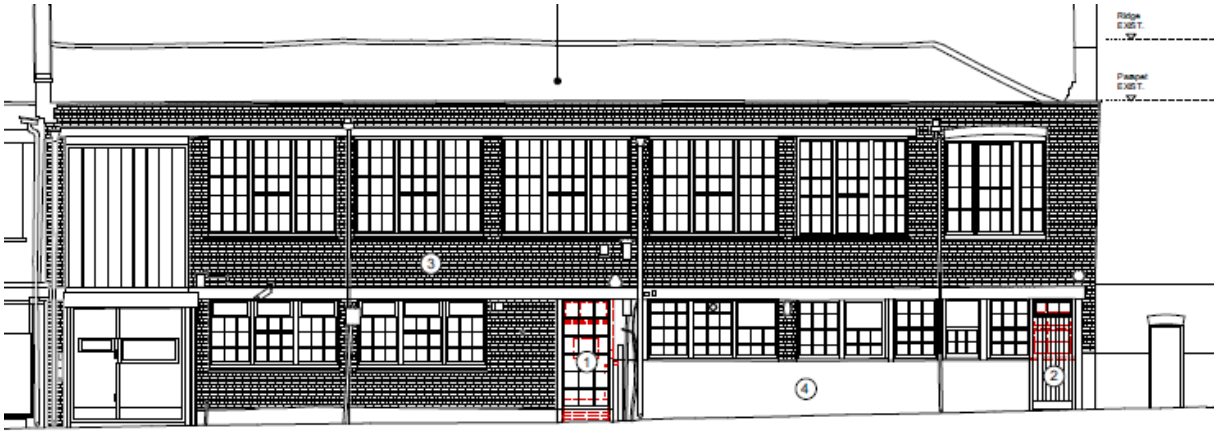
21 and 20a Brownlow Mews, Holborn, London, WC1N 2LA

Energy Statement



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Executive Summary

The purpose of an energy assessment is to demonstrate that the proposed climate change mitigation measures comply with the London Plan 2016 and the London Borough of Camden's energy policies; including the energy hierarchy. It also ensures that energy savings and emission reductions are prioritised over other factors such as construction costs, as part of development's design, construction and occupation.

This Energy Statement has been prepared by Peter Deer and Associates to accompany the planning application for some minor alterations and upgrades to 20a-21 Brownlow Mews, currently being used as offices, and the proposals are for the refurbishment of the all the interior design and replacement of all the building services, with some external works.

London Borough of Camden local planning energy related Policy Requirements.

https://www.camden.gov.uk/documents/20142/35992328/Energy+Efficiency+and+Adaptation+CPG.pdf/e314f05d-0b56-00c0-6e24-bc9c969d061b

Camden Policies for non-domestic refurbishment project between 500m^2 and 1000m^2

- Overall Carbon Reduction Target - Greatest possible reduction below Part L of 2013 Building Regulations (Local Plan CC1)
- Reduction in CO2 from onsite renewables (after all other energy efficiency measures have been incorporated) - 20% (London Plan 5.7, Local Plan CC1)
- Local Background air quality simply appraisal
- BREEAM Pre-Assessment Non Domestic Refurbishment Excellent rating

The Greater London Authority London Plan generally applies to non-domestic developments of greater than 1,000m^2.

Overall Carbon Emission

Table 1 below shows how the proposed refurbishment of the 20-21a Brownlow Mew reduces the building regulation regulate energy related Carbon dioxide emission.

The base energy is based on energy profile for the two registered EPC (see Appendix) for the current gas heating with natural ventilation building services.

	Commercial Refurbishment (assessed under Part L2B)	
		% Reduction at each stage
Baseline (exist	55 tonne CO2	
Be Lean	49 tonne CO2	11%
Be Clean	43 tonne CO2	23%
Be Green	43 tonne CO2	23%
Total emission saving	13 tonne CO2	23%
Shortfall	n/a	

Table 1 carbon reductions calculations

Be Lean (11% Emission Reduction)

The proposed thermal fabric improvements contribute towards reducing the energy consumption from the current building. Table 8

To reduce the internal water consumption proposals include the total replacement of the domestic hot and cold water services, with low water using fittings, water shut off valves and major water leak detection.

Be Clean (12% Emission)

The existing building gas fuelled boiler is to be replaced with a clean electric high efficiency air source heat pump. As clean energy source, heat pumps will help to improve the local air quality by removing the old higher NOx emitting gas boilers.

The nearest districting heating network is Great Ormond Street Hospital and currently there are no plans to develop the heat network beyond the hospital estate. There are no other local district heat networks within 200m of the site. As medium sized development there is no requirement to pay the district heating Community Infrastructure Levy payment.

Be Green

Brownlow Mews is within the Bloomsbury conservation area, and it is considered not appropriate to install a Photovoltaics (PV) array on the East elevation roof as visible within the mews. The flat roof at rear of the building is shaded by the taller houses fronting Doughty Street. The shading reduces the performance of the PV panels and extends the simple Payback period beyond the economic life of the PV panel. Therefore PV is not proposed.

The urban location prohibits other renewable technologies such as wind turbines and biomass boilers.

The project does include Air Source Heat pumps. There are no opportunities for passive cooling of ground source heat pumps.

Background Air quality

The site is surrounded by taller residential buildings which act as barrier to dust emissions from the Gary's Inn road. This is as evidenced in the LBC Background Air quality maps, which show the Gary's Inn Road in red and side street in yellow.

The Russell Square air monitoring station show general improvement in local air quality and is predicted to remain with World health Organization standards.

Therefore the ventilation proposal is to continue to naturally ventilate the building which is in keeping with buildings heritage.

BREEAM Non-Domestic Refurbishment Pre-Assessment.

During the design process a BREEAM Pre-assessment has been undertaken and summary I in section 7 and 8. Appendix contains the BREEAM Pre-assessment score sheet.

The Pre-assessment predicts a BREEAM "Excellent" rating.

	Available	Target	Section achieved	Overall (weighted) %
Energy	21	11	52%	10.7%
Water	7	5	71%	5.6%
Materials	13	10	77%	16.3%
Other	55	34	62%	37.7%
Overall	96	60	63%	70.3%

Table 2 Summary BREEAM Pre-Assessment Results Table

This is a small project invoking the sympathetic refurbishment of an existing mews building being currently used as an office. Undertaking a full BREEAM assessment will add considerably to the project cost and increase the construction period. It request that Full BREEAM assessment is not conditioned.

Summary

This is a small refurbishment project of an existing naturally ventilated mews office building with an improved building fabric, modern low energy LED lighting. The refurbishment project improves the local air quality by replacing the high NOX emitting gas boiler with zero air polluting energy efficient air source heat pumps. The proposal will not increase the number occupants or result in increased deliveries to the site.

Following the BREEAM non domestic refurbishment, the project is predicted to meet the equivalent of BREEAM excellent rating.

The contractor will respect the neighbours and ensure quick project turn around.

2 Introduction

2.1 The purpose of this energy assessment is to demonstrate that the proposed climate change mitigation measures comply with the London Plan 2016 and the London Borough of Camden energy policies, including the energy hierarchy. It also ensures energy remains an integral part of the development's design and evolution.

2.2 This Energy Statement has been prepared by Peter Deer and Associates to accompany the planning application for some minor alterations and upgrades to 20a -21 Brownlow Mews currently being used as offices, and the proposal are to the refurbishment of the all the interior design and replacement of all the building services, with some external works.

Proposed Works

2.3 The proposed works in this submission include:

- Replacing an existing door on the front elevation with a new window.
- Relocating the existing door further along the same front elevation.
- Replacing an existing rear elevation access door at first floor level.
- Replacing the existing pitched roof with a new pitched roof to match existing, all in slate tiles to better suit surrounding area.
- Raising the ridge to the pitched roof and the parapets to the North-East and North-West elevations by 150mm in order to accommodate a new layer of insulation to improve the building's thermal performance.
- Adding a new plant enclosure to the first floor flat roof on the rear elevation.

Site

2.4 The site is located at 21 & 20A Brownlow Mews, Camden, London WC1N 2LA.

2.5 21-20A Brownlow Mews is situated in Bloomsbury Conservation Area. The building forms part of the end terrace on a quiet mews street, parallel to neighbouring Gray's Inn Road.

Table 3 Gross Internal Areas and Net Internal Areas (ST D&A Rev D July 2019)

	Existing GIA	Existing NIA	Proposed GIA	Existing NIA
Ground Floor	426 m^2	330 m^2	426 m^2	351 m^2
First Floor	329 m^2	277 m^2	325 m^2	272 m^2
Total	756 m^2	607 m^2	751 m^2	624 m^2

Figure 1 Aerial View of the site in red (Google Maps 2019).

2.6 The mews were developed as service streets for the larger houses in the principal streets. Their distinctive character derives from the smaller scale of the street, the footprint and scale of the mews buildings (mostly of two storeys their elevational treatment reflecting their original use with large ground-floor openings and small openings on the upper floors, and building lines immediately behind the street edge).

2.7 In Camden there are few instances where original cobbles survive, such as in Brownlow Mews. The mews buildings tend to have narrow entrances, often incorporated into archways in buildings, which give a strong sense of enclosure.

2.8 Whilst pressure for change has led to many of the original mews buildings being replaced, Doughty Mews and the northern end of Brownlow Mews arguably contain the best surviving examples of original mews buildings although many have been altered.

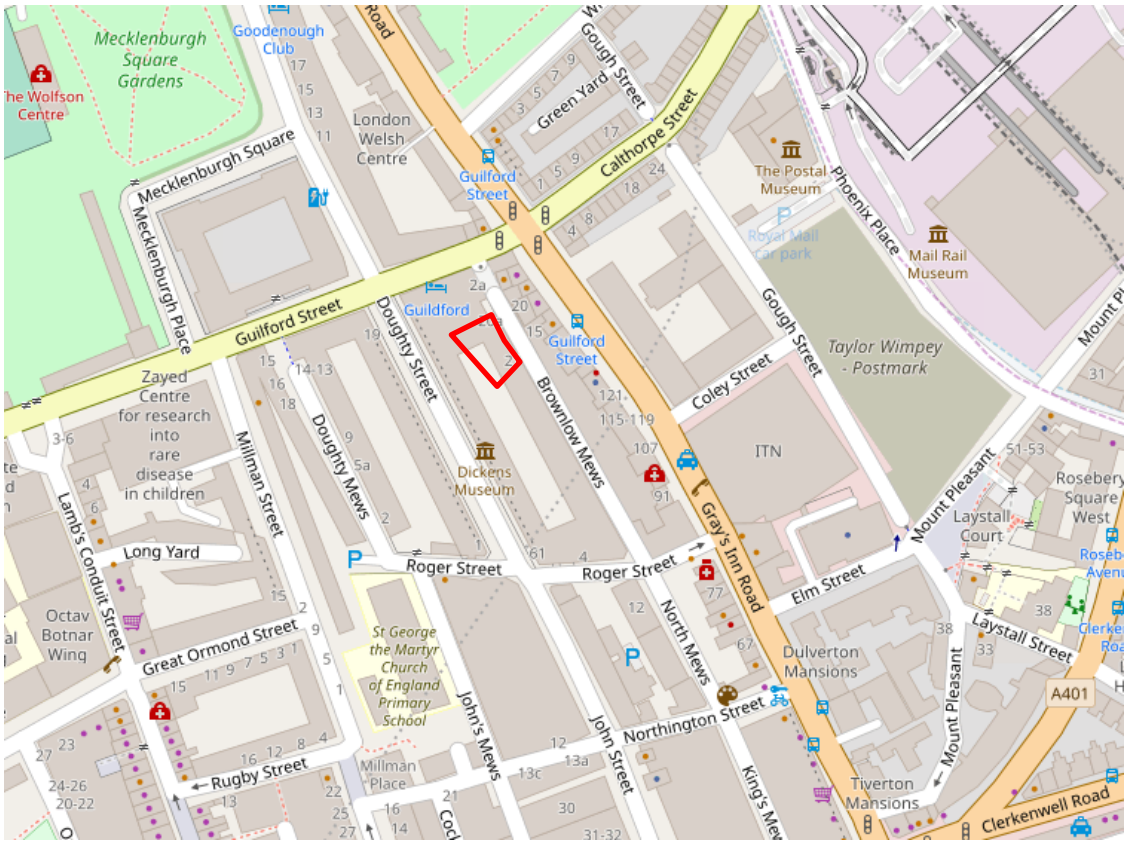


Figure 2 Site Location in Context (Open Street Map 2019)

Figure 3 Bloomsbury Conservation area- Sub area 10, Brownlow Mews.

In addition to the heritage formally listed buildings that are on the statutory list, there are a large number of individual buildings and groups of buildings that contribute to the character of their immediate surroundings and the Conservation Area as a whole. Whilst some of these buildings may have experienced minor alterations over the years, they are still considered to add valued contribution towards the area's conservation status. 21a Brownlow mews is a building that is consider to add positive contributions within the area. The planners therefore wish to preserve and enhance the external appearance of the building.

3 Local Planning Policies

3.1 It is expected that the refurbished building will be constructed to the highest standards of sustainable design and construction as proposed by the GLA London Plan (2016) and London Borough of Camden. These policies are designed to promote the inclusion of on-site renewable energy production and the use of decentralised energy systems. This approach will help reduce the dependency on conventional fuels for electricity and heating needs, contributing towards achieving regional and national CO_2 reduction targets and hence mitigating climate change. These policies relate to major projects with over ten Domestic units and or Non Domestic projects over 1,000m^2 in area.

Greater London Policies (major developments) March 2015:

Policy 5.1 Climate Change
Policy 5.2 Minimising Carbon Dioxide emissions
Policy 5.3 Sustainable Design and Construction
Policy 5.6 Decentralised Energy in Development Proposals, Planning
Policy 5.7 Renewable Energy Strategy
Policy 5.15 Water Use and Supplies

3.2 The energy assessment must fully comply with Policies 5.2 to 5.9 inclusive and, recognising the integrated nature of London Plan policies, take account of relevant design, spatial, air quality, transport and climate change adaptation policies in the Plan

London Borough of Camden - Sustainability and Climate Change Policies

3.3 The London Borough of Camden (LBC) aims to tackle the causes of climate change in the Borough by ensuring that developments use less energy and assess the feasibility of decentralised energy and renewable energy technologies.

Summary List of energy related LBC policies

3.4 LBC Local Pan (2017) Energy Related Planning Policies:

Policy CC1 Climate Change Mitigation – Energy efficiency and carbon emission reduction, Carbon neutral developments and connection to district heat networks.
Policy CC2 Adapting to climate change – summertime over heating Risk
Policy CC3 Water and flooding – SUD options
Policy CC4 Air quality - Reduction of polluting emission sources, and provision of cleaner ventilation systems
Policy CC5 Waste – Reduction of waste in construction, use and demolition.
Policy A4 Noise and vibration - External Noise Report – use of acoustic glass, ventilation and building fabric.

3.5 Climate change and minimising the use of resources – there are links between poor health and wellbeing and the ability to heat a home cost effectively or, in hot weather, the ability to ensure that the property does not overheat. Policies ‘CC1 Climate Change Mitigation’ and ‘CC2 Adapting to Climate

Change' will seek to ensure that buildings are designed to be more energy efficient and to cope with changes to our climate system such as wetter winters and hotter summers

3.6 London Borough of Camden expects the application of a BREEAM assessment to non-residential developments (including conversions, extensions and changes of use) of 500 m² or more. We will expect these to achieve a BREEAM rating of excellent and will encourage zero carbon from 2019.

3.7 Refurbishments and other non-domestic development will be expected to meet BREEAM water efficiency credits.

3.8 LBC require a basic Air Quality Assessment for all newly erected buildings/substantial refurbishments and changes of use where occupants will be exposed to poor air quality (due to its location next to a busy road, diesel railway line or in a generally congested area).

3.9 Air Quality Assessments must outline the predicted and forecasted pollutant concentrations at the proposed development and the planned mitigations. The Air Quality Assessment should also consider wider cumulative impacts on air quality arising from a number of smaller developments.

Climate Change

3.10 The LBC aims to tackle the causes of climate change in the borough by ensuring developments use less energy and assess the feasibility of decentralised energy and renewable energy technologies.

Policy CC1 Climate Change Mitigation

The Council will require all developments 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 developments 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*
- *i. requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.*

To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.

3.11 All developments involving five or more dwellings and/or more than 500m^2 (gross internal) of any floor space will be required to submit an energy statement demonstrating how the energy hierarchy has been applied to make the fullest contribution to CO_2 reduction. All new residential development will also be required to demonstrate a 19% CO2 reduction below Part L 2013 Building Regulations (in addition to any requirements for renewable energy). This can be demonstrated through an energy statement or sustainability statement.

Adapting to Climate Change

3.12 Climate change adaptation involves changing the way we do things to prepare for the potential effects of climate change. The councils needs to ensure that buildings and people can adapt to changes already evident within the climatic system.

3.13 To minimise the risks connected with climate change LBC expects the design of developments to consider anticipated changes to the climate. It is understood that some adaptation measures may be challenging for listed buildings and some conservation areas and LBC advises developers to engage early with the Council to develop innovative solutions.

Policy CC2 Adapting to Climate Change

The Council will require development to be resilient to climate change.

All developments 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 by 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 measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.
d. 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:

e. ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;
f. encourage new build residential development to use the Home Quality

Mark and Passivhaus design standards;

g. encouraging conversions and extensions of 500 sqm of residential floor space or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and
h. expecting non-domestic developments of 500 sqm of floor space or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019

Climate change adaptation measures

To minimise the risks connected with climate change we will expect the design of developments to consider anticipated changes to the climate.

3.14 To minimise the risks connected with climate change LBC expects the design of developments to consider anticipated changes to the climate. It is understood that some adaptation measures may be challenging for listed buildings and some conservation areas and LBC advises developers to engage early with the Council to develop innovative solutions.

3.15 LBC expects a BREEAM pre-assessment to accompany all non-residential developments (including conversions, extensions and changes of use) of 500m^2 or more. Demonstrating a BREEAM rating of excellent and will encourage zero carbon from 2019

Water Supply and Quality

3.16 London has lower rainfall than the national average while having a very high population density. This combination of limited water resources and high demand has resulted in London being declared an area of serious water stress and this trend is likely to be exacerbated by climate change. The Council

will protect the Borough's existing water infrastructure to ensure there is adequate supply, storage and foul water capability.

Policy CC3 Water and flooding

The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible.

We will require development to:

a. *incorporate water efficiency measures;*
b. *avoid harm to the water environment and improve water quality;*
c. *consider the impact of development in areas at risk of flooding (including drainage);*
d. *incorporate flood resilient measures in areas prone to flooding;*
e. *utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and*
f. *not locate vulnerable development in flood-prone areas.*

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable. The Council will protect the Borough's existing drinking water and foul water infrastructure, including the reservoirs at Barrow Hill, Hampstead Heath, Highgate and Kidderpore.

3.17 Developments must be designed to be water efficient. This can be achieved through the installation of water efficient fittings and appliances (which can help reduce energy consumption as well as water consumption) and by capturing and re-using rain water and grey water on-site. Refurbishments and other non-domestic development will be expected to meet BREEAM water efficiency credits.

Air Quality Action Plan.

3.18 Improving local air quality, mitigating the impact of development on air quality and reducing exposure to poor air quality in the borough is vital in safeguarding public health and the environment. The focus of Policy CC4 is to mitigate the impact of development on air quality and to ensure exposure to poor air quality is reduced in the borough.

Policy CC4 Air quality

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the Borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

The Council's Air Quality Action Plan identifies actions and mitigating measures to be implemented by the Council and partners to reduce NO2 and PM10 from the four main emission sources of the borough: road transport; gas boilers; new developments; and small industrial processes. The Air Quality Action Plan takes into account the measures contained within the Mayor's Air Quality Strategy 'Clearing the Air'.

In order to help reduce air pollution and adhere to London planning policy, developments must demonstrate that they comply with Policy 7.14 of the London Plan (to be at least air quality neutral).

The LBC Air Quality Action Plan identifies actions and mitigating measures to be implemented by LBC and partners to reduce NO2 and PM10 from the four main emission sources of the borough: road transport; gas boilers; new developments; and small industrial processes. The Air Quality Action Plan takes account of the measures contained within the Mayor's Air Quality Strategy 'Clearing the Air'.

3.19 Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. If the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact.

3.20 Similarly, if developments introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality, they must be designed to mitigate the impact in order to be acceptable.

3.21 Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

Waste

3.22 The LBC is committed to reducing the amount of waste produced in the Borough, encouraging recycling and managing collected waste in a sustainable way. It fully supports the objectives of sustainable waste management – to move the management of waste up the 'waste hierarchy' of prevention, preparing for reuse, recycling, other recovery, and to only consider disposal as a last resort.

Policy CC5 Waste

The Council will seek to make Camden a low waste borough.

We will:

a. *aim to reduce the amount of waste produced in the Borough and increase recycling and the reuse of materials to meet the London Plan targets of 50% of household waste recycled/composted by 2020 and aspiring to achieve 60% by 2031;*
b. *deal with North London's waste by working with our partner boroughs in North London to produce a Waste Plan, which will ensure that sufficient land is allocated to manage the amount of waste apportioned to the area in the London Plan;*
c. *safeguard Camden's existing waste site at Regis Road unless a suitable compensatory waste site is provided that replaces the maximum throughput achievable at the existing site; and*
d. *make sure that developments include facilities for the storage and collection of waste and recycling.*

3.23 To ensure an integrated approach to waste management and the highest possible reuse and recycling rates, the Council will encourage the submission of a site waste management plan prior to construction. For further details please refer to our supplementary planning document Camden Planning Guidance on sustainability

Assessing the impact of noise and vibration

3.24 This policy seeks to ensure that noise and vibration is appropriately considered at the design stage and that noise sensitive uses are not negatively impacted by noise and vibration or that existing uses (such as music venues, theatres and some employment uses) are not unduly restricted through the introduction of nearby noise sensitive uses.

Policy A4 Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. *development likely to generate unacceptable noise and vibration impacts; or*
b. *development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

3.25 Where building users are sensitive to noise and vibration are proposed close to an existing source of noise or when development is likely to generate noise is proposed, the LBC requires an acoustic report to accompany the planning application.

3.26 Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces. The impacts on external amenity spaces such as gardens and balconies will also be considered. LBC supplementary planning document provides further information on how to minimise the impact of noise by developments; ways to mitigate noise emitted from developments and further detail on how the Council will assess the impact of noise and vibration.

Summary of LBC Planning Policy

19% CO2 reduction below Part L 2013 Building Regulations

20% reduction in carbon dioxide emissions from on-site renewable energy generation

Summary of the background Air quality

BREEAM Pre Assessment

4 Energy analysis

4.1 The National Calculation Methods Simplified Building Energy Model (SBEM) Version 5.6a 2019 is used to estimate the energy consumption for the refurbished building regulated and un-regulated energy consumption. The SBEM energy modelling software was developed to demonstrate the energy and emission savings for compliance with the 2019 Building Regulations. The resulting output data is accepted as suitable for early design energy comparison.

4.2 The Building Regulation Energy modelling software using the National Calculation Method Simplified Building Energy Model (SBEM) Version 5.6a 0 and interfaced with Bentley System design Database engine V26.06. The results are used to demonstrate building regulation 2013 (including 2016 amendments) compliance under the guidance of Approved Documents Part L2A. The resulting output data is generally accepted as suitable for early design energy comparison for planning stage energy assessment as set out in Greater London Authority guidance on preparing energy assessments as part of planning applications (October 2018).

4.3 The SBEM energy model predicts the unregulated energy from benchmark data embedded with the software.

1. Regulated energy is the energy used by building engineering services systems, and is used to calculate the building emissions rate (BER).
2. Unregulated energy is the energy associated through the occupation, and use of the building, and is not included in the BER calculations. This is the energy used by office computer systems, photocopiers, etc.

Base Building Energy

4.4 There are two registered EPC for this address with Landmark

Rear Unit 20a Brownlow Mews
20a Brownlow Mews

https://www.ndepcregister.com/reportSearchAddressListAddresses.html?id=0cc5ee02293958a5ab140dd8a34870ef

	FLA	Emission	Energy	Asset	Heating	Building
Unit	m²	kgCO2/m²	kWh/m²	Rating	Fuel	Environment
20a Brownlow Mews	112	67.61	390.57	D - 95	Gas	Natural Ventilation
Rear Unit 20a Brownlow Mews	165	56.74		D - 92	Gas	Natural Ventilation

Table 4 Current registered EPC form which the bas energy and emission are calculated.

4.5 The EPC is replicating using SBEM to retrieve an estimation of the building regulated energy consumption for existing pre development building. This model becomes the base energy. The second model is the proposed building post refurbishment. The proposed energy improvements show a 23% emission reduction (regulated) from the base building.

Proposed Building Energy

4.6 The proposal is to provide completely new services which entail:-

- High efficiency heat pump systems providing comfort heating and cooling to the open plan office spaces.
- The WC areas will be provided with electric heating controlled by wall mounted thermostats.
- Existing walls on the existing floors are of solid brick construction and this will be unchanged.
- New improved high insulated pitched roof.
- New automated window openers design to maintain thermal comfort levels through monitoring humidity and temperature levels in the building.
- WC are to provide with new continuous low energy local extract ventilation with occupancy sensing controls to increase ventilation when the area is occupied.
- All areas (internal and external) will be provided with automated energy efficient LED lighting including integrated presence and daylight sensors.
- New WC cores and sanitary ware with reduce water consumption.
- Energy metering of the office floor power consumption and all mechanical plant and lift.

Energy Tables	Base	Be lean	Be clean	Be Green
Area	812 m²	812 m²	812 m²	812 m²
Heating (Electricity)			28,847 kWh	32,182 kWh
Heating (gas)	77,130 kWh	57,695 kWh		
Cooling (electricity)			6,465 kWh	5,982 kWh
Hot water (gas)				
Hot water (electricity)	31,784 kWh	31,786 kWh	31,786 kWh	31,786 kWh
Electricity Pumps Fans	2,311 kWh	2,311 kWh	586 kWh	586 kWh
Electricity Lighting	44,266 kWh	44,266 kWh	14,687 kWh	14,687 kWh
PV Energy Produced	0	0	0	0
Equipment	27,896 kWh	27,896 kWh	27,896 kWh	27,896 kWh
Total				
Regulated	155,491 kWh	136,058 kWh	82,372 kWh	85,223 kWh
Unregulated	27,896 kWh	27,896 kWh	27,896 kWh	27,896 kWh
Regulated /m²	192 kWh/m²	168 kWh/m²	101 kWh/m²	105 kWh/m²

Table 5 Estimated Energy from each stage of the Energy Hierarchy.

Energy Tables	Base	Be lean	Be clean	Be Green
Area	812 m²	812 m²	812 m²	812 m²
Heating (Electricity)			14,972 KgCO2	16,702 KgCO2
Heating (gas)	16,660 KgCO2	12,462 KgCO2		
Cooling (electricity)			3,355 KgCO2	3,105 KgCO2
Hot water (gas)				
Hot water (electricity)	16,496 KgCO2	16,497 KgCO2	16,497 KgCO2	16,497 KgCO2
Electricity Pumps Fans	1,199 KgCO2	1,199 KgCO2	304 KgCO2	304 KgCO2
Electricity Lighting	22,974 KgCO2	22,974 KgCO2	7,623 KgCO2	7,623 KgCO2
PV Energy Produced				
Equipment	14,478 KgCO2	14,478 KgCO2	14,478 KgCO2	14,478 KgCO2
Total				
Regulated	57,329 KgCO2	53,132 KgCO2	42,751 KgCO2	44,231 KgCO2
Unregulated	14,478 KgCO2	14,478 KgCO2	14,478 KgCO2	14,478 KgCO2
Regulated /m²	70.63 kgCO2/m²	65.46 kgCO2/m²	52.67 kgCO2/m²	54.50 kgCO2/m²

Table 6 Estimated Emissions from each stage of the Energy Hierarchy.

Fuel	CO_2 Emission factors (SAP 2012)
Natural Gas 2012	0.216 kgCO_2/kWh
Grid Electricity 2012	0.519 kgCO_2/kWh
Heating Fuel Oil	0.315 kgCO_2/kWh

Table 7 Carbon Factors

5 Energy Hierarchy

5.1 The energy hierarchy is a sequence of steps that minimise the energy consumption of a building. Buildings designed in line with the energy hierarchy prioritise lower cost passive design measures, such as improved fabric performance over higher cost active systems such as renewable energy technologies. The following diagram shows a simplified schematic of the energy hierarchy, which is explained further in supplementary planning document Camden Planning Guidance on sustainability.

Be Lean

5.2 The Mayor's energy hierarchy is designed to encourage the designers to consider energy saving through specifying and constructing a long lasting energy efficient building fabric. The building regulations encourage a fabric first approach by including the fabric energy efficiency target.

5.3 Improving the building fabric to reduce heat loss in winter can also result in negatively trapping solar gains in the summer months. The designers have reviewed the building layout, for the continued use of balanced natural ventilation between the front and rear elevations.

Thermal Elements

5.4 The table below shows that the proposed U-values for the new build part of the development are in line with appendix C of ADL2a of Building Regulations. These values, from a buildability aspect, can be achieved with standard building materials.

Element	Part L 2013 (minimum standards)	Proposed U-values
New external wall s to be cons	0.28 W/m²K	0.28 W/m²K
Work Undertaken on Existing Solid Brick Walls	0.7 W/m²K Threshold	Repair
Existing single glazed windows	1.5 W/m²K	Remaining for heritage
Replacement Windows	2.20 W/m²K	1.80 W/m²K
New External doors	2.20 W/m²K	2.20 W/m²K
Flat Roof	0.18 W/m²K	Repair
Replacement Pitch Roof	0.18 W/m²K	0.16 W/m²K
Floor No Change	0.22 W/m²K	No works
Air permeability Test	25.00 m³/h.m² @ 50Pa (Default)	Not required

Table 8 Proposed Building Fabric improvement.

5.5 The proposed U-values combined with the high efficiency heating plant reduce the energy required to heat the building even further than the base building.

Air tightness

5.6 Refurbishment of existing building are not required to meet an air permeability rate minimum standard although it is advised to pressure test the building to find and remove air paths between the outside and inside elements. The contractor will be asked to pressure test the building and where possible seal unwanted air paths. It is accepted that in retaining and repairing the existing steel frame windows there will be some air leak through this element.

Background ventilation

5.7 All naturally ventilated buildings must have background ventilation air paths, other than opening windows to maintain thermal comfort conditions and reduce internal humidity levels from the occupation and use of the building. This is generally achieved using air vents and/or trickle vents in the windows.

5.8 Building 21a has been identified as a building providing a positive contribution toward conservation area status. It is proposed to retain the original appearance of the existing windows and not to substantially alter the external appearance of the building. Therefore the conventional methods of providing background ventilation are not considered suitable (trickle vent in windows or larger wall vents). The design team in consultation with building control officer are proposing to add locking devices to the windows to create air paths through the window frame while the windows remain securely locked.

5.9 Cross ventilation is achieved using windows on the opposite log façade (first floor) and passive extract ventilation at the back of the building on the ground floor. The passive extract ventilation is a slow moving solar powered fan linked to a humidity sensor. When the office relative humidity levels exceed 60%, the extract fan operates. A number of the windows will be fitted with automated window openers designed to operate in conjunction with internal humidity levels. This is required to maintain internal comfort condition when spaces are fully occupied to higher than the average density.

Figure 4 First Floor Brownlow Mews façade industrial Style Opening Windows

Purge Ventilation

5.10 The current window openings exceed the building regulation floor area window requirement to provide purge level ventilation.

Water efficiency

5.11 The UK has less water per person than most other European countries. London is drier than Istanbul, and the South East of England has less water available per person than Sudan and Syria.

5.12 As our population grows, more and more people are sharing this limited resource. Also, the more water consumed the less there is available for the environment. Therefore, it is important that we use water wisely and do not waste it.

5.13 Approved Document Part G of the Building Regulations in April 2010 sets a whole building standard of 125 litres per person per day for domestic buildings. This comprises internal water use of 120 litres per person per day and an allowance of 5 litres per person per day for outdoor water use.

.Installation	Description	Water Use
WC	Dual Flush Cistern	5 Litres and 3 litres
Wash Hand Basin	Low Flow Regulators Or Aerating Taps	3.0 Litres/Min
Shower	Low Flow Rate Between	8 litres / minute
Cleaner Sink	Standard Monoblack At $^{2}/_{3}$ Maximum Flow rate	3.25 Litres/Min

Table 9 Efficient Water Fitting Flow rates

BREEAM water efficiency requirement for an office building.

Wat 01 Water consumption

5.14 Reducing the demand for potable water through the provision of efficient sanitary fittings, rainwater collection and water recycling systems. As shown in table above.

Wat 02 Water monitoring

5.15 The mechanical services designer will include water meters to allow for management and monitoring of water use in the building. This encourages reductions in water use by identifying areas of high usage and investigating potential causes.

Wat 03 Water leak detection

5.16 A New water leak detection device will be installed to reduce the unintended water consumption due to leaks by installing leak detection systems and flow control devices.

Low Energy Lighting

5.17 All lighting will be low energy integrated LED light fittings and controls.

5.18 LED lighting technology with the development of multichip LED Lamps means it is now possible to install high quality, low energy lights with short warm up periods and low fading loss over the life of the lamps. The lighting industry is continually developing new stylish compact LED luminaires, which can now replace all the less efficient incandescent and fluorescent lights.

5.19 The external lighting design will include input from a Metropolitan Police crime officer to ensure the external lighting design provide good quality safe lighting which can help to prevent crime and will not cause nuisance to the neighbours.

5.20 The selected luminaires will include the following integrated controls avoid wasting energy

- Automatic presence detection to turn light fitting on and off.
- BMS compatible time clock controls
- Daylight Sensing dimming control ,
- Automated self-test to give advance warning of when the luminaire requires replacing.
- Automated emergency light testing and record keeping through the BMS.
- A reduction in the strength of external lighting after midnight and before six am.

5.21 The lighting energy in most areas of the building is generally less than the base building however, the lighting requirements for some areas such as the science labs will be greater than the base building due to their use.

Be Clean

District Energy Networks

5.22 Most of central London is classified as having the potential for future heat networks but this site is not in close (200m) proximity to any existing or proposed heat networks.

5.23 BuroHappold Engineering Ltd was commissioned by the London Borough of Camden (LBC) to carry out a decentralised energy study as part of DECC's Heat Network Development Unit (HNDU) funding scheme aimed at developing new and expanding existing decentralised energy networks. The results of the exercise is published in the BuroHappold report "Wide Heat Demand and Heat Source Mapping", London Borough of Camden. (May 2015).

5.24 The site is to the east of the Great Ormond Street hospital which is identified an anchor load of the district heating network. The hospital has installed its own Combine heat power plant to supply heat and power the hospital estate. The BuroHappold report identifies that the Great Ormond Street CHP could be developed further by integrating the hospital plant, with heat recovery unit from the two large UKPN substations secondary heat sources and adjacent London Borough Camden estates to establish a future District heat network. (See Figure below).

5.25 The viability of the scheme is reliant on developing a business case to connect the hospital as the key catalyst of the network. The hospital has an existing onsite CHP led network and so two options exist for developing a new network. Either the current scheme is extended with the capacity to serve external loads or the hospital is connected to a new off-site energy centre.

5.26 There are currently no proposals to further develop the Great Ormond Street Hospital estate wide heating system beyond the boundary of the hospital or to connecting into third party own district heat network.

5.27 Therefore there is no requirement to at this point in time to make allowance for future connection into a potential local heat network. The situation will be reviewed when the heating system is replace in the next 15 to 20 years.

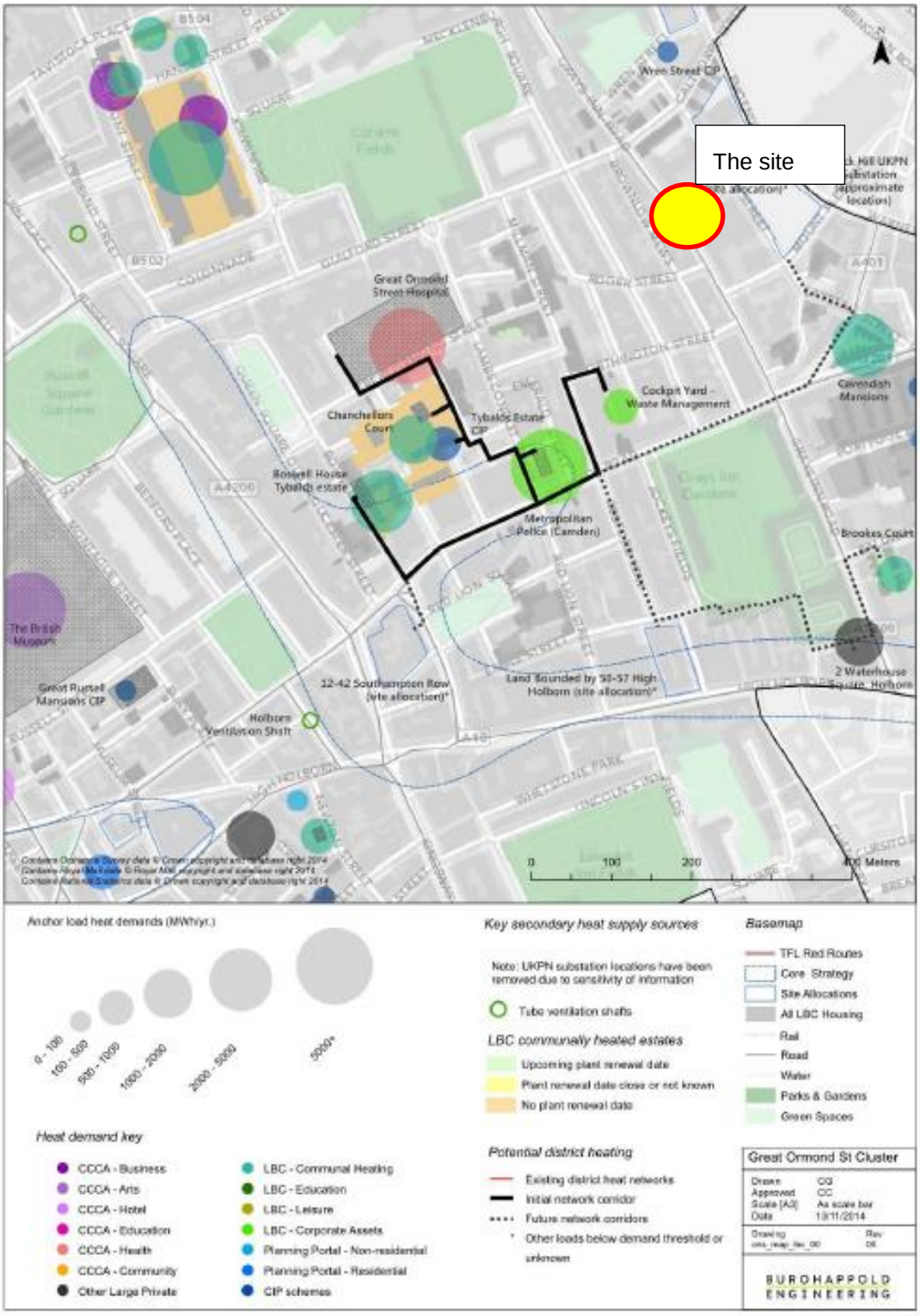


Figure 5 Great Ormond Street decentralised energy network cluster

Communal Energy Network

5.28 The planning proposal is the refurbishment of a single existing building, and communal network is appropriated.

Proposed Energy System

5.29 To avoid damaging playfield surfaces, a new mains gas supply is not acceptable. Therefore, electric fuelled heating system is the only workable option. The type of building is suited to the fast acting and very controllable electric panel heaters. The factory constructed airtight building will retain heat over night, and only require a relative small heat input from the fast acting electric panel heaters. The internal heat gains from building equipment and occupants will maintain the room temperatures. The cross ventilation between the windows and the roof vents above central corridors will ensure internal temperatures of the classroom can be regulated.

Be Green

5.30 LBC require medium sized developments to reduce the carbon dioxide emissions by at least 20% using on-site renewable energy generation wherever feasible. Development proposals should seek to utilise renewable energy technologies.

Photovoltaics

5.31 Photovoltaic cells are panels you can attach to your roof or walls. Each cell is made from one or two layers of semiconducting material, usually silicon. There are a number of different types available e.g. panels, tiles cladding and other bespoke finishes.

5.32 When light shines on the PV cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced.

5.33 The most efficient location for PV is on flat easily accessible first floor roof in clear sunshine. At rear of the building. This roof could accommodate a 5kW PV array (50m^2) which in sunshine could offset 3% of the building energy related Carbon dioxide emission.

5.34 A simple shadow calculation Figure 7 shows that the roof is shaded in the early morning to 10am and again from 5pm to sunset. This substantially reduces the energy output from the PV array and therefore extends the simple payback period to greater than 20 years, which is longer than the economic life of most PV panels.

5.35 Because of the shading from other building and conservation area status it suggest that PV array is not include within the design proposals.

Figure 6 21a Brownlow mews (Google Earth).

Figure 7 Shadow Calculator

5.36 The flat roof section of roof is in shade up to 10 am and again from 5pm based of on simple Shadow Calculation.

5.37 Modest shading will reduce energy out from PV by 20% and increase the a simple Pacak Calculation By 5 years.

Shade	Full sun	Modest	Significant	Heavy
Jan	140 kWh	112 kWh	91 kWh	70 kWh
Feb	211 kWh	169 kWh	137 kWh	105 kWh
Mar	355 kWh	284 kWh	231 kWh	178 kWh
Apr	491 kWh	393 kWh	319 kWh	246 kWh
May	591 kWh	473 kWh	384 kWh	296 kWh
Jun	623 kWh	498 kWh	405 kWh	311 kWh
Jul	608 kWh	486 kWh	395 kWh	304 kWh
Aug	543 kWh	434 kWh	353 kWh	271 kWh
Sep	423 kWh	339 kWh	275 kWh	212 kWh
Oct	288 kWh	230 kWh	187 kWh	144 kWh
Nov	171 kWh	136 kWh	111 kWh	85 kWh
Dec	116 kWh	93 kWh	76 kWh	58 kWh
Total	4,560 kWh	3,648 kWh	2,964 kWh	2,280 kWh
Reduction		-20%	-35%	-50%
Installation	£10,000	£10,000	£10,000	£10,000
Income	£547	£438	£356	£274
Simple payback	18 years	23 years	28 years	37 years

Table 10 Predicted energy Output from a 5kW PV array.

Alternative renewable energy options

5.38 The following alternative renewable options have been considered but found not to be appropriate:

Biomass – Not suitable for urban location as installation will reduce the local air quality through smoke emission and increased vehicle movement from the transportation of biomass fuel.

Solar Thermal – Office building have very low hot water requirements, mainly for washing hands, occasional showers, and dish washing. As a result of having fittings that are low water use, the hot water demand is reduced even further, and therefore savings from solar thermal are also smaller.

Wind Turbines – It is general accepted that wind turbine are not suitable technology for urban locations. The turbulent airflow around buildings requires a larger blade diameter to generating a useful amount of electricity.

6 Local Air Quality

6.1 Air Quality Assessments must outline the predicted and forecast pollutant concentrations at the proposed development and the planned mitigations. The Air Quality Assessment should also consider wider cumulative impacts on air quality arising from a number of smaller developments.

The Local Site Background Air Quality

6.2 In many situations the background contribution may represent a significant proportion of the total pollutant concentration. A good understanding of background concentrations is important when completing air quality assessments as it allows for a good understanding of the local pollutant sources.

6.3 The DEFRA Air Pollution Background Concentration Maps are provided to estimate the average background annual concentrations for specific pollutants. These can then be used in air quality assessments to better understand the contribution of local sources to total pollutant concentrations. They provide information on how pollutant concentrations change over time and across a wide area; they also provide an estimated breakdown of the relative sources of pollution.

6.4 The total concentration of a pollutant comprises those from explicit local emission sources such as, roads, chimney-stacks, etc., and those that are transported into an area by the wind from further away. If all the local sources were removed, all that would remain is that which comes in from some distance; it is this component that is called ‘background’.

6.5 The maps allow for the assessment of new pollutant sources that are introduced into an area and the impact they may have upon local air quality.

6.6 http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011

London Bloomsbury (Russell Square)

6.7 The monitoring station is within a self-contained, air conditioned housing located within the north-east corner of a central London gardens. The gardens are generally laid to grass with many mature trees. All four sides of the gardens are surrounded by a busy 2 lane one-way road system, which is subject to frequent congestion. The nearest road lies at a distance of approximately 25 metres from the station. The area in the vicinity of the manifold is surrounded by small buildings (lower than the height of the manifold).

Data Link

http://www.londonair.org.uk/LondonAir/LATools/AnnualAirQuality.aspx

http://www.londonair.org.uk/london/asp/basicstats.asp?sitename=Camden++Bloomsbury&site=BL0&region=0&stats=AQIndex&periodyear=2019

Pollutant	Objective	Result	Capture Rate (%)	Achieved Objective
Nitrogen Dioxide	200 ug/m^3 as a 1 hour mean, not to be exceeded more than 18 times a year	0	97%	YES
Nitrogen Dioxide	40 ug/m^3 as an annual mean	33	97%	YES
Ozone	100 ug/m^3 as an 8 hour mean, not to be exceeded more than 10 times a year	9	96%	YES
PM10 Particulate	40 ug/m^3 as an annual mean	18	86%	YES
PM10 Particulate	50 ug/m^3 as a 24 hour mean, not to be exceeded more than 35 times a year	9	86%	YES
PM2.5 Particulate	25 ug/m^3 as an annual mean	11	92%	YES
Sulphur Dioxide	125 ug/m^3 as a 24 hour mean, not to be exceeded more than 3 times a year	0	84%	YES
Sulphur Dioxide	266 ug/m^3 as a 15 minute mean, not to be exceeded more than 35 times a year	0	84%	YES
Sulphur Dioxide	350 ug/m^3 as a 1 hour mean, not to be exceeded more than 24 times a year	0	84%	YES

Table 11 Camden Bloomsbury Urban Air Quality Monitoring Station Annual Objectives Camden Bloomsbury - (Date range one year from 1-6-2018)

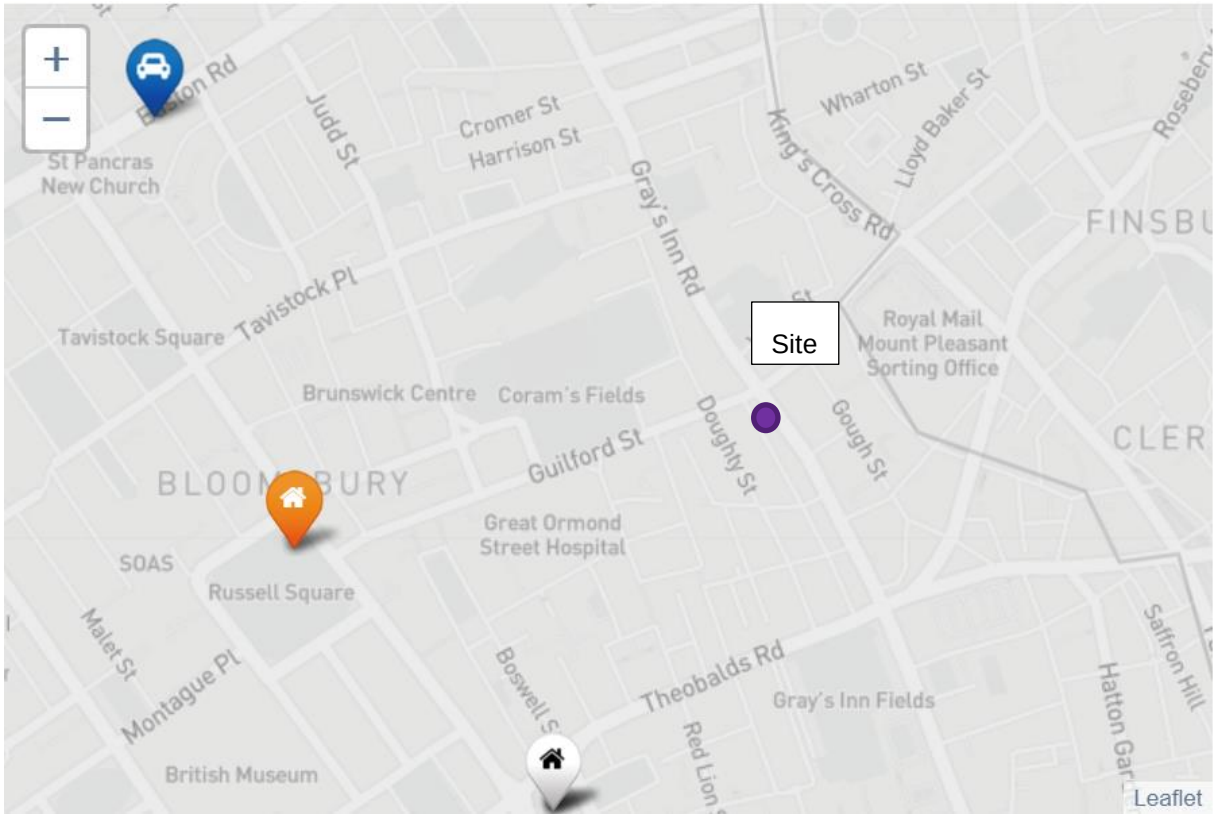


Figure 8 Location of Camden Bloomsbury Air Quality Monitoring Station.

Annual Mean Future Background air quality Base Rear 2017

6.8 2017-based background maps for years 2017 to 2030 are available for NOx, NO2, PM10 and PM2.5 using the link below. This provides information about the maps, and will allow you to download a separate 1x1km grid file of concentrations for each local authority (per pollutant). These maps should be used for all new air quality assessments.

https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017

Gas	2019	2025
Nitrogen Dioxide(NO_2) (ug.m^3)	26.74	37.96
PM10 Particulate (ug.m^3)	17.25	20.41
PM2.5 Particulate (ug(ug.m^3).m^3)	10.95	12.66
Nitrogen Oxides (NOx) (ug.m^3)	41.18	64.07

Table 12 Comapison of Future annual measn from base year 2017 Data (2019 & 2025)

6.9 Table 12 above predicts a general worsening of local air quality in coming years. The main pollutant being NO_X emission from vehicles and gas fuelled heating systems. The future annual mean background air quality prediction is a statistical calculation base of the previous year's data. The calculation cannot predict the future affects from the GLA active promotion of increasing more stringent air quality legislation for London. For example;

Implementing stricter vehicle emission
Promoting the electrification of public busses
Creation of inner city car free areas
Promoting the installation of zero emission heating system

London Borough of Camden Air Quality

6.10 The new bespoke borough packages provide a set of maps, data and graphs in order to facilitate the usability of LAEI 2013 data.

https://data.london.gov.uk/dataset/llaqm-bespoke-borough-by-borough-2013-update-air-quality-modelling-and-data

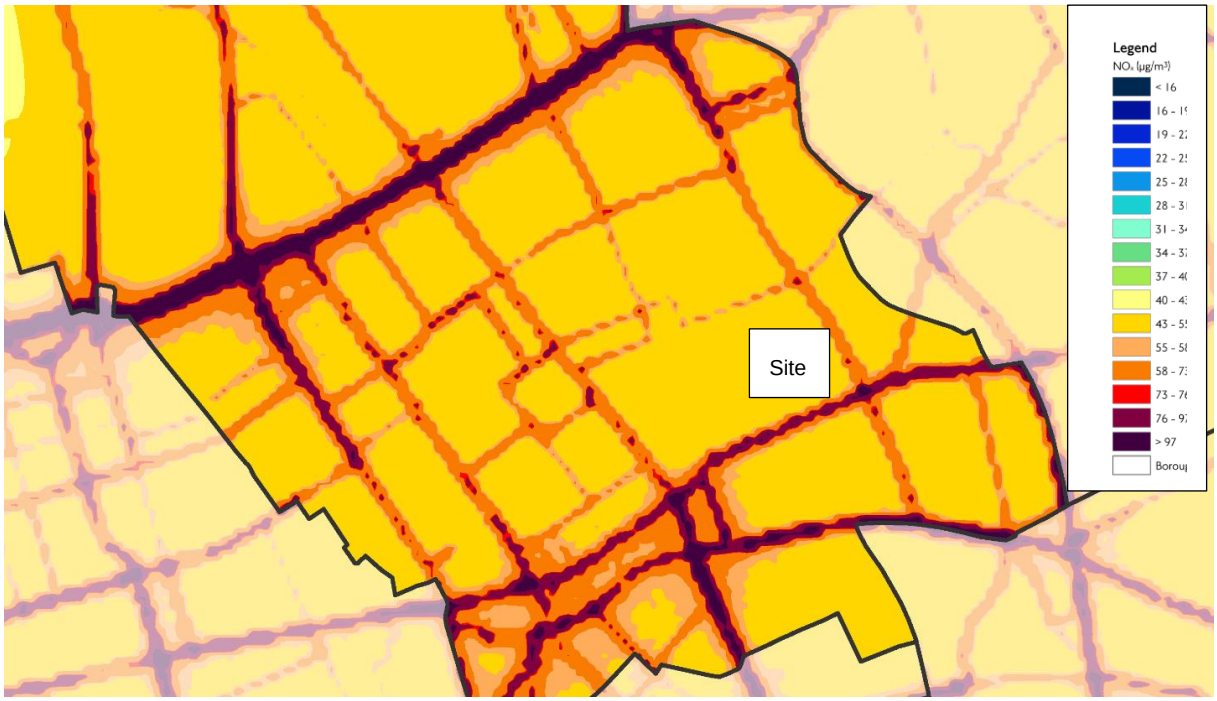


Figure 9 LBC Annual Mean NOx Concentration 2020 (LAEI 2013)

Conclusion of the Background Air Quality

6.11 The site is adjacent to the busy Gray's Inn Road. Fortunately, the tall buildings between Gray's Inn Road and the Brownlow Mews act as a barrier for the road related air pollution, which tends to remain close to the roads.

6.12 The site pollution levels will be similar to the pollution level found in the Russell Square air monitoring station.

6.13 The annual mean background air quality is within the limits of the World Health Organisation targets and is predicted to remain within the targets in future years. (See table below)

Gas	Target		2018	2019	2025
Nitrogen Dioxide	40 µg/m^3	annual mean	33 µg/m^3	26.74 µg/m^3	37.96 µg/m^3
PM10 Particulate	20 µg/m^3	annual mean	18 µg/m^3	17.25 µg/m^3	20.41 µg/m^3
PM2.5 Particulate	10 µg/m^3	annual mean	11 µg/m^3	10.95 µg/m^3	12.66 µg/m^3

Table 13 Summary Background Air Quality

6.14 The building is currently a naturally ventilated office space and the proposal is to continue to use natural ventilation, as the background air quality levels are predicted to remain within WHO annual mean limits.

Air Quality Neutral

Transport

6.15 The building is currently used as an open plan office space and there is no proposed change for increasing the number of the occupants.

6.16 The transport requirement remains the same as the pre-furbished building. As it is in Central London, it is walking distance to several underground railway stations and has good bus services, resulting in the highest possible public transport rating of (PTAL) 6b. The site is located close to London cycle paths.

6.17 The transport requirements are not likely to change due to the good public transport connections and the number of occupants not changing.

Vehicle Movements

6.18 The building is not changing its use or increasing in size therefore vehicle movement will not change from existing building requirements.

Heating and cooling systems

6.19 The building, having been designed as workshop facility and converted in office use over the years, has a retrofitted heating system without additional thermal fabric improvements or thermal controls. The heating system uses an older style of small commercial gas boilers with fairly poor heat efficiencies and high NO_X emissions.

6.20 The proposals are to replace the gas heating system with Zero NOx emission electric heat pumps. The works include additional insulation to thermal elements and improved thermal controls. The refurbished building will have zero NOx emission.

Conclusion

6.21 Post refurbishment the building will not have increased vehicle and transport requirements and will have improved local air quality due to the emission electric air source heat pumps heating system.

7 BREEAM Pre-assessment Non-Domestic Refurbishment

Summary Score

Summary	Target	Available	Percentage
Total	**60**	**96**	**70.35%**
Management	7	9	6.77%
Health and Wellbeing	11	14	12.69%
Energy	11	21	10.72%
Transport	6	6	6.77%
Water	5	7	5.64%
Materials	10	13	16.27%
Waste	5	8	5.29%
Land Use & Ecology	0	0	0.00%
Pollution	4	8	5.21%
Innovation	1	10	1.00%
		Rating	Excellent

Table 14Summary BREEAM Non-Domestic refurbishment credit scores

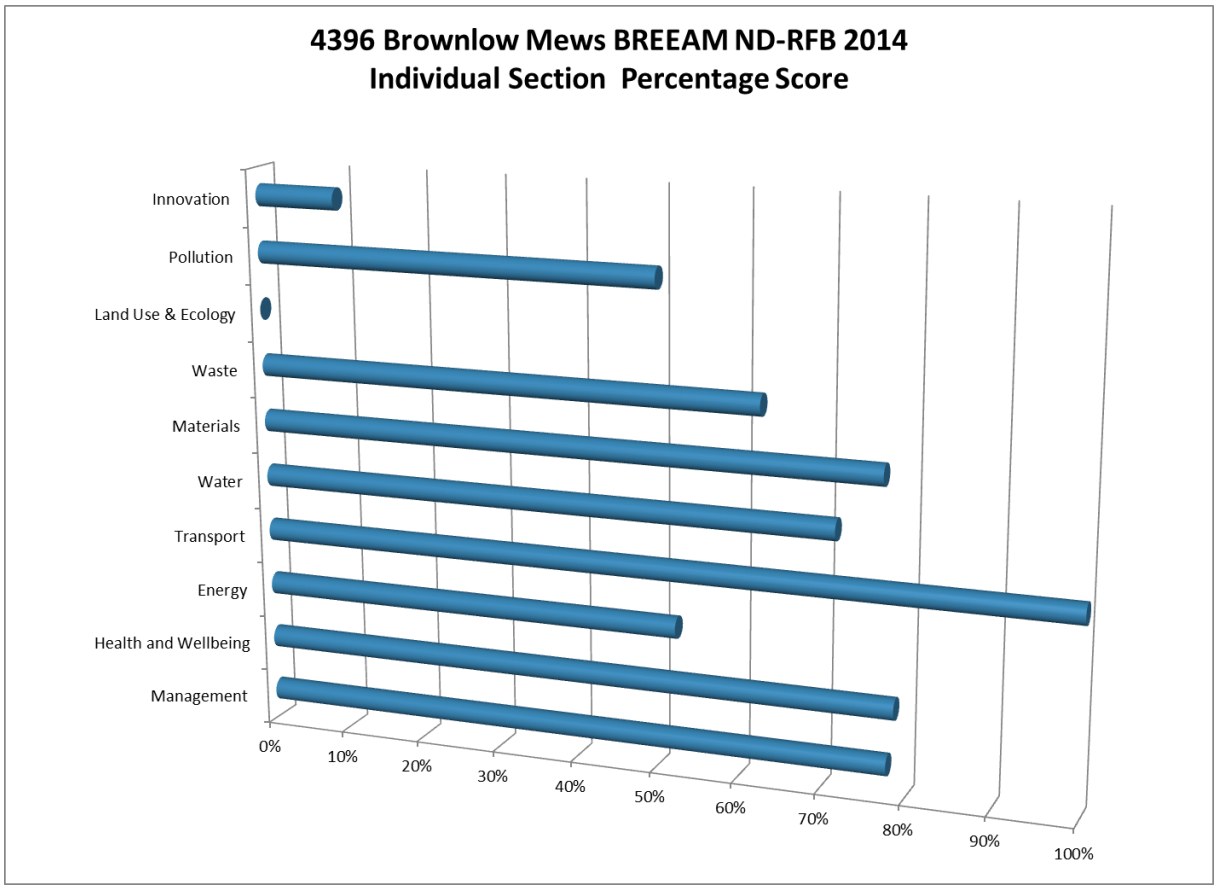


Figure 10 BREEAM Individual Section Score

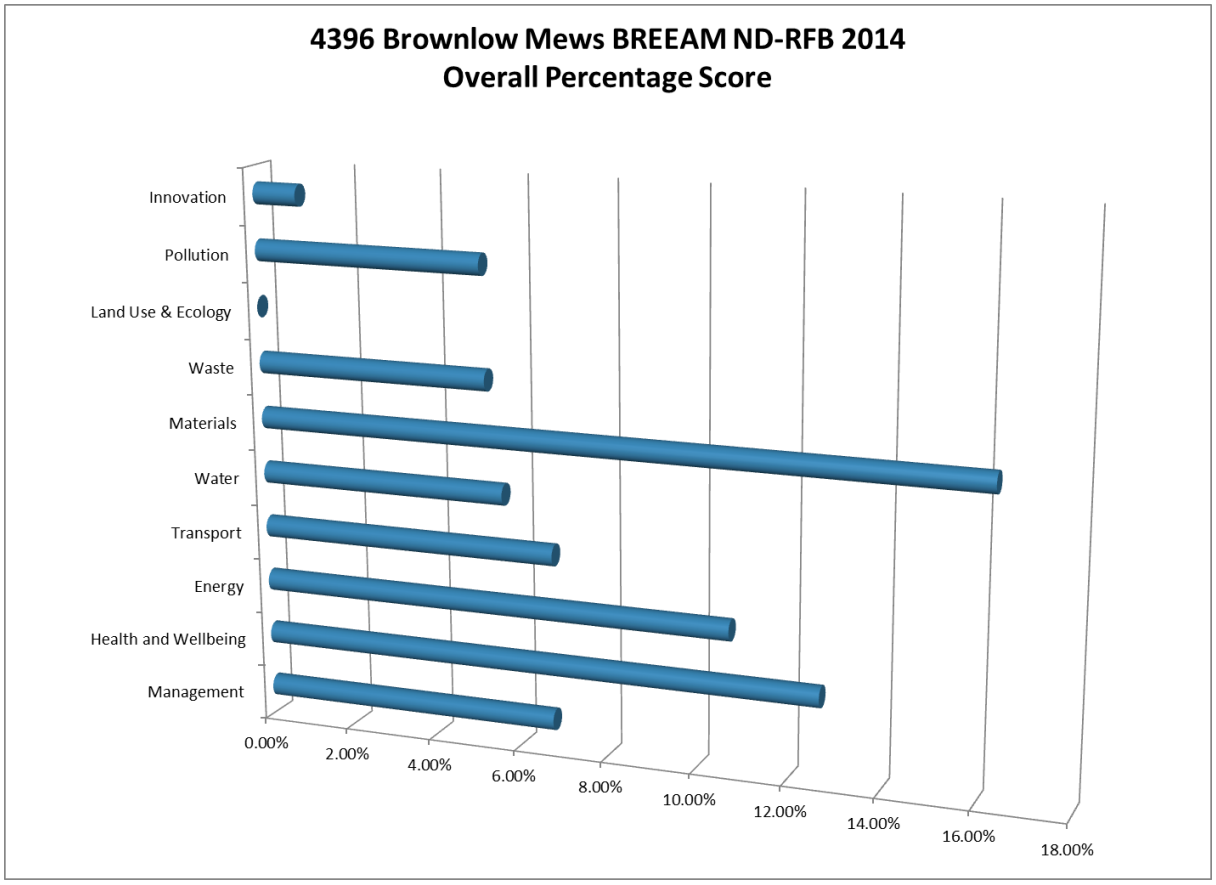


Figure 11 BREEAM Overall Percentage Score

Management

7.1 The design team and contractor will manage the project to improve the building energy performance, reduce maintenance and end of use recyclability

7.2 The contractor will be required to comply with the Considerate Contractor Scheme and be expected to a score between 24 and 31.5.

7.3 Post construction the contractor will demonstrate to the end user all the building systems and provide maintenance technical manual and log book.

Health and Wellbeing

7.4 The large windows with high levels of daylight entering the office space is to be retained. South facing windows will have internal blinds and screens to reduce solar gains.

Energy

7.5 To reduce the building energy consumption the existing inefficient gas fuelled heating system and building fabric is to be replaced with the following:

Improved thermal performance of the building fabric and construction methods to lower the heating energy and reduce cooling in summer.

Energy efficient heating and cooling system (VRF heat recovery heat pumps),

Advanced building thermal controls, to ensure the space heating and cooling operates efficiently and only when required.

Low energy lighting with automated controls to reduce artificial lighting with increased level of daylight and to turn the lighting off when the room is not occupied.

Transport

7.6 The location has excellent transport links with a PTAL Rating of 6b.

Water

7.7 All existing sanitary and water using items will be replaced with modern low water-use fittings. The design for the water services will include major water leak detection and sanitary water shut off devices to all water cisterns.

Materials

7.8 The Architect and design team are to review the opportunities and appropriate measures investigated and implemented to optimise the use of materials in building design, procurement, construction, maintenance and end of life cycle.

7.9 The contractor will be required to use only suppliers that have commitment to responsible resourcing.

Waste

7.10 The proposed development will have a combination of internal storage space, with an external local authority collection scheme and will accommodate all of the required waste streams prescribed by the LBC for collection for example, recyclable, general waste, food waste, garden waste etc. The proposed development will meet the BREEAM 2014 criteria for operation waste.

7.11 All Construction waste will be sent to a waste contractor that recycles 100% of the waste from site.

Pollution

7.12 Pollution for the site is reducing due to the zero emission heating and cooling system.

7.13 All Proposed external plants are to be acoustically treated and sited to ensure that any increase in background is of a level that will not cause inconvenience to the neighbours. A second external noise survey will be undertaken to demonstrate that acoustic attenuation measures comply with the design standards.

Ecology and Biodiversity

7.14 As the BREEAM Non-Domestic refurbishment project has no external landscaping areas, this section is removed from the assessment.

8 The Construction

8.1 The Contractor will be required to sign up to the Considerate Contractor Scheme.

8.2 The Considerate Contractors Scheme is a UK Certification Scheme that encourages the considerate management of construction sites. The Scheme is operated by the Construction Confederation and points are awarded in increments of 0.5 over the following eight sections:

Considerate
Environmentally Aware
Site Cleanliness
Good Neighbour
Respectful
Safe
Responsible
Accountable

8.3 To achieve certification under this scheme, a score of at least 24 is required.

Considerate

8.4 All work is to be carried out with positive consideration to the needs of traders and businesses, site personnel, visitors and the general public. Special attention is to be given to the needs of those with sight, hearing and mobility difficulties.

Environment

8.5 Be aware of the environmental impact of the site and minimise as far as possible the effects of noise, light and air pollution. Efforts should be made to select and use local resources wherever possible. Attention should be paid to waste management. Reduce, reuse and recycle materials where possible.

Cleanliness

8.6 The working sites are to be kept clean and in good order at all times. Site facilities, offices, toilets and drying rooms should always be maintained to a good standard. Surplus materials and rubbish should not be allowed to accumulate on the sites or spill over into the surroundings. Dirt and dust from construction operations should be kept to a minimum.

Good Neighbour

8.7 General information regarding the Scheme should be provided for all neighbours affected by the work. Full and regular communication with neighbours, including adjacent residents, traders and businesses, regarding programming and site activities should be maintained from pre-start to completion.

Respectful

8.8 Respectable and safe standards of dress should be maintained at all times. Lewd or derogatory behaviour and language should not be tolerated under threat of severe disciplinary action. Pride in the

management and appearance of the site and the surrounding environment is to be shown at all times. Operatives should be instructed in dealing with the general public.

Safe

8.9 Construction operations and site vehicle movements are to be carried out with care and consideration for the safety of site personnel, visitors and the general public. No building activity should be a security risk to others.

Responsible

8.10 Ensure that everyone associated with the site understands implements and complies with this Code.

Accountable

8.11 The Considerate Contractor's Scheme poster is to be displayed where clearly visible to the general public. A site's contact details should be obvious to anyone affected.

8.12 The contractor will also be required to monitor:

Site waste and reduce it where possible.
Site water consumption and set targets to reduce.
Dust levels and reduce from the site.
Local water quality to avoid the site contaminating of the local groundwater.
Site energy consumption
Vehicle deliveries.

9 Appendices

Appendix A Existing Building BRUKL and EPC

Energy Performance Certificate

HM Government

Non-Domestic Building

Brownlow Mews Base Energy
20a -21 Brownlow Mews
London
WC1N 2LA

Certificate Reference Number:
0000-3005-0080-0000-4091

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO_2 emissions

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

72 **This is how energy efficient the building is.**

Less energy efficient

Technical information

Main heating fuel:	Natural Gas
Building environment:	Heating and Natural Ventilation
Total useful floor area (m^2):	811.6
Building complexity (NOS level):	3
Building emission rate ($kgCO_2/m^2$ per year):	70.63
Primary energy use (kWh/m^2 per year):	412.34

Benchmarks

Buildings similar to this one could have ratings as follows:

30 If newly built

89 If typical of the existing stock

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Brownlow Mews Base Energy

As built

Date: Wed Aug 07 09:56:09 2019

Administrative information

Building Details

Address: Brownlow Mews Base Energy, 20a -21 Brownlow Mews, London, WC1N 2LA

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.a.2

Interface to calculation engine: Design Database

Interface to calculation engine version: v26.06.00.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Adrian Holmes

Telephone number: 020 8232 0080

Address: 282 Chase Road,, London, N14 6HA

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	29.6
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	29.6
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	70.6
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	1.98	1.98	FT. 2 OFF Wall 1
Floor	0.25	0.2	0.2	GRD WC Exposed Floor 1
Roof	0.25	0.15	0.15	FT.1 OFF Exposed Roof 3
Windows***, roof windows, and rooflights	2.2	5.56	5.7	FT. 2 OFF Window 6 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	2.78	2.78	GRD. ENTR Door 1 (High Usage Entrance Door)

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	25

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.8	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- stair corridors

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.8	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- WC and WEt rooms

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.8	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

1- Default DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FT.WC	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
GRD STAIR	0.3	-	-	-	-	-	-	-	-	-	N/A
GRD WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GRD. ENTR	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FT. 2 OFF	28	-	-	3027
FT.1 OFF	28	-	-	3986
GRD. 2 OFF	28	-	-	4531
GRD.1 OFF	28	-	-	2594
FT. STAIR	-	55	-	461
FT.STR 1	28	-	-	318
FT.STR 2	28	-	-	614
GRD. CRM	-	55	-	501
FT.WC	-	55	-	515
GRD STAIR	-	55	-	557
GRD WC	-	55	-	530
GRD. ENTR	-	55	-	561

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FT. 2 OFF	NO (-33.7%)	YES
FT.1 OFF	YES (+13.5%)	YES
GRD. 2 OFF	NO (-94.1%)	YES
GRD.1 OFF	NO (-13%)	YES

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	811.6	811.6
External area [m²]	1010.5	1010.5
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	1644.81	516.16
Average U-value [W/m²K]	1.63	0.51
Alpha value* [%]	3.79	13.77

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	95.03	23.1
Cooling	0	0
Auxiliary	2.85	1.97
Lighting	54.54	18.07
Hot water	39.16	45.3
Equipment*	34.37	34.37
TOTAL**	**191.58**	**88.44**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	373.92	185.99
Primary energy* [kWh/m²]	412.34	138.01
Total emissions [kg/m²]	70.6	29.6

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	255.2	145.6	99.3	0	2.1	0.71	0	0.8	0
	Notional	63.2	140.2	21.4	0	1	0.82	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	281.5	58.4	109.5	0	2.1	0.71	0	0.8	0
	Notional	97.6	17.7	33.1	0	1	0.82	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	155.4	92.2	60.5	0	7.4	0.71	0	0.8	0
	Notional	74.1	66	25.1	0	8.1	0.82	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	1.98	FT. 2 OFF Wall 1
Floor	0.2	0.2	GRD WC Exposed Floor 1
Roof	0.15	0.15	FT.1 OFF Exposed Roof 3
Windows, roof windows, and rooflights	1.5	1.7	GRD. ENTR Door 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	2.78	GRD. ENTR Door 1 (High Usage Entrance Door)

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	25

Energy Performance Certificate

Non-Domestic Building

HM Government

20a Brownlow Mews
LONDON
WC1N 2LA

Certificate Reference Number:
9239-3029-0388-0690-4595

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO_2 emissions

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

95 **This is how energy efficient the building is.**

Less energy efficient

Technical Information

Main heating fuel:	Natural Gas
Building environment:	Heating and Natural Ventilation
Total useful floor area (m^2):	112
Assessment Level:	3
Building emission rate ($kgCO_2/m^2$ per year):	67.61
Primary energy use (kWh/m^2 per year):	390.57

Benchmarks

Buildings similar to this one could have ratings as follows:

27 If newly built

80 If typical of the existing stock

Appendix B Proposed BRUKL and EPC

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Brownlow Proposed (be Clean)

As built

Date: Wed Aug 07 18:08:24 2019

Administrative information

Building Details

Address: 20a-21 Brownlow Mews, London, WC1N 2LA

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.a.2

Interface to calculation engine: Design Database

Interface to calculation engine version: v26.06.00.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Adrian Holme

Telephone number: 020 8232 0080

Address: 282 Chase Road,, London, N14 6HA

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	32.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	32.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	54.5
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	1.98	1.98	FT. 2 OFF Wall 1
Floor	0.25	0.2	0.2	GRD WC Exposed Floor 1
Roof	0.25	0.15	0.15	FT.1 OFF Exposed Roof 3
Windows***, roof windows, and rooflights	2.2	5.56	5.7	FT. 2 OFF Window 6 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	2.78	2.78	GRD. ENTR Door 1 (High Usage Entrance Door)

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	25

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	4	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- stair corridors

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- WC and WEt rooms

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- Default DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FT.WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GRD STAIR	0.3	-	-	-	-	-	-	-	-	-	N/A
GRD WC	0.3	-	-	-	-	-	-	-	-	-	N/A
GRD. ENTR	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FT. 2 OFF	109	-	-	764
FT.1 OFF	109	-	-	1007
GRD. 2 OFF	109	-	-	1144
GRD.1 OFF	109	-	-	655
FT. STAIR	-	100	-	128
FT.STR 1	99	-	-	88
FT.STR 2	99	-	-	171
GRD. CRM	-	100	-	139
FT.WC	-	100	-	143
GRD STAIR	-	100	-	155
GRD WC	-	100	-	147
GRD. ENTR	-	100	-	156

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FT. 2 OFF	NO (-33.7%)	YES
FT.1 OFF	YES (+13.5%)	YES
GRD. 2 OFF	NO (-94.1%)	YES
GRD.1 OFF	NO (-13%)	YES

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	811.6	811.6
External area [m²]	1010.5	1010.5
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	1644.81	516.16
Average U-value [W/m²K]	1.63	0.51
Alpha value* [%]	3.79	13.77

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	39.65	11.56
Cooling	7.37	8.27
Auxiliary	0.72	0.96
Lighting	18.1	18.07
Hot water	39.16	45.3
Equipment*	34.37	34.37
TOTAL**	**105**	**84.16**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	349.33	180.01
Primary energy* [kWh/m²]	322.36	153.43
Total emissions [kg/m²]	54.5	32.9

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	259.5	98.7	22.1	9.6	0	3.26	2.84	3.5	4
	Notional	55.4	140.2	6.3	10.8	0	2.43	3.6	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	409.9	30.4	142.3	0	0	0.8	0	1	0
	Notional	97.6	17.7	33.1	0	0	0.82	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	180.7	52.1	62.7	0	5.3	0.8	0	1	0
	Notional	74.1	66	25.1	0	7.1	0.82	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	1.98	FT. 2 OFF Wall 1
Floor	0.2	0.2	GRD WC Exposed Floor 1
Roof	0.15	0.15	FT.1 OFF Exposed Roof 3
Windows, roof windows, and rooflights	1.5	1.7	GRD. ENTR Door 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	2.78	GRD. ENTR Door 1 (High Usage Entrance Door)

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	25

Energy Performance Certificate

Non-Domestic Building

HM Government

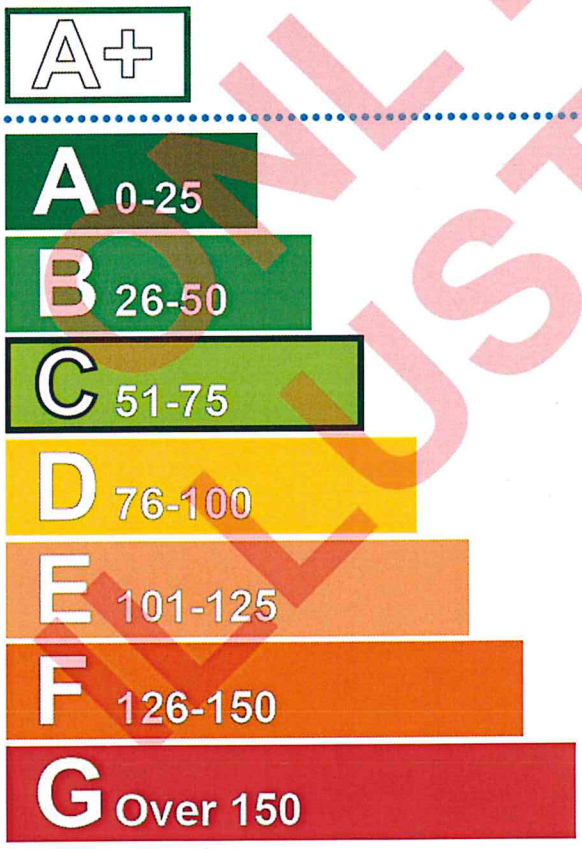
20a-21 Brownlow Mews
London
WC1N 2LA

Certificate Reference Number:
0000-0031-0009-0073-0002

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m^2):	811.6
Building complexity (NOS level):	4
Building emission rate ($kgCO_2/m^2$ per year):	54.5
Primary energy use (kWh/m^2 per year):	322.36

Benchmarks

Buildings similar to this one could have ratings as follows:

34 If newly built

98 If typical of the existing stock

Appendix C BREEAM Non Domestic Refurbishment (2014)

	Targeted	Maximum	Percentage
Total	60	96	**70.3%**

Management

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Man 01	**Project Brief and Design**	**2**	**1**			
	Stakeholders and Design team to hold meeting. Sustainability Champion to be appointed.					
Man 02	**Life cycle cost and service life planning**	**1**	**1**			
	This Credit is currently not targeted as a Life Cycle Cost Analysis is a complex RIBA Stage 1&2 task.					
Man 03	**Responsible construction practices**	**4**	**3**			
	The requirement for the principal contractor to source timber from sustainable sources, operate a compliant EMS and adopt best practice pollution prevention policies and procedures to be written into the tender specifications when appointing contractor. Contractor to appoint member of site management team as Sustainability Champion. Site construction site log to include consumption data. See BRE SMART WASTE management tool. The requirements for the principal contractor to comply with the CCS scheme achieving a score between 24 and 31.5 to be written in the tender specification. The principal contractor needs to provide a CCS certificate in the post-construction stage of the assessment.					
Man 04	**Commissioning and handover**	**2**	**2**			
	An appropriate project team member(s) will be appointed to monitor and programme pre-commissioning, commissioning and where necessary, re-commissioning on behalf of the client.					
Man 05	**Aftercare**	**0**	**0**			
	Currently not sought - Architect to provide evidence for project brief and design. Building services engineer to provide evidence for commissioning and seasonal commissioning and the requirements to be written into the tenancy lease agreements. The requirements are to monitor energy and water for at least 12 months and providing aftercare support to all the building occupiers to be written into the briefing document.					
Management		**9**	**7**	**77.8%**	**0.087**	**6.8%**

Health and Wellbeing

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Hea 1	**Visual comfort**	**7**	**5**			
	Building services engineer to provide fluorescent lamps specifications and internal and external lighting specifications. Detailed internal daylighting calculation to be undertaken to meet the BREEAM criteria for achieving the daylight credits. Architect to provide drawings and specifications for glare control strategy and view out. Solar controlled blinds - zoning two zones per floor.					
Hea 2	**Indoor air quality**	**3**	**3**			
	Building services engineer to provide air quality plan and strategy to reduce internal and external sources of pollution and also strategy to provide natural ventilation. Supply air grills should be over 10m apart, with intakes over 20m (in a 3E distance) from source of external pollution. Architect to specify materials with low VOC's.					
Hea 3	**Safe containment in laboratories**	**N/A**	**N/A**			
Hea 4	**Thermal comfort**	**3**	**2**			
	Building services engineer to carry out thermal modelling, thermal zoning and control strategy. Thermal modelling carried out. Limited opportunity for design adaptability with regards to climate change scenario.					
Hea 5	**Acoustic Performance**	**0**	**0**			
	The building meets the appropriate acoustic performance standards and testing requirements, for Sound insulation, Indoor ambient noise level, and Reverberation times.					
Hea 6	**Safety and Security**	**1**	**1**			
	Architect to design safe access to and around the building, and to reduce the potential for crime. Access control system to limit the access to occupants for only the floor that their employers occupy. It is recommended that architects meet with Secured by Design Officer before going to planning to explain proposed security systems .					
Health and Wellbeing		**14**	**11**	**78.6%**	**0.1615**	**12.7%**

Energy

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Ene 01	**Reduction of energy use and carbon emissions**	**15**	**7**			
	A compliant BRUK Report and EPC					
Ene 02	**Energy Monitoring**	**2**	**2**			
	Energy metering of all major loads and building service plant.					
Ene 03	**External Lighting**	**1**	**1**			
	Building services engineer to provide specifications for external lighting in line with BREEAM requirements.					
Ene 04	**Low carbon design**	**3**	**1**			
	Possibility Passive design measures and free cooling considered. Free cooling is not possible. Natural ventilation is not possible. There are no available natural heat sinks.					
Ene 05	**Energy efficient cold storage**	**N/A**	**N/A**			
Ene 06	**Energy efficient transportation systems**	**N/A**	**N/A**			
Ene 07	**Energy efficient laboratory systems**	**N/A**	**N/A**			
Ene 08	**Energy efficient equipment**	**N/A**	**N/A**			
Ene 09	**Drying Space**	**N/A**	**N/A**			
Energy		**21**	**11**	**52.4%**	**0.2046**	**10.7%**

Transport

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Tra 01	**Public Transport Accessibility**	**3**	**3**			
	The travel plan confirms there is excellent provision of public transport accessibility. GLA Web Portal PTAL ring of 6b.					
Tra 02	**Proximity to Amenities**	**1**	**1**			
	Urban site in busy shopping area.					
Tra 03	**Cyclist facilities**	**2**	**2**			
	Secure Cycle storage of 50 bikes with compliant storage lockers and shower cubicle and changing spaces.					
Tra 04	**Maximum car parking capacity**	**0**	**0**			
	No car parking provided					
Tra 05	**Travel Plan**	**0**	**0**			
	Site specific travel plan to be included with the planning transport report.					
Transport		**6**	**6**	**100.0%**	**0.0677**	**6.8%**

Water

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Wat 01	**Water consumption**	**5**	**3**			
	Water efficient fittings (Wash hand basins, WC, and showers, is specified as part new WC fit-out.					
Wat 02	**Water monitoring**	**1**	**1**			
	It is unlikely that BMS will be installed in building. Water meters with pulsed output. To wireless meter collection system. Mains incoming on water meters. Meter on tenant has sub water meter @each floor level.					
Wat 03	**Water Leak and detection and prevention**	**1**	**1**			
	Building services engineer to provide specifications and manufacturers details confirming that a water leak detection system will be specified and that flow control devices will be installed in each sanitary area.					
Wat 04	**Water efficient equipment**	**N/A**	**N/A**			

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Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Man 01	Project Brief and Design	2	1			
Man 02	Life cycle cost and service life planning	1	1			
Man 03	Responsible construction practices	4	3			
Man 04	Commissioning and handover	2	2			
Man 05	Aftercare	0	0			
Management		**9**	**7**	**77.8%**	**9%**	**6.8%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Hea 1	Visual comfort	7	5			
Hea 2	Indoor air quality	3	3			
Hea 3	Safe containment in laboratories	N/A	N/A			
Hea 4	Thermal comfort	3	2			
Hea 5	Acoustic Performance	0	0			
Hea 6	Safety and Security	1	1			
Health and Wellbeing		**14**	**11**	**78.6%**	**16.15%**	**12.7%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Ene 1	Reduction of Energy use and Carbon emissions	15	7			
Ene 02	Energy Monitoring	2	2			
Ene 03	External Lighting	1	1			
Ene 04	Low carbon design	3	1			
Ene 05	Energy efficient cold storage	N/A	N/A			
Ene 06	Energy efficient transportation systems	N/A	N/A			
Ene 07	Energy efficient laboratory systems	N/A	N/A			
Ene 08	Energy efficient equipment	N/A	N/A			
Ene 09	Drying Space	N/A	N/A			
Energy		**21**	**11**	**52.4%**	**20.46%**	**10.7%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Tra 01	Public Transport Accessibility	3	3			
Tra 02	Proximity to Amenities	1	1			
Tra 03	Cyclist facilities	2	2			
Tra 04	Maximum car parking capacity	0	0			
Tra 05	Travel Plan	0	0			
Transport		**6**	**6**	**100.0%**	**6.77%**	**6.8%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Wat 01	Water consumption	5	3			
Wat 02	Water monitoring	1	1			
Wat 03	Water Leak and detection and prevention	1	1			
Wat 04	Water efficient equipment	N/A	N/A			
Water		**7**	**5**	**71.4%**	**7.90%**	**5.6%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Mat 01	Life cycle Impacts	6	4			
Mat 02	Hard landscaping and boundary protection	N/A	N/A			
Mat 03	Responsible Sourcing	4	3			
Mat 04	Insulation	1	1			
Mat 05	Designing for durability and resilience	1	1			
Mat 06	Material efficiency	1	1			
Materials		**13**	**10**	**76.9%**	**21.15%**	**16.3%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Wst 01	Construction waste management	4	2			
Wst 02	Recycled Aggregates	N/A	N/A			
Wst 03	Operational Waste	1	1			
Wst 04	Speculative floor and ceiling finishes	1	1			
Wst 05	Adaptation to climate change	1	0			
Wst 06	Functional adaptability	1	1			
Waste		**8**	**5**	**62.5%**	**8.46%**	**5.3%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
LE 01	Land Use and ecology	N/A	N/A			
LE 02	Ecological Value of site and protection of ecological features	N/A	N/A			
LE 03	Mitigating ecological impact	N/A	N/A			
LE 04	Enhancing Site ecology	N/A	N/A			
LE 05	Long term impact on biodiversity	N/A	N/A			
Land Use & Ecology		**0**	**0**	**0**	**0.00%**	**0.0%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Pol 01	Impact of refrigerants	0	0			
Pol 02	NOx Emissions	3	0			
Pol 03	Surface water run off	4	3			
Pol 04	Reduction of night time light pollution	1	1			
Pol 05	Noise Attenuation	N/A	N/A			
Pollution		**8**	**4**	**50.0%**	**10.41%**	**5.2%**

Credit	Description	Credits Available	Credits Targeted	0	Weighting	Score
Inn 01	Innovation	10	1			
Innovation		**10**	**1**	**10.0%**	**10%**	**1.0%**

Summary	Target	Available	Percentage
Total	**60**	**96**	**70.35%**
Management	7	9	6.77%
Health and Wellbeing	11	14	12.69%
Energy	11	21	10.72%
Transport	6	6	6.77%
Water	5	7	5.64%
Materials	10	13	16.27%
Waste	5	8	5.29%
Land Use & Ecology	0	0	0.00%
Pollution	4	8	5.21%
Innovation	1	10	1.00%
		Rating	Excellent

Water		**7**	**5**	**71.4%**	**0.079**	**5.6%**

Materials

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Mat 01	**Life cycle Impacts**	**6**	**4**			
	Architect to provide green guide ratings, drawings and specifications.					
Mat 02	**Hard landscaping and boundary protection**	**N/A**	**N/A**			
Mat 03	**Responsible Sourcing**	**4**	**3**			
	All timber products to be responsibly resourced. A contractor to have a documented sustainable procurement methodology. Use large scale National Building suppliers					
Mat 04	**Insulation**	**1**	**1**			
	All insulation to have a tier 3 Green Guide ratings. The insulation is most likely phenolic resin products or mineral wool, which are in the tier 3 category.					
Mat 05	**Designing for durability and resilience**	**1**	**1**			
	The design incorporates suitable durability and protection measures or design features/solutions to prevent damage to the vulnerable parts of the building. This must include, but is not necessarily limited to:. A. Protection from the effects of high pedestrian traffic in main entrances, public areas and thoroughfares (corridors, lifts, stairs, doors etc.). B. Protection against any internal vehicular/trolley movement within 1m of the internal building fabric in storage, delivery, corridor and kitchen areas.					
Mat 06	**Material efficacy**	**1**	**1**			
	The Architect and rest of the design team should review the opportunities and appropriate measures investigated and implemented, to optimise the use of materials in building design, procurement, construction, maintenance and end of life . As a project being assessed only as the shell and core - This assessment and certification option is available where the developer's scope of works covers new build works to the fabric, sub and superstructure of the building only, including: External walls, windows, doors, roof, core internal walls, floors, hard and soft landscaping areas (where present and within scope of works)					
Materials		**13**	**10**	**76.9%**	**0.2115**	**16.3%**

Waste

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Wst 01	**Construction waste management**	**4**	**2**			
	Contractor to provide SWMP in line with BREEAM requirements. The requirement that the contractor needs to implement a SWMP needs to be included in the tender specification when appointing contractor. BRE SMARTWaste tool has been used to reduce waste to landfill.					
Wst 02	**Recycled Aggregates**	**N/A**	**N/A**			
Wst 03	**Operational Waste**	**1**	**1**			
	Architect to provide drawings to show where recycling and composting bins are to be provided.					
Wst 04	**Speculative floor and ceiling finishes**	**1**	**1**			
	Floor Finish only to sales marketing areas. Office space waiting for tenant will not be fitted out with carpet.					
Wst 05	**Adaptation to climate change**	**1**	**0**			
	Current not sought					
Wst 06	**Functional adaptability**	**1**	**1**			
	Provide a functional analysis study to show how the building has been altered to improve the building efficiency and enable future adaptations. Some of the measures are to be adopted by the design. Omissions should be justified. In terms of change of use, the office space could be designed in a way that the partitions and internal space can be adaptable.					
Waste		**8**	**5**	**62.5%**	**0.0846**	**5.3%**

Land Use & Ecology

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
LE 01	**Land Use and ecology**	**N/A**	**N/A**			
LE 02	**Ecological Value of site and protection of ecological features**	**N/A**	**N/A**			
LE 03	**Mitigating ecological impact**	**N/A**	**N/A**			
LE 04	**Enhancing Site ecology**	**N/A**	**N/A**			
LE 05	**Long term impact on biodiversity**	**N/A**	**N/A**			
Land Use & Ecology		**0**	**0**	**0.0%**	**0**	**0.0%**

Pollution

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Pol 01	**Impact of refrigerants**	**0**	**0**			
	Not Sought as VRF heating and cooling					
Pol 02	**NOx Emissions**	**3**	**0**			
	Not Sought as VRF electric heating and cooling					
Pol 03	**Surface water run off**	**4**	**3**			
	FRA Required - Local planning requirement - low flood risk area					
Pol 04	**Reduction of night time light pollution**	**1**	**1**			
	With relation to reduction of light pollution, the external lighting strategy has been designed in compliance with Table 1 of the ILP Guidance notes for reduction of obtrusive light 2011. All external lighting, with exception of those used of safety and security, can be automatically switched off between 23.00 and 07.00. A timer will be installed and set to these appropriate hours.					
Pol 05	**Noise Attenuation**	**N/A**	**N/A**			
Pollution		**8**	**4**	**50.0%**	**0.1041**	**5.2%**

Innovation

Credit	Description	Credits Available	Credits Targeted		Weighting	Score
Inn 01	**Innovation**	**10**	**1**			
Innovation		**10**	**1**	**10.0%**	**0.1**	**1.0%**

	Score	Maximum	Percentage
Total	60	96	**70.3%**