

7 Brantwood Road Energy Strategy Report

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Author:	Charlotte Curry
Reviewer:	Jess James
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1 Introduction

This energy strategy has been prepared for the development at 7 Brantwood Road (fig. 1.1). The development consists of the demolition of existing structures, and the erection of a 3 storey residential building. The building contains 4 single storey flats and 1 duplex unit, refuse and recycling storage and cycle parking.



Figure 1.1 Brantwood Road © Google Maps

This statement summarises the sustainable design and construction measures that have been incorporated into the project in order to meet the sustainability requirements of the Borough of Haringey and the London Plan.

1.1 Assessment approach

This report summarises the work undertaken to support the development of an energy strategy for the new development, following the energy hierarchy ‘Be Lean, Be Clean, Be Green’.

Standard Assessment Procedure for the Energy Rating of Dwellings (SAP) calculations have been carried out for the residential units. These are used to assess the impact on energy demand and CO₂ emissions of improvements through the hierarchy and demonstrate the most appropriate solution for the development to meet the relevant planning requirements.

2 Policy

2.1 London Borough of Haringey

Policy SP4 Working towards a low carbon Haringey

Over the life time of the Local Plan, reducing energy use in buildings and working towards a low carbon borough will be one of the key challenges facing Haringey. The Council will promote the measures outlined below to reduce carbon emissions from new and existing buildings.

1. In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation, by incorporating the following measures:
 - a. From 2011 onwards, all new residential development will achieve a minimum 25% reduction in total (regulated) CO₂ emissions in line with Code for Sustainable Homes Level 4 energy standards, and should aim to achieve Level 6. All new residential development shall be zero carbon from 2016 onwards; and
 - b. From 2011 onwards all new non-residential development shall be built to at least BREEAM “very good” standard and should aim to achieve BREEAM “excellent” or the current nationally agreed standard. All new non-residential development shall be zero carbon from 2019.
2. The Council will promote low- and zero-carbon energy generation through the following measures:
 - a. Requiring all developments to assess, identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
 - b. Establishing local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible;
 - c. Working with neighbouring boroughs and other partners to explore ways of implementing sub-regional decentralised energy networks including the potential in the Upper Lee Valley Opportunity Area; and
 - d. All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

2.2 The London Plan Policies on Energy

The policies referred to in order to develop this energy strategy, are those in the Intend to Publish New London Plan. This strategy also complies with the currently publish London Plan

Policy SI 2 Minimising greenhouse gas emissions

- A. Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:
- 1) be lean: use less energy and manage demand during operation
 - 2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly

- 3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
- 4) be seen: monitor, verify and report on energy performance.

This development consists of 5 units and does not surpass the requirement for a major development, therefore the remaining London plan policies referring to major developments are not relevant.

3 Energy Strategy

An energy strategy has been developed following the energy hierarchy ‘Be Lean, Be Clean, Be Green’, ‘Be Seen’. Energy calculations using Building Regulations approved and accredited software have been undertaken at each stage to calculate the savings associated with the measures incorporated.

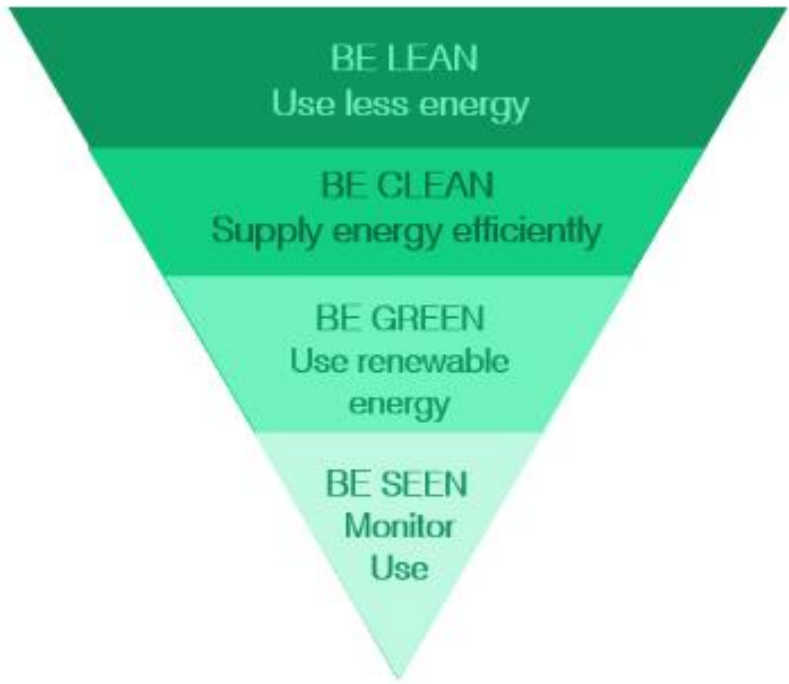


Figure 3.1 The Energy Hierarchy

The energy consumption and carbon emission figures within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP).

3.1 Energy Targets

In line with the London Plan and the Borough of Haringey, there is a target of zero carbon, with at least a 20% reduction from onsite renewable energies. Table 3.1 below details the energy and carbon breakdown of the Part L target emission rate. These have been calculated using the SAP10 carbon factors

Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)						Electricity CO2 (kg/yr)
Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	Total	
13,109	11,209	24,318	5,107	0	0	0	375	1,376	1,751	408

Table 3.1 Target regulated energy demand and carbon emissions per energy source

Total Energy (kWh/yr)	Total CO2 (kg/yr)
26,069	5,515

Table 3.2 Target total energy consumption and CO2 production

3.2 Be Lean

As part of the Be Lean approach, passive design measures have been considered throughout the pre-planning stage to reduce initial energy demand.

Solar Gain Control and Daylight

Solar gains are a passive form of heating from the sun’s radiation and are beneficial to a building during winter months as they provide an effective source of heat and reduce internal heating requirements. However, summer months they must be controlled in order to mitigate the risk of overheating. They can be controlled through glazing and shading design in order to allow low level winter sun to enter the building and to limit access to high level summer sun.

The glazing strategy design has carefully considered orientation and window size in order to maximise daylight while controlling excessive solar gains. Glazing will incorporate low emissivity coatings to limit overheating without compromising light transmittance.

Overheating

The impact of solar gains has been analysed as part of the SAP calculations, taking into account the ventilation strategies and the risk of solar overheating has been concluded to be not significant, when measured against the Part L1A criteria.

Building Fabric

Designing an efficient thermal envelope will greatly reduce the need for space heating and cooling as heat transmittance through the thermal elements is reduced.

Low air permeability rates will also reduce heating and cooling energy demand by reducing the volume of air that can penetrate the building.

As part of a ‘fabric first’ approach, the building fabric has been carefully considered and specified to meet or exceed current Building Regulations minimum requirements, as detailed in table 3.3.

Fabric Component	Residential Specification
External Walls	0.16 W/m²K
Stairwell/Corridor Wall	0.16W/m²K
Roof	0.12 W/m²K
Ground/ Exposed Floor	0.13 W/m²K
Party Walls	Fully filled cavity with edge sealing
Windows	1.2 W/m²K G-value 0.55
External Doors	1 W/m²K
Air Tightness	4m³/m²/h
Thermal Bridging	Default

Table 3.3 Proposed Be Lean passive design measures

With regards to party walls, to reach the required standards, these must be fully filled. Partially filled cavities will not comply.

Building Services

Services have been specified to maximise efficiency therefore reducing energy used. Table 3.5 shows the proposed services strategy and energy efficiency measures for the development. In line with the London Plan requirements, a gas base gas has been utilised. Individual gas boilers with a 91% efficiency have been assumed for the Be Lean calculations.

Services Component	Residential Specification
Space Heating and Hot Water	Induvial Air Source Heat Pump (ASHP) system providing 100% of heat Summer COP: 187.5 Winter COP: 302
Hot Water cylinder	210L cylinder Measured Loss 2kwh\day
Heating Controls	Time and temperature zone control
Ventilation	MVHR 89% efficient SFP 0.6 w/l/s Rigid Duct/ Insulated Approved Installation
Lighting & Controls	100% low energy lighting

Table 3.5 Proposed energy efficient design measures

The breakdown of carbon and energy use has been identified for the site. Table 3.6 shows the breakdown of carbon and energy use once the strategies proposed at the be lean stage are incorporated.

Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)						Electricity CO2 (kg/yr)
Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	Total	
12,701	10,665	23,366	4,907	0	0	0	1,097	1,374	2,471	576

Table 3.6 Estimated regulated energy demand and carbon emissions per energy source at be lean stage

Total Energy (kWh/yr)	Total CO2 (kg/yr)
25,837	5,483

Table 3.7 Estimated regulated energy demand and carbon emissions per energy source at be lean stage

Carbon Savings

Tables 3.8 demonstrates the percentage improvement over the notional baseline levels for the be lean stage for each of the use types.

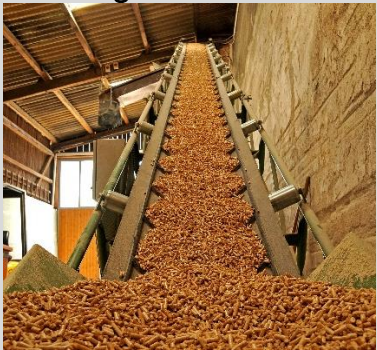
Residential			
Energy Hierarchy stage	CO ₂ Emissions (T/yr)	CO ₂ Savings (T/yr)	% Saving
Building Regulations 2013 Baseline	5.51		
Be Lean	5.48	0.03	0.58%

Table 3.8 improvements over Part L

The development has incorporated thermally efficient fabric and passive design measures to generate savings at the Be Lean stage. The residential parts of the development achieves a 0.58% improvement over Part L.

3.3 Be Green

At the Be Green stage, renewable technologies are investigated. Table 3-3 considers the feasibility of renewable energy technologies for the scheme.

LZC Technologies	Description	Noise	Visual impact	Internal Space	External Space	Capital Cost	Maintenance	Feasibility	
Solar Thermal Collectors 	Solar thermal collectors can be used to provide hot water using the irradiation from the sun. They can generally provide approx. 50% of the hot water demand	●	●	●	●	●	●	There are areas of flat roof that can incorporate solar thermal collectors. However, carbon savings are quite low and it is quite a high cost technology.	✖
Solar Photovoltaic Panels 	Solar PV panels generate electricity from the sun's energy. They should be installed within 90° of due south ideally at a 30° angle. The electricity can be used to supply the landlords load.	●	●	●	●	●	●	PV has been deemed in-appropriate for this project. There is a very limited area of flat roof and the areas of south facing roof will in shadow.	✖
Biomass Heating 	Solid, liquid or gaseous fuels derived from plant material can provide boiler heat for space and water heating A biomass boiler would supplement a standard gas heating system so some of the cost may be offset through money saved on using smaller traditional boilers reliability of fuel access/supply can be a problem	●	●	●	●	●	●	Biomass is not considered feasible for this development due to issues with fuel storage, access for delivery vehicles and local NO _x emissions	✖

Wind Turbines 	Vertical and horizontal axis wind turbines enable electricity to be generated using the power within the wind Not suitable for urban environments due to low wind conditions and obstructions							This development is in an urban environment and so a wind turbine will not generate much energy	✗
Ground Source Heat Pumps (GSHP) 	Utilising horizontal loops or vertical boreholes, GSHP make use of the grounds almost constant temperature to provide heating and/or cooling using a heat exchanger connected to a space/water heating delivery system Optimum efficiency with underfloor heating systems							GSHP are not a feasible technology for the site since there is a limited external space available for installation of boreholes	✗
Air Source Heat Pumps (ASHP) 	Air Source Heat Pumps extract latent energy from the external air in a manner similar to ground source heat pumps Optimum efficiency with underfloor heating systems							Air source heat pumps are a feasible option for the project, to provide both heating and cooling. The lower carbon content of electricity now means that ASHP technology can result in very low carbon heat.	✓

Table 3.9 Feasibility of LZC technologies for the development

Renewable systems

The feasibility study has identified air source heat pumps as the most appropriate technology for the development.

System	Residential Specification
ASHP	Individual Air Source Heat Pump (ASHP) system providing 100% of heat Summer COP: 187.5 Winter COP: 302

Table 3.10 Proposed LZC specifications

ASHP System

A Mitsubishi ECODAN 5kW ASHP with the Summer COP: 187.5 Winter COP: 302 has been used in calculations at this stage and a unit with the same or better efficiency will be specified.

3.4 Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the site. Table 3.11 shows the breakdown of carbon and energy use for regulated energy uses once the strategies proposed in this report are incorporated. Table 3.12 shows the total estimated regulated energy consumption and carbon emission once the strategies detailed in this report are incorporated.

Electricity (kWh/yr)							Electricity CO ₂ (kg/yr)
Space Heat	HW	Cooling	Pumps & Fans	Lighting	PV	Total	
2,073	2,876	0	722	1,374	0	7,044	1,641

Table 3.11 Estimated regulated energy demand and carbon emissions per energy source at be Green stage

Total Energy (kWh/yr)	Total CO2 (kg/yr)
7,044	1,641

Table 3.12 Estimated total of regulated energy demand and carbon emissions at be Green Stage

Carbon Savings

Table 3.13 and Figure 3.5 demonstrate the percentage improvement in emission reduction over the notional baseline levels for the development considering only regulated energy use and associated emissions.

Energy Hierarchy stage	CO ₂ Emissions (T/yr)	CO ₂ Savings (T/yr)	% Saving
Building Regulations 2013 Baseline	5.51		
Be Lean	5.48	0.03	0.58%
Be Clean	5.48	0.00	0.0%
Be Green	1.64	3.84	69.65%
Total Cumulative Savings		3.87	70.24%

Table 3.13 regulated emissions improvements over Part L

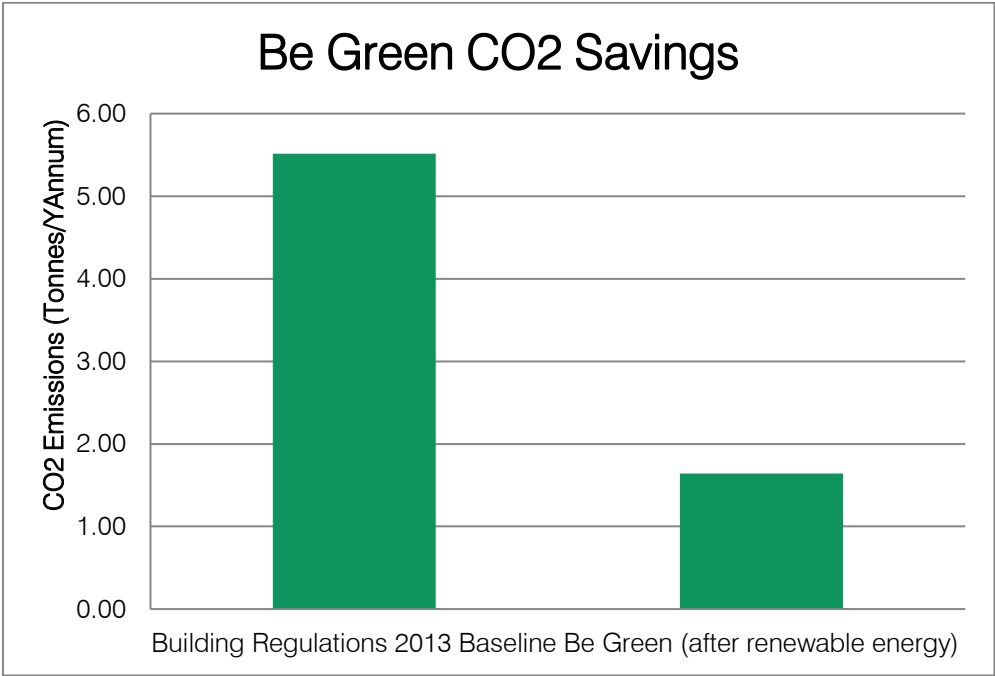


Figure 3.5 – Reduction in regulated carbon emissions over part L

Carbon Offset Payment

The development has achieved a 70.24% improvement over Part L for the residential development. In line with Haringey’s carbon reduction requirements, there is a target of zero carbon, which can be achieved through an offset payment when there is a shortfall on site. This calculation is detailed below in table 3.14.

Shortfall on zero carbon	
Carbon emissions (tonnes / annum)	Offset payment (£920/tonne)
1.64	£ 4,678

Table 3.14 shortfall on zero carbon target and required offset payment

3.5 Be Seen

All major plant will be fitted with meters to allow remote monitoring of energy used by the heat pumps. A contract will be put in place to monitor the readings so that they can be compared with the predicted energy performance, and this information will be reported.

The performance of the heat pump system will be monitored as part of this process, to ensure predicted energy uses and savings are achieved. Where issues are found, the system can then be recommissioned to improve operation where possible.

3.6 Water efficiency

Water fittings will be specified with the following or similar flow rates to meet the target water consumption of 105 l/p/day in line with London plan and the local council's water efficiency requirements:

- Wash basin taps – 6.5 l/min
- Showers – 7.5 l/min
- Bath – 120l to overflow
- Dishwasher - 1.2 l/place setting
- Washing machine - 9 l/kg load
- WC – 6/4 litre dual flush
- Kitchen taps – 6.5 l/min

Water meters will be installed to encourage residents to limit their consumption.

3.7 Materials

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. The use low embodied carbon products will be further investigated.

Responsible sourcing will also be pursued. All timber used on site during the construction phase and within the building will be from legal sources. Where possible, FSC or equivalent timber will be used. Sourcing of other materials will include products where the manufacturer employs an environmental management system such as ISO 14001 or BES 6001. Where possible, materials will be sourced locally.

Non-toxic materials will be used wherever possible, including the specification of products with low VOC content in line with European testing standards.

All the building elements will achieve high ratings on the BRE Green Guide to Specification. Materials will be specified to have a low embodied energy, taking into account whole life cycle analysis.

3.8 Waste Management and Construction

Construction site waste will be managed in such a way to reduce the amount of waste produced as much as possible, and the waste hierarchy will be followed. In addition, at least 85% of waste that does arise will be recycled using an external waste contractor and the Civil Engineer's Demolition Protocol. This will encourage materials to be re-used on site or where this is not possible, salvage appropriate materials to enable use off-site.

Household waste will be recycled through the local authority collection scheme. Internal recycling bins in a kitchen cupboard will be provided to facilitate this.

3.9 Nature Conservation and Biodiversity

The site is occupied by existing buildings and minimal vegetation and is considered to be of low suitability for nesting birds and bats. There are a few existing trees surrounding the site, care will be taken during construction to avoid damage to existing trees. Measures will be taken during construction to minimise impact on ecology by timing works appropriately and following best practice guidance. Landscaping and native planting will be incorporated into the scheme. Urban greening opportunities will be maximised where possible to the rear and front of the proposed development.

3.10 Climate Change Adaptation

Tackling Increased Temperature and Drought

The impact of solar gain has been incorporated into the SAP analysis for compliance with Part L and the risk of solar overheating has been concluded to be Low overall for the development.

Windows will incorporate low emissivity coatings to reduce solar gain. Other than mandatory ventilation to meet AD Part F, the development utilises a natural ventilation strategy through openable windows.

Flooding

Surface water drainage strategies will ensure that the peak and volume of surface water run-off rates will not be increased due to the development, as the site is already occupied by an existing building. The site is in flood zone 1 so the building is not at risk of flooding.

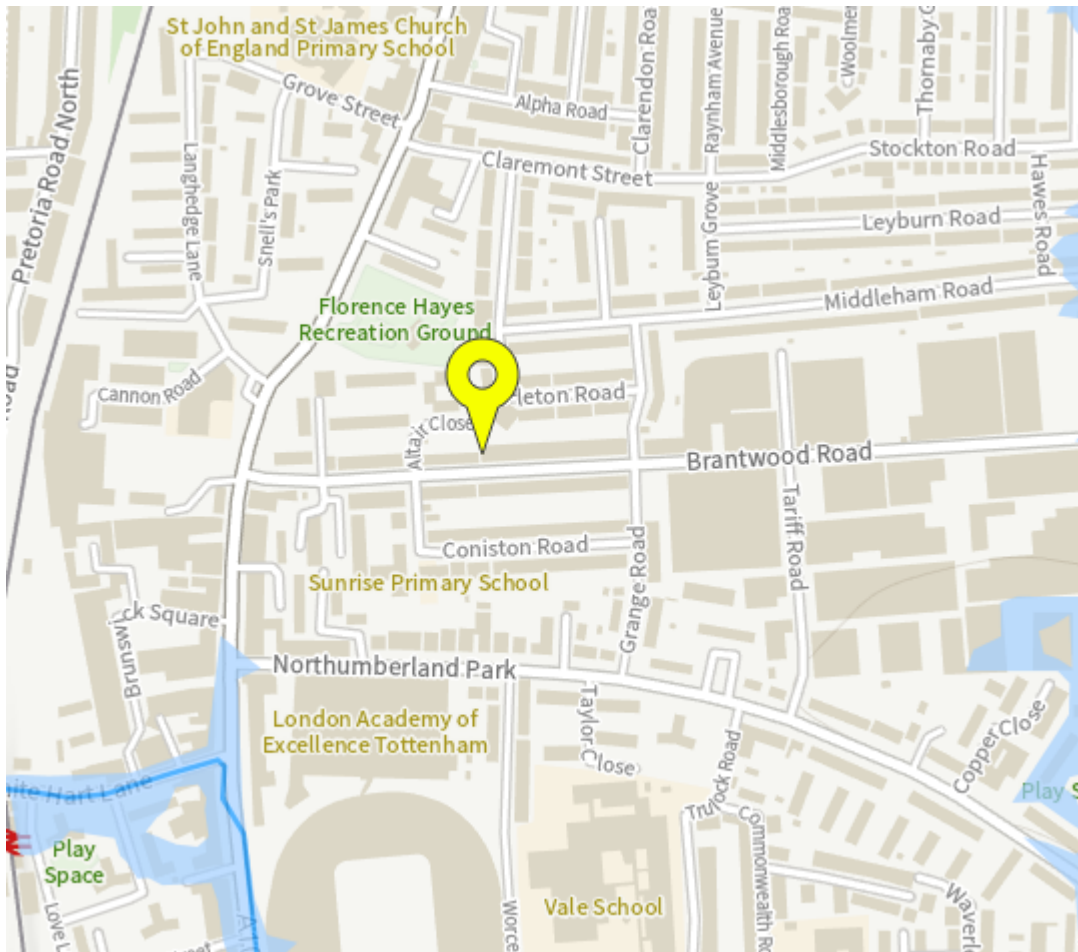


Figure 3.6 Brantwood Road Flood Risk Map

3.11 Pollution Management

Air Quality

The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies for dust pollution by using dust sheets, covering skips and damping down where appropriate.

Plant and machinery

All plant and equipment installed in the development will be appropriately sized and selected for efficiency in order to reduce greenhouse gas emissions.

All equipment will be frequently maintained to ensure it continues to run efficiently and cleanly. Insulating materials and heating systems will be specified to keep pollutants to a minimum. Insulation will have a low Global Warming Potential (GWP).

Noise

The dwellings will comply with Building Regulations Part E providing a good level of sound insulation. All windows are to be specified as high efficiency double glazing to minimise the transmission of noise between the property and surrounding area.

Light Pollution

100% of the proposed lighting will be provided by low energy light fittings specified to have a luminous efficacy greater than 40 lm/W. All external lighting will be adequately controlled to ensure that spaces are only lit out of daylight hours and when the area is occupied. As the proposed building use is residential; there will be no illuminated signage or up lighting incorporated. The proposed dwelling is in a highly urbanised location, and therefore will not significantly contribute to increasing the effects of light pollution.

4 Conclusion

This energy strategy has been prepared for the development at 7 Brantwood Road. The development consists of the demolition of existing structures, and the erection of a 3 storey residential building. The building contains 4 single storey flats and 1 duplex unit, refuse and recycling storage and cycle parking.

The development follows the energy hierarchy, incorporating passive design measures and energy efficient equipment. The development employs an efficient building fabric, including new insulation and highly efficient glazing and efficient electric ASHPs to maximise carbon savings for the site, resulting in 70.24% savings over the Target Emissions Rate. The Zero Carbon target will be met by a carbon offset payment. Measures are also incorporated to minimise pollution and reduce water use. The development complies with sustainability policy of the London Borough of Haringey and the London Plan, for minor developments.

The figures within this report are based on preliminary analysis only and further detailed studies will be required at the detailed design stage before specifying any of the proposed systems.