

Proposed Development
at

Northfleet Barn
Northfleet Green
Gravesend

the
duncan+graham
partnership
chartered architects

8 Cecil Square Margate Kent CT9 1BD
tel: 01843 223488
email: margate@duncan-graham.co.uk

Sustainability Statement

Introduction

The opportunity to replace the existing building which consists of a part timber frame barn and part solid brick building will allow significant improvements in the energy efficiency of the building and allow some sustainable measures to be introduced to the site.

The current building contains solid brick walls in part and the remainder of the building is an old timber frame barn, structurally sound but with gaps in the external envelope and no insulation standard. The original proposal to convert the buildings would have allowed some insulation to be provided to the building but this would have been limited without encroaching into the internal floor space, and measures to try and improve the air leakage of the building would also be limited.

With the proposals to replace the existing building with a new modern construction, it provides the opportunity to greatly increase the thermal capacity of the building with improvements on both the insulation values, the air tightness of the building and to look at additional sustainable measures to improve the green credentials of the new build option.

Thermal Efficiency

The U values of the external elements of the building will be designed to provide betterment over and above the expected levels of the 2023 requirements, as noted in the table below.

This will be achieved with thicker cavity walls, and insulation while not impeding on the floor areas of the building, with thicker roof insulation and floor insulation.

The floor insulation can be achieved by excavating slightly further into the ground, the roof and wall insulation can be added to the building which will marginally increase the external footprint over the original building to achieve these figures.

With the use of modern construction techniques and having a new build option from the outset, the air tightness of the building will be improved from a base point requirement of $8\text{m}^3/\text{h}/\text{m}^3$ with a proposal to seek an improvement to achieve $4\text{m}^3/\text{h}/\text{m}^3$

The following energy -efficient design measures are proposed:	Proposed development	L1 2023 requirements
Ground and exposed floor U-value (W/m ² K)	0.08 (average)	0.13
External wall U-value (W/m ² K)	0.13	0.18
Roof U-value (W/m ² K)	0.10	0.11
Triple glazed windows and fully glazed doors U-value (W/m ² K)	1.10	1.20
External door U-value (W/m ² K)	1.00	1.00
Air permeability	4.0 m ³ /h.m ²	8 m ³ /h.m ²
Thermal bridging	Y=0.07	Y=0.15

The applicant will seek to locally source materials for the construction and where possible to look at recycled materials. All insulation materials will have a global warming value of zero, all timber used will be to FSC and PEFC Certified with a chain of custody certificate sought.

In addition to this, providing materials with lower environmental impacts by promoting the specification of responsibly sourced materials for the main building elements and the finishing elements. Three of the five main key building elements will be sought from sustainable sources with chain of custody certification or sought with reference to the BREEAM Green guide with materials rated A+ to A

The use of photovoltaic panels for the generation of electricity and the use of solar thermal panels for the pre-heating of hot water is proposed with panels being proposed on the southern slope of Unit 1 and the western slope of unit 2.

The heating system being proposed will seek to use air source heat pumps linked to both the solar thermal and photovoltaic panels.

Ground source heat pumps require external horizontal ground loops, or vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space. It is not considered that Northfleet Barn can accommodate horizontal ground loops and bore holes would be subject to further investigations. As such air source heat pumps will be used, and while they have a slightly lower seasonal efficiency than ground source heat pumps, they require less space and it is considered more suitable for this development for serving the heating and domestic hot water requirements, again subject to detailed design.

Building Services and Equipment

The new home will be designed to be energy efficient and maximise the benefits of passive solar gain and natural ventilation where possible. A fabric first approach will reduce the heating and cooling demand of the new homes as detailed below;

- Mechanical Ventilation; Mechanical Ventilation with Heat Recovery. Expected efficiency in excess of 75%.
- Natural Daylight and Ventilation; Design to optimise natural daylight and ventilation in all the habitable spaces, incorporating suitable window sizes relative to living spaces and bedrooms.

- this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of the Domestic Building Services Compliance Guide. These combined energy efficiency measures lead to a reduction in CO₂ emissions.

Additional 'active' measures can further enhance the energy efficiency of the development and reduce carbon emissions. Below is a summary of measures which have been considered prior to detailed design of the building services and which, where suitable will be incorporated:

- Installation of low energy/LED lighting throughout the development.
- Provision of A+ energy efficient appliances.

Energy display devices will be installed to display energy consumption data, thus empowering dwelling occupants to reduce energy use

Water Efficiency

Climate change will lead to periods of drought, making it increasingly important to reduce water demand and use water more efficiently. Potable water is an increasingly important natural resource and the conservation of water is becoming a more significant sustainability metric.

The need to conserve water throughout the UK is paramount with various areas being considered to be in serious water stress, emphasising the need for new developments to minimise water potable water use. As such to development will seek to achieve a maximum of 110 litres/person/day

To reduce water consumption during occupation the new care home will include a number of water efficiency measures such as:

- Dual flush WCs;
- Water meters;
- Aerated outlets;
- Low flow fittings; and
- Where appropriate, water efficient appliances