

Planning Department
Arun District Council
Arun Civic Centre
Maltravers Road
Littlehampton
West Sussex
BN17 5LF

25th April 2025

Application Reference: Land Adjacent 18 Queens Lane, Arundel, BN18 9JN
Subject: Energy and Overheating Strategy for Proposed Dwelling

Dear Mr Chalk,

This letter provides a summary of how the proposed dwelling at Land Adjacent 18 Queens Lane seeks to respond to Policy ECC SP2 of the Arun Local Plan 2011 – 2031, through a combination of passive and active design measures¹. Please note that this letter does not constitute a full energy strategy, which will be developed and assessed at a later stage².

Passive Design Measures

The proposed dwelling incorporates passive design measures aimed at reducing operational energy consumption and mitigating the risk of overheating, without reliance on active cooling.

Orientation and Form

The orientation and massing of the building have been optimised, within the site constraints, to reduce overshadowing and maximise useful solar gains during the winter months. The building's simple form, demonstrated by a low form factor of 1.8³, reduces the surface area relative to its floor area thereby reducing heat loss and space heating demand.

Glazing Ratios

Glazing ratios have been optimised with respect to daylight and thermal comfort (i.e. minimising excessive heat loss during winter months and overheating risk in summer months) in line with best practice (see Table A.1).

U Values

The design will incorporate high levels of insulation and high-performance glazing throughout to reduce unwanted heat loss. All thermal elements are targeting an improvement on Part L 2021 limiting values as evidenced in Table A.2.

¹ All new residential... development...will be expected to be energy efficient and to demonstrate how they will:

- Achieve energy efficiency measures that reflect the current standards applicable at the time of submission
- Use design and layout to promote energy efficiency
- Incorporate decentralised renewable energy and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.

² The results of these assessments can be formally reported on where necessary.

³ Compared to a typical Passivhaus benchmark of 3.0 (the lower the form factor, the greater the energy efficiency potential of the building).

External walls are to be constructed using 'Ecobrix', a highly efficient type of Insulated Concrete Formwork (ICF)⁴. Manufactured in the UK, Ecobrix are designed such that the insulation is external to the concrete core, ensuring it wraps around the full envelope; this delivers reduced risk of thermal bridging, enhanced airtightness and provides some exposed thermal mass with benefits for overheating mitigation.

The ground/exposed floor and roofs will be insulated using Expanded Polystyrene (EPS), or similar. Careful detailing will be undertaken to minimise thermal bridging risk at junctions.

Triple glazing is proposed throughout to reduce unwanted heat losses. Glazing g-value is to be optimised to enable useful solar gains during heating season, whilst minimising overheating risk during the summer months.

Airtightness

Best practice construction detailing and techniques will be employed to create an airtight fabric and reduce heat losses associated with air infiltration, with a target value of 3.0 m³/m²·hr; well below the Part L 2021 limiting value of 8.0 m³/m²·hr.

Airtightness testing will be conducted at multiple stages during construction:

- After the air barrier is complete and before services are installed (to ensure any defects can be identified and remedied)
- Following the installation of services but prior to final finishes (to ensure an airtight seal at all services penetrations)
- A final test, if necessary, prior to handover.

Overheating Risk

Overheating has been considered from the outset and measures to mitigate this proposed in line with the cooling hierarchy as follows:

- Reduction in hot water pipework to reduce heat loss to internal spaces;
- Optimised orientation and g-value;
- Exposed thermal mass to absorb and store excess heat during the hottest times and release this heat slowly during cooler periods to reduce peak temperatures;
- Optimised natural ventilation strategy with free area maximised through tilt and turn panes throughout. The living spaces and main bedrooms benefit from cross ventilation, the most effective form of natural ventilation.

An overheating risk assessment will be conducted in line with Approved Document O. If necessary to fully mitigate overheating risk under future climate scenarios, a cooling module will be proposed for the MVHR to provide air tempering.

Active Design Measures

Energy Efficient Lighting

The proposed dwelling will incorporate high efficacy Light Emitting Diodes (LEDs) throughout.

⁴ ICFs are an alternative to traditional constructions such as cavity masonry and timber frame construction.

Mechanical Ventilation

A Mechanical Ventilation with Heat Recovery (MVHR)⁵ system will be installed to manage indoor temperature, humidity, and air quality while minimising reliance on traditional, higher carbon forms of heating. The selected unit will have a heat recovery efficiency of 75–85%. As per the plans submitted in support of this planning application dated 22nd March 2025, the MVHR unit is to be located at an external wall to reduce cold duct lengths. An additional allowance of approximately 20 – 30 mm of insulation to ductwork has been made within the ceiling void to further optimise performance.

Heating And Domestic Hot Water (DHW)

Whilst heating demand is to be minimised as far as possible through passive measures, an all-electric solution is proposed to meet both the space heating and DHW demand of the proposed dwelling. An all-electric solution means that the dwelling will continue to decarbonise over its lifetime as the grid mix transitions to a greater proportion of renewable generation.

Solar Photovoltaic Panels (PV)

Renewable electricity will be generated on-site via monocrystalline Solar PV panels. PV panels will be installed on the available south facing roof areas as indicated on the plans submitted in support of this planning application, dated 22nd March 2025.

Table A.3 summarises the technical data for the proposed PV array and estimated CO₂ savings from the application of this technology. A comparison has been made against the previously approved scheme - assuming application of PV to available south facing roof areas of both schemes, the proposed design results in a marked increase in renewable electricity generation.

Monitoring & Controls

In addition to the above design measures, the development will incorporate monitoring equipment and controls to enable the occupier to optimise and track their energy use. The proposed strategy will include room level thermostats for enhanced control and a building level smart meter (with sub-metering, where appropriate).

This letter outlines the passive and active design proposals to minimise operational energy and carbon associated with the proposed dwelling at Land Adjacent 18 Queens Lane, demonstrating how the development responds to Policy ECC SP2 of the Arun Local Plan 2011 – 2031. As the design develops, detailed predictive energy modelling will be undertaken to provide an accurate prediction of energy performance in use and identify further measures to improve performance. Results of these assessments can be shared if necessary.

Should you have any queries regarding the contents of this letter, please do not hesitate to contact me at [REDACTED]

Kind Regards,

[REDACTED]

Ellie Burkill, BEng, MSc, CPHD
Building Physics Engineer



⁵ MVHR provides a constant supply of fresh air, whilst recovering heat from outgoing air to optimise energy performance. MVHR units function by extracting warm air from 'wet areas' such as kitchens and bathrooms, passing this air over a heat exchanger and transferring it to incoming cold fresh air which is then supplied to 'dry areas' such as bedrooms and living rooms at the desired temperature.

Reference Tables

Table A.1: Glazing Ratios of Proposed Dwelling

Glazing Ratios (%)		
Façade	Recommended Glazing Ratio	Proposed Glazing Ratio
North	10 – 15	-
East	10 – 20	19
South ⁶	20 – 30	16
West	10 – 20	20

Table A.2: Proposed U Values of Thermal Envelope

Proposed U Values (W/m ² K)			
	Building Regulation Limiting Value ⁷	Proposed Performance	Improvement
External Walls	0.26	0.14	46%
Floor	0.18	0.1	44%
Roof	0.16	0.1	38%
Windows	1.6	1.0 (g-value 0.5 – 0.55)	38%
Rooflights	2.2	1.2	45%

Table A.3: Solar PV Performance

Solar PV Performance		
	Proposed	Previously Approved
Module Efficiency	19%	19%
Electrical Conversion Efficiency	95%	95%
Orientation from North	233°	225°
Tilt	15°	15°
Array Area	28.0 m ²	8.5 m ²
Primary Energy Offset by PV (per dwelling)	4.87 kWh	1.49 kWh
CO ₂ Savings from PV (per dwelling)	1008 kgCO ₂ e/annum	309 kgCO ₂ e/annum

⁶ A slightly lower glazing ratio is proposed on the south façade on account of the overall orientation of the building (SSW).

⁷Table 4.1, Part L 2021