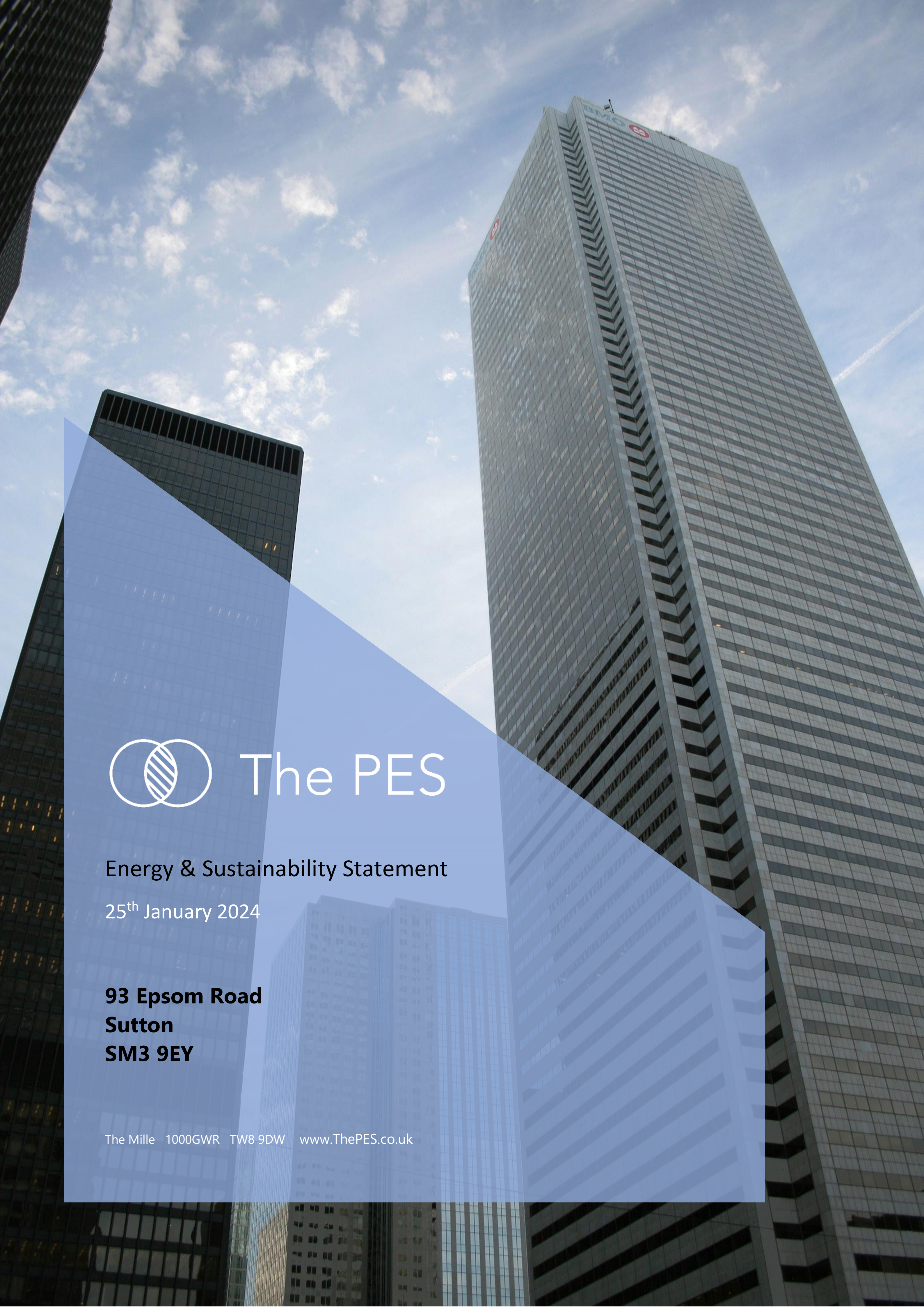


The PES

Energy & Sustainability Statement

25th January 2024

93 Epsom Road
Sutton
SM3 9EY

The Mille 1000GWR TW8 9DW www.ThePES.co.uk

Contents

Version Control

25th January 2024	V1	

1.0 Executive Summary

The proposed development at 93 Epsom Road 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 Sutton's relevant policy documents.

The project consists of the construction of a new semi-detached dwelling adjacent to the existing 93 Epsom Road.

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 London Plan and the latest GLA guidance on the preparation of energy statements (June 2022) and the development aims to achieve an overall improvement (BER/TER) in regulated emissions of at least 65% over the Part L 2021 standard, through the adoption of high standards of insulation, heat pump driven heating and hot water systems and roof mounted PV array.

2.0 The Site & Proposal

The site is located on corner of Epsom Road and Elm Road West.

The proposal is for the development of a new semi detached dwelling to the north east side of the existing dwelling, including vehicular access and new cycle and bin storage.

2.1 Planning Policy

The site sits within the London Borough of Sutton (Sutton).

As a result of an initial application, Sutton have advised the specific requirements to accompany the application:-

Sutton's key Local Plan Policies 31 & 33 are reproduced below:-

Policy 31: Carbon and Energy

A. Proposed developments should meet the following targets for reducing CO2 emissions expressed as a percentage improvement over Part L of the 2013 Building Regulations:

- all residential buildings forming part of major developments should achieve 'zero carbon' standards, by:
  (i) achieving at least a 35% reduction in regulated CO2 emissions on site.
  (ii) offsetting the remaining regulated emissions (to 100%) through the delivery of CO2 reduction measures elsewhere through a Section 106 contribution to the council's carbon offset fund priced at £60 per tonne over 30 years.
- all major non-residential developments should achieve at least a 35% reduction in regulated CO2 emissions on site.
- all minor residential developments should achieve at least a 35% reduction in regulated CO2 emissions on site.

B. In seeking to minimise CO2 emissions in line with the above targets, all proposed developments will apply the Mayor's energy hierarchy by:

- achieving the highest standards of energy efficient design and layout.
- supplying energy efficiently in line with the following order of priority:
  (i) being designed to connect to existing or planned district heating and/or cooling networks supplied by low or zero-carbon energy, unless it can be demonstrated through whole life cycle evidence that connection is not reasonably possible. All major developments located within identified DeEpsomised Energy Opportunity Areas (Maps 10.1 and 10.2) should apply the council's 'DeEpsomised Energy Protocol' (Schedule 10.A).
  (ii) site wide heating and/or cooling network supplied by low or zero-carbon energy.

(iii) communal heating and cooling.

- using renewable energy generated on-site. Major developments will be expected to achieve at least a 20% reduction in total CO_2 emissions (regulated and unregulated) through renewables with minor developments achieving a reduction of at least 10%.

C. All planning applications for new dwellings or major non-residential developments should be supported by an Energy Statement incorporating 'as-designed' Building Regulations Part L outputs to demonstrate how the relevant targets for reducing CO_2 emissions will be met. The Energy Statement should include calculations of energy demand and emissions at each stage of the Mayor's energy hierarchy for both regulated and non-regulated elements in line with GLA 'Guidance on Preparing Energy Assessments' as amended.

D. The council will collaborate with potential heat suppliers, energy service companies, major developers and the community to deliver district heating networks to serve new and existing developments in Hackbridge and within other identified 'DeEpsomised Energy Opportunity Areas' over the plan period.

Policy 33: Climate Change Adaptation

C. Conserving water resources by maximising the flood storage role of rivers, aquifers, ponds, natural floodplains and other surface water features; promoting the benefits of SuDS for groundwater recharge; and achieving high standards of water efficiency. All new dwellings should limit domestic water consumption to 110 litres per person per day (l/p/d) in line with the Government's higher 'optional requirements' for water efficiency set out in Part G of the Building Regulations as amended.

2.2 The London Plan

Chapter 9 deals with Sustainable Infrastructure:-

Policy SI2 Minimising greenhouse gas emissions

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.

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.

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

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

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.

This report will be advised accordingly based on the requirements for a minor scheme utilising SAP10.2 emissions data, in line with the latest GLA guidance.

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 New Build Dwellings

The baseline emission levels – the Target Emission Rate (TER) - is obtained by applying the design to a reference 'notional' building the characteristics of which are set by regulations – SAP10.2; The new Part L Building Regulations 2021 came into force in June 2022 and introduced a completely new notional dwelling as detailed below:-

Table 1.1 Summary of notional dwelling specification for new dwelling[1]

Element or system	Reference value for target setting
Opening areas (windows, roof windows, rooflights and doors)	Same as for actual dwelling not exceeding a total area of openings of 25% of total floor area[2]
External walls including semi-exposed walls	U = 0.18 W/(m²K)
Party walls	U = 0
Floors	U = 0.13 W/(m²K)
Roofs	U = 0.11 W/(m²K)
Opaque door (less than 30% glazed area)	U = 1.0 W/(m²K)
Semi-glazed door (30–60% glazed area)	U = 1.0 W/(m²K)
Windows and glazed doors with greater than 60% glazed area	U = 1.2 W/(m²K) Frame factor = 0.7
Roof windows	U = 1.2 W/(m²K), when in vertical position (for correction due to angle, see specification in SAP 10 Appendix R)
Rooflights	U = 1.7 W/(m²K), when in horizontal position (for correction due to angle, see specification in SAP 10 Appendix R)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	5 m³/(h·m²) at 50 Pa
Main heating fuel (space and water)	Mains gas
Heating system	Boiler and radiators Central heating pump 2013 or later, in heated space Design flow temperature = 55 °C
Boiler	Efficiency, SEDBUK 2009 = 89.5%
Heating system controls	Boiler interlock, ErP Class V Either: – single storey dwelling in which the living area is greater than 70% of the total floor area: programmer and room thermostat – any other dwelling: time and temperature zone control, thermostatic radiator valves
Hot water system	Heated by boiler (regular or combi as above) Separate time control for space and water heating
Wastewater heat recovery (WWHR)	All showers connected to WWHR, including showers over baths Instantaneous WWHR with 36% recovery efficiency utilisation of 0.98
Hot water cylinder	If cylinder, declared loss factor = 0.85 × (0.2 + 0.051 $V^{2/3}$) kWh/day where V is the volume of the cylinder in litres
Lighting	Fixed lighting capacity (lm) = 185 × total floor area Efficacy of all fixed lighting = 80 lm/W
Air conditioning	None
Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces / 6.5 For flats: kWp = 40% of dwelling floor area / (6.5 × number of storeys in block) System facing south-east or south-west

NOTE:
1. For a dwelling connected to an existing district heat network, an alternative notional building is used. See paragraph 1.8 and SAP 10.
2. See SAP 10 for details.

SAP first creates the notional reference building, based upon the same shape and form as the proposed dwelling and applies the above the characteristics as defined in SAP10.2.

3.2 Unregulated Energy Use

The baseline un-regulated energy use for cooking and 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 = (138 + 28N)/TFA

N= no of occupant SAP table 1B

TFA – Total Floor Area

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 Local Plans policies.

4.0 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 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

London Plan policies place great emphasis on the need to incorporate passive design 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.

The orientation of the existing property is very much based on a north west – south east configuration with an open aspect to the north west

The living areas have large glazed patio doors to the south east aspect to ensure plentiful natural daylight and beneficial solar gain during the heating season, whilst avoiding the key southern aspect and excessive gains.

In addition, the glazing will have a low g value to offer further protection from excessive solar gain during the summer months.

The proposed building fabric as noted below will also assist in controlling heat ingress and the designs all enable the use of opening windows and cross ventilation to further enhance natural cooling.

It is concluded that the proposed units will not be vulnerable to overheating and that a natural ventilation strategy will be appropriate.

4.2 Heating system

For the "notional" energy efficient model, the primary heating system for the dwelling will consist of high efficiency condensing gas boilers providing hot water and LTHW heating:-

- A-Rated gas condensing boiler – (92.3% seasonal efficiency)

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
- Boilers fitted with flue gas heat recovery systems.

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:-

- New wall constructions will be of a brick and block cavity and will target a U-Value of 0.15W/m^2k or better.
- New Roof constructions are yet to be specified, but a lightweight construction achieving a U-Value of 0.12W/m^2k will be targeted.
- The newly laid floors will achieve a minimum U-Value of 0.11/0.12 W/m^2k subject to perimeter/area ratios

Glazing

- The proposed new glazing will have an area weighted U-Value at 1.1W/m^2k

Air Tightness

- The new build dwelling will be tested for air tightness with a target value of 4m^3/hr/m^2 in line with best practice for naturally ventilated dwellings.

Construction Details

- Heat loss via non-repeating thermal bridging will be minimised by the use of Accredited Construction Details for these new build units. An overall y value <0.06 is targeted to ensure compliance with the minimum standards for dwelling fabric energy efficiency.

4.4 Ventilation

The dwelling will retain the natural ventilation approach as per conclusion of the passive analysis, using background (trickle) ventilation, opening windows for purge ventilation and wet room extracts.

4.5 Lighting

100% of internal light fittings throughout the development will be dedicated low-energy LED lighting.

External lighting will be controlled by daylight controls.

4.6 WWHR

The project is to incorporate waste water heat recovery systems to further reduce energy loads for the generation of hot water

4.7 Energy efficiency results

The results of the passive deign measures for the new development, with the energy efficiency measures, the reduction in CO_2 emissions is expected to be in excess of **10%.**

5.0 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 deEpsomised energy where practical and appropriate.

5.1 Community Heating/Combined Heat and Power (CHP)

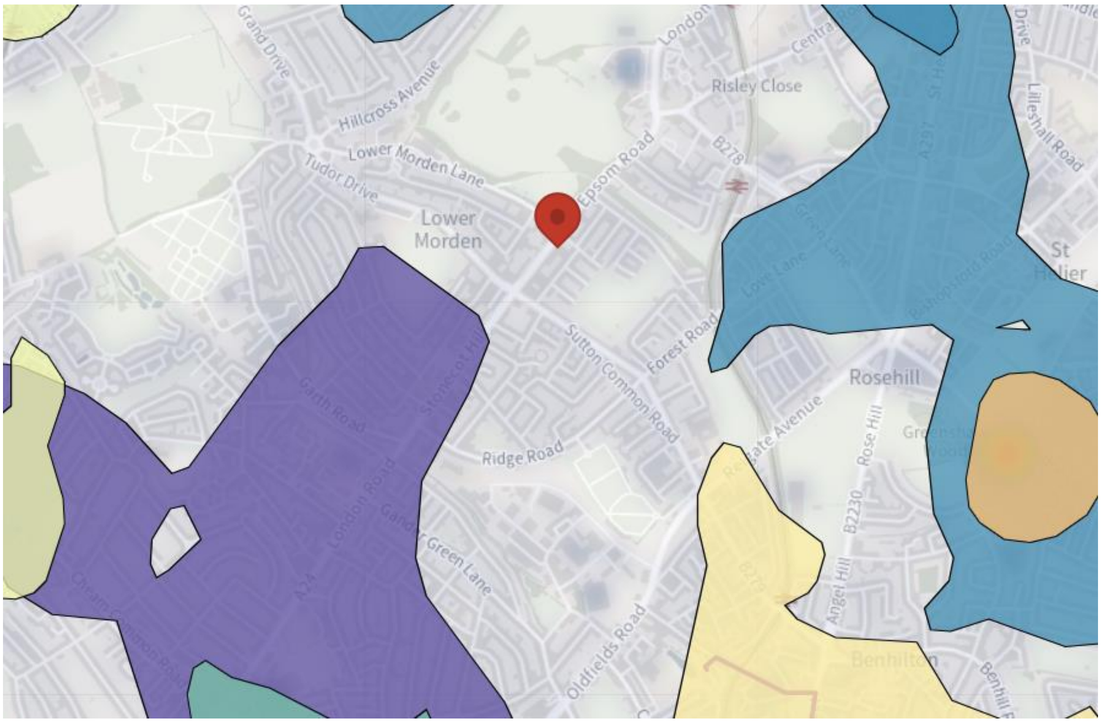
The London Plan, Policy 5.6 - DeEpsomised energy in development proposals requires:

- Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

Combined heat and power systems are essentially biomass or fossil fuel fired electricity generators that use the heat by-product to provide space and water heating. The electricity generated can be used directly within the host buildings or sold to electricity suppliers on the national grid. These systems can be employed on a large scale for community schemes or at the micro scale for individual dwellings.

Alternatively larger scale systems operated as a standalone entity can be used to provide heat and power to the local neighbourhood.

The extract from the London Heat Map (reproduced below) suggests there are no areas of potential DEN within 500m of Epsom Road development and the site is not within an identified an area for Potential Heat Network Projects.



Extract from London Heat map

Clearly there is no potential to connect to any currently existing or proposed networks in the foreseeable future. That said, the proposals for LTHW heating systems are compatible with a DEN connection should one be made available on Epsom Road in the future.

There is still a requirement to consider the use of on-site community heating in the medium term.

5.2 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, 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 baseline 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.

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.

GLA Guidance states non-domestic developments providing a substantial coincidence of demand for heat and power for the majority of hours in the year (5,000 hours per annum) and the heat to power ratio is low (e.g. 1:1), will still be expected to include on-site CHP as part of their energy strategy to meet the London Plan CO_2 reduction targets.

Clearly, as a single unit residential development an on-site CHP installation cannot be justified.

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 energy consumption.

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 to 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.

Payments are made against metered exports only.

6.1.2 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was formally closed to all applications in March 2022.

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 Epsom 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 by other properties of similar height in all directions in a low rise suburban locale. 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 and project site itself.

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

6.3 Solar Energy

The development at Epsom Road has areas of flat roof that could accommodate solar panels orientated to the south.

In general, the roofs will have an unrestricted aspect, so there is scope therefore to site solar photovoltaic (PV) or water heating equipment at roof level.

6.3.1 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.

Both collector types can capture heat whether the sky is overcast or clear. Depending on location, approximately 900–1100 kWh of solar energy falls on each m^2 of unshaded UK roof surface annually. The usable energy output per m^2 of solar panel as a result of this amount of insolation ranges from between 380 – 550 kWh/yr.

Solar hot water systems are of course, displacing the energy used for gas fired DHW provision, and due to the low demand for DHW in a small residential development, it would require a very large system to compete with the off-setting of electricity use afforded by PV panels.

Accordingly, the use of solar thermal systems is dismissed.

6.3.2 Photovoltaics (PV)

A 1kWp (1 kilowatt peak) system in the UK could be expected to produce between 790-800kWh of electricity per year based upon a south east orientation according to SAP2005 methodology used by the Microgeneration Certification Scheme (MCS). The figure given in the London Renewables Toolkit is 783 kWh per year for a development in London.

The area of panelling required to achieve 1kWp is dependent upon the efficiency of the system, but in currently, panels can achieve a 440w output from 1.6m^2 of panel area, which would optimise the roof space available.

The withdrawal of the Feed in Tariff has now rendered such investments less attractive, however, there is still the benefit and carbon savings derived from the electricity produced – currently some 3.5 x as expensive as mains gas – so returns can still achieve in excess of 6%.

Accordingly, the installation of a PV array is recommended for the Epsom Road project; a 5 panel/2.2kWp south facing array is proposed to service the proposed new dwelling, generating some 1,900kWh/annum

6.3.2 Battery Storage

With advancement in battery storage and the introduction of "car charging" tariffs, batteries can offer a significant financial return.

Utilising a dual tariff meter, the batteries can be charged over night and the electricity used during the following day.

In addition, the part discharged batteries would also be able to absorb any unused energy output from the PV array.

The use of battery storage is recommended.

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. There is inadequate space at ground floor level for a fuel store and limited access for delivery lorries.

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, as well as other pollutants and would therefore have to be considered carefully against the high standard of air quality requirements in London Boroughs. 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, there is insufficient land area to install low level collector loops on even deep bore GSHP.

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

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.

It must be remembered that heat pumps utilise grid based electricity, so calculations base the benefits on SAP10.2 emissions data

Assuming a seasonal system efficiency of 320% (Coefficient of Performance of 3.2) and that the air source heat pump will replace 100% of the space heating/hot water demand, then the system would reduce the overall CO_2 emissions by approximately 70%. The table below demonstrates, on the assumption of a demand of 1000Kwh/year for heating and hot water.

Table 1– Air Source Heat Pump Performance

Type of Array	Energy Consumption (kWh/yr.)	Emission factor ($kgCO_2/h$)	Total CO_2 emissions (kg/annum)
90% efficient gas boiler	11111	0.210	2333
320% efficient ASHP	2813	0.136	383
100% efficient immersion (back-up)	1000	0.136	136

A theoretical carbon saving of 77%

Accordingly, the design team are proposing the use of an air source heat pump system; an air to water heat pump to service the heating and hot water requirements for the proposed new dwelling.

Efficiencies are expected to be in excess of 330%.

Heat pump technology also offers the significant additional benefit of emitting zero local emissions.

6.8 Final Emissions Calculation

Given the outcome of the feasibility study above, the developer is proposing the use of air source LTHW heating and hot water systems and a 5 panel 2.2Kwp PV array is to be installed to the remaining roof area – this will produce circa 1,900kWh per annum, saving an additional 0.25t of CO_2/annum

The above noted strategy will result in a reduction in emissions controlled under AD Part L, in excess of **65%.**

7.0 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 Sutton's sustainability policies

7.1 Domestic Accommodation

The Code for Sustainable Homes (the Code) was the national standard for the sustainable design and construction of new homes.

This was formally withdrawn by DCLG, and planning authorities are no longer able to require developments to meet the technical guidance within the Code for Sustainable Homes.

However, the applicants do acknowledge some requirements of the Code, and intend to incorporate the following measures in order to underline the suitability credentials of the proposed development.

- Water use - Ensuring that internal wholesome water use will be limited to 110 litres/person/day in line with Sutton's Local Plan Policy 33. Apart G internal water use calculation is attached at **Appendix A.**
- SuDs – the existing site is a combination of building and landscaped garden areas; the development will not impact on surface water run-off and a report under separate cover demonstrates how run-off will be controlled.
- 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.
- The principle contractor with be required to produce a site waste management plan and sustainable procurement plan, to ensure the use of responsibly sourced materials and to ensure that construction waste sent to landfill is kept to a minimum.
- The contractor will also produce a construction management plan highlighting best practice construction site standards to avoid the potential for air (dust) pollution, ground water pollution or indeed, noise pollution.
- Energy display devices will be provided for the dwelling. These would monitor the electrical consumption and heating fuel.
- Only appliances with high EU energy rating to be installed - typically these would be a washer/dryer, a fridge/freezer and a dishwasher.

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.

Assessing the project against Part L 2021 emissions data, 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 by over **10%.**

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 air source heating and DHW systems and a 2.2Kwp PV array at roof top level.

This would result in an overall improvement in emissions over the Building Regulations Part L standards for regulated emissions of minimum of **65%**.

Accordingly, the project would be compliant with the Local Plan Policies 31 and 32 relating to energy efficiency and climate change adaptation.

Appendix A

Part G Internal Water Use

Job no:	24178
Date:	Jan-24
Assessor name:	Neil Ingham
Registration no:	STRO010583
Development name:	93 Epsom Road
Issue Date:	24/01/2024

Rainwater **Greywater** **Results**

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS

(for use with the Code for Sustainable Homes issues Wat 1 for the May 2009 and subsequent versions)

Dwelling Description	New Semi-detached dwelling

1st step - Select from options below:

Is a Rain and/or Greywater system specified?	**No**
Is a shower AND bath present?	**Yes**
Has a washing machine been specified?	**No**
Has a dishwasher been specified?	**No**

2nd step - Build spreadsheet (click button below)

BUILD SPREADSHEET

As soon as this button is pressed the spreadsheet will change according to the options selected previously in the 1st step. Scroll down to see the changes.

3rd step - Enter consumption details for the specified fittings

TAPS (excluding kitchen taps)	**Fitting type**	**Flow rate (litres/min)**	**Number of fittings**
1	Basins	5.50	3
2			
3			
4			
		Proportionate flow rate (litres/min)	3.85

	Consumption / person / day (Litres)		10.27

BATHS	Fitting type	Capacity to overflow (litres)	Number of fittings
1	Bath	155.00	1
2			
3			
4			
	Proportionate capacity to overflow (litres)		108.50
	Consumption / person / day (Litres)		17.05

SHOWERS	Fitting type	Flow rate (litres/min)	Number of fittings
1	Shower	9.00	2
2			
3			
4			
	Proportionate flow rate (litres/min)		6.30
	Consumption / person / day (Litres)		39.33

DISHWASHER	
Where no dishwasher is specified, a default consumption figure of 1.25 litres per place setting is used.	
Consumption / person / day (Litres)	4.50

WASHING MACHINES	Number of fittings
Where no washing	

machine is specified, a default consumption figure of 8.17 litres per kilogram of dry load is used.	
Where no washing machines have been specified but plumbing for future supply of grey/rainwater was installed, please enter details:	
Consumption / person / day (Litres)	17.16

WC's	Fitting Type	Flush Type	Volume**	Number of fittings
1	Toilet	Full Flush	5.00	3
		Part Flush	3.00	
2		Full Flush		
		Part Flush		
3		Full Flush		
		Part Flush		
4		Full Flush		
		Part Flush		
		Average effective flushing volume (litres)		3.66
		Consumption / person / day (Litres)		16.18

KITCHEN SINK TAPS	Fitting Type	Flow rate (litres/minute)	Number of fittings
1	Kitchen	6.00	1
2			
3			
4			
	Proportionate flow rate (litres/min)		4.20
	Consumption / person / day (Litres)		13.00

WASTE DISPOSAL UNIT	
Is a waste disposal unit specified for the dwelling?	No
Consumption / person / day (Litres)	0.00

WATER SOFTENER

Water Softener in use?	No
Total capacity used per regeneration (%)	
Water consumed per regeneration (litres)	
Average number of regeneration cycles per day (No.)	
Number of occupants served by the system (No.)	
Water consumed beyond 4% person / day (Litres)	**0.00**

4th step - Analyse Results

Go to Start

INTERNAL WATER CONSUMPTION

NET INTERNAL WATER CONSUMPTION	(litres/person/day)	**117.49**
RAINWATER ONLY COLLECTION SAVING	(litres/person/day)	**0.00**
GREYWATER ONLY RECYCLING SAVING	(litres/person/day)	**0.00**
RAIN/GREYWATER COLLECTION SAVING (combined system)	(litres/person/day)	**0.00**
NORMALISATION FACTOR	(litres/person/day)	**0.91**
TOTAL WATER CONSUMPTION	(litres/person/day)	**106.9**
	CSH CREDITS ACHIEVED	**2**
	CSH MANDATORY LEVEL:	**Level 1/2**

17. K COMPLIANCE

EXTERNAL WATER USE	(litres / person / day)	5.00
TOTAL WATER CONSUMPTION	(litres / person / day)	**111.9**
	17. K COMPLIANCE?	**Yes**

PRINTING: before printing please make sure that in "Page Setup" you have selected the page to be as "Landscape" and that the Scale has been set up to 75% (maximum)