Energy & Sustainability Statement

13 - 15 John's Mews
London
WC1N 2PA

15th December 2020

Prepared for:

JM13 LTD

Contents

Appendices

1.0 The Site & Proposal

The proposed development is located at 13 - 15 John's Mews, London, WC1N 2PA.

The development site relates to two attached buildings (Nos.13 and 15 St John's Mews), 2 x two storey traditional mews buildings located on the western side of the mews and forming part of a terrace.

The proposals comprises of the part demolition, change of use and conversion from B1 garage/workshop/offices (B1) to create 2 x 1 bed flats & 2 x 2 bed flats (C3) with a mansard extensions.

1.1 Planning Context

The project sits within the London Borough of Camden (Camden), Camden's Local Plan was adopted by Camden on 3rd July 2017 and has replaced the Core Strategy and Camden Development Policies documents as the basis for planning decisions and future development in the borough.

Therefore the key policies taken into account when compiling this report are:-

- London Plan Policy
- Camden Local Plan – 2017 – Chapter 8 (key policies reproduced below)
- Camden's CPG 3 Sustainability

<u>Camden's Local Plan, Chapter 8 - Sustainability and Climate Change</u>

Policy CC1 Climate change mitigation

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

We will:

a. promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;

b. require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;

c. ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;

d. support and encourage sensitive energy efficiency improvements to existing buildings;

e. require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and

f. expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:

g. working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;

h. protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and

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.

Policy CC2 Adapting to climate change

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

All development should adopt appropriate climate change adaptation measures such as:

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

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

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

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

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace 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 floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and

h. expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.

1.2 The London Plan

The New London Plan is due to be adopted in the coming months and as such is considered as a material consideration for new planning application

Chapter 9 deals with Sustainable Infrastructure:-

Policy SI2 Minimising greenhouse gas emissions

A Major development should be net zero-carbon. This means reducing carbon dioxide emissions from construction and operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1) Be lean: use less energy and manage demand during construction and operation.
2) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly. Development in Heat Network Priority Areas should follow the heating hierarchy in Policy SI3 Energy infrastructure.
3) Be green: generate, store and use renewable energy on-site.

B Major development should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy and will be expected to monitor and report on energy performance.

C In meeting the zero-carbon target a minimum on-site reduction of at least 35 per cent beyond Building Regulations is expected. Residential development should aim to achieve 10 per cent, and non-residential development should aim to achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided:

1) through a cash in lieu contribution to the relevant borough's carbon offset fund, and/or
2) off-site provided that an alternative proposal is identified and delivery is certain.

Policy SI3 Energy infrastructure

D Major development proposals within Heat Network Priority Areas should have a communal heating system

1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

a) connect to local existing or planned heat networks
b) use available local secondary heat sources (in conjunction with heat pump, if required, and a lower temperature heating system)
c) generate clean heat and/or power from zero-emission sources

d) use fuel cells (if using natural gas in areas where legal air quality limits are exceeded all development proposals must provide evidence to show that any emissions related to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler)
e) use low emission combined heat and power (CHP) (in areas where legal air quality limits are exceeded all development proposals must provide evidence to show that any emissions related to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler)
f) use ultra-low NOx gas boilers.

2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that there is no significant impact on local air quality.
3) Where a heat network is planned but not yet in existence the development should be designed for connection at a later date.

Policy SI5 Water infrastructure

C Development proposals should:

1) minimise the use of mains water in line with the Optional Requirement of the Building Regulations (residential development), achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption)
2) achieve at least the BREEAM excellent standard (commercial development)
3) be encouraged to incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future proofing.

Accordingly, this report is guided by and reports against the above noted required standards, however, it should be noted that the project at 13-15 Johns Mews would not be considered major development.

2.0 Baseline Energy Results

In order to consider the project against the London Plan Energy Hierarchy, this report will first establish the "Baseline" energy consumption.

2.1 Dwelling created via change of use/conversion

The new dwellings created as part of the conversion/extension of the existing office building will be considered against the Building Regulations AD L1B; Accordingly, the energy requirements for space heating, water heating and ventilation for the dwellings within the existing structure have been calculated using the Standard Assessment Procedure 2012 (SAP) in line with Part L1B of the Building Regulations 2013 and the Domestic Heating Compliance Guide 2nd Edition.

The baseline building results have been calculated and are presented in Table 4 below. They have been compiled assuming basic compliance with the building regulations as set out below:-

Table 1 - AD L1B Elemental Standards

Element	AD L1B U -Value Standard
Retained Walls (where upgraded)	0.30
New Walls	0.28
Retained/New Roof - pitched	0.16
Retained/New Roof - flat	0.18
Floors	0.22
Windows	1.6
Doors	1.8
Air permeability	$15m^3/Hr/m^2$

The replacement of/new controlled services are governed by the Compliance Guides:-

Table 2 – AD L1B - Controlled services and fittings

Controlled Service	AD L1B Compliance Requirement
Mains Gas Boiler	86% Efficient
DHW	150l tank with 35mm Foam insulation
Controls	Programmer, Stat, TRVs & Interlock
Lighting	N/A

The baseline un-regulated energy uses for cooking & appliances in the residential units have been calculated using the SAP Section 16 methodology; the same calculation used for Code for Sustainable Homes (CfSH) Ene 7.

Appliances = $E_A = 207.8 \times (TFA \times N)^{0.4714}$

Cooking = (119 + 24N)/TFA

N= no of occupant SAP table 1B

TFA – Total Floor Areas

The unregulated energy use per sqm is summarised in Table 3 below

Table 3 – Unregulated Energy Use

Unit	Unregulated Energy Use Kg/sqm
Flat 1	15.68
Flat 2	15.73
Flat 3	15.29
Flat 4	15.23

The un-regulated emission rates are added to the baseline regulated emission rates (as calculated above) in order to set the total baseline emission rates before then applying the energy hierarchy in line with The London Plan and Camden Local Plans policies: -

Table 4 – Baseline energy consumption and CO2 emissions

Unit	Baseline Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total baseline emissions Kg/sqm	Total baseline emissions Kg
Flat 1	38.6	15.68	54.28	2608.38
Flat 2	38.87	15.73	54.60	2487.09
Flat 3	31.49	15.29	46.78	3567.81
Flat 4	27.49	15.23	42.72	3488.19
Total				12151.47

The baseline SAP DER outputs are attached at **Appendix A** confirming the above tabulated data.

3.0 Design for energy efficiency

The first step in the Mayor's 'Energy Hierarchy' as laid out in Section 5 of The London Plan requests that buildings be designed to use improved energy efficiency measures – Be Lean. This will reduce demand for heating, cooling, and lighting, and therefore reduce operational costs while also minimising associated carbon dioxide emissions.

This section sets out the measures included within the design of the proposed dwellings, to reduce the demand for energy, both gas and electricity (not including energy from renewable sources). The table at the end of this section details the amount of energy used and CO_2 produced by the proposed development after the energy efficiency measures have been included.

To achieve reductions in energy, demand the following measures have been included within the design and specification of the building:

3.1 Orientation & Passive Design

Local Plan policy requires "measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.."

The project is based upon a site with fixed southwest – northeast orientation due to its mid-terrace location.

The fenestration design is specific to meeting the design requirements of the building's contribution to the conservation area, so options for external shading are limited.

Accordingly, passive solar gain control is achieved via the use of a solar control glazing with a g-value at less than 0.45.

Advantage is taken of the north easterly aspect – not seen from the road, with larger areas of glazing incorporated to enhance internal daylight levels and reduce reliance on artificial lighting

All flats have a design which enables cross ventilation, enabling a purge ventilation rate at circa 3 air changes per hour - maximising passive cooling, with upper floor flats able to purge ventilate overnight.

3.2 Heating system

The primary heating system for the dwellings will consist of a high efficiency condensing gas boilers - this will in turn provide domestic heating and hot water via highly insulated low loss cylinders for DHW storage

- High efficiency gas boiler – (89.3% SEDBUK efficiency)
- Built-in flue gas heat recovery, improving combustion efficiency by up to 3%

To increase the efficiency in the use of the heating system, the following controls will be used in a 'boiler interlock' system to eliminate needless firing of the boiler.

- Time and temperature zone control
- Boiler fitted with delayed start thermostat

3.3 Fabric heat loss

Insulation measures will be utilised to ensure the calculated u values exceed the Building Regulations minima, with specific guidance taken from the design team, with the applicant seeking to go beyond the recommendation contained within Camden's CPG 3:

Existing walls will be internally lined to go beyond the requirements of AD L1B, achieving a u value of 0.25.

The mansard roof structures will meet a u-value of 0.12 for the roof and 0.15 for the walls.

The ground floor will be an insulated ground slab floor structure achieving u = 0.14.

Glazing

New glazing for windows, roof lights and doors have area weighted average U-Values of 1.4w/m^2 K or better

3.4 Lighting and appliances

A 100% of internal light fittings will be dedicated low-energy/compact fluorescent fittings, with extensive use of LED lighting.

It is anticipated that under the principles of BREEAM and best practice sustainability, all of the electrical appliances will be provided as part of the finished dwelling; fridge/freezers A+ rated, Dishwasher and washing machines A rated and tumble dryer with a B rating.

In addition, again in line with BREEAM principles, any external lighting will be of the low energy type with consideration given to the design and location to reduce light pollution.

3.5 Energy efficiency results

The following table shows a comparison between the baseline scheme assessed under the SAP methodology based upon AD Part L1B minima and the scheme following the introduction of energy efficiency measures (not including energy from renewable sources).

Table 5 – Energy consumption and CO2 reductions

Unit	"Be lean" Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total "Be lean" emissions Kg/sqm	Total emissions Kg
Flat 1	32.49	15.68	48.17	2314.80
Flat 2	33.23	15.73	48.96	2230.19
Flat 3	22.9	15.29	38.19	2912.66
Flat 4	22.13	15.23	37.36	3050.54
Total				10508.18

The results show that, the new dwellings with the energy efficiency measures have achieved emissions reductions of 13.52% over the baseline model and clearly, the applicant has confirmed their commitment to go beyond the requirements of the minimum standards of the Building Regulations through the fabric first approach.

The SAP 2013 Dwelling Emission Rate outputs are attached at **Appendix B.**

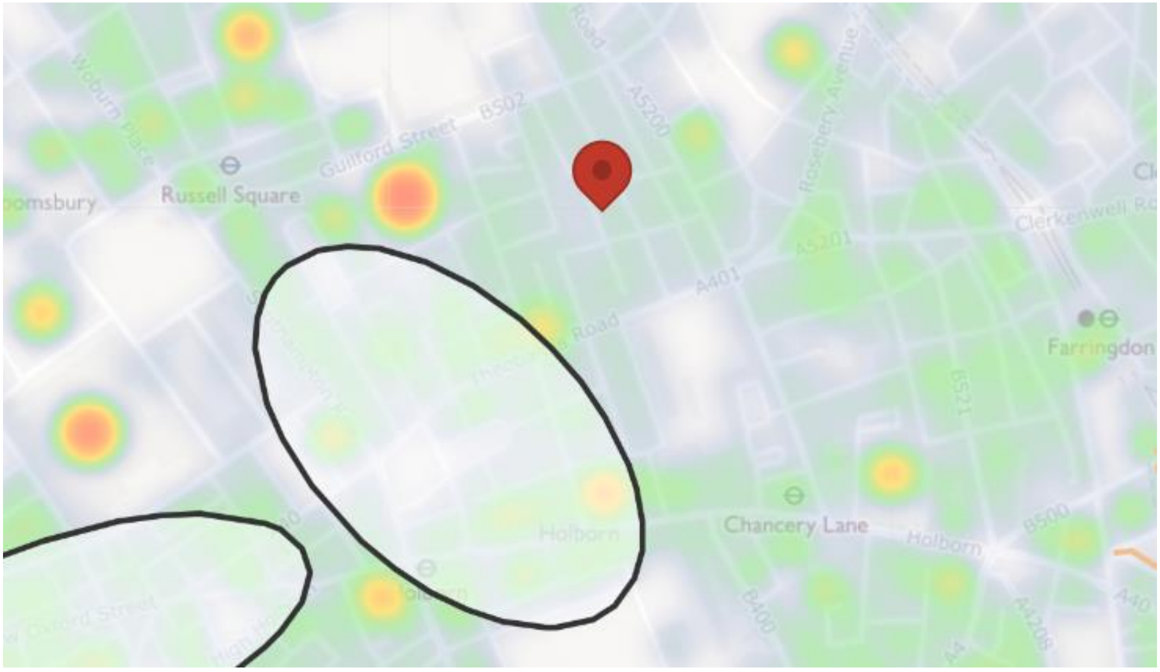
4.0 Supplying Energy Efficiently

The second stage in the Mayor's 'Energy Hierarchy' is to ensure efficient and low carbon energy supply – Be Clean. In particular, this concerns provision of decentralised energy where practical and appropriate.

4.1 Community Heating/Combined Heat and Power (CHP)

The London Plan requires development to consider the availability of district energy networks (DENs) and the ability of new development to connect to any such network:-

The London Heat map has been consulted to look at the potential for the project to connect to a DEN now, or in the future. Johns Mew's is some 150m distant from any heat map study area, but is within the heat network priority area.



Extract from London Heat Map

Clearly there is very little potential for the project site to connect to a DEN in the near future. That said, the proposed LTHW heating systems would be compatible with a connection to such a network should one become available in the coming years.

However, consideration must be given for an on-site district heating/CHP solution for the subject development:-

4.2 On-site CHP/District Heating

The heat production facility for a district heating scheme is generally considered to include heat only boilers (HOB) and/or the production of both electricity and heat i.e. CHP.

CHP is, as a rule of thumb, is only operated as a base load as, depending on the technology, it may be difficult and/or inefficient to operate according to daily variations in demand.

In a well-designed district heating network heat from CHP will provide between 60% and 80% of the annual heat (heating and hot water) requirement with heat-only boiler plants providing the peak load and back-up. To maximise efficiency of the engine it needs to run for at least 17 hours a day; therefore, the heat load needs to be present for this period.

Clearly, as a limited scale domestic development, with only the limited combined DHW demand to support a CHP installation, the economy of scale, in terms of year-round demand simply isn't present and as such the potential use of on-site CHP can be dismissed.

We should however, consider the use of a heat only DEN;

In more recent times, the difference between the actual and assumed efficiency of DH networks has come under the spotlight from a number of different sources.

Indeed, in recent studies collated by Innovate UK in the Building Data Exchange, inappropriately installed community heating systems were suffering heat losses of 50% or more.

However, when it comes to small scale networks as least, it is becoming very apparent that there is a difference between theoretical and real-world system efficiencies.
In the CIBSE Technical symposium "CHP and District Heating - how efficient are these technologies?" (2011), further commentary is made on this issue.

This report identifies and acknowledges that the heat losses within a well-designed DH network will be at minimum of 15%, so immediately it can be seen that, a large scale modular boiler system offering gross efficiencies at circa 96%, will be less efficient than a local condensing boiler with a gross efficiency of 92%-93% at point of delivery.

It should be noted, that the efficiency of the latest condensing boilers with built-in heat recovery systems and modern controls, such as the system proposed under 3.2 above, that they can achieve gross efficiencies close to 96%. A further significant benefit of the use of local gas boilers, is the lower NOx emission associated, commonly less than 35mg/kWh of heat delivered.

Clearly, a DH network driven by HOB would not be viable at the John's Mews development.

5.0 Renewable Energy Options

The final element of the Mayor's 'Energy Hierarchy' requires development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible – Be Green.

Renewable energy can be defined as energy taken from naturally occurring or renewable sources, such as sunlight, wind, waves/tides, geothermal etc. Harnessing these energy sources can involve a direct use of natural energy, such as solar water heating panels, or it can be a more indirect process, such as the use of Biofuels produced from plants, which have harnessed and embodied the suns energy through photosynthesis.

The Energy Efficiency measures outlined under 3.0 above have the most significant impact on the heating and hot water energy requirements for the dwelling, and the associated reduction in gas consumption.

It should be noted that each kWh of gas energy saved reduces emissions by 0.216kgCO_2/kWh, whereas, grid based electrical energy has a emissions factor of 0.519kgCO_2/kWh and accordingly, emphasis will be placed upon "off-setting" grid based electricity in order to achieve the optimum use of renewable technologies.

This section then sets out the feasibility of implementing different energy technologies in consideration of: -

- Potential for Carbon savings
- Capital costs
- Running costs
- Payback period as a result of energy saved/Government incentives
- Maturity/availability of technology
- Reliability of the technology and need for back up or alternative systems.

5.1 Government incentives

5.1.1 Feed in Tariff

The Feed in Tariff was formally withdrawn in April 2019.

5.1.2 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was formally launched by the UK Government on 10th March 2011. The RHI will pay a tariff payment to renewable technologies that provide heat energy from a renewable source, with the payment relating to the kWh of heat energy provided e.g. if a property has a heat load of 20,000 kWh per annum, and it is 100% provided from a renewable source, then the tariff is paid against the 20,000kWh.

The Government decided on a two stage delivery - the first stage being for non-domestic schemes, which commenced in July 2011, with domestic scheme having come on stream in April 2014.

5.2 Wind turbines

Wind turbines come in two main types'- horizontal axis and vertical axis. The more traditional horizontally axis systems rotate around the central pivot to face into the wind, whilst vertical axis systems work with wind from all directions.

The potential application of wind energy technologies at a particular site is dependent upon a variety of factors. But mainly these are: -

- Wind speed
- Wind turbulence
- Visual impact
- Noise impact
- Impact upon ecology

The availability and consistency of wind in urban environments is largely dependent upon the proximity, scale and orientation of surrounding obstructions. The site is surrounded with other properties of 3-4 storeys in height adjacent and in all directions.

To overcome these obstructions and to receive practical amounts of non-turbulent wind, the blades of a wind turbine would need to be placed significantly above the roof level of the surrounding buildings.

It is clear that a wind turbine of this size would be considered unacceptable in this location and is therefore dismissed as an option.

5.3 Solar Energy

5.3.1 Solar water heating

Solar water heating panels come in two main types; flat plate collectors and evacuated tubes. Flat plate collectors feed water, or other types of fluid used specifically to carry heat, through a roof mounted collector and into a hot water storage tank. Evacuated tube collectors are slightly more advanced as they employ sealed vacuum tubes, which capture and harness the heat more effectively.

Solar energy can be delivered in 2 formats as noted above, each system requiring an appropriate area in which to install panels.

The new development at John's Mews has some available roof space with a clear southerly aspect, so solar panels could be an option.

However, given the limited roof space available, and the strategy to off-set the electrical use, solar PV may be a stronger candidate (see below) and would offer a greater return in terms of carbon savings

Solar thermal systems also require a constant demand on hot water, and a large solar tank in which to store the pre-heated water as well as a management strategy to ensure energy savings and environmental benefits are maximised – the space required not being a commodity available for the development at John's Mews

Additionally, the development is located within the Bloomsbury conservation area, therefore the feasibility of installing solar thermal collectors is not considered viable due to the aesthetic constraints.

Accordingly, this technology is dismissed as being inappropriate for the development.

5.3.2 Photovoltaics (PV)

Solar panel electricity systems, also known as solar photovoltaics (PV), capture the sun's energy using photovoltaic cells. These cells will be accumulated on a PV panel, usually about 2.0m x 1.0m. These panels are then wall, roof or floor mounted and are connected directly to the electricity grid via the properties meter. In this way, the electrical generation can be fully exported and is not related to the consumption of the houses within this development.

The return on PV panels has been much impacted by the withdrawal of the Feed in Tariff, but returns can still achieve 3% + based on the saving on electricity.

As noted above, the available roof spaces located on the main roof areas would be appropriate for solar PV panels. However, also as noted above, the development is located within the Bloomsbury conservation area where rooftop development is not acceptable. Therefore Photovoltaics are not proposed for inclusion.

5.4 Biomass heating

Biomass is a term given to fuel derived directly from biological sources for example rapeseed oil, wood chip/pellets or gas from anaerobic digestion. It can only be considered as a renewable energy source if the carbon dioxide emitted from burning the fuel is later recaptured in reproducing the fuel source (i.e. trees that are grown to become wood fuel, capture carbon as they grow).

Biomass heating systems require space to site a boiler and fuel hopper along with a supply of fuel. There also needs to be a local source of biomass fuel that can be delivered on a regular basis.

It is not considered appropriate to specify biomass boilers within these dwellings, as they do not have space to accommodate a relatively large biomass boiler and a supply of fuel.

A boiler of this type would replace the need for a conventional gas boiler and therefore offset all the gas energy typically used for space and water heating, however, biomass releases high levels of NO_x emissions and would therefore have to be considered carefully against the high standard of air quality requirements required in Camden's Borough wide Air Quality Management Area and as set out in the London Plan.

5.5 Ground source heat pump

All heat pump technologies utilise electricity as the primary fuel source – in this case displacing gas, as such, the overall reduction in emissions when using this technology can be less effective when opposed to a technology that is actually displacing electricity.

Ground source heating or cooling requires a source of consistent ground temperature, which could be a vertical borehole or a spread of pipework loops and a 'heat pump'. The system uses a loop of fluid to collect the more constant temperature in the ground and transport it to a heat pump. In a cooling system this principle works in reverse and the heat is distributed into the ground.

The heat pump then generates increased temperatures by 'condensing' the heat taken from the ground, producing hot water temperatures in the region of 45°C. This water can then be used as pre-heated water for a conventional boiler or to provide space heating with an under floor heating system.

The use of a ground source heating/cooling system will therefore require:

- Vertical borehole or ground loop
- Use of under floor heating
- Space for heat pump unit

Clearly, there is insufficient land area to install low level collector loops, leaving deep bore GSHP as the only potential option.

Normally the boreholes would need to be 6 to 8 metres apart and a 100 metre deep borehole will only provide about 5kW of heat. The borehole should also be formed around 3m away from the perimeter of the building and most specialists don't recommend using the structural boreholes.

Clearly, in the case of the proposed development at John's Mews, there is no scope for the locating of the ground collector devices and as such, ground source heating cannot be considered.

5.6 Air source heat pump

Air source heating or cooling also employs the principle of a heat pump. This time either, upgrading the ambient external air temperature to provide higher temperatures for water and space heating, or taking warmth from within the building and dissipating it to the outdoor air.

It must be remembered that heat pumps utilise grid based electricity and the associated emissions, so that the actual reduction in emissions can be limited. Assuming a seasonal system efficiency of 320% (Coefficient of Performance of 3.2) and that the air source heat pump will replace 90% of the space heating/hot water demand, then the system would reduce the overall CO_2 emissions by approximately 10-20%. The table below demonstrates, on the assumption of a demand of 10000kWh/year for heating and hot water:-

Table 6 – Comparative Heat Pump performance

Type of Array	Energy Consumption (kWh/yr.)	Emission factor ($kgCO_2$/kWh)	Total CO_2 emissions (kg/annum)
90% efficient gas boiler	11111	0.216	2400
320% efficient ASHP	2813	0.519	1460
100% efficient immersion (back-up)	1000	0.519	519

A theoretical carbon saving of 17.5%

With the above data in mind, clearly an ASHP could be an option, however, heat pump would require external installation, giving rise to: -

- A potential visual impact to neighbouring properties overlooking the installation location.
- The requirement for a noise impact assessment, and the potential for a noise nuisance to be present in this dense suburban location.
- Associated loss of amenity space.
- Negative impact on the Bloomsbury conservation area.

Given such impacts, it is considered that air source heat pumps would not be appropriate at this location.

5.7 Final Emissions Calculation

The results of the assessment of suitable technologies relative to the nature, locations and type of development suggest that, principally due to the development's location in the Bloomsbury conservation area – there are no suitable renewable technologies that would be acceptable in this location.

Accordingly, the data set out in Table 5 above and reproduced below demonstrate the final design SAP DER outputs, which are attached at **Appendix B**: -

Table 5 – Energy consumption and CO2 reductions

Unit	"Be lean" Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total "Be lean" emissions Kg/sqm	Total emissions Kg
Flat 1	32.49	15.68	48.17	2314.80
Flat 2	33.23	15.73	48.96	2230.19
Flat 3	22.9	15.29	38.19	2912.66
Flat 4	22.13	15.23	37.36	3050.54
Total				10508.18

The data at Table 5 confirms that overall emissions – including unregulated energy use - have been reduced by **13.52%** over and above the baseline model.

Excluding the un-regulated use, i.e. considering emissions controlled under the Building Regulations AD Part L, then the reduction equates to **19.87%** and given the proposals put in place above, it is clear that the applicant has sought to meet the requirements of London Borough of Camden's Policies through a careful design strategy involving best practice passive design and efficient services.

6.0 Sustainable Development

Due to the small scale nature of the development, LDF Policy DP22's requirement for a formal Eco Homes assessment does not apply - indeed, in March 2015, HM Government withdrew the Code for sustainable Homes and any other technical housing standard.

However, the applicant is committed to adopting many of the principles of Eco Homes and the Code for Sustainable Homes:-

Materials

- Newly construction elements will be considered against the BRE Green Guide to ensure that, where practical, the most environmentally friendly construction techniques are deployed.
- Construction materials will be sourced from suppliers capable of demonstrating a culture of responsible sourcing via environmental management certification, such as BES6001
- Insulation materials will be selected that demonstrate the use of blowing agents with a low global warming potential, specifically, a rating of 5 or less. Additionally, all insulants used will demonstrate responsible sourcing of material and key processes.
- The principle contractor with be required to produce a site waste management plan and sustainable procure plan, in line with BREEAM requirements – this will include a pre-demolition audit to identify demolition materials to reuse on-site or salvage appropriate materials to enable their reuse or recycling off-site. The procurement plan will follow the waste hierarchy Reduce; Reuse & Recycle.
- A Site Waste Management Plan (SWMP) will be developed prior to commencement of development stage to inform the adoption of good practice waste minimisation in design. This will set targets to minimise the generation of non-hazardous construction waste using the sustainable procurement plan to avoid over-ordering and to use just-in-time delivery policies.
- The developer will also maximise the use of recycled and secondary aggregates.
- Waste and recycling – appropriate internal and external storage space will be provided to ensure that residents can sort, store and dispose of waste and recyclable materials in line with Camden's collection policies.

Pollution

- The contractor will also monitor the use of energy and water use during the construction phase and incorporate best site practices to reduce the potential for air (dust) and ground water pollution.
- The completed dwellings will use low NOx emission gas boilers, with a minimum NOx rating of 5 and emissions at less than 40mg/kWh
- The main contractor will be required to register the site with the Considerate Constructors Scheme and achieve a best practice score of 25 or more.

- To void the issue of noise pollution, the development will comply with Building Regulations Part E, providing a good level of sound insulation between the proposed development and surrounding buildings. All new windows will be double glazed to minimise the transmission of noise between the building and adjacent properties.

Energy

- All the new dwellings will incorporate the energy efficient measures as set out within the main body of this report.
- Each home will also be supplied with a Home User Guide offering practical advice on how to use the home economically and efficiently.
- This will be further enhanced by the installation of smart energy metering, enabling occupants to accurately assess their energy usage and thereby, manage it.

Water

- The development minimise water use as far as practicable by incorporating appropriate water efficiency and water recycling measures. In new homes, the applicants will ensure that all dwellings meet the required level of 105 litres maximum daily allowable usage per person in accordance with Level 4 of the Code for Sustainable Homes. A sample Part G internal water use calculation is attached at **Appendix D**
- The individual dwelling at basement level will have rainwater harvesting – water butts connected to rainwater pipes to enable the recycling of rainwater for the upkeep of terrace planting
- SuDs – The site is located in Flood Zone 1 – at low risk of flooding. The Site is also currently completely impermeable with hard landscaping and building areas, the main aim of development will be to improve the water retention of the site. The design will ensure the peak rate of surface runoff into watercourse is no worse than existing rate.
- Elements of green roof are to be incorporated into the design proposals to further aid in the attenuation of surface water run-off, as well as enhances site ecology.

7.0 Conclusions

This report has detailed the baseline energy requirements for the proposed development, the reduction in energy demand as a result of energy efficiency measures and the potential to achieve further CO_2 reductions using renewable energy technologies.

The baseline results have shown that if the development was built to a standard to meet only the minimum requirements of current building regulations, the total amount of CO_2 emissions would be **12,151Kg/year**.

Following the introduction of passive energy efficiency measures into the development, as detailed in section 3, the total amount of CO_2 emissions would be reduced to **10,508Kg/year**, a reduction of **13.52%.**

There is also a requirement to reduce CO_2 emissions across the development using renewable or low-carbon energy sources, where practical and feasible. Therefore, the report has considered the feasibility of the following technologies:

- Wind turbines
- Solar hot water
- Photovoltaic systems
- Biomass heating
- CHP (Combined heat and power)
- Ground & Air source heating

The results of the assessment of suitable technologies relative to the nature, location and type of development suggest that given the limitations imposed by the sensitive location within the Bloomsbury conservation area, there are no appropriate renewable technologies that can be recommended for the Johns Mews development.

The SAP models (reproduced at **Appendix B**) for the development which have also been detailed above in Table 5, which show a final gross emission level of **10,508/year** representing a total reduction in emission over the baseline model, considering unregulated energy, of **13.52%.**

Tables 8 & 9 Demonstrate how the project at John's Mews aligns with the London Plan requirements and current GLA guidance on the preparation of energy statements.

Table 8 – Carbon Emission Reductions – Domestic Buildings

Key	Tonnes/annum
Baseline CO_2 emissions (Part L 2013 of the Building Regulations Compliant Development)	8.27
CO_2 emissions after energy demand reduction (be lean)	6.63
CO_2 emissions after energy demand reduction (be lean) AND heat network (be clean)	6.63
CO_2 emissions after energy demand reduction (be lean) AND heat network (be clean) AND renewable energy (be green)	6.63

Table 9 – Regulated Emissions Savings – Domestic Buildings

	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	
Savings from energy demand reduction	1.64	19.83%
Savings from heat network	0.00	0.00
Savings from renewable energy	0.00	0.00
Total Cumulative Savings	0.00	19.83
	(Tonnes CO_2)	
Carbon Shortfall	6.63	
Cumulative savings for off-set payment	N/A	
Cash-in-lieu Contribution	**N/A**	

Appendix A

Baseline Energy Use:-

SAP 2012 Dwelling Emission Rate Outputs

Appendix B

SAP 2012 Dwelling Emission Rate Outputs

“Be Lean”

Appendix C

Part G Water Use calculations