EALCONSULT Building Sustainability

Energy and Sustainability Statement

Property Address
3,5 &7 Fortess Road
London
NW5 1AA

Date
January 2019

Prepared By
EAL Consult

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EXECUTIVE SUMMARY

EAL Consult has prepared this Energy and Sustainability Statement in support of planning application for the demolition of the three storey buildings to create a four storey residential and commercial development; consisting of 3 number flats above 2 number shops, with a new basement for each shop, to numbers 3, 5 & 7 Fortess Road, Kentish Town, London NW5 1AA.

The evidence contained within, demonstrates that the development will meet the minimum policy requirements of the National Planning Policy Framework, the London Plan and London Borough of Camden Core Strategy 2017. The London Plan 2016 sets a target of 100**% reduction** (Policy 5.2 Part L 2013 carbon emissions Regulations Carbon Target Emission Rate

The Energy strategy proposed adheres to the principles of the energy hierarchy by proposing ''Lean and Green'' measures in order to reduce the overall energy consumption and use onsite renewable technology to reduce carbon emissions from the development.

The methodology and measures used are outlined below:

Be ''Lean'' - Use less energy: This first step deals with the reduction in energy use, through the adoption of sustainable design and construction measures. The development intends to achieve a carbon emission reduction through energy efficiency measures alone, by adopting standard levels of insulation, which exceed current Building Regulations (2013) requirements. Energy demand reduction measures incorporated include:

- High levels of insulation, which exceed current Building Regulations (2013) requirements;
- High performance glazing;
- 100% Low energy lighting;
- Low Air Permeability ;and
- Natural Lighting;

Be ''Clean'' - Supply energy efficiently: There is no installed district heating scheme in the immediate vicinity of the site and the proposed development is considered to be too small to successfully incorporate a community heating system.

Combined heat and power (CHP) has been assessed in terms of feasibility. CHP systems are usually needed where there is a large heat demand therefore, it has not been considered as appropriate for the proposed scheme.

Be ''Green'' - Use renewable energy: A feasibility study was carried out to determine the most suitable and cost effective renewable technology. It included a biomass heating system, ground and air source heat pumps, photovoltaic panels, solar thermal and wind turbines.

Renewable technology chosen:

- **6.5Kw PV panels**
- ERLQ004CAV3 + EHVH04SU18CB6W **Air Source Heat Pump for each flat.**
- Underfloor, pipes in insulated timber floor Time and Temperature zone control

As a result of the recommended energy strategy, the development's energy performance is significantly improved over Part L 2013 standards. The scheme achieves a calculated reduction in C02 emissions of **39%** over Part L 2013.

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy

	Carbon dioxide emissions (Tonnes CO2 per annum)		
	Regulated	Unregulated	Total
Building Regs Part L Compliant Development	16.9	3.4	**20.3**
After energy demand reduction	14.9	3.0	**17.9**
After Renewable energy integration	10.3	2.0	**12.3**

Calculations are based on SAP

Table 2: Carbon Dioxide Savings from each stage of the Energy Hierarchy

	Carbon Dioxide Savings (Tonnes CO2)		Carbon Dioxide Savings (%)	
	Regulated	Total	Regulated	Total
Savings from energy efficiency measures	2.0	2.4	12	**12**
Savings from Renewable Technology	4.6	5.6	27	**27**
Total Cumulative Savings	**6.6**	**8.0**	**39**	**39**

Table 3 Carbon Emissions Reduction

	Energy Efficiency Measures			Plus Renewable Technology – ASHP/PV		
	TER	DER/BER	% CO_2 Reduction	TER	DER/BER	% CO_2 Reduction
Flat 1	16.20	14.24	**12.1**	23.06	2.97	**87.1**
Flat 2	16.20	14.25	**12.0**	23.06	2.94	**87.2**
Flat 3	16.20	14.24	**12.1**	27.47	4.77	**82.6**
Unit 3	17.00	14.3	**16.0**	17.00	10.05	**40.9**
Unit 5	60.40	55.9	**7.5**	60.40	53.3	**11.7**

Table 3 shows the result from applying the methodology and Building regulations Part L 2013. The Dwelling Emission Rate (DER/BER) for the development is compared to Target Emission Rate (TER) for each stage of the energy hierarchy.

SUSTAINABLE DESIGN AND CONSTRUCTION

Sustainable Design and Construction measures incorporated in the development are in accordance with The London Plan 2016 and London Borough of Camden Core Strategy 2017.

- **Design:** Design measures capable of mitigating and adapting to climate change and proposed energy strategy will follow the energy hierarchy in order to reduce CO_2 emissions.
- **High Efficacy Lighting:** Use of 100% energy efficient lighting.
- **Ventilation:** The development has been designed to use natural and Mechanical Ventilation and Heat Recovery (MVHR).
- **Overheating:** The glazing design has taken into consideration the issue of overheating in hot weather.
- **Solar Gain for Heating:** Design will ensure that annual heat gains exceed heat losses.
- **Water Efficiency**: Water consumption will be reduced by incorporating water efficiency measures.
- **Water Pollution:** Contaminants will not reach any watercourses or ground-water.
- **Noise Pollution:** Noise levels will be properly controlled during construction.
- **Waste Management:** A site waste management plan could be used to reduce and recycle waste during demolition and construction.
- **Green Building Materials:** Materials used in construction will be A or B rated in the BRE Green Guide Specification.
- **Health and Wellbeing:** Each dwelling has been designed to provide good levels of daylight for its occupants.
- **Surface Water Run Off and Flood Risk:** The development will incorporate sustainable urban drainage systems (Suds).
- **Travel:** Cycle storage will be incorporated in the design in order to encourage a sustainable method of travel.
- **Biodiversity:** The usage of vertical green wall system can reduce local flooding by absorbing rainwater which increases local biodiversity, regulate air temperature and combats air pollution by trapping particles on leaves. It acts an additional layer of insulation in the winter & a screen to the sun in the summer.

INTRODUCTION & METHODOLOGY

This Energy and Sustainability statement outlines the energy demand from the development together with the associated CO_2 emissions, using the present Building Regulations Part L as a baseline. It demonstrates how the emissions from energy use in the development will be reduced through a combination of energy efficiency measures and renewable energy technology.

The proposed scheme is required to make carbon emission reduction in accordance with the London Plan Policies 5.2 and London Borough of Camden Core Strategy 2017.

Methodology:

The methodology employed to determine the potential CO_2 savings is in accordance with the three-steps of the Energy Hierarchy outline in the London Plan 2016.

- **Be Lean -** Improve the energy efficiency of the scheme.
- **Be Clean -** Supply as much of the remaining energy requirement with low carbon technologies such as combined heat and power (CHP).
- **Be Green -** Offset a proportion of the remaining carbon dioxide emissions by using renewable technologies.

The Environmental Sustainability of the development has been assessed in accordance with National Planning Policy Framework, London Plan 2016 London Borough of Camden Core Strategy 2017.

Opportunities for incorporating features into the development that contribute to the objectives of sustainable development were explored during the design process, to ensure that where possible, the proposals achieve best practice.

PLANNING POLICY CONTEXT

National Planning Policy Framework 2012 – emphasise the concept of sustainable development by encouraging local authorities to adopt proactive strategies to mitigate and adapt to climate change. It recommends the move to a low carbon future by:

- Planning new development in locations and ways, which reduce greenhouse gas emissions.
- Actively supporting energy efficiency improvements to existing buildings; and
- When setting any local requirement for a building's sustainability do so in a way consistent with the Government's zero carbon buildings policy and adopts nationally described standards.

The government's Energy Policy, including its policy on renewable energy, is set out in the Energy White Paper. This aims to put the UK on a path to cut its carbon dioxide emissions by 60% by 2050. As part of the strategy for achieving these reductions the White Paper sets out, the Government's target to generate 20% of UK Electricity from renewables by 2020.

Regional Plan

The London Plan 2016 provides the strategic framework for an integrated socio-economic, transportation and environmental development plan across the capital to 2036. The Plan seeks to ensure new developments are designed to enable the more efficient use of energy and support the development of sustainable energy infrastructure to produce energy more efficiently. It sets out a range of energy Policies that apply to new developments. The energy hierarchy underpins them.

Policy 5.1 Climate Change Mitigation: The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting this strategic reduction target, and the GLA will monitor progress towards its achievement annually.

Policy 5.2 Minimising Carbon Dioxide Emissions: Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

1. Be lean: Use less energy
2. Be clean: Supply energy efficiently
3. Be green: Use renewable energy

The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

Local Policy: Camden Council - Core Strategy 2017.

Policy CC1 Climate change mitigation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

- **a)** promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
- **b)** require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
- **c)** ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
- **d)** support and encourage sensitive energy efficiency improvements to existing buildings;
- **e)** require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
- **f)** expect all developments to optimise resource efficiency. For decentralised energy networks, we will promote decentralised energy by:
- **g)** working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;
- **h)** protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and

Policy CC2 Adapting to climate change

The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as:

a) the protection of existing green spaces and promoting new appropriate green infrastructure;

b) not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;

c) incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and

a) measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

Any development involving 5 or more residential units or 500 sqm or more of any additional floor space is required to demonstrate the above in a Sustainability Statement.

Sustainable design and construction measures

The Council will promote and measure sustainable design and construction by:

- ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation.

ENERGY STRATEGY

The Energy strategy for the development is based on GLA Energy Hierarchy; it adopts a set of principles to guide design and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. It seeks to incorporate energy efficiency through the approach detailed in Figure 1 below.

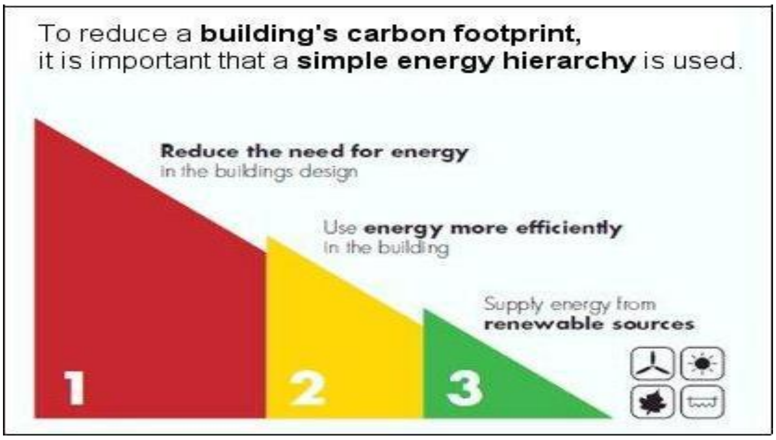

Figure 1 – Energy Hierarchy

Be 'Lean' - Demand Reduction

Lean Measures reduce the demand for energy by designing efficiency into the very fabric of the building through the specification and construction of an efficient thermal cover. The focus should be on air tightness, Accredited Construction Details (ACD's), thermal bridges and solar control, as well as taking into account the thermal mass of the areas being considered. Table 4 below shows a summary of target u values for each thermal element.

Table 5– Fabric U values

Thermal Element	Part L2B 2013 Minimum Standard
Wall	0.30 W/m²k
Roof	0.20 W/m²k
Floor	0.25 W/m²k
Glazing & Doors	2.00 W/m²k

The heat loss of different building elements is dependent upon their U –value. A building with low U values provides better levels of insulation and reduced heating demand.

The development will incorporate high levels of insulation and efficient glazing; thereby reduce demand for space heating. The table below shows the U values for the development and the associated improvements over Building Regulations.

Table 6 - Energy Efficient Design Specification

Element	Standard	Proposed Specification
Wall	0.30 W/M2k	0.15W/m2k
Flat & Pitched Roof	0.20 W/M2k	0.13 W/m2k
Roof lights	0.20 W/M2k	0.10 W/m2k
Floor	2.00 W/M2k	0.17 W/m2k
Windows	2.00 W/M2k	1.10 W/m2k
Air permeability flats	10 m3/hr/m2 at 50Pa	3.9m3/hr/m2 at 50Pa
Air permeability commercial	10 m3/hr/m2 at 50Pa	5.0m3/hr/m2 at 50Pa

Air-tightness and Thermal Bridging

Air tightness of a building is important in reducing heat loss, but also in the prevention of drafts that can ultimately mean warm temperatures feels uncomfortably cold. Current Part L Building Regulations (2013) sets a maximum air permeability rate of 10h/m^2 at 50Pa. The dwelling will improve upon this by achieving 5m^3/hr/m^2 at 50Pa.

Efficient Lighting and Controls

Throughout the development natural lighting will be optimised. Also, the development will incorporate low energy light fittings throughout. External lighting will be fitted with time controls and light sensors to ensure illumination is restricted to required areas.

Ventilation

The layout of the building will provide good internal air quality for all areas but not too much so as to waste heat. Natural and mechanical ventilation have been incorporated.

Overheating and Cooling Policy

Minimising internal heat gains: Where possible the internal gains are minimised. This includes highly efficient design of light fittings and where applicable, selecting highly efficient A rated equipment and appliances to reduce small power and internal gains.

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Be ‘Clean’ – Supply Energy Efficiently

Clean Measures ensures that energy is supplied and used efficiently within a property. Local Heat and power sources minimise distribution losses and achieve greater efficiencies when compared to separate energy systems, thus reducing C02 emissions. This section considers the potential for connection to any existing or planned district heating scheme in the proximity of the site. However, the London Heat Map shows that there is no district heating near the development site.

Combined heat and power (CHP) is classified as a clean measure within the London Plan Energy Hierarchy. CHP systems are usually specified for large schemes due to the need to have a large enough heat demand to supply from the CHP system. Plant room space is also required on site. This technology is not considered suitable for this development as annual demand for space heating and domestic hot water for a project of this scale and nature is low and not stable throughout the year.

Figure 2 – Example of CHP unit

Be 'Green' - Renewable Energy

Once energy demand reduction measures have been applied, methods for generating low and -zero carbon energy are then assessed. Renewable technologies that have been considered for the development are:

- Biomass;
- Ground/water source heat pump;
- Air source heat pump;
- Wind energy;
- Solar thermal panels; and
- Photovoltaic panels.

Potential renewable technologies were assessed in conjunction with the Energy Efficiency and Carbon Compliance measures discussed in previous sections of the report. To determine the appropriate renewable technology for the site, the following factors were considered.

- CO_2 savings
- Their compatibility with the site and site constraints
- Installation and maintenance costs
- Any potential impacts

Biomass Heating

A biomass system designed for wood pellets, which have a high-energy content, would fuel this development. Wood pellets require less volume of storage than other biomass fuels. Pellet boilers also require less maintenance and produce considerably less ash residue.

A biomass system, however, would not be an appropriate low-carbon technology for the site for the following reasons:

- The burning of wood pellets releases substantially more NOx emissions when compared to similar gas boilers. Furthermore, the installation of a biomass boiler would further reduce the air quality in this area.
- The initial costs such as buying the boiler and installing it are high compared with traditional gas or oil boilers.

Figure 3 – Biomass Boiler and Wood Pellets

Ground Source Heat Pump

Ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year.

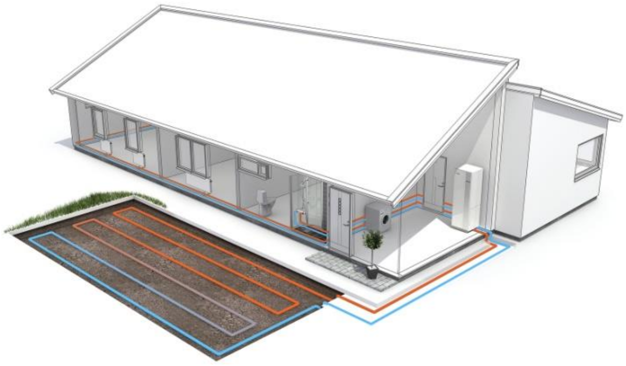

Figure 4 - Ground source heat pump

The use of Ground Source heat pumps for the scheme has been considered as an expensive technology as it is more expensive to install than an air source heat pump, because of the need to install a ground heat exchanger.

Air Source Heat Pump

Figure 5 - External unit

Air source heat pumps are an efficient and environmentally-friendly way of heating using air drawn freely from the atmosphere. They operate rather like a refrigerator in reverse, absorbing heat from the air into a working fluid which is passed into a compressor where its temperature is increased before it is transferred into the heating and hot water circuits of the building. An air source heat pump can get heat from the air even when the temperature is as low as -15°C. ASHPs work better with underfloor heating systems. If underfloor heating is not possible, large radiators should be used. Electricity is still required to drive the pump, so an air source heat pump cannot be considered completely zero-carbon unless this is provided by a renewable source, such as solar power or a wind turbine.

- Air source heat pumps can generate less CO2 than conventional heating systems.
- They are cheaper than ground source heat pumps and easier to install, particularly for retrofit, although their efficiency can be lower than with ground source heat pumps.
- ASHPs can provide heating and hot water.
- They require very little maintenance.
- Some can be used for air conditioning in the summer.
- ASHPs can qualify for the RHI, a financial incentive that pays you to produce heat through clean technologies.

- You need to use electricity to power the pump which circulates the liquid in the outside loop, but for every unit of electricity used by the pump, you get between two and three units of heat – making this an efficient way to heat a building.
- Space is required for the external condenser unit.

- ***The use of this system has been considered appropriate and suitable for residential units development.*** ERLQ004CAV3 + EHVH04SU18CB6W **Air Source Heat Pump for each flat.**

Wind turbines:

Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings. Local wind speeds in the area is likely to be below the level generally required for investment in large wind turbines.


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In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

Roof mounted turbines could be used at the development to generate small but valuable amounts of electricity but the small output and contribution to total emissions means any investment would be small. Furthermore, the use of wind turbines will have a detrimental aesthetic impact on the appearance of the building. Therefore, this technology is not considered suitable for this site.

Solar thermal

Solar hot water systems (also known as Solar Thermal) harness heat from sunlight by capturing energy which is radiated by the sun within solar panels or collectors.

Figure 6 – Solar Thermal Panels

This heat energy is then moved down pipes to the hot water cylinder within the home, reducing the need to use Gas, Oil or Electricity to heat the hot water; for this development solar thermal panels could be used for hot water. The system has been considered not suitable for the scheme as it will not contribute sufficiently towards the sustainability performance of the development.

Photovoltaic Panel

Photovoltaic panels extract the energy of the sun to generate electricity. They operate most efficiently when oriented to the south and are inclined to about 30 degrees. Several factors had to be considered to determine the amount of photovoltaic arrays that could be sited on the roof of the proposed development.

This included:

- Any overshadowing from the neighbouring buildings.

- Available roof space.

- ***The use of this system has been considered appropriate and suitable for the development.*** **6.5Kw PV Panels.**

Table 7 – PV System Fortess Road

	System Size	No of panels	Approximate Size of panel*
1.5kW each flat x 3 1Kw each commercial unit x 2	6.5kWp	26x 250w	Length 1640mm 992mm Width 40mm Depth Weight 19kgs

***Sunshine Polycrystalline 250W Solar PV (Example)**

Sustainable Design And Construction

The development will incorporate sustainable design and construction measures capable of mitigating and adapting to climate change to meet future needs. This section details site-specific initiatives which demonstrate how the Development helps to meet the sustainability objectives set out in the National Planning Framework 2016 the London Plan (2016) London Borough of Camden Core Strategy 2017.

Energy Use and Pollution

The design of the development has taken into consideration daylighting to habitable spaces to improve the wellbeing of occupants. Good levels of daylight will offer occupants a pleasant and highly valued connection to the outdoors and plenty of natural light. It will also reduce the use of artificial lighting and therefore energy use. All light fittings will be specified as low energy lighting.

External lighting will be automatically controlled to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.

The location and orientation of windows in the building will help to create a design that avoids overheating in the summer.

Pollution: Air, Noise and Light

An appropriate Construction Management Plan will be prepared to address issues such as water, waste, noise and vibration, dust, emissions and odours, ground contamination etc. Any mechanical system that will produce noise will be stored and measures will be taken to reduce the impact of noise.

The layout of a dwelling can provide good internal air quality for habitable areas but not too much so as to waste heat. The use of openanble windows will create horizontal airflow. By achieving a good naturally ventilated building the energy demand for air conditioning and mechanical ventilation will thereby be eliminated or reduced within the development.

The development will not increase the air pollution of the area by reducing as a start, its energy consumption, which in turn will reduce emissions that lead to air pollution.

Other measures will include:

a. Use of eco-friendly building materials

b. Non-toxic paints

c. Installation of energy efficient appliances and devices

d. Use of renewable technologies

Light pollution can best be described as artificial light that is allowed to illuminate or intrude upon areas not intended to be lit. Light in the wrong place at the wrong time can be intrusive.

Intrusive light is over bright or poorly directed lights shining onto neighbouring property which affect the neighbours' right to enjoy their property. Therefore, the proposal will incorporate lighting measures in order to avoid causing a nuisance.

Materials

Materials can have a significant impact on environmental performance, both in construction but also ongoing use. Materials used in the development will have lower environmental impacts over their lifecycle. This applies to the materials used in the external walls, roof, ground floor and upper floors and windows and extends to elements of the materials category such as the basic building materials (staircases, internal walls, upper floors) and the finishing elements (fascias, skirting, furniture.

It is expected that all timber used in the development will come from a legal Source (FSC Scheme). At least 80% of the building materials will be responsibly sourced and will use suppliers who can provide an EMS certificate or equivalent. Materials rated with an A or B in the BRE Green Guide to Specification will be preferred.

Water: Water Efficiency

In domestic buildings, the demand for water can be reduced as much as 50% using a variety of simple and innovative strategies that are integrated into the plumbing and mechanical systems. In order to reduce water consumption the proposed development will include efficient fixtures with low flow rates. Total internal water consumption will not exceed 105 litres/person/day. A water meter will be installed in the commercial unit.

Table 8: Water Fittings Standards

Schedule Appliance Water Consumption		
Appliance	**Flow rate or Capacity**	**Total Litres**
WC	Dual flush WC 4/2.6 litre	14.72
Basin	1.7 litres/min	5.98
Shower	8 litres/minute flow	24.00
Bath	160 litres	25.60
Sink	4 litres/min	14.13
W/machine	Default used	16.66
Dish Washer	Default used	3.90
		104.99

Surface Water Management

Surface water runoff will be managed through selection of Sustainable Urban Drainage System (SUDs) such as permeable paving and rain water harvesting.

Waste Management

There will be measures in place that will facilitate high levels of reuse and recycling throughout the demolition and construction stages. The development Site Waste Management Plan (SWMP) will aim to divert at least 50% by weight or by volume of non-hazardous construction waste from landfill. Adequate external storage for bins with applicable disabled access will be on site; level threshold, gentle approach and a hard surface with adequate turning circle have been specified in the design.

Transport

The site is next to a public transport hub with a bus stop directly adjacent providing access to two major bus routes heading North & South on Fortess Road with bus no.s 134, 214, C2 & N20 and additionally Highgate

Road has frequent services. There are trains from nearby Kentish Town West Overground station, as well as Gospel Oak and Kentish Town underground stations. The PTAL rating for this area is 6a.

The provision of quality cycle parking supports active and healthier life styles and more sustainable travel patterns. Development proposals are expected to provide cycle parking in accordance with the local policies and London Plan standards. Cycle spaces will be provided in a secured place.

Pollution

The contractor will be encouraged to meet to the standards of the Considerate Constructors Scheme which requires, amongst other things that dust emissions, potential noise pollution, impacts on water quality and the potential for ground contamination are minimised during demolition and construction. The Contractor would also be obliged to adhere to a site specific Code of Construction Practice to reduce potential nuisance effects.

Air Quality

To mitigate environmental impacts to the surrounding areas of the development, the scheme will meet commitments and best practices for Air (dust) pollution and Water (ground and surface) pollution from the site.

Daylight

When it is essential for certain construction activities to take place during dark hours, lighting will be sufficient for safety purposes, but will be set up in a way that any potential nuisance to nearby residential properties is minimized.

CONCLUSION

The development has been designed to exceed Part L1A building regulations requirements. In line with the London Plan three-step energy hierarchy and Camden policies, regulated CO_2 emissions from the development will be reduced by **39%** once energy efficiency measures and Green measures are taken into account.

In order to achieve the required carbon emissions reduction, the report concludes and proposes the installation of **6.5Kw PV panels on the roof and Air Source Heat Pump (ASHP).**

An appraisal of the proposed development has been undertaken against key sustainability objectives identified from relevant policy guidance. The framework for the appraisal was guided by the London Plan and headline issues from the Local Plan. This process has ensured that the development responds to the sustainable development objectives that are relevant to the area. Key sustainability initiatives in waste management, water, health and wellbeing, materials, pollution and Surface water management have been incorporated in the design of the proposed Development.

APPENDIX A
Project Information
Building type Mid-floor flat

Reference
Date 8 January 2019
Email: none Project Flat 1
7 Fortess Road
Kentish Town
LONDON
NW5 1AA

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.04a1, printed on 21/1/2019 at 14:49:33

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 23.06	
Dwelling Carbon Dioxide Emission Rate	DER = 2.97	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 41.3	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 32.3	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

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2b Fabric U-values

Element	Average	Highest	
Wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.00 (max. 0.25)	0.00 (max. 0.70)	OK
Roof	0.00 (max. 0.20)	0.00 (max. 0.35)	OK
Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK

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3 Air permeability

Air permeability at 50 pascals:	3.90	OK
Maximum :	10.00	

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4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Daikin Altherma ERLQ004CAV3 + EHVH04SU18CB6W
Source of efficiency: from boiler database
Secondary heating system:
None -

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5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):		OK
	Slight	OK
Based on:		
Thermal mass parameter :	162.81	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : East		
Ventilation rate :	6.00	
Blinds/curtains :		

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Double-glazed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K
Walls U-value 0.13 W/m²K
Design air permeability 3.9 m³/h.m²
Photovoltaic array

APPENDIX B
Project Information
Building type Mid-floor flat

Reference
Date 8 January 2019
Email: none Project Flat 2
7 Fortess Road
Kentish Town
LONDON
NW5 1AA

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.04a1, printed on 21/1/2019 at 14:50:12

New dwelling as designed

1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 23.06	
Dwelling Carbon Dioxide Emission Rate	DER = 2.94	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 41.2	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 32.3	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

2b Fabric U-values

Element	Average	Highest	
Wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.00 (max. 0.25)	0.00 (max. 0.70)	OK
Roof	0.00 (max. 0.20)	0.00 (max. 0.35)	OK
Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK

3 Air permeability

Air permeability at 50 pascals:	3.90	OK
Maximum :	10.00	

4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Daikin Altherma ERLQ004CAV3 + EHVH04SU18CB6W
Source of efficiency: from boiler database
Secondary heating system:
None -

5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):		OK
	Slight	OK
Based on:		
Thermal mass parameter :	162.85	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : East		
Ventilation rate :	6.00	
Blinds/curtains :		

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Double-glazed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K
Walls U-value 0.13 W/m²K
Design air permeability 3.9 m³/h.m²
Photovoltaic array

APPENDIX C
Project Information

Building type Top-floor flat

Reference			
Date	8 January 2019		
Email:	none	Project	Flat 3 7 Fortess Road Kentish Town LONDON NW5 1AA

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.04a1, printed on 21/1/2019 at 14:50:29

New dwelling as designed

1 TER and DER

Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 27.47	
Dwelling Carbon Dioxide Emission Rate	DER = 4.77	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 56.2	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 46.4	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

2b Fabric U-values

Element	Average	Highest	
Wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.00 (max. 0.25)	0.00 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK

3 Air permeability

Air permeability at 50 pascals:	3.90	OK
Maximum :	10.00	

4 Heating efficiency

Main heating system:
Air source heat pump, underfloor, electric
Daikin Altherma ERLQ004CAV3 + EHVH04SU18CB6W
Source of efficiency: from boiler database
Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):		OK
	Medium	OK
Based on:		
Thermal mass parameter :	153.09	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : East		
Ventilation rate :	6.00	
Blinds/curtains :		

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Double-glazed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K
Walls U-value 0.13 W/m²K
Design air permeability 3.9 m³/h.m²
Photovoltaic array