



THERMAL COMFORT ASSESSMENT

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Executive Summary

Noise from Palatine Road has been assessed and considered to be, at times, above the acceptable comfort levels. Keeping windows closed to block out noise may impact on summertime overheating in rooms facing east / Palatine Road.

Dynamic simulation software has been used to assess the risk of overheating, in order to advise the design and provide alternatives to openable windows.

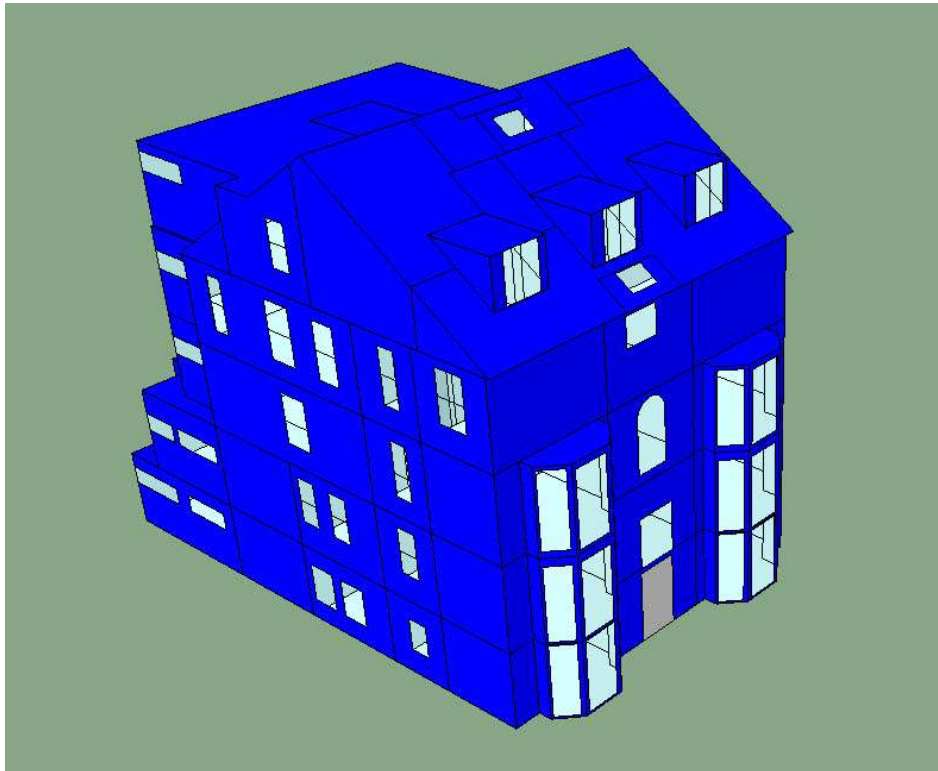
The assessment was carried out using IES Virtual Environment, based on drawings and information provided.

Initial results showed all of the rooms that would experience road noise would overheat if windows remained closed. To combat this, the glazing performance was altered to slightly reduce solar gain and mechanical ventilation introduced to provide fresh air. With the amended specification, all rooms pass the overheating criteria set out in CIBSE TM59.

Introduction

The following calculations were undertaken using IES Virtual Environment ApacheSim, a whole building energy simulation programme. Weather data is taken from the CIBSE DSY1 weather file for Manchester.

The analysis summarised herein has been undertaken to confirm if the occupied areas of the building comply with CIBSE TM59 – Design methodology for the assessment of overheating risk in homes.



Methodology

CIBSE TM59 offers criteria for predominantly naturally ventilated dwellings, which are as follows:

- Criterion 1 of TM52 should also be met for domestic style living rooms, kitchens and bedrooms. Limiting the number of hours that the actual operative temperature can exceed the threshold comfort temperature (upper limit range of comfort temperature) by 1°K or more during the occupied hours of a typical non-heating season (1 May to 30 September).

- Operative temperature shall not exceed 26°C for more than 1% of annual hours, between the hours of 10pm and 7am. 1% of the hours during this time frame annually equates to 32 hours, thus 33 or more hours above 26°C would be recorded as a fail.
- Communal corridors should not exceed an operative temperature of 28°C for more than 3% of the annual hours.

For predominantly mechanically ventilated spaces, the following criterion applies:

- All occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours.

Model information

Geometry

No site visit has been undertaken by Up Energy. Drawings have been supplied by Simon James ARQ and these have been used to create the 3D model.

Building fabric

Construction information has been supplied for the proposed new build elements as well as the existing fabric. The building has been modelled using the following performance: -

Element	U value (W/m ² K)	Cm value (kJ/(m ² K))
New wall	0.27	129
Upgraded wall	0.3	12
Window	1.6	-
Window (lower g-value)	1.6	-
Extension floor	0.22	85
Existing floor	0.58	36
2013 Internal Ceiling/Floor	1.09	95
2013 Internal Partition	1.79	8.75
Roof	0.18	98.75
Rooflight	2.3	-

Window and glazed doors have been modelled from the plans and schedules supplied. Thermal and solar performance figures used are: -

Type	U value (W/m ² K)	G value	Location
Window	1.60	0.63	Majority
Window (lower g-value)	1.60	0.53	FF.5 bed 2, FF.6 bed 1, FF.6 bed 2, G.3 bed 2, G.4 bed 2, LG.1 bed 2, SF.8 bed 2, TF.9 bed 1, TF.9 bed 2
Rooflight	2.30	0.55	All

The building has been modelled to include outside air infiltration of 0.25 air changes per hour in the new build elements and 0.70 air changes per hour in the original building area. These values have been taken from CIBSE guidance.

Ventilation strategy

In the rooms where there is a risk of overheating, due to windows remaining closed, mechanical supply ventilation has been incorporated at the following rates:

Room	Ventilation type	Flow rate
FF.5 bed 2, FF.6 bed 1, FF.6 bed 2, G.3 bed 2, G.4 bed 2, LG.1 bed 2, SF.8 bed 2, TF.9 bed 1, TF.9 bed 2	External supply air	3.75 ACH

Window openings in low noise risk rooms have been modelled to open to an angle of 20°, where hinged and fully openable, where sash types are used. These rooms have been included in the modelling to accurately represent the likely temperature, and therefore heat transfer internally, of adjacent rooms.

Window opening profiles (in appropriate rooms) follow the guidance in TM59 for bedrooms and living spaces.

Occupancy profiles

Occupancy profiles are set up as required by TM59.

Internal gains

Lighting

Gains have been set at 2.5W/m² and profiled as per TM59 guidance.

People

Gains have been set at 75W sensible and 55W latent, per person, and profiled as per TM59 guidance.

Equipment

Gains have been set and profiled as per TM59 guidance.

Results

Overheating

Standards for existing buildings are slightly more lenient than those for new build. The table below details all assessed rooms. For mechanically ventilated spaces, there is one criterion to pass.

Room Name	% Hours Top > 26
FF.6 bed 2	1.31
FF.5 bed 2	1.97
FF.6 bed 1	2.84
G.3 bed 2	1.91
G.4 bed 2	2.92
LG.1 bed 2	1.84
SF.8 bed 2	0.71
TF.9 bed 1	0.61
TF.9 bed 2	0.94

