OVERHEATING ASSESSMENT

28 AVENUE ROAD, ST JOHNS WOOD, NW8

ME7 LTD

Jorand House, Bebington Close
Billericay, Essex
CM12 0DT

ASSESSMENT INFORMATION

Prepared for:

Prepared by:
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Date: Date:
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Reviewed by:

DISCLAIMER

The findings, conclusions and recommendations of this report are based on the information supplied. ME7 Ltd disclaims responsibility in respect of incorrect information imparted to them or for the actual performance of any of the building services installations.
This Report is prepared for the use of 28 Avenue Road; a duty of care is not owed to other parties.

INTRODUCTION

BACKGROUND

ME7 Ltd have been appointed to provide an Overheating Assessment for the proposed development.
This is to ascertain a requirement for mechanical cooling in habitable areas of the proposed house.

DESCRIPTION OF THE SITE

Construction of a new 11-bedroom house arranged over basement, ground, 1st and 2nd floor.

SUMMARY

To fully comply with London Plan Policy 5.9 and Camden Plan Policy CC2, a dynamic thermal simulation has been carried out to ascertain a need for mechanical cooling. The dynamic simulation was carried out for all bedrooms and ground floor Kitchen/Dining/Reception/Library areas. After implementing all previous steps in the cooling hierarchy, most of the tested rooms comply with the overheating criteria under the least stringent weather data DSY1. However under more extreme design weather files DSY2 and DSY3 majority of the tested rooms don't achieve thermal comfort criteria required by CIBSE TM59. Mechanical cooling is therefore proposed for the building.

RESIDENTIAL CRITERIA

CIBSE TM59

Compliance is generally based on passing both of the following two criteria:

Criterion 1a: Hours of Exceedence (He):
For living rooms, kitchens and bedrooms:
the number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours.

Criterion 1b:
For bedrooms only:
to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C is recorded as a fail).

DYNAMIC SIMULATIONS

The analysis was carried out using DesignBuilder v6 - EnergyPlus v8 engine. The 3D model is based on the architectural drawings and specifications.

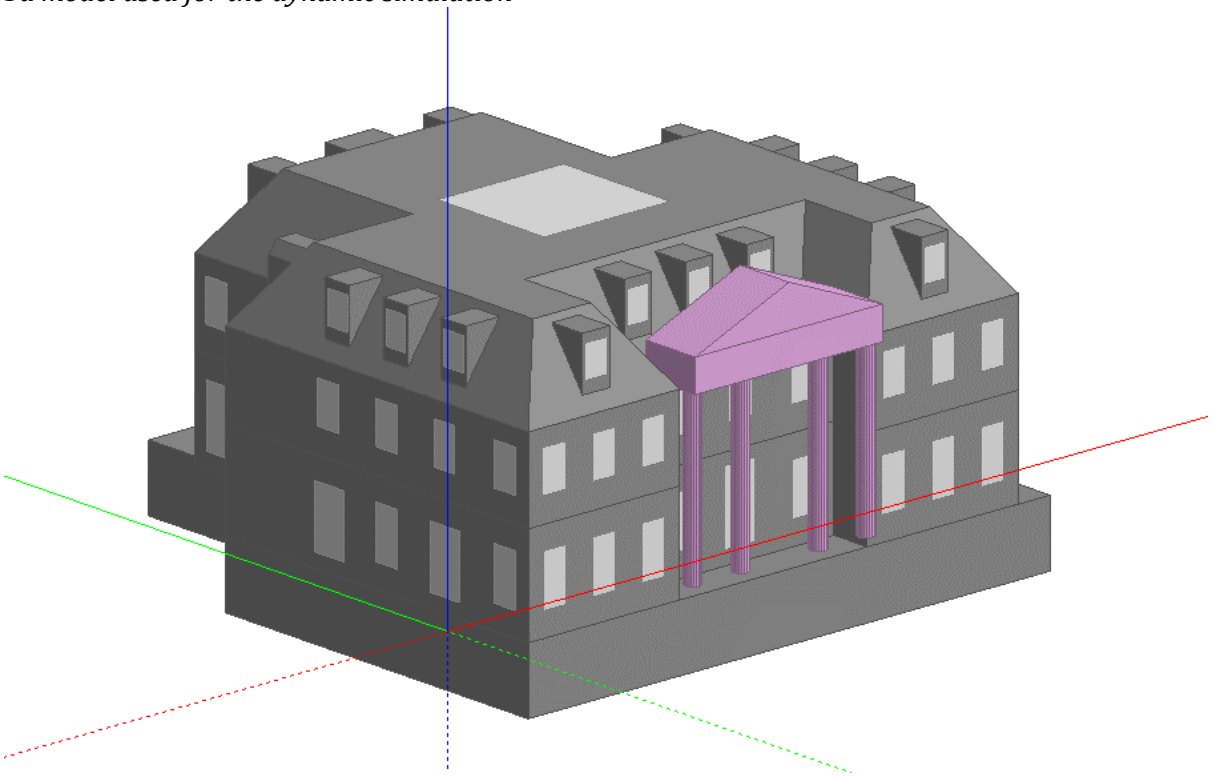
Thermal mass and U-values used in the dynamic simulation are based on architect specification, as shown in Table 3.

Weather data sets used for the simulation are chosen in line with CIBSE TM59 and GLA Energy Assessment Guidance:

- DSY1 (Design Summer Year) for the 2020s, high emissions, 50% percentile scenario
- DSY2 – 2003: a year with a very intense single warm spell.

- DSY3 – 1976: a year with a prolonged period of sustained warmth.

3d model used for the dynamic simulation



INTERNAL DESIGN CONDITIONS

Occupancy in the main Family Kitchen / Living / Dining area is set to 12 people, formal dining 12 people, formal living 6 people and library 3 people. All other internal design conditions are modelled as per CIBSE TM59 Table 2:

Double bedroom	2 people at 70% gains from 11 pm to 8 am	Peak load of 80 W from 8 am to 11 pm
	2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm	Base load of 10 W during the sleeping hours
	1 person at full gain in the bedroom from 9 am to 10 pm	

Lighting is modelled as 2 W/m2 from 6pm to 11pm.

COOLING HIERARCHY

SOLAR SHADING

All windows and glazed doors are modelled with internal blinds, which are modelled as closed when the solar irradiance exceeds 120 W/m2

THERMAL MASS

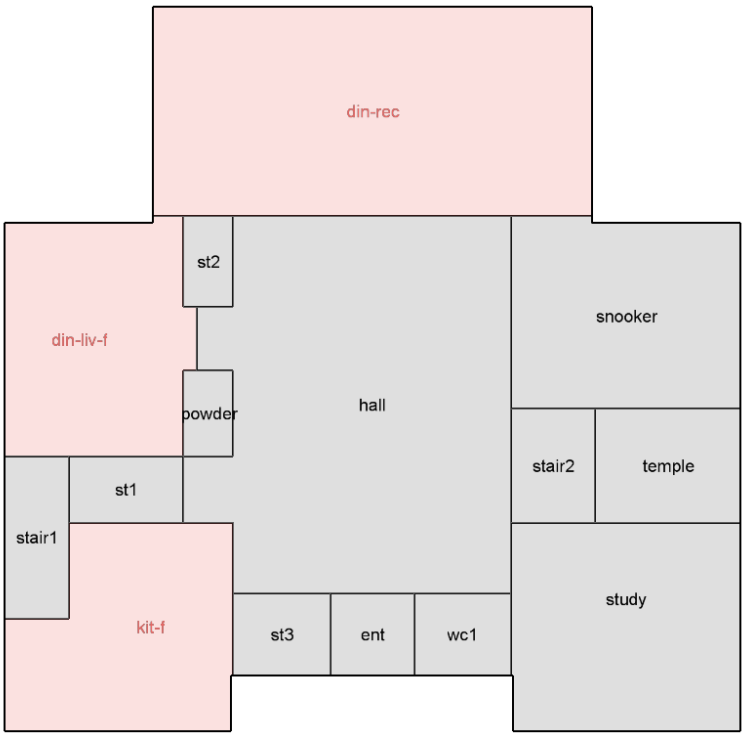
Thermal mass is included in the model by allowing for masonry external walls, partitions and concrete floor slabs

VENTILATION

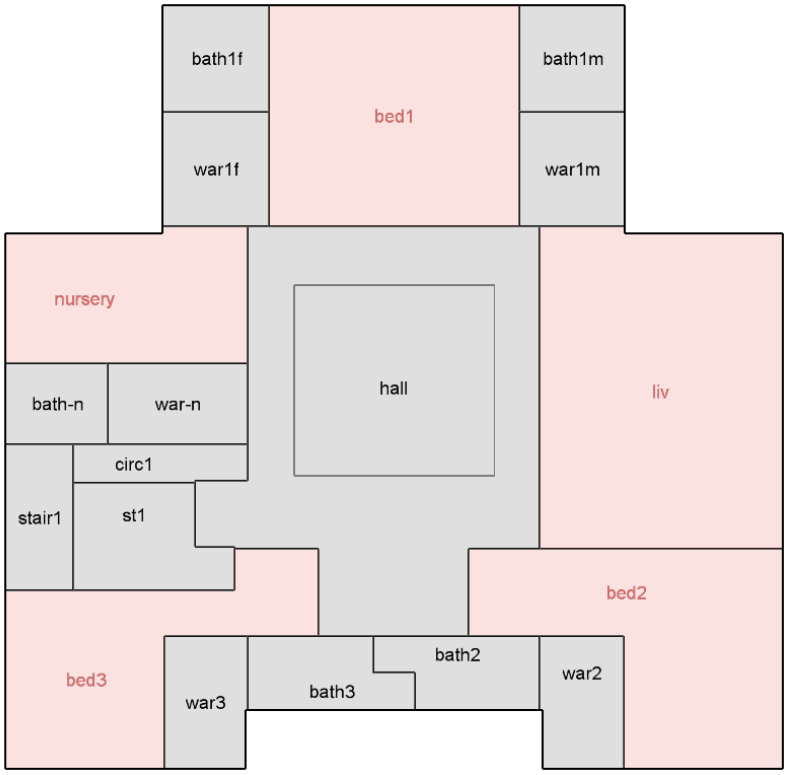
Ventilation strategy has been chosen in line with London Plan Cooling hierarchy.

Natural ventilation through openable windows is adopded and used in the dynamic simulations, with all windows open in the model, as per CIBSE TM59 guidance. The openability of windows is modelled as per architect drawings (e.g. sliding sash or side hung windows and glazed doors)

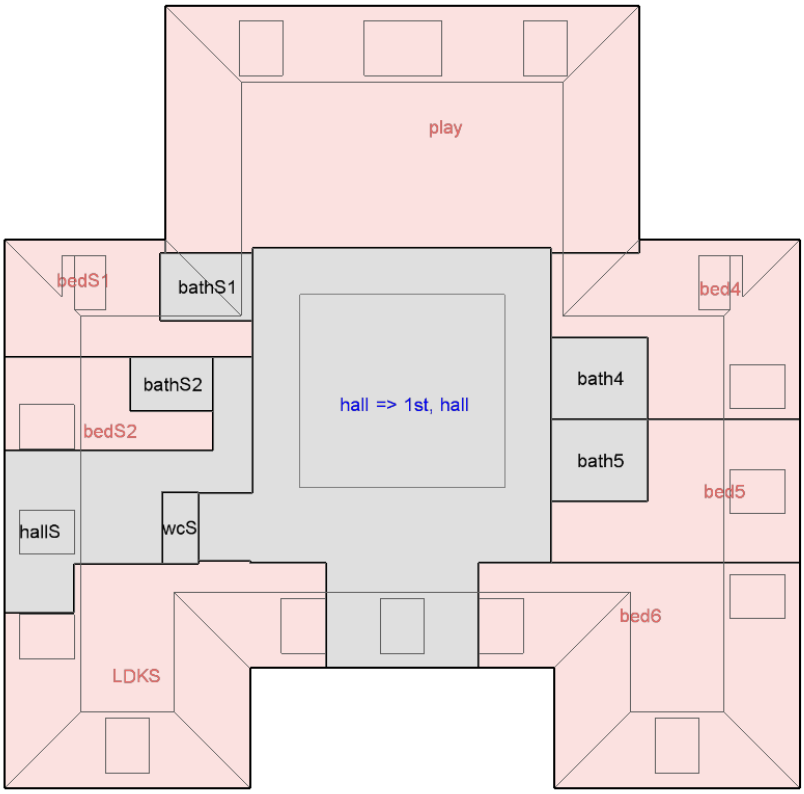
ASSESSED ZONES – GROUND FLOOR



ASSESSED ZONES – 1ST FLOOR



ASSESSED ZONES – 2ND FLOOR



OVERHEATING SIMULATION RESULTS – DSY1 WEATHER DATA

Floor	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
0GF	Din-liv-f	0.66	N/A	Pass
0GF	Din-rec	1.16	N/A	Pass
0GF	Kit-f	0	N/A	Pass
1st	Bed1	0	16	Pass
1st	Bed2	0	7	Pass
1st	Bed3	0	15.5	Pass
1st	Liv	0	N/A	Pass
1st	Nursery	0	24	Pass
2nd	Bed4	0	11	Pass
2nd	Bed5	0	18	Pass
2nd	Bed6	0	8.5	Pass
2nd	BedS1	0	25.5	Pass
2nd	BedS2	0.07	40.5	Fail
2nd	LDKS	0.91	N/A	Pass
2nd	Play	0	N/A	Pass

OVERHEATING SIMULATION RESULTS – DSY2 WEATHER DATA

Floor	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
0GF	Din-liv-f	1.21	N/A	Pass
0GF	Din-rec	2.33	N/A	Pass
0GF	Kit-f	0.91	N/A	Pass
1st	Bed1	0	46	Fail
1st	Bed2	0	28.5	Pass
1st	Bed3	0.48	50.5	Fail
1st	Liv	0	N/A	Pass
1st	Nursery	0	60.5	Fail
2nd	Bed4	0	25.5	Pass
2nd	Bed5	0	47	Fail
2nd	Bed6	0.15	31	Pass
2nd	BedS1	0	58	Fail
2nd	BedS2	0.6	78	Fail
2nd	LDKS	1.75	N/A	Pass
2nd	Play	0.48	N/A	Pass

OVERHEATING SIMULATION RESULTS – DSY3 WEATHER DATA

Floor	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
0GF	Din-liv-f	3.31	N/A	Fail
0GF	Din-rec	4.76	N/A	Fail
0GF	Kit-f	0.86	N/A	Pass
1st	Bed1	0	58.5	Fail
1st	Bed2	0	24.5	Pass
1st	Bed3	0.51	65	Fail
1st	Liv	0	N/A	Pass
1st	Nursery	0	98	Fail
2nd	Bed4	0	24	Pass
2nd	Bed5	0	52.5	Fail
2nd	Bed6	0	24.5	Pass
2nd	BedS1	0	74.5	Fail
2nd	BedS2	0.58	94	Fail
2nd	LDKS	2.53	N/A	Pass
2nd	Play	0.28	N/A	Pass

ACTIVE COOLING

As most habitable rooms fail on the overheating assessment against CIBSE TM59 criteria, after implementing all previous steps in the cooling hierarchy, it is proposed to install a mechanical cooling system using ground source heat pump. This is considered to be the most efficient way of active cooling as the heat extracted from house will be transmitted by a closed loop GSHP directly to the ground.

Periods with the highest cooling demand will match the periods with the highest electricity yield from solar photovoltaics system. It is therefore estimated, that most of the electricity demand for ground source cooling will be supplied by PV (on-site renewable source). The active cooling will therefore be a zero or near-zero CO2 emission process.