Energy and Sustainability Statement

155 Drummond Street, London, NW1 2PB

Prepared on behalf of:
plat-from

BE 1921

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V3	04/09/2020	Sean Mills	Pete Mitchell	Revised scheme

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Contents

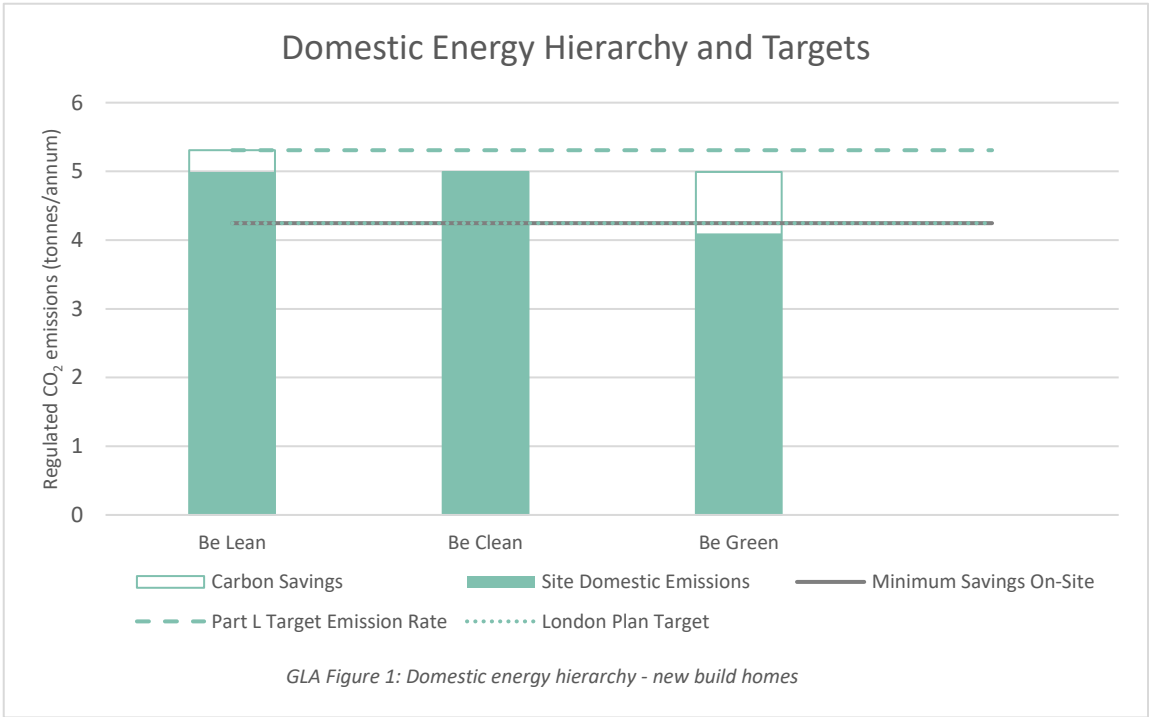
Executive Summary

This report has been produced on behalf of plat-from to demonstrate how the application for creation of four new homes at 155 Drummond Street, London, NW1 2PB will address the carbon reduction and sustainability requirements set by the Greater London Authority (GLA) and The London Borough of Camden.

The energy assessment has been prepared in accordance with 'Energy Planning – Greater London Authority guidance on preparing energy assessments (October 2018)' and local guidance documents from The London Borough of Camden. Additional civic and local sustainability criteria are also addressed. The report demonstrates that the proposed specification achieves a reduction of **22.85%** in on-site regulated emissions, meeting the target of 20% beyond Building Regulations requirements.

This has been achieved by following the GLA's Energy Hierarchy. Demand reduction measures have been implemented including improved U-values, construction methods for the avoidance of thermal bridging and the improvement of air tightness, and more efficient controls. The energy systems for use at the development have been considered and selected in accordance with the order of preference described by the GLA. Finally, after full consideration of the suitability of renewable technology, photovoltaic panels have been incorporated into the design. The proposal is for 8.32kWp.

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



GLA Figure 1: Domestic energy hierarchy - new build homes

Summary of Carbon Targets

The following reduction targets for regulated operational carbon emissions are applicable to the proposed development at 155 Drummond Street, London, NW1 2PB.

Targets set Nationally

Part L of the Building Regulations sets requirements for the conservation of fuel and power in buildings within England and Wales. Among other requirements, new buildings are expected to meet or exceed a TER (Target Emission Rate), a maximum level of regulated emissions expressed in kg of CO_2 per m^2 per year. There is no TER for buildings created from refurbishment or change of use.

Targets set by the GLA (Greater London Authority)

For major developments, the GLA sets targets for reduction in carbon dioxide (CO_2) emissions beyond 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 1,000 m^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 new build dwellings within major developments is Zero Carbon (100% over Part L1A of the Building Regulations). This must be achieved with a minimum saving of 35% on-site. The target for major new build non-domestic developments is 35% over Part L2A of the Building Regulations.

Certain additional criteria apply to developments which are referred to the Mayor. To be referable an application must meet one of three criteria outlined with the Mayor of London Order (2008):

- Include 150 domestic units or more.
- Be over 30 metres in height if outside of The City of London.
- Be on Green Belt or Metropolitan Open Land

The proposed 155 Drummond Street scheme does not meet these criteria and is therefore not a referable application.

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 155 Drummond Street

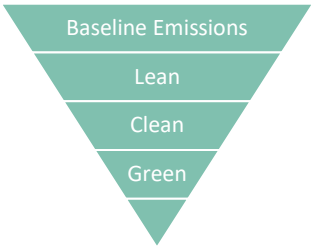
The proposed 155 Drummond Street scheme is defined as a minor non-referable development under the criteria described above, and so targets set by The London Borough of Camden apply. As such there is a **20%** target reduction in CO_2 emissions over Part L of the Building Regulations through on-site solutions following the Energy Hierarchy.

Establishing CO_2 Emissions

This assessment seeks to identify the carbon footprint of the 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 assessments.

The GLA describes the Energy Hierarchy as follows:

- Baseline Emissions: Compliance with the relevant Part L 2013 Building Regulations only
- Be Lean: Use less energy
- Be Clean: Supply energy efficiently
- Be Green: Use renewable energy



The carbon footprint of 155 Drummond Street at each stage of the Energy Hierarchy is demonstrated in the tables below:

Carbon dioxide emissions after each stage of the Energy Hierarchy for new build domestic buildings	Carbon dioxide emissions for domestic buildings (tonnes CO_2 / annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations compliant development	5.31	6.23
After energy demand reduction	4.99	6.23
After heat network / CHP	4.99	6.23
After renewable energy	4.09	6.23

Regulated carbon dioxide savings from each stage of the Energy Hierarchy for new domestic buildings	Regulated carbon dioxide savings	
	(Tonnes CO_2 / annum)	**(%)**
Be lean: Savings from energy demand reduction	0.31	5.92
Be clean: Savings from heat network	0.00	0.00
Be green: Savings from renewable energy	0.90	16.93
Cumulative on-site savings	1.21	22.85

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 outlined in SAP 2012 for dwellings.

When determining this baseline, it has been assumed that the heating would be provided by 89.5% efficient gas boilers and that any active cooling present in the final design specification would be provided by electrically powered equipment.

Reporting from SAP 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 representative dwelling, the related TER is multiplied by the cumulative floor area for that dwelling type to establish the related regulated CO_2 emissions.

Samples representing all proposed plots have been modelled for the purposes of this report. There are no non-domestic buildings proposed. The baseline levels of emissions in tonnes of CO_2 per year are shown below:

Cumulative savings after 'be lean'	(Tonnes CO2 / year)			
	Baseline	**Be lean**	**Be clean**	**Be green**
Domestic new build	5.31	-	-	-

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.

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

Carbon Emission Factors

Carbon emission factors are a measure of the carbon associated with each fuel type used within approved software, given in kg of CO_2 per kWh. These are changed routinely between versions of approved software. For example, the next version of SAP (known as SAP 10) will consider mains electricity to be less carbon intensive due the decarbonisation of the National Grid that has taken place since the launch of SAP 2012.

Until the expected launch of SAP 10, it is a requirement that the current SAP 2012 is used for assessment under Part L of the Building Regulations. For referable developments from January 2019, the GLA encourages applicants to use the emissions factors within SAP 10 in conjunction with SAP 2012 (see 5.1 of 'Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications - October 2018').

As the proposed development is not defined as a referable application it has been considered appropriate to used carbon emissions factors aligned with Part of the Building Regulations as per SAP 2012.

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:

Unregulated emissions

Type	Total (tonnes CO_2 / year)
Domestic new build	6.23

Methodology for Calculating Unregulated Emissions

The GLA recommend that 'BRE Domestic Energy Model (BREDEM) or a similar methodology' is used for dwellings, although unfortunately no calculator tools are currently available to implement BREDEM. Build Energy has sought the advice of BRE (authors 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.

Demand Reduction (Be Lean)

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

It is expected that all referable applications exceed the Building Regulations requirements through demand reduction measures alone. Although 155 Drummond Street is not a referable scheme, this has been achieved.

Demonstrating CO_2 Savings from Demand Reduction Measures

As per GLA guidance, passive design measures, including optimising orientation and site layout, natural ventilation and lighting, thermal mass and solar shading must be set out in the Design and Access statement. These factors are also accounted for in SAP calculations. 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-values, air tightness improvement and the development's approach to limiting thermal bridges. The specification for these items as proposed for the project is outlined below:

Specification at 'Be Lean' Stage	
Demand Reduction Measures	**Specification**
Building Fabric - U-Values (W/m^2K)	
Walls	0.18
Floors	0.13
Roofs	0.13
External opaque doors (whole frame)	1.0
Glazing (glazed doors, windows & rooflights (whole frame)	1.2
Building Fabric - Other	
Air Permeability (m^3/hm^2)	4.0
Thermal Bridging	Accredited Construction Details
Services	
Ventilation	MVHR
Low Energy Lighting	100% of fittings

The glazing areas of the project are shown within the SAP documents which are included within the appendices of this report. The specification of the building is such to ensure that Building Regulations compliance has been met through demand reduction measures alone. The table below demonstrates that TER has been exceeded (this is expressed in terms of $kgCO_2$ per m^2 of floor area per year).

Compliance with TER from Building Regulations Part L: Conservation of Fuel and Power	Average BER/DER	Average TER	Improvement (%)
Domestic new build	8.55	9.30	8.82%

SAP 2012 output documents including DER worksheets for the 'Be Lean' scenario are also provided within the appendices of this report. So that reductions arising from demand reduction measures alone can be understood, the GLA requires that for the purposes of the 'Be Lean' model, heating must be provided by gas boilers and any active cooling by electrically powered equipment. These are required to have an efficiency of 89.5% for domestic and 91% for non-domestic, with controls aligned with the Part L notional building assumptions. The carbon produced and reductions achieved by the project when the above specification is applied are shown below.

Cumulative savings after 'be lean'	(Tonnes CO_2 / year)				Cumulative Improvement (%)
	Baseline	Be lean	Be clean	Be green	
Domestic new build	5.31	4.99	-	-	5.92%

Energy Demand Reporting

Following the energy efficiency measures outlined above, the total energy demand in MWh/year is reported in the tables below.

Reporting total energy demand	Energy demand following energy efficiency measures (MWh/year)						
Building use	Space heating	Hot Water	Lighting	Auxiliary	Cooling	Unregulated electricity	Unregulated gas
Domestic - new build	6.03	9.01	0.30	1.86	0.00	10.63	0.00
Site total	6.03	9.01	0.30	1.86	0.00	10.63	0.00

For the domestic units, the total Part L Fabric Energy Efficiency Standard (FEES) is provided in the table below.

Reporting FEES	Target Fabric Energy Efficiency (MWh/year)	Design Fabric Energy Efficiency (MWh/year)	Improvement (%)
Development total	*13.37*	*11.59*	*13.33*

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'. Although 155 Drummond Street is considered a minor development, the developer will address the following as a matter of priority to reduce overheating risk and the requirement for active cooling:

1. **Minimise 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. **Reduce 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. **Manage the heat within the building through exposed internal thermal mass and high ceilings**
   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.

6. **Active cooling systems**
   If air conditioning is necessary, the lowest carbon options should be used.

Cooling demand has been reduced through addressing the first four measures which are considered passive measures. It has not been considered necessary to specify air conditioning nor mechanical ventilation for this development, thus fulfilling the objectives of policy 5.9 for major developments.

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 155 Drummond Street development has been found to be compliant with overheating rules within SAP, posing a 'medium' risk of overheating.

Heating Infrastructure (Be Clean)

The energy systems for use at the development have been considered and selected in accordance with 'Table 13: Hierarchy for selecting an energy system' within 'Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications - October 2018'. This supersedes the previous order of preference within Policy 5.6 (B) of the London Plan and omits the inclusion of CHP (Combined Heat and Power). The hierarchy is as follows:

- **Connection to an area wide heat network**. Where proposed developments are located near to existing or planned networks, connection must be prioritised.

- **Communal heating system**

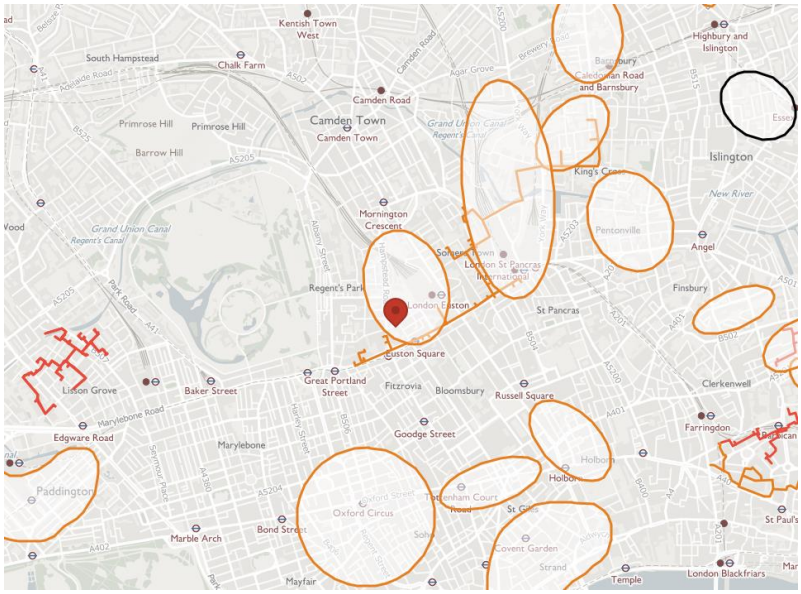
    - **Site-wide heat network**. Where proposed developments are located in areas of decentralised energy potential, but no heat networks currently exist or are planned, developers should provide a site-wide heat network served by a single energy centre to future proof the development for easy connection to a wider heat network in the future.

    - **Building-level heating system**. Appropriate for single building applications or low density developments with domestic blocks, where no district heating networks are planned or feasible.

- **Individual heating system**. Appropriate for low density individual housing, where no district heating networks are planned or feasible, and where evidence is provided that a site-wide heat network is uneconomic.

Connection to Area Wide Low Carbon Heat Distribution Networks

Using the London Heat Map as a guide, there are no existing networks near the development. Planned networks are shown in orange.



London heat map results for 155 Drummond Street

Site-wide Heat Networks & Building-level Heating System

A site-wide heat network is defined by the GLA as "a set of flow and return pipes circulating hot water to the apartment blocks (and apartments contained therein) and non-domestic buildings on a development." This must be explored where "proposed developments are located in areas of decentralised energy potential, but no heat networks currently exist or are planned". Due to the nature of the site and the absence of a plant room the applicant has expressed a preference for individual electrical systems and PV offset.

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 has also been removed from the GLAs hierarchy for selecting energy systems with the publication of within 'Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications - October 2018'. CHP installed at the 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 development.

Proposed Heating and Cooling Specification

Individual heating systems have been found to be viable in accordance with the guidance from the GLA and as such form part of the proposed specification. The proposed system is a individual ASHP (air source heat pump) providing heating and hot water. Details of this are given below. In accordance with the advice of the GLA, this is considered a renewable technology and modelled under "Be Green". The "Be Clean" model retains the previous HVAC assumptions.

Specification at 'Be Lean' Stage (Continued)

Element	Specification
Heating Infrastructure	
Type	5kw electric Air Source Heat Pump (ASHP)
Controls	Time and temperature zone controls
Hot water	From main

The carbon produced by the 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.

Cumulative savings after 'be clean'

	(Tonnes CO_2 / year)				Cumulative Improvement (%)
	Baseline	Be lean	Be clean	Be green	
Domestic new build	5.31	4.99	4.99	-	5.92%

Air Quality

All combustion processes can emit oxides of Nitrogen (NO_x), which can contribute to poor air quality and can have detrimental impacts on the health of local residents and future occupants of the development. The GLA has set emission limits for boilers, gas engines, turbines and solid and liquid biomass which need to be met in all developments. As the proposed systems are electric, no fossil fuels are consumed on site. As such there are no local emissions of NO_x. To assist the assessment of air quality impacts, the following table has been provided in accordance with guidance from the GLA:

Reporting air quality impacts

Building use	Total fuel consumption - domestic (MWh/year)	Total fuel consumption - non-domestic (MWh/year)
Grid electricity	27.82	0.00
Domestic or communal gas boilers	0.00	0.00
Gas CHP	0.00	0.00
Connection to an existing DH network	0.00	0.00
Other gas use (e.g. cookers)	0.00	0.00

Renewable Energy (Be Green)

The use of renewable technology in the proposed design of the 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 proposal is for a 8.32, facing south at a c.a. 30° pitch. This system is equivalent to an area of approximately 55m^2, depending upon the array and configuration chosen. The south facing roof space has been identified as suitable for this purpose during SAP/BRUKL modelling. Drawings of the proposed array will be available when finalised by the design team.

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. The carbon produced by the project when this specification is applied is shown below. The results of these improvements show a **22.85%** reduction in emissions over the Part L compliant base case, exceeding the target.

Cumulative final savings	(Tonnes CO_2 / year)				Cumulative Improvement (%)
	Baseline	Be lean	Be clean	Be green	
Domestic new build	5.31	4.99	4.99	4.09	22.85%

Carbon Offsetting

This report demonstrates that it is possible to reduce the regulated on-site carbon dioxide emissions of the proposed 155 Drummond Street development by 22.85% over Part L of the Building Regulations with the specification described, based on the modelling undertaken. This reduction meets the required target of 20%, as such there are no further requirements for carbon offsetting stipulated by the GLA or The London Borough of Camden.

Monitoring

The applicant will consider options for post occupancy monitoring of the 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 development to support the growth of demand side response.

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 is assessed under the methodologies set out in Part G of the Building Regulations. Although a variety of specifications are available to meet this target, the proposed flow rate criteria for dwellings at the development is outlined in Appendix D. This achieves an internal water use of **105 L/p/d** (litres per person per day) by design. 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 domestic 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).

Materials and Waste Reduction

Sustainable Specification

Materials will be chosen to lower the environmental impact of the development wherever possible. BRE's Green Guide will be consulted when finalising specifications of products and element build types. This applies primarily 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. They may also be chosen to 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.

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. Due to the nature of the development (being a brownfield site), there will be minimal loss of biodiversity. Additional planting will be carried out to ensure a net gain in vegetation.

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 155 Drummond Street development by **22.85%** beyond the requirements of 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 20%, and is therefore compliant with the carbon reduction policies of both the GLA and 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 8.32 kWp. 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 – Water Usage Report
Appendix C – SAP Documents