Neil Dusheiko
Architects

Design & Access Statement

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Gage Farm, Comberton, Cambridge

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1 INTRODUCTION

1.1 The proposal

Neil Dusheiko Architects have been appointed by the client to put together design proposals for a replacement dwelling at Gage Farm, located on Branch Road in Comberton.

The proposals is to demolish the existing bungalow and outbuildings and replace them with a new build house that more suits the clients growing needs and provides a more suitable and environmentally sustainable family home.

2 SITE ANALYSIS

2.1 Site and context

Gage Farm

The site is located in the Greenbelt west of Cambridge, on the outskirts of the town of Comberton.

The site is 2.85 acres and has a solitary nature except from one neighbouring property to the East. The neighbouring property has been unoccupied for a number of years, with several unsuccessful planning applications for various types of schemes.

Located on the site is a single storey four bedroom dwelling with an adjacent garage and outbuilding, as well as a stable block. Despite its name there is no record of Gage Farm being used as a working farm. The stables appear to have been used as ancillary storage for the main dwelling for at least 10 years.

The existing bungalow has a rendered finish to external walls and a tiled roof. Ornament and decoration is to a minimum, with glazed openings being small in size and single glazed. The existing stable block is constructed from block work and is not in good condition, large cracks have formed and it could be described as structurally unsound.

Aerial view of the site.

Aerial view of the site.

2.2 Existing site photographs

View of House and Garage from Entrance to Site

View of House looking East from Stable Block

View of Southern Elevation of House

Existing Stable Block

View of Proposal Site and Existing House Looking South

2.3 Planning history

There has been few planning applications at Gage Farm over the years:

Application 1: Extension of existing dwelling.
Date: 1973

An extract of this application can be seen to the right.

Application 2: 23/02817/CL2PD. Extension of existing dwelling through Permitted Development
Date: July, 2023.

Under the Permitted Development Application a side and rear extension was proposed to add roughly 100m2 to the footprint of the building and 243m3 to the volume of the building.
Please also see Appendix 2.

Existing ground floor plan

Proposed ground floor plan. Dark grey hatch illustrates extended walls.

Application 2: Extension of existing dwelling through Permitted Development

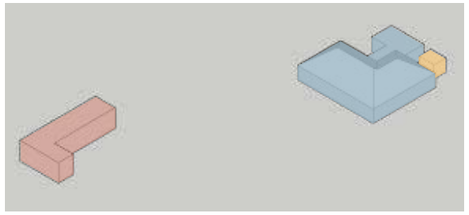
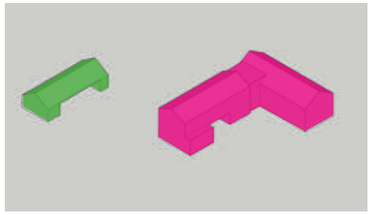
3.1 Scale and massing

In preparing a concept design, Neil Dusheiko Architects modelled the existing bungalow, stables and outbuilding to determine the existing building volume.

Following the establishment of the existing volume totals, Neil Dusheiko Architects then modelled the volumes of the house, stables and outbuilding based on the permitted development application to extend the property. This was submitted in July 2023.

Once the existing volume and the permitted development volume was established, Neil Dusheiko Architects then used these figures to develop the concept design for the replacement dwelling.

In addition to this we want to include a separate garage in the scheme, the aim of the proposal is to ensure that the volume of the new dwelling and the new garage are less than the volume of permitted development scheme, the permitted development volume calculation is 1,258m3, the proposal volume calculation is 1,244m3.

	Existing Building	**Permitted Development**	**Replacement dwelling and garage**
	 House Barn Outbuilding	 House Barn Outbuilding PD extension	 House Garage
Footprint (m2)	**Total: 287** House: 205 Outbuilding: 7.5 Barn: 75	**Total: 385** House: 303 Outbuilding: 7.5 Barn: 75	**Total: 291** House: 212 Garage: 79
Height (m)	Eaves: 2,46 Ridge: 5,42	Eaves: 2,46 Ridge: 5,42	Eaves: 4,32 / 5,66 Ridge: 6,4 / 7.52
Volume (m3)	**Total: 1015** House: 720 Outbuilding: 20 Barn: 275	**Total: 1258** House: 963 Outbuilding: 20 Barn: 275	**Total: 1244** House: 1110 Garage: 134

3.1 Context and precedents

The landscape around Comberton, where Gage farm is located, is traditional Cambridgeshire agricultural flatland; sparse and repetitive, ditched out with tree- and hedge lined straight country lanes and predominently buildings relating to farming. These buildings are simple and utalitarian, often large and shallow pitched, with materiality aimed to withstand the weather and the wind, and be easy to maintain. Corrugated metal cladding is common, arranged to suit the sizes of the metal sheets, often with a datum emphasizing levels or change in materialty. Colours are mostly dark - black, brown, green, grey - relating to the venacurlar agricultural architecture which used to be timber treated with tar.

Gage farm itself now consists of a run-down stable block and a mid-centrury single storey white-rendered bungalow of low quality; the latter an alien feauture of a landscape of such scale.

The new proposed buildings seek to reference their architectural and rural context in scale, in form and in materiality. The new dwelling house consists of two simple pitched volumes, un-ornamented and with the upper level and roof clad in black metal sheeting, and like its agricultural neighbours, without overhangs or eaves. It's lower level, closer to the human scale, is clad with black-painted timber, all stood upon a base of concrete.

Areal view of the agricultural landscape around Gage Farm.

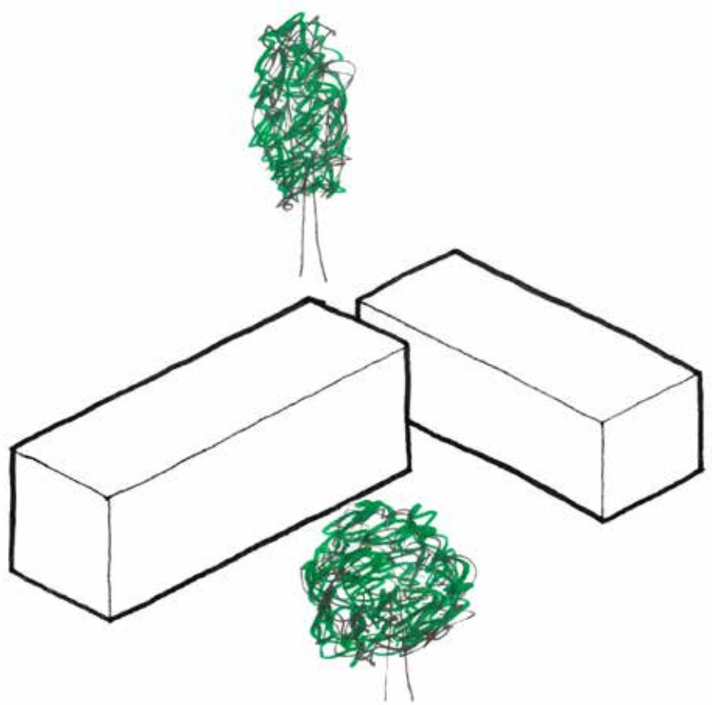
Roadside view of neighbouring farm buildings.

Precedent of new dwelling house at a Cambridgeshire farm: an un-ornamented black-clad volume.

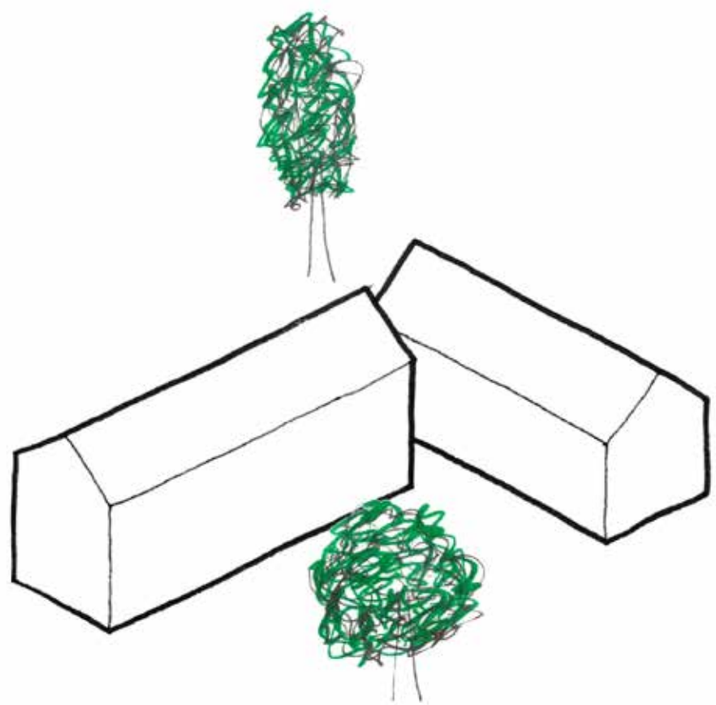
3.2 Scale and massing

The scale of the proposal is relatively modest, especially when viewed in the wider context of the entire site (the new proposal footprint takes up 2.2% of the site). It consists of two two-storey volumes arranged in an L-shape and sperated by a “glass link”. The form of the volumes are informed by barn typologies commonly found in the area.

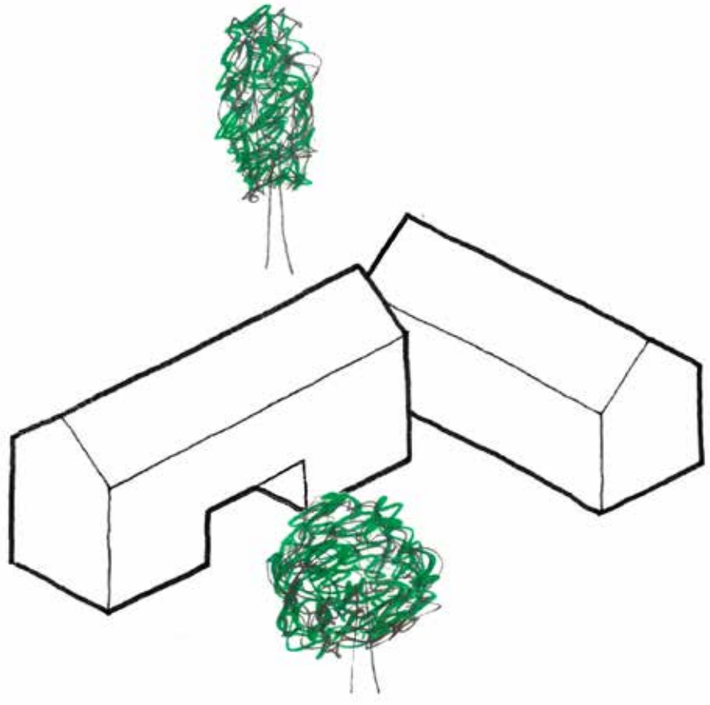
The L-shape arrangement has been dictated by existing trees on site, ensuring that both wings of the proposal have a focal point of an existing willow tree, a tree important to the applicants, and to retain and celebrate this tree in the new design. Additionally, when approaching the new house one is met by a large pine tree; this pine will be the focal point of the entry garden.



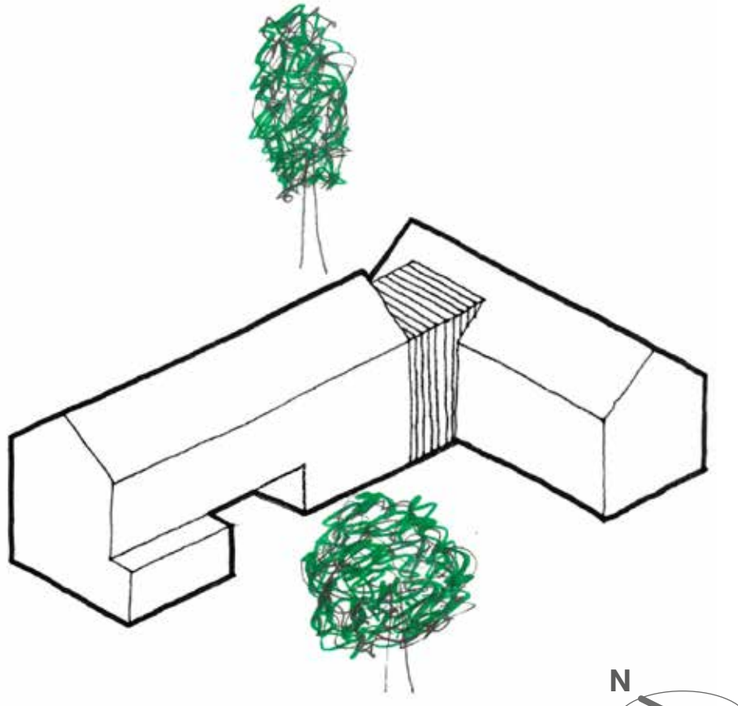
Step 1 - Initial Box Massing



Step 2 - Boxes Adjusted to Resemble Barn Typology



Step 3 - Undercroft Introduced to Increase Permeability and Allow Continuity of Landscape

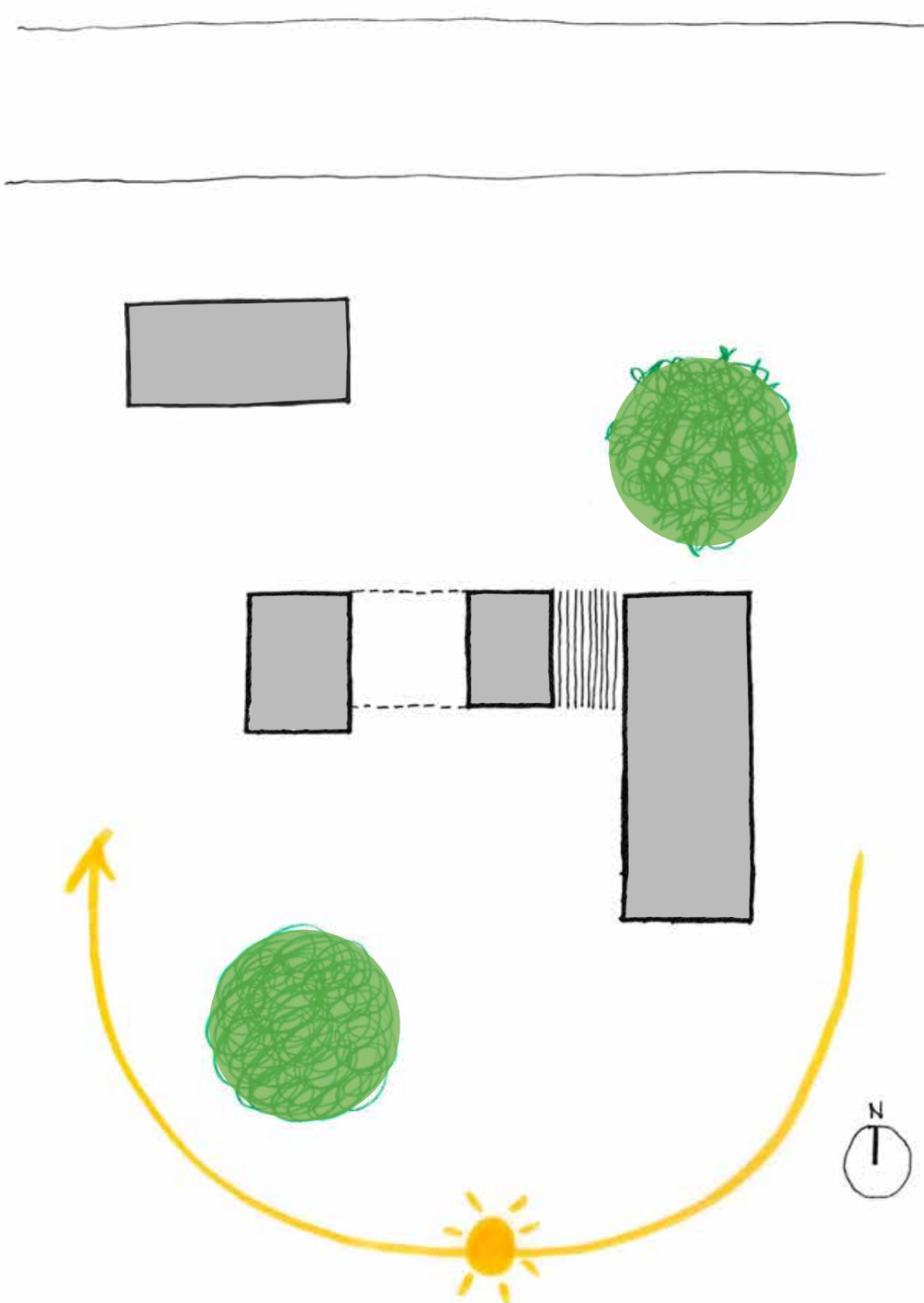


Step 4 - Glass Link and Roof Terrace Added

3.2 Scale and massing

The building is also orientated so the main living/kitchen/dining volume sits on a north to south axis, reducing the solar gain in this space as well as providing varying places to sit outside during the day.

Bedrooms are located in the east to west axis, meaning they will benefit from solar gain, particularly in the winter months when the sun is lower. In the summer months the higher solar gain will be managed by windows recessed in the walls, providing shading.



3.3 Material palette

Metal Cladding - Roof and upper level walls

Referencing agricultural buildings in the area, we are proposing to clad the building's roof and upper level walls in vertical metal sheeting of black colour, creating a rainscreen for the the most exposed parts, and a clear datum line to ground floor level.

Timber - Walls lower level

Dark timber cladding to lower level to soften to the appearace and have a more tactile material close to outdoor spaces.

Black window frames, high performing aluminium windows will be sued in the scheme, these will be finished in grey/black.

Concrete Block - Ground Floor Plinth Material.

Taking cues from argicultural building precedents we are proposing a concrete plinth for the building to sit on.

3.3 Visuals

View from Branch Road

4 SUMMARY

4.1 Conclusion

The proposals have emerged after a close study and analysis of the site and responding to the objectives that Neil Dusheiko Architects felt were crucial to the development and configuration of the proposal. Some of the areas that have been taken into considerations besides the the Applicant's brief are:

• By a design-led approach create a beautiful, modern and well crafted proposal which will enhance its surroundings.

• A carefully thought through response to scale, mass and the use of materials to minimise the impact of the developement on the agricultural character of area.

• The creation of an environmentally enhanced dwelling, responsible to the climate and our shared resources, and a comfortable long term home for the Applicant.

For reasons explained in this document, Neil Dusheiko Architects believe that the proposal would preserve and enhance the special character of the area and its contemporary design will be encouraged and deemed appropriate by Cambridgeshire Council.

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GAGE FARM, CAMBRIDGE
ENERGY STRATEGY FOR PLANNING

Allwood Design

29/01/24 Rev 01
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ENERGY STRATEGY

Summary

The energy strategy for the new building is to provide a high-performance and well-designed building envelope that will minimise energy usage and carbon emissions for the building's lifetime. Efficient and low-carbon building services that complement this will be installed. The heating will be fully electrified with high-efficiency heat pumps. There will be no fossil fuels burnt on the site.

Reduce – Fabric Performance

The fabric of the building has been designed to meet and exceed the requirements of Building Regulation Part L. Table ES.1 shows the proposed performance for each building element. High-specification glazing will minimise energy use and optimise comfort in the space.

The fabric has also been selected to reduce embodied carbon. Timber cladding is used at low levels with lightweight recycled aluminium above. The lightweight aluminium reduces the extent of supporting structure. The ground floor slab is to be piled to reduce the volume of concrete and minimise the impact and excavation of the ground.

Efficiency – Building Services

Low-energy and high-efficiency building services will be installed, exceeding the requirements of the Domestic Building Service Compliance Guide.

The building will be fully electrified using an Air Source Heat Pump (ASHP) to provide all heating and hot water needs. The heat pump shall be located as shown on the layouts.

Electrifying the heat with highly efficient heat pumps (350%+) reduces heating carbon emissions by over 80% compared to a gas or oil boiler. This is due to the decarbonising UK electricity grid (Graph ES.1). The carbon emission will continue to drop as the grid decarbonises further reducing the impact of the building.

Renewables

Whilst Photovoltaic Panels have not been included in the compliance calculations, there is a plan to install them on the south-facing roof of the garage. The property's design will allow for the future installation of a PV array and electrical supply.

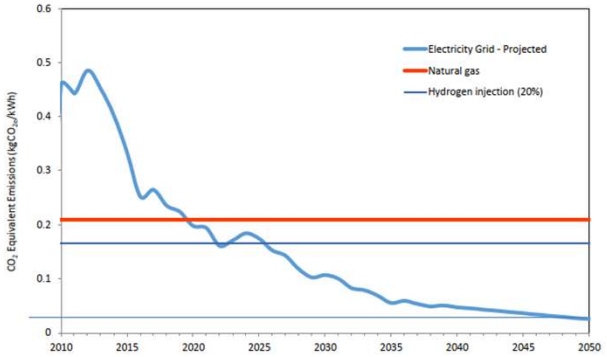
Performance

The regulated carbon emissions for the property have been modelled using SAP 10 software and are fully compliant with Part L of Building Regulations.

The SAP 10 results show that by use of low-carbon technologies, the carbon emissions for the site are reduced by over 25% compared to Building Regulations.

Element	Part L U-value W/(m².K)	Notional Building W/(m².K)	Proposed U-Value W/(m².K)
External Walls	0.26	0.18	0.18
Floors	0.18	0.13	0.13
Roofs	0.16	0.11	0.11
Windows & Doors	1.6	1.2	1.0
Rooflight	2.2	1.7	1.0
Air Permeability	8.0 m³/(h.m²) @ 50Pa	5.0 m³/(h.m²) @ 50Pa	5.0 m³/(h.m²) @ 50Pa

Table ES.1 - Building Regulation Part L and Proposed Fabric Thermal Performance



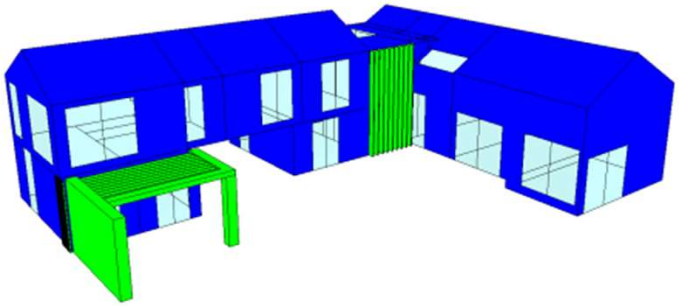
Graph ES.1 - Decarbonisation of UK Electricity Grid

1 no. approx 12kW ASHP
e.g Samsung 12kW EHS Mono HT Quiet R32
Dimensions - 1000H 1300W 530D

OVERHEATING MITIGATION

As well as minimising the impact of the property on the environment, measures have been taken to ensure that it will not overheat and is adapted to climate change.

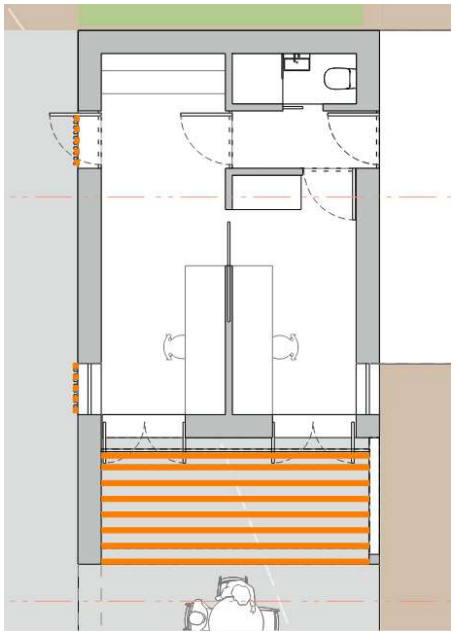
A detailed dynamic thermal simulation of the property was carried out using ApacheSIM (IESVE, 2023). The building was tested against a typical summer scenario (DSY1 2020 50% high emissions) and fully complies with TM59 / Part O.



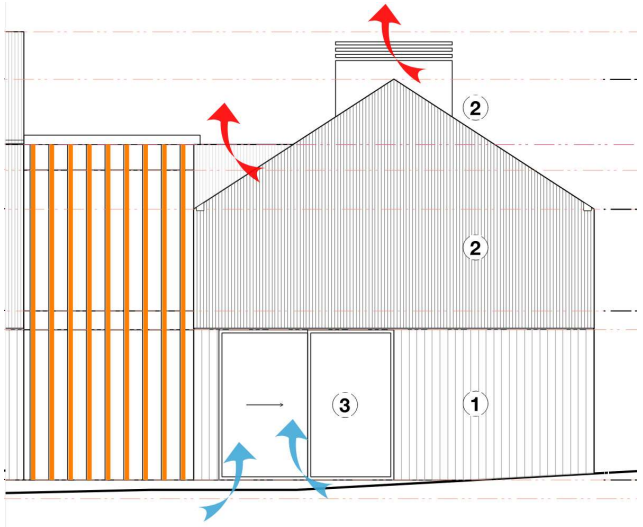
IES Dynamic Thermal Model

The modelling was carried out at an early design stage to ensure mitigation measures could be fully integrated into the design. The following steps have been taken to ensure a comfortable house which does not overheat:

- High-performance glazing with low g-values (0.35) to reflect solar heat
- High fabric performance
- External shading positioned to minimise solar gain
- A pergola protecting the south-facing study spaces
- Generous window openings and cross-ventilation
- Openable sky-lights providing stack vent up through the building



Pergola and vertical solar shading protecting south-facing studies from excess solar gains



Vertical solar shading reduces solar gain along with large ventilation openings and roof lights positioned to allow stack ventilation through the property

WATER USAGE

Water Efficiency

Water consumption will be kept to a minimum within the new dwelling by installing water-efficient fittings and appliances. These will include the following:

- Low-flow taps and showers
- Dual Flush WC's
- Low-flow appliances
- Avoidance of leaks
- Low volume (to overflow) bathtub

Through the implementation of water-efficient fittings and appliances, wastewater will also be reduced within the property.

The BRE Water Efficiency Calculator Tool has been used to predict water usage for the property and meets the 110l/person/day set out as an optional requirement in Building Regulation Part G.

Rainwater Recycling

A rainwater recycling system shall collect water from the property's roof, store it in a tank, and then use it for irrigation on the site.