Energy and Sustainability Statement

1 Hampshire Street, London, NW5 2TE

BE0969

Prepared on Behalf of:
Redtree Ventures Ltd

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Executive Summary

This report has been produced on behalf of Redtree Ventures Ltd to demonstrate how the application for the construction of a multi-use residential and commercial scheme at 1 Hampshire Street, London, NW5 2TE will address the carbon reduction and sustainability targets set by the Greater London Authority (GLA) and the London Borough of Camden.

The Energy Assessment demonstrates that the proposed specification achieves a reduction of **35.11%** in on-site regulated emissions, exceeding the target of 35% beyond Building Regulations requirements. This has been achieved by following the GLA's Energy Hierarchy.

The carbon savings achieved by the proposed development are shown at each stage of the Energy Hierarchy in the tables and figures below. These have been calculated and presented in accordance with the guidance set by the GLA.

	Carbon dioxide emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	18.86	6.13
After energy demand reduction	18.37	6.13
After heat network / CHP	18.37	6.13
After renewable energy	12.26	6.13
Carbon Dioxide Emissions after each stage of the Energy Hierarchy for new build domestic buildings [GLA Table 1].		

	Regulated Carbon dioxide savings	
	(Tonnes CO_2 / annum)	**(%)**
Savings from energy demand reduction	0.49	2.59
Savings from heat network / CHP	0.00	0.00
Savings from renewable energy	6.11	32.42
Cumulative on site Savings	**6.60**	**35.01**
Annual Savings from off-set payment	12.26	
	(Tonnes)	
Cumulative savings for off-set payment	367.79	
Regulated carbon dioxide savings from each stage of the Energy Hierarchy for new build domestic buildings [GLA Table 2].		

	Carbon dioxide emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline Emissions	6.62	7.50
After energy demand reduction	5.87	7.50
After heat network / CHP	5.87	7.50
After renewable energy	4.28	7.50
Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings [GLA Table 3].		

	Regulated Carbon dioxide savings	
	(Tonnes CO_2 / annum)	**(%)**
Savings from energy demand reduction	0.76	11.46
Savings from heat network / CHP	0.00	0.00
Savings from renewable energy	1.59	23.96
Total Cumulative Savings	**2.35**	**35.42**

Regulated carbon dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings [GLA Table 4].

	Annual Shortfall (Tonnes CO_2)	**Cumulative Shortfall (Tonnes CO_2)**
Total Target Savings	2.32	0.00
Shortfall	0.00	0.00

Shortfall in regulated carbon dioxide savings (non domestic only) [GLA Table 5].

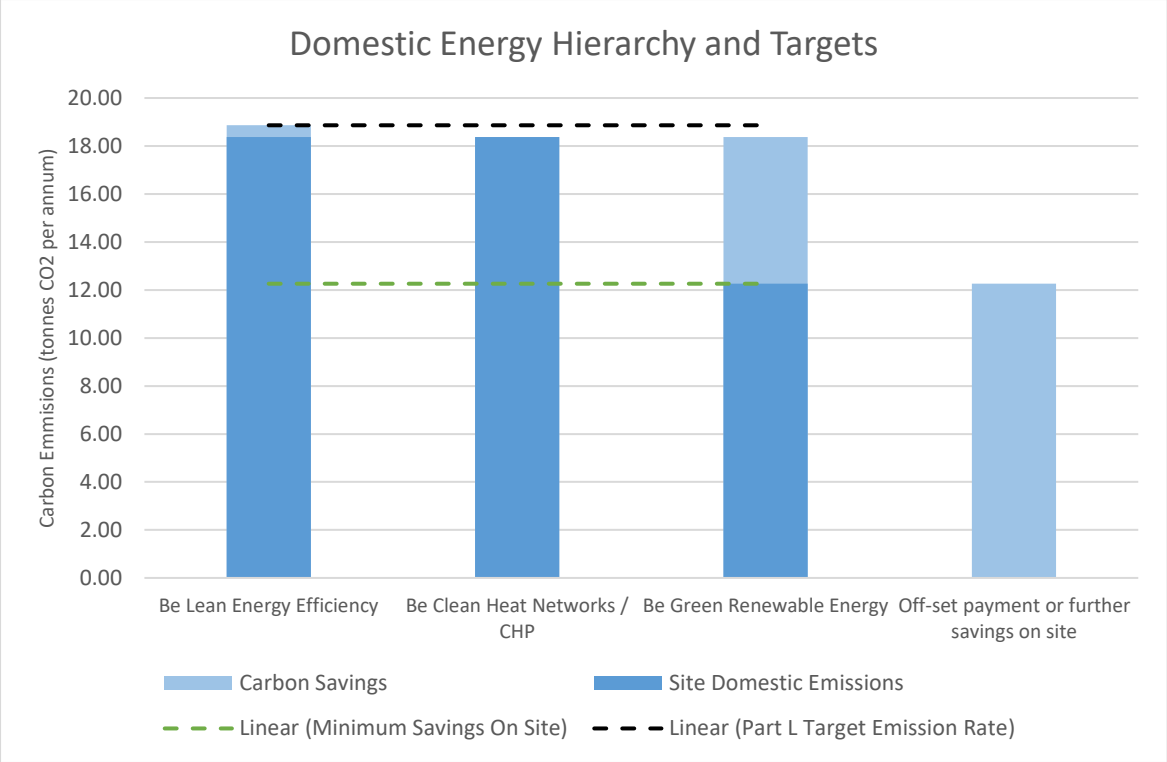
	Total regulated emissions (Tonnes CO_2/year)	**CO_2** Savings (Tonnes CO_2 / Year)	**Percentage Saving (%)**
Part L 2013 Baseline	25.49		
Be Lean	24.24	1.25	4.90
Be Clean	24.24	0.00	0.00
Be Green	16.54	7.70	30.22

	CO_2 savings off-set (Tonnes CO_2)
Off-set	367.79

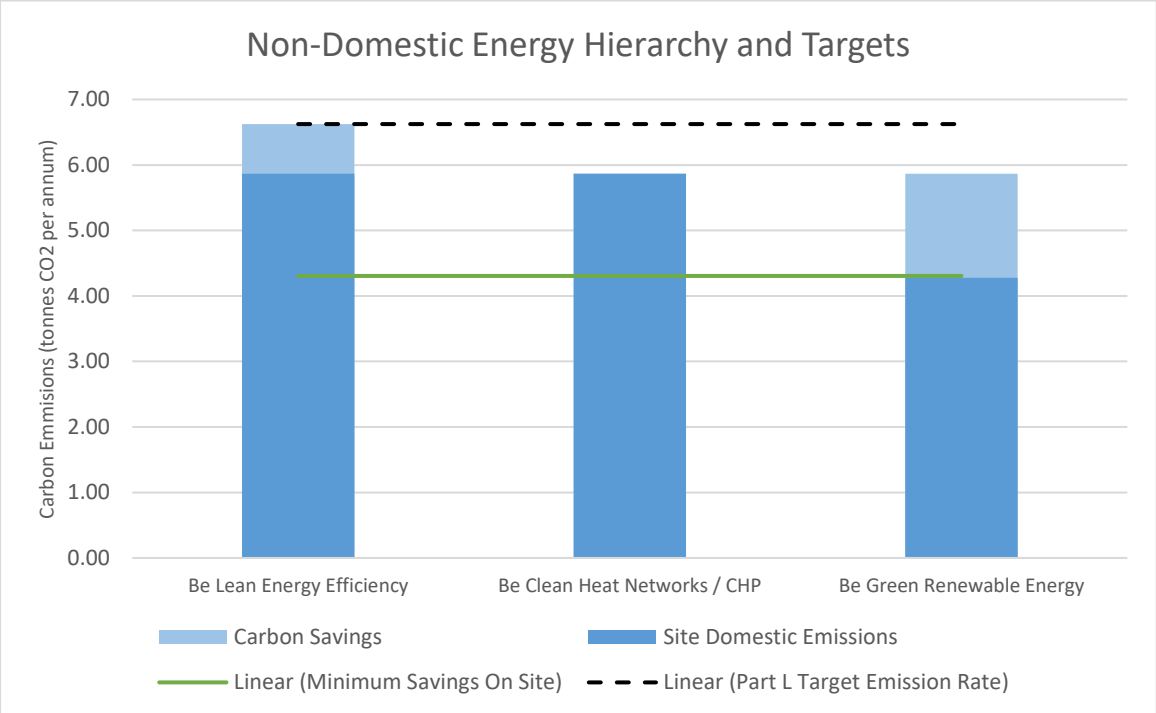
Site wide regulated carbon dioxide emissions and savings [GLA Table 6].

	CO_2 savings (Tonnes CO_2/year)	**Percentage Saving (%)**
Total Savings	**8.95**	**35.11**

Final Total and Percentage Savings.



The Domestic Energy Hierarchy [GLA Figure 1].



The Non-domestic Energy Hierarchy [GLA Figure 2].

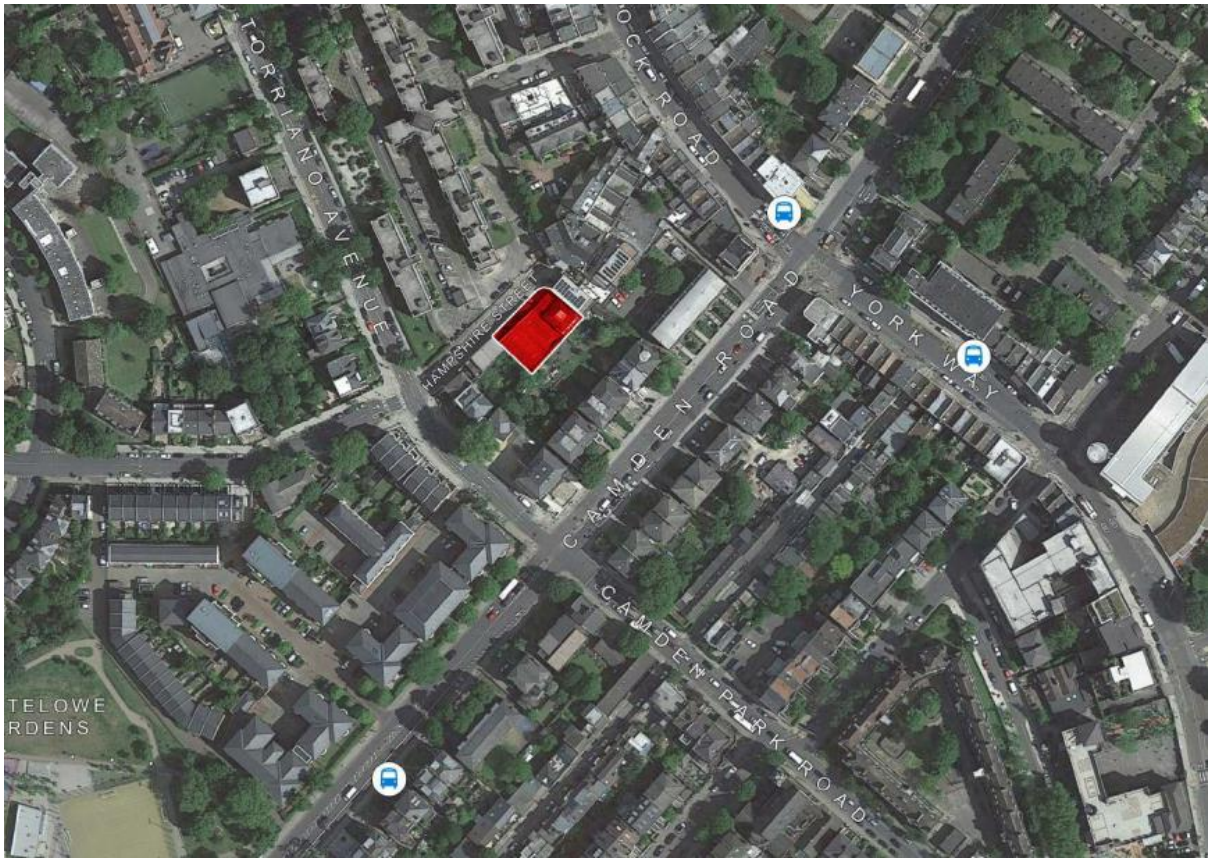
An overheating assessment has been carried out through SAP 2012, finding the proposed development to be compliant and posing a not significant/slight risk of overheating. Additional assessments of overheating risk have been undertaken using Dynamic Thermal Modelling.

A Sustainability Statement has been prepared to demonstrate a commitment to enhance the environmental performance of the development. This includes the specification of materials, waste reduction, biodiversity, and internal water use limited by design to 105 L/p/d (litres per person per day).

Introduction to the Proposed Hampshire Street Development

The proposed development involves the demolition of two existing two storey buildings which currently form one commercial unit and construct a four-storey mixed use residential/commercial building. The proposed new development will consist of three commercial units on the ground floor with sixteen flats varying in size – 1 bedroom, 2 bedrooms and 3 bedrooms, spanning three floors. All will have access to a private terrace.

1 Hampshire Street is situated in the Kentish Town Ward of the London Borough of Camden and lies 4.5km North of the city of London. Hampshire Street is off Torriano Avenue (part of the A5200 Road), which begins where Camden Park Road meets Camden Road and runs north terminating at Brecknock Road. Hampshire Street is a cul-de-sac and runs parallel to Camden Road, 80m to the south east. The closest commercial centre to the site are Brecknock Road into York Way, 100m to the north east and Kentish Town Road, 700m west of the site, almost parallel to Torriano Avenue.



The proposed development is a car free site with a dedicated bike store for 26 bikes which meets Camden's requirement of 1 space per 1-2-bedroom dwelling. Car parking spaces are available opposite the site and the site also has a PTAL rating of 5 which denotes a high level of frequent and nearby public transport options. The bus routes 390 and the 393 run along Brecknock Road and York Way. The 29, N29, 253, N253 and N279 all run along Camden Road, with stops for all less than five minutes' walk from Hampshire Street. The closest tube Station is Caledonian Road, 900m to the east, the closed railway station is Kentish Town, 700m west of the site.

Energy Assessment

This assessment has been prepared in accordance with 'Energy Planning – Greater London Authority guidance on preparing energy assessments (March 2016)'. It outlines the measures and specification proposed to achieve a reduction of **35.11%** over Part L of the Building Regulations through the Energy Hierarchy, meeting the on-site targets set by the GLA and the London Borough of Camden.

The Executive Summary of this report contains graphs and tables demonstrating carbon dioxide emissions and regulated carbon dioxide savings at the Hampshire Street project at each stage of the Energy Hierarchy.

Summary of Targets

Greater London Authority (GLA) Targets

For major developments, the GLA sets targets for reduction in carbon dioxide (CO_2) emissions above those required by Part L of the Building Regulations. A major development is defined in The Town and Country Planning (Development Management Procedure) (England) Order 2010 as one meeting any one of the following criteria:

- The number of dwellings provided is **ten or more.**
- The floor space to be created by the development is **1,000m^2 or more.**
- The development is carried out on a site having an area of **1 hectare or more.**

The target set by the GLA for major new build domestic developments is Zero Carbon (100% over Part L1a of the Building Regulations). This must be achieved with a minimum saving of 35% on site.

Targets set by the London Borough of Camden

In the case of a minor development, it is the responsibility of the Local Authority to set a target, in this case the London Borough of Camden.

Targets Applicable to Hampshire Street

The proposed Hampshire Street scheme is defined as a major development under the criteria described above, and so targets set by the GLA / the London Borough of Camden apply.

As such there is a **35%** target reduction in CO_2 emissions over Part L of the Building Regulations through on site solutions following the Energy Hierarchy.

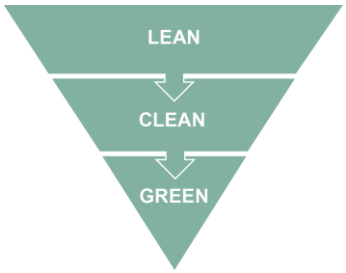
Of this, **20%** must be found using renewable technology in accordance with the polices of the London Borough of Camden.

Establishing CO_2 Emissions

This assessment seeks to identify the carbon footprint of the Hampshire Street development after each stage of the Energy Hierarchy. This includes regulated emissions and, separately, those emissions associated with uses not covered by Building Regulations i.e. unregulated emissions. The methodologies for calculating emissions in this report have been taken from GLA guidance on preparing energy statements.

The GLA describes the Energy Hierarchy as follows:

- Baseline Emissions: Compliance with the relevant Part L 2013 Building Regulations only
- Be Lean: Energy demand reduction
- Be Clean: After heat network / CHP
- Be Green: After renewable energy generation



Calculating Regulated CO_2 Emissions for a Part L 2013 Compliant Development

This assessment has established baseline regulated CO_2 emissions using approved compliance methods as follows:

- SAP 2012 for Dwellings
- SBEM / Dynamic Simulation Modelling for Non-Domestic Buildings

When determining this baseline, it has been assumed that the heating would be provided by 89.5% efficient gas boilers for residential and 91% for non-residential with controls aligned with the Part L notional building assumptions, and that any active cooling present in the final design specification would be provided by electrically powered equipment.

Reporting from SAP, SBEM or DSM software presents CO_2 emissions as kg/m^2/year. The GLA has specified a methodology for converting these figures into tonnes of CO_2 per annum for comparisons as follows:

- For each non-domestic building, the Target Emissions Rate (TER) should be multiplied by its floor area to provide the related regulated CO_2 emissions.
- For each representative dwelling, the related TER is multiplied by the cumulative floor area for that dwelling type to establish the related regulated CO_2 emissions.
- The CO_2 emissions for each non-domestic building and dwelling type are then summed to give the total regulated emissions for the development.

Samples representing all proposed plots have been modelled for the purposes of this report. There are three non-domestic units proposed.

The baseline levels of emissions in tonnes of CO_2 per year are shown below:

Type	**Total (Tonnes CO_2 / Year)**
Domestic New Build Regulated Emissions	18.86
Non-Domestic New Build Regulated Emissions	6.62
Total (Site Wide)	25.49

Baseline Emissions (Approved Part L Software)

The GLA stipulates that the emissions factors used in this assessment must be those adopted for Part L 2013 of the Building Regulations at the time of application. As approved software uses those emissions factors which are presently adopted, this requirement has been met.

Calculating Regulated CO_2 Emissions at Each Stage of the Energy Hierarchy

The methodology described within the GLA's guidance on preparing energy statements has been followed for measuring regulated CO_2 emissions at each stage of the hierarchy. This methodology is as follows:

- For dwellings, the Dwelling CO_2 Emissions Rate (DER) is calculated through the Part L 2013 of the Building Regulations methodology SAP 2012. This is then multiplied by the cumulative floor area for the particular dwelling type in question to give the related CO_2 emissions. A representative sample must be modelled.

- For non-domestic buildings, a Building CO_2 Emissions Rate (BER) calculated through the Part L 2013 of the Building Regulations methodology based on the National Calculation Methodology (NCM) and implemented through SBEM 15 v5.2d or later or equivalent software. For each building, the related BER is multiplied by its floor area to give the related carbon dioxide emissions.

This is repeated at each stage of the Energy Hierarchy as regulated emissions are reduced through changes in specification from the baseline.

Unregulated CO_2 Emissions

Unregulated emissions are those which are not assessed under Part L of the Building Regulations, nor measured via SAP or SBEM. In dwellings, these typically result from cooking or use of appliances. Non-domestic sources are more varied but include uses such as catering, computing, etc.

The GLA states that unregulated emissions are not to be included in methods for calculating baseline emissions, targets or reductions, but instead presented separately. These are shown below:

Type	**Total (Tonnes CO_2 / Year)**
Domestic New Build	6.13
Non-Domestic New Build	7.50
Total (Site Wide)	13.63

Unregulated Emissions

Methodology for Calculating Unregulated Emissions

The GLA recommend that 'BRE Domestic Energy Model (BREDEM) or a similar methodology' is used for dwellings, though unfortunately no calculator tools are currently available to implement BREDEM. Build Energy has sought the advice of John Henderson of BRE (co-author of the 2012 edition of the BREDEM model), who advises that other BRE tools are more suitable.

Build Energy have proposed to use BRE CSH tools, and the GLA have confirmed that this method is acceptable to them on the basis that they are similar to BREDEM.

For non-dwellings, unregulated emissions are established by using individual end use figures (for example catering and computing) from CIBSE guide baselines.

Demand Reduction (Be Lean)

The following section of the report outlines measures which have been taken to reduce the energy demand of the Hampshire Street proposal. This includes both architectural and building fabric measures (passive design) and energy efficient services (active design), considered at the earliest design stage.

Demonstrating CO_2 Savings from Demand Reduction Measures

Active design measures to reduce energy demand are described by the GLA as including high efficiency lighting and ventilation. Other possible measures include enhanced U-value numbers, air tightness improvement and the development's approach to limiting thermal bridges. The specification for these items as proposed for the Hampshire Street project is outlined below:

Demand Reduction Measures	**Specification**
Building Fabric - U-Values (W/m²K)	
Walls	0.18
Floors	0.13(Divided by 2 as exposed floor-achieving 0.065W/m2k)
Roofs - Flat	0.11
External Doors Domestic (Whole Frame)	1
Non-domestic external doors (Whole frame)	1.4
Windows (Whole Frame)	1.4
Building Fabric - Other	
Air Permeability (m^3/hm^2)	5.0
Thermal Bridging	Accredited Construction Details Throughout Domestic
Services	
Ventilation	Natural
Lower Energy Lighting	100%

Specification for 'Be Lean' Case

Where is has not been possible to specify CHP or district heating networks, GLA guidance requires that the final heating and cooling specification has also been modelled under the 'Be Lean' case. Accordingly, this has been included and is as follows. A full analysis of the viability of CHP and heat networks, as well as selection and specification in accordance with Policy 5.6B of the London Plan, follows under 'Be Clean'.

Element	Specification
Heating Infrastructure residential	
Type	Mains gas boiler.
Efficiency	89.50%
Controls	Time and Temperature Zone Controls
Heat Recovery	Waste Water Heat Recovery
Heating Infrastructure non-residential	
Type	Mains gas boiler.
Efficiency	91%
Controls	Aligned with Part L notional building assumptions

Specification for 'Be Lean' Case (Countinued)

The carbon produced and reductions achieved by the Hampshire Street project when this specification is applied are shown below. SAP 2012 output documents including DER worksheets for the 'Be Lean' scenario are also provided within the appendices of this report.

Type	**(Tonnes CO_2 / Year)**		**Improvement (%)**
	Baseline	Be Lean	
Domestic New Build Regulated Emissions	18.86	18.37	2.59
Non-Domestic New Build Regulated Emissions	6.62	5.87	11.46
Total New Build Emissions	**25.49**	**24.24**	**0.27**
Total (Site Wide)	25.49	24.24	4.90

Emissions for Baseline and Lean Stages (Approved Part L Software)

As per GLA guidance, passive design measures, including optimising orientation and site layout, natural ventilation and lighting, thermal mass and solar shading, are set out in the Design and Access statement. These factors are also accounted for in SAP and SBEM calculations.

The glazing percentages of the Hampshire Street project are shown within the SAP documents which are included within the appendices of this report.

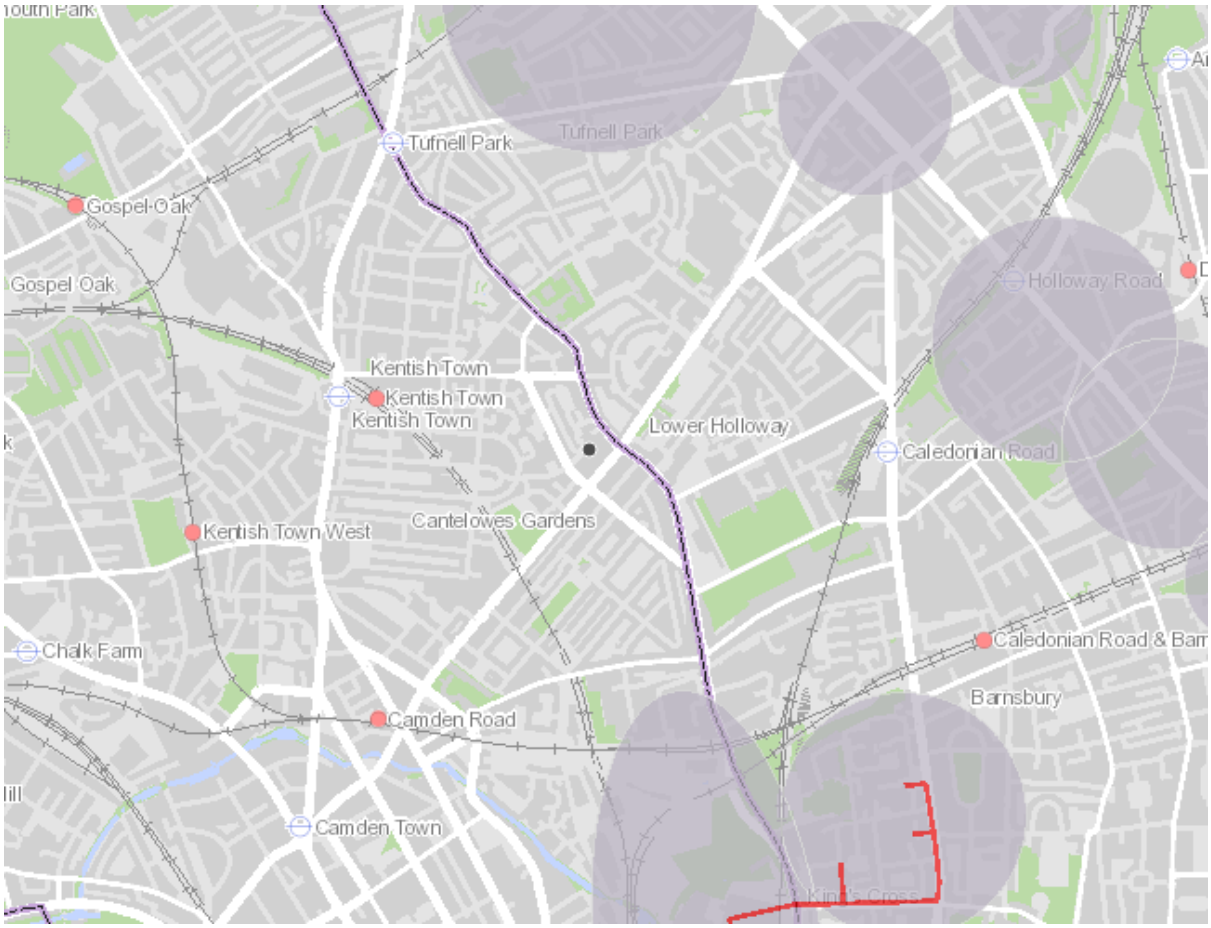
It is the intention of the applicant to provide smart meters to support the growth of demand side response.

Heating Infrastructure Including CHP (Be Clean)

The energy systems for use at the Hampshire Street development have been considered and selected in accordance with the order of preference in Policy 5.6B of the London Plan.

Connection to Area Wide Low Carbon Heat Distribution Networks

Using the London Heat Map as a guide, there are no existing or planned heat networks near the development, and as such the scheme is outside of the London Heat Map's areas of 'Heat Mapping Decentralised Energy Potential'. The screenshot below shows the location of the development. No existing or proposed networks are close enough to make it viable to connect. Decentralised Energy Potential areas are shown in purple.



Combined Heat and Power (CHP)

A Combined Heat and Power system (CHP) or cogeneration is the simultaneous generation of both heat and power (thermal energy and electricity). This is achieved through recovering heat generated in the production of electricity, which can be utilised in providing space heating and hot water.

The most common fuel used in the UK to power a CHP engine is natural gas although LPG, biogas, ethanol, methane, hydrogen, biofuel, oil or any fuel that can drive an engine can be used. A CHP operating on fossil fuels, e.g. gas, diesel, is not considered a renewable technology. A biomass CHP, however, is considered to be a renewable energy technology but it is only suitable for developments with larger heat and electricity demands.

A CHP system uses on average 35% less primary energy compared to conventional heat-only boilers and power stations approaching efficiencies as high as 75%. Although not a renewable technology, except if biomass is being used, CHP is considered very efficient, reducing carbon emissions related to a site's energy consumption while providing electricity and heat to occupiers.

The GLA does not recommend CHP for use in developments consisting of 500 units or less, as 'at this scale it is generally not economical'.

CHP installed at the Hampshire Street development to meet the base heat load would require the export of electricity to the national grid as it would likely exceed demand. The GLA continues to state that '…the administrative burden of managing CHP electricity sales at this small scale where energy service companies (ESCOs) are generally not active, and the low unit price available for small volumes of exported CHP electricity, means it is generally uneconomic for developers to pursue'.

CHP requires significant infrastructure and a substantial heat demand. In order to obtain maximum efficiency, it is necessary to have an energy demand profile which is evenly spread throughout the day and night. A CHP unit will operate efficiently when running continuously and so requires its energy to be used continuously to avoid wastage. This usage profile does not match that of the proposed development.

For these reasons the applicant is not specifying a CHP system for the Hampshire Street development.

Proposed Heating and Cooling Specification

As neither CHP nor connection to a heat network has been found to be viable in accordance with the guidance from the Greater London Authority and Policy 5.6B of the London Plan, they do not form part of the proposed specification. The proposed heating and cooling specification for the domestic part of the development is shown instead under 'Be Lean'. The proposed heating and cooling specification for the 'Be Clean' non-residential part of the development would be:

- ASHP heating and cooling to offices
- Efficient lighting in all areas with absence detection and photocell dimming
- Mechanical ventilation with heat recovery

The carbon produced by the Hampshire Street project when this specification is applied is shown below. SAP 2012 output documents including DER worksheets for the 'Be Clean' scenario are also provided in the appendices of this report.

Type	**(Tonnes CO_2** / Year)			**Improvement (%)**
	Baseline	Be Lean	Be Clean	
Domestic New Build Regulated Emissions	18.86	18.37	18.37	0.00
Non-Domestic New Build Regulated Emissions	6.62	5.87	5.87	0.00
Total New Build Emissions	**25.49**	**24.24**	**24.24**	**0.32**
Total (Site Wide)	25.49	24.24	24.24	4.90

Emissions for Baseline, Lean and Clean Stages (Approved Part L Software)

Cooling and Overheating

The Cooling Hierarchy

Policy 5.9 of the London Plan states that 'major development proposals should reduce potential overheating and reliance on air conditioning systems, and demonstrate this in accordance with the cooling hierarchy'. Hampshire Street is considered a major development therefore, the developer will address the following as a matter of priority to reduce overheating risk and the requirement for active cooling:

1. Minimising internal heat generation through energy efficient design: For example, heat distribution infrastructure within buildings will be designed to minimise pipe lengths, particularly lateral pipework in corridors of apartment blocks, and adopting pipe configurations which minimise heat loss e.g. twin pipes.
2. Reducing the amount of heat entering the building in summer: For example, through use of carefully designed shading measures, including balconies, louvres, internal or external blinds, shutters, trees and vegetation.
3. Use of thermal mass and high ceilings to manage the heat within the building: Increasing the amount of exposed thermal mass can help to absorb excess heat within the building.
4. Passive ventilation: For example, through the use of openable windows, shallow floorplates, dual aspect units, designing in the 'stack effect'.
5. Mechanical ventilation: Mechanical ventilation can be used to make use of 'free cooling' where the outside air temperature is below that in the building during summer months. This will require a by-pass on the heat recovery system for summer mode operation.

It has not been considered necessary to specify air conditioning in line with the cooling hierarchy as set out in Policy 5.9.

Overheating Risk Analysis

An overheating assessment has been carried out as a part of the process to produce SAP calculations for the proposed domestic units. This assessment is related to the factors that contribute to internal temperature: solar gain (taking account of orientation, shading and glazing transmission), ventilation (taking account of window opening in hot weather), thermal capacity and mean summer temperature for the location of the dwelling. Full details of this methodology and relevant calculations can be found in the latest approved SAP document.

Using these criteria, the proposed Hampshire Street development has been found to be compliant with overheating rules within SAP, posing a not significant/slight risk of overheating.

Criterion 3 of the Part L2A gives details of a solar gain check that is made on each of the non-domestic zones. This is a 'limiting solar gain check', which looks at whether any zones are experiencing very high levels of solar gain which would could create the conditions for overheating or excessive cooling loads.

Based on the proposed glazing specification in the SBEM summary, all zones are currently within the solar gain limit.

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Commercial Unit 1	NO (-69%)	NO
Commercial Unit 2	NO (-33%)	NO
Commercial Unit 3 - North Perimeter	NO (-56%)	NO
Commercial Unit 3 - South Perimeter	NO (-67%)	NO
Commercial Unit 3 - Non-Perimeter	NO (-69%)	NO

It is proposed that mechanical cooling will be installed in the commercial units at fit-out stage, so the value of compliance with Criterion 3 in this case is that it ensures that cooling systems will not be dealing with excessively high levels of solar gain, thus reducing energy use and associated emissions.

This is reinforced by the fact that the projected cooling energy consumption in the BRUKL for the 'Actual' building is lower than that of the 'Notional' building.

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	6.81	7.35
Cooling	5.57	8.86
Auxiliary	5.9	3.47
Lighting	15.5	20.48
Hot water	2.89	3.17
Equipment*	41.87	41.87
TOTAL**	**36.67**	**43.33**

It is expected by the GLA that Dynamic Thermal Modelling of the overheating risk will be undertaken to support this energy assessment. Build Energy have provided these in the appendices of this report.

Renewable Energy (Be Green)

The use of renewable technology in the proposed design of the Hampshire Street development has been fully considered as outlined in Appendix A.

Photovoltaic solar panels have been identified as a suitable technology for incorporation into the design. The proposed system will provide 13.64kWp serving the domestic plots, with a further 3.4kWp serving the non-domestic space.

Due to limited roof space, solar hot water cannot be used effectively alongside photovoltaic arrays. Accordingly, it is considered preferable to install photovoltaic arrays in the available space identified, as these represent a greater carbon saving. Due to the size of the proposed project, biomass energy has not been considered as an economically suitable technology for this development. Due to outdoor space constraints and noise considerations, heat pumps are also not considered feasible.

The carbon produced by the Hampshire Street project when this specification is applied is shown below. The results of these improvements show a **35.11%** reduction in emissions over the Part L compliant base case, exceeding the target.

Type	**(Tonnes CO_2 / Year)**				**Improvement (%)**
	Baseline	Be Lean	Be Clean	Be Green	
Domestic New Build Regulated Emissions	18.86	18.37	18.37	12.26	35.01
Non-Domestic New Build Regulated Emissions	6.62	5.87	5.87	4.28	35.42
Total New Build Emissions	**25.49**	**24.24**	**24.24**	**16.54**	**35.11**
Total (Site Wide)	25.49	24.24	24.24	16.54	35.11

Final Emissions for Baseline, Lean, Clean and Green Stages (Approved Part L Software)

Carbon Offsetting

This report demonstrates that it is possible to reduce the regulated on-site carbon dioxide emission of the proposed Hampshire Street development by 35.11% over Part L of the Building Regulations with the specification described, based on the modelling undertaken.

This reduction meets the required target of 35% in on site savings. However, as the Hampshire Street development is a major scheme containing new build homes, these are also required to comply with Zero Carbon Homes targets introduced by the GLA in October 2016. The remaining regulated carbon dioxide emissions for these dwellings are to be off-set through a cash in lieu contribution to the London Borough of Camden, with the funds to then be allocated to secure delivery of carbon dioxide savings elsewhere.

The total tonnes of CO_2 predicted to be produced by the new dwellings over a 30-year period are demonstrated above in *Regulated carbon dioxide savings from each stage of the Energy Hierarchy for new build domestic buildings [GLA Table 2]* (labelled 'Cumulative savings for off-set payment'). These have been calculated using the tables and methodologies required by the GLA. It is not necessary to multiply this figure by an assumed lifecycle as this has already taken place.

To calculate the required offset payment this figure must be multiplied by the boroughs preferred price per tonne. The Mayor's Housing Standard's Viability Assessment assumes a carbon off-set price of £60 per tonne of carbon dioxide.

Monitoring

The applicant will consider options for post occupancy monitoring of the Hampshire Street development in accordance with advice from the GLA's Supplementary Planning Guidance. It is the intention of the applicant to provide smart meters at the Hampshire Street development to support the growth of demand side response.

Sustainability Statement

The report so far has sought to address the energy and sustainability concerns outlined within 'Energy Planning - Greater London Authority guidance on preparing energy assessments'. The following section of this report looks to address issues not covered within this document, but where there may be additional requirements set by the GLA, the London Borough of Camden or where additional steps to consider sustainability during the design.

Internal Water Use

It is the intention of the applicant to reduce the consumption of potable water within the proposed dwellings from all sources, using efficient fittings and flow restrictors where required.

Performance in domestic properties will be assessed under the methodologies set out in Part G of the Building Regulations and the former Code for Sustainable Homes, achieving a maximum internal water use of **105 L/p/d** (litres per person per day) by design.

Although a variety of specifications are available to meet this target, the proposed flow rate criteria for dwellings at the Hampshire Street development has been chosen as follows:

Fitting	**Flow Rate / Capacity**
Sanitary Fittings	
Dual Flush WC	4 litres per minute (full).
	2.6 litres per minute (part).
Taps (Main)	5 litres per minute.
Bath (if present)	170 litres to overflow.
Shower	8 litres per minute.
Taps (Kitchen / Utility)	6 litres per minute.
Appliances	
Washing Machine	8.17 litres per kilogram (dry load).
Dishwasher	1.25 litres per place setting.

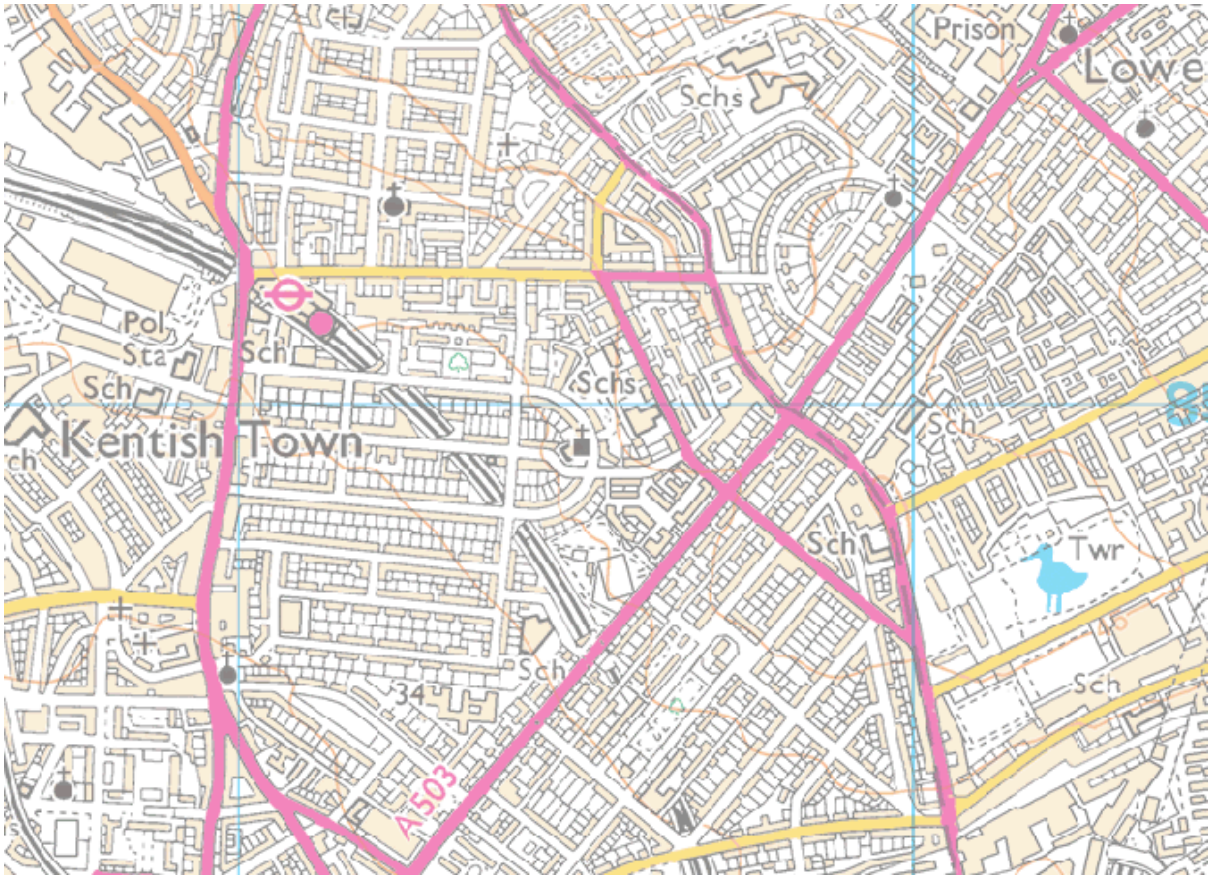
Proposed Fittings to Achieve 105/L/p/d for each dwelling proposed.

This is compliant with Policy 5.15 B (Water Use and Supplies) of the London Plan, which states that developers should minimise the use of mains water by:

A. Incorporating water saving measures and equipment.
B. Designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day (excluding an allowance of 5 litres or less per head per day for external water consumption).

Flood Risk

Data and mapping from the Environment Agency indicates that the site is not within a floor risk area.



Environment Agency flood risk map for 1 Hampshire Street, London, NW5 2TE.

Areas of the map without blue shading indicate that flooding from rivers and the sea is very unlikely, with a less than a 0.1% (1 in 1000) chance of flooding occurring each year. This is often referred to in planning documents as Flood Zone 1, and is typical of the majority of England.

Surface Water Runoff

As the proposed development replaces an existing building, the development will result in a neutral impact to ground floor area and surface water runoff rates. Opportunities to improve surface water runoff from the development is limited by the lack of outdoor space.

A Sustainable Drainage Systems and Flood Risk Assessment have been carried out separately to demonstrate compliance with GLA or borough policy.

Materials and Waste Reduction

Sustainable Specification

Materials will be chosen to lower the environmental impact of the Hampshire Street development wherever possible. BRE's Green Guide will be consulted when finalising specifications of products and element build types. This applies primary to:

- Roofs
- External walls
- Internal walls (including separating walls)
- Upper and ground floors (including separating floors)
- Windows

In all cases, it is the applicant's intention to secure Green Guide ratings of between A+ and D, exceeding the requirements of the former Code for Sustainable Homes.

All timber used during the development will come from a 'legal source' and will not be on the CITES list, or in the case of Appendix III of the CITES list, it will not have been sourced from a country seeking to protect this species as listed in Appendix III.

To promote the reduction of emissions of gases with high Global Warming Potential (GWP) associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials, products will be chosen with a GWP of <5 wherever possible.

Wherever possible, products will be chosen which comply with additional voluntary industry standards for responsible sourcing, including FSC Chain of Custody and BES 6001:2008 Framework Standard for Responsible Sourcing of Construction Products certifications where applicable.

Products such as paints and vanishes will be sourced to minimise the use of Volatile Organic Compounds (Formaldehyde, VCM, etc.).

Minimising Site Waste

A Site Waste Management Plan (SWMP) will be created to include procedures, commitments for waste minimisation and diversion from landfill, as well as setting target benchmarks for resource efficiency in accordance with guidance from:

- DEFRA (Department for Environment, Food and Rural Affairs)
- BRE (Building Research Establishment)
- Envirowise
- WRAP (Waste & Resources Action Programme)
- Environmental performance indicators and/or key performance indicators (KPI) from Envirowise or Constructing Excellence.

The applicant will seek to establish a 'take back' scheme from suppliers in order to avoid the unnecessary waste of excess materials. Care will also be taken to minimise loss through breakage etc. following guidance from the Waste and Resources Action Programme (WRAP) and others.

The London Borough of Camden requires that developers aim to source at least 15-20% of the total value of materials used during the construction phase of the build from recycled or reused sources. This target will be incorporated into the SWMP.

Biodiversity

The presence of any significant ecological features as defined using guidance from BRE will be noted, and the appropriate measures for protection and conservation undertaken before works begin. Features to promote biodiversity, such as bird and bat boxes will be incorporated into the design wherever feasible.

The proposed development is not within a conservation area and no trees are currently on site. The development proposes a green roof to be installed which will provide a habitat for micro ecosystems, which in turn, provide habitat for all types of wildlife.

Conclusion

This report outlines how a variety of sustainability criteria have been considered and solutions successfully incorporated into the proposed design of the development.

Based on the modelling undertaken, it has been demonstrated that it is possible to reduce regulated on-site carbon dioxide emissions of the proposed Hampshire Street development by **35.11%** over Part L of the Building Regulations, where the building and services specification described in this report is implemented. This is sufficient to meet the target of 35%, and is therefore compliant with the carbon reduction policies of both the GLA and the London Borough of Camden. Of this reduction, 20% has been provided by the use of renewables in accordance with the policies of the London Borough of Camden.

This has been achieved by following the Energy Hierarchy in accordance with guidance from the GLA. Fabric performance has been improved to meet and surpass the requirements of Part L of the building regulations, whilst heating and hot water equipment and controls have been chosen to maximize carbon savings. Photovoltaic panels have been incorporated into the design to provide 13.64kWp serving the domestic plots, with a further 3.4kWp serving the non-domestic space.

Additional efforts to enhance the environmental performance of the development include the specification of materials, waste reduction, biodiversity, and internal water use limited by design to 105 L/p/d (litres per person per day).

Appendices

Appendix A – Consideration of Renewable Technology
Appendix B - BRUKL-Baseline & Be Lean
Appendix C - BRUKL-Be Green
Appendix D – Summary of SBEM Input Parameters
Appendix E – SAP-Be Clean
Appendix F – SAP-Be Lean
Appendix G – SAP-Be Green
Appendix H – Part G water calculation