GFZ Properties

4 Tavistock Place

Energy and Sustainability Statement

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Report Name	Energy and Sustainability Statement	1011009

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
-	30/01/2015	Draft Issue for Comment
A	04/02/2015	Updated to reflect comments
B	12/10/2015	Updated to reflect latest drawings

Document Validation (latest issue)

Revision	Issue Date	Purpose of issue / description of revision / version			
C	14/10/2015	Updated to reflect area schedule			
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		Signature			

Executive Summary

Low environmental impact will be key to the design of the proposed 4 Tavistock Place redevelopment. This energy and sustainability statement outlines the development's approach to sustainability, energy efficiency and renewable energy strategies in order to meet the London Borough of Camden's and the GLA's planning requirements.

To benchmark the design process, the BREEAM Domestic Refurbishment methodology has been applied. It considers the broad environmental concerns of climate change, pollution, impact on occupants and the wider community. It balances these with the need for a high quality, safe and healthy internal environment. These standards go beyond the requirements of the Building Regulations.

The development is targeting a 'Very Good' BREEAM rating to comply with the Borough of Camden's planning policy. A BREEAM pre-assessment has been completed (see Appendix A), indicating that the development could potentially achieve a 'Very Good' rating.

The following passive design measures have been incorporated into the design:

- Thermal insulation levels for all building elements to be enhanced beyond minimum Building Regulation standards, thereby substantially reducing the building's heat losses;
- The dwellings will be naturally ventilated;
- Natural day lighting will improve occupancy comfort and reduce the requirement for lighting;
- All light fittings will be low energy fittings;
- All energy supplies will be metered using smart meters, with energy display devices located in a visible place to enable residents to monitor and therefore take actions to reduce their CO_2 emissions;

The combination of the above measures will result in the development potentially achieving an improvement of **50%** over the 2013 Building Regulations Part L standards considering the material change of use from office to residential dwellings.

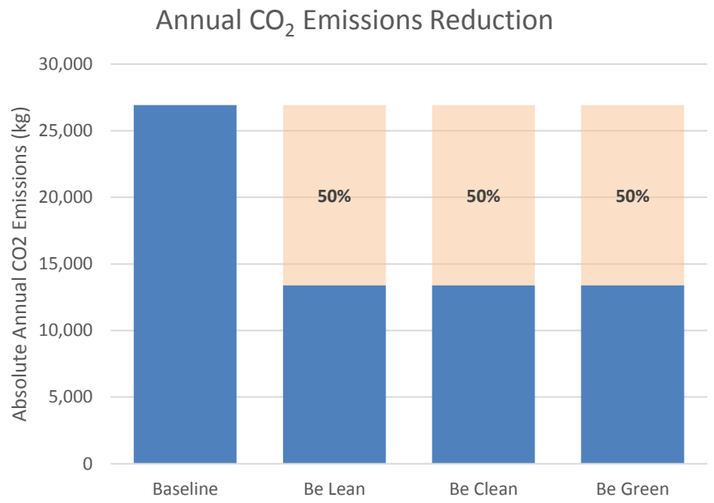
Investigation into the feasibility of connecting to a district energy network as per Policy 5.6 of the London Plan indicates that there are no networks within viable connection distance to the development. The London Borough of Camden have been contacted to confirm whether there may be a future connection to the Euston Road network possible. Furthermore the minor size of the development and relative heating and electrical demands means that a combined heat and power unit is not feasible.

The viability of different renewable technologies has been investigated and due to the spatial constraints of the site, combined with the architecturally sensitive area of the Bloomsbury Conservation Area that the site occupies, no renewables are feasible for this scheme.

While the development is classified as minor by the GLA and therefore does not need to achieve the GLA's requirement for a 35% improvement over the Building Regulations, by following the guidance of the London Plan and the London Borough of Camden, the prescribed energy strategy could reduce carbon dioxide emissions by 50% over the existing office development.

Additional sustainable features unique to this development include:

- All timber will be purchased from responsibly managed sources;
- Recycling facilities will be provided on site for construction and operational waste;
- Water usage will be minimised through the use of efficient taps, showers and dual flush toilets;
- The development achieves Camden's mandatory 60% of Water credits required for BREEAM;
- The development achieves Camden's mandatory 40% of Materials credits required for BREEAM.



Carbon Offset Fund		
35% Carbon Target Offset	9424	kg
Design Offset	13541	kg
Shortfall	-4117	kg
Carbon Cost (Zero Carbon Hub)	46	£/T
Years	30	
Total Offset Cost	-5681	£

	Regulated Carbon dioxide savings	
	(Tonnes CO_2 pa)	(%)
Savings from Energy Demand Reduction	13.54	50%
Savings from CHP	0.00	0%
Savings from Renewable Sources	0.00	0%
Total Cumulative Savings	**13.54**	**50%**
Total Target Savings	**9.42**	35%
Annual Surplus	**4.12**	

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1. Introduction

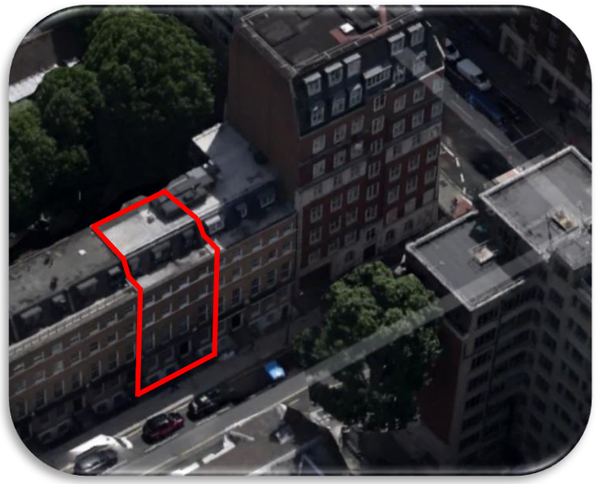


Figure 1- Site Location

Figure 2 - Existing Elevation (L) Proposed Elevation (R)

This Energy and Sustainability Statement has been prepared to accompany a planning application for the proposed residential development at 4 Tavistock Place, London Borough of Camden. It aims to meet the energy and climate change requirements of the London Borough of Camden and the Greater London Authority.

The structure of this report is in accordance with the 'GLA's Guidance on preparing energy assessments' document, April 2014, which provides detail on addressing the London Plan's energy hierarchy. The principal objectives are to reduce the site's contribution to the causes of climate change by minimising the emissions of CO_2, by reducing the site's needs for energy and providing some of the requirement by renewable/sustainable means. Issues such as water, waste, biodiversity, etc. have also been addressed in the study.

To guide and benchmark this process, the Building Research Establishment's BREEAM Domestic Refurbishment 2012 methodology has also been used to assess the development. A preliminary assessment indicating that a "Very Good" rating could be achieved (see Appendix A).

BREEAM considers the broad environmental concerns of climate change, pollution, impact on residents and the wider community. It balances these with the need for a high-quality, safe and healthy internal living and working environment. These standards go beyond the requirements of the Building Regulations.

The GLA London Plan and GLA Energy Strategy are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy and sustainability assessments. For the purpose of this assessment they have been used in an advisory nature secondary to the requirements of the London Borough of Camden to help incorporate a number of energy efficiency measures into the proposed development.

1.1 Description of Site

The existing building consists of a 6 storey property, currently in use as a commercial office (B1 Use). The office is arranged over the lower ground floor to the fourth floor, which exists within the mansard roof. The property is grade II listed and was built in c.1975, the listing is principally concerned with the facsimile façade on the front of the property. The core and rear of the building was built to the relevant Building Regulations in place at the time.

The proposal is a material change of use from B1 office to C3 residential, creating 9 no. self-contained residential apartments.

The site is located on Tavistock Place, near the transport hubs of St Pancras and King's Cross. The site falls within the Bloomsbury Conservation Area, a protected area that aims to retain the look and quality of the Bloomsbury area.

These 9 residential units will be a mix of studio apartments, 1 bedroom, 2 bedroom, duplex and 3 bedroom apartments. The unit mix and area schedule is displayed below:

Flat	Bedrooms	Area (m^2)
1	2	82
2	1	50
3	2	76
4	3	101
5	1	58
6	Studio	37
7	2	59
8	1	47
9	2	101
Total	**14**	**611**

Table 1 – AREA SCHEDULE

2. Planning Policy

The National Planning Policy Framework (NPPF) was published in March 2012, which states a clear presumption in favour of sustainable development. The NPPF supports the transition to a low carbon future in a changing climate, taking account of flood risk and coastal change, and encourages the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The Planning Practice Guidance (NPPG) was published on 6th March 2014, superseding a plethora of planning guidance. The NPPG complements and amplifies the NPPF and carries due weight in decision making.

The NPPF replaces PPS22 and in Section 10 outlines its energy and climate change policies. To support the move to a low carbon future, local planning authorities should:

- Plan for new development in locations and ways which reduce greenhouse gas emissions;
- Actively support energy efficiency improvements to existing buildings; and
- When setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards.

In determining planning applications, local planning authorities should expect new developments to:

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption;
- have a positive strategy to promote energy from renewable and low carbon sources;
- identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

The key focus of the NPPF is to support local and regional planning authorities.

2.1 The London Plan

The GLA London Plan 2011, London Plan REMA October 2013 and GLA's Guidance on Preparing Energy Assessments September 2013 document are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy and sustainability assessments. For the purpose of this assessment they have been used in an advisory way secondary to the requirements of the London Borough of Camden, to help incorporate a number of energy efficiency measures into the proposed development.

The London Plan sets out a number of core policies for major developments with regards reducing CO_2 emissions and providing energy in a sustainable manner. As this is not classified as a major development is does not technically have to comply with these requirements, but the design team have used them as guidance and sought to achieve them, where possible within the limitations of the existing constrained site.

Policy 5.2 - requires that major developments achieve a 35% improvement over the 2013 Building Regulation CO_2 Emission Target.

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy;
- Be clean: supply energy efficiently;
- Be green: use renewable energy.

Policy 5.6 - requires all major developments to evaluate the feasibility of connecting to existing or proposed district heating networks and where no opportunity exists consider a site wide Combined Heat and Power (CHP) system.

Policy 5.7 - requires that all major developments seek to reduce their CO_2 emissions by at least 20% through the use of onsite renewable energy generation wherever feasible. Individual development proposals will also help to achieve these targets by applying the energy hierarchy in Policy 5.2.

2.2 London Borough of Camden

The London Borough of Camden set out their approach to sustainable development through their Core Strategy, Development Policies and Supplementary Planning Documents. Core Strategy Policy 13 sets out the overarching approach to sustainability in the borough, with the aims of mitigating and adapting to climate change, promoting local energy generation, managing water resources and reducing carbon dioxide emissions

The Development Policies provide further detail as to how the Core Strategy policies can be achieved. In this instance *"Development Policy 22 – Promoting Sustainable Design and Construction*" provides the details as to how the targets of CS13 will be meet and states:

"The council will require development to incorporate sustainable design and construction measures. Schemes must:

- Demonstrate how sustainable development principles, including relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation; and
- Incorporate green or brown roofs and green walls wherever suitable

The council will promote and measure the sustainable design and construction by:

- Expecting new build housing to meet Code for Sustainable Homes Level 3 by 2010 and Code Level 4 by 2013 and encouraging Code level 6 (zero carbon) by 2016.;
- Expecting developments (except new build) of greater than 500sqm of residential floor space to achieve "very good" in Ecohomes assessment prior to 2013 and encouraging "excellent" from 2013;
- Expecting non-domestic developments of 500sqm of floorspace or above to achieve "very good" in BREEAM assessments and "excellent" from 2016 and encouraging zero carbon from 2019.

The council will require developments to be resilient to climate change by ensuring scheme include appropriate climate change adaption measures, such as:

- Summer shading and planting;
- Limiting run-off;
- Reducing water consumption;

- Reducing air pollution;
- No locating vulnerable uses in basements in floor-prone areas.

In addition to this policy, the Supplementary Planning Document *"Camden Planning Guidance 3 – Sustainability"* provides greater detail on the targets for developments and the approach that should be adopted in meeting these targets.

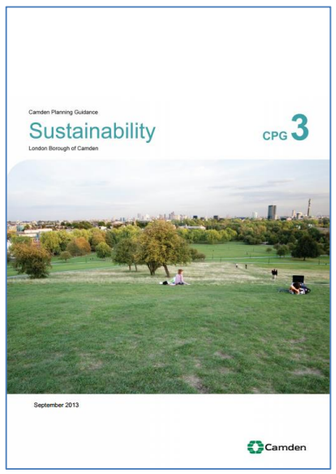


Figure 3 - Camden Council's Planning Guidance

3. Energy Strategy

The application covers the change of use of the existing B1 office space at 4 Tavistock Place into 9 no. residential units. The design of the residential units has been developed to reduce the development's annual energy consumption, whilst providing energy in the most environmentally friendly manner to reduce the annual CO_2 footprint.

The initial focus is on passive building measures such as high levels of insulation and air tightness, followed by energy efficiency. In order to achieve this, Cundall's "Steps to Low Carbon" methodology has been applied.

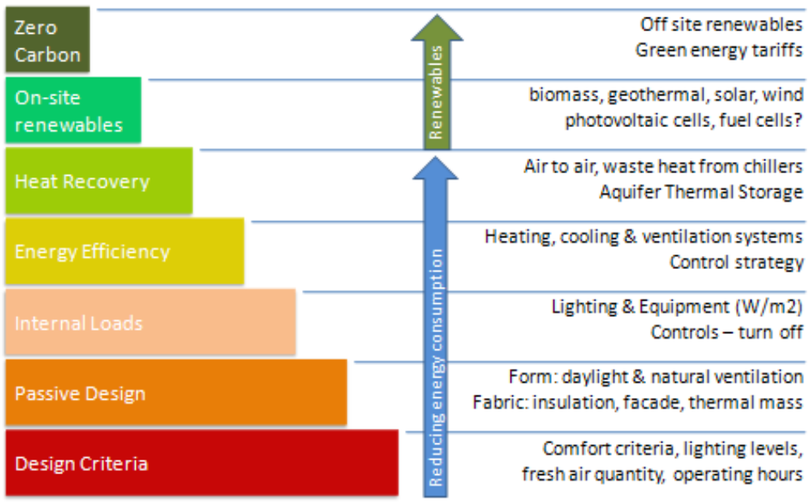
3.1 Passive Design

Substantial reductions in energy usage for the scheme will be achieved through enhancing the passive elements of the design, together with improved occupant comfort. The aim is to optimise the passive building elements and hence reduce the energy consumption associated with the mechanical systems. This is balanced between a range of requirements and accounting for factors such as site constraints and acoustic considerations.

Passive Solar Design – Day Lighting vs. Solar Control

Glazing types and window locations have been carefully considered, so that low angle winter solar gains and sun light are able to enter the space providing 'free' heating and lighting in winter. Solar gain is controlled in summer through solar coatings on the glazing to reduce the risk of 'overheating'. This has been achieved by the careful selection of glazing types and areas.

The design of the living spaces have large areas of glazing to open up the building to the outside and allow light penetration, whilst in the bedroom areas the glazing areas have been reduced for privacy and reduced solar gains. The quantities of solar radiation entering the dwellings have been limited by the glazing specification, which will call for glass with high light transmission (75%), but limited solar transmission (60%).



Building Envelope

As the existing office building is being converted to residential units which typically have higher heat requirements than commercial spaces, the existing façade will be thermally enhanced to minimum values for existing building elements. This will be achieved through new internal dry lining on the walls, increased insulation levels in the roofs and floors and new energy efficient windows at the rear of the scheme, whilst the addition of secondary glazing to the front façade should achieve a similar level of thermal insulation.

All new thermal elements will be specified to achieve the following area weighted U-values to reduce the heat losses though the building's fabric:

Building Fabric Performance

Detail	Design
Ground floor average U-value	0.25W/m^2K
External wall average U-value	0.30W/m^2K
Roof average U-value	0.18W/m^2K
Window U-value (including frame)	1.60W/m^2K
Glazing total solar transmission	60%
Y-value	0.15 (default)
Air permeability @ 50 Pascals	15.0m^3/hr/m^2

Figure 5 - Design Building Fabric

Thermal Bridging

Linear thermal bridge Ψ values if not considered carefully will have a high conductivity which will require a greater enhancement of the other elements of the building envelope to compensate. Where this is not possible, all architectural details will be in accordance with the enhanced construction details listed on the Energy Trust website or as an absolute minimum as per the requirements of Accredited Construction Details document.

Air Permeability

Although not required by Building Regulations, an air pressure test is being considered for the development in order to determine their air leakage rates and taken any remedial actions to improve it. An air leakage rate of 15m³/hr/m² at 50Pa will be targeted, an improvement over the required default value of 25m³/hr/m² as defined by the Part L EPC conventions for a building of this age.

Good air tightness will be achieved by prefabrication of a number of key building components under factory conditions, robust detailing of junctions, good building practices on site and making good of any existing details.

Natural Ventilation

All elements of the development will be naturally ventilated to provide minimum fresh air through trickle vents. A naturally ventilated solution reduces the requirement for fans to supply the requisite fresh air, instead relying on openable windows and trickle vents.

The openable windows will allow the occupants of the dwellings to have full control over the ventilation rate into the units, and provide a degree of cooling during the shoulder months and non-peak times.

Energy Efficient Systems & Appliances

After assessing the contribution of the passive elements to the overall energy balance, the aim is to further reduce CO_2 emissions by selecting efficient mechanical and electrical systems and efficient controls to manage the energy used during operation. On the basis of good practice the following principles will be adopted throughout the proposed development where possible.

Eco-Labelled Goods

Figure 6 - White Goods efficiency rating

As lights and appliances account for about a third of the CO_2 emissions in dwellings, where domestic appliances are installed energy efficient units will be incorporated, including A and A+ rated appliances as a minimum.

Low-Energy Lighting

To reduce the energy consumption associated with artificial lighting, 100% of all internal lighting fittings in each dwelling will be dedicated energy efficient light fittings*:

Furthermore, the development has been designed to maximise daylight into communal areas, reducing the need for lighting.

** Fittings that comprise the lamp, base, control gear, and an appropriate housing, reflector, shade or diffuser. The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit Watt. The fixing must be permanently fixed to the ceiling or wall. A light fitting may contain one or more lamps*.

HVAC Plant Efficiencies

The design team have exceeded the minimum requirements of the domestic HVAC guide. It provides guidance on the means of complying with the requirements of Part L1b of the Building Regulations for conventional space heating systems, hot water systems and ventilation systems.

Energy metering

Metering of the energy use will help the building users identify areas of increased consumption and highlight potential energy-saving measures for the future, hence reducing the associated annual CO_2 emissions from these systems. The gas and electrical supplies will be metered using smart meters with internal display units located in the hall area.

4. Estimated Annual Energy Consumption

In accordance with the London Borough of Camden's Core Strategy and the Mayor's Energy Hierarchy, an energy assessment based on the Building Regulations Part L1b 2013 standard has been undertaken. The approved Standard Assessment Procedure (SAP) software Elmhurst Energy 2012 was used for the calculation.

The London Plan's Energy Hierarchy has been adopted as a guide, however the scheme does not qualify as a major development under the London Plan's definitions and therefore it is exempt from London Plan targets.

The results have been compared between a baseline case, based on the minimum fabric threshold standards for Part L1B and the minimum plant efficiencies under the Domestic Modelling Guide, and the proposed scheme with the aforementioned passive and energy efficient measures. The SAP Building Services Inputs outlines the design parameters used in the base case and proposed models.

The analysis indicates that the proposed dwellings are all performing significantly better than base case and achieving improvements of between 42% and 58% dependant on the dwelling type, with an area weighted improvement for the development of **50%**.

All SAP calculations have been carried out using the approved software Elmhurst Energy and the Part L1b 2013 methodology.

Building Fabric Performance

Detail	Base Case	Design
Ground floor average U-value	0.70W/m^{2}K	0.25W/m^{2}K
External wall average U-value	0.70W/m^{2}K	0.30W/m^{2}K
Roof average U-value	0.35W/m^{2}K	0.18W/m^{2}K
Window U-value (including frame)	3.50W/m^{2}K	1.60W/m^{2}K
Glazing total solar transmission	60%	60%
Y-value	0.15	0.15 (default)
Air permeability @ 50 Pascals	25.0m^3/hr/m^3	15.0m^3/hr/m^2

Figure 7 - Building Fabric Performance Comparison

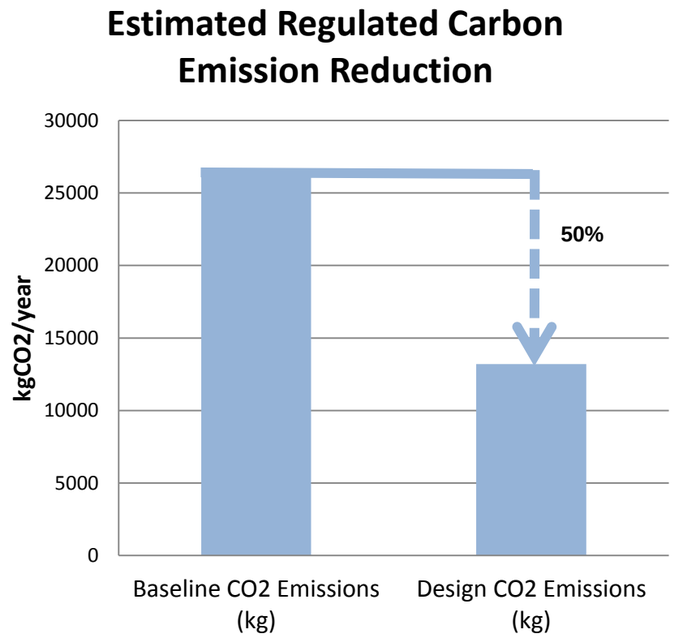
Fixed Building Services

Detail	Base Case	Design
Heating type	Individual Boilers	Individual Combi Boilers
Heating fuel	Natural gas	Natural gas
Gross boiler seasonal efficiency	84%	90%
Heating Emitters	Radiators	Underfloor
Boiler Compensator	None	Weather
Heating system controls	Time, thermostat	Time and Temp. Zone Control
Ventilation	Naturally Ventilated	Naturally Ventilated
Hot water pipework insulated	Yes	Yes
Cooling SEER	2.5	2.5
Low energy light fittings	75%	100%
Hot water daily usage	> 125 l/p/day	< 125 l/p/day

Figure 8 - Fixed Building Services Comparison

Area Weighted Results

Area Weighted Results	Base Case		Design	
	Absolute	per sqm	Absolute	per sqm
Heating (kWh)	86604	141.7	27990	45.8
Hot water (kWh)	15840	25.9	13632	22.3
Lights (kWh)	3586	5.9	2694	4.4
Fans & Pumps(kWh)	13074	21.4	5433	8.9
Cooling (kWh)	0	0.0	0	0.0
Total Energy (kWh)	101230	165.7	50090	82.0
DER (kgCO_2)	26926	44.1	13385	21.9
Improvement (%)			**50%**	



5. Decentralised Energy Networks

The feasibility of connecting to an existing or proposed district energy network has been investigated for the Tavistock Place site in accordance with Policy 5.6 of the London Plan. The London Heat Map indicates there are no existing district heating networks within a feasible connection distance of 500m, however there is a proposed network running along the Euston Road.

Figure 9 - London Heat Map of the Tavistock Place Area (Existing networks in yellow, proposed networks in red, areas of opportunity in purple)

The London Borough of Camden have been contacted to gauge whether it is feasible to connect to this proposed network (see Appendix C – Proposed DH Network Email). It is expected that the cost of connection for such a minor development would be prohibitive due to the distances involved. If Camden respond positively then further consideration will be taken for connection to such a network, but for now it is considered unviable due to the technical and financial concerns.

5.1 Combined Heat and Power

In accordance with the Mayor's Energy Hierarchy in Policy 5.6 the feasibility of a site wide CHP network has been investigated.

The initial analysis indicates that due to the size of the development, the heating and power demands will not be sufficient in order to promote efficient usage of a CHP scheme.

For this reason CHP is not considered viable for the 4 Tavistock Place development.

5.2 Low and Zero Carbon Energy Sources

Policy 5.7 of the London Plan requires that all major developments seek to reduce their CO_2 emissions by at least 20% through the use of onsite renewable energy generation wherever feasible. Despite this not being a major development, the following technologies have been investigated to determine the feasibility of delivering a reduction in the CO_2 emissions through renewables.

The feasibility of each of the energy sources listed has been assessed with regard to the potential contribution each could make to supply a proportion of the development's delivered energy requirement, whilst considering the technical, planning, land use and financial issues.

5.2.1 Air Source Heat Pumps (ASHP)

Air source heat pumps exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems are inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pumps can supply as much as 3kW of heat output for just 1kW of electrical energy input. They can also be used to provide cooling.

They are most efficient when they work at lower temperatures, typically around 40ºC. As the output temperature increases above this the efficiency of the system drops off. Therefore, as DHW is required at 60-65ºC, two systems would need to be installed if a heat pump system was considered; an efficient instantaneous gas-fired LTHW system for the DHW and either a underfloor heating system for space heating or a heating coil on the MVHR feeding off the heat pumps.

There is only sufficient space to locate the outdoor units of the split systems on the lower ground floor and at roof level. The spatial requirement for an individual heating system with a separate hot water generator means that an air source heat pump system is not viable for this scheme.

5.2.2 Solar Thermal

Solar thermal collectors utilises solar radiation to heat water for use in buildings. The optimum orientation for a solar collector in the UK is a south facing surface, tilted at an angle of 30º from the horizontal.

Solar collectors are typically designed to meet a development's base heat load, associated with its domestic hot water requirements. For residential development these usually equates to 60-70% of the total DHW annual load, with the natural gas-fired boilers meeting the remainder of the load.

An initial study into the feasibility of incorporating a solar thermal collector system onto the roof of the dwelling has been undertaken. The system considered was a roof mounted evacuated tube collector array, facing south and tilted with an inclination of 30º in order to maximise the operational efficiency of the system.

However, as previously stated the proposed roof structure has been designed to be in keeping with the local conservation area and the building orientation makes the inclusion of solar thermal collectors unviable.

5.2.3 Ground Source Heat Pumps (GSHP)

As this is an existing building on a constrained site it not feasible to drill new boreholes under the site. Furthermore GSHPs only work efficiently on developments where there is a reasonably balanced heating and cooling load, to prevent the piles warming or cooling the ground.

The spatial constraints and unbalanced heating and cooling demands mean that ground source heat pumps are not considered feasible for this development.

5.2.4 Wind Turbines

The output from wind turbines are highly sensitive to wind speed. Hence it is essential that turbines should be sited away from obstructions, with a clear exposure or fetch for the prevailing wind.

The urban location of the site coupled with the adjacent buildings will result in a turbulent flow regime across the site. As such it is not proposed to include wind turbines as part of the development. Furthermore, the protected conservation area of Bloomsbury forbids additions that could detract from the visual aesthetic of the area, which rules out wind turbines for this scheme.

5.2.5 Photovoltaics

Photovoltaic solar cells convert solar energy directly into electricity. The cells consist of two layers of silicon with a chemical layer between. The incoming solar energy charges the electrons held within the chemical. The energised electrons move through the cell into a wire creating an electrical current.

A study into the feasibility of onsite electric generation using south facing photovoltaic panels at 30º on the roof of the development to meet a proportion of the residential development's electricity demand has been undertaken.

The building's listing and its location within the Bloomsbury Conservation Area, a famed example of formal town planning with a predomination of terraced townhouses, many of which have retained their facades and enhanced the quality and heritage of the conservation area means that the south facing photovoltaic panels are unviable for the 4 Tavistock Place scheme.

5.2.6 Biomass Heating

Although the development's thermal load indicates that a small biomass boiler could operate as a lead boiler in a modular arrangement with a number of conventional gas-fired boilers and provide a significant reduction in its CO_2 emissions, biomass boilers are not recommended for this development. A biomass boiler would have to be integrated into a centralised energy strategy as the individual dwelling heat loads are too small to efficiently run.

Biomass boilers require significant space for storage and delivery of fuel. They have higher particulate emissions than gas boilers which typically raises concerns with the Environment Agency as central London suffers from poor air quality. Therefore biomass boilers have not been considered feasible for the proposed development.

6. Proposed Energy Strategy

Although the proposed development is not a major development, we have followed the methodology of the Mayor's Energy Hierarchy with the estimated energy consumption for the development based on the National Calculation Methodology (NCM), calculated with the approved software Elmhurst Energy SAP 2012.

Energy Strategy

The residential units will be well insulated ensuring heat losses are kept to a minimum with improved fabric U-values making the development significantly more air tight. Natural ventilation will provide the apartment's minimum fresh air requirements through trickle vents and openable windows. Energy efficient lighting and metering will be used to ensure that the tenants will be informed on the performance of the development.

The heating in the individual dwellings will be provided by a Low Temperature Hot Water (LTHW) underfloor system, connected up to individual high efficiency condensing boilers.

The combination of passive and energy efficiency systems result in the residential development achieving an area weighted improvement of **50%** over the baseline Building Regulations.

Renewable Energy Strategy

The feasibility of connecting to an existing or proposed district network has been investigated for the site in accordance with Policy 5.6 of the London Plan. The London Heat Map indicates that there are no existing heat networks in the vicinity of the site. A connection to the proposed network in the vicinity seems unviable unless further evidence to the contrary can be provided by the London Borough of Camden Council.

The feasibility of utilising a combined heat and power unit to deliver a portion of the development's heat demand and electricity was analysed. The small size of the development and associated demand means that CHP could not function effectively and is therefore considered not viable for this project.

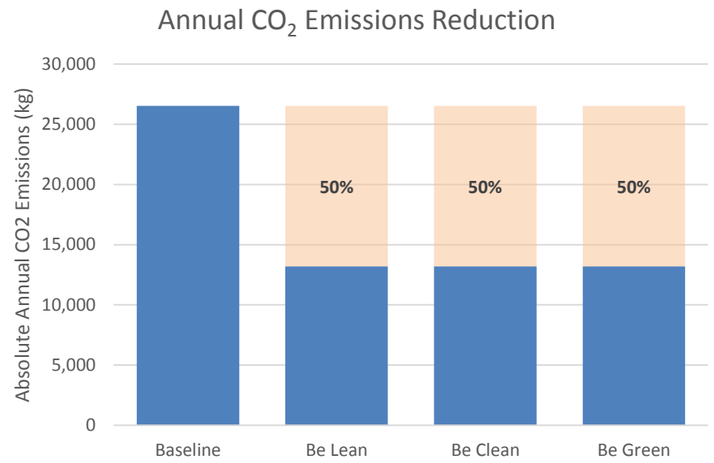
In accordance with Policy 5.7 of the London Plan, investigations into providing a proportion of the site's energy requirements through renewables were undertaken.

The spatial constraints of the site, caused by its location in a built up area, its position within the Bloomsbury Conservation area and the fact the scheme is in an existing building makes it unviable to incorporate any renewable technologies into the development.

As this is a minor development it does not need to achieve the 35% London Plan target, however the proposed solutions exceed this target by following the passive design measures and energy efficiency measures as outlined in Policy 5.2 of the London Plan.

This reduction in carbon emissions the development complies with the requirements of the London Borough of Camden and the GLA for minor developments. No payment will be forthcoming in order make up for any shortfall in carbon emission reduction.

The BREEAM Domestic Refurbishment 2012 Pre-assessment indicates that the development could potentially achieve a 'Very Good' rating, and it could also achieve the mandatory 60% of Water credits and 40% of Material credits under the London Borough of Camden's requirements.



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Carbon Cost (Zero Carbon Hub)	46	£/T
Years	30	
Total Offset Cost	-5681	£

	Regulated Carbon dioxide savings	
	(Tonnes CO_2 pa)	(%)
Savings from Energy Demand Reduction	13.54	50%
Savings from CHP	0.00	0%
Savings from Renewable Sources	0.00	0%
Total Cumulative Savings	**13.54**	**50%**
Total Target Savings	**9.42**	35%
Annual Surplus	**4.12**	

Figure 10 - Energy Hierarchy for 4 Tavistock Place scheme

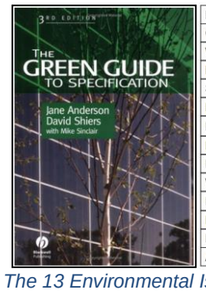
7. Materials

Building and construction activities worldwide consume 3 billion tons of raw material each year, which account for approximately 50% of total global consumption. Using green/sustainable building materials and products promotes conservation of dwindling non-renewable resources. In addition, integrating sustainable building materials into building projects can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these source materials.

The aim for the proposed Tavistock Place development will be for its overall environmental impact to be minimised through the specification of sustainable materials.

7.1 Environmental Impact of Materials

New materials with low overall environmental impact will be chosen and advice from the Green Guide to Specification will be taken into consideration for the selection. The Green Guide rates the environmental impact of different materials and components, taking into account factors like toxicity, ozone depletion, ease of recycling, waste disposal etc. Where viable, at least 80% (by area) of the new main elements in the building, fabric & building services insulation should be specified to achieve the best performing “A” and “A+” ratings from the Green Guide.



Environmental Issue
Climate Change*
Water extraction
Mineral extraction
Stratospheric ozone depletion*
Human toxicity
Ecotoxicity to freshwater
Higher level nuclear waste
Ecotoxicity to land
Waste disposal
Fossil fuel depletion
Eutrophication*
Photochemical ozone creation*
Acidification*

Figure 11 - The 13 Environmental Issues assessed by the Green Guide

7.2 Sustainable Timber

All timber used for basic or finishing building elements in the scheme will be sourced from responsibly managed and sustainable forests or plantations. Such timber products are the only truly renewable construction material in common use and growing trees also absorb and fix CO_2. Forests can also provide the habitat for a wide variety of plant and animal life, preserving important ecology and promoting biodiversity.

7.3 Locally Sustainable Materials

A building that is truly sustainable must be constructed using locally sourced, sustainable materials i.e. materials that can be supplied without any adverse effect on the environment. Therefore, where practical, materials should be sourced from local suppliers, reducing the environmental impacts and CO_2 emissions associated with transportation to the site.

7.4 Recycled Materials

Scope for increased recycling will be incorporated by specifying recycled materials where possible and ensuring that even where new materials are used, as much as possible can be recycled at the end of the buildings’ life.

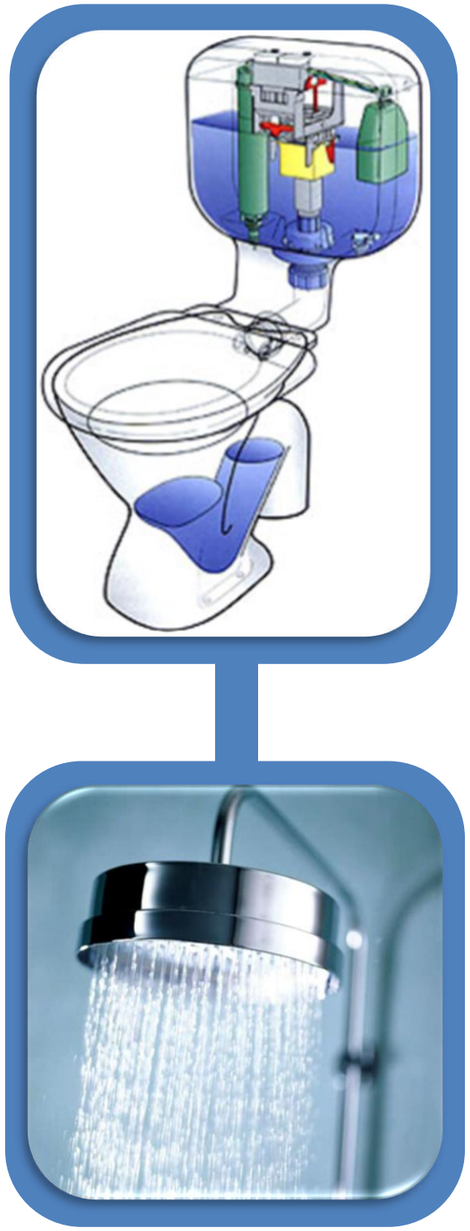
Any material not required from the original building can be recycled and used as aggregate.

Specifying materials with a high-recycled content is also another method of saving processing or manufacturing energy. The recycled content of a material can be described as either post-consumer or post-industrial to indicate at what point in the life cycle a material is reclaimed.

7.5 Ozone Depletion and Global Warming

CFCs and HCFCs, compounds commonly used in insulation materials and refrigerants, can cause long-term damage to the Earth’s stratospheric ozone layer, exposing living organisms to harmful radiation from the sun. They also significantly increase global-warming if they leak into the atmosphere. Following the Montreal Protocol, production and use of CFCs is no longer permitted and EC regulations will require phasing out of HCFCs by 2015. However, products that replace these gases are often still potent global warming contributors.

All insulation materials specified for the proposed scheme will have zero Ozone Depleting Potential and low Global Warming Potential, (GWP<5) in either manufacture or composition in line with the CSH requirements. This will include insulation for building elements (roof, internal & external walls, floor – including foundations) as well as insulation for hot water vessels and pipe or duct work.



8. Water Conservation

Water consumption in the UK has risen by 70% over the last 30 years. Trying to meet the increasing demand by locating new sources of water supply is both expensive and damaging to the environment. Therefore, the design team have focused on reducing the demand for water and managing the existing resources.

8.1 Demand Reduction and Water Efficiency

The aim is to minimise internal and external potable water use within the development. Good water management can contribute to reducing the overall level of water consumption maintaining a vital resource and having environmental as well as cost benefits in the life-cycle of the building. This also contributes towards achieving the London Borough of Camden's Development Policy DP23, ensuring that all developments are designed to be water efficient and to minimise the need for future water infrastructure. The following water saving measures are being considered:

Dual Flush Cisterns on WC's - These units have the ability to provide a single flush of 4L and/or a full flush of 6L.

Flow Restrictors to Taps - Flow restrictors reduce the volume of water discharging from the tap. Spray taps have a similar effect and are recommended to reduce both hot and cold-water consumption. Low flow taps in one of the above forms will be installed in all areas.

Low Flow Showers - The average shower uses 15 litres of water a minute, by restricting the output of the showers in the development to a maximum of 9 litres/ min a 40% water saving can be achieved. Flow rate can be reduced down to 6 litres/ min without compromising on water pressure and hence should be considered.

Water Meters - In 1995 approximately 33,200 million litres of water a day were extracted in England and Wales, this increased to 44,130 million litres/day in 2001, and much of this was for domestic water supply. To reduce this figure, accurate information on usage is required for management of a building's consumption. Water meters will be specified on the main supply to each dwelling.

9. Sustainable Urban Drainage

The site's drainage strategy will aim to reduce the impact of development on the natural drainage patterns, by retaining water on site by the incorporation Sustainable Urban Drainage techniques (SUDs).

As the site is currently completely impermeable with hard landscaping and building areas, the main aim for the development will be to improve the water retention of the site.

The Environment Agency's Flood Map indicates that the site is located within Flood Zone 1.

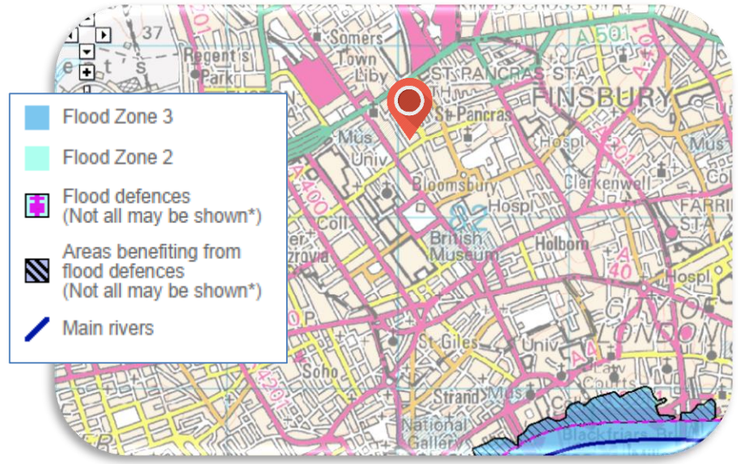


Figure 12 - Flood Map for Tavistock Place

As a minimum, the design will ensure that the peak rate of runoff into watercourses is no worse than the existing site's run off rate. This will comply with the Interim Code of Practice for Sustainable Drainage systems (SUDS) (CIRIA, 2004) or for at least the 1 year and 100 year return period events.

10. Waste Management

Buildings and building sites produce a significant amount of waste annually. Most of the waste produced in the UK is disposed of in landfill sites and only a small percentage of it is recycled or reused.

10.1 Waste Targets

Under EU legislation the UK will have to ensure that less than a third of its waste is sent for burial in landfill sites by 2020 and the figure at present is about 80%. To achieve this target a number of measures are implemented, including landfill tax, aiming to discourage disposal of waste to landfill. Good waste management is a key component of sustainable development. Reducing waste is an important means of:

- Reducing unnecessary expenditure;
- Reducing the amount of natural resources used for production of new materials;
- Reducing energy for waste disposal;
- Reducing levels of contamination and pollution arising from waste disposal.

The proposed development will minimise the impact of waste in the environment where possible.

10.2 Demolition & Construction

During the construction phase a large amount of waste material will be generated through construction, demolition and land clearing procedures. In building construction, the primary waste products in descending percentages are: wood, asphalt/concrete/masonry, drywall, roofing, metals, and paper products.

Prior to commencement on site a Site Waste Management Plan (SWMP) that complies with the requirements of current legislation and CSH will be prepared. This plan will identify the local waste haulers and recyclers, determine the local salvage material market, identify and clearly label site spaces for various waste material storage and require a reporting system that will quantify the results and set targets. As a minimum the SWMP will contain:

a. The target benchmark for resource efficiency e.g. m^3 of waste per $100m^2$ or tonnes of waste per $100m^2$;
b. Procedures and commitments for minimising non-hazardous waste in line with the benchmark;
c. Procedures for minimising hazardous waste;
d. Procedures for monitoring, measuring and reporting hazardous and non-hazardous site waste;
e. Procedures for sorting, reusing and recycling construction waste into defined waste groups either on site or through a licensed external contractor;
f. The name or job title of the individual responsible for implementing the above.

As the proposed scheme will utilise the existing building's core and facades, the amount of new building material required will be far less than for a comparable new build. Opportunities for introducing more reused or reusable materials/components will be explored during detailed design.

10.3 Waste Management & Reporting in Operation

The detailed design phases will identify the potential waste streams that the development will produce. As a minimum, plans will be formulated to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metals. The collection points will be easily accessible to all of the users.

The main aim will be to recycle as much waste as possible; this will be achieved by making sure that waste recycling facilities are strategically placed in convenient locations.

The space allocated for waste storage should be able to accommodate containers with at least the minimum volume recommended by British Standard 5906 (British Standards, 2005) based on a maximum collection frequency of once per week. This is 170 litres volume for a two bedroom dwelling.

Large integrated recycling bin with at least 3 containers for recyclable waste and one general waste will be considered for each dwelling similar to the following image:

Area has been set aside within the lightwelll at the front of the building to accommodate large Eurobin containers to collect the separate waste streams.

Figure 13 - Internal segregated waste storage

Figure 154 - Recycling waste streams

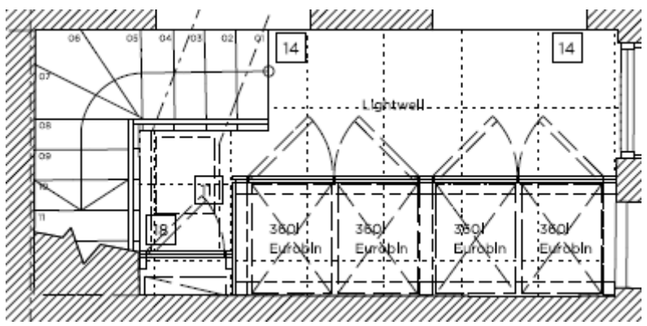


Figure 145 - Acessible communal waste storage

11. Environmental Management

11.1 Construction

Construction sites are responsible for significant impacts, especially at a local level. These arise from noise, potential sources of pollution and waste and other disturbances. Impacts such as increased energy and water use are also significant. Therefore attention is being given to site-related parameters with the aim to protect and enhance the existing site and its ecology.

The aim is to have a construction site managed in an environmentally sound manner in terms of resource use, storage, waste management, pollution and good neighbourliness. To achieve this, there will be a commitment to comply with the Considerate Constructors Scheme. As a minimum a score of greater than 35 of out 50 will be achieved with an aspiration to exceed 40, with no individual section achieving a score of less than 7.

Areas that can be taken into consideration in order to minimise the impact of the construction site on its surroundings and the global environment are as follows:

- Monitor, report and set targets for CO_2 or energy usage arising from site activities;
- Monitor, report and set targets for CO_2 or energy usage arising from transport to and from site;
- Monitor, report and set targets for water consumption arising from site activities;
- Monitor construction waste on site, sorting and recycling construction waste where applicable;
- Adopt best practice policies in respect of air and water pollution arising from site activities;
- Operates an Environmental Management System;
- Additionally, all timber used on site should be responsibly sourced.

12. Land Use and Ecology

The site currently comprises of an existing building with no landscaping. The land has been in use for commercial applications for a period of time and the existing site ecology is limited, with little diversity or habitats suitable for wildlife.

Private terraces will be provided for each residential development, increasing the biodiversity in the local area. Roof terraces can be used to grow flowering plants that will also improve the local biodiversity.

13. Pollution

Global concern for environmental pollution has risen in recent years, as concentrations of harmful pollutants in the atmosphere are increasing. Buildings have the potential to create major pollution both from their construction and operation, largely through pollution to the air (dust emissions, NOx emissions, ozone depletion and global warming) but also through pollution to watercourses and ground water. The proposed development will aim to minimise the above impacts, both at the design stage and on-site.

13.1 Ozone Depletion

CFCs and HCFCs, compounds commonly used in insulation materials and refrigerants, can cause long-term damage to the Earth's stratospheric ozone layer, exposing living organisms to harmful radiation from the sun. They also significantly increase global-warming if they leak into the atmosphere. Following the Montreal Protocol, production and use of CFCs is no longer permitted and EC regulations will require phasing out of HCFCs by 2015. However, products that replace these gases are often still potent global warming contributors.

13.2 Internal pollutants

Volatile organic compounds (VOCs) are emitted as gases (commonly referred to as offgassing) from certain solids or liquids. VOCs include a variety of chemicals, some of which are known to have short-term and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials, furnishings, adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. These 'eco-friendly' paints are made from organic plant sources and also powdered milk based products.

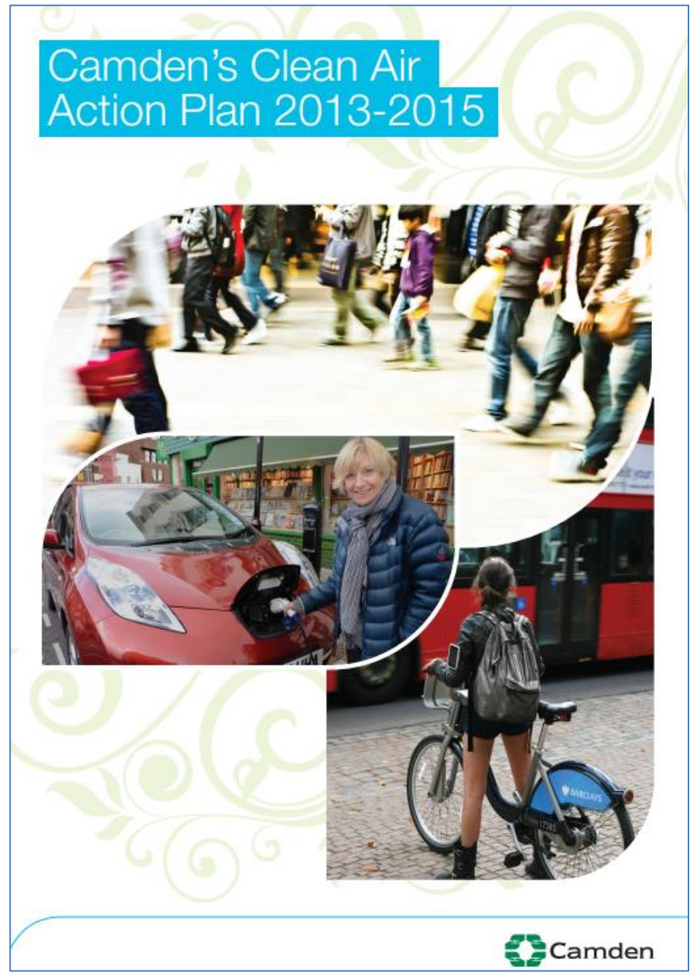
The design team will seek to select internal finishes and fittings with low or no emissions of VOCs and comply with European best practice levels as a minimum.

13.3 NOx emissions from boilers

Nitrous oxides (NOx) are emitted from the burning of fossil fuels and contribute to both acid rain and to global warming in the upper atmosphere. At ground level, they react to form ozone, a serious pollutant and irritant at low level. Burners in heating systems are a significant source of low-level NOx, while power stations (and therefore electric heating) are a significant source of NOx in the upper atmosphere.

The amount of NOx emissions varies between products. New gas boilers vary from 40 NOx/kWh to <70mg NOx/kWh (class 5). The proposed high efficiency gas-fired combination boilers will be specified to emit less than 70 NOx/kWh.

The entire London Borough of Camden was declared an Air Quality Management Area (AQMA) in 2000 and remains an AQMA for both NOx and particulates to the present day. Camden is committed to strict regulation of large new boilers and combined heat and power systems within its boundaries.



14. Green Transport

The transport of people between buildings is the second largest source of CO_2 emissions in the UK after energy use in buildings and remains the main source of many local pollutants. Energy use and emissions from transport are growing at 4% per year, and at the same time, the effects of climate change are becoming more severe; there will be greater pressure to control CO_2 emissions from transport and sites without good access to public transport will be at much greater risk from these controls.

14.1 Site Location

4 Tavistock Place is located just south of St. Pancras and King's Cross. As such it has excellent local and regional transport links within easy walking distance of the site.

A total of 19 distinct bus services are available within a 500m radius of the site, at Tavistock Square, Euston Road and Gower Street.

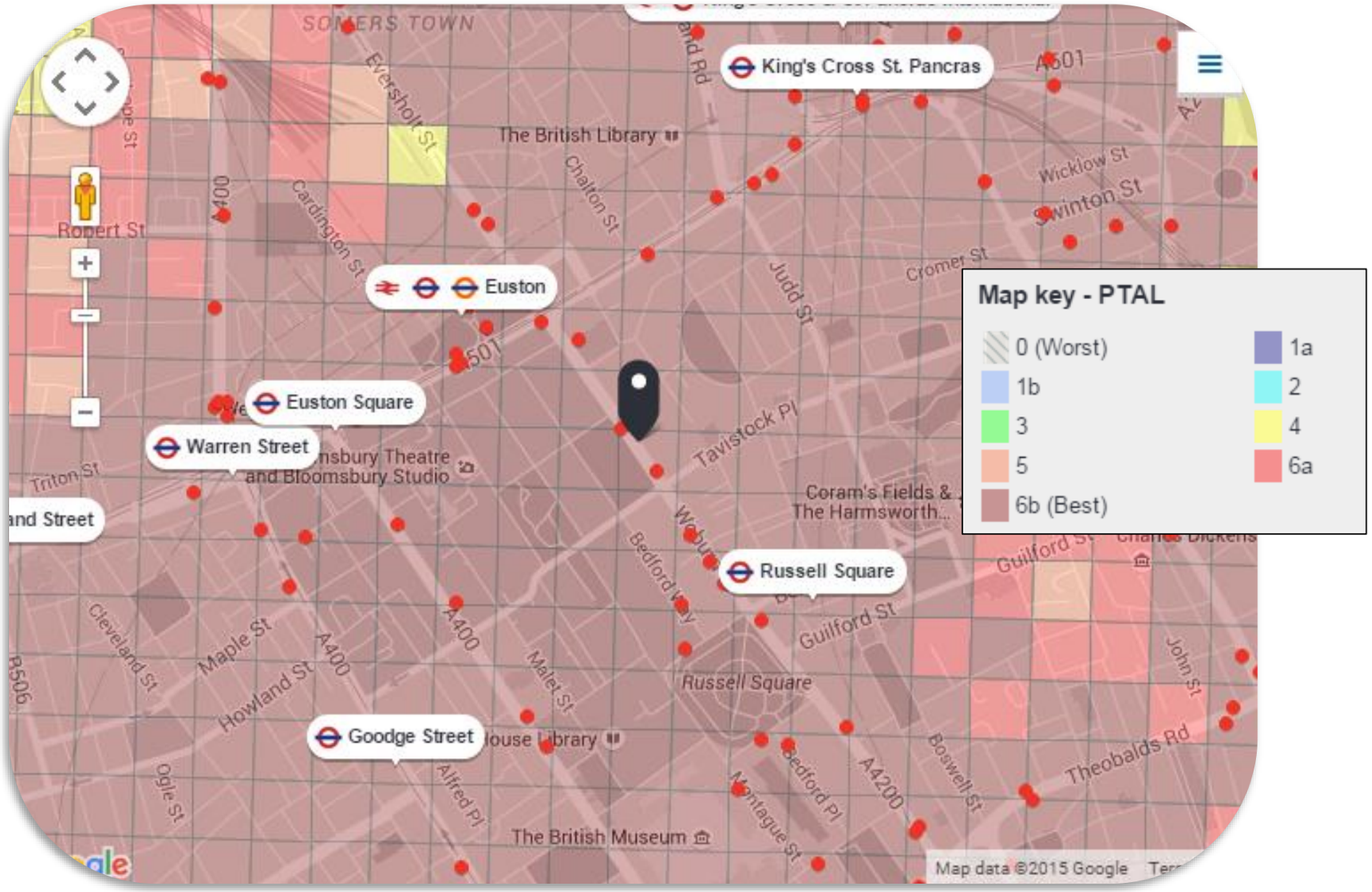
Russell Square Underground Station is within 400m of the site, located on the Piccadilly line.

St. Pancras train station is approximately 900m away, offering trains to the south east of England. London Euston train station is 570 to the north and offers services running both north of London, with King's Cross also offering services north.

The Public Transport Accessibility Level for the development is 6b, the highest possible indicating excellent transport links.

14.2 Cycling Facilities

Each residential unit will have at least one cycle storage space provided. These will be located on a secure rack on the ground floor of the development or within each unit.



15. Appendix A - Code for Sustainable Homes Pre-Assessment

BREEAM Domestic Refurbishment 2012 Pre-Assessment Estimator v0.7

BREEAM

This assessment and indicative BREEAM rating is not a formal certified BREEAM assessment or rating and must not be communicated as such. The score presented is indicative of a dwelling's potential performance and is based on a simplified pre-formal BREEAM assessment and unverified commitments given at an early stage in the design process.

Building name	4 Tavistock Place
Indicative building score (%)	67.67%
Indicative BREEAM rating	BREEAM Very Good

Management | Health & Wellbeing | Energy | Water | Materials | Waste | Pollution

	Minimum Standards				
	Pass	Good	Very Good	Excellent	Outstanding
Ene 02	✓	✓	✓	✓	✗
Wat 01	✓	✓	✓	✗	✗
Hea 05	✓	✓	✓	✓	✓
Hea 06	✓	✓	✓	✓	✓
Pol 03	✓	✓	✓	✓	✓
Mat 02	✓	✓	✓	✓	✓

INNOVATION Section Weighting: 10% Indicative Section Score: 0.00%

Comments

MANAGEMENT Section Weighting: 12% Indicative Section Score: 10.91%

Man 01 Home Users Guide

No. of BREEAM credits available	3	Available contribution to overall score	3.27%
No. of BREEAM innovation credits	0	Minimum Standards applicable:	No

Assessment Criteria

Where a Home Users Guide be provided to all dwellings, covering all issues set out in the 'Users Guide Contents list', three credits may be awarded

Indicative Credits: 3

Comments

Man 02 Responsible Construction Practices

No. of BREEAM credits available	2	Available contribution to overall score:	2.18%
No. of BREEAM innovation credits	1	Minimum Standards	No

Assessment Criteria

Where a compliant considerate construction scheme will be used, credits are awarded depending the score achieved as outlined below:

Indicative Credits: 2

Large Scale - project with more than 5 units

	One Credit	Two Credits
Considerate Constructors Scheme	Score of 25-34 with a score of 5 in each section	Score of 35-39 with a score of 7 in each section
Alternative Compliant Scheme	Compliance	Beyond Compliance

Small Scale - project with 5 units or fewer

	One Credit	Two Credits
Considerate Constructors Scheme	Score of 25-34 with a score of 5 in each section	Score of 35-39 with a score of 7 in each section
Alternative Compliant Scheme	Compliance	Beyond Compliance
Checklist A-3	50% of the optional items	80% of the optional items

Exemplary Credit

Considerate Constructors Scheme	Score of 40 or more with a score of 7 in each section
Alternative Compliant Scheme	Exemplary Level Compliance
Checklist A-3*	All Items (Optional & Mandatory)

* Small Scale Project Only

Indicative Innovation Credits Achieved: 0

Comments

Man 03 Construction Site Impacts

No. of BREEAM credits available	1	Available contribution to overall score	1.09%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where evidence demonstrate that site impacts will be monitored, as detailed below:

Indicative Credits: 1

	One Credit
Large Scale	Where there is evidence to demonstrate that **2 or more** of the sections in **Checklist A-4** are completed
Small Scale	Where there is evidence to demonstrate that **2 or more** of the sections in **Checklist A-5** are completed

Sections of Checklist	
Large Scale - Checklist A-4	Small Scale - Checklist A-5
Monitor, report and set targets for CO2 production of energy use arising from site activities	Set objectives for reducing CO2 production from energy use arising from site activities
Monitor, report and set targets for water consumption arising from site activities	Set objectives for reducing water use arising from site activities
A main contractor with an environmental materials policy	Main contractor environmental materials statement
A main contractor that operates an Environmental Management System	80% of site timber is reclaimed, re-used or responsibly sourced
80% of site timber is reclaimed, re-used or responsibly sourced	

Same definition of small and large scale as in Man 02

Comments

Man 04 Security

No. of BREEAM credits available	2	Available contribution to overall score:	2.18%
No. of BREEAM innovation credits	0	Minimum Standards applicable:	No

Assessment Criteria

Where the following requirements will be met:

Indicative Credits: 1

One Credit Secure windows and doors	External doors and accessible windows meet minimum standards and appropriately certified
Two Credits Secured by design	Principles and guidance of Secured by Design Section 2 are complied with
	A suitably qualified security consultant is consulted at the design stage and their recommendations are incorporated into the refurbishment

Comments

Man 05 Protection and Enhancement of Ecological Features

No. of BREEAM credits available	1	Available contribution to overall score:	1.09%
No. of BREEAM innovation credits	1	Minimum Standards applicable:	No

Assessment Criteria

Where the following requirements will be met:

Indicative Credits: 1

One Credit Protecting Ecological Features	Site survey carried out to determine presence of ecological features
	Statutory Nature Conservation Organisation notified of protected species
	Features of ecological value protected during refurbishment works

Indicative Innovation Credits Achieved: 0

Exemplary Credit Ecological enhancement	A suitably qualified ecologist recommends features to enhance ecology of the site
	adopts all general ecological recommendations
	adopts 30% of additional recommendations

Comments

Man 06 Project Management

No. of BREEAM credits available	2	Available contribution to overall score	2.18%
No. of BREEAM innovation credits	2	Minimum Standards applicable	No

Assessment Criteria

Where the following requirements will be met:

Indicative Credits: 2

One Credit Project Roles and Responsibilities	Where all of the project team are involved in the project decision making
	Small Scale - the project manager assigns individual and shared responsibilities amongst the project team including all trades on site
	Large Scale - the project manager assigns individual and shared responsibilities across the following key design and refurbishment stages: i. Planning and Building control notification ii. Design iii. Refurbishment iv. Commissioning and handover v. Occupation

Small Scale projects: five units or fewer and less than £100k **Large Scale projects: more than five units and more than £100k**

One Credit Handover and Aftercare	Handover meeting arranged
	2 or more of the following committed to: - A site inspection within 3 months of occupation - Conduct post occupancy interviews with building occupants or a survey via phone or posted information within 3 months of occupation - Longer term after care e.g. a helpline, nominated individual or other appropriate system to support building users for at least the first 12 months of occupation

Indicative Innovation Credits Achieved: 0

Exemplary Credits

One Exemplary Credit Early Design Input	Where A BREEAM Accredited Professional has been appointed to oversee key stages within the project. OR Where a BREEAM Domestic Refurbishment Assessor has been appointed at an early stage of the project, prior to the production of a refurbishment specification
One Exemplary Credit Thermographic Surveying and Airtightness Testing	Where Thermographic surveying and Airtightness testing have been carried out at both pre and post refurbishment stages Where an improved air tightness target has been set at design stage and testing demonstrates that this has been achieved post refurbishment

Comments

HEALTH & WELLBEING

Section Weighting: 17%

Indicative Section Score 9.92%

Hea 01 Daylighting

No. of BREEAM credits available	2	Available contribution to overall score	2.83%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the refurbishment results in a neutral impact on daylighting or where minimum daylighting standards are met, up to two credits may be awarded as follows:

Indicative Credits: 1

For Existing Dwellings and Change of Use Projects

First Credit Maintaining Good Daylighting	The refurbishment results in a neutral impact on the dwellings daylighting levels in the kitchen, living room, dining room and study

Where the property is being extended

	New spaces achieve minimum daylighting levels
First Credit Maintaining Good Daylighting	The extension does not significantly reduce daylighting levels in the kitchen, living room, dining room or study of neighbouring properties

For All Properties

Second Credit Minimum Daylighting	The dwelling achieves minimum daylighting levels in the kitchen, living room, dining room and study

Comments

Hea 02 Sound Insulation

No. of BREEAM credits available	4	Available contribution to overall score	5.67%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

To ensure the provision of acceptable sound insulation standards and so minimise the likelihood of noise complaints.

Indicative Credits: 2

Properties where sound testing has been carried out:

Up to Four Credits	Four credits awarded according to the improvement over building regulations. See table in additional information in Technical Manual

Properties where sound testing is not feasible and not required by the appointed Building Control body

Two Credits	Where existing separating walls and floors are designed to meet the requirements of Building Regulations with compliant construction details
Up to Four Credits	Where a Suitably Qualified Acoustician (SQA) provides recommendations for the specification of all existing separating walls and floors
	SQA confirms in their professional opinion that they have the potential to meet or exceed the sound insulation credit requirements
	Where these recommendations are implemented
	See table in additional information in Technical Manual

Historic Buildings

Up to Four Credits	Where the dwelling is a Historic Building and sound testing results demonstrate existing separating walls and floor meet the Historic Building credit requirements
	See table in additional information in Technical Manual
	Where sound testing is not feasible and not required by the appointed Building Control body meeting criteria 2 and 3 using Table 12
	Properties where sound testing has been carried out, credits awarded according to the improvement over building regulations. See table in additional information in Technical Manual
	Where the dwelling is a detached property
	Where the dwelling is a propertywith separating walls or floors only between non habitable rooms OR Testing not required by building control body

Detached Properties

Four Credits	By Default

Properties with separating walls or floors only between non habitable rooms OR Testing not required by building control body

Four Credits	By Default

Comments

Hea 03 Volatile Organic Compounds

No. of BREEAM credits available	1	Available contribution to overall score	1.42%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the refurbishment avoids the use of VOCs with new products meeting the following requirements:

Indicative Credits: 0

One Credit Avoiding the use of VOCs	Where all decorative paints and varnishes used in the refurbishment have met the requirement listed in table 5.4 in the Technical Manual
	Where at least five of the eight remaining product categories listed in table 5.4 have met the testing requirements and emission levels for Volatile Organic Compound (VOC) emissions against the relevant standards identified within table 5.4 in the Technical Manual
	Where five or less products are specified within the refurbishment, all must meet the requirements in order to achieve this credit.

Comments

Hea 04 Inclusive Design

No. of BREEAM credits available	2	Available contribution to overall score	2.83%
No. of BREEAM innovation credits	1	Minimum Standards applicable	No

Assessment Criteria

Where an access statement has been carried out using Checklist A-8 of the Technical Manual to optimise the accessibility of the home as follows:

Indicative Credits: 1

	Checklist A-8 of the Technical Manual	
	Section 1	Section 2
One Credit Minimum Accessibility	Completed with Evidence	
Two Credits Advanced Accessibility	Completed with Evidence	Completed with Evidence

Exemplary Performance

One Credit	Where an access expert suitably qualified member of the design team has completed sections 1, 2 and 3 of Checklist A-8, access statement template with evidence provided of the measures implemented in the refurbishment

Indicative Innovation Credits Achieved: Please Select

Comments

Hea 05 Ventilation

No. of BREEAM credits available	2	Available contribution to overall score	2.83%
No. of BREEAM innovation credits	0	Minimum Standards applicable	Yes

Assessment Criteria

Where the dwelling meets the following ventilation requirements:

Indicative Credits: 2

One Credit Minimum Ventilation Requirements	A minimum level of background ventilation is provided (with trickle ventilators or other means of ventilation) for all habitable rooms, kitchens, utility rooms and bathrooms compliant with section 7, Building Regulations Approved Document Part F, 2010
	A minimum level of extract ventilation is provided in all wet rooms (e.g. kitchen, utility and bath-rooms), compliant with section 5, Building Regulations Approved Document Part F 2010.
	A minimum level of purge ventilation is provided in all habitable rooms and wet rooms, compliant with section 7, Building Regulations Approved Document Part F, 2010.
	It is an historic building and meets historic building requirements in CN4 of the technical manual
Two Credits Advanced Requirements	Ventilation is provided for the dwelling that meets the requirements of Section 5 of Building Regulations Part F in full
	Where the building is a historic building and meets the requirements for Historic Buildings in compliance note 4 of the technical manual

Comments

Hea 06 Safety

No. of BREEAM credits available	1	Available contribution to overall score	1.42%
No. of BREEAM innovation credits	0	Minimum Standards applicable	Yes

Assessment Criteria

Where a fire and carbon monoxide (CO) detection and alarm system is specified as follows:

Indicative Credits: 1

One Credit Fire and Carbon Monoxide (CO) Detection and Alarm Systems	Where a compliant fire detection and fire alarm system is provided
	Carbon Monoxide detector installed if dwelling is supplied with mains gas or other fossil fuel
	Mains supplied fire detection and alarm system if project involves re-wiring*
	Battery operated fire detection and alarm system if no re-wiring* is to take place

*** see CN9 in Hea 06 for the definition of re-wiring**

Comments

CUNDALL

ENERGY

Section Weighting: 43%

Indicative Section Score 28.91%

Ene 01 Improvement in Energy Efficiency Rating

No. of BREEAM credits available	6	Available contribution to overall score	8.90%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the following targets are met for the improvement in Energy Efficiency Rating achieved as a result of refurbishment:

Indicative Credits: 2.5

Improvement in EER	Credits
≥ 5	0.5
≥ 9	1
≥ 13	1.5
≥ 17	2
≥ 21	2.5
≥ 26	3
≥ 31	3.5
≥ 36	4
≥ 42	4.5
≥ 48	5
≥ 54	5.5
≥ 60	6

Comments

Ene 02 Energy Efficiency Rating Post Refurbishment

No. of BREEAM credits available	4	Available contribution to overall score	5.93%
No. of BREEAM innovation credits	2	Minimum Standards applicable	Yes

Assessment Criteria

Where the following Energy Efficiency Rating benchmarks will be met as a result of refurbishment:

Indicative Credits: 3

EER post refurbishment	Credits	Minimum requirements
≥50	0.5	'Pass' level EER of 50
≥55	1	'Good' level EER of 58
≥60	1.5	
≥65	2	'Very Good level' EER of 65
≥70	2.5	'Excellent' level EER of 70
≥75	3	
≥80	3.5	'Outstanding' level EER of 81
≥85	4	

Exemplary	Credits
≥90	1
≥100	2

Indicative Innovation Credits Achieved: Please Select

Comments

Ene 03 Primary energy demand

No. of BREEAM credits available	7	Available contribution to overall score	10.38%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the following Primary Energy Demand benchmarks will be met as a result of refurbishment:

Indicative Credits: 6

Primary Energy Demand Post Refurbishment	Credits
≤ 400	0.5
≤ 370	1
≤ 340	1.5
≤ 320	2
≤ 300	2.5
≤ 280	3
≤ 260	3.5
≤ 240	4
≤ 220	4.5
≤ 200	5
≤ 180	5.5
≤ 160	6
≤ 140	6.5
≤ 120	7

Comments

Ene 04 Renewable Technologies

No. of BREEAM credits available	2	Available contribution to overall score	2.97%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the dwelling will meet the following % contribution from renewables and primary energy demand targets as a result of refurbishment

Indicative Credits: 0

Dwelling Type	Primary Energy Demand	Percentage from Renewables	
		1 Credit	2 Credits
Detached	≤ 250 kWh/m²/year	≥10%	≥20%
Semi-Detached		≥10%	≥20%
Bungalow		≥10%	≥20%
End of Terrace		≥10%	≥20%
Mid Terrace	≤ 220 kWh/m²/year	≥10%	≥20%
Low Rise Flat		≥10%	≥20%
Mid Rise Flat		≥10%	≥15%
High Rise Flat		≥10%	≥15%

Comments

Ene 05 Energy Labelled White Goods

No. of BREEAM credits available	2	Available contribution to overall score	2.97%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where Energy Efficiency White goods are to be provided as follows:

Indicative Credits: 2

First Credit

Appliance	Appliance provided	Appliance not to be provided
Fridges, Freezers and Fridge-Freezers	Energy Saving Trust Recommended appliances specified	EU Energy Efficiency Labelling Scheme Information Leaflet provided to all dwellings

Second Credit

Appliance	Appliance provided	Appliance not to be provided
Washing Machines and Dishwashers	Energy Saving Trust Recommended appliances specified	Second credit not achieved
Washer-Dryers and Tumble Dryers	Appliances specified with B Rating under EU Energy Efficiency Labelling Scheme	EU Energy Efficiency Labelling Scheme Information Leaflet provided to all dwellings

Comments

Ene 06 Drying Space

No. of BREEAM credits available	1	Available contribution to overall score	1.48%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where adequate, secure internal or external space with posts and footings or fixings is provided with the following:

Indicative Credits: 1

1 Credit

Number of bedrooms	Drying line required
1-2	4m+
3+	6m+

Comments

Ene 07 Lighting

No. of BREEAM credits available	2	Available contribution to overall score	2.97%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where energy efficient internal and external lighting is provided as follows:

Indicative Credits: 1

External Lighting - 1 Credit

Energy Efficient Space Lighting of more than 45 lumens per circuit watt and Energy Efficient Security Lighting OR
Where Energy Efficient Space Lighting is provided ONLY

Internal Lighting - 1 Credit

Maximum average wattage across the total floor area of the dwelling of 9 watts/m2

Comments

Ene 08 Display Energy Devices

No. of BREEAM credits available	2	Available contribution to overall score	2.97%
No. of BREEAM innovation credits	1	Minimum Standards applicable	No

Assessment Criteria

Where consumption data is displayed to occupants by a compliant energy display device

Indicative Credits: 2

Electricity usage data displayed	Primary Heating Fuel	
	Electricity	Other
Electricity usage data displayed	2 credits awarded	1 credit awarded
Primary Heating Fuel usage data displayed	N/A	1 credit awarded
Electricity & Primary Heating Fuel usage displayed	N/A	2 credits awarded

Exemplary Credits

One credit Recording consumption data	Where the first two credits are achieved
	Where any compliant Energy Display Device is capable of recording consumption data

Indicative Innovation Credits Achieved: 0

Comments

CUNDALL

Ene 09 Cycle Storage

No. of BREEAM credits available	2	Available contribution to overall score	2.97%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where individual or communal compliant cycle storage is provided as follows:

Indicative Credits: 1

Dwelling Size	One Credit	Two Credits
Studios/ 1 bedroom	1 per two dwellings	1 per dwelling
2-3 bedrooms	1 per dwelling	2 per dwelling
4 bedrooms	2 per dwelling	4 per dwelling

Comments

Ene 10 Home Office

No. of BREEAM credits available	1	Available contribution to overall score	1.48%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where sufficient space and services will be provided to allow occupants to set up a home office in a suitable room with adequate ventilation

Indicative Credits: 1

Comments

WATER

Section Weighting: 11%

Indicative Section Score 7.70%

Wat 01 Internal Water Use

No. of BREEAM credits available	3	Available contribution to overall score	6.60%
No. of BREEAM innovation credits	1	Minimum Standards applicable	Yes

Assessment Criteria

Where the dwellings water consumption meets the following consumption benchmarks, or where terminal fittings meet the following water consumption standards:

Indicative Credits: 1.5

Calculated Water Consumption (litres/person/day)	Equivalent terminal fitting standards	Minimum Standard	Credits
>150	Typical baseline performance	N/A	0
from 140 to ≤ 150	All showers specified to 'Good' **OR** All taps and WC's to 'Good' **OR** Kitchen fittings specified to 'Excellent'	N/A	0.5
from 129 to < 140	All showers specified to 'Excellent' **OR** All showers and bathroom taps to 'Good'	BREEAM Very Good	1
from 118 to < 129	All bathroom and WC room fittings specified to 'Good' **OR** All bathroom fittings specified to 'Excellent'	N/A	1.5
from 107 to < 118	All Bathroom and WC room fittings specified to 'Excellent' **OR** All Bathroom fittings Specified to 'Excellent' and WC room fitting specified to 'Good' **OR** All Bathroom fittings, kitchen and utility sittings specified to 'Good'	BREEAM Excellent	2
from 96 to < 107	All kitchen, bathroom, utility room and WC room fittings specified to 'Good' **OR** All bathrooms, kitchens and utility rooms specified to 'Excellent'	N/A	2.5
< 96	All bathroom fittings specified to 'Excellent' and WC room, kitchen and utility room fittings specified to 'Good'	BREEAM Outstanding	3

NOTE: 'Good' fittings are equivalent to good practice fittings with "Excellent" fittings equivalent to best practice fittings (see the technical manual for full details.

Exemplary Credit	If the water consumption is less than 80l/person/day

Indicative Innovation Credits Achieved: 0

Comments

Wat 02 External Water Use

No. of BREEAM credits available	1	Available contribution to overall score	2.20%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where the following requirements will be met:

Indicative Credits: 1

Requirements:

One Credit	Where a compliant rainwater collection system for external/internal irrigation use has been provided to dwellings. **OR** Where dwellings have no individual or communal garden space.

Comments

Wat 03 Water Meter

No. of BREEAM credits available	1	Available contribution to overall score	2.20%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where an appropriate water meter for measuring usage of mains potable water meter has been provided to dwelling(s), one credit may be awarded

Indicative Credits: 1

Comments

MATERIALS

Section Weighting: 8%

Indicative Section Score 4.09%

Mat 01 Environmental Impact of Materials

No. of BREEAM credits available	25	Available contribution to overall score	4.44%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Up to 25 credits can be awarded, with credits calculated using the Mat 01 calculator tool. The table below shows the maximum number of credits available for each element:

Indicative Credits: 10

Elements	Green Guide Rating credits available	Thermal performance credits available*
Roof	5	3
External walls	5	3.8
Internal walls (including separating walls)	5	-
Upper and Ground Floor	5	1.2
Windows	5	2

The full 25 credits represents all of the elements containing refurbished or existing materials that meet the Green Guide Rating of A+(6)

GG Rating	Points for existing / refurbished elements	Points for new elements
A+ (6)	5	
A+ (5)	4.6	
A+ (4)	4.2	
A+ (3)	3.8	
A+ (2)	3.4	
A+	3	3
A	2	2
B	1	1
C	0.5	0.5
D	0.25	0.25
E	0	0

Where the full 25 credits cannot be achieved the score can be 'topped up' with thermal performance credits. The full number of thermal performance credits for each element can be achieved when achieving the minimum U-values shown below.

Elements	Minimum U-Value (W/m2K)
Roof	0.11
External walls	0.15
Internal walls (including separating walls)	-
Upper and Ground Floor	0.15
Windows	1.4

Comments

Mat 02 Responsible Sourcing of Materials

No. of BREEAM credits available	12	Available contribution to overall score	2.13%
No. of BREEAM innovation credits	0	Minimum Standards applicable	Yes

Assessment Criteria

Where new materials are responsibly sourced, up to 12 credits may be awarded where 80% of new materials for an element are responsibly sourced. The credits achieved are dependent on % of point achieved which is based upon the responsible sourcing tier level of each material sourced as detailed below:

Indicative Credits: 9

Table 1

Tier level	Points
1	4
2	3.5
3	3
4	2.5
5	2
6	1.5
7	1
8	0

Will all new timber used in the project be sourced in accordance with the UK Government's Timber Procurement: Yes

Table 2

BREEAM credits	% of available points achieved
12	≥54%
10	≥45%
8	≥36%
6	≥ 27%
4	≥ 18%
2	≥ 9%

Comments

CUNDALL

Mat 03 Insulation

No. of BREEAM credits available	8	Available contribution to overall score	1.42%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where any new insulation specified for use within external walls, ground floor, roof and buildings services meet the following requirements:

Indicative Credits: 4

Requirements

4 Credits	Where the Insulation Index for new insulation used in the buildings is ≥2
	Where Green Guide ratings are determined using the Green Guide to specification tool

Requirements

4 Credits	Where ≥ 80% of the new thermal insulation used in the building elements is responsibly sourced.

Comments

WASTE

Section Weighting: 3%

Indicative Section Score 2.40%

Was 01 Household Waste

No. of BREEAM credits available	2	Available contribution to overall score	1.20%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Where compliant recycling and composting facilities are provided, up to two credits may be awarded as follows

Indicative Credits: 2

First Credit - Recycling Facilities

Scenario	Internal recycling storage requirements
Compliant collection scheme in place	3 internal recycling containers provided where recycling is not sorted post
	1 internal recycling container provided where recycling is sorted post collection
	Minimum 30 litre total capacity, no single container less than 7 litre capacity
	Dedicated position in accordance with compliance note 1
No compliant collection scheme in place No adequate external storage	3 internal recycling containers provided
	Minimum 60 litre total capacity
	Dedicated position in accordance with compliance note 1
No compliant collection scheme in place Adequate external storage provided	3 internal recycling containers provided
	Minimum 30 litre total capacity, no single container smaller than 7 litre capacity
	Dedicated position in accordance with compliance note 1

Second credit - Composting facilities

With external space	Without external space
Where a composting service or facility is provided for green/garden waste	Where a composting service or facility is provided for kitchen waste
Where a composting service or facility is provided for kitchen waste	Where an interior container is provided for kitchen composting waste of at least 7 litres
Where an interior container is provided for kitchen composting waste of at least 7 litres	

Comments

Was 02 Refurbishment Site Waste Management

No. of BREEAM credits available	3	Available contribution to overall score	1.80%
No. of BREEAM innovation credits	1	Minimum Standards applicable	No

Assessment Criteria

Up to three credits are available depending on the site waste management plan to be implemented as follows

Indicative Credits: 2

Projects up to £100k

Three Credits	Where waste generated through the refurbishment process is managed in accordance with Checklist A-9
Exemplary Credit	Where a compliant Level 1; Site Waste Management Plan (SWMP) is in place

Indicative Innovation Credits Achieved: 0

Projects up to £300k

Three Credits	Where a compliant Level 1; Site Waste Management Plan (SWMP) is in place
Exemplary Credit	Where a compliant Level 2; Site Waste Management Plan (SWMP) is in place
	Non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the resource efficiency benchmark
	The percentage of non-hazardous construction waste and demolition waste generated by the project has been diverted from landfill and meets or exceeds the refurbishment & demolition waste diversion benchmarks

Projects over £300k

First Credit Management Plan	Where a compliant Level 2; Site Waste Management Plan (SWMP) is in place
Second Credit Good Practice Waste Benchmarks	First credit achieved
	Non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the resource efficiency benchmark
	Amount of waste generated against £100,000 of project value is recorded in the
	Pre-refurbishment audit of the existing building is completed
	If demolition is included as part of the refurbishment programme, then the audit should also cover demolition materials
Third Credit Best Practice Waste Benchmarks	Where the first two credits have been achieved achieved
	Where Non-hazardous demolition waste generated by the dwellings refurbishment meets or exceeds the refurbishment & demolition waste diversion
Exemplary Credit	Where non-hazardous construction waste generated by the dwellings refurbishment meets or exceeds the *exemplary level resource efficiency*
	Where Non-hazardous demolition waste generated by the dwellings refurbishment meets or exceeds the exemplary level diversion benchmarks

Comments

POLLUTION

Section Weighting: 6%

Indicative Section Score 3.75%

Pol 01 NOx Emissions

No. of BREEAM credits available	3	Available contribution to overall score	2.25%
No. of BREEAM innovation credits	0	Minimum Standards applicable	No

Assessment Criteria

Credits are awarded on the basis of NOx emissions arising from the operation of space heating and hot water systems for each refurbished dwelling as follows:

Indicative Credits: 2

	Dry NOx Emissions
One Credit	≤100 mg/kWh (NOx class 4 boiler)
Two Credits	≤70 mg/kWh (NOx class 5 boiler)
Three Credits	≤40 mg/kWh

Comments

Pol 02 Surface Water Runoff

No. of BREEAM credits available	3	Available contribution to overall score	2.25%
No. of BREEAM innovation credits	1	Minimum Standards applicable	No

Assessment Criteria

Where impacts of the refurbishment on surface water runoff are neutralised or where runoff is reduced as a result of refurbishment, up to three credits can be awarded as follows:

Indicative Credits: 1

Requirements

One Credit Neutral Impact on Surface Water	New hard standing areas must be permeable
	If building on to previously permeable area additional run-off must be managed on site
	Calculations should be carried out by an appropriately qualified professional

Requirements

OR Second Credits Reducing Run-Off From Site: Basic	Where the criteria needed for One Credit has been achieved
	Where all run-off from the roof for rainfall depths up to 5 mm, have been managed on site using source control methods
	Include runoff from all existing and new parts of the roof.
	An appropriately qualified professional should be used to design an appropriate drainage strategy for the site

Requirements

OR Three Credits Reducing Run-Off From Site: Advanced	Where run-off as a result of the refurbishment is managed on site using source control
	An appropriately qualified professional should be used to design an appropriate drainage strategy for the site.
	The peak rate of run-off as a result of the refurbishment for the 1 in 100 year event has been reduced by 75% from the existing site.
	The total volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100 year event of 6 hour duration has been reduced by 75%.
	An allowance for climate change must be included for all of the above calculations, in accordance with current best practice (PPS25, 2010).

Requirements

Indicative Innovation Credits Achieved: 0

Exemplary Credit	Where all run-off from the developed site is managed on site using source control
	The peak rate of run-off as a result of the refurbishment for the 1 in 1 year event is reduced to zero.
	The peak rate of run-off as a result of the refurbishment for the 1 in 100 year event is reduced to zero.
	There is no volume of run-off discharged into the watercourses and sewers as a result of the refurbishment, for a 1 in 100 year event of 6 hour duration.
	An allowance for climate change must be included for all of the above calculations, in accordance with current best practice (PPS25, 2010).

Comments

Pol 03 Flooding

No. of BREEAM credits available	2	Available contribution to overall score	1.50%
No. of BREEAM innovation credits	0	Minimum Standards applicable	Yes

Assessment Criteria

Where the dwelling is located in a low flood risk zone, or where in a medium to high flood risk zone and a flood resilience/resistance strategy has been implemented, up to two credits can be awarded as follows:

Indicative Credits: 2

Minimum Standards	A minimum of two credits must be achieved for this issue at the Excellent and Outstanding levels

Option 1 - Low Flood Risk

Two Credits	Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a low annual probability of flooding.

Option 2 - Medium / High Flood Risk

Two Credits	Where a Flood Risk Assessment (FRA) has been carried out and the assessed dwellings are defined as having a medium or high annual probability of flooding.
	Two credits are awarded where as a result of the dwellings floor level or measures to keep water away the dwelling is defined as achieving avoidance from flooding by following Checklist A-10; Decision Strategy Flow Chart.
	Where avoidance is not possible, two credits are achieved where a full flood resilience/resistance strategy is implemented for the dwellings in accordance with recommendations made by a Suitably Qualified Building Professional

Comments

16. Appendix B – SAP Summary Calculations

Sample Report Ltd
1 Sample Street
Sampletown

elmhurst energy systems

Summary Information

Property Reference: 1 Bed
Survey Reference: Design
Property: Tavistock Place, Camden

Issued on Date: 23.Jan.2015
Prop Type Ref:

SAP Rating: 80 C **CO2 Emissions (t/year):** 0.99 **DER:** 20.05 Fail **TER:** 15.42 **Percentage DER<TER:** -30.11 %
Environmental: 86 B **General Requirements Compliance:** Fail **DFEE:** 30.19 Fail **TFEE:** 28.66 **Percentage DFEE<TFEE:** -5.36 %

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 2.01r14
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Page 1 of 4

Orientation	North East
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2015
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	10.45	57.70	2.60

7.0 Living Area	28.42
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.28		27.17	17.41

9.1 Party walls

Description	Construction	Kappa	Area
Party Wall	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill		66.74

10.1 Party Ceilings

Description	Construction	Kappa	Area
Party Ceilings	Concrete floor slab, carpeted		57.70

11.1 Party Floors

Description	Construction	Kappa	Area
Party Floor	Concrete floor slab, carpeted		57.70

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.60
Door	Manufacturer	Door to Corridor							2.00

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
South East Windows	Window	[1] Solid Wall	South East	None	0.00					7.86	
Front Door	Door to Corridor	[1] Solid Wall	North East							1.90	

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	Yes

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Page 2 of 4

17.0 Thermal Bridging: User Input
17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
	E1 Steel lintel with perforated steel base plate	6.59		Yes
	E3 Sill	5.66		Yes
	E4 Jamb	15.28		Yes
	E7 Party floor between dwellings (in blocks of flats)	13.37		No
	E7 Party floor between dwellings (in blocks of flats)	10.45		Yes
	E18 Party wall between dwellings	10.40		Yes
	P3 Party wall - intermediate floor between dwellings (in blocks of flats)	31.34		No

18.0 Pressure Testing	Yes
Designed q50	7.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	Yes
Air change rate	4.00
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500398
Configuration	3
MVHR Duct Insulated	Yes
Manufacturer SFP	0.88
Duct Type	Rigid
MVHR Efficiency	85.00
Wet Rooms	3
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0	0	0	
Number of open flues	0	0	0	
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	Yes
Cooled Area	52.48
Data Source	Manufacturer
Cooling Type	Split or Multi-Split
Energy Class	
Energy Efficiency Ratio	2.50
System Control	Modulating
22.0 Lighting	
Internal	
Total number of light fittings	8
Total number of L.E.L. fittings	8
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Individual Combi Boilers
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	None
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGW
TestMethod	
SAP Code	104
Efficiency (Sedbuk 2009) %	90.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	Electric, time clock
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Supplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes Insulation	
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	
Recommendations	
None	
Further measures to achieve even higher standards	
None	

Sample Report Ltd
1 Sample Street
Sampletown

elmhurst energy systems

Summary Information

Property Reference: 2 Bed
Survey Reference: Design
Property: Tavistock Place, Camden

Issued on Date: 23.Jan.2015
Prop Type Ref:

SAP Rating:	82 B	**CO2 Emissions (t/year):**	1.18	**DER:** 17.38 Fail	**TER:** 14.03	**Percentage DER<TER:**	-23.87 %
Environmental:	86 B	**General Requirements Compliance:**	Fail	**DFEE:**30.25 Pass	**TFEE:**30.60	**Percentage DFEE<TFEE:**	1.13 %

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 2.01r14
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	North East
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2015
3.0 Property Age Band	
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	13.38	81.30	2.40

7.0 Living Area	25.17
8.0 Thermal Mass Parameter	Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.28		32.11	14.37

9.1 Party walls

Description	Construction	Kappa	Area
Party Wall	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill		73.30

10.1 Party Ceilings

Description	Construction	Kappa	Area
Party Ceilings	Concrete floor slab, carpeted		81.30

11.1 Party Floors

Description	Construction	Kappa	Area
Party Floor	Concrete floor slab, carpeted		81.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.60
Door	Manufacturer	Door to Corridor							2.00

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
North West Windows	Window	[1] Solid Wall	North West	None	0.00					5.60	
South East Windows	Window	[1] Solid Wall	South East	None	0.00					10.24	
Front Door	Door to Corridor	[1] Solid Wall	North East							1.90	

14.0 Conservatory None

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

15.0 Draught Proofing	100
16.0 Draught Lobby	Yes
17.0 Thermal Bridging	User Input

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
	E1 Steel lintel with perforated steel base plate	9.27		Yes
	E3 Sill	8.34		Yes
	E4 Jamb	27.28		Yes
	E5 Ground floor (normal)	13.38		Yes
	E7 Party floor between dwellings (in blocks of flats)	13.37		No
	E18 Party wall between dwellings	9.60		Yes
	P3 Party wall - intermediate floor between dwellings (in blocks of flats)	31.34		No

18.0 Pressure Testing	Yes
Designed q50	7.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	Yes
Air change rate	4.00
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500398
Configuration	3
MVHR Duct Insulated	Yes
Manufacturer SFP	0.88
Duct Type	Rigid
MVHR Efficiency	85.00
Wet Rooms	3
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	Yes
Cooled Area	68.33
Data Source	Manufacturer
Cooling Type	Split or Multi-Split
Energy Class	
Energy Efficiency Ratio	2.50
System Control	Modulating
22.0 Lighting	
Internal	
Total number of light fittings	8
Total number of L.E.L. fittings	8
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Individual Combi Boilers
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	None
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	

SUMMARY FOR INPUT DATA FOR New Build (As Designed) — Page 3 of 4

Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGW
TestMethod	
SAP Code	104
Efficiency (Sedbuk 2009) %	90.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	Electric, time clock
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Supplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	

SUMMARY FOR INPUT DATA FOR New Build (As Designed) — Page 4 of 4

Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes Insulation	
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	
Recommendations	
None	
Further measures to achieve even higher standards	
None	

Sample Report Ltd
1 Sample Street
Sampletown

elmhurst energy systems

Summary Information

Property Reference: 3 Bed
Survey Reference: Design
Property: Tavistock Place, Camden

Issued on Date: 23.Jan.2015
Prop Type Ref:

SAP Rating: 79 C **CO2 Emissions (t/year):** 1.77 **DER:** 21.17 Fail **TER:** 16.76 **Percentage DER<TER:** -26.32 %
Environmental: 82 B **General Requirements Compliance:** Fail **DFEE:**50.85 Fail **TFEE:**49.99 **Percentage DFEE<TFEE:** -1.71 %

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 2.01r14
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	North East
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2015
3.0 Property Age Band	
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	19.39	100.90	3.50

7.0 Living Area 39.06

8.0 Thermal Mass Parameter Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.28		67.87	44.66

9.1 Party walls

Description	Construction	Kappa	Area
Party Wall	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill		119.80

10.1 Party Ceilings

Description	Construction	Kappa	Area
Party Ceilings	Concrete floor slab, carpeted		100.90

11.1 Party Floors

Description	Construction	Kappa	Area
Party Floor	Concrete floor slab, carpeted		100.90

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.60
Door	Manufacturer	Door to Corridor							2.00

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
North West Windows	Window	[1] Solid Wall	North West	None	0.00					13.45	
South East Windows	Window	[1] Solid Wall	South East	None	0.00					7.86	
Front Door	Door to Corridor	[1] Solid Wall	North East							1.90	

14.0 Conservatory None

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

15.0 Draught Proofing	100
16.0 Draught Lobby	Yes

17.0 Thermal Bridging: User Input
17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
	E1 Steel lintel with perforated steel base plate	11.59		Yes
	E3 Sill	10.66		Yes
	E4 Jamb	36.80		Yes
	E7 Party floor between dwellings (in blocks of flats)	13.37		No
	E7 Party floor between dwellings (in blocks of flats)	19.39		Yes
	E18 Party wall between dwellings	14.00		Yes
	P3 Party wall - intermediate floor between dwellings (in blocks of flats)	31.34		No

18.0 Pressure Testing	Yes
Designed q50	7.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	Yes
Air change rate	4.00
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500398
Configuration	3
MVHR Duct Insulated	Yes
Manufacturer SFP	0.88
Duct Type	Rigid
MVHR Efficiency	85.00
Wet Rooms	3
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	Yes
Cooled Area	91.50
Data Source	Manufacturer
Cooling Type	Split or Multi-Split
Energy Class	
Energy Efficiency Ratio	2.50
System Control	Modulating
22.0 Lighting	
Internal	
Total number of light fittings	8
Total number of L.E.L. fittings	8
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Individual Combi Boilers
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	None
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGW
TestMethod	
SAP Code	104
Efficiency (Sedbuk 2009) %	90.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	Electric, time clock
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Supplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes Insulation	
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Sample Report Ltd
1 Sample Street
Sampletown

elmhurst energy systems

Summary Information

Property Reference: Duplex
Survey Reference: Design
Property: Tavistock Place, Camden

Issued on Date: 23.Jan.2015
Prop Type Ref:

SAP Rating: 81 B CO2 Emissions (t/year): 1.48 DER: 19.24 Fail TER: 14.98 Percentage DER<TER: -28.41 %
Environmental: 84 B General Requirements Compliance: Fail DFEE:41.26 Fail TFEE:39.13 Percentage DFEE<TFEE: -5.45 %

CfSH Results Version: ENE1 Credits: N/A ENE2 Credits: N/A ENE7 Credits: N/A CfSH Level: N/A

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 2.01r14
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	North East
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	2
3.0 Date Built	2015
3.0 Property Age Band	
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	10.34	41.20	2.60
1st Storey:	17.83	50.87	2.29

7.0 Living Area 33.30

8.0 Thermal Mass Parameter Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Solid Wall	Solid wall : plasterboard on dabs, Insulation, any outside structure	0.28		67.71	52.95

9.1 Party walls

Description	Construction	Kappa	Area
Party Wall	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill		94.32

10.0 External Roofs

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
External Roof	Plasterboard, Insulated flat roof	0.18		50.87	45.11

11.1 Party Floors

Description	Construction	Kappa	Area
Party Floor	Concrete floor slab, carpeted		41.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.60
Door	Manufacturer	Door to Corridor							2.00
Roof Lights	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
North West Windows	Window	[1] Solid Wall	North West	None	0.00					5.00	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Front Door	Door to Corridor	[1] Solid Wall	North East			1.90
South East Windows	Window	[1] Solid Wall	South East	None	0.00	7.86
Roof Lights	Roof Window	[1] External Roof	South East	None		5.76

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	Yes
17.0 Thermal Bridging	User Input
17.1 List of Bridges	

Source Type	Bridge Type	Length	Psi	Imported
	E1 Steel lintel with perforated steel base plate	10.59		Yes
	E3 Sill	9.66		Yes
	E4 Jamb	22.78		Yes
	E6 Intermediate floor within a dwelling	17.83		Yes
	E7 Party floor between dwellings (in blocks of flats)	13.37		No
	E7 Party floor between dwellings (in blocks of flats)	10.34		Yes
	E14 Flat roof	17.83		Yes
	E16 Party wall between dwellings	19.56		Yes
	P3 Party wall - intermediate floor between dwellings (in blocks of flats)	31.34		No
	R1 Head of roof window	4.00		Yes
	R2 Sill of roof window	4.00		Yes
	R3 Jamb of roof window	11.52		Yes

18.0 Pressure Testing	Yes
Designed q50	7.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	Yes
Air change rate	4.00
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500398
Configuration	3
MVHR Duct Insulated	Yes
Manufacturer SFP	0.88
Duct Type	Rigid
MVHR Efficiency	85.00
Wet Rooms	3
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	Yes
Cooled Area	78.93
Data Source	Manufacturer
Cooling Type	Split or Multi-Split
Energy Class	
Energy Efficiency Ratio	2.50
System Control	Modulating
22.0 Lighting	
Internal	
Total number of light fittings	8
Total number of L.E.L. fittings	8
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard

CUNDALL

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Individual Combi Boilers
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	None
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGW
TestMethod	
SAP Code	104
Efficiency (Sedbuk 2009) %	90.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	Electric, time clock
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Summer Immersion	
Supplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	
Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes Insulation	
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

Sample Report Ltd
1 Sample Street
Sampletown

elmhurst energy systems

Summary Information

Property Reference: Studio
Survey Reference: Design
Property: Tavistock Place, Camden

Issued on Date: 23.Jan.2015
Prop Type Ref:

SAP Rating: 77 C **CO2 Emissions (t/year):** 0.86 **DER:** 27.34 Fail **TER:** 20.56 **Percentage DER<TER:** -32.98 %
Environmental: 85 B **General Requirements Compliance:** Fail **DFEE:**42.01 Fail **TFEE:**41.05 **Percentage DFEE<TFEE:** -2.35 %

CfSH Results **Version:** **ENE1 Credits:** N/A **ENE2 Credits:** N/A **ENE7 Credits:** N/A **CfSH Level:** N/A

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client:

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 2.01r14
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Orientation	North East
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2015
3.0 Property Age Band	
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	6.34	36.20	2.94

7.0 Living Area 18.64

8.0 Thermal Mass Parameter Simple calculation - Medium

9.0 External Walls

Description	Construction	U-Value	Kappa	Gross Area	Nett Area
Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.28		18.64	11.82

9.1 Party walls

Description	Construction	Kappa	Area
Party Wall	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill		65.51

10.1 Party Ceilings

Description	Construction	Kappa	Area
Party Ceilings	Concrete floor slab, carpeted		36.20

11.1 Party Floors

Description	Construction	Kappa	Area
Party Floor	Concrete floor slab, carpeted		36.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	Solar Trans	Frame Type	Frame Factor	U value
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.60
Door	Manufacturer	Door to Corridor							2.00

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width	Height	Count	Area	Curtain Closed
North West Windows	Window	[1] Solid Wall	North West	None	0.00					4.92	
Front Door	Door to Corridor	[1] Solid Wall	North East							1.90	

14.0 Conservatory	None
15.0 Draught Proofing	100
16.0 Draught Lobby	Yes

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

17.0 Thermal Bridging User Input
17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
	E1 Steel lintel with perforated steel base plate	4.35		Yes
	E3 Sill	3.42		Yes
	E4 Jamb	12.72		Yes
	E7 Party floor between dwellings (in blocks of flats)	13.37		No
	E7 Party floor between dwellings (in blocks of flats)	6.34		Yes
	E18 Party wall between dwellings	11.76		Yes
	P3 Party wall - intermediate floor between dwellings (in blocks of flats)	31.34		No

18.0 Pressure Testing	Yes
Designed q50	7.50
Property Tested ?	
As Built q50	
Same As Designed ?	
19.0 Mechanical Ventilation	
Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Windows open in hot weather	Windows fully open
Cross ventilation possible	No
Night Ventilation	Yes
Air change rate	4.00
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500398
Configuration	3
MVHR Duct Insulated	Yes
Manufacturer SFP	0.88
Duct Type	Rigid
MVHR Efficiency	85.00
Wet Rooms	3
Brand, Model	

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0	0	0	0
Number of open flues	0	0	0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Cooling System	Yes
Cooled Area	32.82
Data Source	Manufacturer
Cooling Type	Split or Multi-Split
Energy Class	
Energy Efficiency Ratio	2.50
System Control	Modulating
22.0 Lighting	
Internal	
Total number of light fittings	8
Total number of L.E.L. fittings	8
Percentage of L.E.L. fittings	100.00
External	
External lights fitted	No
Light and motion sensors	
23.0 Electricity Tariff	Standard
24.0 Heating Systems	
Main Heating 1	Manufacturer
Description	Individual Combi Boilers
Percentage of Heat	100 %
Main Heating 2	None
Description	
Percentage of Heat	%
Community Heating	None
Secondary Heating	None
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery	No
Instantaneous System 1	
Waste Water Heat Recovery	No
Instantaneous System 2	

SUMMARY FOR INPUT DATA FOR New Build (As Designed) — Page 3 of 4

Waste Water Heat Recovery Storage System	No
Solar Panel	No
25.0 Main Heating 1	
Database Ref. No.	
Fuel Type	
Main Heating	BGW
TestMethod	
SAP Code	104
Efficiency (Sedbuk 2009) %	90.0
Efficiency (Sedbuk 2009) %	
In Winter	
In Summer	
Model Name	TBC
Manufacturer	TBC
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Burner Control	Modulating
Boiler Compensator	
HETAS approved System	
Oil Pump Inside	
FI Case	
FI Water	
Flue Type	Balanced
Smoke Control Area	
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Yes - Pipes in thin screed
Electric CPSU Temperature	
Combi boiler type	Standard Combi
Combi keep hot type	Electric, time clock
Combi store type	
27.0 Community Heating	
Space Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Controls	
SAP Code	
Water Community Heating	
PCDF Index	
Distribution Loss	
Distribution Loss Value	
Charging Linked To Heat Use	
28.0 Secondary Heating	
Description	
SHS efficiency %	
SAP Code	
HETAS Approved System	
Smoke Control Area	
Test Method	
Manufacturer	
Model Name	
29.0 Water Heating	HWP From main heating 1
Water use <= 125 litres/person/day	Yes
SAP Code	901
Immersion Heater	
Summer Immersion	
Suplementary Immersion	
Immersion Only Heating Hot Water	
29.1 Flue Gas Heat Recovery System	
Database ID	
Brand Model	
Details	
29.2 Waste Water Heat Recovery System	
Total rooms with shower and/or bath	
30.0 Hot Water Cylinder	None
Cylinder Stat	
Cylinder In Heated Space	
Independent Time Control	
Insulation Type	

SUMMARY FOR INPUT DATA FOR New Build (As Designed) — Page 4 of 4

Insulation Thickness	
Cylinder Volume	
Loss (kwh/day)	
Pipes Insulation	
In Airing Cupboard	
31.0 Solar Panel	
Solar Panel Area	
Area Type	
Panel Type	
n0, a1, a2, A/G ratio	
Orientation	
Elevation	
Overshading	
Solar Storage Volume	
Pump electrically powered	
Combined Cylinder	
32.0 Thermal Store	
Thermal Store Pipework	
33.0 Photovoltaic Unit	
Apportioned KWh/Year	
34.0 Wind Turbines	
Terrain Type	Urban
Wind Turbines	
Count	
Apportioned Kwh/year	
Rotor Diameter	
Hub Height	
35.0 Small-scale Hydro	
Electricity Generated	
Description	
Apportioned kWh/Year	

Recommendations

None

Further measures to achieve even higher standards

None

17. Appendix C – Proposed DH Network Email

Turner, Chris

From: Turner, Chris
Sent: 26 January 2015 11:39
To: 'mark.everest@camden.gov.uk'
Subject: Euston Road DH Network

Mark,

I'm completing a planning application for a minor residential development consisting of 9 units located at 4 Tavistock Place. Following the London Plan's Energy Hierarchy I am investigating the feasibility of connecting to a local DH network. The London Heat Map indicates that the proposed Euston Road network could run within 250m of the scheme. I have a few queries which I was hoping you could assist with.

- Is there a confirmed date of construction for this network?
- Would you have a cost estimate for connection to the network, considering the run would be around 250m long, and including the plate heat exchanger in the scheme.
- Would you have an estimate for the carbon emission factor for the network?
- Would the network have spare capacity for the scheme? It will consist of 9 residential units with a total GIA of 599m^2, and a peak heating load of approximately 90kW.

Any information you could provide would be much appreciated.

All the best,

Chris Turner
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