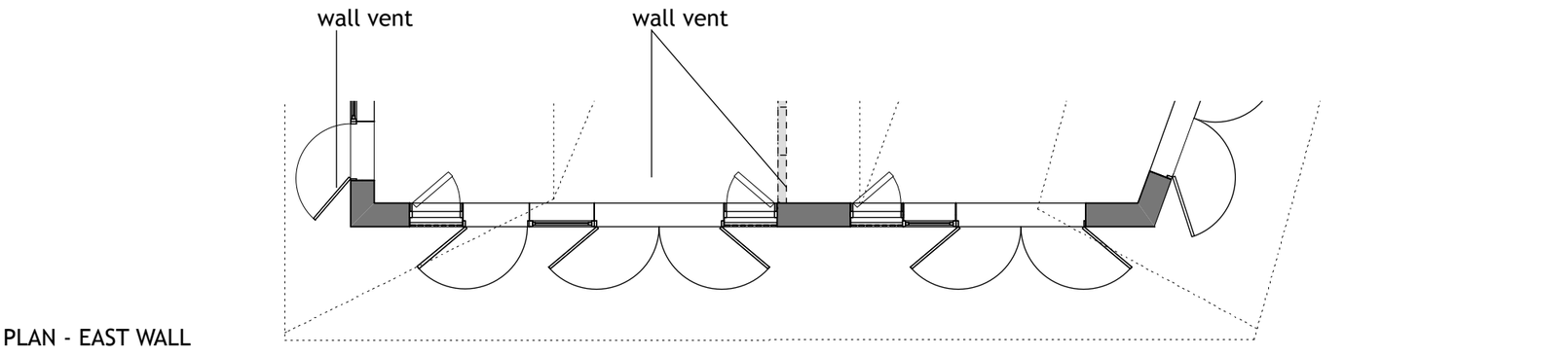
6.4.3 Vent Design

The wall vents are spread around the space to allow sufficient airflow. The glazing area are spaced apart to incorporate the wall vent.
At the top of the roof chimneys roof vents are integrated in between the fins.

EAST ELEVATION



PLAN - EAST WALL

0m 1m 5m 1:100

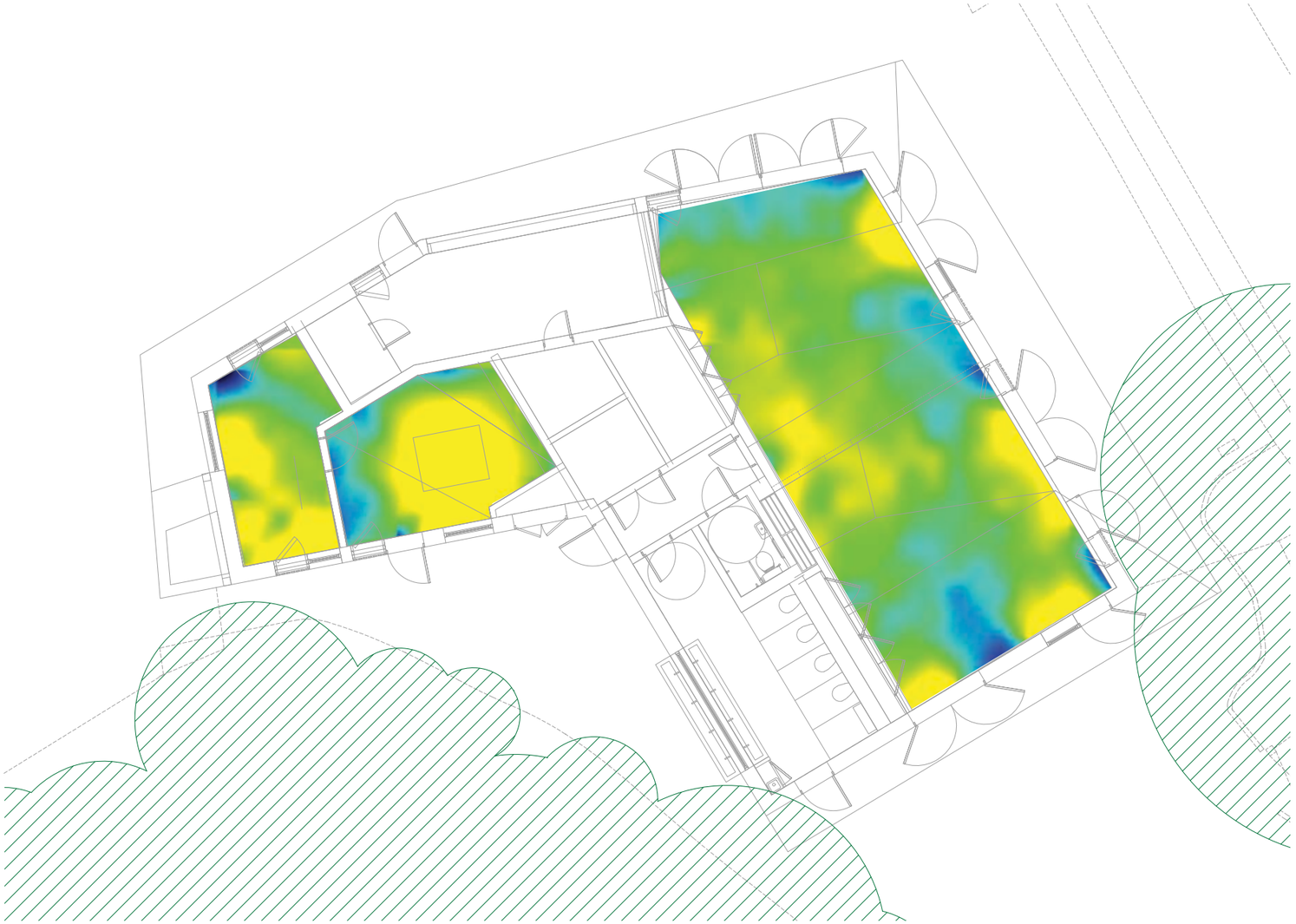
Example of wall vent with insulated internal panel

6.4.4 Daylight and Artificial Lighting

The building form has been designed to maximise daylight and delight within all key spaces. Rooflights can provide good quality, uniform daylight and are necessary in the proposed building because the surrounding trees and overhangs provided for covered outdoor space diminish daylight through the façade. The rooflights have been designed to allow sunlight in a controlled way, such that the interior walls of the rooflight chimney are bathed in sunlight at certain times of the day. The glazing area is also balanced to prevent overheating in the spaces during the summertime.
The office, volunteer room and main space are being designed to achieve > 4% average daylight factor on a cloudy day. This means that the spaces can be naturally illuminated to > 400 Lux for 75% of the year between 9am and 5pm.
The daylight levels in the main space, volunteer room and office have been simulated using a simplified 3D model of the building and surrounding trees and the results are presented.

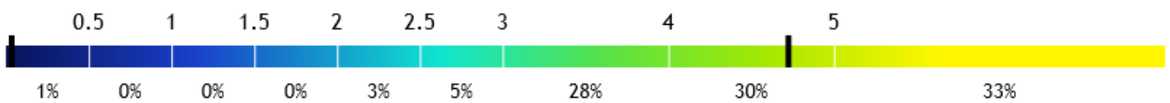
Natural light will be supplemented with artificial lighting throughout. The lighting will be very efficient and purposeful – as a general target it is intended that the selected lamp and luminaire technology is capable of 70 and 120 lumens per watt. We expect that most of the lamps within the building will be LED (light emitting diode).

6.4.5 Daylight Factor Scale

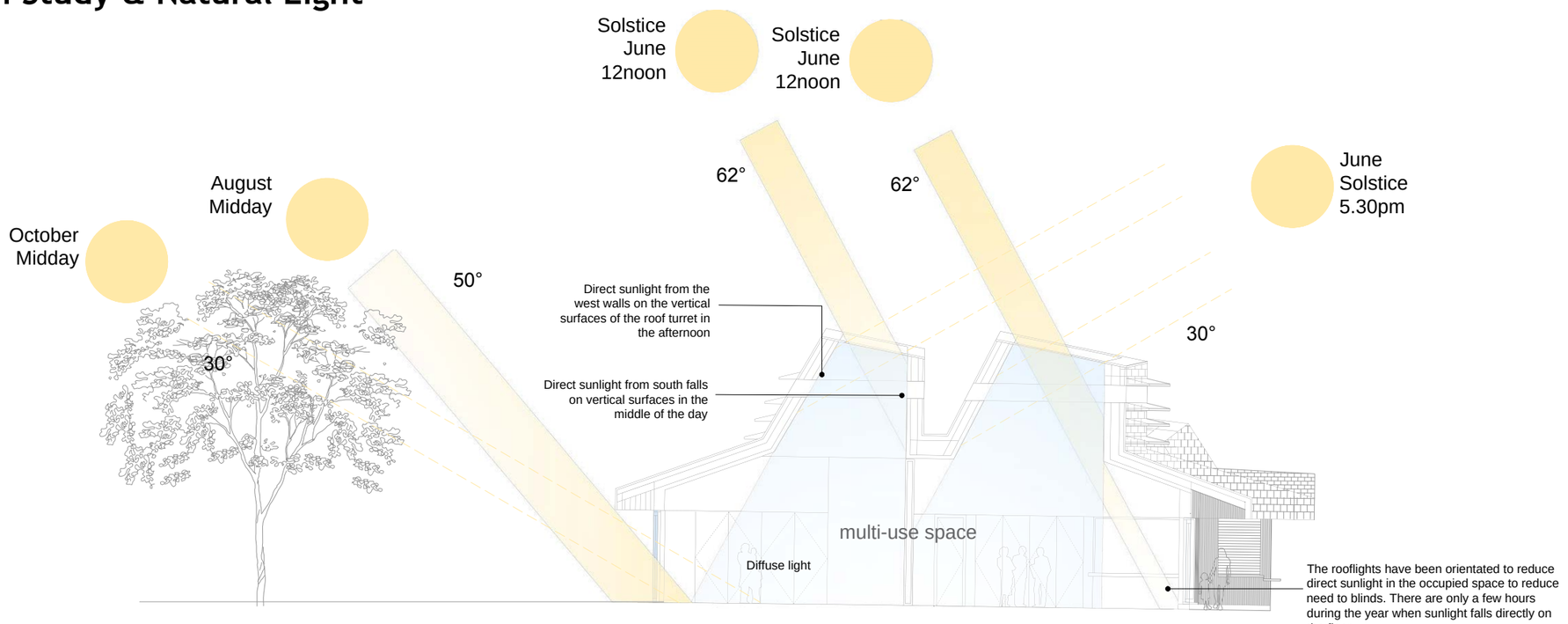


Daylight Factor Scale

Daylight Factor (DF) is the ratio of light inside the room to the light level outside and measured here at 0.85 from the floor. The modelling is done on an 'overcast day' when outside light levels are 10,000 lux.



6.4.6 Sunpath Study & Natural Light

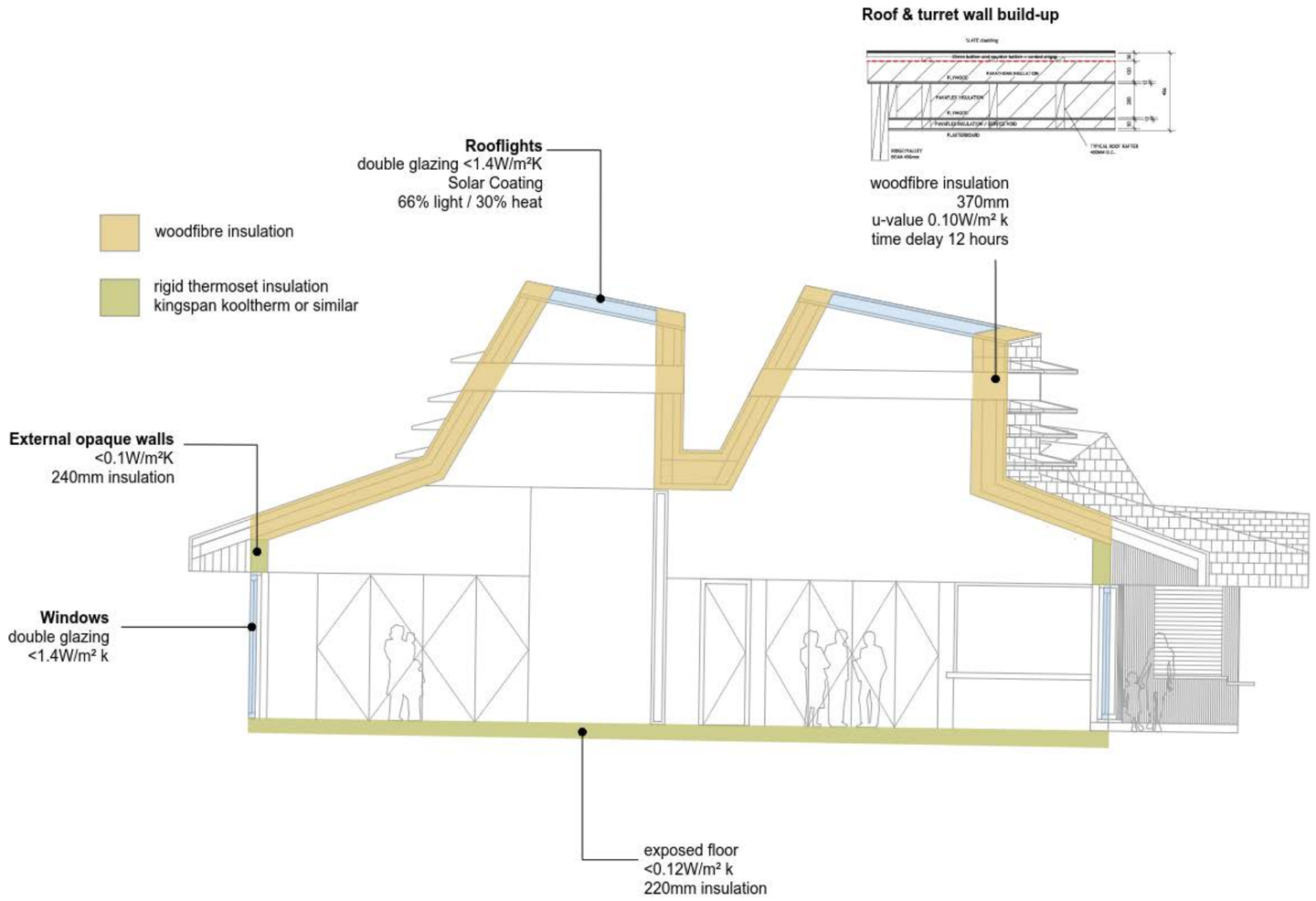


6.5 Materials and Construction

6.5.0 Thermal Envelope Material

All new external elements shall be super insulated and shall exceed the regulatory minimum u-value requirements.
All opaque walls and roofs shall be insulated to achieved a u-value resistance of 0.1W/m2k.
The rooflights and windows shall be high performance double glazed units and target an overall u-value of 1.4W/m2k as a minimum.

The exposed roof spaces have been considered in relation to heat flow in warm weather and shall be provided with wood fibre insulation. This has a greater density and added weight, therefore slowing down the flow of a heat from a warm solar heated roof surface into the interior. This measure helps reduce the risk of overheating.



Woodfibre Insulation
Rigid & flexible boards

370mm

Thermal Conductivity = 0.038W/mk
Density = 55kg/m^3 (flexi) - 110 kg/m^3 (rigid)
Specific Heat Capacity = 2100j/kg k

U-Value 0.1 W/m^2 k

Excellent thermal resistance

Time Lag 12 hours

Excellent time delay of heat flow

Thermal Admittance 0.51W/m^2 k

Poor 24hr internal heat storage

Polyurethane Insulation
220mm

Thermal Conductivity = 0.022W/mk
Density = 30kg/m^3
Specific Heat Capacity = 1000j/kg k

U-Value 0.1 W/m^2 k

Excellent thermal resistance

Time Lag 3 hours

Poor time delay of heat flow

Thermal Admittance 0.2W/m^2 k

Poor 24hr internal heat storage

6.5.1 Structural Strategy

The scheme has been developed using timber as the primary structural material. This does not only make conceptual sense (building in a nature reserve surrounded by trees), but there are a number of benefits that timber brings to the project, most notably in terms of sustainability but also by exposing the structure where possible, the natural finish of the timber marries well with the overall material palette for the building and means additional finishes can be omitted, reducing costs.

Specifically, the timber proposed will be a combination of laminated veneer lumber (LVL) beams for longer roof spans and more typical soft wood framing for the roofs and walls. Stability will be provided by sheathing the roofs and walls with timber panel materials, e.g. ply or OSB, to create horizontal and vertical diaphragms to transmit lateral loads to the foundations.

The building will be supported on piled foundations due to the relatively poor ground conditions but this is also beneficial in that it causes minimal disruption to the existing site and reduces the amount of material that needs to be excavated and moved elsewhere.

LVL beam

Softwood beam