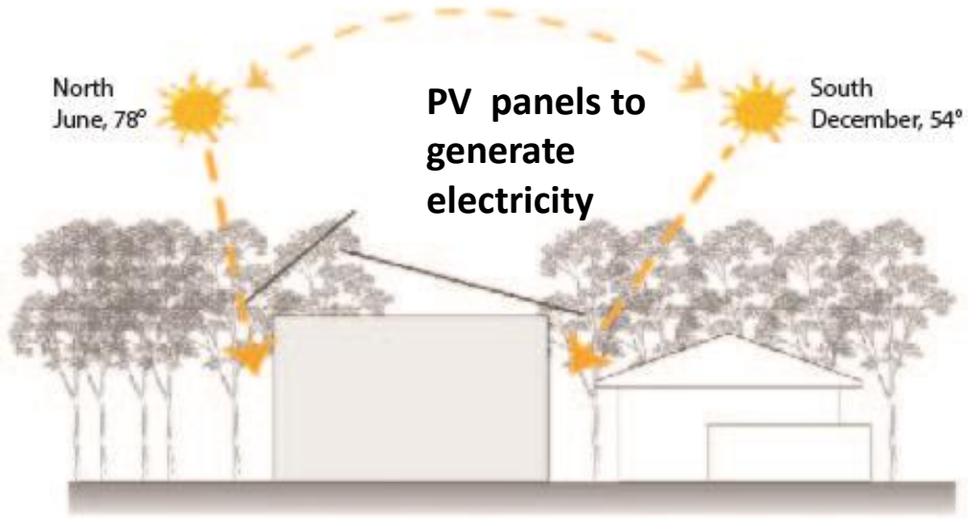
* Lifespan and Life cycle based on battery system (25°C)

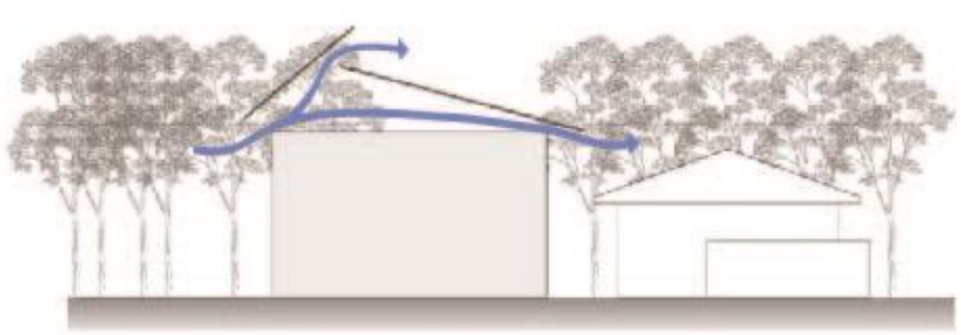
6,000 CYCLE

LIFE CYCLE

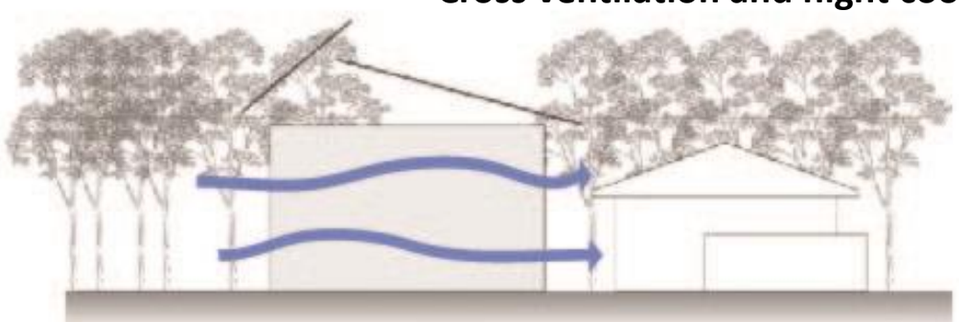
Orientation_ Sun Direction

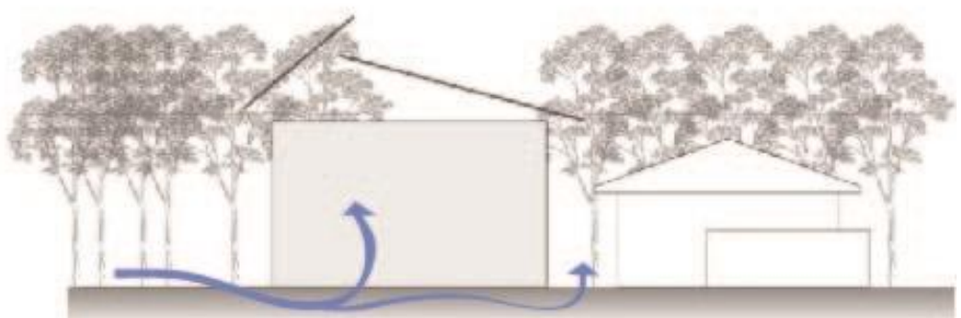






Cross ventilation and night cooling





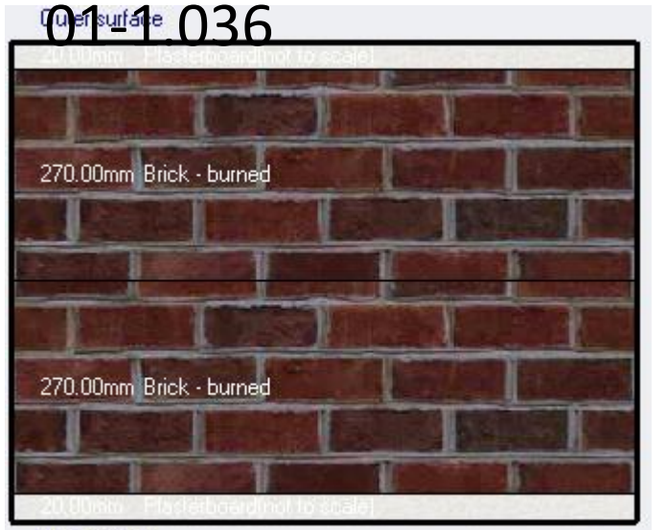
Pre cooled air is pulled through

01-1.036

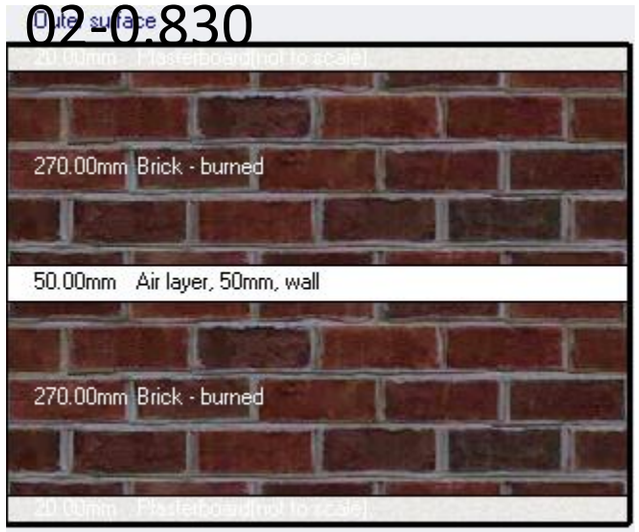
02-0.830

03-0.657

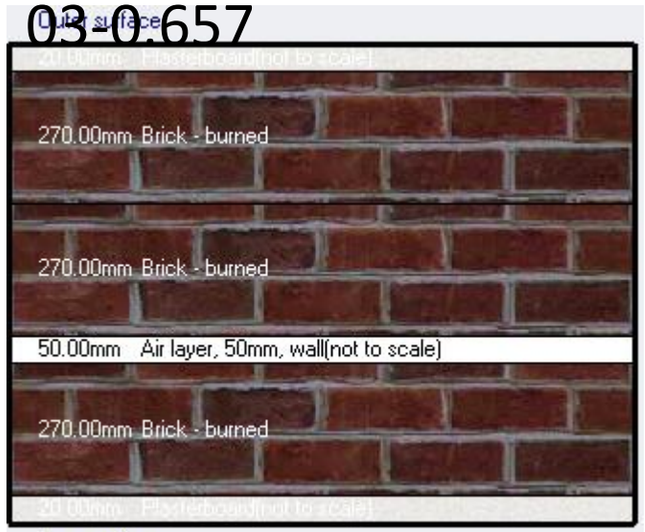
01-1.036

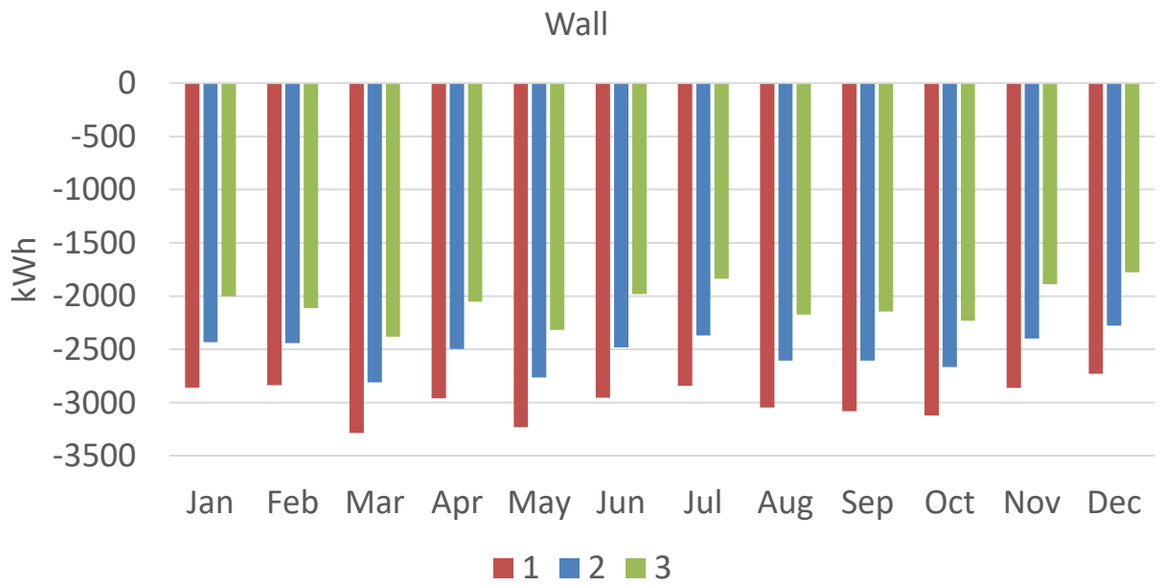


02-0.830



03-0.657





30% glazing on South and North façade
Solid West and East wall

Reducing Electrical Loads

Reduce Electrical Demand

It was found from the initial building physics modelling that the building had a relatively high electricity demand for lighting and appliances. This can easily be reduced with the following strategies:

-LED lighting throughout

-High levels of natural daylight

-Low energy appliances

-Minimise electric heat sources

-Minimise ‘phantom loads’ such as pumps and fans.



LED lighting

With LED fitting, each using around 2W, it is relatively easy to light a room with 12W, and a whole home for between 60 and 100W.





potential zero ozone depletion refrigerator

Reducing Water Consumption

Water Use Reduction

The previous water consumption scenario was based on 2 flushes of 9 litres per person per day, and 2 uses of the wash basin, with a faucet flow rate of 8 litres per minute for 20 seconds at a time.

If aerating faucets (taps) are installed to reduce the flow rate to 4 litres per minute, and toilet flushes are reduced to 3 litres per flush, about 50% water per year can be saved .

Rainwater use

Although mains water is relatively low cost with the onset of climate change this is a resource that is likely to be under future strain. The use of drinkable quality water for non human contact should be reduced in a future proofing scenario. The rainwater for the region cannot directly replace the amount of water used for toilet flushing but can make a significant impact if low flush appliances are used.

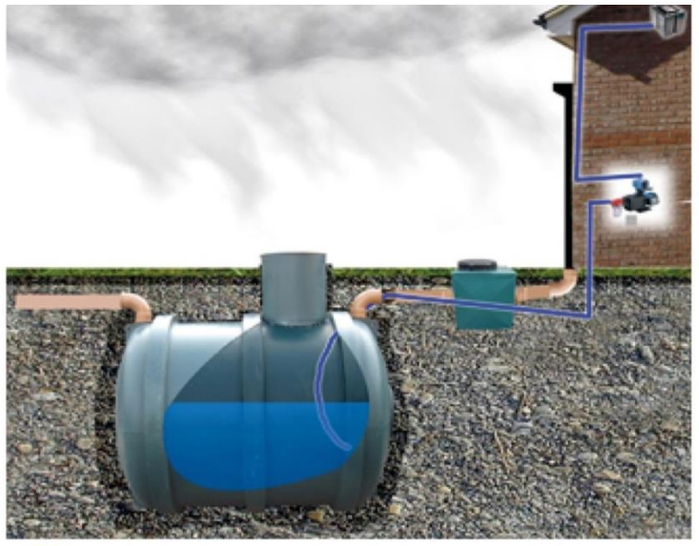
The rainwater store to work effectively requires each cistern to have a mains water back up in case the rainwater store becomes dry in times of low rainfall. The rainwater stored can be used indefinitely if the store is not exposed to sunlight or fresh air to eliminate algae and mosquito growth.



Sensor low flush tap

Water efficiency: low flush taps, showers & toilets

In the UK, all new toilets must have a maximum flush volume of 6 litres, and most are actually less than this, with a half flush of 4 litres.



MS18 rainwater recycling



MP26 water saving taps & showers





MP25 low flush wc

Zero Carbon Transportation Facilities and Product Design





Low embodied carbon

-The use of concrete is minimized . It is neither environmentally nor economically sustainable.
-







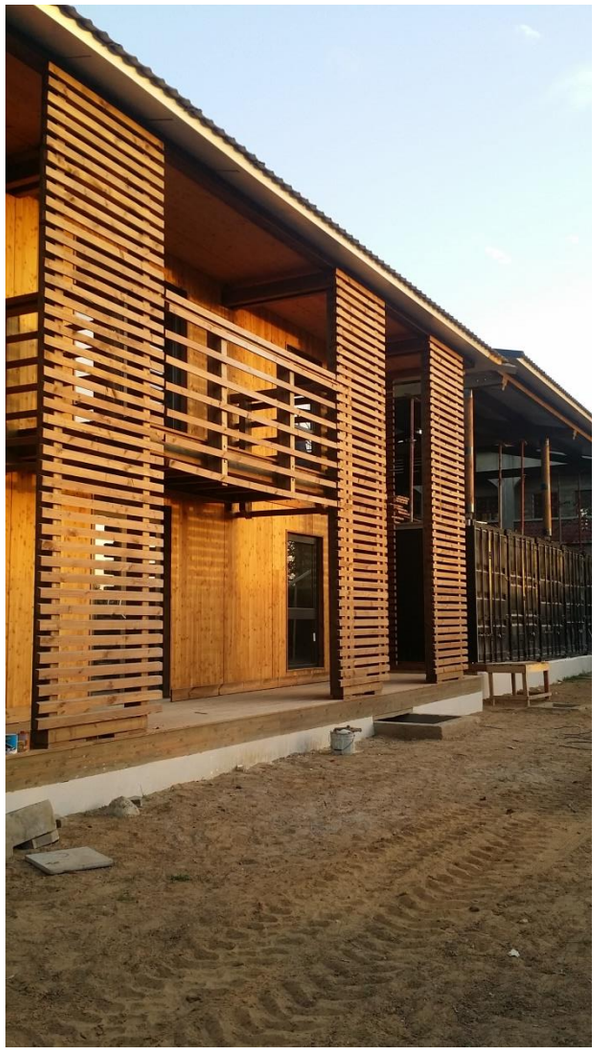




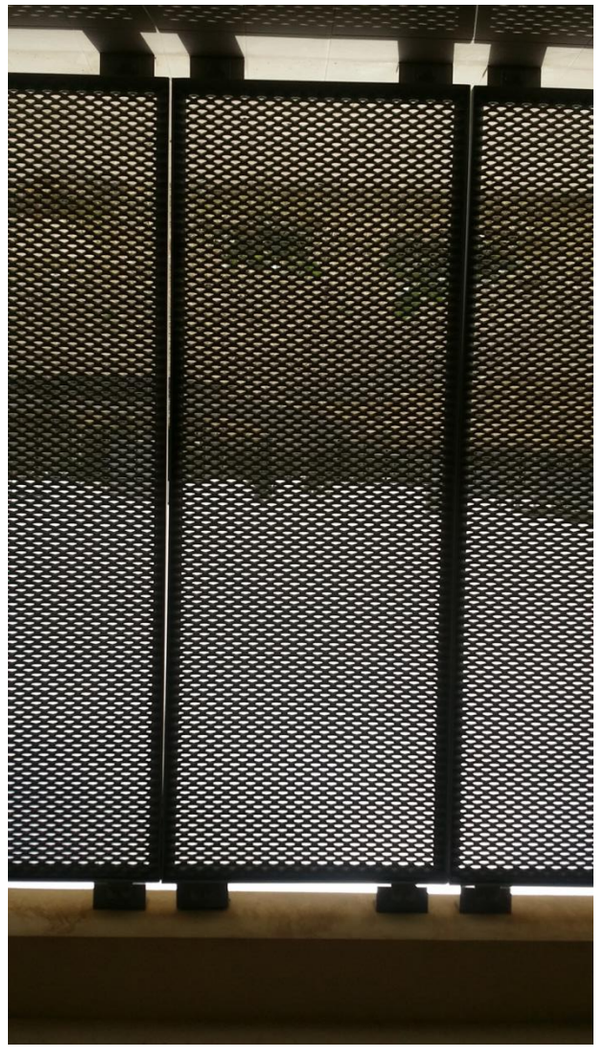


THERMAL MASS - COOL VAULT TERRACOTTA CEILING BLOCK

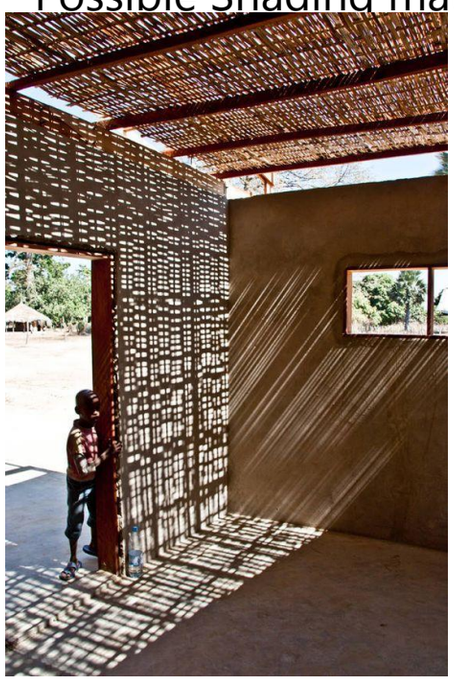








Possible Shading material



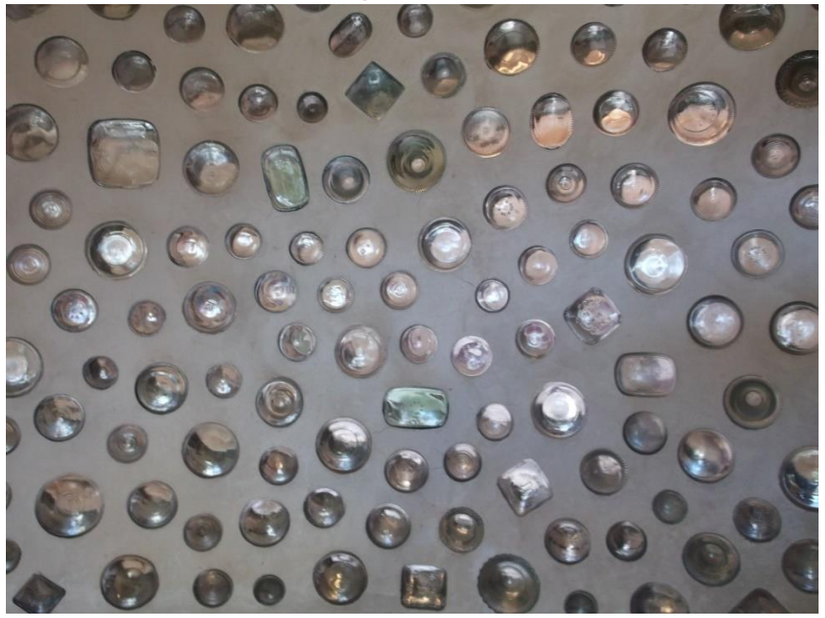


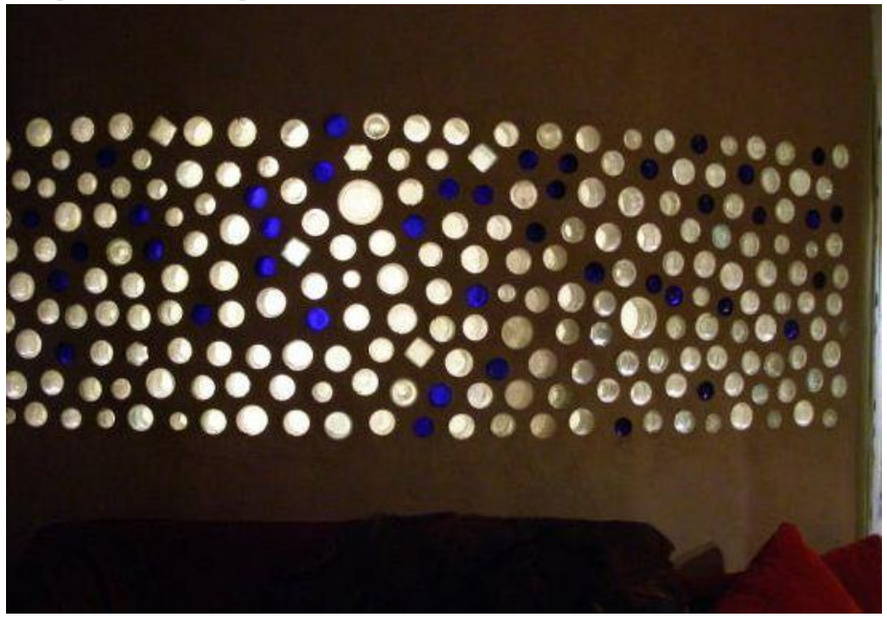




Possible roof material

Possible use of recycled bottle as part of wall design to let light in









Possible use clay bricks as cheap roof material

Possible Landscape Design








Fly
Emirates