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32 a&b Glenilla Road
Energy Statement

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Contents

This Energy Statement is for the development of two new houses at 32 Glenilla Road in the London Borough of Camden.

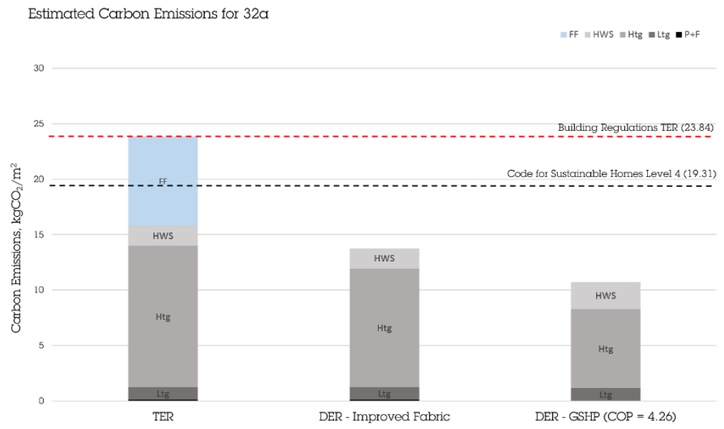
The houses are being designed to meet the energy credits required for Code for Sustainable Homes Level 4. The energy standards of Code Level 4 demand a 19% reduction in operational carbon emissions over Building Regulations 2013.

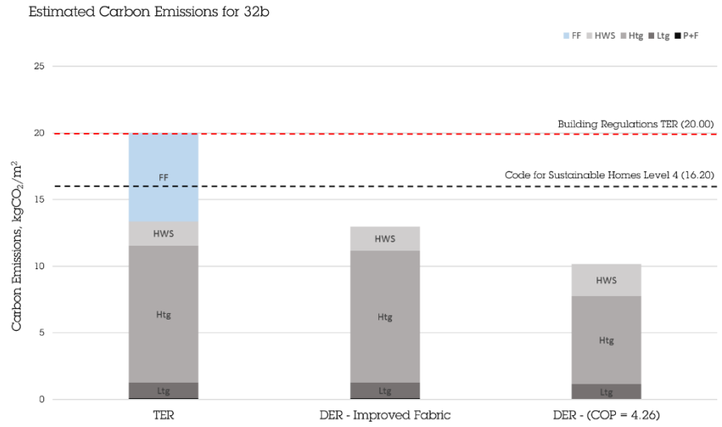
The reductions are achieved through energy efficiency improvements resulting from specification of highly insulating building fabric, and the choice of a ground source heat pump for heating & hot water.

	Carbon dioxide emissions for domestic buildings (Tonnes CO2 per annum)	
	32a	32b
Baseline: Part L 2013 of the Building Regulations Compliant Development	8.37	7.12
TER Emissions omitting fuel factor	5.56	4.76
After energy demand reduction	4.84	4.62
After heat network/CHP	N/A	N/A
After renewable energy	3.77	3.62

	Regulated domestic carbon dioxide savings associated with 32a Glenilla Road	
	Tonnes CO2 per annum	(%)
Savings from energy demand reduction	0.72	13.01
Savings from heat network / CHP	N/A	N/A
Savings from renewable energy	1.06	19.14
Cumulative on site savings	1.79	32.15

	Regulated domestic carbon dioxide savings associated with 32b Glenilla Road	
	Tonnes CO2 per annum	(%)
Savings from energy demand reduction	0.14	2.92
Savings from heat network / CHP	N/A	N/A
Savings from renewable energy	1.00	20.97
Cumulative on site savings	1.14	23.89



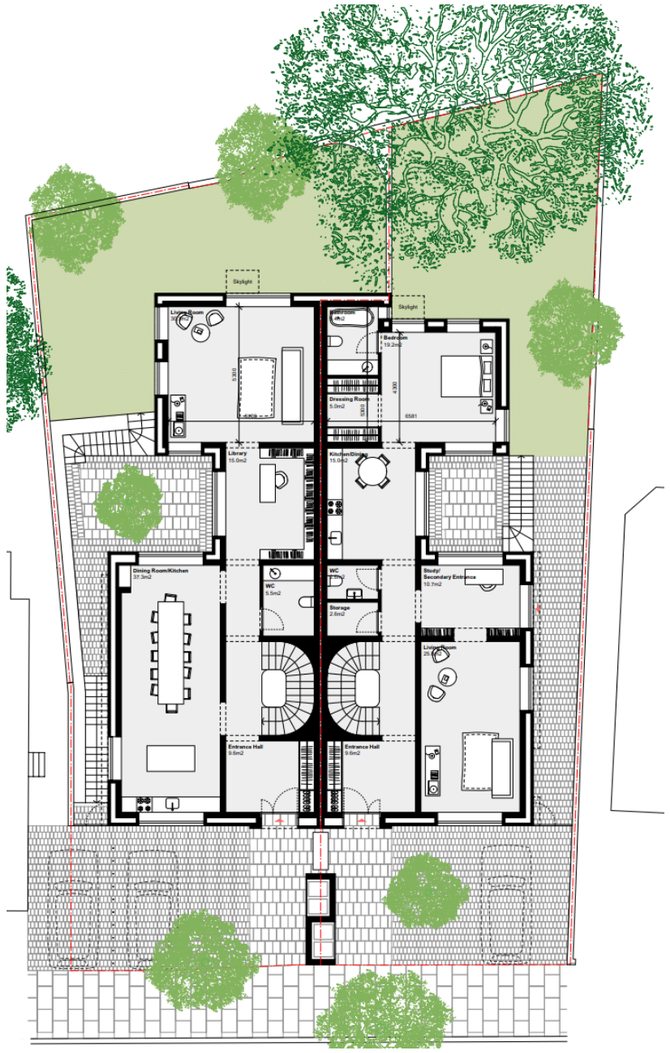


Introduction
This Energy Statement has been produced by Ritchie + Daffin for the planning application for two new houses at 32 Glenilla Road in the London Borough of Camden.

The owners are proposing to redevelop the derelict site in Glenilla Road for the building of 2 new single family dwellings in a semi-detached form.

Due to the proposed gross floorspace being >500m2 in total Camden's Planning Guidance requires the submittal of an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy.

The energy planning policy requirements are summarised in the following section. Section 3.0 outlines the proposed energy strategy for the two houses. Section 4.0 presents the estimated operational carbon emissions associated with the development demonstrating compliance with the planning policies.



Ground Floor Plan

2.0 Policy Requirements

2.1 Relevant Local Policy

Camden Core Strategy
CS13 Tackling climate change through promoting higher environmental standards

Reducing the effects of and adapting to climate change
The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;
b) promoting the efficient use of land and buildings;
c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:
- ensuring developments use less energy,
- making use of energy from efficient sources
- generating renewable energy on-site; and
d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions

Camden Local Development Framework

Camden Development Policy DP22 and DP23
Policy DP22 - Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:
a) demonstrate how sustainable development principles …have been incorporated into the design and proposed implementation.

The Council will promote and measure sustainable design and construction by:
c) expecting new build housing to meet Code for Sustainable Homes Level 3 by 2010 and
Code Level 4 by 2013 and encouraging Code Level 6 (zero carbon) by 2016.
d) expecting developments (except new build) of 500 sq m of residential floorspace or above or 5 or more dwellings to achieve "very good" in EcoHomes assessments prior to 2013 and encouraging "excellent" from 2013;

The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:
f) summer shading and planting;
g) limiting run-off;
h) reducing water consumption;
i) reducing air pollution; and
j) not locating vulnerable uses in basements in flood-prone areas.

Policy DP23 - Water

The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by:
a) incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;

Camden Planning Guidance 3: Sustainability provides information on ways to achieve carbon reductions and more sustainable developments. It also highlights the Council's requirements and guidelines which support the relevant Local Development Framework (LDF) policies.

Developments involving 5 or more dwellings and/or 500sq m (gross internal) floorspace or more are required to submit an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy.

2.2 Relevant Regional Policy

Energy planning :Greater London Authority guidance on preparing energy assessments (March 2016)

The buildings are being designed to satisfy the energy credit requirements of Code for Sustainable Homes Level 4. This means a 19% reduction in carbon emissions over a Building Regulations 2013 Part L1A compliant building (equivalent to 25% reduction over 2010 Building Regulations).

To reduce the energy demand, building fabric with excellent thermal performance will be used, which exceeds the requirements of Building Regulations. The target building fabric parameters are given in the adjacent table.

After improving the thermal performance of the building fabric and thereby reducing the heating demand, efficient heating, ventilation, and lighting systems will be chosen to reduce energy consumption.

Each house will be heated by ground source heat pump with underfloor heating. The houses will be naturally ventilated (with intermittent mechanical extract in bathrooms, kitchen etc.) to reduce electrical energy consumption and maintenance requirements. No active cooling will be installed and large window openings will be designed to allow for summertime purge ventilation.

The London Heat Map indicates there are currently no district heating schemes available to connect to in the site vicinity. Should a suitable network become available in the future then the proposed heating system would not preclude the houses being connected if so required.

SAP Parameters

Element or system	TER Building	Inc. Renewables.
Size and shape	Same as actual dwelling	Same as actual dwelling
Opening areas (windows and doors)	Same as actual dwelling (25% opening area < floor area)	Same as actual dwelling
External walls	U = 0.18 W/m²K	U = 0.12W/m²K
Floors	U = 0.13 W/m²K	U = 0.13 W/m²K
Roofs	U = 0.13 W/m²K	U = 0.10 W/m²K
Opaque door	U = 1 W/m²K	U = 1.0 W/m²K
Windows and glazed doors	U = 1.4 W/m²K	U = 1.2 W/m²K
	Frame factor 0.7	Frame factor 0.8
	Solar energy transmittance 0.63	Solar energy transmittance 0.63
	Light transmittance 0.80	Light transmittance 0.80
Thermal mass	Medium (TMP = 250 kJ/m²K)	Medium (TMP = 250 kJ/m²K)
Living area	Same as actual dwelling	Same as actual dwelling
Shading, orientation and number of sheltered sides	Same as actual dwelling	Same as actual dwelling
Allowance for thermal bridging	Same as actual dwelling - Y = 0.15	Same as actual dwelling - Y = 0.15
Ventilation system	Natural ventilation with intermittent extract fans	Natural ventilation with intermittent extract fans
Air permeability	5 m³/h·m² at 50 Pa	3 m³/h·m² at 50 Pa
Chimneys	None	None
Open flues	None	None
Extract fans	4	8
Main heating fuel (space and water)	Mains gas	Electricity
Heating system	Boiler with radiators, pump in heated space	Ground source heat pump, pipes in screed above insulation, pump in heated space
Heating system controls	Time and temperature zone control	Time and temperature zone control
Hot water system	Heated by boiler	Heated by boiler
	Separate time control for space and water heating	Separate time control for space and water heating
Hot water cylinder	500 litre cylinder	500 litre cylinder
	Loss factor 2.29kWh/day	
Primary water heating losses	Fully insulated primary pipework	Fully insulated primary pipework
	Cylinder temperature controlled by thermostat	Cylinder temperature controlled by thermostat
	Cylinder in heated space	Cylinder in heated space
Water use limited to 125 litres per person per day	Yes	Yes
Secondary space heating	None	None
Low energy light fittings	100% of fixed outlets	100% of fixed outlets

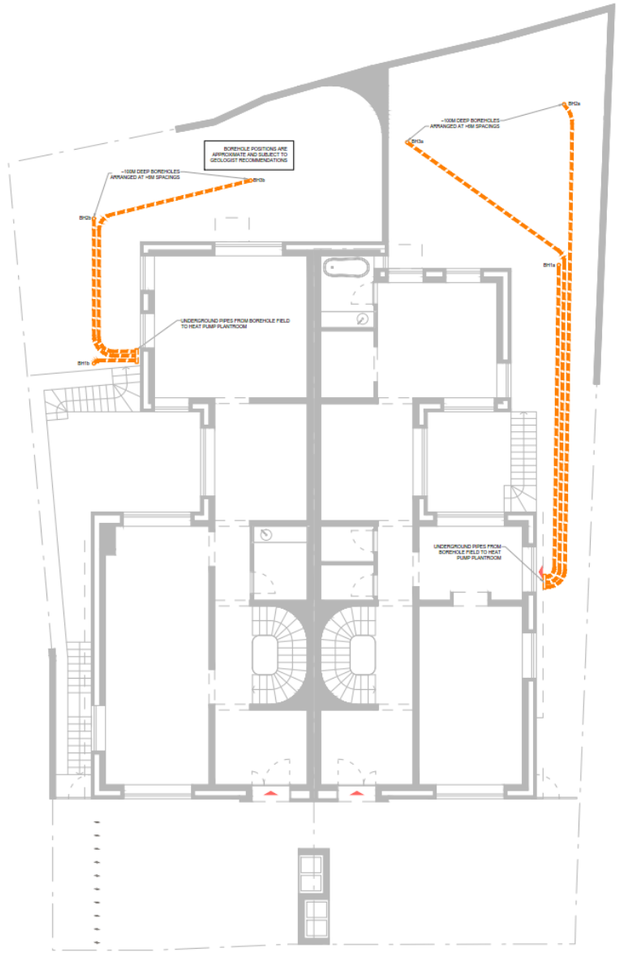
3.1 Renewable Energy

Heat will be taken from the ground via closed-loop pipes in boreholes sunk in the gardens. Based on an initial assessment of the ground strata, the London clay horizon is at around 10m deep, therefore the large majority of the borehole length will be in impermeable London Clay, which has a poor thermal conductivity.

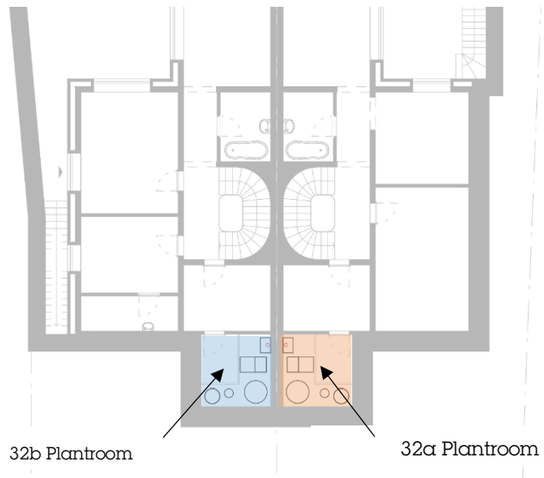
On this basis, the design is progressing with 3 no. 100m deep boreholes per home (12kW (load) / 40 W/m of borehole), each drilled at least 6m apart (refer to plan adjacent). The pipework will be bought back underground to a manifold in the basement of each building along the route shown in the site plan opposite.

To avoid problems with heat pump cycling at periods of low load, a buffer vessel will be provided, located next to the heat pump in the plant room. Heating to rooms will be provided by under-floor heating.

Layout of domestic ground source heat pump plantroom



Pipework Site Plan



Basement Plan indicating Plantrooms

4.0 Estimated Carbon Emissions

To demonstrate compliance with Building Regulations and the energy credits for Code for Sustainable Homes 4, the carbon emissions associated with the operation of the houses have been estimated through the Government approved compliance software SAP (Standard Assessment Procedure).

This software calculates a target emission rate (TER), for the dwelling based on a notional set of performance criteria from a benchmark building of the same shape and size as the proposals (although notional glazing may vary). This is compared against a calculated dwelling emission rate (DER), which is the estimated carbon emission rate based on the actual design

The carbon emission results determined through the compliance software for each house are shown in the adjacent charts demonstrating how improvements were made.

The results demonstrate the carbon reduction achieved through improving the fabric alone (Energy Efficient Measures)

With the addition of renewable energy in the form of a ground source heat pump the software estimates the carbon emissions associated with the operation of 32a Glenilla Road will be 10.74 kg of CO_2 per m^2 of floor area and for 32b the emissions are estimated to be 10.16 kg of CO_2 per m^2. This is greater than a 19% reduction over the Building Regulations Target Emission Rate for the houses, which are 23.84 kg CO_2/ m^2 and 20.00 kg CO_2/ m^2 respectively.

The graphs indicate how the TER is calculated – by adding a 'fuel factor' to the space & water heating emissions for any system fuelled by electricity, such as heat pumps.

It can be noted that although the two houses appear similar their performance differs due to orientation (more solar gain to house 32b), differing rooflight areas and the provision of fireplace to 32b. These are the reasons for different carbon emissions levels.

The policy requirement to meet Code for Sustainable Homes Level 4 energy standard is therefore expected to be satisfied through the proposed energy strategy.