SUSTAINABILITY, ENERGY & OVERHEATING REPORT

at

58A Redington Road
Hampstead
London
NW3 7RS

for

Mr D Belov & Ms G McDougal

Working with: -

TAG Architects

Date: 28th February 2023

Contract: CSL1556
Revision – 0

Prepared by: -

Trevor L Fuller BEng (Hons) CEng MCIBSE MIMechE MINSTR MIET
Director

Con-Serv Ltd
building services & energy engineering

The White Cottage,
6 Station Road,
Loudwater,
Buckinghamshire HP10 9TZ
Tel: 01494 471240
www.con-serv.co.uk
design@con-serv.co.uk

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1. Executive Summary

1.1 Introduction

The building is to be constructed and serviced in such a way as to at least meet the requirements of Building Regulations (as a minimum) and any enhanced performance required by the local Planning Conditions such as Camden Local Plan Policy CC1 – which requires an improvement of 12% over standard minimum compliance level.

As such the approach to the design of the Mechanical and Electrical Services is key in ensuring that the dwelling (when in operation) carries Low Carbon Emissions and Low Energy credentials. This has been demonstrated previously in the SAP calculations submitted which shows an improvement of 12.8% over minimum compliance levels.

1.2 Aim of this Report

This report aims to describe the systems adopted for heating / cooling and ventilation in detail and demonstrate that the approach taken results in considerably lower CO2 emissions than a conventional all gas system.

It will show the approach taken in using passive measures to reduce the overheating risk (in accordance with Camden Local Plan Policy CC2) using the cooling hierarchy.

It will also show that the external units proposed are primarily for low carbon heating and the use of the units for cooling need only be to offset any overheating (both now and in the future years).

1.3 Methodology

In addition to the standard Compliance tools required for Building Regulations, the building has been subjected to Dynamic Thermal Simulation Modelling and assessed in accordance with CIBSE Standard TM59 “Design Methodology for the assessment of overheating risk in homes (2017) – using approved TAS Software by EDSL a summary of the results from which are appended to this report.

Further, the approach to the heating solution for the property has been to keep CO2 emissions to a minimum when compared to the alternative all gas solution. This is demonstrated both in the SAP calculations prepared for Building Regulations compliance and in accordance with Camden Local Plan Policy CC1, but also using “Energy in use” calculations for a more actual representation.

1.4 Conclusion

The results of the Dynamic Thermal Simulation Modelling (to TM59) using present day (2020) and 2050 weather data indicates that despite taking all possible passive measures, in the future overheating of the property (as defined by TM59) will unfortunately be inevitable.
The inclusion of the Air to Water Air Source Heat Pump coupled with the VRF (Air to Air Heat Pump) to provide the heating requirements of the property is very CO_2 efficient and means that the provision of cooling requires NO additional plant.
The proposed overall installation is a very efficient and sustainable method to satisfy the heating (and cooling) requirements of the property for many years to come.

2. Systems Description

2.1 Heating

The primary source of heating is to be an Air Source Heat Pump, located in the rear garden, set within an acoustic enclosure to meet the local Planning requirements for noise levels.
The heat pump will deliver low grade heat directly into a thermal store situated within the basement plant room of the property.
The thermal store will be kept up to a temperature of between 45 and 55 deg.C (depending on the time of year).
From the thermal store, pumped heating circuits will be distributed to the underfloor heating and to towel rails.
The capacity of the proposed Air to Water Air Source Heat Pump is 14 kW. The Heat Loss calculations indicate a maximum design heat loss for the property of 20.35 kW and therefore the heat pump will be sufficient to heat the house until the outside air temperature drops below approximately 4 deg.C.
At lower outside air temperatures, the fan coil units provided can operate as required together with the Air to Water Heat Pump to maintain the desired indoor air temperature (as set by the user). The fan coil units form part of a Variable Refrigerant Flow (VRF) system which operates in both heating and cooling modes. In heating mode the system will be an air to air heat pump with an average seasonal efficiency of 361% (SCOP as stated by the manufacturer).
The outdoor units associated with the VRF installation are also proposed to be in the rear garden set within acoustic enclosures to meet the local Planning requirements for noise levels.

There is also a gas boiler proposed which will provide top up (from 45 deg.C to 60 deg.C) of the Domestic Hot Water. It is also possible for the gas boiler to input heat into the thermal store for periods when the Air Source Heat Pump is being serviced or as an emergency back-up.

The Energy in use calculations appended to this report show the following results: -

	All Gas	Heat Pump (As Designed)	Units
Total Annual Heating & Hot Water Energy (Gross)	70,109	70,109	kWhrs
Total Annual Heating & Hot Water Energy (Nett)	81,321	23,413	kWhrs
Total Annual CO2 Emissions (kg)	**17,078**	**5,343**	**kg**

The above shows the significant reduction in CO2 emissions when adopting the proposed Design compared to an all gas solution.

2.2 Ventilation

The principle of ventilation for the property is a combination of Natural Ventilation (opening windows), Mechanical Extract and room by room Heat Recovery Mechanical & Extract Ventilation.
All Mechanical systems are designed to operate at a background trickle rate 24/7, going to boost level based on occupancy or high humidity.
In this way vitiated and moist air is removed efficiently from the property and replaced with filtered and tempered air in the habitable rooms.
This maintains good internal air quality whilst keeping the heating requirement of the incoming fresh air to a minimum.

In addition to fresh air and extract, there is a ceiling mounted “Punka” style fan in the Master Bedroom and fan coil units (on the VRF System) in all habitable rooms which can run in fan only mode. This serves to increase the air velocity within the rooms they are installed in and assist in reducing the

effect of overheating by increasing moisture evaporation from human bodies therefore improving thermal comfort. This has therefore been included in the Dynamic Thermal Simulation Modelling.

3. Construction Details Summary

The building is proposed to be built to a very high insulation standard with the following thermal characteristics: -

Proposed Construction U Values

Exposed and Ground Floors ..... 0.15 w/m^{2}K
External Walls ..... 0.15 w/m^{2}K
Roof..... 0.12 w/m^{2}K
Windows (in walls) ..... 1.40 w/m^{2}K
Rooflights ..... 1.40 w/m^{2}K
External Doors ..... 1.00 w/m^{2}K

Air Permeability

3.5 m^3/hr/m^2 when pressure tested to 50 Pa (Notional building is 5 m^3/hr/m^2)

Thermal Bridging

Using accredited details (average Y value) – 0.04 w/m^{2}K (non-accredited details = 0.15 w/m^{2}K)

- Ventilation to the property will be by Decentralised Mechanical Supply and Extract ventilation using a combination of Heat Recovery Ventilation units in habitable rooms and extract fans in sanitary accommodation. The system/s to operate on a trickle basis 24/7 going to boost on occupancy or humidity levels.

- Low Energy lighting will be adopted wherever practical throughout the property. It is proposed that 91% of the light fittings will be Low Energy. (The minimum requirement for this is 75%).

4. Passive Measures to prevent Overheating

(based on the Camden Cooling Hierarchy)

4.1 Minimising Heat Gain through Energy Efficiency Design

The following measures have been incorporated into the building design: -

- Low Energy Lighting
  LED lamps are proposed throughout the property wherever possible. A minimum of 91% of the fixed lighting will incorporate low energy LED lamps.
  The intention is to increase this during the final selection process.

- IT / Electrical Services Equipment
  The AV / IT equipment is to be housed within a dedicated enclosure / cupboard which will in itself be ventilated and temperature controlled thereby minimizing the impact it will have on surrounding rooms.
  The main electrical distribution equipment will be housed in the basement where the effect of any heat gain from it will only be useful. The room containing the equipment will itself be ventilated thereby minimizing the effect on surrounding rooms.

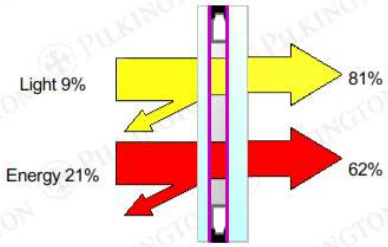
- Key Spaces
  The property front faces approximately North West with the front and back being very short façades. The orientation of this and the adjacent buildings and roadway are fixed and could not be changed. In order to mitigate possible overheating of key spaces, the following areas that either generate heat or may require cooling are situated towards the front (NW) of the property: -
  Spa Room; Plant room; Laundry; Study.

Other key areas such as the Wine Cellar and Kitchen have been located in the basement where they are less subject to solar gain.

- Window Sizes
  The fixed orientation of the property and the small length of the NW and SE facades mean that the window sizes could not practically be very different. In any event it was considered beneficial to have early morning sun at the rear of the property for daylighting and winter sun. The solar transmission through the glazing is limited by the glass specification (see earlier).

- Shading Measures
  The following shading measures have been adopted.
  Study - American shutters, lower half of windows.
  Bedroom 4 - American shutters, full length, with darkening option.
  Bedrooms 2 and 3 - Blackout roller blinds and roman blind combination.
  Play Room - blackout blinds to rooflights and windows.
  Master Bedroom folding solid shutters.

- Glazing Specification
  The glazing specification used has been selected to maximise the transmission of daylight whilst controlling (to some degree) the transmission of Solar Energy.
  The glazing used reduces the solar energy transmitted by some 38% whilst maintaining 81% light transmission.
  This was considered a good compromise as it improves daylight conditions internally, reduces heat gain in the summer whilst maintaining some useful heat gain in the winter to offset heating energy.
  See details below of the glazing used.



DESCRIPTION

Position	Product	Process	Thickness (nominal) mm	Weight kg/m²
Pilkington **Insulight**™	Protect			
Glass 1	Pilkington **K Glass**™ S	Annealed	4.0	
Cavity 1	Krypton (90%)		6.0	
Glass 2	Pilkington **Optilam K Glass**™ S	Laminated	6.4	
Product Code	4KS-6Kr-KS6.4L		16.4	25.38

PERFORMANCE

Light		
Transmittance	LT	81%
	UV %	2%
Reflectance Out	LR out	9%
Reflectance In	LR in	9%

Performance Code	
U_g-value/Light/Energy	1.4 / 81 / 62
Ra	97

The values of some of characteristics are displayed as NPD. This stands for No Performance Determined.

Energy		
Direct Transmittance	ET	53%
Reflectance	ER	21%
Absorptance	EA	26%
Total Transmittance	g	62%
Shading Coefficient Total		0.71
Shading Coefficient Shortwave		0.6
Sound Reduction	R_w (C;C_{tr}) dB	NPD
Thermal Transmittance	W/m²K	1.4

- Green & Brown Roofs and Green Walls
  The following design features have been incorporated:-

  Master Bedroom / Dressing Room – Green Roof on the flat roof which covers the majority of these rooms.

  Basement Stairs from rear garden – Green living wall opposite glazed doors to the Bar Area.

4.2 Natural Cooling

The following measures are incorporated into the building design: -
Openable windows and in all rooms where possible. This includes the top floor bedroom which when open will encourage the stack effect through the adjacent stairwell core to reduce heat building up at the top of the building.

4.3 Thermal Performance

The building is to be well insulated (as described earlier in this report). Accredited details are to be used to limit cold or thermal bridging and hence condensation. The standards proposed exceed the minimum compliance standards required by some margin.
The Design Air Permeability for the building is 3.5 m3/h/m2 which is some 30% lower than the notional building standard within the SAP calculations. This will significantly reduce heat loss through uncontrolled infiltration / ventilation.

5. Dynamic Thermal Simulation

A 3D model has been constructed using TAS Software (by EDSL) which is approved for assessing the performance of buildings under various recognized Standards. The one appropriate for this property is CIBSE TM59 - Design Methodology for the assessment of overheating risk in homes (2017)".

A summary of the results from the study from EDSL is appended to this document. In summary, when assessed using current **CIBSE 2020 Design Summer Year** weather data (High Emissions / 50th percentile) only three rooms fail the criteria included in the Standard (see appended table for full results). These are : -

Room	Allowable Hours > Comfort Range	Actual Hours > Comfort Range
Kitchen / Living Room	59	190
Music / Craft Room	59	67
Study	59	104

Note:- the "Comfort Range" is defined as being when the temperature difference between the room and the external temperature is greater than or equal to 1 deg.K during the Summer months (May to Sept).

The Bedrooms are assessed using an additional criterion which is that the room temperature must not be above 26 deg.C between the hours of 10pm to 7am for more than 1% of the annual hours (which is 32 hours).

Whilst all the bedrooms "pass" the above criteria, the no of hours they exceed the comfort range and 26 deg.C is not insignificant (as below): -

Bedroom	Allowable Hours > Comfort Range	Actual Hours > Comfort Range	Allowable Hours > 26 deg.C	Actual Hours > 26 deg.C
Master Bedroom	110	93	32	7
Bedroom 2	110	78	32	13
Bedroom 3	110	79	32	13
Bedroom 4	110	74	32	11
Bedroom 5	110	72	32	9

As the property and installed services are designed for 30 year plus life, and the evidence is clear that Climate Change is continuing, the building has also been assessed using **CIBSE 2050 Design Summer Year** weather data (Med Emissions / 50th percentile) with the following notable failures (see appended table for full results).

Room	Allowable Hours > Comfort Range	Actual Hours > Comfort Range
Bar / Games Area	59	98
Hobby Room	59	88
Kitchen / Living Room	59	291
Music / Craft Room	59	113
Study	59	165

Bedroom	Allowable Hours > Comfort Range	Actual Hours > Comfort Range	Allowable Hours > 26 deg.C	Actual Hours > 26 deg.C
Master Bedroom	110	165	32	18
Bedroom 2	110	125	32	27
Bedroom 3	110	128	32	26
Bedroom 4	110	126	32	27
Bedroom 5	110	119	32	16

The above shows that the effect of Climate Change will be to increase the period during the summer where most of the habitable rooms would exceed the Criteria as set out in TM59.

The responsible conclusion from this would be to allow the fan coil units on the VRF system to operate in Cooling Mode (see description below) when required to offset the overheating predicted from the above results.

6. Active Cooling

The fan coil units provided as part of the VRF system can operate in heating and cooling mode.
Therefore, to minimise overheating in the property, the fan coil units can be set to automatically maintain a pre-determined maximum temperature on a room by room basis.
Only occupied rooms need have the cooling function operational (determined by the occupant).
When operating, the VRF system has a cooling seasonal efficiency of up to 5.25 (SEER as stated by the manufacturer). Therefore, for every kW of electricity used, 5.25 kW of cooling is achievable.

The overheating study carried out (as section 2.4 and report appended) assumes no active cooling and shows how the property would perform using only Passive measures and natural / mechanical ventilation.

The number of rooms provided with Fan Coil Units together with the capacity required to top up the underfloor heating and the cooling capacity required to offset the peak heat gains has resulted in the selection of the outdoor units proposed. It is not possible to serve the number of rooms required with the heating / cooling necessary with fewer or smaller outdoor units.

In order to reduce the impact of the outdoor units, it is proposed to house them within acoustic enclosures. These enclosures will reduce the noise level to a maximum of 41 dB(A) at 1m from the units which has been assessed by an Acoustic Specialist Consultant as meeting the requirements of the Local Authority in being more than 5 dB below the existing background noise level (measured at the quietest operating time) when predicted at the nearest sensitive façade (closest neighbour's window / door.

Appendix 1 – Heating Energy Calculations

Job ref: -	58a Redington Road - All Gas Solution

LPHW Heating

Variables

Heatloss Coefficient	**0.814**	Total building heatloss (Calculated at 20.35 kW) / temperature difference (25 deg.K)
Design t_{ai}	**21**	Deg.C
Night t_{ai}	**17**	Deg.C
Day Hours	**16**	No.
Internal Gain	**0**	kW
Fresh Air Volume	**0**	m3/s inc heat recovery (if any)
System Efficiency (peak)	**0.9**	Efficiency of radiator or other heating system
Plant Efficiency (peak)	**0.95**	Efficieny of heat generating plant

Frequency of occurrence hours shown below are based on the CIBSE Test Reference Year

Calculation

Ambient range Deg.C	**-8.8 to -5.5**	**-5.5 to -2.2**	**-2.2 to 1.1**	**1.1 to 4.4**	**4.4 to 7.8**	**7.8 to 11.1**	**11.1 to 14.4**	**14.4 to 17.8**	**17.8 to 19**
Hours / Year (CIBSE TRY)	0	15	216	779	1568	1732	1748	1457	371
Average t_{ao}	-7.15	-3.85	-0.55	2.75	6.1	9.45	12.75	16.1	18.4
Heatloss Daytime (kW)	22.91	20.23	17.54	14.86	12.13	9.40	6.72	3.99	2.12
Heatloss Night (kW)	19.66	16.97	14.29	11.60	8.87	6.15	3.46		
Internal Gain - day only kW	0	0	0	0	0	0	0	0	0
Nett Day Loss kW	22.91	20.23	17.54	14.86	12.13	9.40	6.72	3.99	2.12
Annual Day Fabric Loss kWh	0.00	202.28	2526.00	7714.96	12678.43	10855.83	7825.80	3874.26	523.46
Fresh Air Heating Requirement kWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Night Loss kWh	0.00	84.86	1028.57	3012.00	4637.41	3548.12	2015.74	0.00	0.00
Total Loss kWh (Gross)	0.00	287.14	3554.58	10726.96	17315.84	14403.95	9841.53	3874.26	523.46
Energy Consumed (inc effs.)	0.00	335.83	4157.40	12546.15	20252.45	16846.72	11510.56	4531.30	612.23

Annual Heating Gas Energy Consumption	**70793 kWhrs**

Domestic Hot Water	**Gas Boiler**	
Occupants (avg)	6	people
HW used per person	75	litres
Usage per day	450	litres
Temperature raised by	50	deg.C
Energy output required per day	26.25	kWh / day
Days used per year	365	days
Method used for heating water	Gas Boiler	
Energy (Gross)	9581	kWh
System efficiency	0.91	
Energy input required per year	10529	kWh / year
Annual DHW Gas Energy	**10529**	**kWhrs**

Total Annual Gross Energy	**70,109**	**kWhrs**
Total Annual Nett Energy	**81,321**	**kWhrs**
Total Annual CO_2 Emissions	**17,078**	**kg**

Based on SAP 10 Carbon Emission Factor for Natural gas at 0.21 kgCO2 per kWh

Note - Assumptions have been made in the above calculations and therefore it should only be used for comparison purposes with other systems and is not a guide for actual running costs as this will depend on user input and occupancy patterns

Job ref: -	58a Redington Road - Heat Pump Solution (as Designed)

LPHW Heating

Variables

Heatloss Coefficient	**0.814**	Total building heatloss (Calculated at 20.35 kW) / temperature difference (25 deg.K)
Design t_{ai}	**21**	Deg.C
Night t_{ai}	**17**	Deg.C
Day Hours	**16**	No.
Internal Gain	**0**	kW
Fresh Air Volume	**0**	m3/s inc heat recovery (if any)
System Efficiency (peak)	**0.9**	Efficiency of radiator or other heating system
Plant Efficiency (peak)	**As Below**	Efficiency of Air to Water Heat Pump varies with outside temperature
	As Below	Efficiency of Air to Air Heat Pump varies with outside temperature

Frequency of occurrence hours shown below are based on the CIBSE Test Reference Year

Calculation

	Heating by VRF (Air to Air) Boiler				Heating by Air to Water Air Srource Heat Pump				
Ambient range Deg.C	**-8.8 to -5.5**	**-5.5 to -2.2**	**-2.2 to 1.1**	**1.1 to 4.4**	**4.4 to 7.8**	**7.8 to 11.1**	**11.1 to 14.4**	**14.4 to 17.8**	**17.8 to 19**
Hours / Year (CIBSE TRY)	0	15	216	779	1568	1732	1748	1457	371
Average t_{ao}	-7.15	-3.85	-0.55	2.75	6.1	9.45	12.75	16.1	18.4
Heatloss Daytime (kW)	22.91	20.23	17.54	14.86	12.13	9.40	6.72	3.99	2.12
Heatloss Night (kW)	19.66	16.97	14.29	11.60	8.87	6.15	3.46		
Internal Gain - day only kW	0	0	0	0	0	0	0	0	0
Nett Day Loss kW	22.91	20.23	17.54	14.86	12.13	9.40	6.72	3.99	2.12
Annual Day Fabric Loss kWh	0.00	202.28	2526.00	7714.96	12678.43	10855.83	7825.80	3874.26	523.46
Fresh Air Heating Requirement kWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Night Loss kWh	0.00	84.86	1028.57	3012.00	4637.41	3548.12	2015.74	0.00	0.00
Total Loss kWh (Gross)	0.00	287.14	3554.58	10726.96	17315.84	14403.95	9841.53	3874.26	523.46
Air to Water Heat Pump Efficiency					2.80	3.20	3.50	4.00	4.20
Air to Air Heat Pump Efficiency	3.61	3.61	3.61	3.61					
Energy Consumed (inc effs.)	0.00	88.38	1094.05	3301.62	6871.37	5001.37	3124.30	1076.18	138.48

Annual Heating Energy Consumption	**20696 kWhrs**

Domestic Hot Water (From Heat Pump to 35 deg.C		
Occupants (avg)	6	people
HW used per person	75	litres
Usage per day	450	litres
Temperature raised by	25	deg.C
Energy output required per day	13.125	kWh / day
Days used per year	365	days
Method used for heating water	ASHP	
Energy (Gross)	4791	kWh
System efficiency	2.9	Annual Avg
Energy input required per year	1651.94	kWh / year
Annual DHW Elec Energy (ASHP)	**1652**	**kWhrs**

Domestic Hot Water (Top up to 60 deg.C		
Occupants (avg)	6	people
HW used per person	75	litres
Usage per day	450	litres
Temperature raised by	25	deg.C
Energy output required per day	13.125	kWh / day
Days used per year	365	days
Method used for heating water	Gas Boiler	
Energy (Gross)	4791	kWh
System efficiency	0.91	
Energy input required per year	5264.42	kWh / year
Annual DHW Gas Energy (Boiler)	**674**	**kWhrs**

Total Annual Gross Energy	**70,109**	**kWhrs**
Total Annual Nett Energy	**23,022**	**kWhrs**
Total Annual CO_2 Emissions	**5,245**	**kg**

Based on SAP 10 Carbon Emission Factor for Natural gas at 0.21 kgCO2 per kWh & Grid El

Note - Assumptions have been made in the above calculations and therefore it should only be used for comparison purposes with other systems and is not a guide for actual running costs as this will depend on user input and occupancy patterns

Appendix 2 – Dynamic Thermal Simulation Modelling (to TM59) results

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): 58a Reddington Road_London_LHR_DSY1_2020High50_London_LHR_DSY1_2020High50.tbd

Simulation Results File (.tsd): 58a Reddington Road_London_LHR_DSY1_2020High50_London_LHR_DSY1_2020High50.tsd

Date: 28 February 2023

Building Category: Category II

Domestic Overheating (CIBSE TM59)

Natural Ventilation Overheating Results

Zone Name	Room Use	Wind Speed (m/s)	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms .	Result
Bar/Games area	Living Room / Kitchen	0.5	1989	59	58	N/A	N/A	N/A	Pass
Bathroom 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Bathroom 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Bedroom 2	Bedroom	0.5	3672	110	78	3285	32	13	Pass
Bedroom 3	Bedroom	0.5	3672	110	79	3285	32	13	Pass
Bedroom 4	Bedroom	0.5	3672	110	74	3285	32	11	Pass
Bedroom 5	Bedroom	0.5	3672	110	72	3285	32	9	Pass
Corridor by master bedroom	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Entrance Hall	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 5	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 6	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hobby Room	Living Room / Kitchen	0.5	1989	59	57	N/A	N/A	N/A	Pass
Kitchen/Living	Living Room / Kitchen	0.5	1989	59	190	N/A	N/A	N/A	Fail
Laundry 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Laundry 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Master bathroom	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Master Bedroom	Bedroom	0.8	3672	110	93	3285	32	7	Pass
Music/Craft Room	Living Room / Kitchen	0.5	1989	59	67	N/A	N/A	N/A	Fail
Study	Living Room / Kitchen	0.5	1989	59	104	N/A	N/A	N/A	Fail
WC 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
WC 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
WC 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass

*Zone names that have an orange coloured font are bedrooms which do not have 24/7 365 days a year occupancy, as per the TM59 guidance.

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): 58a Reddington Road_London_LHR_DSY1_2020High50_London_LHR_DSY1_2050Med50.tbd

Simulation Results File (.tsd): 58a Reddington Road_London_LHR_DSY1_2020High50_London_LHR_DSY1_2050Med50.tsd

Date: 28 February 2023

Building Category: Category II

Domestic Overheating (CIBSE TM59)

Natural Ventilation Overheating Results

Zone Name	Room Use	Wind Speed (m/s)	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms .	Result
Bar/Games area	Living Room / Kitchen	0.5	1989	59	98	N/A	N/A	N/A	Fail
Bathroom 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Bathroom 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Bedroom 2	Bedroom	0.5	3672	110	125	3285	32	27	Fail
Bedroom 3	Bedroom	0.5	3672	110	128	3285	32	26	Fail
Bedroom 4	Bedroom	0.5	3672	110	126	3285	32	27	Fail
Bedroom 5	Bedroom	0.5	3672	110	119	3285	32	16	Fail
Corridor by master bedroom	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Eaves storage 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Entrance Hall	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 5	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hall 6	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Hobby Room	Living Room / Kitchen	0.5	1989	59	88	N/A	N/A	N/A	Fail
Kitchen/Living	Living Room / Kitchen	0.5	1989	59	291	N/A	N/A	N/A	Fail
Laundry 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Laundry 2	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Master bathroom	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
Master Bedroom	Bedroom	0.8	3672	110	165	3285	32	18	Fail
Music/Craft Room	Living Room / Kitchen	0.5	1989	59	113	N/A	N/A	N/A	Fail
Study	Living Room / Kitchen	0.5	1989	59	165	N/A	N/A	N/A	Fail
WC 1	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
WC 3	Other	0.1	0	0	0	N/A	N/A	N/A	Pass
WC 4	Other	0.1	0	0	0	N/A	N/A	N/A	Pass

*Zone names that have an orange coloured font are bedrooms which do not have 24/7 365 days a year occupancy, as per the TM59 guidance.