LONDON BOROUGH OF CAMDEN

MAITLAND PARK ESTATE

ENERGY STATEMENT

FINAL ISSUE

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EXECUTIVE SUMMARY

A team of construction professionals, commissioned by London Borough of Camden (LBC), have developed proposals for the regeneration of Maitland Park Estate, located in the Gospel Oak area of North West London. The scheme was granted planning approval in 2015.

In order to better meet the changing housing demands of LBC residents and to introduce some design changes, a minor material amendment (MMA) application is to be submitted to LBC.

The Greater London Authority (GLA) London Plan (2016) stipulates that a major residential development is required to be net zero carbon, meaning that the development will achieve at least a 35% improvement in regulated CO_2 emission beyond Building Regulations Part L1A, 2013. Residual carbon emissions are dealt with by a one-off cash-in-lieu payment into a suitable funded scheme on site or elsewhere in the borough.

The current carbon offsetting charge recommended by the GLA is £60.00/tonne per annum over a 30-year period. This equates to £1,800.00/tonne of carbon emitted.

In considering and formulating a revised energy plan for this development the three-point model known as an 'Energy Hierarchy', has been adopted as a frame of reference. This model is described in the GLA London Plan.

The Maitland Park estate development comprises three new residential buildings incorporating a TRA Hall and associated public realm works.

Aspen Court and Aspen Villas include dwellings only. Grafton Terrace includes dwellings and a TRA Hall. Grafton Terrace also includes a single, end-of-terrace, Town House which is detached from the main building. Total number of dwellings = 119.

The previously consented scheme included gas-fired community heating systems and combined heat and power which had been arranged to deliver thermal energy into the new buildings.

Thermal energy for this development will now be delivered by two new communal heating systems incorporating air to water air source heat pump (ASHP) technology

The open roof area on all three buildings and the single Town House will host solar photo-voltaic (PV) panels. The anticipated total number of PV panels = **294**. This will produce **80.85kWp.**

The previously consented scheme was predicted to achieve a **30%** improvement over the 2010 Part L compliant notional building. This revised scheme is predicted to achieve a **44%** improvement in carbon emissions compared to a 2013 Part L compliant notional building.

The improvement arising from introduction of solar PV is calculated to achieve a **15.6%** reduction in carbon emissions. The percentage of total regulated energy required by the development and delivered by solar PV = **15.9%.**

1.0 INTRODUCTION

1.1 Background

A team of construction professionals, commissioned by the London Borough of Camden (LBC), have developed proposals for the regeneration of Maitland Park Estate, located in the Gospel Oak area of North West London.

In 2015 approval was given to a scheme comprising residential buildings and a Tenants and Residents Association (TRA) Hall that delivered 112 units (app ref:2014/5840 as amended by 2015/6696/P). A minor material amendment (MMA) application is to be made to this approval in order to seek consent for an increase in units being delivered (to 119), adapt the energy strategy and introduce other minor design changes. Together, these changes will better meet the changing housing demands of Camden residents and will comply with updated building regulations.

TGA consulting Engineers LLP has been engaged by the Applicant to assist the professional team in the process of seeking and obtaining the MMA approval. TGA's role is to address changes in MEP servicing strategies and to produce a revised Energy Statement.

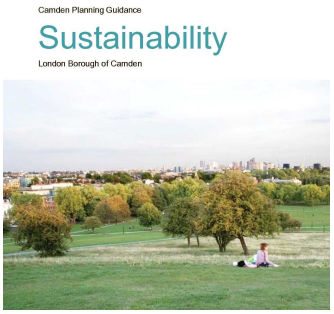
1.2 Camden Council Planning Policies

New building developments in the LBC are required to meet minimum standards relating to sustainability, energy efficiency and carbon reduction. This is in line with local, London-wide and national aspirations set by LBC, GLA and the UK Government.

Sustainability standards that will be applied to this development will be those set out in the BRE Homes Quality Mark One (HQM) standard. This development is targeting a 3-star rating.

Published planning guidance relevant to this development includes:

- The National Planning Policy Framework, March 2012.
- Mayor's SPG on Sustainable Design and Construction, April 2014.
- London's Response to Climate Change, The London Plan, March 2015
- GLA London Plan, including minor alterations to the London Plan, March 2016.
- LBC planning policy CPG3 – Sustainability, 2015, (updated 2018).



The GLA draft London Plan 2019 stipulates that a major residential development is required to be net zero carbon, meaning that the development will achieve at least a 35% improvement in regulated CO_2 emission beyond Building Regulations Part L1A, 2013. Residual carbon emissions are dealt with by a one-off cash-in-lieu payment into a suitable funded scheme on site or elsewhere in the borough.

The current carbon offsetting charge recommended by the GLA is £60.00/tonne per annum over a 30-year period. This equates to £1,800.00/tonne of carbon emitted.

LBC planning guidance document CPG3 requires that new developments are to target a 20% reduction in carbon emissions from on-site renewable energy technology.

This Energy Statement considers guidance contained in the above listed documentation.

1.3 The Energy Hierarchy

In considering and formulating an energy plan for this development the three-point model known as an 'Energy Hierarchy', has been adopted as a frame of reference. This model is described in the GLA London Plan.

The Energy Hierarchy is commonly defined as follows:

1. **Be Lean** – Design and construct a new building to achieve a high standard of building fabric efficiency. The so-called fabric-first approach.

2. **Be Clean** – Deliver and consume the regulated energy, required by the development, to a high standard of efficiency.

3. **Be Green** – Deliver some or all the required energy from renewable energy sources.

The importance of the 'Energy Hierarchy' is in its 'drive' to ensure that buildings are designed and constructed to consume only the minimum amount of energy in the first instance.

After this first objective in the hierarchy has been satisfied, the design of the energy generation and delivery systems can be considered and optimised.

A final step in the process is to identify how much of the building's energy needs can be met from renewable energy sources.

1.4 Caveat

The energy consumption analysis and results, which underpin the recommendations included in this Energy Statement, have been derived by applying the National Calculation Methodology (NCM). This methodology is embedded in SBEM and SAP calculation procedures.

Annual energy consumption for the completed buildings, as measured by energy meters, may differ from the predictions given by SBEM and SAP. This is known as the 'performance gap'.

1.5 This Report

The purpose of this report is to set out design strategies and performance targets relating to energy conservation, energy efficiency and carbon reductions, which have been embodied into the development proposals and will be carried forward into the detail design and construction phases of the project.

In the first instance, the information contained in this report will enable the Local Planning Authority to consider and understand the adopted measures and features, relating to the energy strategy, that have been incorporated into the development proposals thus far.

The emphasis in this report is on energy consumption and carbon reduction.

The broader subject of sustainability has been addressed separately by Envision within the planning application pack.

2.0 DEVELOPMENT PROPOSALS

2.1 Project Description

The Maitland Park Estate development comprises three new residential buildings incorporating a TRA Hall and associated public realm works.

New buildings include:

- Aspen Court. (51 dwellings)
- Aspen Villas. (39 dwellings)
- Grafton Terrace. (29 dwellings)

Aspen Court and Aspen Villas include dwellings only. Grafton Terrace includes dwellings and a TRA Hall. Grafton Terrace also includes a single, end-of-terrace, dwelling house which is detached from the main building.

Total number of dwellings = 119.

The following section of this report describes the strategies that have been adopted, firstly to reduce the energy demand imposed by the new building and secondly, to identify the principal modes of energy delivery.

Finally, the provision of renewable energy systems is described.

2.2 Fabric first approach

In order to minimise the thermal energy required by the new buildings a 'Fabric First' approach has been adopted meaning that a very high standard of building fabric efficiency will be incorporated into the design. Individual elements of building fabric have been assigned u-values, g-values & Ψ-values, as given in the table 2.1.

Table 2.1

Element	u-value	g-value	Ψ-value	Remark
External wall	0.12 W/m^2.K			
Party wall	0.25W/m^2.K			
Windows	1.40 W/m^2.K	0.4		Light transmittance 0.7
External doors	1.4 W/m^2.K	0.4		Light transmittance 0.7
Ground Floor	0.12 W/m^2.K			
Roof	0.10 W/m^2.K			
Thermal bridges			0.1W/m.K	

An air permeability value ≤ 2m^3/h.m^2 has been targeted.

2.3 Overheating in Summertime

Summertime overheating in individual dwellings is a key design consideration.

The quality of the temperature environment within each dwelling in summer will be affected by excessive heat gains and inadequate ventilation provision.

Overheating can have very serious health consequences for elderly residents and for residents with pre-existing medical conditions.

Overheating in landlord areas is also a significant issue albeit, in this case, Landlord areas are limited to relatively small entrance vestibules and stairways.

Comfort cooling systems are not provided in the residential dwellings. Opening windows and provision for natural cross-ventilation will be the principal means by which unacceptable high internal temperatures will be controlled in summertime.

An exception to this is the TRA Hall situated in the ground floor of Grafton Terrace. Due to the periodic high occupancy in this facility, comfort cooling will be provided.

A summertime overheating assessment in dwellings and Landlord areas had been undertaken prior to the previous planning submission and has not been revisited again as part of this MMA submission. The fundamental principles relating to building fabric, ventilation and window openings has not been significantly altered.

A full CIBSE TM59 overheating assessment will be undertaken by the Developer during the final detailed design stage and submitted to the Council for their approval. Compliance with the TM59 summertime overheating performance standards is mandatory and is stipulated in the Employers Requirements and the technical specification.

2.4 Passive Design Features

The buildings have been designed to exploit a number of passive, internal climate moderating, features. These features will result in less reliance on building engineering systems, reduced energy consumption and will help to moderate and control peak internal temperatures in summertime.

Passive features that are incorporated into the design include:

- Natural cross-ventilation in each dwelling to maintain a comfortable internal temperature environment in warm summer weather.
- Natural stack ventilation in stairs and circulation spaces, by using smoke ventilators in natural ventilation mode.
- Good quality day lighting in interior spaces, reducing reliance on electric lighting during the daytime.

2.5 Energy Generation and Delivery

The previously consented scheme included gas-fired community heating systems and combined heat and power.

The options for generation and delivery of heat has been reconsidered and changed. Thermal energy for this development will now be delivered by two new communal heating systems incorporating air source heat pump (ASHP) technology.

Communal heating systems will be established to serve the three new buildings as follows:

System 1 – Central ASHP installation serving Aspen Court and Aspen Villas.

System 2 – Central ASHP installation serving Grafton Terrace.

Air-to-water heat pump units will be installed in open, screened areas of roof on Grafton Terrace and Aspen Villas.

A single end-of-terrace dwelling in the Grafton Terrace complex will include a single air-to-water heat pump unit located at ground level in the private garden.

Primary heat energy will be delivered into each dwelling demise via a proprietary heating and domestic hot water heat interface unit (HIU). HIU's will be provided in each dwelling in the utility cupboard.

ASHP units will produce a high primary water distribution temperature = 55°C. This is because the community heating system is designed to deliver central heating and domestic hot water in each dwelling. As a consequence of this operating strategy, ASHP units are expected to operate with seasonal coefficient of performance (SCOP) in the order of 2.5.

It is not intended that the ASHPs are required to qualify for renewable heat incentive payments.

Primary energy delivery and consumption by dwelling will be monitored with individual heat meters. The London Borough of Camden heat metering specification has been included in the Employers Requirements documentation and this is a mandatory requirement.

Space heating in each dwelling will be by provided by either: -

- Underfloor heating circuits; or
- Panel radiators.

Radiators installed in dwellings intended for disabled residents will be low surface temperature (LST) pattern. LST radiators operate with a maximum touch temperature not greater than 41°C.

Domestic hot water will be produced instantaneously, on demand. Domestic hot water will not be stored in each dwelling.

Whole house mechanical ventilation with heat recovery (MVHR) will be provided in each dwelling for normal background and boost ventilation purposed. MVHR systems will provide automatic boost ventilation when bathrooms or kitchen spaces are being used.

A recirculating cooker hood, fitted with carbon filters, will be provided above each domestic cooker unit.

MVHR is a mandatory requirement in buildings designed and constructed to a fabric air permeability standard ≤ $3m^3/m^2$ at 50Pa.

Opening windows in perimeter rooms will be provided in order to moderate peak internal temperatures during summertime.

Energy efficient light sources and switching will be installed.

Each dwelling will be provided with effective programmable central heating user controls.

The ground floor TRA Hall in Grafton Terrace will be serviced independently. Heating and ventilation systems will include:

- Mechanical ventilation with heat recovery;
- Toilet extract systems;
- A VRF heating, cooling heat recovery system; and
- Electric point-of-use electric domestic water heaters.

2.6 Renewable Energy

The open roof area on all three buildings and the single dwelling house will host solar photo-voltaic (PV) panels. None of the new buildings will be overshadowed by adjacent buildings, being generally as tall or taller than surrounding structures.

The number and disposition of solar PV panels is as follows:

- Grafton Terrace 68Nr
- Aspen Villas 62Nr
- Aspen Court 164Nr

The total number PV panels (size 1956 x 992mm) = **294**. This will produce a generating capacity of at least **80.85kWp**. Note that the current roof areas are, in aggregate, able to host up 310 individual PV panels. The precise number of panels will be determined by the Developer during the final detailed design stage. The agreed solution will be required to meet the overall carbon reduction targets set out in this Energy Statement.

Plans submitted in support of this application show the anticipated layout of the solar PV installation. Layouts may be subject to further change during detailed design and finalisation of the solar PV panel specification. It is anticipated that the Council will secure, via a planning condition, the details of the PV panel specification, their layout (including a details cross-section demonstrating their orientation and tilt) and an operation and maintenance strategy prior to the occupation of the relevant phase of the development.

The solar PV installation is expected to generate at least **53,635kWh/year** electrical energy. This is demonstrated in the difference between the ‘be clean’ and ‘be green’ stages of the energy strategy shown in Table 3.4 of this report.

Electrical energy produced by the solar PV installation will be consumed within the Landlord low voltage electrical distribution system, during periods of demand.

Since ASHP equipment is powered by electricity, the solar PV installation, when generating electricity, will be able to offset demand for Grid derived electricity.

Surplus electricity, not required by the building systems, will be exported and sold back to Grid for a nominal fixed charge.

The noise implications of locating ASHP units on open roof areas has been addressed in an acoustic report produced by consultant Cole Jarman. This report has been included in the planning submission documentation.

2.7 Third Party Energy Consumers

The two central energy centres, which are to be established in Grafton Terrace and Aspen Villas, will not include capacity to serve potential third-party energy consumers.

The reasoning behind this decision is that excessive areas of roof area would need to be set aside for the additional heat pump units, and this would take up valuable space that can otherwise be used to accommodate the solar PV installation.

The previously consented scheme did not include space and facility to serve third party consumers.

2.8 Connection to an Existing Heat and Power Network

There is no viable municipal heat and power network in this area nor is there one planned.

No provision has been made, therefore, to connect this development into a heat network in the future.

2.9 Technologies not Included

Consideration has been given to other energy supply/energy generation technologies and table 2.2 below provides a summary of renewable technologies that have been considered and excluded.

Table 2.2

Item	Description	Remark
Geothermal Energy	Central ground source heat pump (GSHP) installation and vertical or horizontal ground loop pipework.	Excluded due to inadequate, unobstructed ground availability required to accommodate ground loops.
Biomass	Automatic wood burning boiler incorporated in the community heating system	Air quality issues, arising from combustion of wood, precludes the inclusion of wood burning appliances in this development.
Wind Turbine	Building mounted wind turbine generators.	Poor availability of wind energy at this site precludes inclusion of this technology

2.10 Un-Regulated Energy Consumption

Regulated energy is the energy consumed in a building by the fixed building services installations.

Un-regulated energy is the energy consumed by white goods, household appliances, and portable electrical equipment.

Energy labelling of domestic electric appliances is regulated under European Directive (EU)2017/1369. All such appliances, which includes washing machines, dishwashers, refrigerators, TV's and lamps, are ranked A to G with grade A being the most efficient.

Domestic appliances, which are to be supplied and installed under the building contract, will be specified 'A' rated or better.

Handover documentation provided at the end of the construction project, will include a 'Building User Guide' and this document will include advice relating to energy efficient product replacements along with general advice about energy efficiency and energy conservation.

A building user guide will be provided to each household.

3.0 THE ENERGY STRATEGY

3.1 General

This section of the report presents a summary of the results and findings obtained during the energy planning process.

In order to formulate a viable and compliant energy strategy for this development, building energy models have been produced using SAP2012. (SAP Energy Software by Elmhurst Energy)

Baseline models and iterations to baseline have been undertaken in order to demonstrate the expected carbon reductions arising from the improvements introduced at each stage of the analysis.

The servicing strategy, described in section 2.0 of this report, is based upon the establishment of two community heating installation which will serve the new buildings in this development, only. The system proposed is compliant with the minimum performance standards as set out in the ECA and MCS certifications.

Grafton Terrace

Thermal energy for Grafton Terrace will be produced by 6Nr ASHP units, each capable of delivering **42.6kW (255.6kW total)** and distributed into each dwelling via interconnecting pipelines routed through the building common areas and buried in the ground outside.

Aspen Villas & Aspen Court

Thermal energy for Aspen Villas and Aspen Court will be produced by 15Nr ASHP units, each capable of delivering **42.6kW (639kW total)** and distributed into each dwelling via interconnecting pipelines routed through the building common areas and buried in the ground outside.

The development will also be provided with renewable energy systems comprising **294** individual solar PV units mounted on the building roof areas.

The number and disposition of solar PV panels across the development will be as follows:

- Grafton Terrace. 68
- Aspen Villas. 62
- Aspen Court 164

Total **294**

The precise number and disposition of solar PV panels will be finalised during the detailed design stage.

3.2 Methodology

The methodology adopted in the energy analysis process first generates a baseline model. From this baseline solution, further model iterations have been undertaken whereby improvements in building fabric, air permeability, energy delivery systems and finally, the introduction of renewable energy sources have been analysed.

The baseline solution is an Approved Document L, 2013 compliant building model including central gas-fired condensing boilers and mechanical ventilation heat recovery (MVHR) in each dwelling.

The 2nd calculation iteration includes upgraded u-values, Ψ-values and an air permeability value as defined in the section 2.2 of this report, central gas-fired condensing boilers and mechanical ventilation heat recovery (MVHR) in each dwelling.

Results from the 3rd iteration identifies the impact of substituting ASHP units in place of gas-fired boilers.

Finally, the 4th iteration identifies the improvement in performance arising from introducing roof mounted solar PV installations.

These calculation iterations are summarised below:

Iteration Description

1. Baseline solution incorporating central gas-fired heating and MVHR, in each dwelling.
2. Enhanced building fabric and fabric air permeability standards, central gas-fired condensing boilers and MVHR in each dwelling. (Be Lean)
3. As iteration 2 but with ASHP in lieu of gas-fired boilers. (Be Clean)
4. As iteration 3 with the addition of roof mounted solar PV. (Be Green)

Enhanced building envelope u-values adopted for this development exceed the minimum statutory values defined in Building Regulations Approved Document L and the accompanying Compliance Guides.

U-value and other input data, used in the modelling process, have been included elsewhere in this document. Refer to table 2.1.

3.3 Calculation Results

Table 3.1, 3.2, 3.3 and 3.4 includes the modelling results data and identifies predicted energy demand and carbon emissions for the four iterations.

Table 3.5 includes the predicted thermal and electrical energy consumption and carbon emission breakdown for the development.

Table 3.1 – Aspen Court Annual Energy Demand and Carbon Emissions

Iteration	Energy kWh/y	Carbon Emissions $kgCO_2/y$	Improvement	Remark
Baseline	183,749.7	64,514.4	Part L Compliant	Note 1
Be lean	155,808.7	40,112.8	13.3%	
Be clean	139901.2	46,212.5	28.4%	Note 2
Be green	116,191.4	33,789.9	47.6%	

Table 3.2 – Aspen Villas Annual Energy Demand and Carbon Emissions

Iteration	Energy kWh/y	Carbon Emissions $kgCO_2/y$	Improvement	Remark
Baseline	124,230.3	43,617.1	Part L Compliant	Note 1
Be lean	105,339.8	27,119.6	13.3%	
Be clean	94,585.0	31,243.5	28.4%	Note 2
Be green	78,555.2	22,844.8	47.6%	

Table 3.3 – Grafton Terrace Annual Energy Demand and Carbon Emissions

Iteration	Energy kWh/y	Carbon Emissions $kgCO_2/y$	Improvement	Remark
Baseline	164,758.0	53,344.4	Part L Compliant	Note 1
Be lean	142,910.1	37,169.0	12.9%	
Be clean	108,860.2	41,028.4	23.1%	Note 2
Be green	94,964.6	33,747.8	36.7%	

Table 3.4 – Total Development Annual Energy Demand and Carbon Emissions

Iteration	Energy kWh/y	Carbon Emissions $kgCO_2/y$	Improvement	Notes
Baseline	472,738.0	161,475.9	Part L Compliant	Note 1
Be lean	404,058.6	104,401.4	13.1%	
Be clean	343,346.5	118,484.4	26.6%	Note 2
Be green	289,711.1	90,382.5	44.0%	

Notes

1. *The baseline results included in table 3.1, 3.2, 3.3 and 3.4 represent a 2013 Part L compliant notional building with gas-fired central heating.*

2. *In the SAP 2012 calculation, when a dwelling includes electric space heating and hot water, a fuel factor = 1.55 is applied to the space heating and hot water energy used value in order to arrive at a Target Emission Rate (TER). A dwelling with an ASHP is therefore compared to a different TER to that of a dwelling with gas-fired boilers. This is the reason why the ASHP calculated carbon emission increase between the 'Be Lean' and 'Be Clean' iterations.*

Table 3.5 – Development Thermal and Electrical Energy Demand Breakdown

Energy Consumption		Total Energy Demand (kWh/y)	Total CO_2 Emission ($kgCO_2/y$)
Hot Water		183,685.51	57,825.3
Space Heating		104,529.4	31,780.7
Electrical	Grid	56,323.3	29,231.8
	Grid displaced	-54,827.2	-28,455.3
TOTAL REGULATED		**289,711.1**	**90,382.5**

3.4 Results Summary

The proposed development is predicted to achieve a **44%** improvement in carbon emissions compared to a 2013 Part L compliant notional building.

The improvement arising from introduction of solar PV is calculated to achieve a **15.6%** reduction in carbon emissions. This results in a total reduction in carbon emissions of **28,101.9kgCO_2/y** as a result of the solar PV panels.

The calculated percentage of total regulated energy required by the development and delivered by solar PV systems = **15.9%.**

4.0 SUMMARY AND CONCLUDING REMARKS

The submission of a minor material amendment to a previously consented scheme for this development, requires a new Energy Statement to be prepared and submitted. This document is intended to fulfil that objective.

Development proposals are at RIBA design stage 3 and the measures and features that have been described in this document, relating to energy conservation and energy supply, are a fundamental and integral part of the stage 3 design solution. The Developer will be required to achieve the overall targeted carbon reductions set out in this document. This is written into the Employers Requirements and the technical specification.

This development is compatible with LBC, GLA and the UK Government long-term aspirations for reducing carbon emissions from buildings.

The originally consented scheme relied upon a combined heat and power plant (CHP) to deliver savings in carbon emissions supported by gas-fired boilers. Both technologies produce products of combustion and hence, increased local air pollution.

This revised scheme now features air source heat pumps to generate a low carbon source of thermal energy using electricity to extract ambient heat from the outside air. This solution not only results in no local air pollution and improved air quality, but also moves away from the use and combustion of fossil fuels. The carbon intensity of Grid Electricity is reducing dramatically as national efforts to de-carbonise the Grid gathers pace. Thus, carbon emissions arising from this development will continue to reduce over the life of the installation.

Heat will be distributed to the new buildings via two small community heating installations. One system will serve Grafton Terrace and the other system will serve Aspen Villas and Aspen Court. A single end-of-terrace Town House will be served independently.

Facility has not been included for additional capacity and connectivity to third party energy consumers.

Solar PV systems have been included in the development proposals. These systems will provide a significant contribution to the development's annual energy needs. The electrical energy produced by solar PV (circa **54,827.2kWh/year**) will be used to drive the ASHP systems. This energy will be supplemented with grid electricity, when required. Surplus electricity generated on-site will be exported back into the Grid.

The output from energy modelling processes, described in this document, and the calculated carbon emissions result identifies a predicted **44%** improvement in performance over **2013** building regulations. In comparison, the previously consented scheme was predicted to achieve a **30%** improvement over **2010** building regulations.

In conclusion, TGA Consulting Engineers LLP believe that the energy conservation and energy supply proposals described in this Energy Statement represents a pragmatic and feasible energy strategy for the development

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