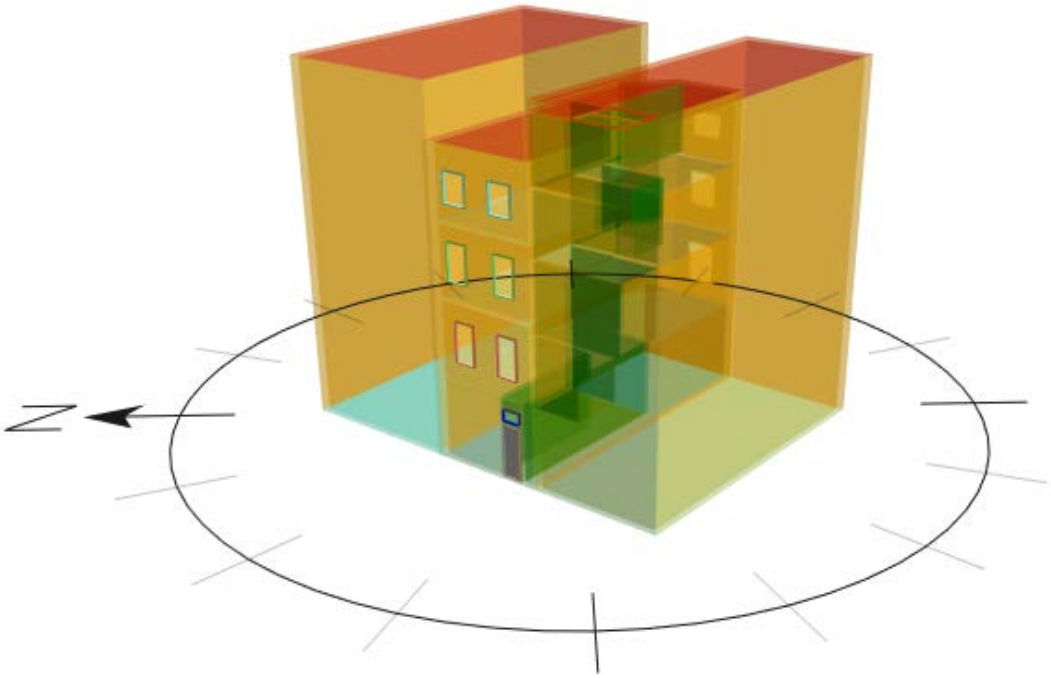
Building Performance & Thermal Comfort Report

14 Monmouth Street, London



Client: Soho Homes UK Ltd

Dated: 19th May 2020

Issue: v2

Report by: Tony Bainbridge, *I.Eng, MIET, MEI, ACIBSE, LCG*

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1. Introduction

McCarthy Bainbridge Ltd were appointed in April 2020 to review and thermally model the four-storey terraced property at 14 Monmouth Street London to ascertain the thermal conditions and performance of the property.

The building is a Grade 2 listed dwelling, with access only on the ground floor, leading to three occupied floors and access to a shared roof terrace.
The property has a central staircase leading from ground floor up to the roof terrace rooflight. Doors of the landing of each floor lead into the various bedrooms and living spaces of the property.

Either side of the property are buildings approximately 2m higher than the dwelling roof height. On the right side is a commercial property and to the left there appears to be a residence, with a shared door onto the terrace area. The door is not fed from a sleeping area within the property.

Being a listed property has resulted in the need to reinstate period features, of which some may have a detrimental effect on the thermal conditions within the property and this report is designed as such to determine thermal performance and to identify if comfort cooling is required to enable the dwelling to meet the recommended temperature control levels.

2. Planning and Development requirement

This report has been compiled to confirm that the design proposal identifies why comfort cooling is required to the property, and that it can be installed to meet the requirements and conditions relating to noise and aesthetics and contained within the standards below:

Camden Local Plan 2017 (CC2):

6.99 Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions. Air conditioning will only be permitted where it is demonstrated that there is a clear need for it after other measures have been considered (Policy CC2 Adapting to climate change). Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development.

8.39 The Council will discourage the use of air conditioning and excessive mechanical plant. In addition to increasing the demand for energy, air conditioning and plant equipment expel heat from a building making the local micro-climate hotter. Where the use of this equipment is considered acceptable by the Council, for example where sterile internal air is required, we will expect developments to provide an appropriate level of mitigation towards cooling the local environment. Cooling measures could be passive or active, such as introducing planting in the public realm, green walls and roofs or other measures as recommended in the Mayor's Sustainable construction and design supplementary planning document.

8.41 All new developments will be expected to submit a statement demonstrating how the London Plan's 'cooling hierarchy' has informed the building design. Any development that is likely to be at risk of overheating (for example due to large expanses of south or south west facing glazing) will be required to complete dynamic thermal modelling to demonstrate that any risk of overheating has been mitigated.

8.42 Active cooling (air conditioning) will only be permitted where dynamic thermal modelling demonstrates there is a clear need for it after all of the preferred measures are incorporated in line with the cooling hierarchy.

8.43 The cooling hierarchy includes:

a) Minimise internal heat generation through energy efficient design;
b) Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
c) Manage the heat within the building through exposed internal thermal mass and high ceilings;
d) Passive ventilation;
e) Mechanical ventilation;
f) Active cooling.

Camden Planning Guidance 2019:

3.14 Local Plan Policy CC2 discourages active cooling (air conditioning).
Air conditioning will only be permitted where thermal modelling demonstrates a clear need for it after all preferred measures are incorporated in line with the London Plan cooling hierarchy (please see Chapter 10 for further information on overheating and the cooling hierarchy). The following passive measures should be considered first. If active cooling is unavoidable, applicants need to identify the cooling requirement and provide details of the efficiency of the system.

Seven Dials Conservation Area Statement:

p.25 Design and alterations to buildings
Most recent development has been designed to infill, however some has been more successful than others in enhancing the Conservation Area. Where new development is thought to have harmed the character or appearance of the area it has usually been caused by one or more of the following reasons:

- Introduction of prominent air handling units/ducting

SD23 The erection of all external ventilation ducts and air handling equipment will require planning permission from the Council.
In assessing applications the Council will be concerned about the siting of the equipment, particularly in visually sensitive locations and in the proximity of residential accommodation, to ensure that local amenity is protected. (refer UDP: EN7).

SD24 The Council will require full details of mechanical plant and equipment for all A3 (change of use to restaurant) applications.

3. Summary & Recommendations

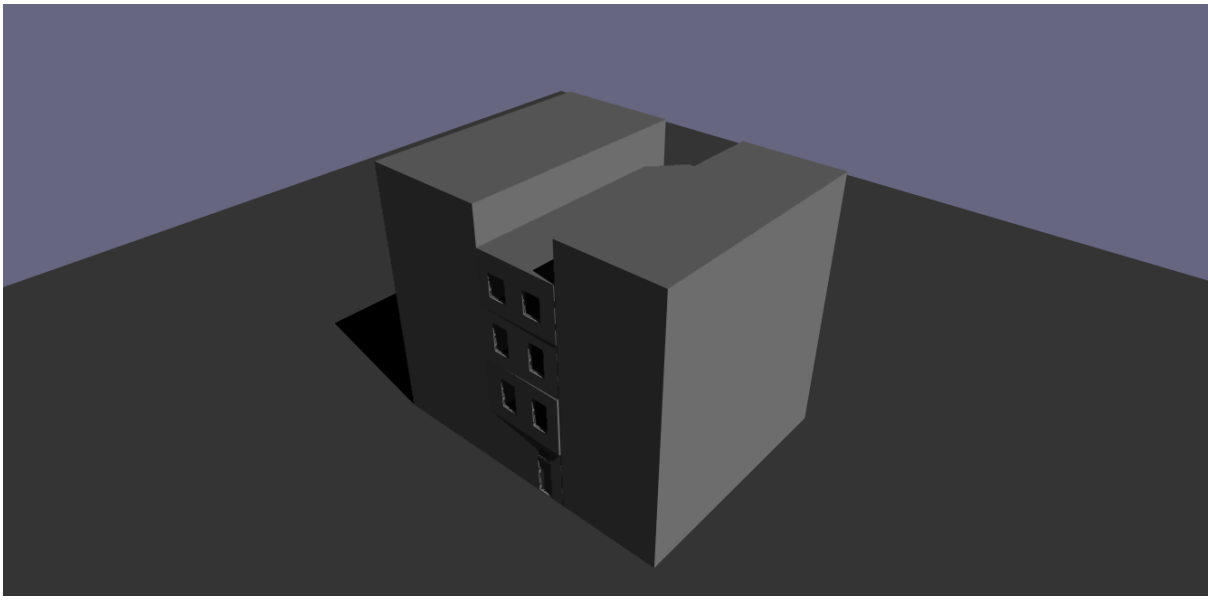
Based on the thermal modelling of the building and the noted results as shown within this report, it is our opinion that the property will require comfort cooling to be able to offer correct environmental temperatures as recommended by CIBSE.

Whilst efforts have been made to determine if temperature control could be offered by other means, the layout of the building prohibits many of those opportunities, and the listed nature of it discounts most other remaining options.

Being a listed property, the ability to run natural ventilation ducts from spaces to external is limited and as such needs to be limited to being used solely in areas requiring ventilation for Building Regulation Compliance.

Whilst opening windows, is certainly an option the local noise levels and potential pollution levels, would affect the residents comfort levels, and as such is likely to be of limited benefit.

The installation can in our opinion be undertaken in such a method that it would have minimal affects of the building aesthetic and importantly without affect on the adjacent property.



4. Base Calculation Data

Building Fabrics:

External Wall	-	Exposed external wall (340mm) uninsulated brick u-value: 1.57 w/m².°C
Roof	-	Flat Roof with insulation between 150m timber rafters u-value: 0.246 w/m².°C
Floor	-	Solid Ground Floor Uninsulated under timber joist suspened floor. u-value: 1.113 w/m².°C
Glazing	-	Single glazed 6mm panes in sash windows with Wooden frames u-value: 5.682 w/m².°C G-Value: 0.816
Opening Rooflight	-	Double Glazed BR Compliant opening Rooflight u-value: 1.724 w/m².°C G-Value: 0.548

Ambient Noise Level:

Based on External Noise Assessment report by Hann Tucker Associates dated 30th April 2020 Ref: 27914/PNA1.

Ambient noise level was measured at the front (position 1) and rear roof (position2) areas. Recorded levels on the roof were as follows:

	Day	**Night**
Position 1	61dBA	51dBA
Position 2	52dBA	47dBA

Front Façade sound levels were recorded with the windows open and an ambient noise level of 61 dBA was recorded (in line with daytime measurement of position1).

As noted within the report BS8233:2014 has a recommended sound level of 35dBA, which means that if single glazed windows are utilised within the property that the sound level will be exceeded by circa +20dBA.

The proximity of the Monmouth Street roadway, and noting many properties are commercial businesses resulting in higher than average commercial vehicle traffic flow with increased pollution and noise levels, would seem it is quite likely that the residents may not choose to have the windows open to offer natural ventilation.

5. Software Details

EDSL TAS Engineering Software v9.4.4 was used to thermally model the building and the fabric performance

6. Weather Data

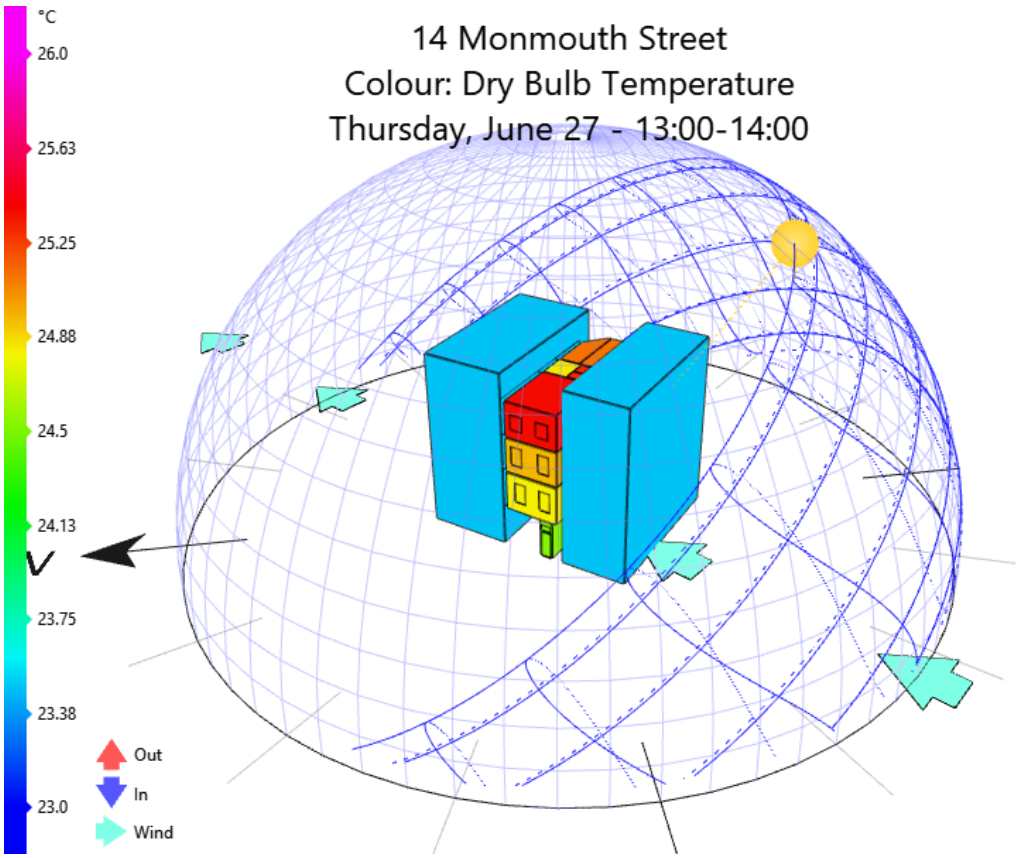
CIBSE Weather Data file 2020 (50%).DSY was used within the CIBSE TM59 Overheating review with modelling using London 2005.TSY Files

7. Building Performance Overview

As can be seen from the TM59 overheating report all habitable rooms suffer from risk of overheating.

This has been caused primarily by the layout of the building failing to allow cross ventilation through the dwelling and the poor thermal control offered by the building fabric and glazing.

As can be seen from the thermal modelling at 13:00-14:00 on day 177, large elements of the property reach quite high temperature and the proximity of the adjoining buildings only offers partial benefit from typical wind flow direction when available.



The ambient noise levels, and risk of pollution particularly on the front façade does not allow localised natural ventilation by opening windows to be used at most peak temperature periods which would lead to determination that property needs comfort cooling to be provided to be able to meet the CIBSE recommended comfort levels.

The use of ASHP/AC to heat and cool primary living spaces within the property will help improve the energy efficiency of what is an inefficient building envelope.

We are aware the client is trying to make improvement where possible, but being a listed property that desire has to be balanced with the need to limit any unnecessary disruption to the buildings aesthetic.

Noise level is obvioulsy a concern especially with the adjoining domestic property, but the siting and screening of the external condenser unit on the roof, could be done so as to minimise any potential noise nuisance to them.

As noted within the noise survey the noise level at position 2 during the day are 52dbA during the day and 47dBA at night. The equipment being reviewed at the moment for use within the project has sound level of 53dbA @ 1m which would be reduced by screening, or by using an acoustic housing by circa 10dBA bringing sound level down to below that of the current ambient level.

Night equipment sound levels can be further reduced by setting the equipment to have night time set-back which ramps down the output of the equipment in cooler periods and as a result reduces the sound level to approximately 43 dBA which with screening or acoustic enclosure would reduce that further.

Appendices

Appendix A	CIBSE TM59 (Domestic) Overheating Report
Appendix B	Peak Loads (Heating & Cooling)
Appendix C	Percentile Loads
Appendix D	Part L Criteria 3 Solar Gain Check

Appendix A

CIBSE TM59 (Domestic) Overheating Report

Building Designer File (.tbd):	14 Monmouth Street_London_LHR_DSY1_2020High50.tbd
Simulation Results File (.tsd):	14 Monmouth Street_London_LHR_DSY1_2020High50.tsd
Building Category:	Category II

Natural Ventilation Overheating Results

Zone Name	Room Use	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
Adjacent Buildings	Other	3672	110	0	N/A	N/A	N/A	Pass
Bedroom 1	Bedroom	3672	110	520	3285	32	619	Fail
Bedroom 2	Bedroom	3672	110	1555	3285	32	871	Fail
Bedroom 3	Bedroom	3672	110	572	3285	32	567	Fail
Entrance/Hallway	Other	3672	110	3396	N/A	N/A	N/A	Fail
Landing 1st	Other	3672	110	3360	N/A	N/A	N/A	Fail
Landing 2	Other	3672	110	3448	N/A	N/A	N/A	Fail
Landing 3	Other	3672	110	3344	N/A	N/A	N/A	Fail
Living Room	Living Room / Kitchen	1989	59	464	N/A	N/A	N/A	Fail
Stairs	Other	3672	110	3325	N/A	N/A	N/A	Fail

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

Appendix B

Peak Loads (Heating & Cooling)

Peak Loads

Heating

Peak Load: 10.12 kW
Peak Load per unit Area: 64.66 W/m²
Day: 60
Hour: 6
Heating Design Margin: 0.00%

#	Zone	Peak Load kW	Peak Load per unit Area W/m²	Day	Hour	Air Temp °C	Res Temp °C	Factor
1	Entrance/Hallway	0.60	74.96	61	6	18.00	15.97	1
2	Landing 1st	0.35	82.87	60	6	18.00	15.38	1
3	Living Room	2.36	114.69	59	15	21.00	16.55	1
4	Kitchen	1.50	78.73	60	6	18.00	14.72	1
5	Landing 2	0.32	75.69	58	18	18.00	15.35	1
6	Bedroom 1	1.41	69.20	58	21	18.00	14.80	1
7	Bathroom	0.38	75.79	59	18	18.00	15.66	1
8	Bedroom 2	1.11	83.52	58	21	18.00	14.92	1
9	Landing 3	0.45	91.77	61	6	18.00	15.06	1
10	Bedroom 3	1.53	75.37	57	21	18.00	14.67	1
11	Bathroom 2	1.72	93.65	60	6	18.00	14.99	1
12	Stairs	1.29	72.02	61	6	18.00	15.58	1

Peak Loads

Cooling

Peak Load: 1.30 kW
Peak Load per unit Area: 8.33 W/m²
Day: 188
Hour: 9
Cooling Design Margin: 0.00%

#	Zone	Peak Load kW	Peak Load per unit Area W/m²	Day	Hour	Air Temp °C	Res Temp °C	Factor
1	Entrance/Hallway	0.00	0.00	0	0	0.00	0.00	1
2	Landing 1st	0.01	2.74	231	16	25.00	24.68	1
3	Living Room	0.28	13.79	187	19	25.00	25.42	1
4	Kitchen	0.73	38.27	231	10	25.00	25.54	1
5	Landing 2	0.02	3.88	188	16	25.00	24.89	1
6	Bedroom 1	0.07	3.63	232	9	25.00	24.87	1
7	Bathroom	0.04	7.69	233	10	25.00	24.99	1
8	Bedroom 2	0.15	11.22	231	9	25.00	25.24	1
9	Landing 3	0.36	72.00	210	11	25.00	27.98	1
10	Bedroom 3	0.10	5.01	188	9	25.00	24.95	1
11	Bathroom 2	0.27	14.78	231	10	25.00	25.29	1
12	Stairs	0.19	10.32	188	14	25.00	25.20	1

Appendix C

Percentile Loads

Percentile Loads

Report Parameters

Reported Load: Heating Load
Analysed Hours: All hours between the start and end day
Start Day: 1
End Day: 365
Date: Tuesday, 12 May, 2020

Results Table

	Percentile (loads displayed in W)										
Zone Name	**100th**	**90th**	**80th**	**70th**	**60th**	**50th**	**40th**	**30th**	**20th**	**10th**	**Analysed Hours**
Bathroom	383.80	230.55	185.77	156.84	136.63	117.46	99.19	76.08	52.84	24.90	2474
Bathroom 2	1719.34	1056.06	850.43	715.88	597.58	484.25	336.51	218.61	128.49	59.59	3094
Bedroom 1	1414.21	940.48	822.05	725.56	634.56	499.65	372.69	244.49	137.30	65.41	3744
Bedroom 2	1112.59	746.12	652.37	579.46	506.64	404.75	305.42	198.57	119.86	59.45	3582
Bedroom 3	1529.62	979.77	843.82	741.39	642.13	501.62	362.74	249.57	149.12	64.89	3881
Entrance/Hallway	600.04	322.66	237.67	198.31	173.88	155.42	134.75	108.10	80.88	52.54	3121
Kitchen	1500.30	946.56	720.35	550.27	433.80	320.62	222.10	143.14	87.26	43.19	2629
Landing 1st	351.27	205.36	173.63	153.02	134.83	117.91	95.62	71.71	51.99	27.69	3090
Landing 2	322.84	187.18	159.91	141.08	125.21	109.96	88.56	67.15	47.85	25.74	3099
Landing 3	454.72	268.89	227.85	198.23	171.80	147.58	121.63	90.32	61.36	33.57	2934
Living Room	2360.57	1416.58	1217.60	1050.08	852.41	611.53	350.29	170.70	89.75	39.40	3398
Stairs	1293.51	738.87	602.44	533.56	487.61	428.45	359.98	270.44	190.03	93.60	3052

***Loads equal to zero are ignored and not counted as an analysed hour.**

Appendix D

Part L Criteria 3 Solar Gain Check

Part L - Criterion 3 - Solar Gain Check

Weather File: London TRY

Zone Name	Lighting Type	Facade Length (m)	Floor Area (m²)	Actual Solar Gain (kWh)	Solar Gain Limit (kWh)	Solar Gain (%)	Internal Blinds	Solar Gain Check	Daylight Factor (%)
Entrance/Hallway	Side Lit	0.91	8.01	74.24	238.17	-68.83	False	False	0
Landing 1st	Side Lit	2.17	4.24	4.94	568.40	-99.13	False	False	0
Living Room	Side Lit	9.16	20.58	661.18	2397.79	-72.43	False	True	1.48
Kitchen	Side Lit	9.82	19.06	596.66	2570.48	-76.79	False	True	1.03
Landing 2	Side Lit	2.20	4.27	4.47	575.81	-99.22	False	False	0
Bedroom 1	Side Lit	9.09	20.44	620.6	2378.47	-73.91	False	True	1.59
Bathroom	Side Lit	0.00	5.06	0	174.15	-100.00	False	False	0
Bedroom 2	Side Lit	9.76	13.32	494.38	2554.17	-80.64	False	True	1.47
Landing 3	Side Lit	2.22	4.96	908.2	580.91	56.34	False	False	21.49
Bedroom 3	Side Lit	9.07	20.29	548.6	2372.90	-76.88	False	True	0.69
Bathroom 2	Side Lit	9.62	18.36	386.49	2517.01	-84.64	False	False	0.41
Stairs	Side Lit	0.00	17.96	270.91	617.69	-56.14	False	False	1.35