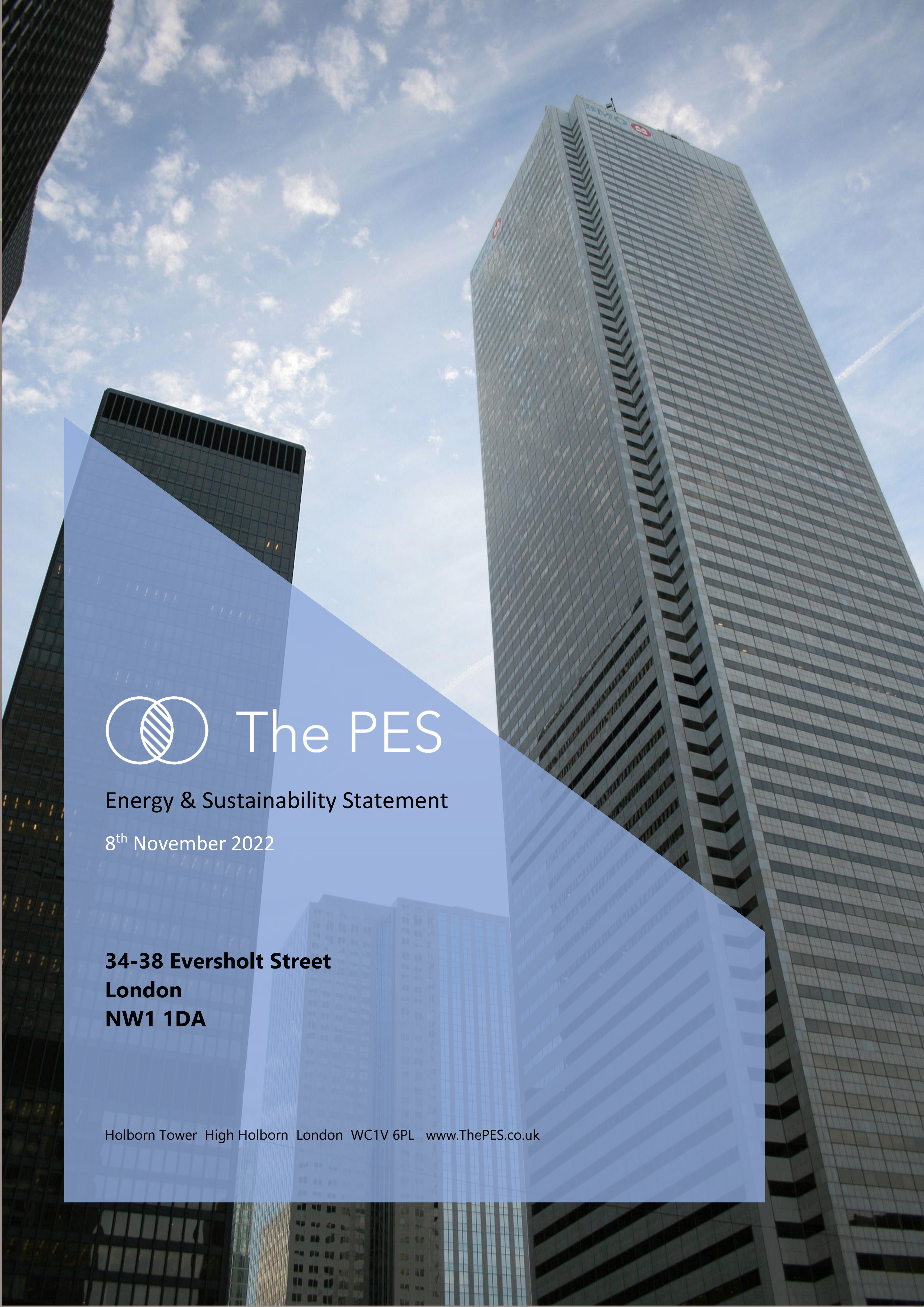


The PES

Energy & Sustainability Statement

8th November 2022

34-38 Eversholt Street
London
NW1 1DA

Holborn Tower High Holborn London WC1V 6PL www.ThePES.co.uk

Contents

Appendices

1.0 Executive Summary

This Energy & Sustainability Report has been prepared by The PES Ltd in support of a full planning application submitted to the London Borough of Camden for the change of use conversion of the premises at 34-38 Eversholt Street into a JDW Public House.

It has been designed to achieve the highest of environmental performance standards following the Energy Hierarchy as set down by the London Plan and the London Borough of Camden's Local Plan policies.

A 'Lean, Clean, Green' approach to assessing energy and thermal comfort needs and appropriate solutions has been adopted following the guidance under Chapter 9 of the adopted London Plan and the latest GLA guidance on the preparation of energy statements (June 2022) the development achieves an overall improvement (BER/TER) in regulated emissions of **59.75**% over the Part L 2013 (utilising SAP10 emissions data in line with the current GLA guidance) and a reduction in overall emissions at **38.12%** when taking into account unregulated energy use, through the adoption of high standards of insulation, super-efficient variable refrigerant flow heating/cooling, domestic hot water generated by heat pump technology and localised ventilation systems.

2.0 The Site & Proposal

The existing building comprises an existing night club establishment at basement / ground floor level with residential properties located above, with other residential properties in the vicinity.

The site is just outside the Euston Growth Area but is within a Neighbourhood Area and the Euston Plan Area, in which it is included as a Protected Primary Frontage. The building is a non-heritage asset location in close proximity to Euston Train Station.

The proposal is for a planning application to change the use of the basement and ground floor levels of the property into a JDW Public House.

2.1 Local Planning Context

The project sits within the London Borough of Camden (Camden).

Camden's Local Plan was adopted in July 2017

Chapter 8 deals with matters of sustainability and climate change:-

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.

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.

2.2 The London Plan

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 SI4 Managing heat risk

A Development proposal should minimise internal heat gain and the impacts of the urban heat island through design, layout, orientation and materials.

B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1) minimise internal heat generation through energy efficient design
2) reduce the amount of heat entering a building through orientation, shading, albedo, fenestration, insulation and the provision of green roofs and walls
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) Provide active cooling systems.

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.

Policy SI12 Flood risk management

C Development proposals which require specific flood risk assessments should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.

E Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.

F Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Where possible, development proposals should set permanent built development back from flood defences to allow for any foreseeable future upgrades.

Policy SI13 Sustainable Drainage

A Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks.

B Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1) rainwater harvesting (including a combination of green and blue roofs)
2) infiltration techniques and green roofs
3) rainwater attenuation in open water features for gradual release
4) rainwater discharge direct to a watercourse (unless not appropriate)
5) rainwater attenuation above ground (including blue roofs)
6) rainwater attenuation below ground
7) rainwater discharge to a surface water sewer or drain
8) rainwater discharge to a combined sewer.

C Development proposals for impermeable paving should be refused where appropriate, including on small surfaces such as front gardens and driveways.

D Drainage should be designed and implemented in ways that address issues of water use efficiency, river water quality, biodiversity, amenity and recreation.

It is noted that the proposed non-domestic development is less than 1,000m^2 and would be considered non-major development.

However, in line with the latest GLA guidance, the design team have progressed this assessment, based upon Part L2013 and the SAP10 emissions calculation methodology.

The SAP10 conversion reporting spreadsheet is attached at **Appendix D**.

3.0 Baseline energy results

The first stage of the Mayor's Energy Hierarchy is to consider the baseline energy model.

The following section details the baseline energy requirements for the development – the starting point when considering the energy hierarchy.

3.1 Commercial Space – Change of Use

The energy requirements for space heating, water heating and ventilation within the proposed new build commercial units have been calculated using the National Calculation Method (NCM) in line with AD L2B of the Building Regulations 2013 and the Non-Domestic Heating Compliance Guide.

The Government approved assessment methodology is the Simplified Building Energy Model (SBEM), The PES Ltd use an advanced modelling software – Design Builder - which enables accurate SBEM models to be created, as well as heat loss and cooling load calculations and full M&E design to be undertaken.

To consider the subject building performance against The Building Regulations (Approved Document L2B 2013) SBEM first creates the notional reference building, the characteristics of which are defined in within the GLA guidance on the preparation of energy statements, and reproduced below:-

Element	Unit	Specification[1]
External Wall	W/m²K	0.55
Roof	W/m²K	0.18
Floor	W/m²K	0.0.25
Glazing	W/m²K	1.80
Vision element	g-value	0.40
Air permeability	(m^3/h m^2 @ 50 Pa)	• Less than 10 – only with an accredited air pressure test result • 10 – buildings > 500 m^2 built to 2002 Building Regulations (or later) • 15 – buildings <= 500 m^2 built to 2002 Building Regulations (or later) • 15 – Buildings built to 1995 Building Regulations • 25 – buildings built to Building Regulations pre 1995
Thermal Bridging	W/m²K	Default
HVAC System	Type	System type as per actual building and heating provided by Gas boiler
Heating and Hot Water	%	84% gross efficiency gas boiler
Cooling (air-condition)[2]	SEER	• 2.60 – for packaged air conditioners, split/multi-split air conditioners & variable refrigerant flow • 3.90 – Vapour compression cycle chillers, water cooled < 750 kW • 4.70 – Vapour compression cycle chillers, water cooled > 750 kW
Central ventilation SFP	W/l/s	2.20
Terminal Unit SFP	W/l/s	0.50
Heat Recovery	%	70%
Lighting	Lm/Watt	51

GLA Guidance 2022 - Appendix 3

As noted above, SAP10 emissions data has been used for gas and electrical consumption; mains gas at 0.210kg/kWh and electricity at 0.233kg/kWh.

3.2 Unregulated Energy Use

The unregulated energy use for the refurbished spaces can be derived from the BRUKL outputs under section "Energy Consumption by End Use" - Equipment.

Table 1 – Unregulated Energy Use

Unit	Unregulated Energy Use Kg/sqm
Eversholt Street	27.34

The un-regulated emission rates are added to the baseline regulated emission rates (as calculated under 3.1 above) in order to set the total baseline emission rates before then applying the energy hierarchy in line with The London Plan and Camden policies.

3.3 Baseline Results

The baseline building results have been calculated, reported within the GLA reporting spreadsheet (**Appendix D**) and are presented in Table 2 below. The Baseline BRUKL BER outputs are attached at **Appendix A**.

Table 2 – Baseline energy consumption and CO_2 emissions

Unit	Building Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total baseline emissions Kg/sqm	Total baseline emissions Kg
Eversholt Street	48.2	27.34	75.54	42151.32
Development Total				**42,151**

4.0 Design for energy efficiency

The first step in the Mayor's 'Energy Hierarchy' as laid out in Chapter 9 of The London Plan, requires 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 minimizing associated carbon dioxide emissions.

This section sets out the measures included within the design of the development, 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 building after the energy efficiency measures have been included. From these figures the overall reduction in CO_2 emissions, as a result of passive design measures, can be calculated. To achieve reductions in energy demand the following measures have been included within the design and specification of the building:

4.1 Passive Design

Local and London Plan policy requires designers to introduce measures to control heat gain and deliver passive cooling.

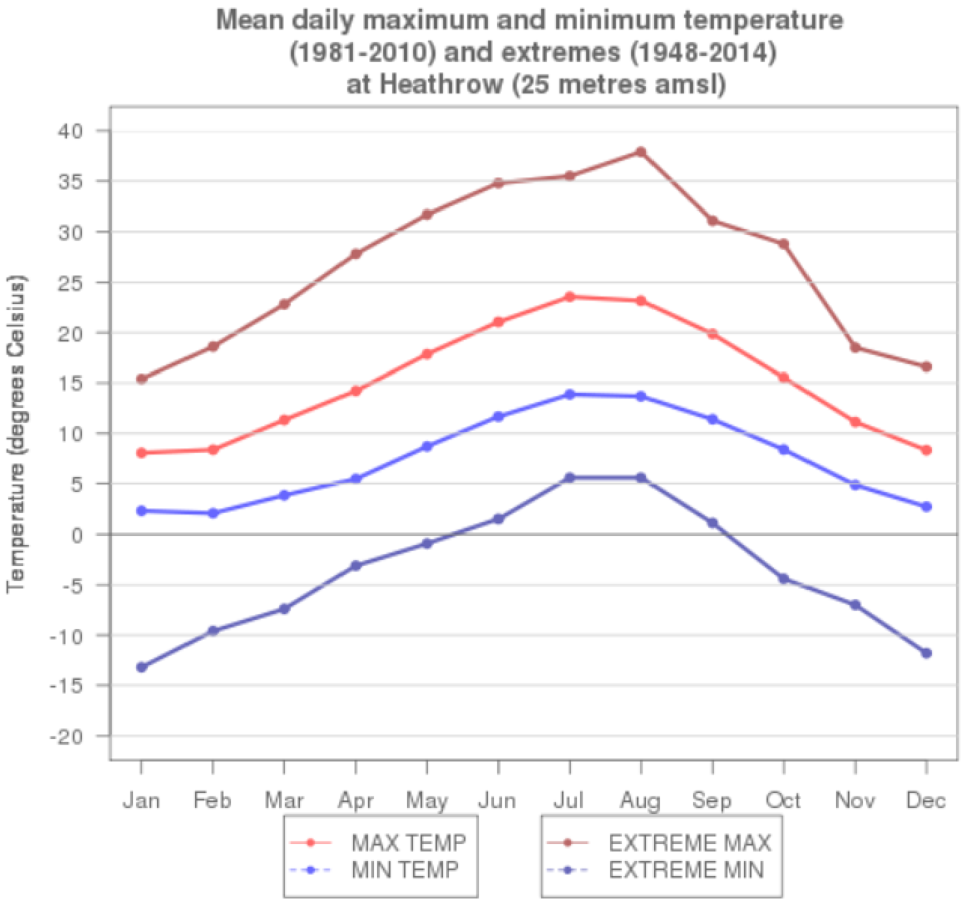
It is further explained that; "the NPPF emphasises the need to take account of climate change over the longer term and plan new developments to avoid increased vulnerability to the range of impacts arising from climate change. The UK Climate Impacts Programme 2009 projections suggest that by the 2080's the UK is likely to experience summer temperatures that are up to 4.2°C higher than they are today."

Accordingly, designers are to ensure buildings are designed and constructed to be comfortable in higher temperatures, without resorting to energy intensive air conditioning.

Accordingly, careful consideration of this issue has been undertaken as part of the application for renewal. The applicants will seek to follow the guidance within CIBSE Guide A and KS03 – Sustainable Low Energy Cooling; An Overview in order, where practical and feasible, to deliver a passive cooling strategy.

4.1.1 Local Environment

The project is located in London. Mean daily maximum temperatures range from just over 6 °C to 8 °C during the winter months and from 20 °C to 23 °C in the summer. These are comparable with typical values found in the summer in the London area which tends to be the warmest part of the UK. Thus, the area is not vulnerable to temperature extremes.



Across the region, sunshine annual averages 1600 hours in the London area, just above the UK average, while much of southern England receives less than 700 mm per year and includes some of the driest areas in the country.

The location in a high rise area of Westminster suggest that the project may well be affected by heat island effect and wind tunnels effects.

4.1.2 Passive Design

Clearly, there are very limited passive design options for the light refurbishment project.

However, the host building has the geographical advantage of having facades to the south east and south west with topographical shading from the adjacent 9 storey building – as such, any solar gains will be highly limited.

The glazing will have an element of solar control via the use of a solar film that will complement the external awnings and all but eradicate any potential excesses in solar gain. The new windows will also be openable, enabling purge ventilation to be introduced as required.

The high thermal mass already associated with the existing heavyweight structure will aid internal temperature control, particularly summer cooling given the proposed uses.

4.1.3 Services

The proposed high density occupation will require the need to introduce mechanical ventilation into the refurbished areas. The team are proposing the use of newly installed localised ventilation systems providing the required fresh air levels at low SFPs.

The design team has confirmed that the use of variable refrigerant flow heat pumps is proposed to provide heating and cooling in a superefficient manner as part of "be green" HVAC solution, the justification for which will be confirmed as this report progresses through the Energy Hierarchy.

Finally, a low energy lighting system – utilising linear surface mounted or suspended direct/indirect, LED luminaires in all newly created bar and restaurant spaces and other occupied areas - controlled via reactive lighting switches and absence detectors - will ensure a/ minimal internal gains, b/ low energy consumption and c/ much reduced running costs.

4.2 Heating System

The "notional" heating system considered under the "be lean – use less energy" section of the Energy Hierarchy, will consist of high efficiency gas boilers providing LTHW heating with the assumption of mechanical cooling as set out in the GLA Guidance (June 2022).

The toilet lobbies and other back of house areas with be assumed to utilise LTHW radiators.

Domestic hot water will be provided by the same notional gas boiler system via appropriately size calorifiers and a secondary return loop.

4.3 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:-

- Wall constructions will be internally lined and will target a U-Value of 0.30W/m^{2}k or better.

Air Tightness

- The newly refurbished restaurant spaces will be air tested to rating at circa 10m^3/hr/m^2.

Glazing

- The existing single glazed units will be retained, although the applicants are proposing the refurbishment of same as noted above.

4.4 Ventilation

As noted above, the proposed mechanical systems will maximise energy efficiency within the air tight building fabric to maximise energy efficiency and ensure a high quality indoor environment. The advised SFP is to be circa 1.0W/l/s.

4.6 Lighting and appliances

The development will incorporate high efficiency light fittings utilising LED lamps.

Common/circulation, BoH and WC areas will also have an absence detection system to ensure lights cannot be left on when not in occupation.

4.7 Energy efficiency results

The above data has been used to update the SBEM models the Building Emission Rate outputs of which are attached at **Appendix B**, which are then calculated via the GLA reporting spreadsheet factors (see **Appendix D**)

The following Table 3 shows the emissions levels, as well as the overall emissions from the building.

Table 3 – Energy Efficient emission levels

Unit	Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total emissions Kg/sqm	Total emissions Kg
Eversholt Street	35.9	27.34	63.24	35287.92
Development Total				**35,288**

The results show that the energy efficiency measures introduced have resulted in the reduction in CO_2 emissions from the development by **16.28%.**

5.0 Supplying Energy Efficiently

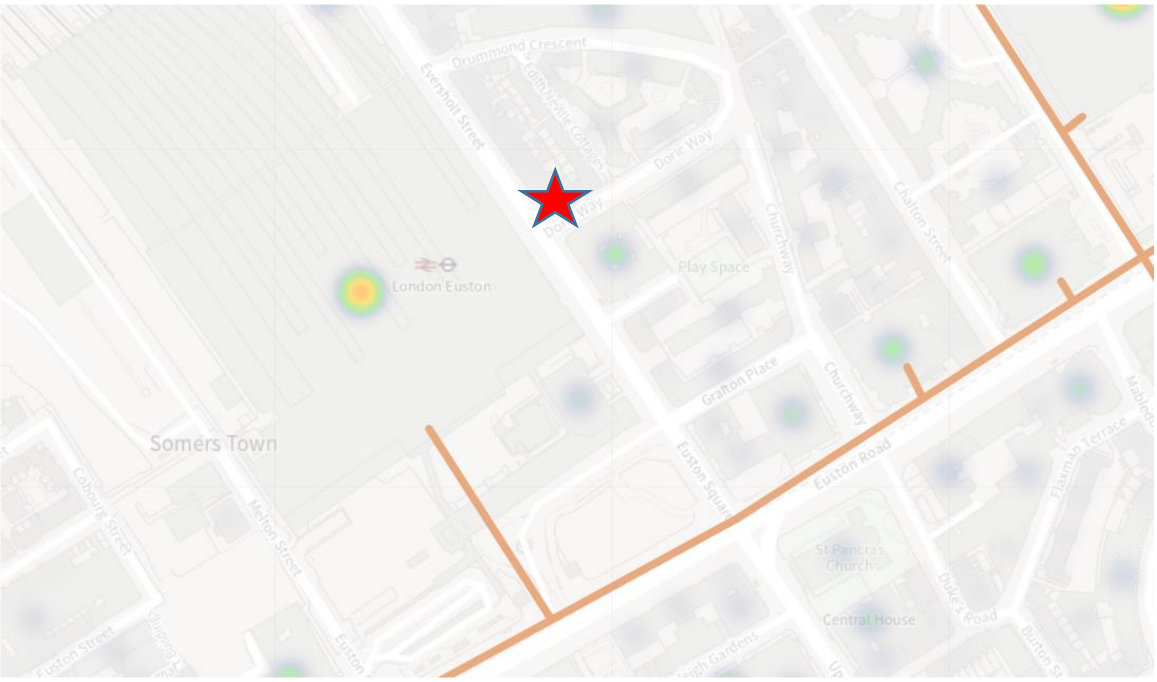
The second stage in the Camden & Mayor's 'Energy Hierarchy' is to ensure efficient and low carbon energy supply – Be Clean. In particular, this concerns provision of decentralised energy where practical and appropriate.

5.1 Community Heating/Combined Heat and Power (CHP)

The London Plan, Chapter 9, requires that major developments 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.

Therefore, this report must consider the availability of heat networks in the local area

The extract from the London Heat Map (reproduced below) indicates that the Eversholt Street site is within the Heat Network Priority Area, but remote from the proposed route of the proposed Euston Road energy network.



Extract from London Heat Map

Clearly there is limited potential for the project site to connect to a DEN at some time in the future.

As a non-major refurbishment scheme, there is no specific obligation to be DEN connection ready; however, as a bar/restaurant development, the DHW demand will be a significant load and the calorifiers and circulation equipment will all be located in the basement plant space.

Accordingly, the design team still wish to ensure the potential to connect to a DEN, so provision will be made onsite to enable such a connection to any such future network to continue the supply of heating and DHW to the project.

The planning submission drawings demonstrate this provision;

- The construction of a basement level plant space which would be capable of producing hot water for site wide DHW distribution.
- Safeguarding an identified route from the plant room to the property boundary at ground floor level, roadway or similar for flow and return pipes to enable connection to a future area wide DEN.

In addition, this report demonstrates via the use of DHW heating proposals that:-

- Appropriate design of on-site heating systems, such as, compatible return temperatures, tees and isolation valves to facilitate the connection to a district heating heat exchanger in future.

In the meantime, this report must consider the use of on-site CHP systems.

5.3 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.

In order to optimise a CHP system, "sizing" is critical to the success of the project. The aim of the process is to maximise the potential financial savings and ensure compliance with current legislation.

The most important factor is to establish the energy profiles – the site's electrical and thermal characteristics; these can be ascertained by referring to either the site's utility bills or by following dynamic design data for new build projects.

Typically, to get the full environmental and financial benefits, CHP is sized to the heat load of a site. That will recover all of the heat and give the best overall efficiency. Excess electricity generated can be exported or a shortfall in power can be met through a supplier.

To gain a good level of benefit from operating a CHP system, it is advisable that running hours are at least 4,500 hours a year, whilst having a high and constant demand for heat. However, it could still be worth exploring CHP viability for some sites with a low demand for heat if there is a high demand for electrical output, and thereby off-set peak daytime tariffs.

However, the most suitable sites for CHP generally have year-round demand for heat – domestic hot water demand - where the unit will be run as "lead boiler".

For units sized just above base load, thermal modulation is possible, where the unit is run at reduced output for short periods. In some cases, a limited amount of heat may be rejected in order to maintain the CHP unit running at full electrical output.

The key benefit from running a CHP engine is that it produces electricity, which can displace grid supplied electricity, which has significant carbon savings. It is for this reason that CHP is designed to run for as many hours of the year as possible.

A bar restaurant scheme is usually a good candidate for a CHP installation - the high hot water load – present almost over 12 hours a day, in combination with a low heating load.

However, we must also consider the net carbon benefits from such a system as the de-carbonisation of national grid dilutes the benefits obtained from the higher efficiency of larger-scale CHP led system.

Reference is made to the latest CIBSE Symposium on the topic; "An operational lifetime assessment of the carbon performance of gas fired CHP led district heating" (2016). This paper sets out a calculation methodology to determine the greenhouse gas emissions associated with district heat networks which use gas fired CHP as a heat source.

Currently, Part L calculations and CHP emissions savings are based on the grid based emission rate taken from the SAP 2012 3-year average - 519g/KwhCO2; SAP 2012 introduced a 15-year average at 381g/KwhCO2 to assist designers considering the longer term impacts.

Such a difference will markedly affect the relative calculated performance of a gas CHP engine versus a gas boiler.

The CIBSE paper further advises that "Using a typical good practice assumption of 40% thermal efficiency of the CHP, the threshold for net benefit is a grid carbon factor of around 338 gCO2/kWh. Below that threshold, CHP is found to be worse than a gas boiler and grid electricity."

DECC provides data for treating energy and emissions in their guidance; this provides projections of grid emissions factors over the next 85 years. With the rapid and recent introduction of renewable technologies to the grid – wind power and PV - DECC's "Green Book" guidance projects that grid carbon intensity will reach 338gCO2/kWh by 2017/18 and will reach 300gCO_2/kWh by 2018/19.

SAP10 data being utilised within this report uses a figure of 233gCO_2/kWh.

So it can be surmised, that by the time any CHP led communal boiler system at Eversolt Street has reached maturity, the carbon benefits will already have been lost.

The use of CHP can be dismissed.

6.0 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, wave's 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 and the sourcing the energy efficiently outlined above have the most significant impact on the heating and hot water energy requirements for the development, and the associated reduction in gas consumption.

It should be noted, that when using SAP10.2 emission factors, each kWh of gas energy saved reduces emissions by 0.210kgCO_2/kWh, whereas, grid based electrical energy is assumed with an emissions factor of 0.233kgCO_2/kWh but at much higher cost – some 3.5 times that of gas - and accordingly, emphasis will be placed upon "off-setting" grid based electricity in order to achieve the optimum use of renewable technologies, albeit, it should be noted that the emissions reduction impact of renewable technologies actually generating electricity will be considerably reduced.

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.

6.1 Government incentives

6.1.1 Smart Export Guarantee (SEG)

Introduced in 2020, the SEG will enable solar photovoltaic (PV), wind, hydro and anaerobic digestion (AD) installations up to 5MW and micro-combined heat and power (micro-CHP) up to 50kW will be able to receive an export tariff under the policy.

The SEG is a market-led initiative, requiring electricity supply licensees to offer export tariffs to eligible generators. Suppliers are free to set their own SEG compliant tariff price (provided it is above zero pence at all times) and decide how their tariffs work.

Installation owners are able to shop around and select the Licensee of their choice based upon an offer of the most appropriate tariff.

Payment are made against metered exports only.

6.1.2 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was formally withdrawn for non-domestic application in March 2021.

6.2 Wind turbines

Wind turbines come in two main types'- horizontal axis and vertical axis. The more traditional horizontal 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 project is bordered by the adjacent commercial development of a similar height in all directions. To overcome this potential obstruction 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 and the proposed project at 6 Eversolt Street itself.

It is inconceivable that any wind turbines of this size would be considered acceptable in this location.

6.3 Solar Energy

The host building has roof space at roof level, but the lower floor restaurant unit, nor the applicant has any control and/or rights to install panels to this space.

Accordingly, there is no scope therefore to site solar photovoltaic (PV) or water heating equipment at roof level.

6.4 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 – which can be very bulky items. There also needs to be a local source of biomass fuel that can be delivered on a regular basis. There are also issues with fuel storage and delivery which mitigate against this technology.

Additionally, 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 particulate matters, as well as other pollutants and would therefore have to be considered carefully against the high standard of air quality requirements the London boroughs; indeed, the whole of the Borough of Camden is a designated air Quality Management Area. Accordingly, the use of biomass is not considered appropriate for this project.

6.6 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, with no external space associated with the restaurant unit, there is no opportunity to install the required ground collectors, as such, ground source heating cannot be considered.

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6.7 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.

Given the requirement to future proof the development against future overheating potential and to maintain a comfortable internal environment for level of high density occupation, the design team are considering the use of variable refrigerant (VRF) flow air-to-air heating and cooling system which incorporates inter-zone heat recovery for the main restaurant/bar areas.

VRF systems can have numerous indoor units, served by a single outdoor unit, in both heating and cooling modes simultaneously. This mixed mode operation leads to energy savings as both ends of the thermodynamic cycle are delivering useful heat exchange. If a system has a cooling COP (Coefficient of Performance) of 3, and a heating COP of 4, then heat recovery operation could yield a COP as high as 7.

VRF typical layout

It should be noted that this perfect balance of heating and cooling demand is unlikely to occur for many hours each year, but whenever mixed mode is used energy is saved. In mixed mode the energy consumption is dictated by the larger demand, heating or cooling, and the lesser demand, cooling or heating is delivered free.

Accordingly, the design team are proposing the use of VRF heating and cooling to service the newly refurbished restaurant and bar areas.

This approach will reduce demand for fossil fuels, and in keeping with this strategy, DHW will also be provided via heat pump cylinder technology - to supply both the kitchen and WC areas - at an efficiency of 320%.

6.8 Final Emissions Calculation

Given the outcome of the feasibility study above, the developer is proposing the use of VRF heat pump technology, to provide the required heating and cooling to the new restaurant space, with heat pump driven cylinders providing the DHW.

The final table – Table 4 – summarises the final outputs from the SBEM models; the BRUKL output attached at **Appendix C.**

Table 4 – "Be Green" emission levels

Unit	Emission Rate (regulated energy use) Kg/sqm	Unregulated Energy Use Kg/sqm	Total emissions Kg/sqm	Total emissions Kg
Eversholt Street	19.4	27.34	46.74	26080.92
Development Total				**26,081**

The data at Table 4 confirms that overall emissions – including unregulated energy use - have been reduced by **38.12%** over and above the baseline model, with a **26.09%** reduction in emissions directly from the use of energy generating and renewable technologies, i.e. over and above the energy efficient model.

Excluding the un-regulated use, i.e. considering regulated emissions controlled under ADL2, then the final reduction in building emission rate equates to **59.75%.**

7.0 "Be Seen"

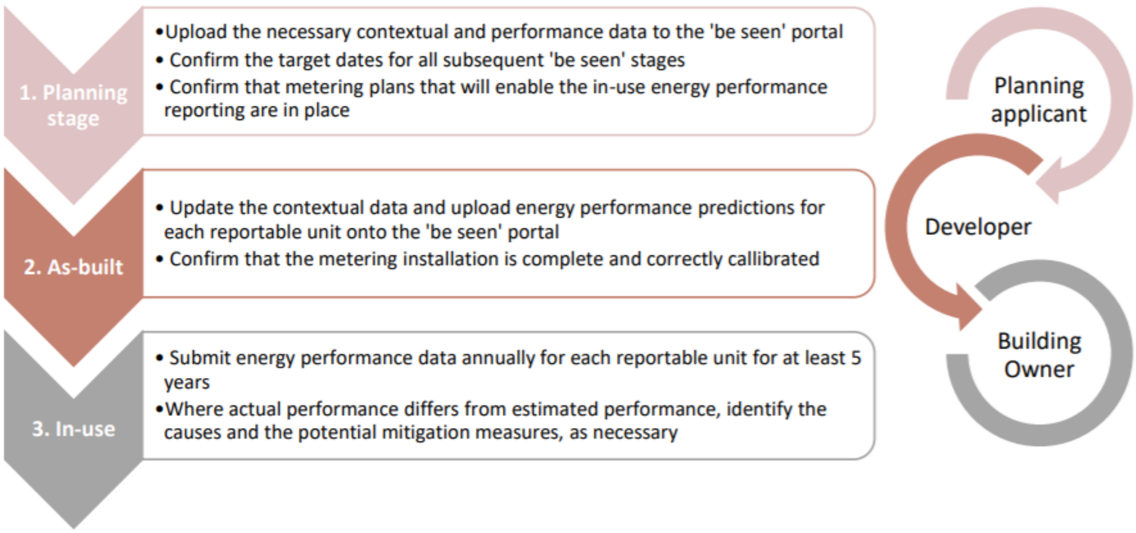
The "Be Seen" Energy Monitoring Guidance Consultation Draft was published in October 2020 and adopted in September 2021.

Although Part L calculations and Energy Performance Certificates (EPCs) give an indication of the theoretical performance of buildings, it is well established that there is a 'performance gap' between design theory and measured reality.

To address this gap the London Plan Policy SI 2 'Minimising greenhouse gas emissions' introduces a fourth stage to the energy hierarchy; the 'be seen' stage, which requires monitoring and reporting of the actual operational energy performance of major developments for at least five years via the Mayor's 'be seen' monitoring portal.

The 'be seen' policy establishes post-construction monitoring as good practice, enabling developers and building owners to better understand their buildings and identify methods for improving energy performance from the project inception stage and throughout the building's lifetime.

The extract below graphically 'be seen' process through the reporting stages of a development including the parties likely to be responsible for the provision of the necessary data at each reporting stage.



The applicants make the commitment that the development will be designed to enable post construction monitoring and that the information set out in the 'be seen' guidance is submitted to the GLA's portal at the appropriate reporting stages.

8.0 Sustainable Design & Construction

The sustainable assessment criteria as developed by BRE are utilised within this report to confirm that the development meets with the requirements of the Borough of Camden's sustainability policies

8.1 Energy efficiency; vacant & underused land and buildings

The project clearly makes use of a vacant/underused building and thereby is high sustainable by default; limiting the levels of embodied carbon.

For matters of Passive Design, Solar gain control & daylighting, Ventilation, Thermal Performance, Services Strategy, Low or zero carbon technologies and overall Energy Performance, all these matters have been dealt within the London Plan compliant Energy Statement within Sections 2 to 6 above.

8.2 Materials

The design team have put a strong focus on sustainability and durability when considering construction profiles and building materials for the development. High Green Guide ratings will be achieved wherever possible and materials will be assessed for suitability with regards to Whole Life Costs, which given the amount of retained building and light tough refurbishment, is expected to perform very well.

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. The use of recycled products will be pursued wherever feasible and the use of other low embodied energy products will be further investigated.

Responsible sourcing will also be pursued. All timber used on site during the construction phase and within the building will be from FSC sources or equivalent. Other materials, including insulation, will be sourced from manufacturers who employ environmental management systems such as ISO 14001 or BES 6001. Where possible, materials will be sourced locally.

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

A Site Waste Management Plan (SWMP) will be produced for the site, which will determine how to maximise the recovery of materials or equipment from the enabling works for subsequent high-grade/value applications.

8.3 Air pollution

Construction site impacts

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

The contractor will be enrolled on the Considerate Constructors Scheme and achieve a best practice score of at least 35.

Plant and machinery

All plant and equipment installed in the building will be appropriately sized and selected for efficiency in order to reduce greenhouse gas emissions. All equipment will be frequently maintained to ensure it continues to run efficiently and cleanly.

Operational impacts

The use of heat pump technology for heating/cooling systems and domestic hot water systems, confirms that the project will have a neutral impact on local air quality.

8.4 Noise pollution

Construction site impacts

The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies to minimise noise pollution, including the use of quieter machinery where possible. Site working hours will be managed to mitigate the possibility that they will cause a nuisance to the surrounding properties.

Noise impact of the building

The development will comply with Building Regulations Part E, providing a good level of sound insulation between the proposed development and surrounding buildings.

All external plant and potential noise impacts of the new ventilation and AC plant in operation will be assessed, attenuated and reported upon accordingly. This issue is the subject of a Noise Impact Assessment submitted under separate cover.

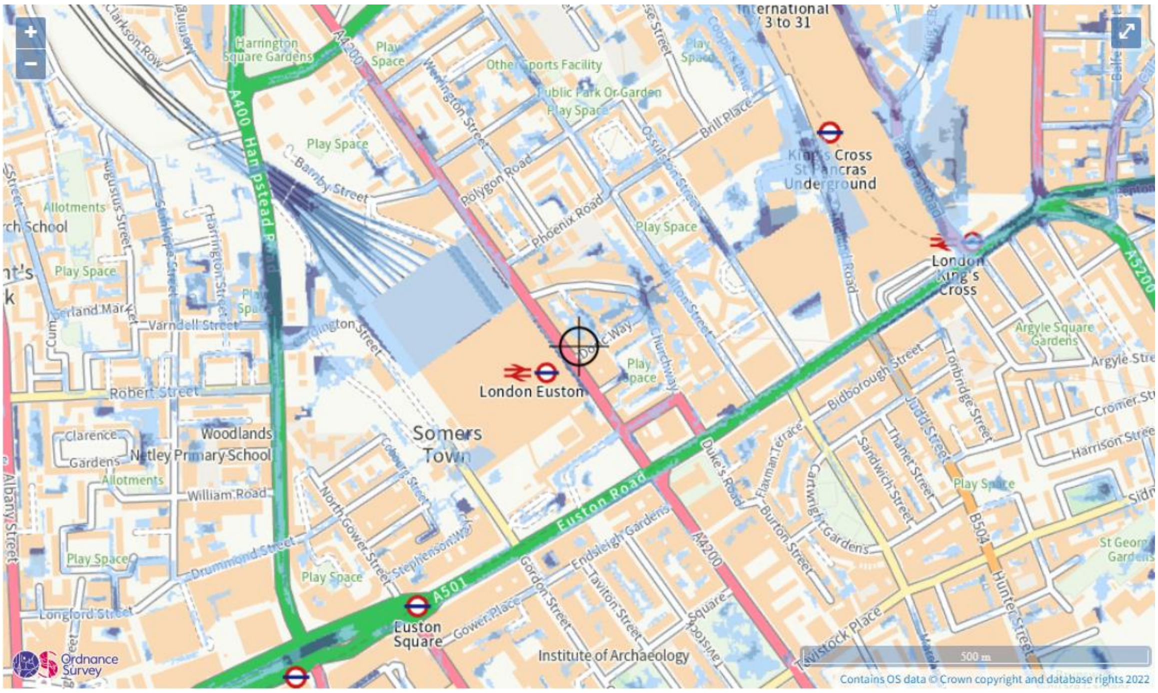
8.5 Contaminated land

The existing below ground superstructure and slabs are to remain in situ.

The proposed building use will not involve the storage, processing or transfer of hazardous substances.

8.6 Water quality, saving and drainage

Flood risk and surface water drainage



The above EA flood risk map demonstrates that the project is within an area of low flood risk for surface water and very low risk of flooding for both rivers and sea.

In addition, there is no increase in the impermeable areas associated with the proposed development, so there is a neutral impact on run-off.

Water consumption

Internal potable water use will be limited through the specification of low flow fittings and dual flush toilets. All white goods provided will have maximum water efficiency ratings.

The following specifications will be considered in order to meet the water consumption target:

- Basin Taps - 5l/min
- WCs – 5/2.6 litre flush

Construction site impacts

The construction site will be managed in such a way that the environmental impact is controlled and minimised. Best practice guidelines for preventing water pollution will be followed on site.

8.7 Light pollution

The ground floor & basement level development will not contribute to increasing the effects of light pollution.

8.8 Waste and recycling

Site waste management

A construction site resource management plan will be developed and implemented to ensure that construction site waste is effectively reduced and recycled, including designing waste out from the initial stages. Material ordering control and modern construction methods will be employed to minimise the potential for waste on site.

Waste will either be segregated on site into at least 5 different streams for recycling or collected, sorted and recycled by an external recycling contractor. Re-use of construction waste will also be encouraged. The site waste management plan will also ensure that hazardous waste is properly managed.

Operational waste management

The recycling of operational waste once the building is occupied will also be encouraged through the provision of recycling facilities and dedicated internal and external storage for recyclable materials, separate to those for domestic refuse.

8.9 Amenity, environmental quality, daylight and sunlight

The refurbishment of basement and ground floor areas will not impact on sunlight and daylight to the surrounding buildings nor have any ecological impact.

8.0 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.

Throughout the assessment against the energy hierarchy – as set out in The London Plan – SAP10 emissions data has been used in line with the very latest GLA guidance on the preparation of energy statements.

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 **42,151Kg/year**.

Following the introduction of passive energy efficiency measures into the development, as detailed in section 4, the total amount of CO_2 emissions would be reduced to **35,288Kg/year**

There is also a requirement to reduce CO_2 emissions across the development using renewable or low-carbon energy sources. 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, locations and type of development suggest that the most suitable solution to meeting reduction in CO_2 emissions would be via the use of VRF heat pump technology to service the heat and cooling loads, as well as the DHW demand.

This has been used in the BRUKL models (reproduced at **Appendix C**) for the development which have also been detailed above in Table 4, which show a final gross emission level of **26,081Kg/year**, representing a total reduction in emissions over the baseline model, taking into account unregulated energy, of **38.12%.**

In addition, the final BRUKL outputs at **Appendix C** demonstrate that the building achieves an overall improvement in emissions over the Building Regulations Part L standards for regulated emissions of minimum of **59.75%**.

Tables 5 & 6 Demonstrate how the Eversholt Street project complies with the London Plan requirements and the GLA guidance relating to zero carbon development.

Table 5 – Carbon Emission Reductions – Non-domestic Buildings

Key	Tonnes/annum
Baseline CO_2 emissions (Part L 2013 of the Building Regulations Compliant Development)	26.90
CO2 emissions after energy demand reduction (be lean)	20.03
CO2 emissions after energy demand reduction (be lean) AND heat network (be clean)	0.00
CO2 emissions after energy demand reduction (be lean) AND heat network (be clean) AND renewable energy (be green)	10.83

Table 6 – Regulated Emissions Savings – Non-domestic Buildings

	Regulated Carbon Dioxide Savings	
	(Tonnes CO2 per annum)	%
Savings from energy demand reduction	6.87	25.54
Savings from renewable energy	9.20	34.20
Total Cumulative Savings	16.07	59.74
	(Tonnes CO_2)	
Carbon Shortfall	10.83	
Cumulative savings for off-set payment	324.9	
Cash-in-lieu Contribution	**£N/A**	

Appendix A

Baseline/Un-regulated Energy Use:-

BRUKL Outputs & Building Emission Rates

Appendix B

Energy Efficient Design:-

BRUKL Outputs & Building Emission Rate

Appendix C

Generating energy on-site:-

Final BRUKL Outputs & Building Emission Rate

Appendix D

GLA SAP10 Conversion & Reporting Spreadsheet