Proport
ECO-SERVICES

Rear of 22 Hillfield Road
London
NW6 1PZ

Energy & Sustainability Statement

September 2018

This Statement has been prepared by Proport Eco-Services on behalf of their clients, to support a planning application for the construction of a single new self-contained dwelling on land to the rear of the existing property.

It is based on evidence supplied by the client and preliminary SAP 2012.

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Version Control

Version	Date	Note
1.0	24Sep2018	Draft for client approval
1.1	25Sep2018	Final

This Energy & Sustainability Statement is in support of a planning application for development to the rear of 22 Hillfield Road, London, NW6 1PZ. The Statement addresses the issues set out in Camden Council's Local Plan, 2017 and relevant policies of the London Plan 2016 including those detailed in the Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance.

Overall, the development proposal fully meets all of the applicable Camden Council and London Plan policy requirements.

This report is for submission in support of a planning application and is intended to demonstrate that environmental sustainability has been considered and addressed in accordance with planning policy.

The application is for the creation of a single new self-contained residential dwelling on land to the rear of the existing property.

The report demonstrates that environmental sustainability including energy efficiency, has been considered and addressed in accordance with planning policy.

The National Planning Policy Framework (NPPF, 2018) paragraph 11, sets a presumption in favour of sustainable development. This includes an environmental dimension "to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy." It sets out the core planning principles that underpin the setting of local plans and decision-taking. In particular it addresses the issue of meeting the challenge of climate change and flooding (Section 14. paragraphs 148 - 169).

National and regional planning policy is enacted and applied at the local level and in that context the main policies applicable to the sustainability appraisal of this development, are as follows:

i. Camden Local Plan 2018. In particular Policies:
   - CC1 Climate change mitigation
   - CC2 Adapting to climate change
   - CC3 Water and flooding
   - CC4 Air quality
   - CC5 Waste

ii. The Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance, April 2014

iii. The Energy Statement addresses all of the relevant policies (5.2 – 5.9) contained in The London Plan, 2016, in particular those policies in Section 5 relating to the minimisation of carbon dioxide emissions (5.2) and sustainable design and construction (5.3). It follows the format contained in the Greater London Authority guidance on preparing energy assessments (March 2016).

This Energy Statement is provided to address Policy CC1 *Climate change mitigation* of the Camden Local Plan as well as, where appropriate, Policies 5.2 to 5.9 of The London Plan and follows guidance provided in the Mayor's Sustainable Design and Construction Supplementary Planning Guidance (SPG). It follows the format described in the Greater London Authority guidance on preparing energy assessments (March 2016). As a minor development of only a single dwelling, it is required to achieve 19% reduction in carbon dioxide emissions below Part L 2013 Building Regulations. However, as a development of less than 5 dwellings and/or 500m^2 gross internal floorspace it is not required to achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation. However, as the following statement will show, renewable energy forms a key part of achieving the 19% reduction in carbon dioxide emissions below Part L 2013 Building Regulations.

The basic principle followed for the design of the development is to reduce the energy demand of the dwellings by means of a 'fabric first' approach. This means that heat loss elements such as walls and roofs exceed the minimum elemental performance requirements of Building Regulations Approved Document Part L1A 2013. Although passive solar gain can be a significant advantage, the orientation of new dwellings is often constrained by the layout and nature of the site and this development is no exception. The orientation and design allow for maximum solar gain but this needs to be balanced against potential overheating in summer months. Ultimately, residents will be able to purge ventilate by opening windows and skylights, These features, combined with appropriate window coverings, will enable residents to reduce the risk of overheating without the need for mechanical cooling.

The space heating, hot water, pumps, fans and lighting energy requirements were calculated using the detailed Bredem-12 method developed by the Building Research Establishment and used in the SAP 2012 calculation, and referenced in the latest version (2013) of the Building Regulations Approved Document L1A.

Whilst the importance of thermal mass is recognised as being important in levelling out fluctuations in internal temperatures this again needs to be balanced against the benefit of construction methods with low thermal mass e.g. timber frame, which can more easily achieve higher levels of thermal insulation.

This Energy Statement takes a standard hierarchical approach as follows:

1. **Baseline.**
   A calculation of baseline energy demand, demonstrating the projected annual heating, cooling and electricity demand of the development. The assessment shows the carbon dioxide emissions resulting from the predicted energy use. Emissions are equal to the Target Emission Rate (TER) multiplied by the floor area.

2. **Energy Efficiency (Lean).**
   An explanation of how the total energy demand and carbon dioxide emissions will be reduced relative to the baseline energy demand through further improvements to building energy efficiency standards; recalculation of total energy demand and associated carbon dioxide emissions. Emissions are equal to the Dwelling Emission Rate (DER) multiplied by the floor area.

3. **CHP/CCHP (Clean).**
   Proposals for the reduction of energy demand and carbon dioxide emissions from heating, cooling and electrical power, including the feasibility of Combined Heat and Power / Combined Cooling, Heating, and Power systems, and community heating systems;

4. **Renewable Energy (Green).**
   Details of any renewable energy technologies to be incorporated in the development, demonstrating how much carbon dioxide emissions from expected energy use will be reduced through on-site renewable energy generation;

   The space heating, hot water, pumps, fans and lighting energy requirements were calculated using the detailed Bredem-12 method developed by the Building Research Establishment and used in the SAP 2012 calculation, and referenced in the last version (2013) of the Building Regulations Approved Document L1A.

   The starting point for the new dwellings was to determine the performance of the "baseline" for the dwelling using the levels of insulation performance and building services equipment consistent with the dwelling achieving compliance with Approved Document L1A: 2013. The specific energy consumption figures for space heating, hot water and lighting were then extracted.

   It is then normal for the calculations to be repeated using improved U-values proposed for the scheme by the applicant and other possible improvements to building services. However, with the update to AD L1A in 2013 it is now the case that just to comply with the requirements necessitates the use of low u-values and highly efficient building services anyway. As a consequence the "lean case" results for the new dwellings are very similar to the baseline.

   The results obtained from this analysis are presented in the following sections and summarised in Section 4.9.

The total energy demand and associated emissions have been calculated taking full account of energy demands for space heating and hot water, and electricity for pumps, fans and lights. The specific energy consumption figures and associated carbon dioxide emissions were then extracted from the SAP 2012 software and are shown in Table 1.

Appendix 1. SAP values for establishment of Baseline and Lean cases

Element or system	Value	
Windows, doors and skylights	U = 1.3 W/m^{2}K	
Ground floor	U = 0.12 W/m^{2}K	
External walls	U = 0.16 W/m^{2}K	
Roof	U = 0.10 W/m^{2}K	
Thermal mass	Medium (TMP = 250 kJ/m^{2}K)	
Thermal bridging	Accredited Construction Details	
Ventilation	Natural, intermittent extract fans	
Air permeability	5.0 m^3/(h.m^2) at 50Pa	
Space heating	Mains gas condensing combination boiler – SEDBUK (2009) 93.5% efficiency. Room sealed, fan flue, UFH. Weather compensator providing +3% boiler efficiency adjustment	Electric underfloor heating in screed above insulation
Water heating	From main boiler	Dual immersion, dual tariff
Hot water cylinder	None, combi' boiler	120L direct cylinder
Heating controls	Time & temperature zone controls Separate controls for heating and water	
Low energy light fittings	100%	

Appendix 2. Carbon emissions by fuel type:

Energy Source	Emissions factor kg CO_2/kWh
Mains gas	0.216
Electricity	0.519
Electricity (displaced from grid)	0.519

The total size of the waste and recycling containers will meet the requirements of BS 5906:2005 (100 Litres per one bedroom property plus 70 litres for each additional bedroom). The development proposal consists of a single two bedroom dwelling:
Total domestic waste storage requirement = (1 x 100) + (1 x 70) = 170 litres.

The development will be provided with a 140L general refuse bin a 140L mixed recycling bin and a food waste bin.

The final design of the storage area is usually subject to a planning condition of part of any planning consent.

Approved Document L1A: Conservation of fuel and power in new dwellings. 2013 edition.

Approved Document G: Sanitation, hot water safety and water efficiency. The Building Regulations 2010.

BS 5837:2005 Trees in relation to construction – Recommendations. Dec-2005, British Standards Institution.

BS 5906:2005. Waste Management in Buildings. Code of Practice. Dec-2005, British Standards Institution.

Camden Local Plan 2017. London Borough of Camden.

Domestic Building Services Compliance Guide. 2013 edition. NBS, Newcastle Upon Tyne.

Energy Planning. Greater London Authority guidance on preparing energy assessments (March 2016).

London Plan 2011 Implementation Framework. Sustainable Design and Construction Supplementary Planning Guidance, April 2014. Mayor of London.

National Planning Policy Framework, July 2018.

Sustainable Design and Construction, Supplementary Planning Guidance, April 2014. London Plan 2011 Implementation Framework, Mayor of London.

The Building Regulations 2010. Approved Document L1A Conservation of fuel and power in new dwellings. 2013 edition.

The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance" London Plan, July 2014.

The Government's Standard Assessment Procedure for Energy Rating of Dwellings, 2012 Edition. DECC, 2013.

The London Plan. Spatial Development Strategy for London, Consolidated with Alterations Since 2011. March 2016. Greater London Authority.

The SuDS Manual, CIRIA C753, London 2015.

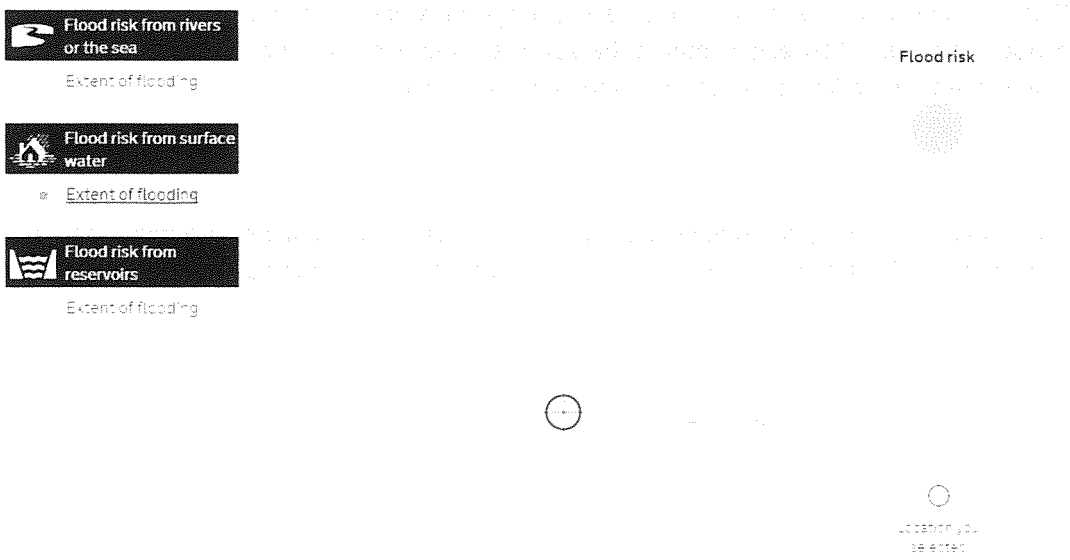

Figure 3. Surface water flood risk map centred on NW6 1PZ

Foul water/sewage drainage will connect to the public foul sewer. The development proposal will be subject to approval by the local wastewater/sewerage provider as part of the consultation process. The proposal will have a neutral impact on water quality, the delivery of the policies in the London Plan and of the Thames River Basin Management Plan. The development of the Thames Tideway Sewer Tunnels to address London's combined sewer over flows is supported in principle.

Camden Council Local Plan policy CC4 seeks to ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The London Plan SPG Policy 7.14 aims to reduce exposure to poor air quality in London as well as reduce emissions from development, including during demolition and construction phases and seeks new development to be 'air quality neutral'.

Policies will be in place during construction to minimise water (ground and surface) pollution as well as air pollution from dust and other particulates in compliance with current legislation and "The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance" London Plan, July 2014.

The residential unit will use electricity for heating and hot water and as such there will be no local NOx emissions from the development. In addition the development post construction will not produce any Particulate Matter (PM) pollution therefore meeting the Air Quality Neutral Assessment for PM10 set by Policy 7.14 of the London Plan.

This is a consequence of the temporary storage provided by a green roof and the opportunity for evapotranspiration, especially during the summer. It is expected that approval of the detailed design of these features will be a condition of the planning consent.

Flooding

According to the Environment Agency flood risk map www.environment-agency.gov.uk the development site has a very low (<0.1%) annual probability of flooding from rivers, Figure 2.

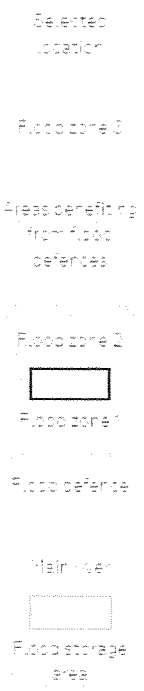

Figure 2. Flood risk map centred on NW6 1PZ

There is only a very low risk (<0.1%) to the development site from surface water run-off, Figure 3.

The London Plan SPG Policy 5.12 outlines the requirement for boroughs and developers to carry out flood risk assessments and that developments must comply with national planning policy on flood risk assessments and management to ensure they are designed and built to be resilient to flooding. Policy 5.13 promotes the inclusion of sustainable urban drainage systems in developments and sets out a drainage hierarchy that developers should follow when designing their schemes. Finally Policy 5.11 specifically supports the inclusion of planting within developments and encourages boroughs to support the inclusion of green roofs.

Water efficiency

The London Plan Policy 5.15 states that residential schemes should be designed to meet a water consumption rate of 105 litres/person/day. Calculation of the average water use of the dwellings has been carried out using the method set out in The Water Efficiency Calculator for New Dwellings (2009). The results are presented in Table 8.

Table 8. Water Efficiency Calculation

Installation Type	Unit of Measure	Capacity/ flow rate	Use Factor	Fixed Use (L/person/day)	L/person/day
WC (dual flush)	Full flush vol.	4.0	1.46	0.00	13.54
	Part flush vol.	2.6	2.96	0.00	
Taps (excl. kitchen/utility)	Flow rate (litres/min)	4.0	1.58	1.58	7.90
Bath (shower also present)	Capacity to overflow (litres)	180	0.11	0.00	19.80
Shower (bath also present)	Flow rate (litres/min)	9.0	4.37	0.00	39.33
Kitchen/utility sink taps	Flow rate (litres/min)	6.0	0.44	10.36	13.00
Washing machine	Litres/kg dry load	8.17 (default)	2.1	0.00	17.16
Dishwasher	Litres/place setting	1.25 (default)	3.6	0.00	4.50
Waste disposal	Litres/use	0	3.08	0.00	0.00
Water softener	Litres/person/day	---	1.00	0.00	0.00
		Total calculated use (litres/person/day)			115.2
		Normalisation factor			0.91
		Total internal water consumption (litres/person/day)			**104.9**

The development will ensure that the maximum internal water use is limited to 105 L/person/day. This will be achieved by the use of low flow rate taps and showers (fitted with flow restrictors where necessary), dual flush WCs and low capacity baths. It is not planned to install a rainwater harvesting system as the required level can be achieved without the use of rainwater.

Drainage

To minimise the impact on local infrastructure and to ensure the risk of flooding elsewhere is reduced, SuDS will be implemented where possible in accordance with The SuDS Manual, 2015. All external hard landscaping areas will consist of permeable paving or other permeable surfaces. In addition a green roof of an extensive type, will be installed on the roof which will also reduce or prevent runoff from normal rainfall events.

The development design meets all of the requirements of Camden Council's Local Plan Policies 2016. It also addresses relevant policies of the London Plan 2016 including those detailed in the Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance (SPG).

Camden Council Local Plan Policy CC2 requires development to be resilient to climate change. In terms of this minor development application the principle concerns are surface water run-off which is addressed in Section 5.2, biodiversity and overheating.

Biodiversity

The current site consists of soft and hard landscaping and a garden shed. It contains only one tree which will be removed retained as part of the development and protected during construction in accordance with BS 5837:2005 *Trees in relation to construction – Recommendations.*

In accordance with current legislation, any protected species discovered on site will be adequately protected, although it is not expected that any will be found. The development site is not close to or within an area covered by International, National, London wide or Local site designation and protection.

It is proposed that an extensive 'green roof' containing a range of low maintenance *Sedum* and other species, will be installed on the main roof. This will provide an entirely different habitat from the typical urban gardens in the local area and will add to the local biodiversity.

Overheating and Cooling

As stated in the Energy Statement although passive solar gain can be a significant advantage in reducing energy demand in the summer months it can lead to overheating. The cooling strategy for the dwelling consists entirely of passive rather than active measures such as mechanical cooling. Solar gains will be minimised by the use of low solar gain glazing, and appropriate window coverings such as curtains and blinds. Residents will be able to open windows sufficiently to create a through draft between the windows and first floor roof light enabling purge ventilation. Finally, the inclusion of a green roof will also help reduce overheating due to the cooling effect created by evapotranspiration and a reduction in heat adsorption. Taken together it is considered these measures will significantly reduce the risk of overheating.

Camden Council Local Plan Policy CC3 requires developers to:

a. incorporate water efficiency measures;
b. avoid harm to the water environment and improve water quality;
c. consider the impact of development in areas at risk of flooding (including drainage);
d. incorporate flood resilient measures in areas prone to flooding;
e. utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and
f. not locate vulnerable development in flood-prone areas.

Table 7. Carbon dioxide reduction at each stage of the energy hierarchy

	Emissions (t CO_2 / yr)	CO_2 savings (t CO_2 / yr)	CO_2 savings (%)
Baseline: AD Part L 2013 compliance	1.832		
After energy demand reduction (Lean Case)	2.299	- 0.467	- 25.5
After heat network / CHP	2.299	0.0	0.0
After renewable energy	1.483	0.349	19.1
After residential off-set payment	1.483	0.0	0.0

Evaluation of all possible renewable energy technologies demonstrated that the most suitable, in terms of reducing carbon dioxide emissions, is the installation of a Photovoltaic (PV) system on the roof of the development. As a minor development it is not required to meet any further carbon dioxide emissions reductions.

The proposed development therefore meets all of the relevant Camden Local Plan and London Plan policy requirements.

Table 4. Feasibility of Renewable Energy

Technology	Criteria	Assessment	Overall suitability
Biofuels	Year-round heat demand Established supply chain Sufficient space for delivery of fuel Sufficient space for storage of fuel Sufficient space for boiler and auxiliary equipment Can the flue be designed to meet planning authority requirements	Development is residential with seasonal and daily variations in heat demand. No space on site for location of plant room and storage of fuel. Fuel delivery issues re. traffic movements to and from site. Biomass has relatively high NOx emissions which is a significant consideration in the London area.	Not suitable
Ground Source Heat Pump	Sufficient space for horizontal coil or separation of multiple boreholes Ground suitable for vertical drilling and avoidance of obstacles Sufficient space for GSHP and auxiliary equipment	Closed loop indirect borehole system possible but insufficient space for horizontal coil. Unknown soil and geological conditions, particularly sub-surface infra-structure.	Not suitable
Air Source Heat Pump	Sufficient space for ASHP and auxiliary equipment Sufficient distance between installation and neighbours to avoid noise disturbance	Whilst sufficient space could be found it would prove very difficult to find a suitable heat pump for such a small dwelling. Potential noise disturbance to dwelling and neighbours.	Not suitable
Hydroelectricity	Nearby watercourse with sufficient head Permission available for access to watercourse Climate change modelling confirms longevity of watercourse (25 yrs)	No suitable water course nearby.	Not suitable
Solar PV	Suitable roof orientation, lack of shading Sufficient roof space	Sufficient space on flat roof of the buildings. Panels can be oriented due south and angled. Limited shading.	**Suitable**
Solar thermal	Suitable roof orientation, lack of shading. Sufficient roof space. Year-round hot water demand. Compatibility with proposed heating system. Sufficient space for communal or individual hot water storage	Sufficient space on flat roof of the buildings. Panels can be oriented due south and angled. Limited shading.	**Suitable**
Wind turbines	Sufficient wind speed. Area free from obstructions / causes of turbulence. Sufficient open space for installation. Sufficient distance between installation and neighbours to avoid noise disturbance	High density urban location with insufficient wind speed. Potential noise and vibration issues.	Not suitable

Two renewable technologies were identified as being suitable; the use of solar thermal panels mounted on the roof to provide domestic hot water and photovoltaic (PV) panels to provide electricity.

Table 3. Baseline & Lean Case Energy Demand and Carbon Dioxide Emissions (mains gas heating and hot water)

	Baseline	Lean Case
Total Energy Demand (kWh/yr)	5,314	5,041
Target Emission Rate (TER)	21.35	
Dwelling Emission Rate (DER)		20.35
Floor Area (m^2)	58.61	58.61
Total CO_2 emissions (kg/yr)	**1,251**	**1,193**
Change (%)		**- 4.7**

The choice to use electricity for the heating and hot water for the development significantly increases the need to use renewable energy to achieve the policy requirement for a 19% improvement in carbon dioxide emissions; Section 4.7.

Although the feasibility of Combined Heat and Power / Combined Cooling, Heating, and Power systems was considered, the nature of the development precludes the use of such technology. Such systems are better suited to those developments that have a constant heat demand such as residential care homes, leisure centres, hotels or large mixed use developments. It is less suited to exclusively residential developments or smaller developments (<100 dwellings) which is the subject of this planning application.
Consideration has also been given to the feasibility of connecting to an existing or planned district heating network. No current local or district heat network exist in the immediate locality of the development.

As stated in Section 4.5 the use of electricity for the heating and hot water significantly increases the challenge of improving carbon dioxide emissions to 19% beyond Part L Building Regulations. This means reducing the emissions to less than 1,484 $kgCO_2/yr$ using renewable energy sources. Renewable energy sources are those defined by EU Directive 2009/28/EC and include, wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. All possible domestic renewable energy technologies were evaluated in relation to the site. Most technologies were excluded because of the nature of the site in terms of the type of development (residential) and location as described in Table 4.

Table 1. Baseline Energy Demand and Emissions

Total Energy Demand (kWh/yr)	5,284
Target Emission Rate (TER)	31.26
Floor Area (m^2)	58.61
Total CO_2 emissions (kg/yr)	**1,832**

The baseline energy demand and efficiency is based on the use of a mains gas condensing boiler. However, because of the cost of installing a gas supply and issues of access the development proposal is for the use of electricity as the fuel for heating and hot water. This has a highly negative effect on the level of carbon dioxide emissions because of the higher emissions associated with mains electricity compared with mains gas (0.519 g/kWh and 0.216 g/kWh respectively). This means that if the baseline and lean case are compared using electricity in the lean case, whilst the energy demand is reduced the associated carbon dioxide emissions significantly increase, Table 2.

Table 2. Baseline & Lean Case Energy Demand and Carbon Dioxide Emissions (electric heating and hot water)

	Baseline (gas heating & hot water)	**Lean Case (electric heating & hot water)**
Total Energy Demand (kWh/yr)	5,284	4,429
Target Emission Rate (TER)	31.26	
Dwelling Emission Rate (DER)		39.22
Floor Area (m^2)	58.61	58.61
Total CO_2 emissions (kg/yr)	**1,832**	**2,299**
Change (%)		**+ 25.5**

This comparison does not allow a direct appraisal of the impact of the fabric on the carbon dioxide emissions. For completeness, a comparison of the baseline with the lean case but using the same boiler and other heating and hot water services used in the baseline, has also been carried out and the results presented in Table 3.

The results show that improvements to the fabric beyond those required for Building Regulations Part L compliance result in a 4.7% reduction in carbon dioxide emissions.