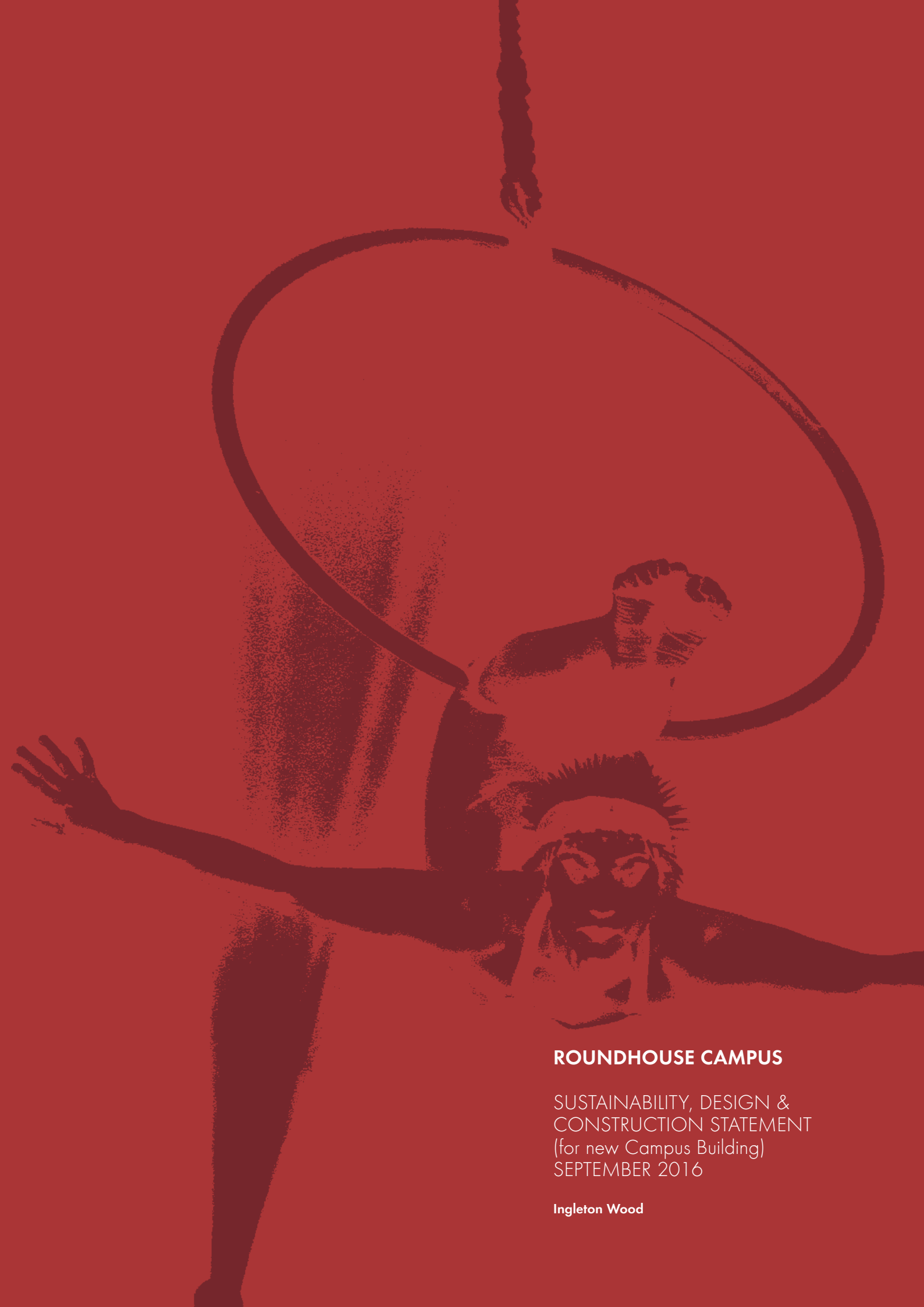

# ROUNDHOUSE CAMPUS

SUSTAINABILITY, DESIGN &
CONSTRUCTION STATEMENT
(for new Campus Building)
SEPTEMBER 2016

**Ingleton Wood**

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# Roundhouse 3, Camden

## Sustainable Design and Construction Statement

**Job No: 50057**

| | |
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# 1.0 Executive Summary

Key sustainable targets and objectives include:

**Low Energy and Low Carbon Design**

- Adopt a 'fabric first' approach to achieve high levels of thermal performance which exceed the minimum requirements of Building Regulations and Camden Council.
- Reduce $CO_2$ emissions by 35% compared to a notional Building Regulations Part L2A 2013 development via efficient heating and hot water systems, low energy lighting, PVs etc.

**Water Conscious Design**

- Specify low water fittings to achieve a 40% improvement over baseline performance.
- Specify external landscaping and green roof to rely solely on precipitation.

**Waste Minimal Design**

- Minimise waste throughout all phases of the development, including design, construction and operation.
- Provide dedicated storage facilities for general and recyclable waste.

**Green Materials and Construction**

- Majority of key building elements to achieve a Green Guide rating of between A+ and D.
- Implement the Considerate Constructors Scheme (CCS) during the site construction.
- Implement measures during site construction to reduce air, ground and water pollution.

**Climate Change Adaptability**

- Incorporate SuDS (i.e. green roof, permeable paving etc.) to minimise surface water run-off.
- Implement measures to mitigate against overheating issues; use of passive design to ensure adequate internal levels of comfort can be maintained

**Landscape and Nature**

- Maintain, protect and enhance the biodiversity and ecological value of the site.
- Increase on-site greenery to protect against hotter summers.

**Management**

- Provision of a Building User Guide covering a wide range of information including operational issues and issues relating to the site and surroundings.
- Monitor the performance of the building in use to ensure design measures are working effectively and efficiently.

# 2.0 Introduction

## 2.1 Objective

This document has been produced by Ingleton Wood to support the planning application for the proposed Roundhouse 3 (RH3).

## 2.2 Background

Roundhouse 3 (RH3) is a new building on the north part of the yard site that links the Roundhouse and the container office building. RH3 will contain three new studios to develop the Roundhouse's work with young people. Space for start-up units will also be provided for the creative industries to encourage collaboration and provide a stepping stone into work for young people engaged with the Roundhouse's creative programmes. Other associated spaces within the proposal includes:

- reception
- offices (large open plan and cellular)
- meeting room
- kitchen area
- summer bar
- break out space

The proposed scheme is of a scale and form that is appropriate to the surrounding built form, and provides a consistent setting for the space it defines, while also enhancing and complementing the local identity of the area.

## 2.3 Microclimate

The area has a temperate maritime climate which is characterised by a lack of extreme weather conditions with warm summers and cool winters. During the summer months, the average temperature reaches 19ºC with average maximum temperatures being up to 23ºC; during winter, average temperatures are approximately 6-8ºC. The effects of climate change and the urban heat island effect could cause an increase in temperature in the coming years.

During the summer, the sun reaches a maximum altitude of 61.9° (rising in the NE and setting in the NW), while the maximum altitude in winter is only 15.0°. This is reflected in the variation of solar radiation throughout the year; the total annual global horizontal solar radiation is 951.5W/m$^2$, with a maximum monthly average of 145.5W/m$^2$ occurring in June of 145.5W/m$^2$ and a minimum monthly average of 15.2W/m$^2$ in December.

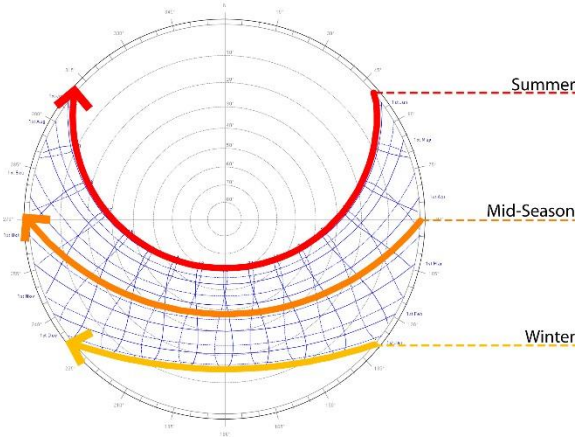
Although there are existing buildings within the yard site and in close proximity to the site, it generally enjoys good solar access with limited overshadowing issues.

The annual precipitation for the area is approximately 600mm. It is predicted that annual rainfall levels will remain fairly constant, but will increase in winter and decrease in summer due to the effects of climate change.

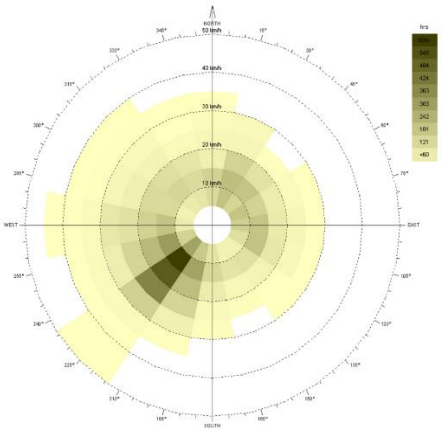
The average wind speed is 4.0m/s, coming predominantly from a south-westerly direction.

The Council has declared the whole borough an Air Quality Management Area (AQMA) for failing to meet the government's health based air quality objectives for nitrogen dioxide and particulate matter.

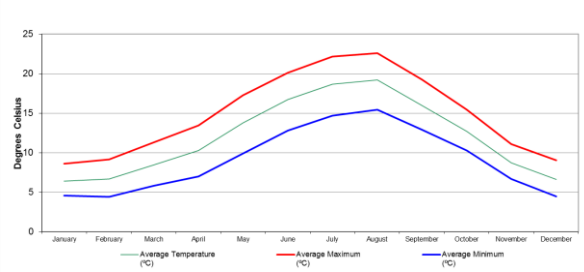
The main source of noise and air pollution in close proximity to the site comes from road traffic passing along the A502 (Chalk Farm Road/Haverstock Hill) to the north of the site. Noise levels can reach up to 65 - 70dBA along the northern façade, although levels drop to less than 60 - 65dBA at the southern façade of the proposed RH3 building. Noise and air pollution also occurs from trains passing along the south of the site, although the railway lines are more than 60m from the proposed building and has less of an impact.



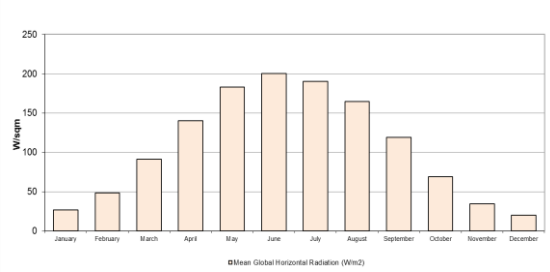

Annual sunpath



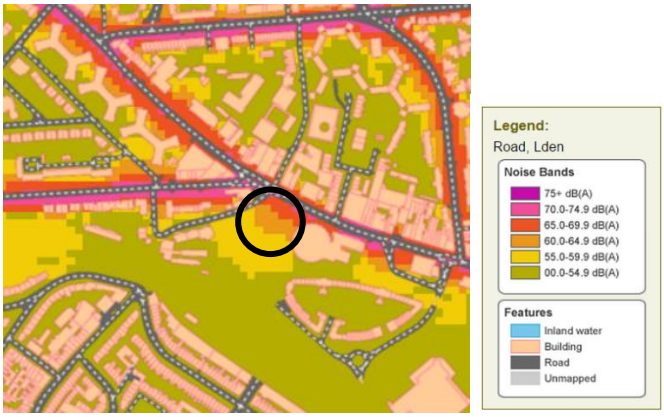
Annual wind rose




Average temperature (°C)

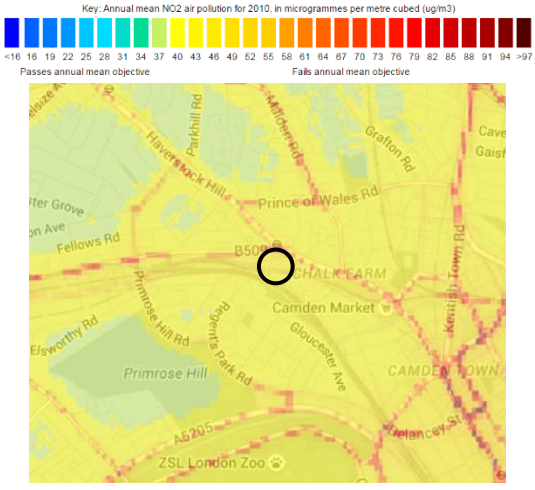



Average solar radiation (W/m$^2$)




Noise map (road)


Noise map (rail)




Nitrogen Dioxide Annual Mean (µg/m$^3$)

Local flood risk zone map

# 3.0 Policy Context

## 3.1 Part L 2013

Building Regulation Part L tightly controls the minimum performance of building fabric, equipment selection and $CO_2$ emissions by setting the baseline TER which must be achieved. Approved Document Part L2A is responsible for controlling new-build non-residential buildings.

The new Building Regulations Part L 2013 came into force since 6th April 2014. The Part L 2013 specifications have been strengthened to deliver 9% $CO_2$ savings across the new non-domestic building mix (and 6% $CO_2$ savings across the new domestic build mix) relative to Part L 2010.

## 3.2 National Planning Policy Framework (2012)

The National Planning Policy Framework was published on 27 March 2012. It sets out the government's planning policies for England, outlining how the planning system protects the environment and promotes sustainable growth.

The Framework sets out planning policies for England and how they are expected to be applied. It provides guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications. It includes 12 core planning principles. The main relevant principles are:

- 7 - Requiring good design;
- 10 - Meeting the challenge of climate change, flooding and coastal change.

## 3.3 The London Plan (2015)

Strategic planning in London is the shared responsibility of the Mayor of London, 32 London boroughs and the Corporation of the City of London. Under the legislation establishing the Greater London Authority (GLA), the Mayor has to produce a spatial development strategy (SDS) – which has become known as 'the London Plan' – and to keep it under review.

The London Plan sets out the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years.

The London Plan includes a range of policies (primarily in Chapters 5 and 7) that deal with matters relating to sustainable design and construction.

## 3.4 GLA Sustainable Design and Construction SPG (2014)

This SPG aims to support developers, local planning authorities and neighbourhoods to achieve sustainable development. It provides guidance on to how to achieve the London Plan objectives effectively, supporting the Mayor's aims for growth, including the delivery of housing and infrastructure.

The guidance in this SPG is intended to:

- provide detail on how to implement the sustainable design and construction and wider environmental sustainability policies in the London Plan;
- provide guidance on how to develop more detailed local policies on sustainable design and construction;
- provide best practice guidance on how to meet the sustainability targets set out in the London Plan; and
- provide examples of how to implement sustainability measures within developments.

As SPG, this document does not set new policy, but explains how policies in the London Plan should be carried through into action.

## 3.5 Local Policies

The following local planning policy documents have been reviewed in relation to energy and sustainable design:

- Camden Core Strategy 2010-2025 (2010)
- Camden Development Policies 2010-2025 (2010)
- CPG 3 Sustainability (2015)
- Camden Draft Local Plan (2016)

Details of relevant policies are highlighted in the following sections of the report.

# 4.0 Energy and Carbon

## 4.1 Planning Policy

### 4.1.1 The London Plan (2015)

Policy 5.2: Make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

Ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings.

| **Non-domestic buildings** | |
|---|---|
| Year | Improvement on 2010 BRegs |
| 2010 – 2013 | 25% improvement |
| **2013 – 2016** | **40% improvement** |
| 2016 – 2019 | As per Building Regs requirements |
| 2019 – 2031 | Zero Carbon |

Policy 5.3: Minimise carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems). Avoid internal overheating and contributing to the urban heat island effect.

Policy 5.5: Prioritise connection to existing or planned decentralised energy networks where feasible.

Policy 5.6: Evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites. Major development proposals should select energy systems in accordance with the following hierarchy:

1) Connection to existing heating or cooling networks
2) Site wide CHP network
3) Communal heating and cooling

Policy 5.7: Provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

Policy 5.9: Reduce potential overheating and reliance on air conditioning systems in accordance with the cooling hierarchy.

### 4.1.2 GLA Sustainable Design and Construction SPG (2014)

2.4.3: The Mayor will adopt a flat carbon dioxide improvement target beyond Part L 2013 of 35% to both residential and non-residential development.

Best Practice: Developers should aim to achieve Part L 2013 Building Regulations requirements through design and energy efficiency alone, as far as is practical.

### 4.1.3 Camden Core Strategy 2010-2025

CS13: Minimise carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the energy hierarchy.

### 4.1.4 CPG 3 Sustainability (2015)

Para 5.4: We will expect developments to connect to a decentralised energy network and use the heat unless developers can demonstrate it is not technically feasible or financially viable.

Para 5.17: Developments which fall within proposed within 1km of an existing decentralised energy network, or one that is likely to be operational within 3 years of occupation of the development, should assess the feasibility of connecting to the network.

Para 5.18: Developments which are proposed within 500m of a potential network (see figure 5 below) which have no timetable for delivery should ensure that the development is capable of connecting to a network in the future.

### 4.1.5 Camden Draft Local Plan (2016)

CC1: Require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met. Assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.

Para 8.11: Achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation.

Para 8.12: Where it is demonstrated that the required London Plan reductions in carbon dioxide emissions cannot be met on site, the Council will require a financial contribution to an agreed borough wide programme to provide for local low carbon projects.

CC2: Reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

## 4.2 Design Response

### 4.2.1 Approach

The methodology employed to determine the potential $CO_2$ savings for the development is in line with the three step energy hierarchy:

**Reduce Energy Demand (Be Lean)** – Use less energy through a range of passive measures (i.e. enhanced building fabric and air tightness, orientation, natural daylight, solar passive heating) and active measures (i.e. low energy lighting, controls etc.)

**Energy Efficiency (Be Clean)** – Once demand for energy has been minimised, investigate the feasibility of connecting to an existing/proposed heat network, implementing a site-wide heat network, on-site CHP etc.

**Renewable Energy (Be Green)** – Use renewable and low energy sources to further reduce emissions.

Such technologies include:

- Solar thermal heating
- Biomass heating
- Ground source heat pumps
- Air source heat pumps
- Photovoltaics
- Wind turbines

### 4.2.2 Lean Measures

The energy efficient design of the proposed development will reduce the energy consumption and associated $CO_2$ emissions whilst maintaining high levels of comfort for the users. This will be achieved by a range of passive measures (i.e. building massing, orientation, high performance building fabric) and active measures (i.e. efficient ventilation systems, low energy lighting etc.).

#### Building Massing

The compact form is thermally efficient to create a low surface area to volume ratio which minimises the heat losses and heat gains through the building fabric. It is of a similar scale to the neighbouring buildings and does not have a major impact on its surroundings.

The form and layout exploits the use of natural daylight wherever possible which reduces the reliance of artificial lighting for portions of the day. Strategic room layouts ensure that natural light and views out are provided to rooms which benefit from it the most, i.e. offices, meeting room, breakout space etc. Rooflights have been incorporated above the breakout space to allow natural daylight into the deeper space and to improve uniformity. Less daylight critical spaces such as circulation, WCs and storage is located internally.

The quantity and positioning of the glazing has been carefully considered to not only provide sufficient daylight and views out, but also to maximise passive solar heating in winter whilst minimising the risk of overheating in summer.

#### Building Fabric

The majority of traditional buildings suffer greatly from high heat loss from the facade and air leakage rates resulting in excessive ventilation, discomfort to occupants and higher fuel bills. Improving the thermal performance of the building fabric is one of the most cost-effective methods of reducing energy consumption and carbon emissions.

By taking a 'fabric first' approach, the building fabric of the proposed development will achieve high levels of thermal performance which exceed the minimum requirements of Building Regulations Part L2A 2013 and Camden Council in order to provide better temperature control and reduce the demand for space heating and cooling. The exact specification and corresponding U-values of the building fabric will be investigated in detail at the next design stage.

#### Air Tightness

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing and the use of best practice construction techniques can minimise the amount of air infiltration into a building.

Current Part L Building Regulations (2013) sets a maximum air permeability rate of $10m^3/m^2$ at 50Pa.

The development will improve upon this and target between 3-$5m^3/m^2$ at 50Pa.

## Thermal Performance Summary

| Element | Minimum Part L2A 2013 Requirements ($W/m^2k$) | Camden Council Requirements ($W/m^2k$) | Indicative RH3 Proposal ($W/m^2k$) |
|---|---|---|---|
| External Walls U-value | 0.35 | 0.20 | 0.18 |
| Floors U-value | 0.25 | 0.20 | 0.15 |
| Roofs U-value | 0.25 | 0.13 | 0.13 |
| Windows U-value | 2.20 | 1.50 | 1.5 |
| Air permeability ($m^3/hr\ m^2$ at 50Pa.) | 10.0 | 3.0 | 3.0 - 5.0 |

Indicative Thermal Performance Summary

## Ventilation

Adequate ventilation is necessary for good health, the removal of odours and excess moisture vapour. Contaminants such as formaldehyde and volatile organic compounds (VOCs) that may cause health problems can accumulate in poorly ventilated buildings. A well designed fresh air system can reduce these levels significantly, replacing contaminants with clean fresh air.

The basic need for energy efficient buildings is to 'build tight, ventilate right' which means ensure unplanned air infiltration is kept to an absolute minimum and introduce ventilation that is effective, draft free and energy efficient.

With growing concerns regarding the cost and environmental impact of energy use, the majority of the smaller rooms/spaces (i.e. cellular offices, meeting room, reception, circulation) with low and predictable occupancy patterns have been designed to be to be naturally ventilated as a low energy and effective solution. Wind and buoyancy will help to move air naturally through the building to ensure safe, healthy and comfortable conditions for the occupants without the use of fans, and also provide free cooling without the use of mechanical systems.

All 3 studios are to be mechanically ventilated (with heat recovery) as they will have much larger and more variable occupancy patterns and will require a 'tighter' control of internal conditions. Mechanical ventilation will also allow for increased responsiveness. The specification of $CO_2$ or air quality sensors are recommended for the studios to ensure the right quantum of air is supplied and to provide the appropriate level of thermal comfort in accordance with CIBSE Guidelines.

The large ground floor office and breakout space front onto the main road are will adopt a mixed-mode ventilation strategy. Natural ventilation will be used as much as possible; however when there are issues of air quality and noise pollution from the main road, or when higher ventilation rates are required, mechanical ventilation will be utilised.

All WCs, showers and kitchen areas will be installed with extract fans to remove moisture and odour.

## Space Heating

Space heating will predominantly be provided via air-to-air heat pumps by extracting heat from the external air and supplying warm air inside the building where and when required.

Naturally ventilated rooms (i.e. meeting room, cellular offices etc.) will supply heat via indoor ceiling mounted cassette units connected to external condensers.

The larger mechanically ventilated rooms (i.e. studios) will have external condensers connected to the AHUs, and pre-heated air will be supplied via ventilation ducts.

All external condensers will be located within the parapet walls of the studio roofs to minimise visual impact, and mitigation measures will be implemented to minimise the egress of noise to sensitive receptors.

## Domestic Hot Water

A dedicated air-to-water heat pump will provide domestic hot water. The heat pump will heat water in a HWS cylinder to a temperature of 45-50°C, which will be increased to the required temperature of 60-65°C via an electric heating coil.

For further details on the ASHPs, please refer to section 4.2.4.

## Cooling

Free cooling (via natural ventilation and mechanical ventilation) will be sufficient for the majority of the time.

Only during periods of high occupancy and/or high external temperatures (i.e. peak summer), will active cooling be utilised to maintain comfortable internal temperatures. This will be provided by the heat pumps working in ‘reverse’ mode (i.e. extracting heat from inside the rooms).

## Lighting

The building massing, room layout, and appropriately sized glazing ensures that natural daylight is provided to the rooms which benefit most from it and reduces the reliance on artificial lighting.

When artificial lighting is required, it will be provided by low energy lighting fittings throughout.

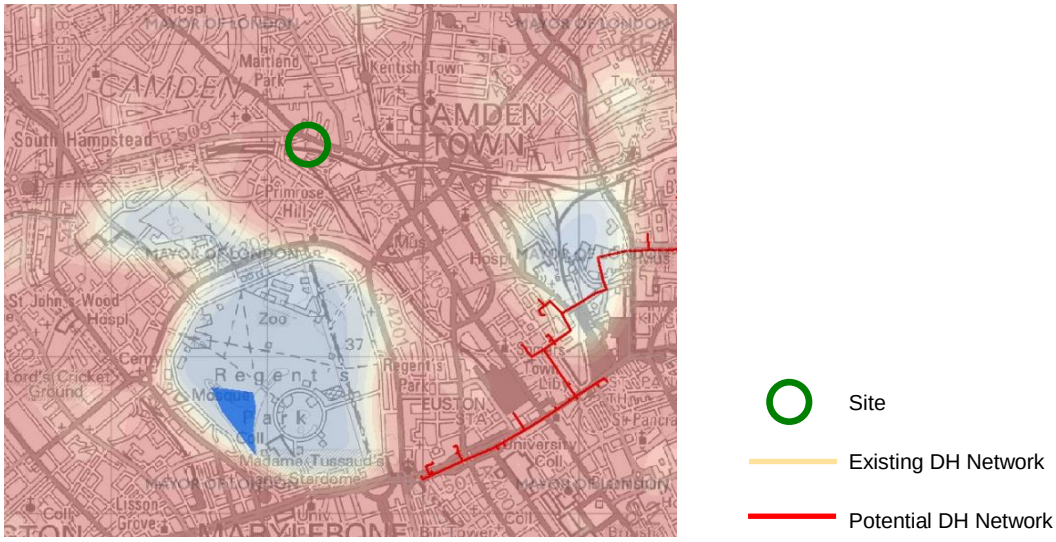
Lighting controls will also be provided where appropriate; for example, daylight control sensors along the perimeter of the large office and breakout space, absence detection in the studios, cellular offices and meeting room, PIR control in the WCs, showers and circulation areas. This will be analysed and specified in detail at the next design stage and all environmental benefits will be considered against costs.

### 4.2.3 Clean Measures

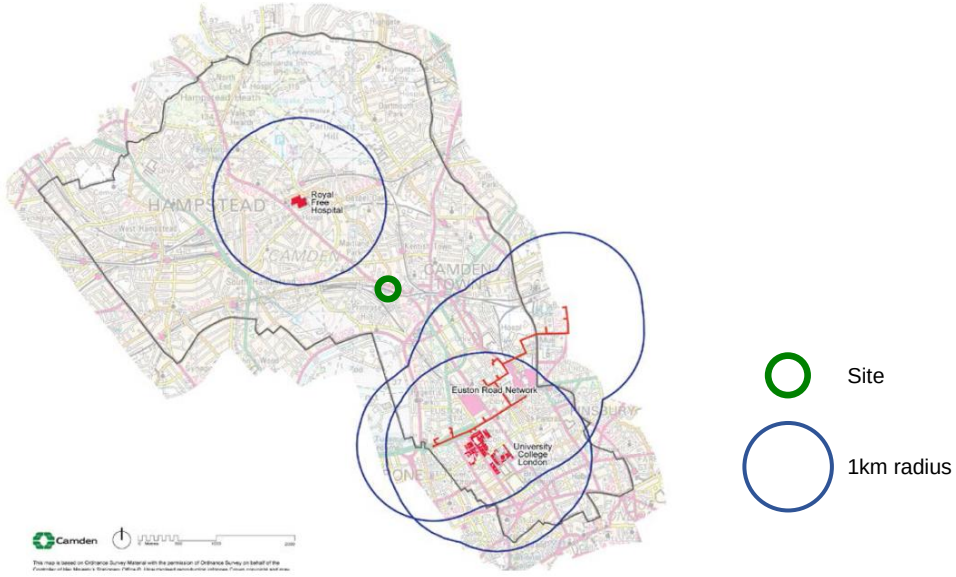
#### Connection to Existing/Proposed District Heating Networks

The London heat map has been developed by the London Development Agency to provide a resource which supports the development of decentralised energy networks and CHP. As a well as mapping heat demands, it provides details on the location of existing and potential heat networks, potential anchor loads and new developments which may connect or act as a catalyst for heat network development.

Analysis of the heat map indicates that there are currently no existing or proposed district heat networks in close proximity to the site making any connection unfeasible. The nearest large proposed heat network in Camden is along Camden Road, which is approximately 2.5km from the site.




Existing and proposed district heat networks
(source: London heat map



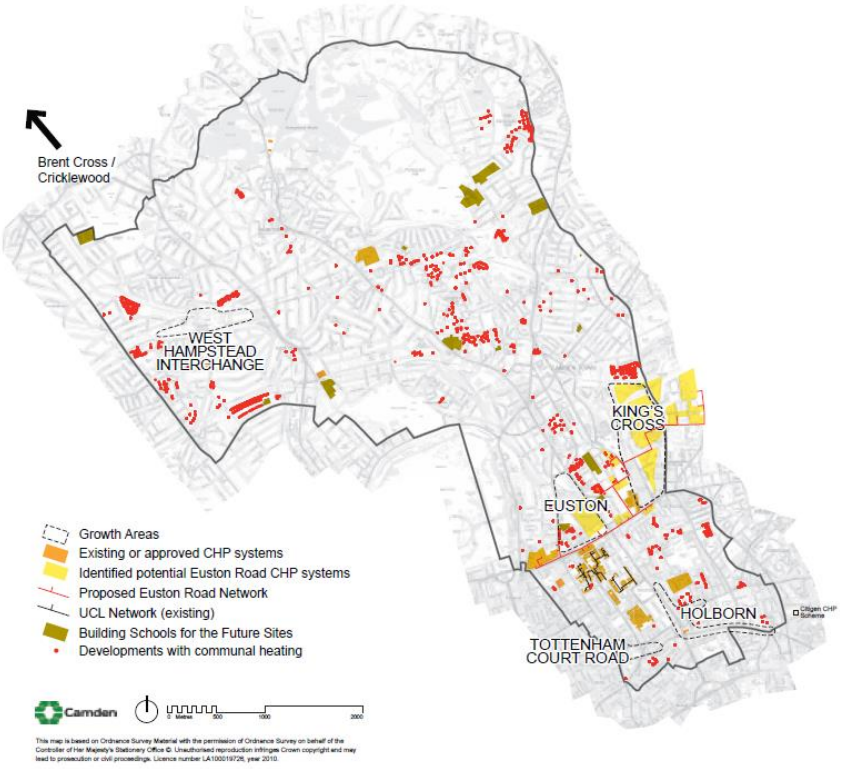

Development within 1km radius of an existing or emerging network
(source: CPG 3 Sustainability)

## Combined Heat and Power

CHP generates electricity whilst also capturing usable heat that is produced in this process. This contrasts with conventional ways of generating electricity where heat is simply wasted.

CHP is ideally suited to very large mixed-use developments with a high heat demand where the heat is required at different times of the day; the Carbon Trust state that CHP's are most useful in scenarios where heating is a constant requirement for at least 5000 hours per year. This allows for the CHP to be running fairly constantly making it more financially viable and maximising $CO_2$ reductions.

It is concluded that due to the size and limited continuous heat demand of the proposed development, on-site CHP is not an economically viable option.




Development within 1km radius of an existing or emerging network
(source: Camden's Core Strategy)

### 4.2.4 Green Measures

#### Photovoltaics

Photovoltaics (PV) generate electricity by harnessing the energy of the sun and are available in various forms such as flat panels for mounting on roofs to thin films which can be incorporated into building fabrics. The efficiency of the PV cells are based on a number of factors, including the type of PV cell, orientation, tilt, overshadowing etc.

The main types of PV are:

- Mono-crystalline; these have an efficiency of 15-20%
- Poly-crystalline; these have an efficiency of 11-15%
- Thin film, these have an efficiency of 6-8% and can be used to integrate into other building materials.

The optimum mounting arrangement for PV arrays is south facing (within 45 degrees of south) with the array tilted at 30 to 40 degrees from the horizontal. However, a 5-15 degree tilt is optimum where roof space is restricted and to reduce spacing requirements between rows of panels.

PVs are a viable option for the site due to the available space at roof level, good solar access with little overshadowing, and the limited visual impact on the surroundings compared to other technologies (such as wind turbines).

#### Solar Thermal Heating

Solar thermal panels utilise the energy from the sun to provide domestic hot water. The system is not ideal for space heating since this is not required during the summer periods when solar thermal is the most effective.

Similar to PVs, solar thermal panels are typically roof-mounted and their optimum arrangement is south facing and tilted at 30 to 40 degrees from the horizontal.

The main two types of solar thermal panels are evacuated tube and flat plate collectors; although evacuated tubes are more expensive, they are more efficient and produce higher temperatures.

The use of solar thermal panels has been discounted as they would be limited to domestic hot water only, and they would compete for the same space on roof-level with PVs, which are a more viable option.

#### Biomass Heating

The burning of biomass fuels such as wood chips or pellets, can be used for providing space heating and/or domestic hot water. The $CO_2$ emitted during combustion is balanced by that absorbed during the fuels growth cycle. Therefore, biomass heating is considered a carbon neutral process. A fuel store is required and boiler flues are typically taller than a gas equivalent. Since $NO_X$ emissions are higher than those of gas, planning and land use should be considered.

Biomass has been discounted as it emits more local pollution (i.e. $NO_X$) than gas, requires significant fuel to be supplied, and the large area required for storage.

## Ground Source Heat Pumps

Ground source heat pumps (GSHPs) utilise the steady state temperature of the ground provide heating and cooling efficiently. Systems work best when they are used for heating and cooling as they enable the ground temperatures to re-balance over the year.

There are two common types of GSHP; horizontal GSHPs which just require pipes laid into the ground and vertical GSHPs which use probes inserted vertically down ranging from 100m to 800m long. Horizontal systems are the cheapest to install but have lower returns than the vertical systems.

GSHPs have been discounted due to the insufficient land available for horizontal GSHPs, and the high capital costs and ground works required for vertical GSHPs.

## Air Source Heat Pumps

Air source heat pumps (ASHPs) are similar to GSHPs, but instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air and upgraded to provide space heating and/or domestic hot water.

ASHPs are much cheaper compared to GSHPs as no ground works is required, and there is very need little maintenance once installed.

Benefits of air-source heat pumps over conventional boilers include no combustion of gases within the building, no need for extract flues, longer life expectancy and low maintenance costs.

Air-source heat pumps are classified as either air-to-air or air-to-water depending on whether the heat distribution system in the building uses air or water.

An advantage of air-to-air heat pumps over air-to-water heat pumps is the lower sink temperature (the temperature of the air passing over the condenser coil). This results in a higher COP and increased heat output. Air-to-air systems also have the ability to operate in reverse and provide cooling.

Due to the limited space for a central plantroom within the building, the use of ASHPs are a suitable and effective solution for RH3 to effectively provide space heating (and occasional cooling) and domestic hot water.

## Wind Turbines

Wind turbines harness the energy of wind to turn a rotor that is connected to an electrical generator. Since wind speed is the governing factor, wind turbines are only suited to sites with sufficient exposure to the wind; heavily built up areas are generally impractical.

Due to the effective wind speed in the area, as well as planning issues, noise control and flicker, this is not a recommended option.

### Preferred Renewable Technologies

Reversible air-to-air heat pumps are proposed to provide space heating (and occasional active cooling in peak conditions when required), and an air-to-water heat pump to provide DHW.

The installation of photovoltaics are also proposed for the scheme to take advantage of the available roof space with good solar access and limited overshadowing. A 15kWp system is proposed consisting of 60no. 250Wp panels located on the roof of the studios.

These are preliminary figures and will need be assessed in more detail at the next design stage as the scheme progresses.

## 4.2.5 Summary

The proposed energy strategy for RH3 (through appropriate use of the facade, efficient systems and the use of renewable energy systems) achieves the following savings in $CO_2$:

An overall **37.13%** reduction in regulated $CO_2$ emissions compared to a Part L2A 2013 notional development, which consists of:

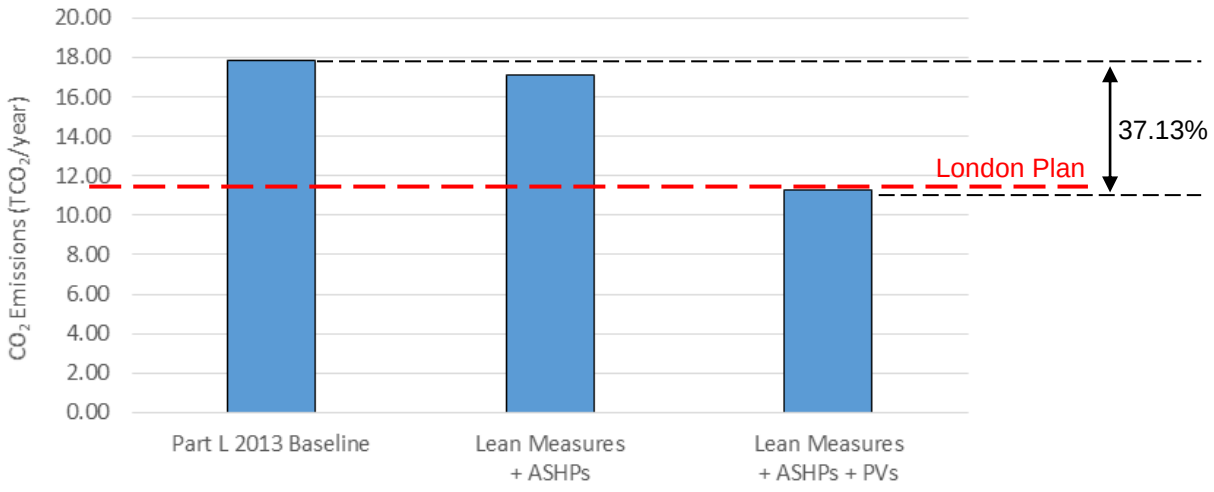
- A 4.19% $CO_2$ saving due to:
  - Building massing which maximises natural daylight and solar passive heating where necessary
  - Building fabric and air tightness which outperforms Part L2A 2013
  - ASHPs to provide space heating and domestic hot water
  - 100% low energy lighting

- A 34.38% $CO_2$ saving due to the inclusion of a 15.00kWp PV system.

Please refer to the results from the preliminary SBEM calculations (Appendix 1) for further details.

| | **Regulated** | | | **Unregulated** |
|---|---|---|---|---|
| | **$CO_2$ Emissions ($TCO_2$/year)** | **Savings ($TCO_2$/year)** | **% Savings** | **$CO_2$ Emissions ($TCO_2$/year)** |
| **Part L 2013 Baseline** | 17.89 | - | - | 12.71 |
| **Lean Measures + ASHPs** | 17.14 | 0.75 | 4.19% | 12.71 |
| **Lean Measures + ASHPs + PVs** | 11.25 | 5.89 | 34.38% | 12.71 |
| **Total Cumulative Savings** | | **6.64** | **37.13%** | **-** |
| **Total Target Savings** | | **6.26** | **35.00%** | **-** |
| **Annual Surplus** | | **0.38** | **-** | **-** |

Summary Table of $CO_2$ Emissions




Graph of Estimated $CO_2$ Emissions

# 5.0 Water

## 5.1 Planning Policy

### 5.1.1 GLA Sustainable Design and Construction SPG (April 2014)

Priority: Maximise the opportunities for water saving measures and appliances in all developments, including the reuse and using alternative sources of water. All developments should be designed to incorporate rainwater harvesting.

Best Practice: All residential units, including individual flats / apartments and commercial units, and where practical, individual leases in large commercial properties should be metered.

### 5.1.2 Camden Core Strategy 2010-2025

CS13: Make sure development incorporates efficient water and foul water infrastructure.

### 5.1.3 Camden Development Policies 2010-2025

DP23: Incorporate water efficient features and equipment and capture, retain and re-use surface water and grey water on-site

## 5.2 Design Response

Although the UK appears to enjoy plenty of rainfall, it has less available water per person than the majority of other European countries, and London has been declared an area of serious water stress. The average consumption in London is currently 164 litres/person/day (l/p/d), which is approximately 20 l/p/d above the national average.

There is a risk that the increasing demand will exceed the available water resource, especially during periods of drought. As the population continues to increase and with other predicted climatic changes, water availability and quality is likely to become as big an issue as climate change itself.

### 5.2.1 Efficient Low Water Consuming Fittings

To enable the proposed scheme to be a low water consuming development, it will appreciate water as a limited resource, and ensure that its use is minimised and controlled as appropriate whilst still maintaining comfort and effectiveness for the users.

Efficient water fittings will be specified to achieve a 25-40% improvement in water consumption compared to a baseline performance (equivalent to 2-3 BREEAM WAT1 credits). Each fitting will be assessed in detail at the next design stage and further savings in water consumption will be made where feasible.

| Fitting | Baseline Performance | 25% Improvement | 40% Improvement |
|---|---|---|---|
| WC | 6 litres/flush | 4.5 litres/flush | 4 litres/flush |
| Wash hand basin taps | 12 litres/min | 7.5 litres/min | 4.5 litres/min |
| Showers | 14 litres/min | 8 litres/min | 6 litres/min |
| Kitchen tap | 12 litres/min | 7.5 litres/min | 5 litres/min |

Water Fittings Specification

### 5.2.2 Alternative Water Source

**Rainwater Recycling**

London only receives moderate rainfall, approximately 600mm per year, which can be collected from the roof-tops of buildings and used for non-potable water uses. Due to the development's location and compact form, the amount of roof area available for capturing rainfall is fairly limited.

Therefore, installing a rainwater recycling system for flushing toilets would be inefficient and economically unviable. In addition, a green roof is proposed for the proposed scheme and due to the low drainage factor and limited harvesting potential associated with green roofs, rainwater recycling for the limited on-site greenery is not suitable.

**Greywater Recycling**

Similar to rainwater recycling, greywater recycling can replace need for mains water for non-potable uses. Greywater from showers and wash hand basins can be used for toilet flushing and irrigation purposes without much treatment other than simple filtration and basic disinfectant.

However, there are significant issues with the use of greywater, most significantly the additional operational and embodied energy and carbon that is required to treat, distribute and store this water for reuse. A study by the Environmental Agency in 2010 *'Energy and Carbon Implications of Rainwater Harvesting and Greywater'* states that the carbon intensities of most greywater applications are over 100% greater than mains water.

Therefore, although significant mains water can be saved, greywater recycling has been discounted on the grounds that they would consume too much energy and emit too much carbon in achieving these savings.

# 6.0 Waste

## 6.1 Planning Policy

### 6.1.1 The London Plan (2015)

Policy 5.3: Minimise the generation of waste and maximise reuse or recycling.

Policy 5.17: Suitable waste and recycling storage facilities are required in all new developments.

### 6.1.2 GLA Sustainable Design and Construction SPG (2014)

Priority: Developers should maximise the use of existing resources and materials and minimise waste generated during the demolition and construction process through the implementation of the waste hierarchy.

### 6.1.3 Camden Core Strategy 2010-2025

CS18: Make sure that developments include facilities for the storage and collection of waste and recycling.

### 6.1.4 Camden Development Policies 2010-2025

DP26: Protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. Provide facilities for the storage, recycling and disposal of waste.

### 6.1.5 CPG 3 Sustainability (2015)

Para. 10.30: As a guide, approximately one cubic metre storage space is required for every 300-500sq m of commercial space (includes both recyclable and non-recyclable waste). Storage space must be designed to accommodate bins to hold this amount of waste, separated, and should be designed in consultation with the waste collection contractor.

### 6.1.6 Camden Draft Local Plan (2016)

Para. 8.98: Provide adequate facilities for recycling and the storage and disposal of waste. Supplementary planning document 'Camden Planning Guidance 1: Design' contains further information on the Council's expectations for on-site facilities for waste and recycling and on construction waste.

Para 8.99: To ensure an integrated approach to waste management and the highest possible reuse and recycling rates, the Council will encourage the submission of a site waste management plan prior to construction.

## 6.2 Design Response

London produced about 15 million tonnes of waste in 2012, consisting of 3 major types; household waste (20%), commercial and industrial waste (32%), and construction, excavation and demolition waste (48%). The ever increasing demand for raw materials is depleting the world's natural resources and supplies of non-renewable energy.

Although there have been considerable improvements in local authority waste recycling rates (up from 8% in 2001 to 30% in 2012), the Mayor wishes to see an increase to 45% by 2015 and then 50% by 2020.

The design team appreciates the benefits of controlling waste both financially and environmentally and is committed to minimising waste throughout all phases of the development.

### 6.2.1 Construction Waste

In 2012, London produced approximately 15 million tonnes of waste, of which construction, excavation and demolition waste (CE&D) accounted for 7.2m tonnes (48% of all waste).

A Site Waste Management Plan (SWMP) will be implemented for the construction phase in order to directly inform the waste management audit process. The SWMP encourages the review of current waste reduction and recovery practice levels, highlighting areas where Good and Best Practice in terms of waste minimisation and management can be achieved. The SWMP also facilitates the identification and implementation of waste minimisation, reducing the quantities of construction waste sent to landfill and reuse and recycling opportunities during on-site operations.

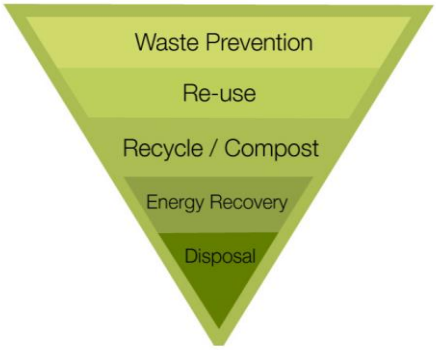
The SWMP will include procedures and commitments for waste minimisation and diversion from landfill, as well as setting target benchmarks for resource efficiency in accordance with guidance from DEFRA, BRE, Envirowise and WRAP.

The team is committed to reducing the quantity of non-hazardous construction waste. According to data collected from hundreds of real life projects by SMARTWaste, 17.4$m^3$/100$m^2$ of construction waste is the industry average for new buildings of this type; the proposed scheme will aim to improve on this and generate less than 7.5$m^3$/100$m^2$. The generation figures will be continually reviewed on-site with the aim to pursue opportunities to further reduce generation figures where possible.

The development is also committed to diverting at least 70% of non-hazardous construction waste from landfill.

### 6.2.2 Operational Waste

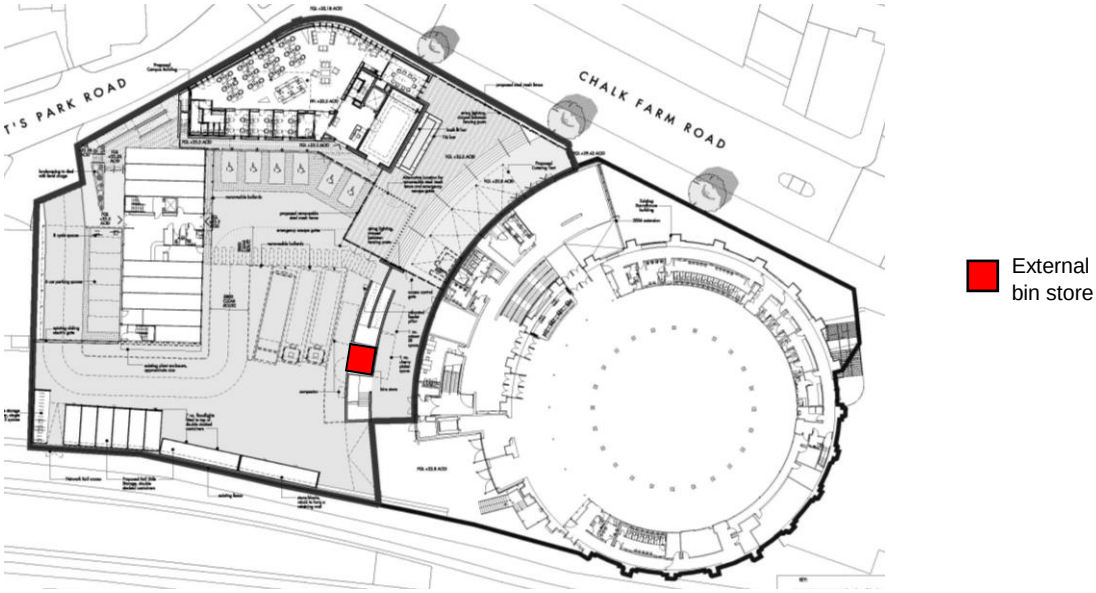
Similar to the construction phase, waste management during the operation of the development will follow the waste hierarchy; prevention, re-use, recycle/compost, energy recovery, and then disposal which is the least attractive waste management option.




Waste hierarchy

The proposed building will make use of the existing external bin store currently shared by the main performing arts venue and office building. It is located in the centre of the site next to the 6no. blue badge parking spaces, and consists of 4no. 1100L Eurobins and 22no. 240L wheelie bins, a total capacity of 9,860L. The bin store currently has spare waste storage capacity which is considered to be sufficient to also cater for the proposed RH3, especially with the waste compactor which greatly helps to reduce the waste storage requirements. In the event that the existing bin store is not sufficient for RH3 once it's in operation, the frequency of collection will be increased.

Waste bins will also be provided within the building, for recyclable and non-recyclable waste to encourage increased recycling rates. All bins throughout the development will be clearly labelled to promote the waste stream being placed into the right bin.




Location of site-wide external bin store

# 7.0 Materials and Construction

## 7.1 Planning Policy

### 7.1.1 The London Plan (2015)

Policy 5.3: Demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process. Secure sustainable procurement of materials, using local supplies where feasible.

Policy 7.14: Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'.

### 7.1.2 GLA Sustainable Design and Construction SPG (2014)

Priority: At least three of the key elements of the building envelope are to achieve a rating of A+ to D in the BRE's The Green Guide of specification.

Priority: At least 50% of timber and timber products should be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source.

Priority: Provide sufficient internal space for the storage of recyclable and compostable materials and waste.

Priority: Meet borough requirements for the size and location of recycling, composting and refuse storage and its removal.

### 7.1.4 Camden Development Policies 2010-2025

DP26: The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The factors we will consider include: noise and vibration levels; odour, fumes and dust; microclimate; the inclusion of appropriate attenuation measures etc.

### 7.1.5 Camden Draft Local Plan (2016)

A3: Require trees and vegetation which are to be retained to be satisfactorily protected during the demolition and construction phase of development in line with BS5837:2012 'Trees in relation to Design, Demolition and Construction' and positively integrated as part of the site layout.

D1: Council will require that development comprises details and materials that are of high quality and complement the local character.

CC4: Development that involves significant demolition, construction or earthworks required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

## 7.2 Design Response

### 7.2.1 Materials

Building materials can have a very large impact on the environment; their manufacture, use and disposal involves the use of significant levels of energy and natural resources, creates pollution and destroys natural habitat. Recent statistics show that 10% of UK carbon dioxide emissions were related to the production and transportation of building materials.

The design team acknowledges the importance of taking a more environmentally responsible approach to the selection and specification of building materials that are environmentally benign in manufacture, use and disposal.

The majority of the key building elements (roof, external walls, internal walls, upper and ground floors and windows) of the development will be selected to achieve a Green Guide rating of between A+ and D; this will be assessed in more detail at the detailed design stage.

In addition, building and finishing elements will be responsibly sourced from certified suppliers where possible (i.e. FSC certified timber, BES6001, EMAS, ISO14001 etc.)

The design team and contractor will endeavour to source materials locally in order to avoid materials with high embodied energy.

The design team will also investigate the feasibility of procuring key internal finishes and fittings (i.e. paints, suspended ceiling tiles, floor coverings) with low VOC content to improve the internal air quality of the proposed building.

### 7.2.2 Construction

The team will look to ideally use contractors that have a formal strategy which clearly sets out their commitment to be more sustainable and have a proven track record of constructing buildings considerately.

There is a commitment to comply with a nationally or locally recognised certification scheme such as the Considerate Constructors Scheme.

In addition, the following procedures will be implemented during the construction of the development, where feasible:

- Monitor and record energy (kWh) and water consumption ($m^3$)
- Monitor and record transport of construction materials and construction waste
- Adopt best practice policies in respect of air (dust) pollution arising from site activities
- Provision of wheel wash or similar facilities to prevent the deposit of materials on the highway
- Lighting (if used during construction) to ideally be directed away from vegetation, trees and wildlife
- 100% of site timber to be reclaimed, re-used or responsibly sourced

# 8.0 Adaptation to Climate Change

## 8.1 Planning Policy

### 8.1.1 The London Plan (2015)

Policy 5.3: Avoid internal overheating and contributing to the urban heat island effect; avoid impacts from natural hazards (including flooding).

Policy 5.9: Reduce potential overheating and reliance on air conditioning systems in accordance with the cooling hierarchy.

Policy 5.11: Include green roofs and walls where feasible, to deliver in the adaptation to climate change (i.e. aiding cooling), mitigation of climate change (i.e. aiding energy efficiency), sustainable urban drainage and improvements to appearance and resilience of the building.

### 8.1.2 GLA Sustainable Design and Construction SPG (2014)

Best Practice: Consider any long term potential for extreme weather events to affect a building's foundations and to ensure they are robust.

Priority: Design Sustainable Drainage Systems (SuDS) into their schemes that incorporate attenuation for surface water runoff as well as habitat, water quality and amenity benefits.

Priority: Design developments to be flexible and capable of being adapted to and mitigating the potential increase in flood risk as a result of climate change.

### 8.1.3 Camden Core Strategy 2010-2025

CS13: Ensure buildings and spaces are designed to cope with, and minimise the effects of, climate change. Avoid harm to the water environment, water quality or drainage systems and prevent or mitigate local surface water and downstream flooding.

### 8.1.4 Camden Development Policies 2010-2025

DP22: Ensure schemes include appropriate climate change adaptation measures, such as summer shading and planting, limiting run-off, reducing water consumption and reducing air pollution.

DP23: Limit the amount and rate of run-off and waste water entering the combined storm water and sewer network through sustainable urban drainage methods to reduce the risk of flooding.

### 8.1.5 Camden Draft Local Plan (2016)

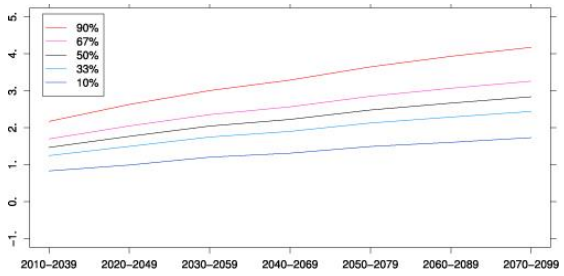
CC2: Adopt appropriate climate change adaptation measures such as promoting new appropriate green infrastructure; not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems.

## 8.2 Design Response

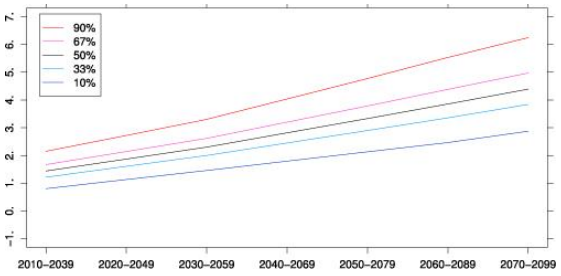
People everywhere will be affected by climate change and the UK will not be immune. Even if global actions prove successful in reducing the impacts of climate change, warmer and drier summers, and wetter winters are likely as more extreme climatic events. There is a major need for buildings to consider these future changes in the designs of today.

The UK's climate has already started to change, and these changes are projected to accelerate in the coming decades. Weather patterns will change all over the UK, but regions will vary in different ways with certain areas likely to be particularly vulnerable to the impacts of present and future climate change. The latest UK Climate Projections 2009 (UKCP09) suggests that London could:

- by the 2020s, see an increase in summer mean temperature of 1.5°C, a decrease in mean summer rainfall of 6% and an increase in mean winter rainfall of 6%, all from a 1961–1990 baseline.
- by the 2050s, see an increase in mean summer temperature of 2.7°C, an increase in mean winter rainfall of 15% and a decrease in mean summer rainfall of 18%.
- by the 2080s, see an increase in mean summer temperature of 3.9°C, an increase of 20% in mean winter rainfall and a decrease in mean summer rainfall of 22%.

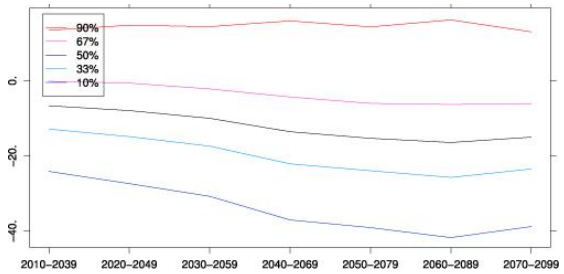



*Low Emissions Scenario*

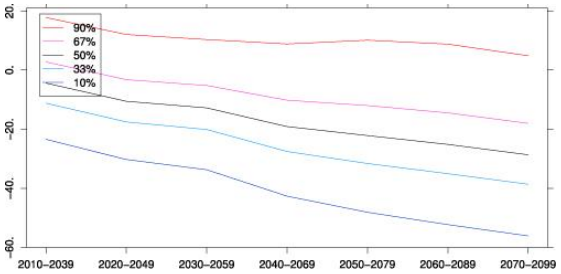



*High Emissions Scenario*

Change in annual mean temperature (◦C)




*Low Emissions Scenario*




*High Emissions Scenario*

Change in summer mean precipitation (%)

The sustainable design and layout of the development has appreciated these issues relating to climate change and several features have been included to combat and mitigate its impact on the successful operation of RH3.

### 8.2.1 Overheating

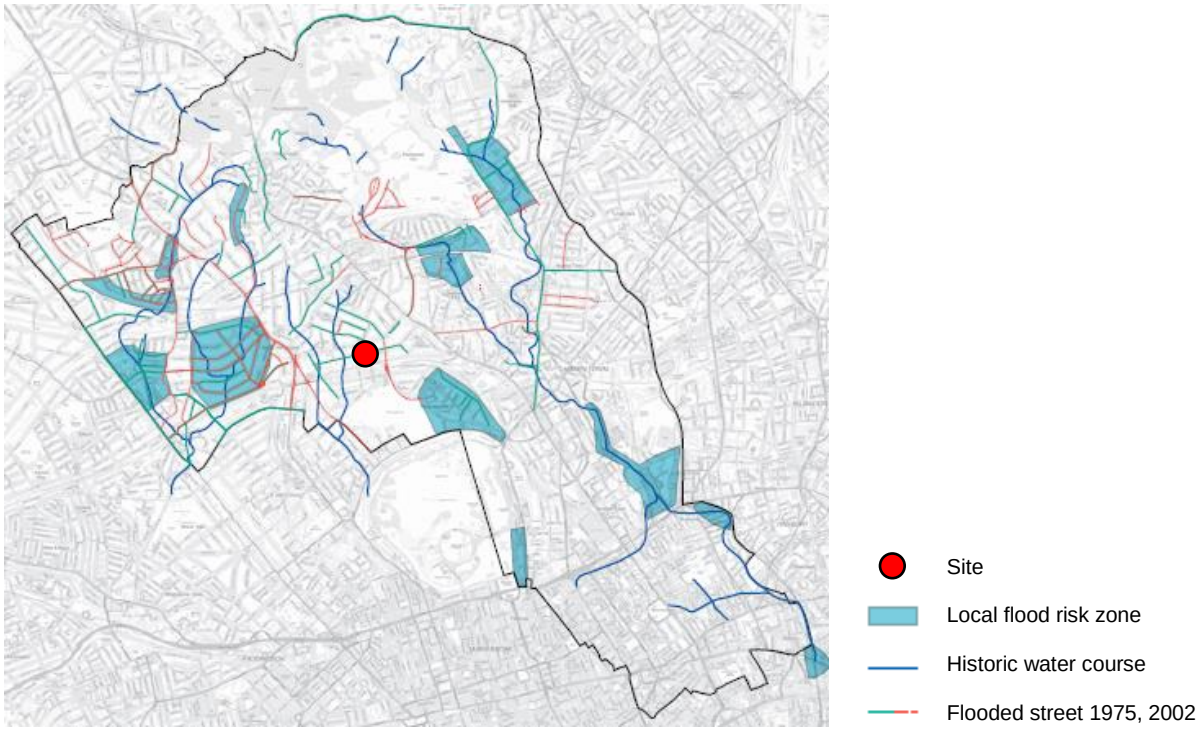
- The compact form is thermally efficient to create a low surface area to volume ratio which minimises the unwanted heat gains (and losses) through the building fabric.
- The quantity and positioning of the glazing has been carefully considered to not only provide sufficient daylight where required, but also to maximise passive solar heating in winter whilst maintaining the risk of overheating to a minimal level in summer.
- The building fabric of the proposed development will achieve high levels of thermal performance beyond the minimum requirements of Building Regulations and Camden Council in order to provide better temperature control and minimise the risk of summertime overheating (and reduce the demand for space heating in winter).
- The 3no. studios are to be mechanically ventilated (with heat recovery) as they will have much larger and more variable occupancy patterns and will require a 'tighter' control of internal conditions. Mechanical ventilation will also allow for increased responsiveness and higher ventilation rates without the need for active cooling for the majority of the time.
- Only during periods of high occupancy and high external temperatures (i.e. peak summer), will active cooling be utilised to maintain comfortable internal temperatures. This will be provided by the heat pumps working in 'reverse' mode (i.e. extracting heat from inside the rooms).
- Incorporation of green roofs and a small portion of soft landscaping to reduce the urban heat island effect (as well as further insulating the building and reducing energy demand to provide heating in winter). In addition, the greenery will naturally cause the local air to be slightly cooler and fresher and will also sequester $CO_2$ from the air helping to reduce the effects of climate change.

### 8.2.2 Sustainable Drainage

- The site is located in Flood Zone 1, equivalent to less than a 1:1000 annual probability of flooding from rivers and seas and fluvial flooding.
- Camden's greatest risk of flooding occurs from surface water due to periods of intense rainfall when the volume and intensity of a rainfall event exceeds the capacity of the drainage system, resulting in localized flooding. However the site does not fall within any of Camden's 12 Local Flood Risk Zones.
- The proposal will aim to achieve a 50% reduction in both peak flow rates and total runoff volume through the installation of SuDS (i.e. green roof, permeable paving, potential attenuation tank etc.). This will lessen the impact on the existing surface water drainage system and minimise flash floods as a consequence of intense rainfall events.

- The drainage strategy will be developed to contain storms up to the 1 in 100 year design event, plus an additional 30% to take into account possible impacts of climate change.

For further details, please refer to Momentum's Outline Drainage Plan (Appendix 2).




Surface Water Flood Risk Potential

# 9.0 Environmental Assessment

## 9.1 Planning Policy

### 9.1.1 Camden Development Policies 2010-2025

DP22: Expect 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.

## 9.2 Design Response

The design team understands and promotes the inherent value of fundamental good design in sustainability terms, as well as the value of achieving levels of excellence gained through assessment from independent bodies.

### 9.2.1 BREEAM 2014 Pre-Assessment

A BREEAM 2014 New Construction Pre-Assessment has been carried out for the proposed RH3 scheme.

The development currently achieves a BREEAM score of **61.63%**, which equates to a rating of ‘Very Good’. This score is indicative in line with what the current scheme can achieve and will need to be continually assessed throughout the programme.

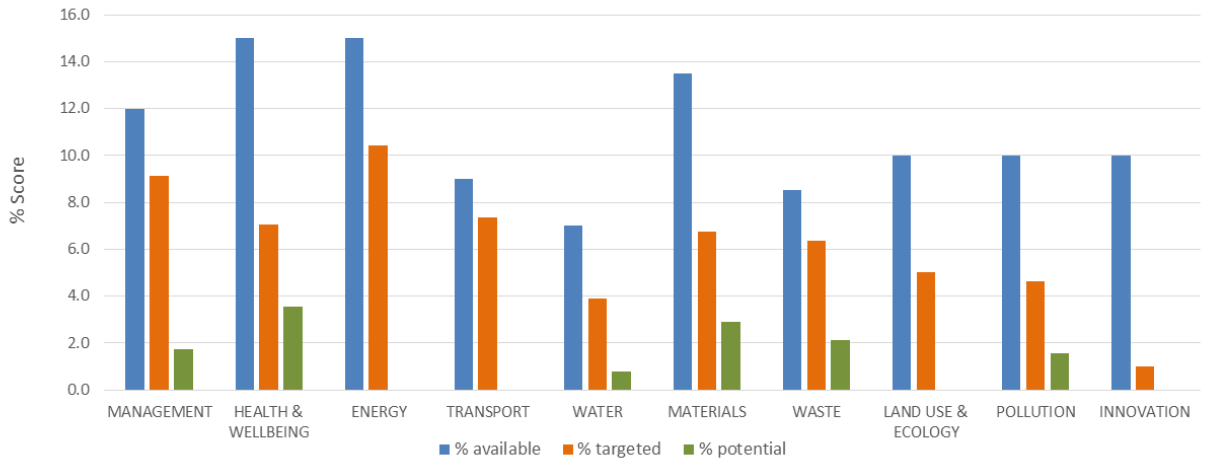
Additional ‘potential’ credits have been highlighted which need to be reviewed further by the design team in order to confirm compliance. These credits will also act as a back-up incase some of the currently targeted credits cannot be achieved as the design progresses.

Although the credits currently targeted (and ‘potential’ credits) are technically feasible and relevant for the scheme, they will need to be carefully considered and some may not be targeted due to the financial constraints of the scheme. This will be analysed in detail at the next design stage and the environmental benefits will be considered against costs.

Please refer to the BREEAM pre-assessment report (Appendix 3) for further details.

| | Maximum Credits | | Targeted Credits | | Potential Credits | | Unlikely Credits | |
|---|---|---|---|---|---|---|---|---|
| | Credits | % | Credits | % | Credits | % | Credits | % |
| **Management** | 21 | 12.0 | 16 | 9.14 | 3 | 1.7 | 2 | 1.1 |
| **Health & Wellbeing** | 17 | 15.0 | 8 | 7.06 | 4 | 3.5 | 5 | 4.4 |
| **Energy** | 23 | 15.0 | 16 | 10.43 | 0 | 0.0 | 7 | 4.6 |
| **Transport** | 11 | 9.0 | 9 | 7.36 | 0 | 0.0 | 2 | 1.6 |
| **Water** | 9 | 7.0 | 5 | 3.89 | 1 | 0.8 | 3 | 2.3 |
| **Materials** | 14 | 13.5 | 7 | 6.75 | 3 | 2.9 | 4 | 3.9 |
| **Waste** | 8 | 8.5 | 6 | 6.38 | 2 | 2.1 | 0 | 0.0 |
| **Land Use & Ecology** | 10 | 10.0 | 5 | 5.00 | 0 | 0.0 | 5 | 5.0 |
| **Pollution** | 13 | 10.0 | 6 | 4.62 | 2 | 1.5 | 5 | 3.8 |
| **Innovation** | 10 | 10.0 | 1 | 1.00 | 0 | 0.0 | 9 | 9.0 |
| **TOTAL** | **136** | **110.0** | **79** | **61.63** | **15** | **12.6** | **42** | **35.8** |

BREEAM Pre-assessment Summary Table




BREEAM Pre-assessment Summary Graph

# 10.0 Landscape and Nature

## 10.1 Planning Policy

### 10.1.1 The London Plan (2015)

Policy 5.3: Promote and protect biodiversity and green infrastructure.

Policy 5.10: Integrate green infrastructure from the beginning of the design process to contribute to urban greening,

Policy 5.11: Include green roofs and walls where feasible, to deliver in the enhancement of biodiversity.

### 10.1.2 GLA Sustainable Design and Construction SPG (2014)

Best Practice: The design of developments should prioritise landscape planting that is drought resistant and has a low water demand for supplementary watering.

Priority: Any loss of a tree/s resulting from development should be replaced with an appropriate tree or group of trees for the location, with the aim of providing the same canopy cover as that provided by the original tree/s.

### 10.1.3 Camden Core Strategy 2010-2025

CS15: Provision of new or enhanced habitat, where possible, including through biodiverse green or brown roofs and green walls.

### 10.1.4 Camden Development Policies 2010-2025

DP22: Require development to incorporate sustainable design and construction measures. Schemes must incorporate green or brown roofs and green walls wherever suitable.

### 10.1.6 Camden Draft Local Plan Draft (2016)

A3: Seek the protection of other features with nature conservation value, including gardens, wherever possible. Assess developments against their ability to realise benefits for biodiversity through the layout, design and materials used in the built structure and landscaping elements of a proposed development, proportionate to the scale of development proposed.

D1: Council will require that development incorporates high quality landscape design (including public art, where appropriate) and maximises opportunities for greening for example through planting of trees and other soft landscaping.

## 10.2 Design Response

Understanding the site is fundamental to any development but particularly crucial to developments which aspire to work in tandem with nature and the environment. The proposed scheme will aim to aim to maintain, protect and enhance the biodiversity and ecological value of the site as much as possible.

The entire site (within the ownership boundary) currently consists entirely of buildings and hardstanding areas with no landscaped areas, and therefore no ecological value.

Although space within the RH3 boundary (Phase 2) is extremely constrained, a small portion of landscaping and a green roof is to be provided to improve the site ecology and biodiversity. The green roof will ideally be planted with mixtures of native flowering grasses and wildflowers to encourage new colonies of insects, invertebrates and birds.

In addition to improving the site's ecology and biodiversity, the landscape features will have the added benefit of:

- providing visual interest
- reducing local temperatures (urban heat island effect)
- improving air quality
- reducing surface water run-off

# 11.0 Appendix

## Appendix 1 – Preliminary SBEM Calculations

- After Lean Measures + ASHPs
- After Lean Measures + ASHPs + PVs

## Appendix 2 – Outline Drainage Plan

## Appendix 3 – BREEAM Pre-Assessment Report

# Appendix 1 – Preliminary SBEM Calculations

- RH3 After Lean Measures + ASHPs
- RH3 After Lean Measures + ASHPs + PVs

## SBEM Calculations - After Lean Measures + ASHPs

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## Roundhouse SBEM

As designed

**Date:** Fri Sep 09 14:26:26 2016

## Administrative information

### Building Details

**Address:** Roundhouse, Chalk Farm Road, London, NW1 8EH

### Certification tool

**Calculation engine:** SBEM

**Calculation engine version:** v5.2.b.3

**Interface to calculation engine:** Design Database

**Interface to calculation engine version:** v26.02

**BRUKL compliance check version:** v5.2.b.1

### Owner Details

**Name:** Information not provided by the user

**Telephone number:** Information not provided by the user

**Address:** Information not provided by the user, Information not provided by the user, Information not provided by the user

### Certifier details

**Name:** Information not provided by the user

**Telephone number:** 01206 224 270

**Address:** Ingleton Wood LLP, 874 The Cresent, Colchester, CO4 9YQ

## Criterion 1: The calculated $CO_2$ emission rate for the building should not exceed the target

| | | |
|---|---|---|
| 1.1 | $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 16.7 |
| 1.2 | Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 16.7 |
| 1.3 | Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 16 |
| 1.4 | Are emissions from the building less than or equal to the target? | BER =< TER |
| 1.5 | Are as built details the same as used in the BER calculations? | Separate submission |

## Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

Values which do not meet standards in the 2013 Non-Domestic Building Services Compliance Guide are displayed in red.

### 2.a Building fabric

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.18 | 0.18 | 0BAR Wall 1 |
| Floor | 0.25 | 0.15 | 0.15 | 0BAR Exposed Floor 1 |
| Roof | 0.25 | 0.13 | 0.13 | 1BREAKOUT Exposed Roof 1 |
| Windows***, roof windows, and rooflights | 2.2 | 1.5 | 1.5 | 0LOBBY Window 2 (1) |
| Personnel doors | 2.2 | - | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | - | "No external vehicle access doors" |
| High usage entrance doors | 3.5 | 1.5 | 1.5 | 0BAR Door 1 (High Usage Entrance Door) |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 3 |

## 2.b Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- HVAC 10

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

2- HVAC 11

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

3- HVAC 5

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

4- HVAC 13

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

5- HVAC 4

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

6- HVAC 7

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

7- HVAC 1

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

8- HVAC 6

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

9- HVAC 2

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

10- HVAC 3

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

1- Hot Water

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 2.5 | - |
| **Standard value** | 2* | N/A |
| * Standard shown is for all types except absorption and gas engine heat pumps. | | |

**Local mechanical ventilation, exhaust, and terminal units**

| ID | System type in Non-domestic Building Services Compliance Guide |
|---|---|
| A | Local supply or extract ventilation units serving a single area |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ID of system type** | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | | |
| **Standard value** | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | **Zone** | **Standard** |
| 0BAR | - | - | - | - | - | - | - | - | - | - | N/A |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | Zone | Standard |
| 0LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 1CIRC1 | - | - | - | - | - | - | - | - | - | - | N/A |
| 1CIRC2 | - | - | - | - | - | - | - | - | - | - | N/A |
| 1LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 1STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 2LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 2STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 0LOBBY | - | - | - | - | - | - | - | - | - | - | N/A |
| 0MEETRM1 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE1 | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1BREAKOUT | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1MULTIUSE | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 0OFFICE2 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE3 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE4 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0RECEPTION | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STORE | - | - | - | - | - | - | - | - | - | - | N/A |
| 1STORE | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STUDIOA | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 0WC1 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 0WC2 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 0WC3 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC1 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC2 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC3 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WCLOBBY | - | - | - | - | - | - | - | - | - | - | N/A |
| 2WC | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1STUDIOA | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1STUDIOB | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| Zone name | Luminaire | Lamp | Display lamp | General lighting [W] |
| Standard value | 60 | 60 | 22 | |
| 0BAR | - | 133 | - | 68 |
| 0LIFTSHAFT | - | 120 | - | 33 |
| 0STAIRWELL | - | 120 | - | 34 |
| 1CIRC1 | - | 108 | - | 66 |
| 1CIRC2 | - | 117 | - | 46 |
| 1LIFTSHAFT | - | 120 | - | 33 |
| 1STAIRWELL | - | 120 | - | 34 |
| 2LIFTSHAFT | - | 110 | - | 33 |
| 2STAIRWELL | - | 110 | - | 34 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| 0LOBBY | - | 138 | - | 56 |
| 0MEETRM1 | 64 | - | - | 206 |
| 0OFFICE1 | 62 | - | - | 1784 |
| 1BREAKOUT | 61 | - | - | 795 |
| 1MULTIUSE | 65 | - | - | 143 |
| 0OFFICE2 | 68 | - | - | 86 |
| 0OFFICE3 | 68 | - | - | 96 |
| 0OFFICE4 | 68 | - | - | 86 |
| 0RECEPTION | - | 100 | 100 | 173 |
| 0STORE | 83 | - | - | 25 |
| 1STORE | 74 | - | - | 32 |
| 0STUDIOA | - | 126 | - | 261 |
| 0WC1 | - | 111 | - | 37 |
| 0WC2 | - | 117 | - | 37 |
| 0WC3 | - | 116 | - | 41 |
| 1WC1 | - | 145 | - | 9 |
| 1WC2 | - | 145 | - | 9 |
| 1WC3 | - | 132 | - | 9 |
| 1WCLOBBY | - | 150 | - | 27 |
| 2WC | - | 103 | - | 133 |
| 1STUDIOA | - | 100 | - | 605 |
| 1STUDIOB | - | 126 | - | 248 |

## Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| 0BAR | N/A | N/A |
| 0MEETRM1 | NO (-40.9%) | NO |
| 0OFFICE1 | NO (-53.9%) | NO |
| 1BREAKOUT | NO (-52.3%) | NO |
| 1MULTIUSE | N/A | N/A |
| 0OFFICE2 | NO (-28.1%) | NO |
| 0OFFICE3 | NO (-35.6%) | NO |
| 0OFFICE4 | NO (-28.1%) | NO |
| 0RECEPTION | NO (-6.7%) | NO |
| 0STUDIOA | NO (-58.2%) | NO |
| 1STUDIOA | NO (-51.9%) | NO |
| 1STUDIOB | NO (-59.6%) | NO |

## Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

## Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

## EPBD (Recast): Consideration of alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Area [$m^2$] | 1020.9 | 1020.9 |
| External area [$m^2$] | 2080.1 | 2080.1 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 4 |
| Average conductance [W/K] | 521.65 | 899.82 |
| Average U-value [$W/m^2K$] | 0.25 | 0.43 |
| Alpha value* [%] | 23.59 | 15.97 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | A1/A2 Retail/Financial and Professional services |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| **38** | **B1 Offices and Workshop businesses** |
| | B2 to B7 General Industrial and Special Industrial Groups |
| | B8 Storage or Distribution |
| | C1 Hotels |
| | C2 Residential Inst.: Hospitals and Care Homes |
| | C2 Residential Inst.: Residential schools |
| | C2 Residential Inst.: Universities and colleges |
| | C2A Secure Residential Inst. |
| | Residential spaces |
| **62** | **D1 Non-residential Inst.: Community/Day Centre** |
| | D1 Non-residential Inst.: Libraries, Museums, and Galleries |
| | D1 Non-residential Inst.: Education |
| | D1 Non-residential Inst.: Primary Health Care Building |
| | D1 Non-residential Inst.: Crown and County Courts |
| | D2 General Assembly and Leisure, Night Clubs and Theatres |
| | Others: Passenger terminals |
| | Others: Emergency services |
| | Others: Miscellaneous 24hr activities |
| | Others: Car Parks 24 hrs |
| | Others - Stand alone utility block |

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

| | Actual | Notional |
|---|---|---|
| Heating | 4.45 | 9.85 |
| Cooling | 4.29 | 4.79 |
| Auxiliary | 3.25 | 2.31 |
| Lighting | 16.41 | 15.87 |
| Hot water | 2.42 | 2.36 |
| Equipment* | 22.87 | 22.87 |
| **TOTAL**** | **30.82** | **35.17** |

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 0 | 0 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 114.9 | 136.67 |
| Primary energy* [$kWh/m^2$] | 94.63 | 94.09 |
| Total emissions [$kg/m^2$] | 16 | 16.7 |

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| **[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 115.6 | 34.6 | 38.1 | 0 | 0 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 262.8 | 95.9 | 89.1 | 0 | 0 | 0.82 | 0 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 56.7 | 26.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 96.8 | 72.7 | 0 | 0 | 0 | 0 | 0 | ---- | ---- |
| **[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 64.1 | 280.5 | 21.1 | 0 | 0 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 87.4 | 67.8 | 29.7 | 0 | 0 | 0.82 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 99.1 | 92.7 | 7.6 | 6.3 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 79.8 | 80 | 9.1 | 8.2 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 12.3 | 102.3 | 0.9 | 6.9 | 4.4 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 27.3 | 65.3 | 3.1 | 6.7 | 2.5 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 44.9 | 126.3 | 3.4 | 8.5 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 51.5 | 91.8 | 5.9 | 9.4 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 30.2 | 77.9 | 2.3 | 5.3 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 30 | 49.7 | 3.4 | 5.1 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 210.5 | 1.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 254.4 | 1.7 | 0 | 0 | 0 | 0 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 9.3 | 66.8 | 0.7 | 4.5 | 5.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 42.7 | 48.2 | 4.9 | 5 | 3.3 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 69.5 | 62.8 | 22.9 | 0 | 7.3 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 123.8 | 116.4 | 42 | 0 | 9.7 | 0.82 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 37.7 | 34.8 | 2.9 | 2.3 | 1.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 70.4 | 42.9 | 8 | 4.4 | 1.1 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 39.4 | 54.5 | 3 | 3.7 | 5.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 133.4 | 76.3 | 15.2 | 7.9 | 3.3 | 2.43 | 2.7 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

# Key Features

**The BCO can give particular attention to items with specifications that are better than typically expected.**

**Building fabric**

| Element | $U_{i\text{-}Typ}$ | $U_{i\text{-}Min}$ | Surface where the minimum value occurs* |
|---|---|---|---|
| Wall | 0.23 | 0.18 | 0BAR Wall 1 |
| Floor | 0.2 | 0.15 | 0BAR Exposed Floor 1 |
| Roof | 0.15 | 0.13 | 1BREAKOUT Exposed Roof 1 |
| Windows, roof windows, and rooflights | 1.5 | 1.5 | 0LOBBY Window 2 (1) |
| Personnel doors | 1.5 | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | "No external vehicle access doors" |
| High usage entrance doors | 1.5 | 1.5 | 0BAR Door 1 (High Usage Entrance Door) |

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

| Air Permeability | Typical value | This building |
|---|---|---|
| m³/(h.m²) at 50 Pa | 5 | 3 |

## SBEM Calculations - After Lean Measures + ASHPs + PVs

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## Roundhouse SBEM

As designed

**Date:** Fri Sep 09 13:03:10 2016

## Administrative information

### Building Details

**Address:** Roundhouse, Chalk Farm Road, London, NW1 8EH

### Certification tool

**Calculation engine:** SBEM

**Calculation engine version:** v5.2.b.3

**Interface to calculation engine:** Design Database

**Interface to calculation engine version:** v26.02

**BRUKL compliance check version:** v5.2.b.1

### Owner Details

**Name:** Information not provided by the user

**Telephone number:** Information not provided by the user

**Address:** Information not provided by the user, Information not provided by the user, Information not provided by the user

### Certifier details

**Name:** Information not provided by the user

**Telephone number:** 01206 224 270

**Address:** Ingleton Wood LLP, 874 The Cresent, Colchester, CO4 9YQ

## Criterion 1: The calculated $CO_2$ emission rate for the building should not exceed the target

| | | |
|---|---|---|
| 1.1 | $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 16.7 |
| 1.2 | Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 16.7 |
| 1.3 | Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 10.5 |
| 1.4 | Are emissions from the building less than or equal to the target? | BER =< TER |
| 1.5 | Are as built details the same as used in the BER calculations? | Separate submission |

## Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

Values which do not meet standards in the 2013 Non-Domestic Building Services Compliance Guide are displayed in red.

### 2.a Building fabric

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 0.18 | 0.18 | 0BAR Wall 1 |
| Floor | 0.25 | 0.15 | 0.15 | 0BAR Exposed Floor 1 |
| Roof | 0.25 | 0.13 | 0.13 | 1BREAKOUT Exposed Roof 1 |
| Windows***, roof windows, and rooflights | 2.2 | 1.5 | 1.5 | 0LOBBY Window 2 (1) |
| Personnel doors | 2.2 | - | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | - | "No external vehicle access doors" |
| High usage entrance doors | 3.5 | 1.5 | 1.5 | 0BAR Door 1 (High Usage Entrance Door) |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 3 |

## 2.b Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- HVAC 10

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

2- HVAC 11

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

3- HVAC 5

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

4- HVAC 13

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

5- HVAC 4

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

6- HVAC 7

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

7- HVAC 1

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

8- HVAC 6

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | - | - |
| **Standard value** | N/A | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

9- HVAC 2

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

10- HVAC 3

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 3.7 | 5.5 | - | - | - |
| **Standard value** | 2.5* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards. | | | | | |

1- Hot Water

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 2.5 | - |
| **Standard value** | 2* | N/A |
| * Standard shown is for all types except absorption and gas engine heat pumps. | | |

**Local mechanical ventilation, exhaust, and terminal units**

| ID | System type in Non-domestic Building Services Compliance Guide |
|---|---|
| A | Local supply or extract ventilation units serving a single area |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ID of system type** | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | | |
| **Standard value** | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | **Zone** | **Standard** |
| 0BAR | - | - | - | - | - | - | - | - | - | - | N/A |

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | Zone | Standard |
| 0LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 1CIRC1 | - | - | - | - | - | - | - | - | - | - | N/A |
| 1CIRC2 | - | - | - | - | - | - | - | - | - | - | N/A |
| 1LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 1STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 2LIFTSHAFT | - | - | - | - | - | - | - | - | - | - | N/A |
| 2STAIRWELL | - | - | - | - | - | - | - | - | - | - | N/A |
| 0LOBBY | - | - | - | - | - | - | - | - | - | - | N/A |
| 0MEETRM1 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE1 | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1BREAKOUT | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1MULTIUSE | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 0OFFICE2 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE3 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0OFFICE4 | - | - | - | - | - | - | - | - | - | - | N/A |
| 0RECEPTION | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STORE | - | - | - | - | - | - | - | - | - | - | N/A |
| 1STORE | - | - | - | - | - | - | - | - | - | - | N/A |
| 0STUDIOA | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 0WC1 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 0WC2 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 0WC3 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC1 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC2 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WC3 | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1WCLOBBY | - | - | - | - | - | - | - | - | - | - | N/A |
| 2WC | 0.3 | - | - | - | - | - | - | - | - | - | N/A |
| 1STUDIOA | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |
| 1STUDIOB | - | - | - | 1.6 | - | - | - | - | - | 0.8 | 0.5 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| Zone name | Luminaire | Lamp | Display lamp | General lighting [W] |
| Standard value | 60 | 60 | 22 | |
| 0BAR | - | 133 | - | 68 |
| 0LIFTSHAFT | - | 120 | - | 33 |
| 0STAIRWELL | - | 120 | - | 34 |
| 1CIRC1 | - | 108 | - | 66 |
| 1CIRC2 | - | 117 | - | 46 |
| 1LIFTSHAFT | - | 120 | - | 33 |
| 1STAIRWELL | - | 120 | - | 34 |
| 2LIFTSHAFT | - | 110 | - | 33 |
| 2STAIRWELL | - | 110 | - | 34 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| 0LOBBY | - | 138 | - | 56 |
| 0MEETRM1 | 64 | - | - | 206 |
| 0OFFICE1 | 62 | - | - | 1784 |
| 1BREAKOUT | 61 | - | - | 795 |
| 1MULTIUSE | 65 | - | - | 143 |
| 0OFFICE2 | 68 | - | - | 86 |
| 0OFFICE3 | 68 | - | - | 96 |
| 0OFFICE4 | 68 | - | - | 86 |
| 0RECEPTION | - | 100 | 100 | 173 |
| 0STORE | 83 | - | - | 25 |
| 1STORE | 74 | - | - | 32 |
| 0STUDIOA | - | 126 | - | 261 |
| 0WC1 | - | 111 | - | 37 |
| 0WC2 | - | 117 | - | 37 |
| 0WC3 | - | 116 | - | 41 |
| 1WC1 | - | 145 | - | 9 |
| 1WC2 | - | 145 | - | 9 |
| 1WC3 | - | 132 | - | 9 |
| 1WCLOBBY | - | 150 | - | 27 |
| 2WC | - | 103 | - | 133 |
| 1STUDIOA | - | 100 | - | 605 |
| 1STUDIOB | - | 126 | - | 248 |

## Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| 0BAR | N/A | N/A |
| 0MEETRM1 | NO (-40.9%) | NO |
| 0OFFICE1 | NO (-53.9%) | NO |
| 1BREAKOUT | NO (-52.3%) | NO |
| 1MULTIUSE | N/A | N/A |
| 0OFFICE2 | NO (-28.1%) | NO |
| 0OFFICE3 | NO (-35.6%) | NO |
| 0OFFICE4 | NO (-28.1%) | NO |
| 0RECEPTION | NO (-6.7%) | NO |
| 0STUDIOA | NO (-58.2%) | NO |
| 1STUDIOA | NO (-51.9%) | NO |
| 1STUDIOB | NO (-59.6%) | NO |

## Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

## Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

## EPBD (Recast): Consideration of alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Area [$m^2$] | 1020.9 | 1020.9 |
| External area [$m^2$] | 2080.1 | 2080.1 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 4 |
| Average conductance [W/K] | 521.65 | 899.82 |
| Average U-value [$W/m^2K$] | 0.25 | 0.43 |
| Alpha value* [%] | 23.59 | 15.97 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | A1/A2 Retail/Financial and Professional services |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| **38** | **B1 Offices and Workshop businesses** |
| | B2 to B7 General Industrial and Special Industrial Groups |
| | B8 Storage or Distribution |
| | C1 Hotels |
| | C2 Residential Inst.: Hospitals and Care Homes |
| | C2 Residential Inst.: Residential schools |
| | C2 Residential Inst.: Universities and colleges |
| | C2A Secure Residential Inst. |
| | Residential spaces |
| **62** | **D1 Non-residential Inst.: Community/Day Centre** |
| | D1 Non-residential Inst.: Libraries, Museums, and Galleries |
| | D1 Non-residential Inst.: Education |
| | D1 Non-residential Inst.: Primary Health Care Building |
| | D1 Non-residential Inst.: Crown and County Courts |
| | D2 General Assembly and Leisure, Night Clubs and Theatres |
| | Others: Passenger terminals |
| | Others: Emergency services |
| | Others: Miscellaneous 24hr activities |
| | Others: Car Parks 24 hrs |
| | Others - Stand alone utility block |

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

| | Actual | Notional |
|---|---|---|
| Heating | 4.45 | 9.85 |
| Cooling | 4.29 | 4.79 |
| Auxiliary | 3.25 | 2.31 |
| Lighting | 16.41 | 15.87 |
| Hot water | 2.42 | 2.36 |
| Equipment* | 22.87 | 22.87 |
| **TOTAL**** | **30.82** | **35.17** |

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 10.65 | 0 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 114.9 | 136.67 |
| Primary energy* [$kWh/m^2$] | 94.63 | 94.09 |
| Total emissions [$kg/m^2$] | 10.5 | 16.7 |

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| **[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 115.6 | 34.6 | 38.1 | 0 | 0 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 262.8 | 95.9 | 89.1 | 0 | 0 | 0.82 | 0 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 56.7 | 26.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 96.8 | 72.7 | 0 | 0 | 0 | 0 | 0 | ---- | ---- |
| **[ST] Other local room heater - fanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 64.1 | 280.5 | 21.1 | 0 | 0 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 87.4 | 67.8 | 29.7 | 0 | 0 | 0.82 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 99.1 | 92.7 | 7.6 | 6.3 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 79.8 | 80 | 9.1 | 8.2 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 12.3 | 102.3 | 0.9 | 6.9 | 4.4 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 27.3 | 65.3 | 3.1 | 6.7 | 2.5 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 44.9 | 126.3 | 3.4 | 8.5 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 51.5 | 91.8 | 5.9 | 9.4 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 30.2 | 77.9 | 2.3 | 5.3 | 0 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 30 | 49.7 | 3.4 | 5.1 | 0 | 2.43 | 2.7 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 210.5 | 1.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 254.4 | 1.7 | 0 | 0 | 0 | 0 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 9.3 | 66.8 | 0.7 | 4.5 | 5.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 42.7 | 48.2 | 4.9 | 5 | 3.3 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 69.5 | 62.8 | 22.9 | 0 | 7.3 | 0.84 | 0 | 1 | 0 |
| | **Notional** | 123.8 | 116.4 | 42 | 0 | 9.7 | 0.82 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 37.7 | 34.8 | 2.9 | 2.3 | 1.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 70.4 | 42.9 | 8 | 4.4 | 1.1 | 2.43 | 2.7 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 39.4 | 54.5 | 3 | 3.7 | 5.9 | 3.63 | 4.11 | 3.7 | 5.5 |
| | **Notional** | 133.4 | 76.3 | 15.2 | 7.9 | 3.3 | 2.43 | 2.7 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

# Key Features

**The BCO can give particular attention to items with specifications that are better than typically expected.**

**Building fabric**

| Element | $U_{i\text{-}Typ}$ | $U_{i\text{-}Min}$ | Surface where the minimum value occurs* |
|---|---|---|---|
| Wall | 0.23 | 0.18 | 0BAR Wall 1 |
| Floor | 0.2 | 0.15 | 0BAR Exposed Floor 1 |
| Roof | 0.15 | 0.13 | 1BREAKOUT Exposed Roof 1 |
| Windows, roof windows, and rooflights | 1.5 | 1.5 | 0LOBBY Window 2 (1) |
| Personnel doors | 1.5 | - | "No external personnel doors" |
| Vehicle access & similar large doors | 1.5 | - | "No external vehicle access doors" |
| High usage entrance doors | 1.5 | 1.5 | 0BAR Door 1 (High Usage Entrance Door) |

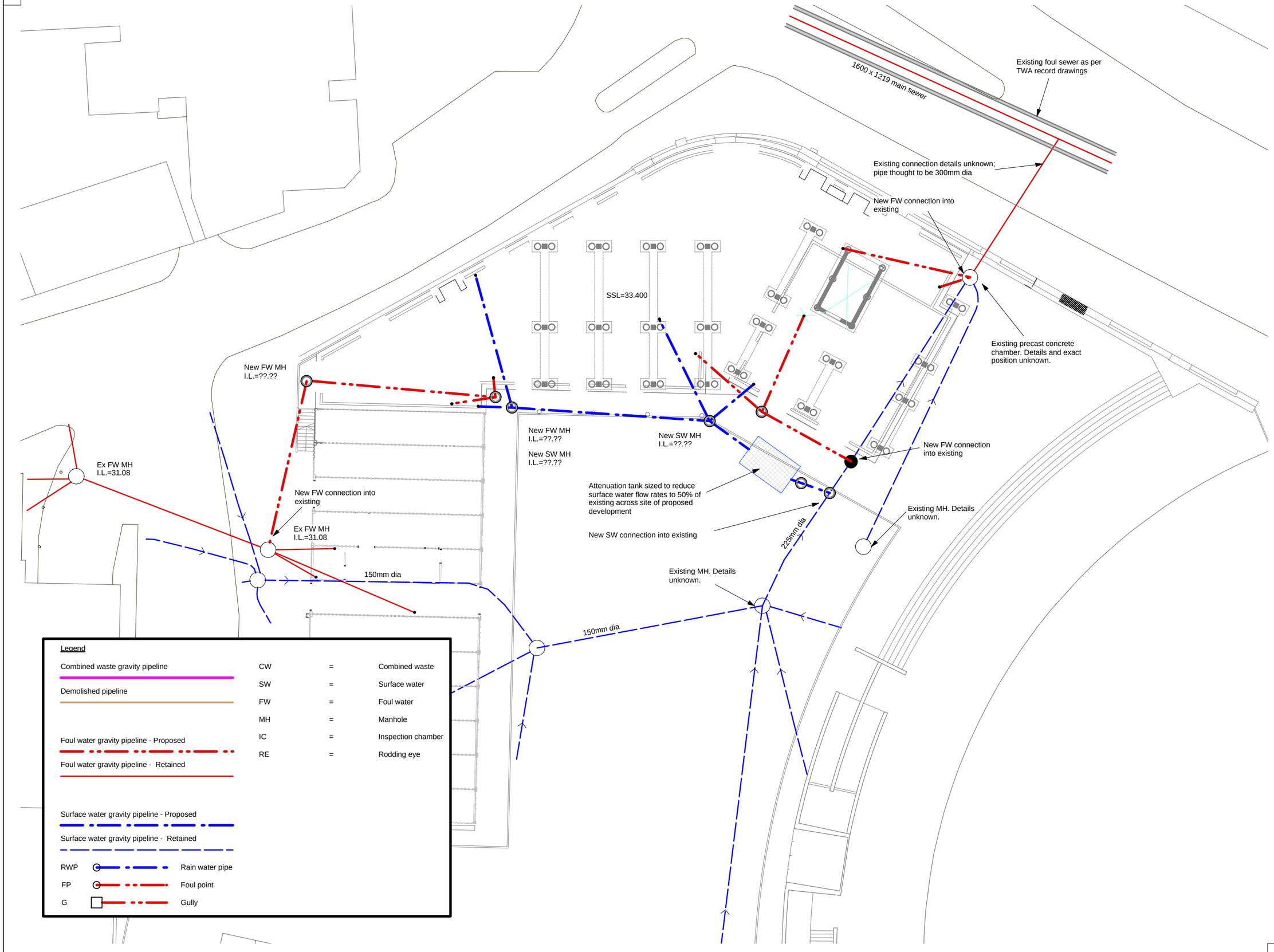
$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

| Air Permeability | Typical value | This building |
|---|---|---|
| m³/(h.m²) at 50 Pa | 5 | 3 |

# Appendix 2 – Outline Drainage Plan

A3






**NOT FOR CONSTRUCTION**

| Revision | Date of Issue | By |
|---|---|---|

Issue History

Work Stage - ACE / (RIBA)
RIBA Stage 2

Issue Status
Planning

Project Title
The Roundhouse

Client
The Roundhouse

Architect
A&M

Drawing Title
Draiange Proposals
Site Plan

| Scale | Drawn | Checked |
|---|---|---|
| 1:250 | RH | DP |

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# Appendix 3 – BREEAM Pre-Assessment Report

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# Roundhouse 3, Camden

## BREEAM UK New Construction 2014 Pre-Assessment

**Job No: 500057**

| | |
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# 1.0 Executive Summary

## 1.1 Current Score

A BREEAM 2014 New Construction Pre-Assessment has been carried out for the proposed Roundhouse 3 development.

The development currently achieves a BREEAM score of **61.63%**, which equates to a rating of 'Very Good'. This score is indicative in line with the current scheme and will need to be continually assessed throughout the programme.

Additional 'potential' credits have been highlighted which need to be reviewed further by the design team in order to confirm compliance. These credits will also act as a back-up incase some of the currently targeted credits cannot be achieved as the design progresses. Although the credits currently targeted (and 'potential' credits) are technically feasible and relevant for the scheme, they will need to be carefully considered and some may not be targeted due to the financial constraints of the scheme. This will be analysed in detail at the next design stage and the environmental benefits will be considered against costs.

| | Maximum Credits | | Targeted Credits | | Potential Credits | | Unlikely Credits | |
|---|---|---|---|---|---|---|---|---|
| | **Credits** | **%** | **Credits** | **%** | **Credits** | **%** | **Credits** | **%** |
| **Management** | 21 | 12.0 | 16 | 9.14 | 3 | 1.7 | 2 | 1.1 |
| **Health & Wellbeing** | 17 | 15.0 | 8 | 7.06 | 4 | 3.5 | 5 | 4.4 |
| **Energy** | 23 | 15.0 | 16 | 10.43 | 0 | 0.0 | 7 | 4.6 |
| **Transport** | 11 | 9.0 | 9 | 7.36 | 0 | 0.0 | 2 | 1.6 |
| **Water** | 9 | 7.0 | 5 | 3.89 | 1 | 0.8 | 3 | 2.3 |
| **Materials** | 14 | 13.5 | 7 | 6.75 | 3 | 2.9 | 4 | 3.9 |
| **Waste** | 8 | 8.5 | 6 | 6.38 | 2 | 2.1 | 0 | 0.0 |
| **Land Use & Ecology** | 10 | 10.0 | 5 | 5.00 | 0 | 0.0 | 5 | 5.0 |
| **Pollution** | 13 | 10.0 | 6 | 4.62 | 2 | 1.5 | 5 | 3.8 |
| **Innovation** | 10 | 10.0 | 1 | 1.00 | 0 | 0.0 | 9 | 9.0 |
| **TOTAL** | **136** | **110.0** | **79** | **61.63** | **15** | **12.6** | **42** | **35.8** |

Table 1 - BREEAM Summary Table

# 2.0 Introduction

## 2.1 What is BREEAM?

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's leading and most widely used environmental assessment method for buildings, with over 115,000 buildings certified and over 700,000 registered. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance. Credits are awarded in ten categories according to performance. These credits are then added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent and Outstanding. The operation of BREEAM is overseen by an independent Sustainability Board, representing a wide cross-section of construction industry stakeholders.

**Aims of BREEAM:**

- To mitigate the impacts of buildings on the environment
- To enable buildings to be recognised according to their environmental benefits
- To provide a credible, environmental label for buildings
- To stimulate demand for sustainable buildings

**Objectives of BREEAM:**

- To provide market recognition to low environmental impact buildings
- To ensure best environmental practice is incorporated in buildings
- To set criteria and standards surpassing those required by regulations and challenge the market to provide innovative solutions that minimise the environmental impact of buildings
- To raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment
- To allow organisations to demonstrate progress towards corporate environmental objectives

## 2.2 BREEAM Credibility

### Technical Credibility

BREEAM is tried and tested, both in terms of its robust technical standards and its commercial delivery, and expert advice (based on scientific evidence) continues to inform almost every issue in BREEAM.

In the UK there are over 115,000 buildings certified and over 700,000 buildings currently registered for assessment. BREEAM can be used to assess any building type anywhere in the world.

### Robust Technical Standards

BREEAM has always used objective criteria to recognise good environmental performance:

- Issues for assessment are agreed to be significant, and offer worthwhile reductions in environmental impact
- Issues must be assessable at the relevant stage in the building's life
- Performance levels are based on scientific evidence wherever possible
- Performance levels must exceed demands of law and regulations and encourage innovation
- Improvements encouraged by BREEAM are achievable and cost effective

Where specific targets cannot be set using hard science or research, sensible practical measures are recommended to minimise environmental impact or enhance the environment of the building and its users.

### Commercial Credibility

Assessments are undertaken by organisations and individuals trained and licensed by BRE Global (Assessors). This ensures:

- Competition in the market for assessment services
- Engagement with the whole of the industry
- Assessors work to the same quality standards (monitored by BRE)

BRE Global has gained UKAS (United Kingdom Accreditation Service) accreditation for all its BREEAM schemes. This means that its management of BREEAM is monitored and overseen by UKAS.

## 3.0 Scoring and Rating

This section of the report explains how an assessed building's certified BREEAM rating is calculated.

There are a number of elements that determine the BREEAM rating; these are as follows:

- BREEAM rating benchmarks
- BREEAM environmental weightings
- Minimum BREEAM standards

### 3.1 Rating Benchmarks

The rating benchmarks for the 2014 version of BREEAM are outlined in table 1 below :

| BREEAM Rating | % score |
|---|---|
| UNCLASSIFIED | <30 |
| PASS | ≥30 |
| GOOD | ≥45 |
| **V GOOD** | **≥55** |
| EXCELLENT | ≥70 |
| OUTSTANDING | ≥85 |

Table 2 - BREEAM 2014 rating benchmarks

### 3.2 Environmental section weightings

Table 3 below outlines the environmental weightings for the nine BREEAM sections.

| BREEAM Section | Weighting (fully fitted out) |
|---|---|
| Management | 12% |
| Health & Wellbeing | 15% |
| Energy | 15% |
| Transport | 9% |
| Water | 7% |
| Materials | 13.5% |
| Waste | 8.5% |
| Land Use & Ecology | 10% |
| Pollution | 10% |
| Innovation (additional) | 10% |

Table 3 - BREEAM 2014 environmental weightings

## 3.3 Minimum standards

To achieve a BREEAM rating, the minimum percentage score must be achieved (as outlined in table 2) and the minimum standards applicable to that rating level must be adhered to.

| BREEAM issue | Minimum standards by BREEAM rating level | | | | |
|---|---|---|---|---|---|
| | **PASS** | **GOOD** | **VERY GOOD** | **EXCELLENT** | **OUTSTANDING** |
| **Man 03:** Responsible construction practices | None | None | None | One credit (Considerate construction) | Two credits (Considerate construction) |
| **Man 04:** Commissioning and handover | None | None | None | Criterion 9 (Building User Guide) | Criterion 9 (Building User Guide) |
| **Man 5:** Aftercare | None | None | None | One credit (Seasonal commissioning | One credit (Seasonal commissioning) |
| **Ene 01:** Reduction of energy use and carbon emissions | None | None | None | Five credits | Eight credits |
| **Ene 02:** Energy monitoring | None | None | One credit (First sub-metering credit) | One credit (First sub-metering credit) | One credit (First sub-metering credit) |
| **Wat 01:** Water consumption | None | One credit | One credit | One credit | Two credits |
| **Wat 02:** Water monitoring | None | Criterion 1 only | Criterion 1 only | Criterion 1 only | Criterion 1 only |
| **Mat 03:** Responsible sourcing of materials | Criterion 1 only | Criterion 1 only | Criterion 1 only | Criterion 1 only | Criterion 1 only |
| **Wst 01:** Construction waste management | None | None | None | None | One credit |
| **Wst 03:** Operational waste | None | None | None | One credit | One credit |
| **LE 03:** Minimising impact on existing site ecology | None | None | One credit | One credit | One credit |

Table 4 - Minimum BREEAM standards

## 4.0 Pre-Assessment Evaluation

### 4.1 Current Score

A BREEAM 2014 New Construction Pre-Assessment has been carried out for the proposed RH3 scheme.

The development currently achieves a BREEAM score of **61.63%,** which equates to a rating of 'Very Good'. This score is indicative in line with the current scheme and will need to be continually assessed throughout the programme.

Additional 'potential' credits have been highlighted which need to be reviewed further by the design team in order to confirm compliance. These credits will also act as a back-up incase some of the currently targeted credits cannot be achieved as the design progresses.

Although the credits currently targeted (and 'potential' credits) are technically feasible and relevant for the scheme, they will need to be carefully considered and some may not be targeted due to the financial constraints of the scheme. This will be analysed in detail at the next design stage and the environmental benefits will be considered against costs.

### 4.2 Potential Credits

An additional **14.00%** has been highlighted as 'potential' credits which need to be reviewed further by the design team in order to confirm compliance. These credits will also act as a back-up incase some of the currently targeted credits cannot be achieved as the design progresses.

Although the credits currently targeted (and 'potential' credits) are technically feasible and relevant for the scheme, they will need to be carefully considered and some may not be targeted due to the financial constraints of the scheme. This will be analysed in detail at the next design stage and the environmental benefits will be considered against costs.

| Credit | Issue | % Change |
|---|---|---|
| **MAN 2 -** Life cycle cost and service life planning | Carry out an elemental life cycle cost (LCC) at RIBA Stage 2 in line with PD 156865:2008. LCC plan to include fabric and servicing strategy outlining services component and fit-out options over a 15 year period. | +1.14% |
| **MAN 3** - Responsible construction practices | Sustainability Champion appointed to monitor progress during RIBA Stages 5-6. To be ideally site based, for regular checks at key stages. | +0.57% |
| **HEA 2** - Indoor Air Quality | Produce an indoor air quality plan to minimise indoor air pollution during occupation. To include procedures for pre-occupancy flush out, third party testing and analysis, maintaining indoor air quality in-use | +0.88% |

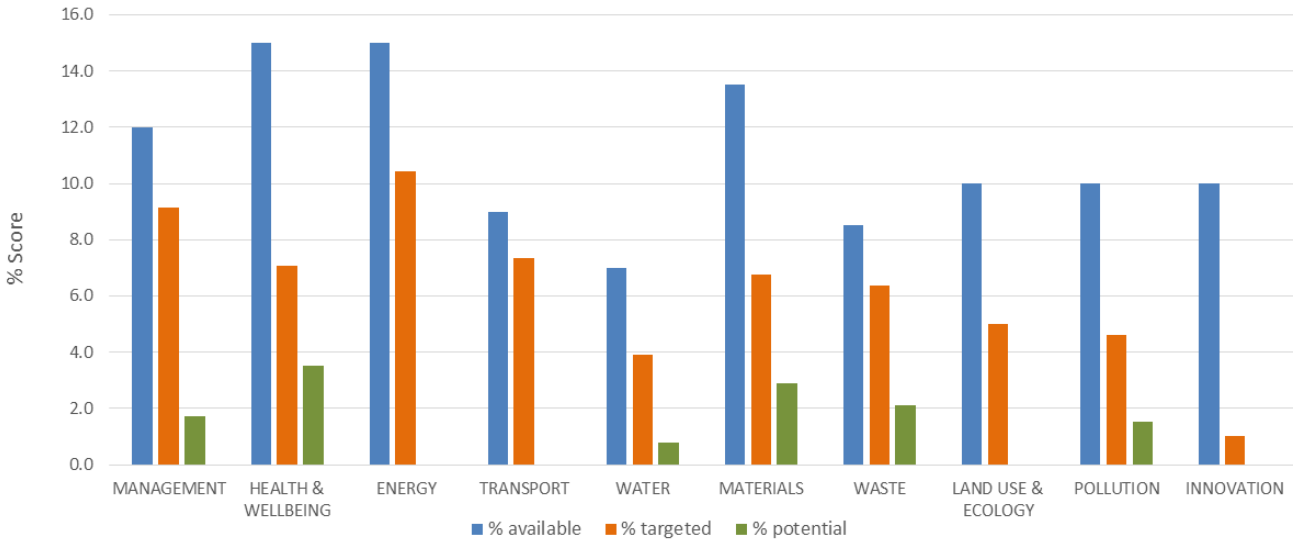
| | | |
|---|---|---|
| **HEA 4** - Thermal Comfort | Carry out full dynamic thermal analysis in accordance with CIBSE AM11 to confirm compliance with CIBSE Guide A.<br><br>Confirm compliance with future climate change weather file.<br><br>Heating/cooling systems have appropriate thermal zoning and control | +0.88%<br><br>+0.88%<br><br>+0.88% |
| **WAT 1** - Water Consumption | Achieve a 40% improvement in water consumption compared to a baseline performance. | +0.78% |
| **MAT 3** - Responsible Sourcing of Materials | Source materials in accordance with a documented 'sustainable procurement plan'. Can be company level and project specific<br><br>Sourcing of responsible materials from approved suppliers (EMS, BES 6001, FSC, reused material etc.). Achieve a RMS score of >18%. | +0.96%<br><br>+0.96% |
| **MAT 6** - Material efficiency | Optimise the use of materials in building design, procurement, construction, maintenance and end of life. For example: use fewer materials, reuse existing materials, recycled content, reduce wastage. | +0.96% |
| **WST 1** - Construction Waste Management | Minimise the non-hazardous construction waste generated to less than 3.4 tonnes/100m$^2$ of GIA. | +1.06% |
| **WST 2** - Recycled Aggregates | Total amount of recycled or secondary aggregate specified is greater than 25% (by weight or volume) of the total high grade aggregate. | +1.06% |
| **POL 1** - Impact of Refrigerants | Systems using refrigerants have Direct Effect Life Cycle $CO_2$ equivalent emissions (DELC $CO_{2e}$) of ≤ 1000 kg$CO_{2e}$/kW. | +0.77% |
| **POL 3** - Surface Water Run Off | No discharge from site for rainfall up to 5mm. Provide appropriate level of water pollution prevention treatment in line with PPG3 and the SuDS manual. Produce an up-to-date drainage plan for the building occupiers. | +0.77% |

Table 5 - Summary of Potential Credits

## 4.3 Score Summary

| | Maximum Credits | | Targeted Credits | | Potential Credits | | Unlikely Credits | |
|---|---|---|---|---|---|---|---|---|
| | Credits | % | Credits | % | Credits | % | Credits | % |
| **Management** | 21 | 12.0 | 16 | 9.14 | 3 | 1.7 | 2 | 1.1 |
| **Health & Wellbeing** | 17 | 15.0 | 8 | 7.06 | 4 | 3.5 | 5 | 4.4 |
| **Energy** | 23 | 15.0 | 16 | 10.43 | 0 | 0.0 | 7 | 4.6 |
| **Transport** | 11 | 9.0 | 9 | 7.36 | 0 | 0.0 | 2 | 1.6 |
| **Water** | 9 | 7.0 | 5 | 3.89 | 1 | 0.8 | 3 | 2.3 |
| **Materials** | 14 | 13.5 | 7 | 6.75 | 3 | 2.9 | 4 | 3.9 |
| **Waste** | 8 | 8.5 | 6 | 6.38 | 2 | 2.1 | 0 | 0.0 |
| **Land Use & Ecology** | 10 | 10.0 | 5 | 5.00 | 0 | 0.0 | 5 | 5.0 |
| **Pollution** | 13 | 10.0 | 6 | 4.62 | 2 | 1.5 | 5 | 3.8 |
| **Innovation** | 10 | 10.0 | 1 | 1.00 | 0 | 0.0 | 9 | 9.0 |
| **TOTAL** | **136** | **110.0** | **79** | **61.63** | **15** | **12.6** | **42** | **35.8** |

Table 6 - BREEAM Summary Table



## Management

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **MANAGEMENT** | | | | | | | | | | | | |
| **MAN 1** | Project brief and design | Stakeholder consultation (project delivery) | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Project delivery stakeholders meet at RIBA Stage 2 to identify and define roles, responsibilities and contributions for each key phase of project delivery. |
| | | Stakeholder consultation (third party) | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Relevant third party stakeholders have been consulted by the design team at RIBA Stage 2. Consultation feedback has been given to, and received by, all relevant parties. Third parties include building users, FM staff, consultation groups etc. |
| | | Appoint sustainability champion (design) | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | client / BREEAM AP | **Targeted:** Appoint sust. champion at Feasibility stage ( RIBA Stage 1), and set targets at Concept Design (RIBA Stage 2) |
| | | Appoint sustainability champion (monitoring progress) | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | client / BREEAM AP | **Targeted:** Achieve above credit. Sust. champion to monitor progress and attend key meetings during RIBA Stages 2-4 |
| **MAN 2** | Life cycle cost and service life planning | Elemental life cycle cost (LCC) | 2 | 1.14 | 0 | 0.00 | 2 | 1.14 | 0 | 0.00 | QS | **Potential:** Carry out an elemental life cycle cost (LCC) at RIBA Stage 2 in line with PD 156865:2008. LCC plan to include fabric and servicing strategy outlining services component and fit-out options over a 15 year period. |
| | | Component level LCC Plan | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | 1 | 0.57 | QS | **Unlikely:** Develop a component level LCC plan at RIBA Stage 4 in line with PD 156865:2008. Include the following: envelope, services, finishes and external spaces. |
| | | Capital cost reporting | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | client / QS | **Targeted:** Report the capital cost for the building in £k/ m2. Include construction, site management, insurance, inspection/testing |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| MAN 3 | Responsible construction practices | **Mandatory:** All site timber to be 'Legally harvested and traded timber' | - | | Yes | | | | | | contractor | **Mandatory:** All site timber to be 'Legally harvested and traded timber' in line with UK Government Timber Procurement Policy |
| | | Contractor operates Environmental Management System<br>Contractor implements best practice pollution policies and procedures on-site | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** EMS to be third party certified (ISO 14001/EMAS) **OR** comply wih BS 8555. Implement best practice pollution prevention policies in line with PPG6. |
| | | Appoint sustainability champion (construction stage) | 1 | 0.57 | 0 | 0.00 | 1 | 0.57 | 0 | 0.00 | contractor | **Potential:** Sustainability Champion appointed to monitor progress during RIBA Stages 5-6. To be ideally site based, for regular checks at key stages. |
| | | Considerate Constructors Scheme | 2 | 1.14 | 2 | 1.14 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Achieve a CCS score of 35 - 39. |
| | | **Innovation:** A Considerate Constructors Scheme score of 40 or more | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | - | **Unlikely:** Achieve a CCS score of 40 or more. |
| | | Monitor and record energy and water consumption on site | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Monitoring of energy and water consumption to include construction plant, equipment and site accommodation |
| | | Monitor and record transport of construction materials and waste | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Monitoring tranpost of materials and waste to include major building elements from factory gate to site |
| MAN 4 | Commissioning and handover | Commissioning and testing schedule and responsibilities | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** A schedule of commissioning and testing that identifies and includes a suitable timescale for commissioning of all building services and building fabric in line with BRegs, BSRIA, CIBSE. An appropriate project team member(s) is appointed to monitor and programme on behalf of the client. |
| | | Commissioning building services | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Achieve above credit. Appoint specialist commissioning manager at design stage for complex systems (i.e. BMS, mech vent, disp vent, air conditioning) |
| | | Testing and inspecting building fabric (thermographic survey, airtightness test) | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | 1 | 0.57 | contractor | **Unlikely:** Achieve 1st credit. Inspect integrity of building fabric (i.e. thermographic survey and airtightness test). Remediate any defects before handover |
| | | Handover (Building User Guide, training schedule) | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Provide a BUG for non-technical staff (staff, visitors, non-tech FM). Prepare a training schedule for building users and timed appropriately around handover. |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| MAN 5 | Aftercare | Aftercare support | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Provide aftercare support to building users, including:<br>- on-site attendance for the first month<br>- long-term support (i.e.helpline) for the first 12 months<br>- monitor energy and water data for the first 12 months |
| | | Seasonal commissioning | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Complete seasonal commissioning during first 12 months post occupation at peak summer, peak winter etc. |
| | | Post occupancy evaluation | 1 | 0.57 | 1 | 0.57 | 0 | 0.00 | 0 | 0.00 | client/contractor | **Targeted:** Commitment to carry out a POE after first 12 months post occupation and to disseminate the findings in terms of the building's post occupancy performance. |
| | | **Innovation:** First 3 years after occupation, collection and analysis of building energy and water use and occupant satisfaction. | 1 | 1.00 | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | client/contractor | **Targeted:** Provide operational infrastructure and resources for the first 3 years after occupation for the collection and analysis of building energy and water use, and occupant satisfaction. To be undertaken at quarterly intervals, and report data (energy and water consumption) to BRE. |
| | | **TOTAL** | **21** | **12.00** | **16** | **9.14** | **3** | **1.71** | **2** | **1.14** | | |

## Health and Wellbeing

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **HEALTH & WELLBEING** | | | | | | | | | | | | |
| **HEA 1** | Visual Comfort | Glare control | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Design out potential of disabling glare, i.e. building form and layout, occupant controlled blinds, etc. |
| | | Daylight Analysis meeting BREEAM ADF and uniformity levels | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | 1 | 0.88 | daylight consultant | **Unlikely:** 80% of GIA to achieve 2% ADF and uniformity ratio of 0.3 |
| | | **Innovation:** Enhanced daylight | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | daylight consultant | **Unlikely:** 80% of GIA to achieve 4% ADF |
| | | View out | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** 95% of relevant areas within 7m of ext. wall with a window (>20% of surrounding wall area). Room depths greater than 7m to comply with table 1 of BS8206. Relevant areas include those with workstations/desks, where occupants are likely to spend a significant amount of time etc. |
| | | Internal and External Lighting levels in accordance with relevant standard (CIBSE, BS) | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Internal and External Lighting levels in accordance with relevant standard (CIBSE, BS) with appropriate zoning and occupant control |
| **HEA 2** | Indoor Air Quality | Indoor air quality (IAQ) plan | 1 | 0.88 | 0 | 0.00 | 1 | 0.88 | 0 | 0.00 | contractor | **Potential:** Produce an indoor air quality plan to minimise indoor air pollution during occupation. To include procedures for pre-occupancy flush out, third party testing and analysis, maintaining indoor air quality in-use |
| | | Minimise the concentration and recirculation of pollutants (intakes/exhausts) | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | 1 | 0.88 | M+E | **Unlikely:** Locate intakes and exhausts 10m apart to minimise the concentration and recirculation of pollutants. Locate intakes 20m from sources of ext pollution |
| | | Specify products to meet VOC levels | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:**Specify paints/varnishes and 5/7 other categories to meet relevant VOC levels (wood panels/flooring, laminated floor, ceiling tiles, floor adhesives, etc.) |
| | | **Innovation:** Enhanced spec to meet VOC levels | 2 | 2.00 | 0 | 0.00 | 0 | 0.00 | 2 | 2.00 | architect | **Unlikely:** All categories meet VOC levels and tested |
| | | Measure VOC levels post construction | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | 1 | 0.88 | contractor | **Unlikely:** Measure VOC and formaldehyde levels post construction and comply with WHO Guidelines. |
| | | Potential for natural ventilation | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | 1 | 0.88 | M+E | **Unlikely:** Occupied spaces capable of providing natural ventilation entirely via natural ventilation. Room depths and ventilation design strategy in accordance with CIBSE AM10 |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| HEA 4 | Thermal Comfort | Thermal modelling in accordance with CIBSE AM11 | 1 | 0.88 | 0 | 0.00 | 1 | 0.88 | 0 | 0.00 | M+E / energy specialist | **Unlikely:** Carry out full dynamic thermal analysis in accordance with CIBSE AM11 to confirm compliance with CIBSE Guide A. |
| | | Adaptability - for a projected climate change scenario | 1 | 0.88 | 0 | 0.00 | 1 | 0.88 | 0 | 0.00 | M+E / energy specialist | **Unlikely:** Achieve 1st credit. Confirm compliance with future climate change weather file |
| | | Thermal zoning and controls | 1 | 0.88 | 0 | 0.00 | 1 | 0.88 | 0 | 0.00 | M+E | **Unlikely:** Achieve 1st credit. Heating/cooling systems have appropriate thermal zoning and control |
| HEA 5 | Acoustic Performance | Meet acoustic performance criteria - sound insulation | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | acoustician | **Targeted:** Appoint acoustician to define performance and testing requirements for sound insulation. |
| | | Meet acoustic performance criteria - Indoor ambient noise level | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | acoustician | **Targeted:** Appoint acoustician to define performance and testing requirements for indoor ambient noise levels. |
| | | Meet acoustic performance criteria - Rerberation times | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | acoustician | **Targeted:** Appoint acoustician to define performance and testing requirements for reverberation times. |
| HEA 6 | Safety and Security | Safe access - pedestrians and cyclists | 1 | 0.88 | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Dedicated footpaths (and crossings) and cycle paths from site entrance to building entrance / cycle stores. External lighting in line with BS 5489. Drop-off areas provide direct access to pedestrian footpaths |
| | | Consultation with Suitably Qualified Security Specialist (SQSS) | 1 | 0.88 | 0 | 0.00 | 0 | 0.00 | 1 | 0.88 | architect | **Potential:** Consultation with a Suitably Qualified Security Specialist (i.e. ALO, CPDA) at Concept Design (RIBA Stage 2). Implement measures recommended by the SQSS. |
| | | **TOTAL** | **17** | **15.00** | **8** | **7.06** | **4** | **3.53** | **5** | **4.41** | | |

## Energy

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **ENERGY** | | | | | | | | | | | | |
| **ENE 1** | Reduction of energy use and carbon emissions | Minimise operational energy demand, consumption and $CO_2$ emissions. | 12 | 7.83 | 7 | 4.57 | 0 | 0.00 | 5 | 3.26 | M+E / energy specialist | **Targeted:** Achieve a EPR of 0.525.<br><br>**Unlikely:** Achieve a EPR of 0.60 - 0.90 (and zero net regulated CO2). |
| | | **Innovation:** Carbon negative building | 5 | 5.00 | 0 | 0.00 | 0 | 0.00 | 5 | 5.00 | M+E / energy specialist | **Unlikely:** Achieve a EPR of >0.90 and zero net regulated CO2. |
| **ENE 2** | Energy Monitoring | Monitor energy use from major consuming systems | 1 | 0.65 | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Meter at least 90% of energy consumption of each fuel. Systems metered with BMS or separate sub-meters (pulsed output). Systems include heating, DHW, cool, major fans, lighting/small power etc. |
| | | Monitor energy use by building function areas | 1 | 0.65 | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Relevant function areas with high energy loads to be separately monitored |
| **ENE 3** | External Lighting | External lighting to BREEAM standards | 1 | 0.65 | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Average luminous efficiacy ≥ 60 lumens per circuit Watt. Provide automatic control (i.e. time or daylight sensor) |
| **ENE 4** | Low carbon design | Passive design analysis | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | 1 | 0.65 | M+E / energy specialist | **Unlikely:** Achieve 1st HEA 04 credit. Carry out analysis to identify opportunities fof passive design solutions. |
| | | Free cooling | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | 1 | 0.65 | M+E / energy specialist | **Unlikely:** Achieve 1st credit. Implement free cooling strategies without any cooling required, i.e. displacement vent., evap cooling, nat vent |
| | | Carry out feasibility study and install LZC | 1 | 0.65 | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | M+E / energy specialist | **Targeted:** Carry out a LZC feasibility study to establist most appropriate technology. Achieve a minimum 5% $CO_2$ reduction |
| **ENE 6** | Energy Efficient Transportation Systems | Energy consumption | 1 | 0.65 | 1 | 0.65 | 0 | 0.00 | 0 | 0.00 | M+E / Lift specialist | **Targeted:** Analysis of transport demand and usage patterns to determine optimum number and size of lifts. |
| | | Energy efficient features | 2 | 1.30 | 2 | 1.30 | 0 | 0.00 | 0 | 0.00 | M+E / Lift specialist | **Targeted:** Operate in stand-by mode during off-peak times, efficient lighting, capable of variable speed/voltage/frequency control of motor |
| **ENE 8** | Energy Efficient Equipment | Reduce unregulated energy use | 2 | 1.30 | 2 | 1.30 | 0 | 0.00 | 0 | 0.00 | client / M+E | **Targeted:** Demonstrate a meaningful reduction in total unregulated energy consumption (i.e. purchase office equipment awarded an Energy Star rating, white goods with an A+ energy efficiency rating etc.). |
| | | **TOTAL** | **23** | **15.00** | **16** | **10.43** | **0** | **0.00** | **7** | **4.57** | | |

## Transport

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **TRANSPORT** | | | | | | | | | | | | |
| **TRA 1** | Public Transport Accessibility | Accessibility Index (nearby bus stops / train stations) | 5 | 4.09 | 5 | 4.09 | 0 | 0.00 | 0 | 0.00 | BREEAM assessor | **Targeted:** Assess frequency of nearby bus stops/train stations. Achieve an Accessibility index (AI) of ≥18. |
| **TRA 2** | Proximity to Amenities | Proximity to amenities within 500m | 1 | 0.82 | 1 | 0.82 | 0 | 0.00 | 0 | 0.00 | BREEAM assessor | **Targeted:** Building is located within 500m of at least 3 local amenities, i.e. food outlet, cash machine, leisure facility, post box, community facility, GP surgery etc. |
| **TRA 3** | Cyclist Facilities | Cycle storage | 1 | 0.82 | 0 | 0.00 | 0 | 0.00 | 1 | 0.82 | architect | **Unlikely:** 1 cycle space per 10 staff, and 1 cycle space per 10 visitors.<br>Note: No. of spaces can be reduced by 50% with good access to public transport. |
| | | Cyclist facilities | 1 | 0.82 | 0 | 0.00 | 0 | 0.00 | 1 | 0.82 | architect | **Unlikely:** Provision of 2 of 4 cyclist facilites: showers, changing facilities, lockers, /drying space.<br>Note: 1 shower per 10 cycle stores (max of 8), 1 locker per cycle store. |
| **TRA 4** | Maximum Car Parking Capacity | Encourage use of alternative means of transport | 2 | 1.64 | 2 | 1.64 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Maximum car parking capacity of 1 space per 6 users (when AI ≥ 8). 2 credits |
| **TRA 5** | Travel Plan | BREEAM compliant Travel Plan | 1 | 0.82 | 1 | 0.82 | 0 | 0.00 | 0 | 0.00 | client | **Targeted:** Produce a travel plan to encourage the use of sustainable modes of transport. To include site specific travel assessment. |
| | | **TOTAL** | **11** | **9.00** | **9** | **7.36** | **0** | **0.00** | **2** | **1.64** | | |

## Water

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **WATER** | | | | | | | | | | | | |
| **WAT 1** | Water Consumption | Energy efficient water fittings | 5 | 3.89 | 2 | 1.56 | 1 | 0.78 | 2 | 1.56 | M+E | **Targeted:** Achieve a 25% improvement in water consumption compared to a baseline performance.<br>**'Potential:** Achieve a 40% improvement in water consumption<br>**Unlikely:** Achieve a 55% improvement in water consumption |
| | | **Innovation:** Enhanced energy efficient water fittings | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | M+E | **Unlikely:** Achieve a 65% improvement in water consumption |
| **WAT 2** | Water Monitoring | Water meter on mains water supply | 1 | 0.78 | 1 | 0.78 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Specification of a water meter on mains water supply to each building.<br>Sub-meter areas comsuming more than 10% with pulsed output or linked to BMS. |
| **WAT 3** | Water Leak Detection and Prevention | Water leak detection system | 1 | 0.78 | 0 | 0.00 | 0 | 0.00 | 1 | 0.78 | M+E | **Unlikely:** Provision of leak detection system to detect major water leak on the mains water supply. Able to alert building occupants and be programmable. |
| | | Flow control devices fitted to WC areas | 1 | 0.78 | 1 | 0.78 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** Provision of flow controal devices to regulate water supply to WC areas (i.e. time controller, PIR etc.) |
| **WAT 4** | Water efficient equipment | Reduce unregulated water consumption | 1 | 0.78 | 1 | 0.78 | 0 | 0.00 | 0 | 0.00 | architect / M+E | **Targeted:** External landscaping and planting that relies solely on precipitation |
| | | **TOTAL** | **9** | **7.00** | **5** | **3.89** | **1** | **0.78** | **3** | **2.33** | | |

## Materials

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **MATERIALS** | | | | | | | | | | | | |
| **MAT 1** | Life Cycle Impacts | Green Guide specified materials | 6 | 5.79 | 4 | 3.86 | 0 | 0.00 | 2 | 1.93 | architect | **Targeted:** Specify key elements of the building envelope using the Green Guide (ext walls, windows, roof, upper floor, int walls, floor finishes).<br><br>**Unlikely:** Improved material slection in accordance with Green Guide ratings |
| | | **Innovation:** Enhanced specification | 3 | 3.00 | 0 | 0.00 | 0 | 0.00 | 3 | 3.00 | architect | **Unlikely:** Further improved material slection in accordance with Green Guide ratings |
| **MAT 2** | Hard Landscaping and Boundary Protection | At least 80% to be A or A+ rated | 1 | 0.96 | 1 | 0.96 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** At least 80% of hard landscaping and boundary protectionto be A or A+ rated. Includes parking areas, footpaths etc. |
| **MAT 3** | Responsible Sourcing of Materials | **Mandatory:** All site timber to be 'Legally harvested and traded timber' | | | Yes | | | | | 0.00 | contractor | **'Mandatory:** In line with UK Government Timber Procurement Policy |
| | | Source materials in accordance with a documented 'sustainable procurement plan' | 1 | 0.96 | 0 | 0.00 | 1 | 0.96 | 0 | 0.00 | contractor | **Potential:** Source materials in accordance with a documented 'sustainable procurement plan'. Can be company level and project specific |
| | | Sourcing of responsible materials from approved suppliers | 3 | 2.89 | 0 | 0.00 | 1 | 0.96 | 2 | 1.93 | contractor / architect | **Potential:** Sourcing of responsible materials from approved suppliers (EMS, BES 6001, FSC, reused material etc.). Achieve a RMS score of >18%.<br><br>**Unlikely:** Achieve a RMS score of >36% (2nd credit) or > 54% (3rd credit). |
| | | **Innovation:** Further sourcing of responsible materials | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | contractor | **Unlikely:** Achieve a RMS score of >70%. |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **MAT 4** | Insulation | Specificy insulation with low embodied environmental impact | 1 | 0.96 | 1 | 0.96 | 0 | 0.00 | 0 | 0.00 | architect / M+E | **Targeted:** Insulation Index for the building fabric (ext walls, ground floor, roof) and building services is >2.5. |
| **MAT 5** | Designing for durability and resilience | Specify suitable durability /protection measures to vulnerable areas of the building | 1 | 0.96 | 1 | 0.96 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Specify suitable durability /protection measures to vulnerable areas of the building. For example: door kick plates, robust ext wall construction, trolley movement protection, hard-wearing floor finishes in circulation areas etc. Relevant building elements include measure to limit material degradation, i.e. corrosion, fading, rotting. |
| **MAT 6** | Material efficiency | Optimise the use of materials in building design, procurement, construction, maintenance and end of life. | 1 | 0.96 | 0 | 0.00 | 1 | 0.96 | 0 | 0.00 | contractor / architect | **Potential:** Optimise the use of materials in building design, procurement, construction, maintenance and end of life. For example: use fewer materials, reuse existing materials, recycled content, reduce wastage, i.e. prefab, off-site manufacture. Useful tools include BS 8895 and WRAP 'Designing out Waste'. |
| | | **TOTAL** | **14** | **13.50** | **7** | **6.75** | **3** | **2.89** | **4** | **3.86** | | |

## Waste

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **WASTE** | | | | | | | | | | | | |
| **WST 1** | Construction Waste Management | SWMP to reduce construction waste | 3 | 3.19 | 2 | 2.13 | 1 | 1.06 | 0 | 0.00 | contractor | **Targeted:** Develop a SWMP covering the non-hazardous waste. Include pre-demolition audit (where applicable) to maximise the recovery of material from demolition for subsequent high grade/value applications. Produce <7.5m2 construction waste per 100m2.<br><br>**Potential:** Produce <3.4m2 construction waste per 100m2. |
| | | Non hazardous waste to be diverted from landfill (70-80%) | 1 | 1.06 | 1 | 1.06 | 0 | 0.00 | 0 | 0.00 | contractor | **Targeted:** Divert 70% of non-demolition waste and 80% of demolition waste from landfill. |
| | | **Innovation:** ≤ 1.6m²/100m² and 85% diversion rate | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 0.00 | contractor | **Unlikely:** Produce <1.6m2 construction waste per 100m2. Divert 85% of non-demolition waste, 85% of demolition waste and 95% of excavation waste from landfill. |
| **WST 2** | Recycled Aggregates | Recycled/secondary aggregates to BREEAM standards | 1 | 1.06 | 0 | 0.00 | 1 | 1.06 | 0 | 0.00 | contractor | **Potential:** Total amount of recycled or secondary aggregate specified is greater than 25% (by weight or volume) of the total high grade aggregate.<br>The % of high grade aggregate that is recycled or secondary aggregate in each application (present) must meet minimum % levels as per BREEAM standards. Applications include structural frame, base/binder for pavements/roads, foundations, concrete roads etc. |
| | | **Innovation:** Enhanced spec of recycled/secondary aggregates | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | contractor | **Unlikely:** Total amount of recycled or secondary aggregate specified is greater than 35% (by weight or volume) of the total high grade aggregate. The contributing recycled or secondary aggregate must not be transported more than 30 km by road transport. |
| **WST 3** | Operational Waste | Recycling waste storage | 1 | 1.06 | 1 | 1.06 | 0 | 0.00 | 0 | 0.00 | architect | **Targeted:** Provision of dedicated space for the segregation and storage of operational recyclable waste. To be clearly labelled, accessible, appropriately sized (at least 2m2 per 1000m2 of net floor area). |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| WST 5 | Adaptation to climate change | Carry out a climate change adaptation strategy appraisal for structural and fabric resilience | 1 | 1.06 | 1 | 1.06 | 0 | 0.00 | 0 | 0.00 | structural engineer / architect | **Targeted:** Conduct a climate change adaptation strategy appraisal for structural and fabric resilience (RIBA Stage 2). Identify and evaluate the impact on the building over its life cycle from expected extreme weather conditions. |
| | | **Innovation:** A holistic approach to the design and construction of the current building's life cycle | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | - | **Unlikely:** Achieve credits HEA 04, ENE 01, ENE 04, WAT 01. MAT 05, POL 03 |
| WST 6 | Functional adaptability | Undertake and implement a building-specific functional adaptation strategy | 1 | 1.06 | 1 | 1.06 | 0 | 0.00 | 0 | 0.00 | client / architect | **Targeted:** Undertake and implement a building-specific functional adaptation strategy (RIBA Stage 2). Include recommendations for measures to be incorporated to facilitate future adaptation. Examples include major refurb potential, replacement of major plant, adaptability of internal env and change of use, extension potential. Measures to be adopted in the design (RIBA Stage 4), where practical and cost effective. |
| | | **TOTAL** | **8** | **8.50** | **6** | **6.38** | **2** | **2.13** | **0** | **0.00** | | |

## Land Use and Ecology

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **LAND USE & ECOLOGY** | | | | | | | | | | | | |
| **LE 1** | Site Selection | Development on previous developed land | 1 | 1.00 | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | ecologist / architect | **Targeted:** At least 75% of the proposed development's footprint is previously developed land. Includes buildings, hard landscaping, car park, access road etc. |
| | | Development on contaminated land | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | 1 | 1.00 | contractor | **Unlikely:** Development on contaminated land, confirmed by contaminated land specialist's site investigation. Remediation to be carried out in line with the specialist's recommendations. |
| **LE 2** | Ecological Value of Site and Protection of Ecological Features | Land within the construction zone defined as 'land of low ecological value' | 1 | 1.00 | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | ecologist / contractor | **Targeted:** Land within the construction zone is defined as 'land of low ecological value'. Confirmed by SQE or complete BREEAM checklist. |
| | | All features of ecological value to be protected | 1 | 1.00 | 1 | 1.00 | 0 | 0.00 | 0 | 0.00 | ecologist / contractor | **Targeted:** All existing features of ecological value within and surrounding the construction zone and site boundary area are adequately protected from damage during clearance, site preparation and construction activities in line with BS42020.<br><br>Features of ecological value include trees > 10 years old, hedges/natural areas requiring protection, wetlands, nesting opportunities for bats/birds. |
| **LE 3** | Mitigating Ecological Impact | There is minimal change in ecological value of the site | 2 | 2.00 | 2 | 2.00 | 0 | 0.00 | 0 | 0.00 | ecologist / architect | **Targeted:** The change in ecological value of the site is less than zero but equal to or greater than minus nine plant species i.e. a minimal change. Appoint a SQE or use BREEAM calculator (areas of existing + proposed broad habitat types) |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **LE 4** | Enhancing Site Ecology | Enhancement of ecological value in line with SQE's ecology report | 2 | 2.00 | 0 | 0.00 | 0 | 0.00 | 2 | 2.00 | ecologist | **Unlikely:** Appoint SQE at RIBA Stage 1 to advise on enhancing the ecology of the site. Implement SQE's recommendations (1st credit). Achieve an increase in ecological value of the site, with an increase of six plant species or greater (2nd credit). |
| **LE 5** | Long Term Impact on Biodiversity | Landscape and habitat management plan, nominate a 'Biodiversity Champion', train site workforce etc. | 2 | 2.00 | 0 | 0.00 | 0 | 0.00 | 2 | 2.00 | ecologist / contractor | **Unlikely:** Appoint SQE prior to commencement of activities on-site to confirm compliance UK/EU legislation relating to the protection and enhancement of ecology.<br>Produce a site specific landscape and management plan to cover first 5 years in line with BS 42020.<br><br>Adopt measures to improve the site's long term biodiversity (i.e. nominate a Biodiversity Champion, train site workforce to protect ecology, record actions taken to protect biodiversity, create new ecologically valuable habitat, minimise disturbance to wildlife. |

## Pollution

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **POLLUTION** | | | | | | | | | | | | |
| **POL 1** | Impact of Refrigerants | Direct Effect Life Cycle CO2 equivalent emissions (DELC CO2e) of refrigerents | 2 | 1.54 | 0 | 0.00 | 1 | 0.77 | 1 | 0.77 | M&E | **Potential:**Systems using refrigerants have DELC CO2e ≤ 1000 kgCO2e/kW<br><br>**Unlikely:** Systems using refrigerants have DELC CO2e ≤ 100 kgCO2e/kW |
| | | Automated refrigerant leak detection | 1 | 0.77 | 0 | 0.00 | 0 | 0.00 | 1 | 0.77 | M&E | **Unlikely:** Install a permanent automated refrigerant leak detection system (or where an in-built automated diagnostic procedure for detecting leakage is installed).<br>Note: Small systems with ref. charge < 6kg, credit can be awarded by default. |
| **POL 2** | NOx Emissions | Install plant (heating and hot water) with low NOx emissions | 3 | 2.31 | 0 | 0.00 | 0 | 0.00 | 3 | 2.31 | M+E | **Unlikely:** NOx emissions for heating and hot water <40mg/kwh. |
| **POL 3** | Surface Water Run Off | Site specific Flood Risk Assessment | 2 | 1.54 | 2 | 1.54 | 0 | 0.00 | 0 | 0.00 | civil engineer | **Targeted:** Site-specific FRA confirms the development is situated in a low flood risk zone. |
| | | Peak rate surface water run off | 1 | 0.77 | 1 | 0.77 | 0 | 0.00 | 0 | 0.00 | civil engineer | **Targeted:** Implement drainage measures to ensure the peak rate of run-off from the proposed site is no greater than existing. This should comply at the 1-year and 100-year return period events, and include an allowance for climate change in accordance with current best practice. |
| | | Surface water run off volume, attenuation, and/or limiting discharge | 1 | 0.77 | 1 | 0.77 | 0 | 0.00 | 0 | 0.00 | civil engineer | **Targeted:** No flooding to occur in event of local drainage failure. Specify drainage measures to ensure the post development run-off volume, over the development lifetime, is no greater than existing for the 100-year 6-hour event, including an allowance for climate change.<br>Any additional predicted volume of run-off is prevented from leaving the site by using infiltration or SuDS. |
| | | Minimise watercourse pollution | 1 | 0.77 | 0 | 0.00 | 1 | 0.77 | 0 | 0.00 | civil engineer | **Potential:** No discharge from site for rainfall up to 5mm. Provide appropriate level of water pollution prevention treatment in line with PPG3 and the SuDS manual. Produce an up-to-date drainage plan for the building occupiers. |

| Credit Issue | Issue Title | Criteria Summary | Maximum | | Targeted | | Potential | | Unlikely | | Design Team Champion | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Credits | % | Credits | % | Credits | % | Credits | % | | |
| **POL 4** | Reduction of Night Time Light Pollution | Specify external lighting to reduce light pollution | 1 | 0.77 | 1 | 0.77 | 0 | 0.00 | 0 | 0.00 | M+E | **Targeted:** External lighting strategy designed in compliance with Table 2 of the ILP Guidance notes. All external lighting (except for safety and security lighting) can be automatically switched off between 23:00 and 07:00. Security lighting during 23:00 and 07:00 to compliy with the lower levels of lighting recommended in Table 2 of the ILP Guidance notes. |
| **POL 5** | Noise Attenuation | Noise impact assessment | 1 | 0.77 | 1 | 0.77 | 0 | 0.00 | 0 | 0.00 | acoustician | **Targeted:** Acoustician to carry out a noise impac assessment in line with BS7445. Proposed noise level to be no greater than +5dB during the day and +3dB at night compared to the background noise level. |
| | | **TOTAL** | **13** | **10.00** | **6** | **4.62** | **2** | **1.54** | **5** | **3.85** | | |