



Bury Old Road Planning Stage Overheating Review and Strategy

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PROJECT:
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REPORT AMENDMENT RECORD SHEET

ISSUE	DATE	CLAUSE	REVISION
Preliminary	06/11/2023	First Issue	P1
Preliminary	10/11/2023	Second Issue following client comments	P2
Preliminary	23/11/2023	Third Issue following client comments	P3
Preliminary	19/01/2024	Fourth Issue following client comments	P4

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1.0 General

GLD Technical Consulting has been commissioned by Mayfair Estates to produce an overview report for planning that identifies the potential for overheating of the residential development at their Bury Old Road housing development. The report is to consider the areas where the potential for overheating is likely and to propose the outline strategy for offsetting the overheating identified.

A sample of the proposed residential (Terrace and Semi-detached) units representing a typical floor are assessed. The study has been undertaken with reference to CIBSE TM59 in order to identify the overheating risk.

2.0 Conclusions

The results obtained indicate that overheating occurs during the day-time and night-time. Studies suggest the night-time temperature is a significant risk factor because higher night-time temperatures may increase the risk to health due to the inability to recover from daytime heat stress and the interruption to sleep.

The acoustic report suggests that the windows cannot be opened to combat overheating due to “excessive internal noise levels”. Therefore, a mechanical ventilation strategy will be required to purge the heat build-up in the summer months and provide the additional ventilation required to prevent further heat gains.

CIBSE Guide A: Environmental Design (2015a) recommends that peak operative bedroom temperatures should not exceed an absolute threshold of 26°C from 10 pm to 7am in order to guarantee comfort during the sleeping hours.

Taking into consideration the statement above, there are mechanical options that can be reviewed to mitigate the higher heat gains within the rooms, which are as follows:

1. Mechanical Ventilation Heat Recovery and Mechanical Purge Ventilation.
2. Mechanical Ventilation Heat Recovery and Externally Acoustic Louvre.
3. Mechanical Ventilation Heat Recovery and Comfort Cooling.

Regardless of which option is selected, the internal temperatures of the spaces should not exceed the maximum of 26 °C for more than 1 percent of the annual occupied period to be in compliance with TM59 – Design methodology for the assessment of overheating risk in homes (2017).

The preferred overheating option has not been determined at this stage, however MVHR with purge ventilation is expected to be the most favourable. MVHR is the client's preferred method of providing background ventilation which is currently proposed for the scheme.

3.0 Design Parameters

The design criteria below have been assumed to estimate the heat loss and heat gains for

External Summer Temperature °C	External Winter Temperature °C	Summer Control Temperature °C	Winter Control Temperature °C	Infiltration ac/h
28	- 4	25	21	0.25

all areas:

<i>(Table 3.1- Parameters)</i>	Element(s)	U-value W/(m²·K)	<i>Design</i>
	External Walls	0.16	
	Floors	0.18	
	Roofs	0.16	
	Windows	1.6	
	Doors	1.6	

(Table 3.2- U Values)

Accurate figures will need to be provided and confirmed by the architect at a later design stage to comply with latest Building regulations.

4.0 Table of results

The following tables show the room heat gains and equivalent ventilation rates required to offset those heat gains as calculated using MEPWORX calculation software for the heat gains.

Bury Old Road

Project Name			Bury Old Road				
Project Number		J358	Date		21.11.2023		
Heat Gains Results			Revision		P2		
Room Gains- Bury Old Road							
Terrace Ref.	Floor	Room Name	Sensible (kW)	Latent (kW)	Total Cooling Load (kW)	Equivalent (m³/s)	Equivalent (ac/h)
Left Terrace	Ground	Living/Kitchen	1.42	0.44	1.86	0.193	17.7
		WC	0.02	0.02	0.04	0.002	1.5
		Circulation	0.37	0.15	0.52	0.051	4.4
		Dining	0.35	0.08	0.43	0.047	7.4
		Utility	0.03	0.01	0.04	0.004	2.9
	First	Bedroom 2	0.32	0.16	0.48	0.044	3.1
		J&J Bath	-0.01	0.05	0.04	0	0
		Circulation	0.39	0.13	0.52	0.054	5.4
		Bedroom 3	0.64	0.12	0.76	0.088	8.6
	Second	Bedroom 1	0.55	0.22	0.77	0.075	4
		En-suite	0.03	0.05	0.08	0.004	1.1
		Circulation	0.4	0.08	0.48	0.055	8.9
	Bedroom 4	0.67	0.12	0.79	0.091	8.9	
Middle Terrace	Ground	Living/Kitchen	0.95	0.44	1.39	0.129	11
		WC	0.02	0.02	0.04	0.002	1.5
		Circulation	0.18	0.15	0.33	0.025	2.1
		Dining	0.35	0.08	0.43	0.047	7.4
		Utility	0.03	0.01	0.04	0.004	2.8
	First	Bedroom 2	0.3	0.16	0.46	0.042	3
		J&J Bath	-0.01	0.05	0.04	0	0
		Circulation	0.09	0.13	0.22	0.013	1.3
		Bedroom 3	0.65	0.12	0.77	0.089	8.7
	Second	Bedroom 1	0.52	0.22	0.74	0.071	3.8
		En-suite	0.03	0.05	0.08	0.004	1.1
		Circulation	0.08	0.08	0.16	0.011	1.8
	Bedroom 4	0.68	0.12	0.8	0.093	9.1	
Right Terrace	Ground	Living/Kitchen	1.4	0.44	1.84	0.19	17.8
		WC	0.02	0.02	0.04	0.002	1.5
		Circulation	0.37	0.15	0.52	0.051	4.4
		Dining	0.35	0.08	0.43	0.047	7.4
		Utility	0.03	0.01	0.04	0.004	2.9
	First	Bedroom 2	0.32	0.16	0.48	0.044	3.1
		J&J Bath	-0.01	0.05	0.04	0	0
		Circulation	0.39	0.13	0.52	0.054	5.4
		Bedroom 3	0.64	0.12	0.76	0.088	8.6
	Second	Bedroom 1	0.55	0.22	0.77	0.075	4
		En-suite	0.03	0.05	0.08	0.004	1.1
		Circulation	0.4	0.08	0.48	0.055	8.9
		Bedroom 4	0.67	0.12	0.79	0.091	8.9

(Table 4.1- Heat Gains - Bury Old Road)

Catherine Road

Project Name			Bury Old Road				
Project Number			J358	Date		21.11.2023	
Heat Gains Results				Revision		P2	
Room Gains- Catherine Road							
House Ref.	Floor	Room Name	Sensible (kW)	Latent (kW)	Total Cooling Load (kW)	Equivalent (m³/s)	Equivalent (ac/h)
Left House	Ground	Living/Dining/Kitchen	0.59	0.34	0.93	0.081	3.8
		WC	0.04	0.03	0.07	0.006	3.5
		Laundry	0.02	0	0.02	0.002	3.5
		Stairwell	0.09	0.04	0.13	0.013	3.1
		Circulation	0.04	0.04	0.08	0.006	2.2
	First	Bedroom 4	0.15	0.05	0.2	0.02	4.6
		Bathroom	0.02	0.04	0.06	0.003	0.9
		Bedroom 3	0.13	0.08	0.21	0.018	2.5
		Bedroom 2	0.18	0.09	0.27	0.024	3.2
		Stairwell	0.09	0.04	0.13	0.013	3.1
	Second	Circulation	0.13	0.05	0.18	0.018	4.9
		Bedroom 1	0.33	0.17	0.5	0.045	3.1
		En-suite Bathroom	0.1	0.07	0.17	0.013	2.4
		Stairwell/ Circulation	0.13	0.05	0.18	0.018	4.9
Right House	Ground	Living/Dining/Kitchen	0.59	0.34	0.93	0.081	3.8
		WC	0.04	0.03	0.07	0.006	3.5
		Laundry	0.02	0	0.02	0.002	3.5
		Stairwell	0.08	0.04	0.12	0.011	2.7
		Circulation	0.04	0.04	0.08	0.006	2.2
	First	Bedroom 4	0.15	0.05	0.2	0.02	4.6
		Bathroom	0.02	0.04	0.06	0.003	0.9
		Bedroom 3	0.13	0.08	0.21	0.018	2.5
		Bedroom 2	0.18	0.09	0.27	0.024	3.2
		Stairwell	0.08	0.04	0.12	0.011	2.7
	Second	Circulation	0.13	0.05	0.18	0.018	4.9
		Bedroom 1	0.33	0.17	0.5	0.045	3.1
		En-suite Bathroom	0.09	0.07	0.16	0.013	2.4
		Stairwell/ Circulation	0.08	0.04	0.12	0.011	4.1

(Table 4.2- Heat Gains - Catherine Road)

It is expected that the overheating review will developed at a later stage to confirm the habitable rooms that exceed 26 °C for more than 1 % of the annual occupied period and the full purge ventilation requirements / flow rates required to offset.

5.0 Mechanical Ventilation Strategy Options

Decentralized Systems (Extract) –

We propose using decentralised extract systems for each dwelling to be in compliance with approved document F – Volume 1: dwellings. This requires separate extraction fans for each wet room within each dwelling. The reason as to why these fans are required is to protect the health of occupants of the building by providing adequate ventilation. Without adequate ventilation, mould and internal air pollution may become hazardous to health.

The extract fans can be operated in two ways:

- Continuous (operating constantly) with boost facility on occupancy.
- Intermittent (operating when room is occupied) with overrun.

Depending on which operation type will be utilised, the flow rate will differ which will be vital when selecting the extraction fans.



(Figure 5.1- Ceiling Mounted Extract Fan)

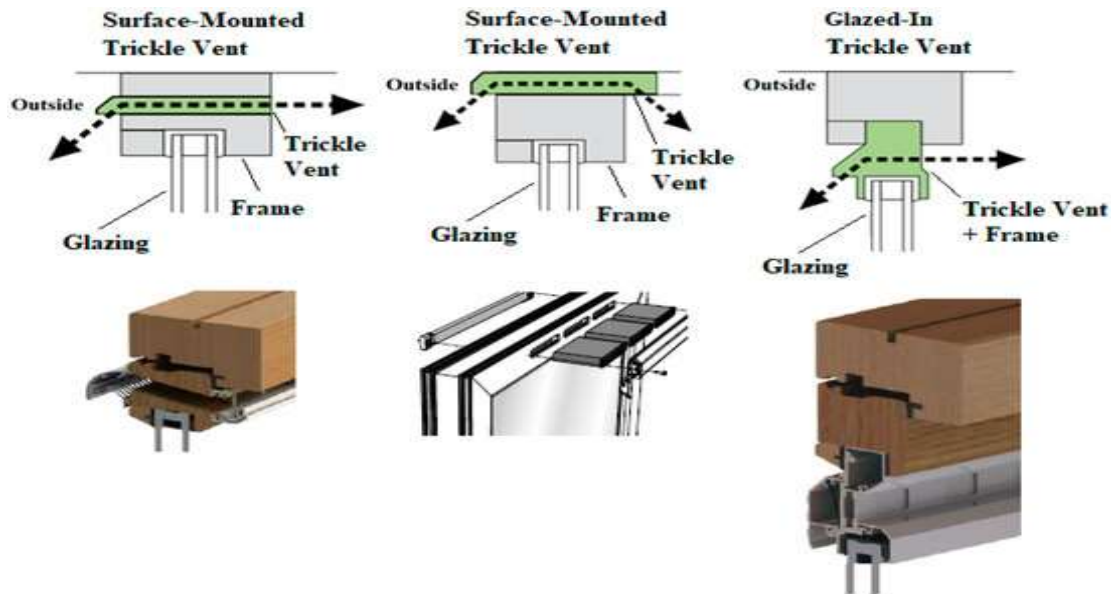
Trickle Ventilation (Supply) –

Supply: trickle vents could be utilised to supply air into the room and offset overheating in the summer months.

We are proposing to use natural air supply systems for each dwelling to be in compliance with approved document F – Volume 1: dwellings. The airflow into the room must be refreshed with new air flow. Trickle vents are designed to provide continuous and discreet fresh air into the rooms at all times when left open. At the same time, they also maintain low noise levels, which modern trickle ventilation products are capable of and should be selected to meet any acoustic requirements for the project.

For windows and doors, three distinct types of trickle vents are possible depending on the product, the installation, or the building:

- Fitted through the window frame itself or the opening sash.
- Located on a separate frame attached to the top of the window.
- Glass units with trickle vents mounted at the top.

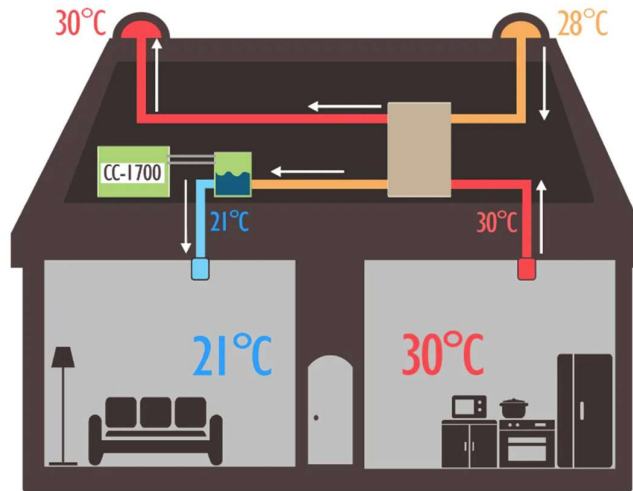


(Figure 5.2- Types of Trickle Vents)

Mechanical Ventilation Heat Recovery (Supply and Extract) –

MVHR provides filtered air into a building as well as transferring the heated (or cooled) air from a room via an internal exchanger. During the winter months, the heat exchanger within the unit transfers heat from the air leaving a room into the colder incoming air. During the summer months, the heat exchanger works in reverse; with cooler air being transferred from a room into the hotter incoming air (see figure 5.3). Ventilation ducts (rectangular or circular) are utilised to circulate air from the rooms through the heat exchanger within the MVHR unit.

Importantly, MVHR removes humid air from kitchens, bathrooms, utility rooms and other ‘wet’ rooms. Humid air leads to slower evaporation of body’s perspiration when compared with a less humid air, even if both are the same temperature. By lowering the relative humidity, MVHR help the body to feel cooler. Also, by removing excess humidity, it ensures there is no mould build up in the wet rooms, which can have a negative effect on the occupant’s health.



(Figure 5.3- MVHR Operation with Comfort Cooling- source: BPC UK)



(Figure 5.4- MVHR Operation- source: Airflow Understanding MVHR Cooling Article)

MVHR technology can help compliance with approved document F – Volume 1: dwellings when specified, designed, and installed correctly. According to this document, dwellings using mechanical ventilation with heat recovery, each habitable room should consist of mechanical supply ventilation. The total supply air flow should be distributed proportionately to the volume of each habitable room.

6.0 Overheating offset strategies

6.1 Improving building fabric energy efficiency & applying internal and external shading

Reducing the U-value of the building fabric will help in reducing the overheating. Incorporating appropriate external shading or to a lesser extent, internal shading will reduce the amount of direct solar gain in summer, reducing overheating risks. This strategy may affect planning applications.

6.2 Purge ventilation

According to the Approved Document F which is the government requirements for ventilation as below in italic.

“Purge ventilation is separate to the main ventilation system and should be provided in each habitable room. Purge ventilation should be capable of extracting at least four air changes per hour per room directly to the outside. This is often achieved using either:

- Openable windows.
- Mechanical extract system such as an inline fan. “

The acoustic report developed by DBX, suggests that the windows cannot be opened) due to the elevated noise levels that are present, meaning that purge ventilation would only be possible through a mechanical extract system.

The purpose of **purge ventilation** is to provide a way of rapidly changing the air within a room to maintain a pleasant living environment.

According to the results obtained, it can be seen that some rooms are slightly exceeding the maximum temperature of 26°C, therefore separate purge extract fans have been proposed for maintaining a pleasant living environment in this rooms.

6.3 Natural ventilation through externally mounted acoustic louvre

If the rooms within the building experience high room temperatures during the summer months, then they will need to be addressed and resolved by natural means. For natural ventilation, natural air that can be supplied via the **externally mounted acoustic louvres**. However, this system may be quite large and costly and may affect planning if mounted in place of windows or façade.

6.4 Mechanical comfort cooling

Mechanical comfort cooling, this is the most expensive option due to the upfront costs, running costs and yearly maintenance. Typically, external units will need to be situated and acoustic treatment may be required. The system would be operated whilst the windows are closed. There are now some standalone air conditioning units (e.g., Unico Air), where it is not necessary to have an outdoor unit, but only two duct to outside with external louvre (supply and extract) required to provide heat exchange.