
# B0874 Renaissance Hotel

# Energy Statement

Version 1.0: 19 July 2018

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# Contents

| Version | Date | Reason for issue | Prepared By |
|---|---|---|---|
| 1.0 | 19 July 2018 | To Support Planning Application | Alan Geddis |

# 1 Introduction

This Energy Statement was commissioned by Arora Management Services Limited to for the extension to the existing Renaissance Hotel Bath Road, Hounslow TW6 2AQ.

The purpose of this Statement is to set how the current design development provides a sustainable approach to the construction of this proposed development, how energy will be handled, and the application of equipment and technologies in the way energy use is controlled. It is the intention to provide a development incorporating high quality systems to meet the needs of the current Building Regulations, the London Plan consolidated with alterations since 2011 (March 2016) and Development Plan Policies to provide a good indoor environment for occupants and neighbours, and meet these objectives with low energy usage and consequent low environmental impact

# 2 Executive Summary

This statement will show the building will have sustainable and energy efficient qualities whilst complying with the

- London Borough of Hillingdon (UDP)
- The London Plan consolidated with alterations since 2011 (March 2016)

The development is classed as a refurbishment and not a new build under building regulations as such the report will show that there are no percentage improvement targets. A modest saving of 2.15% in whole building terms can be achieved using

- ❖ Low thermal properties of the building extension envelope
- ❖ Aerothermal heat pumps for heating and cooling
- ❖ High Efficiency Lighting

The saving is based on a combination of existing building settings and Part L2B 2013 baseline.

# 3 Building Location

The location of the development informs the sustainable design

General area

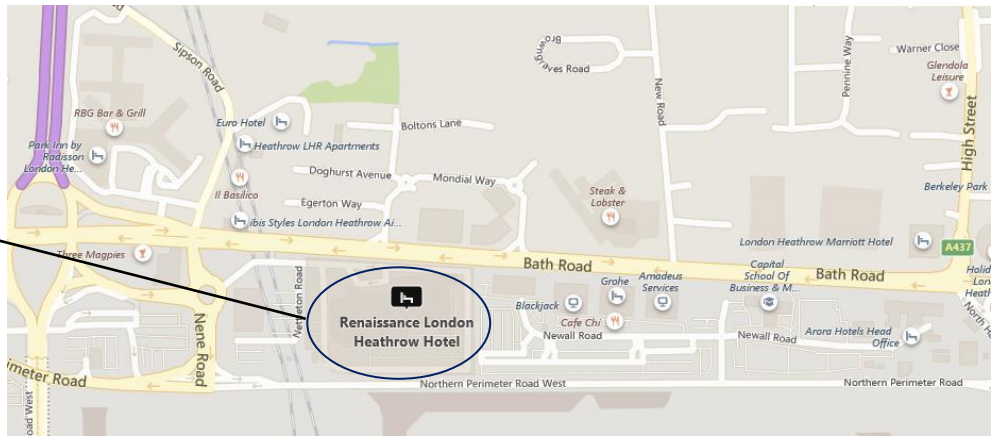


*Figure 1 Hotel Location*

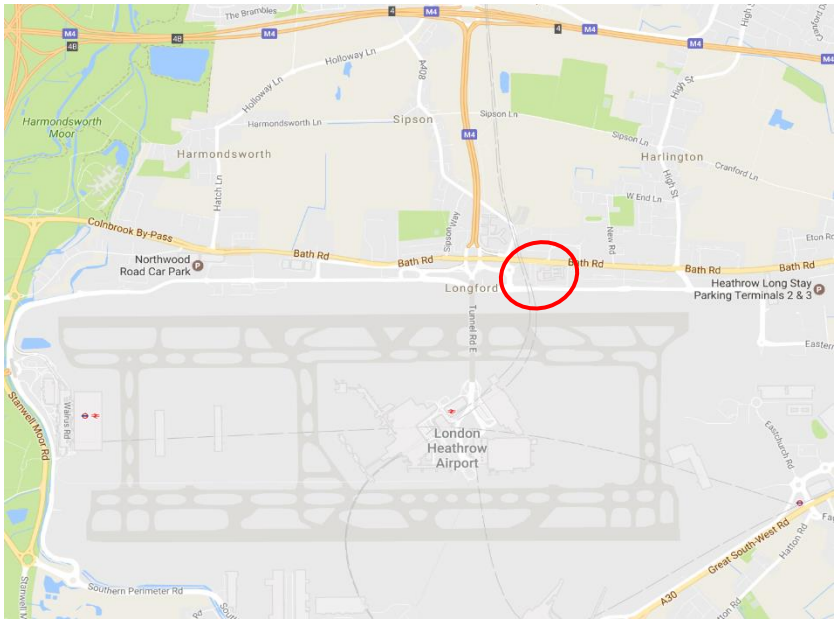


*Figure 2 Local Area View - Location near Heathrow*

The location has the following advantages:

- Access to grid electricity
- Access to natural gas
- Close to transport links rail, road and air
- Potential links to a future local heat network

# 4 Review of Planning Requirements

The hotel development is within the London Borough of Hillingdon. The Local council have set planning policies that relate to the sustainable aspects of this development. These are briefly explored below:

## *4.1 London Borough of Hillingdon Unitary Development Plan (UDP)*

The development falls within the London Borough of Hillingdon. This council has a Unitary Development Plan. The local council documents state the following

> "The Unitary Development Plan (UDP) was originally adopted in September 1998 as Hillingdon's statutory development plan. It is being replaced by the emerging Local Plan, including the adopted Local Plan: Part 1- Strategic Policies (formerly known as the Core *Strategy).*
>
> *The Unitary Development Plan (UDP) set out Hillingdon's long term strategic goals for land use, together with the planning policies and standards for making decisions on planning applications. Following a direction issued by the Secretary of State, some policies and proposals were deleted, and most were 'Saved' in September 2007.*
>
> *Saved policies in Hillingdon's UDP (September 2007) will gradually be replaced by policies in Hillingdon's Local Plan documents. The Hillingdon Local Plan: Part 1- Strategic Policies (adopted in November 2012) is the first of these documents".*

The Hillingdon local plan requests that developments meet the carbon targets of the London plan and take into building design, energy efficiency and consideration of low or zero carbon sources.

## *4.2 The London Plan consolidated with alterations since 2011 (March 2016)*

This is the main overarching document that is formally linked to the local City of London policies. Although the London Plan 2011 is referred to in the Local plan the latest the London Plan consolidated with alterations since 2011 (March 2016) is used to compliance. The relevant policies are summarized below.

### 4.2.1 *Policy 5.2 Minimising Carbon Emissions*

This is the main criteria when considering this energy statement as it established the energy hierarchy and approach to the energy assessment.

Confusingly the tables in this section still refer to percentage improvements over the 2010 building regulations. In a supporting document

*"SUSTAINABLE DESIGN AND CONSTRUCTION SUPPLEMENTARY PLANNING GUIDANCE LONDON PLAN 2011 IMPLEMENTATION FRAMEWORK APRIL 2014"*

**POLICY 5.2 MINIMISING CARBON DIOXIDE EMISSIONS**

**Planning decisions**

A Development proposals should 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

B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

**Residential buildings:**

| Year | Improvement on 2010 Building Regulatons |
|---|---|
| 2010 – 2013 | 25 per cent (Code for Sustainable Homes level 4)t |
| 2013 – 2016 | 40 per cent |
| 2016 – 2031 | Zero Carbon |

**Non-domestic buildings:**

| Year | Improvement on 2010 Building Regulatons |
|---|---|
| 2010 – 2013 | 25 per cent |
| 2013 – 2016 | 40 per cent |
| 2016 – 2019 | As per building regulations requirements |
| 2019 - 2031 | Zero Carbon |

The principle of measuring the improvement based on 2013 Building Regulations was established in section 2.4.3

2.4.3 The Mayor began to implement his 40% carbon dioxide reduction target for major development, in line with London Plan policy 5.2 from 1st October 2013. It was thought that this would be in line with the introduction of Part L of the Building Regulations 2013. The Government has announced the improvements in carbon dioxide emissions set out in Part L 2013 will come into force on the 6th April 2014.

The Part L 2013 carbon dioxide improvements are in the lower range of the options consulted and there will be different improvement targets for various building types[20] to recognise the differing potential for carbon abatement between different forms of building. Part L 2013 aims to deliver an overall 6% reduction in carbon dioxide emissions from new residential buildings and an overall 9% reduction in carbon dioxide emissions from new non-residential buildings compared to 2010[21].

To avoid complexity and extra costs for developers, the Mayor will adopt a flat carbon dioxide improvement target beyond Part L 2013 of 35% to both residential[22] and non-residential development.

This is also strengthened in the document ENERGY PLANNING Greater London Authority Guidance on preparing energy assessments (March 2016).

This policy is now widely accepted that the requirement is that new non-domestic developments have a 35% improvement over the 2013 Part L2A of the Building Regulations.

However, this applies only to a New Build project and this project is classed as a refurbishment i.e. the extension is not large enough in relation to the existing area in relation to building regulations. And so, the project would be assessed using Part L2B of the building regulations. This means that the 35% reduction is not applicable.

## *4.3 Policy 5.3 Sustainable Design and Construction*

In this section, the development aims include minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems) by avoiding internal overheating and contributing to the urban heat effect.

### *4.3.1 Policy 5.5 Decentralised Energy Networks*

In this policy, the development is encouraged to connect to local networks should they be available or planned in the future.

### 4.3.2 *Policy 5.6 Decentralised Energy in Development Proposals*

In this policy, the development has a requirement to examine the use of Combined heat and Power (CHP) in the scheme.

### 4.3.3 *Policy 5.7 Renewable Energy*

In this policy, the development has a requirement to examine renewable energy for the scheme. This state

> *"individual development proposals will also help to achieve these targets by applying the energy hierarchy in Policy 5.2. There is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible. Development proposals should seek to utilise renewable energy technologies such as: biomass heating; cooling and electricity; renewable energy from waste; photovoltaics; solar water heating; wind and heat pumps."*

This policy is primarily directed towards new build projects that comply with Part L1A of the regulations. As this project fails under the Part L2B (refurbishment) then the 20% target would not be applicable.

## 4.4 *Target Summary*

From the review of the planning requirements the following are established as the main targets for the development.

- Improvement over Part L 2013 Building regulations (based on BRUKL Outputs) with no target
- Examination of local heat network
- Examination of CHP
- Examination of Renewables

# 5 Sustainable Approach

## 5.1 *Sustainable Approach*

Our approach to sustainability follows the overarching sustainable hierarchy as illustrated in Figure 3 - Clean Lean Green Graphic

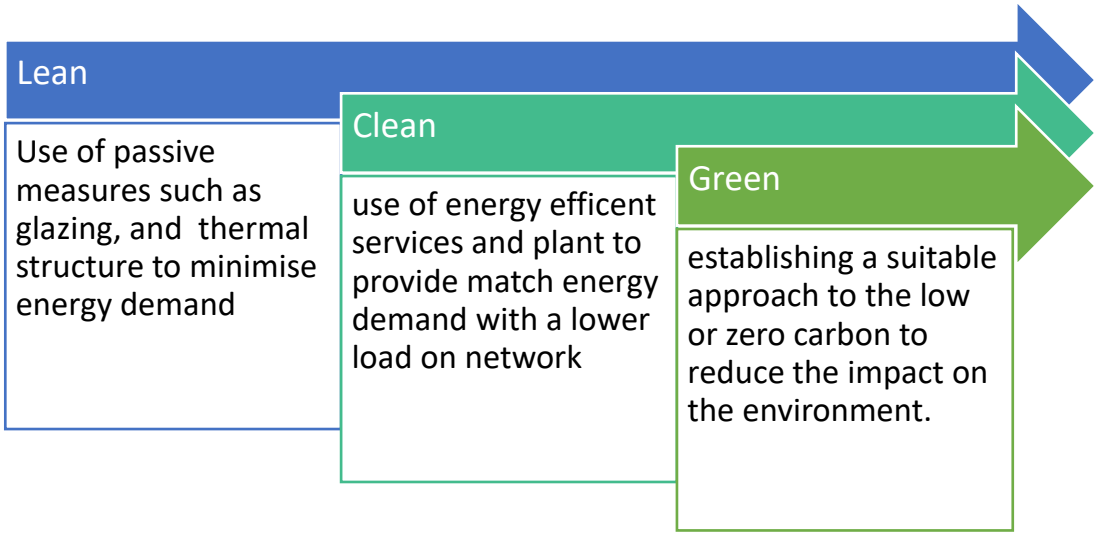


*Figure 3 - Clean Lean Green Graphic*

### 5.1.1 *Baseline*

The base line building is starting point for the comparisons and is based on a building which will comply with building regulation Part L2B 2013 England (refurbishment). This may include elements form the Clean and lean stages to achieve this.

### 5.1.2 *Lean*

The building will reduce energy demands by incorporating an improved U Value thermal envelope of wall, windows, and roof for the extension area. The glazing systems will incorporate reasonable g value to minimise heat gains to the building.

### 5.1.3 *Clean*

The services will respond to the building demand by using highly efficient plant including:

- Ventilation with low Specific Fan power
- Lighting with good efficacy

### 5.1.4 *Green*

The building and services will incorporate

- Aerothermal Heat pumps for heating and cooling.

Refer to Brief review of possible LZC for further information regarding this.

## *5.2 Brief review of possible LZC solutions*

The use of low or zero carbon (LZC) technologies can have a positive impact on the development. It's important that any development does not simply provide LZC as a token and that each could be considered as a benefit to the environment and the building users. In the summary below the use of aerothermal heat pumps is proposed.

### *5.2.1 Heat pumps*

The use of aerothermal heat pumps is currently in the proposal and provide significant heating and cooling for the building development. Heat pumps using aerothermal have advanced to a very high degree with improved efficiency at part load and mostly can overtake the ground source heat pump. These will apply to the new construction areas. The existing area plant is being retained.

### *5.2.2 Combined Heat and Power Plant (CHP)*

CHP plant is not currently in the proposal as the existing plant DHW plant is being retained and thus incorporating a CHP is not possible within the plantroom confines.

### *5.2.3 Wind Power:*

This is not currently in the proposal as it is unlikely that an urban site, wind power generation of any significance will be a realistic option. Referring to Appendix – Climate Data the average wind speed is 3.7 m/s which is not suitable for a consistent energy generation - on a wind turbine which should be above 5.0m/s as a minimum.

### *5.2.4 Green Energy Tariffs:*

The possibility for building occupants to avail of green energy tariffs will be brought to their attention in associated documentation. However, this is at the discretion of the building operator and would not be binding as it would relate to commercial costs at the time of building operation.

### *5.2.5 Solar water heating*

Solar water heating has a theoretical use for the DHW demand however as the existing plat is being retained the infrastructure would not be able to integrate the plant within the present plant. At this stage, solar water heating is not anticipated as being part of the development.

### 5.2.6 *Solar Photovoltaic*

Solar PV has potential to feed into all the electrical systems however it would not significantly offset the energy demand. The main incoming electrical connection is not anticipated as being altered and so integration of PV is not possible at this stage.

### 5.2.7 *Bio Fuel*

Biomass can have a significant impact on carbon emissions however the location could impact on the air quality aspects of the biomass fuel emissions with respect to local pollution limits. Also, the plant areas would be able to facilitate a biomass system. The reaction times of biomass are slow and may suffer in responding to a spiked demand profile. Also, the deliveries of fuel would be problematic for roof top plant areas. Bio diesel type solutions we consider to be not yet fully developed commercially and that the ethical issues surrounding energy crops are still to be fully resolved. At this stage Biomass is not anticipated as being part of the development.

## 5.3 *Energy Demand and Part L Calculations*

In order to explore these stages, we developed a range of Dynamic Simulation Models for the development using IESVE 2018 which is an AM11 compliant simulation software package. The simulations are of level 5 quality with simulation points calculated every 10 minutes and recorded in a data file every hour for a full year. The simulation year weather file used was the CIBSE Test Reference year for London.

IESVE module VE Compliance was used for the Part L Calculations which use the NCM methodology.

IESVE Module ApacheSim was used for the Energy Demand and hierarchy predication.

Note that the Part L2A BER/TER method was been used to provide the energy figures however in accordance with building regulations under Part L2B the BER does not have the requirement that the BER is lower than the TER.

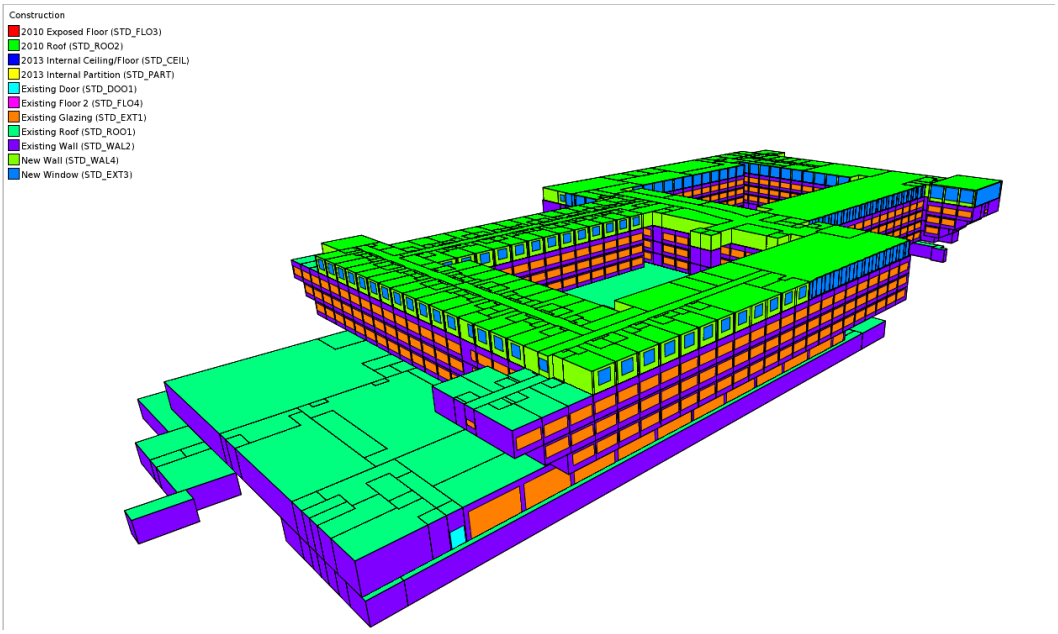


*Figure 4 - Image of the Dynamic model with construction settings*

## 5.4 Carbon Results

Following the guidance in the London Plan consolidated with alterations since 2011 (March 2016) Energy Planning document the table below sets out the data in a compliant format. Note that the Baseline is taken from the existing building and extension based on the Part L2B regulations. The energy demand reduction is based on improvements on the extension only. It also includes values for the unregulated carbon emissions for the whole building.

*Table 1 - London Plan Format Carbon Emissions*

| | Carbon dioxide emissions for non-domestic buildings | |
|---|---|---|
| | (Tonnes CO2 per annum) | |
| | **Regulated** | **Unregulated** |
| Baseline: Part L 2013 (L2B Compliant) | 4,414.89 | 2,388 |
| After energy demand reduction | 4,319.85 | 2,388 |
| After heat network/CHP | 4,319.85 | 2,388 |
| After renewable energy | 4,319.85 | 2,388 |
| | **Regulated Non-domestic carbon dioxide savings** | |
| | **(Tonnes CO2 per annum)** | **(%)** |
| Savings from energy demand reduction | 95.04 | 2.15 |
| Savings from heat network/CHP | | 0.00 |
| Savings from renewable energy | | 0.00 |
| Total Cumulative Savings | 95.04 | 2.15 |

The figure above relates to the Part L calculation which use NCM templates. This follows the London plan Energy Guide and as this guide acknowledges may differ from actual building emissions.

The building has achieved this from a mix of low thermal fabric values, solar glazing, efficient plant and low energy lighting in the extension area.

Further information on the settings between the stages is included in Appendix 2- Model Settings for each stage

# 6 Conclusion

In this report we reviewed the general location and planning requirements for the developments including The London Plan consolidated with alterations since 2011 (March 2016). As this development is classed as a refurbishment and not a new build under building regulations there are no percentage improvement targets. A modest saving was able to be obtained in terms of the whole building calculation by incorporating:

- Low thermal properties of the building extension envelope
- Aerothermal heat pumps for heating and cooling
- High Efficiency Lighting

Results from models show the Clean, Lean Green process with an overall 2.15% improvement on the combined existing building setting and Part L2B 2013 baseline.

In conclusion we have shown that this development complies with the planning policies with good sustainable and energy efficient qualities.

# 7 Appendix 1– Climate Data

The following information relates to the climate data from a London Airport Weather File

## London Weather Centre

| | | |
|---|---|---|
| ASHRAE 90.1[1] (calculated) | **4A** | Mixed humid |
| ASHRAE 90.1[1] (defined) | **none defined** | |
| Koeppen-Geiger[1] | **Cfb** | Humid temperate (mild winters), Fully humid; no dry season, Warm summer (marine), Mild winters with heavy precipitation, warm/short/dry summers, on western continental coasts |

Chosen weather file is **LondonTRY05.fwt**
Rainfall location: **London - Kew, United Kingdom**
Winter is potentially most dominant - the design must minimise heating energy.
Latitude is mid - solar radiation on south/east/west walls is significant. Solar radiation on roofs is significant.
Summer is cool. Summer also has a moderate diurnal range. Summer also has cool summer nights.
Winter is mild.
Winter prevailing winds typically from the north. Summer prevailing winds typically from the south. Wind patterns: Typically westerly winds.

### Temperature[2]:

Warmest month Jul
Max annual temperature (Jun) 31.8 °C
Warmest six months Jul Aug Jun Sep May Oct
Coldest month Feb
Min annual temperature (Feb) -4.6 °C
Coldest six months Feb Dec Jan Mar Nov Apr
Number of months warmer than 10.0°C mean = 6

### Diurnal temperature swing[3]:

0 months swing > 20 °C, of which 0 are in the warmest 6M
0 months swing 15 to 20 °C, of which 0 are in the warmest 6M
0 months swing 10 to 15 °C, of which 0 are in the warmest 6M
9 months swing 5 to 10 °C, of which 6 are in the warmest 6M
3 months swing < 5 °C

### Moisture and humidity[4]:

Max. moisture content 0.014 kg/kg
Min. moisture content 0.002 kg/kg
Mean moisture content 0.007 kg/kg
Mean relative humidity 79.2 %

### Wind[5]:

Annual mean speed 3.7 m/s
Annual mean direction E of N 225.1°

### Precipitation[6]:

Annual rainfall 611.0 mm
Driest month Feb with 36.0 mm rainfall
Wettest month Dec with 57.0 mm rainfall
Wettest summer month Oct
Wettest winter month Nov
Driest summer month Jul
Driest winter month Feb
Wettest six months Dec Nov Oct Aug Sep Jan

### Solar energy[7]:

Annual hourly mean global radiation(a) 107.4 $W/m^2$
Mean daily global radiation(b) 2571.6 $Wh/m^2$
Annual solar resource(c) 941.2 $kWh/m^2.yr$
Annual mean cloud cover(d) 5.6 oktas

### Degree days[8]:

HDD(18.3) = 2582.7
CDD(10.0) = 1088.3

**Notes on the figures**

**The climate report provides the headlines you need to know about the weather file you have selected**

**1. The Ashrae 90.1 climate classes are based around the Koeppen-Geiger classification system, but provide better definition in temperate and maritime zones. See also Koeppen Geiger and Kottek, Greiser,Beck, Rudolf and Rubel. Both the climate zone defined by ASHRAE and the climate zone calculated from the assigned weather data are displayed. The analysis in this report is based on the calculated climate zone.**

**2. Note the coincidence of wet or dry seasons and warm or cold seasons e.g. Wet summers, dry summers, wet winters etc**

**3. A good diurnal swing (monthly mean of the daily swing) during the warmest months indicates the potential for passive night time cooling and the use of thermal mass**

**4. Moisture content the nominal comfort range is 0.004-0.012 kg/kg If moisture content is 0.020 kg/kg or above either all year or in summertime it is an issue. High humidity high temp. cause comfort stress.**

# 8 Appendix 2- Model Settings for each stage

The table below shows the man differences between the models used in the lean clean green process.

| Item | Unit | Baseline | Clean Lean | Green |
|---|---|---|---|---|
| | | 2013 Part L2B and existing values | Passive Measures | Proposed Building |
| Existing Wall | w/m2.k | 1.7 | 1.7 | 1.7 |
| Extension Wall | w/m2.k | 0.28 | 0.18 | 0.28 |
| Existing Roof | w/m2.k | 1.8 | 1.8 | 1.8 |
| Extension Roof | w/m2.k | 0.18 | 0.18 | 0.18 |
| Existing Glazing | w/m2.k | 3.12 | 3.12 | 3.12 |
| Extension Glazing | w/m2.k | 2.2 | 1.6 | 2.2 |
| Extension Floor | w/m2.k | 0.58 | 0.58 | 0.58 |
| Lights (Existing area) | lm/w | Inference Fluorescent (no details) | Inference Fluorescent (no details) | Inference Fluorescent (no details) |
| Lights (Extension Area) | lm/w | 60 | 80 | 80 |
| Power Factor Correction | % | >0.9 | >0.9 | >0.9 |
| Air permeability | At 50 pa (m3/(h.m2) | 25 (based on EPC convention default for construction age) | 25 (based on EPC convention default for construction age) | 25 (based on EPC convention default for construction age) |
| Aerothermal Heat Pump (existing area) | SCoP | 2 | 2 | 2 |
| Aerothermal Heat Pump (existing area) | SEER | 2 | 2 | 2 |
| Aerothermal Heat Pump (Extension area) | SCoP | 2 | 3 | 3 |
| Aerothermal Heat Pump (Extension area) | SEER | 2 | 4.5 | 4.5 |
| Ventilation (Extension area) | w/(l/s) | 1.6 | 1.6 | 1.6 |
| Ventilation (Extension area) | w/(l/s) | 0.5 | 0.5 | 0.5 |
| DHW (existing plant used for all areas) | Seasonal Efficiency | 65.00% | 65.00% | 65.00% |

# 9 Appendix 3 – District heating network

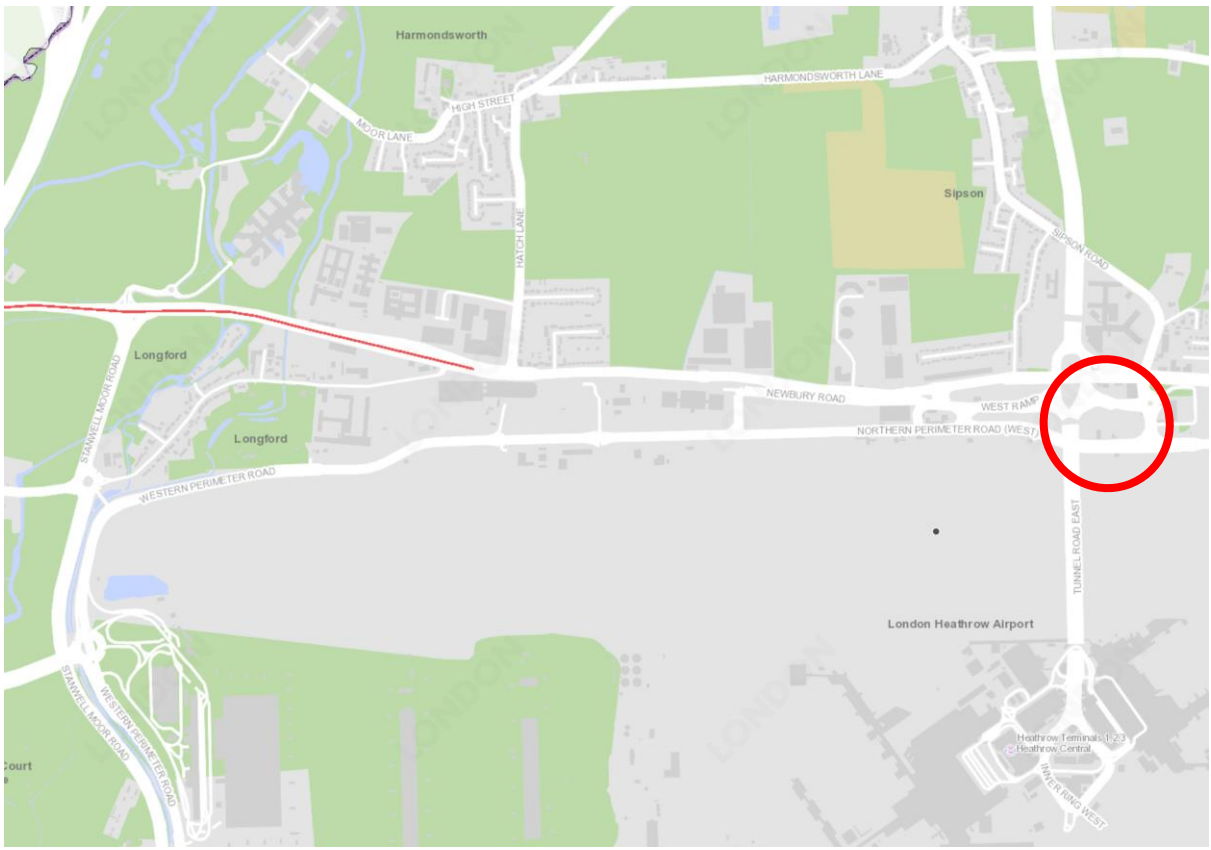


*Figure 5 - London Heat Map of site area*

The above image is from the London heat map[1] which indicates where district heating networks have potential, exist or feasibility studies have marked them as possible. The nearest existing DH network is near Warwick Way is over 13 miles from the site. The potential future network is closer but still approximately 1100 meters from the site. These distances are not suitable for a connection to this building.

[1] http://www.londonheatmap.org.uk/Mapping/