



TM52 Overheating Assessment

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**New Build Office Block at the Former Car Wash,
Broad Lane, Haringey**

Prepared for:

Broad Lane Properties Limited

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Executive Summary

This CIBSE TM52 Overheating Assessment was prepared by Energylab Consulting Ltd in support of the full planning application for the new build, commercial development of offices at the former car wash on Broad Lane, London.

The report confirms that the proposed development is compliant with CIBSE TM52 guidelines in reducing the risk of overheating, particularly in summer months. The climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD)
2. The London Plan relevant planning policies within section 9, i.e. Policy SI 4 - Managing Overheating Risk
3. The Approved Document: Part O 2021

The CIBSE TM52 Assessment provides a robust methodology to analyse and understand the risk of overheating in non-domestic developments as a result of these rising temperatures. This assessment is conducted at the design stage to identify any potential high risk areas, and implement mitigation measures where necessary.

The Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach.

Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy utilising CIBSE weather file DSY1:

1. Model A - utilising solely passive cooling measures
2. Model B - utilising mechanical ventilation
3. Model C (Actual) - utilising active cooling measures (VRV/F system)

The summarised pass rate for the assessed spaces across each model is displayed below:

1. Model A: **0%**
2. Model B: **5%**
3. Model C: **100%**

As displayed, active cooling measures, utilising a VRV/F system is required to compliantly mitigate overheating risk for the proposed occupied spaces.

To provide confidence in the strategy proposed, Model C was assessed utilising weather files DSY2 and DSY3 in addition to DSY1. Both sets of results displayed a **100%** pass rate for all occupied spaces. (Please refer to Appendices 1 and 2)



1. Introduction

1.1 Existing Site

The site is located on Broad Lane, adjacent to Fountayne Business Centre within the London Borough of Haringey. The existing site used to formally be a car wash centre, however, the site is currently vacant and not developed. Please see the image below (Source: Google Maps).



Figure 1: Existing Site

1.2 The Proposal

The proposal is for a 9 storey, new-build office. The office building shall be developed as shell & core, however, the services shall be extended to serve

the speculative office floors alongside the landlord core areas. The services shall be mainly space heating, cooling, ventilation, public health/water to core areas and vertical transportation.

In addition to the office space, the development will comprise 6 no. sedum green roofs, 1 no. terrace and 2 no. cycle stores to encourage green means of transportation. There will be external amenity spaces included within the building.

The area schedule for the proposed development is displayed below in Table 3.

Table 3: Domestic Area Schedule	
Building	Approximate Gross Internal Area (sqm)
Ground Floor	1130
1st Floor	877
2nd Floor	877
3rd Floor	873
4th Floor	763
5th Floor	478
6th Floor	232
7th Floor	232
8th Floor	232



1.3 CIBSE TM52 Criteria

A key aspect of the Haringey Council's Sustainable Design and Construction SPD and the Approved Document Part O 2021 is to ensure developments are prepared against rising temperatures. The airtight envelope is critical in reducing energy demand for space heating and domestic hot water, however, this imposes some real challenges related to the risks of overheating.

Appropriate mitigation methods must be adopted and considered throughout the design process to ensure adequate thermal comfort is maintained through the occupancy of the building.

CIBSE have produced a robust methodology to assess the risk of overheating within a non-domestic building during occupancy. The CIBSE TM52 Overheating Assessment consists of three criterion to achieve compliance:

1. **Hours of Exceedance** - *'The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1 K or more during the occupied hours of a typical non-heating season (1 May to 30 September).'*
2. **Daily Weighted Exceedance** - *'The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and its duration. This criterion sets a daily limit for acceptability.'*
3. **Upper Limit Temperature** - *'The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.'*

If two or more criteria fail during the assessment, the non-domestic building is considered unacceptable for risk of overheating. If this occurs, mitigation measures must be adopted to ensure adequate thermal comfort for occupants utilising the GLA's cooling hierarchy.

This assessment has been carried out using dynamic modelling software Integrated Environmental Solutions Virtual Environment (IES VE).



2. Strategy

2.1 The Cooling Hierarchy

As stated, the Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach. The cooling hierarchy is outlined below:

1. Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure;
2. Minimise internal heat generation through energy efficient design;
3. Manage the heat within the building through exposed internal thermal mass and high ceilings;
4. Provide passive ventilation;
5. Provide mechanical ventilation;
6. Provide active cooling systems.

This approach aims to counter overheating risk whilst minimising energy consumption through reducing the reliance on air conditioning systems.

Additionally, this strategy is encouraged within Haringey Council's Sustainable Design and Construction SPD, stating '*Buildings should avoid overheating during summer months without reliance on energy intensive mechanical cooling systems.*'

2.2 Proposed Strategy

The cooling strategy proposed has been developed in line with the GLA Cooling Hierarchy. Please see the proposed response each stage of the cooling hierarchy below:

1. Solar gain has been reduced through the following:
 - a) There is limited capability in altering orientation due to the constraints of the site.
 - b) Glazing with a G-value of 0.35 has been specified to mitigate solar gain.
 - c) South-facing windows have been reduced to further mitigate solar gain. (Please refer to Figure 2 displaying the South and North-facing facades of the proposed development) As displayed by Figure 3, the glazed area on the facade most exposed to solar gain, the south-facing facade, is highly reduced.
 - d) Sedum green roofs have been proposed for all available roof space (approx. 820 sqm)





Figure 2: North and South Facing Facades

2. Energy efficient equipment has been proposed to reduce internal gain, such as:
 - a) High efficiency LED lighting
 - b) Energy efficient office equipment.
3. Ceilings with a minimum height of 2.6m have been proposed for each level, allowing for reasonable heat dissipation.
4. Natural ventilation has been proposed for all communal areas* through the incorporation of openable windows and the employment of a night-purge to ensure adequate thermal comfort and indoor air quality for the occupants.

**Communal areas refers to all stairwells and lift reception areas, i.e., any circulation areas where occupants are expected to remain for less than 30 minutes.*

5. Mechanical ventilation is proposed:
 - a) Continuous mechanical ventilation with heat recovery (MVHR) has been proposed to service all office areas and meeting rooms.
 - b) Localised intermittent mechanical extract ventilation has been proposed for all WCs.
6. The development will be served by a low carbon technology to meet any additional space cooling demand. A Variable Refrigerant Volume/Flow (VRV/F) system will be proposed which is a technology based on the principles of an Air Source Heat Pump extracting the free energy within the air. The systems are extremely efficient with potentially 300% cooling efficiency i.e for every 1kW of electricity supplied to the system, the system produces at least 3kW of cooling.



2. Methodology

2.1 Software Utilised

This assessment has been carried out using dynamic modelling software Integrated Environmental Solutions Virtual Environment (IES VE). The commercial development has been modelled specifying the building fabric, glazing and systems, providing an accurate representation of the proposed development.

The proposed building energy demand benchmarks were based on the National Calculation Methodology's (NCM) 'NCM Building Area Type B1: Office or Workshop (Office)' in IES. Within the IESVE, NCM room-types were assigned based on their proposed function. For example, all meeting rooms were assigned under 'NCM Office: Office (Office: Meeting)'. In doing so, an accurate analysis of the associated operations and, in particular, occupied hours was achieved for each space, and therefore the building.

The thermal calculations were conducted utilising Apachesim within IES VE.

2.2 Model Inputs

2.2.1 Construction

Table 1 displays the proposed fabric properties utilised for the model.

Table 1: Proposed Fabric Properties and Part L 2021 Fabric Standards		
	Proposed Design	Part L Limiting Values
Walls U-Value Target	0.13 W/m ² .k	0.26 W/m ² .k
Floors U-Value Target	0.10 W/m ² .k	0.18 W/m ² .k
Roofs U-Value Target	0.12 W/m ² .k	0.18 W/m ² .k
Doors U-Value Target	1 W/m ² .k	1.6 W/m ² .k
Windows U-Value Target	1.1 W/m ² .k	1.6 W/m ² .k
Windows G Value Target	0.35	-
Glazing Light Transmittance	0.7	
Air Permeability Target	5 m ³ /h.m ² @50pa	8 m ³ /h.m ² @50p
Thermal Bridging Target	0.05 (y-value)	0.2 (y-value)
Thermal Mass	Medium	-

Although the airtight envelope is critical in reducing energy demand for space heating and domestic hot water, it imposes some real challenges related to the risks of overheating.



2.2.2 Weather Files

To accurately simulate the periods in a year in which overheating is likely to occur, the 'design summer year' (DSY) weather files must be used as per the CIBSE TM49. Three CIBSE weather files are available:

1. DSY1 - a moderately warm summer
2. DSY2 - a summer with a short intense spell
3. DSY3 - a summer with a longer less intense warm spell

All three weather files have been utilised to determine overheating risk across the three scenarios. The CIBSE TM52 states an 'appropriate' weather file must be used to determine risk. By utilising all three, confidence is provided in ensuring adequate thermal comfort throughout the occupied spaces in all threatening climatic conditions.

2.2.5 Internal Gains

Internal gains were modelled utilising the associated NCM values dependent on occupancy and operation. The NCM modelling guide states '*The Activity Database provides standard occupancy, and internal heat gain profiles for each type of space in the building so that buildings with the same mix of activities will differ only in terms of their geometry, construction, building services, and weather location.*'

2.2.3 Solar Gain

Solar gain is modelled using the SunCast (solar shading analysis) module within IES VE. This models any internal gains into the development based on its orientation and the position of the sun. Please see Figure 4 for an image of the model within IES VE.

2.2.4 Cooling

As stated in section 2.2, a VRV/F system will be proposed to provide efficient active cooling for the office and meeting areas. This is necessary as adequate thermal comfort is unattainable with solely passive measures.

Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy:

Model A - utilising solely passive cooling measures

Model B - utilising mechanical ventilation

Model C (Actual) - utilising active cooling measures (VRV/F system)



3. Results

All results have been obtained utilising the DSY1 weather file, deemed most appropriate for risk analysis. Please refer to Appendices 1 and 2 for results utilising DSY2 and DSY3 files (for Model C only).

3.1 Model A

Model A utilises solely passive measures with natural ventilation. All windows were modelled to open with 10% free area when temperatures exceeded 22°C. In reality, it is likely that adjustable louvres would be installed if a passive solution was viable (for health and safety reasons). The use of openable windows is merely to model airflow through the building. The results are displayed in Table 2.

Table 3: TM52 Overheating Results (Model B - MVHR)						
Space	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failed	Pass/Fail
Office L1	100	10	31	5	1 & 2 & 3	Fail
Office L2	100	10.3	32	5	1 & 2 & 3	Fail
Office L3	100	10.2	32	5	1 & 2 & 3	Fail
Office L4	100	10.1	29	5	1 & 2 & 3	Fail
Office L5	100	9.9	28	4	1 & 2	Fail
Office L6	100	16.9	29	4	1 & 2	Fail
Office L7	100	17.2	28	4	1 & 2	Fail
Office L8	100	15.1	27	4	1 & 2	Fail
Meeting Room GFa (5P)	100	24.6	19	2	1 & 2	Fail



Meeting Room GFb (5P)	100	18.1	19	2	1 & 2	Fail
Meeting Room L1 (8P)	100	16	30	4	1 & 2	Fail
Meeting Room L2a (8P)	100	14.8	33	6	1 & 2 & 3	Fail
Meeting Room L2b (8P)	100	17.7	31	4	1 & 2	Fail
Meeting Room L3 (8P)	100	17.7	32	4	1 & 2	Fail
Meeting Room L4 (8P)	100	3.2	10	2	1 & 2	Fail
Meeting Room L6a (4P)	100	17.1	41	8	1 & 2 & 3	Fail
Meeting Room L6b (4P)	100	9.9	32	7	1 & 2 & 3	Fail
Meeting Room L7a (4P)	100	17.4	41	8	1 & 2 & 3	Fail
Meeting Room L7b (4P)	100	9.9	32	7	1 & 2 & 3	Fail
Meeting Room L8a (4P)	100	16.4	40	9	1 & 2 & 3	Fail
Meeting Room L8b (4P)	100	9.3	32	7	1 & 2 & 3	Fail

As displayed by Table 2, solely passive measures are insufficient across all occupied spaces to mitigate overheating risk.



3.2 Model B

Model B utilises continuous mechanical ventilation with heat recovery (MVHR). This allows for stale air to be extracted from spaces when humidity and temperature rise above a certain threshold, whilst supplying fresh air to the occupied spaces. The results are displayed in Table 3.

Table 3: TM52 Overheating Results (Model B - MVHR)						
Space	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failed	Pass/Fail
Office L1	100	6.6	28	4	1 & 2	Fail
Office L2	100	7.2	28	4	1 & 2	Fail
Office L3	100	7.1	28	4	1 & 2	Fail
Office L4	100	6.8	27	4	1 & 2	Fail
Office L5	100	6.9	27	4	1 & 2	Fail
Office L6	100	10.8	24	4	1 & 2	Fail
Office L7	100	11.3	22	4	1 & 2	Fail
Office L8	100	9.8	22	4	1 & 2	Fail
Meeting Room GFa (5P)	100	8.7	13	2	1 & 2	Fail
Meeting Room GFb (5P)	100	7.3	13	2	1 & 2	Fail
Meeting Room L1 (8P)	100	9.2	26	4	1 & 2	Fail
Meeting Room L2a (8P)	100	10.7	29	4	1 & 2	Fail
Meeting Room L2b (8P)	100	11.7	26	6	1 & 2 & 3	Fail



Meeting Room L3 (8P)	100	11.4	29	4	1 & 2	Fail
Meeting Room L4 (8P)	100	1.2	5	1	-	Pass
Meeting Room L6a (4P)	100	15.4	38	8	1 & 2 & 3	Fail
Meeting Room L6b (4P)	100	8.9	31	6	1 & 2 & 3	Fail
Meeting Room L7a (4P)	100	15.4	39	8	1 & 2 & 3	Fail
Meeting Room L7b (4P)	100	8.9	31	6	1 & 2 & 3	Fail
Meeting Room L8a (4P)	100	14.6	39	8	1 & 2 & 3	Fail
Meeting Room L8b (4P)	100	8.7	31	6	1 & 2 & 3	Fail

As displayed by Table 3, the addition of MVHR is not capable of sufficiently mitigating overheating risk across the occupied spaces, with exception for *Meeting Room L4 (8P)*.



3.3 Model C

Model C utilises active measures through the implementation of a VRV/F system as stated in section 2.2. The results are displayed in Table 4.

Table 4: TM52 Overheating Results (Model C - Active Cooling)						
Space	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failed	Pass/Fail
Office L1	100	0	0	0	-	Pass
Office L2	100	0	0	0	-	Pass
Office L3	100	0	0	0	-	Pass
Office L4	100	0	0	0	-	Pass
Office L5	100	0	0	0	-	Pass
Office L6	100	0	0	0	-	Pass
Office L7	100	0	0	0	-	Pass
Office L8	100	0	0	0	-	Pass
Meeting Room GFa (5P)	100	0	0	0	-	Pass
Meeting Room GFb (5P)	100	0	0	0	-	Pass
Meeting Room L1 (8P)	100	0	0	0	-	Pass
Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass



Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass
Meeting Room L3 (8P)	100	0	0	0	-	Pass
Meeting Room L4 (8P)	100	0	0	0	-	Pass
Meeting Room L6a (4P)	100	0	0	0	-	Pass
Meeting Room L6b (4P)	100	0	0	0	-	Pass
Meeting Room L7a (4P)	100	0	0	0	-	Pass
Meeting Room L7b (4P)	100	0	0	0	-	Pass
Meeting Room L8a (4P)	100	0	0	0	-	Pass
Meeting Room L8b (4P)	100	0	0	0	-	Pass

As displayed by Table 3, when active cooling is employed through the use of a VRV/F system, all occupied spaces are compliant with all TM52 criteria.



4. Conclusion

This CIBSE TM52 Overheating Assessment was prepared by Energylab Consulting Ltd in support of the full planning application for the new build, commercial development of offices at the former car wash on Broad Lane, London.

The report confirms that the proposed development is compliant with CIBSE TM52 guidelines in reducing the risk of overheating, particularly in summer months. The climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD)
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The CIBSE TM52 Assessment provides a robust methodology to analyse and understand the risk of overheating in non-domestic developments as a result of these rising temperatures. This assessment is conducted at the design stage to identify any potential high risk areas, and implement mitigation measures where necessary.

The Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach.

Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy utilising CIBSE weather file DSY1:

4. Model A - utilising solely passive cooling measures
5. Model B - utilising mechanical ventilation
6. Model C (Actual) - utilising active cooling measures (VRV/F system)

The summarised pass rate for the assessed spaces across each model is displayed below:

4. Model A: **0%**
5. Model B: **5%**
6. Model C: **100%**

As displayed, active cooling measures, utilising a VRV/F system is required to compliantly mitigate overheating risk for the proposed occupied spaces.

To provide confidence in the strategy proposed, Model C was assessed utilising weather files DSY2 and DSY3 in addition to DSY1. Both sets of results displayed a 100% pass rate for all occupied spaces. (Please refer to Appendices 1 and 2)



Appendices

Appendix 1: Model C (DYS2 weather file)

Space	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failed	Pass/Fail
Office L1	100	0	0	0	-	Pass
Office L2	100	0	0	0	-	Pass
Office L3	100	0	0	0	-	Pass
Office L4	100	0	0	0	-	Pass
Office L5	100	0	0	0	-	Pass
Office L6	100	0	0	0	-	Pass
Office L7	100	0	0	0	-	Pass
Office L8	100	0	0	0	-	Pass
Meeting Room GFa (5P)	100	0	0	0	-	Pass
Meeting Room GFb (5P)	100	0	0	0	-	Pass
Meeting Room L1 (8P)	100	0	0	0	-	Pass
Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass



Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass
Meeting Room L3 (8P)	100	0	0	0	-	Pass
Meeting Room L4 (8P)	100	0	0	0	-	Pass
Meeting Room L6a (4P)	100	0	0	0	-	Pass
Meeting Room L6b (4P)	100	0	0	0	-	Pass
Meeting Room L7a (4P)	100	0	0	0	-	Pass
Meeting Room L7b (4P)	100	0	0	0	-	Pass
Meeting Room L8a (4P)	100	0	0	0	-	Pass
Meeting Room L8b (4P)	100	0	0	0	-	Pass



Appendix 2: Model C (DSY3 weather file)

Space	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failed	Pass/Fail
Office L1	100	0	0	0	-	Pass
Office L2	100	0	0	0	-	Pass
Office L3	100	0	0	0	-	Pass
Office L4	100	0	0	0	-	Pass
Office L5	100	0	0	0	-	Pass
Office L6	100	0	0	0	-	Pass
Office L7	100	0	0	0	-	Pass
Office L8	100	0	0	0	-	Pass
Meeting Room GFa (5P)	100	0	0	0	-	Pass
Meeting Room GFb (5P)	100	0	0	0	-	Pass
Meeting Room L1 (8P)	100	0	0	0	-	Pass
Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass
Meeting Room L2a (8P)	100	0	0	0	-	Pass
Meeting Room L2b (8P)	100	0	0	0	-	Pass



Meeting Room L3 (8P)	100	0	0	0	-	Pass
Meeting Room L4 (8P)	100	0	0	0	-	Pass
Meeting Room L6a (4P)	100	0	0	0	-	Pass
Meeting Room L6b (4P)	100	0	0	0	-	Pass
Meeting Room L7a (4P)	100	0	0	0	-	Pass
Meeting Room L7b (4P)	100	0	0	0	-	Pass
Meeting Room L8a (4P)	100	0	0	0	-	Pass
Meeting Room L8b (4P)	100	0	0	0	-	Pass





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