SUSTAINABILITY STATEMENT TECHNICAL NOTE

From:	**Iceni Projects**
Date:	**June 2023**
Title:	**Zetter Hotel, 2 – 7 Montague Street | Sustainability Statement Technical Note**

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1. Iceni Projects Ltd was commissioned by Zorca Holding London Ltd to produce a Sustainability Statement Technical Note for the proposed development of the Zetter Hotel, 2 – 7 Montague Street, London, WC1B.

2. This document presents an Overheating Assessment undertaken to demonstrate the need to include for the proposal addition of comfort cooling plant to be included as part of the proposed development, as required following comments from the London Borough of Camden Council in June 2023.

The Proposals

3. The site consists of six terraced townhouses, number 2 – 7 Montague Street, that were converted to hotel use during the 20th Century. The proposed development seeks to amalgamate the two existing hotels, and includes:

    - Removal of the existing conservatory on-site, and replacement with a new brick and timber orangery;
    - Chiller compound to the north west corner of the site;
    - Internal strip-out of the internal finishes and replacement with sympathetic finishes to match the Georgian period of the buildings;
    - Removal of the original staircase in No. 5 as a result of the amalgamation of the two hotels. Components of this staircase are proposed to be incorporated in the design of No. 6; and
    - New platform lift and staircase proposed at lightwell 1, to replace the poor quality staircase here (used for servicing).

4. A Site Plan is provided within Appendix 1.

Planning and Regulatory Context

5. Built environment sustainability is incorporated within policy and regulation at a national, regional and local level, as set out below.

National Planning Policy Framework

6. The Ministry of Housing, Communities & Local Government determines national policies on different aspects of planning and the rules that govern the operation of the system. Accordingly, the National Planning Policy Framework (NPPF), which came into force in March 2012 and was

updated in February 2019, aims to strengthen local decision making. Additional updates have since been made through the latter half of 2020 and in January and July 2021 to reflect changes related to use classes, permitted development rights, the calculation of housing need, and requirements to achieve beauty alongside sustainability.

The London Plan (March 2021)

7. The London Plan is the overall strategic plan for London and includes policies for sustainable development within Chapter 9 (London's response to climate change). Key policies of relevance to this scheme are as follows:

- **Policy SI4 Managing Heat Risk** states that development proposals should minimise adverse impacts on the urban heat island effect through design, layout, orientation, materials and the incorporation of green infrastructure. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
    - Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
    - Minimise internal heat generation through energy efficient design
    - Manage the heat within the building through exposed internal thermal mass and high ceilings
    - Provide passive ventilation
    - Provide mechanical ventilation
    - Provide active cooling systems

Camden Local Plan (July 2017)

8. The Local Plan sets out the Council's planning policies, ensuring Camden has robust, effective and up-to-date planning policies that respond to changing circumstances and the borough's unique characteristics. Policies of relevance to this project in the context of sustainability are as follows:

- **Policy CC1: Climate change mitigation** states that the Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. The Council will:
    - Promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
    - Require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
    - Ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
    - Support and encourage sensitive energy efficiency improvements to existing buildings;
    - Require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
    - Expect all development to optimise resource efficiency.

- **Policy CC2: Adapting to climate change** states that the Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as:

    - The protection of existing green spaces and promoting new appropriate green infrastructure;

    - Not increasing, and wherever possible reducing, surface water run-off through increasing permeable surfaces and use of Sustainable Drainage Systems;

    - Incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and

    - Measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

  Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

  Sustainable design and construction measures

  The Council will promote and measure sustainable design and construction by:

    - Ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;

    - Encouraging new build residential development to use the Home Quality Mark and Passivhaus design standards;

    - Encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and

    - Expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.

  Under the subheading "Urban heat island", the supporting text for Policy CC2 states:

  "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.

  Trees near buildings to mitigate the urban heat effect are best placed to the west, south-west or south of buildings with small leafed species likely to offer the greatest impact. Green spaces and wider green infrastructure should be a minimum of 0.5ha in order to achieve cooling at significant distances beyond site boundaries (Forestry Commission, Air temperature regulation by urban trees and green infrastructure, 2013)."

  Additionally, under the subheading "Cooling", the supporting text for Policy CC2 states:

  "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.

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.

The cooling hierarchy includes:

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

Comments from the London Borough of Camden Council

9. The following comments were provided by the London Borough of Camden in June 2023:

"(…) your application is invalid for the following reasons:

(…) missing a ***sustainability statement*** *outlining the cooling hierarchy as you are proposing additional plant and in line with policies CC1 and CC2 you will need to demonstrate that the buildings are at risk of overheating. This is a validation requirement."*

10. Additional advice was provided, as follows:

*"**Plant:***

Camden has declared a climate emergency and therefore the justification sought for schemes to facilitate comfort cooling in smaller developments is required in line with Policy CC2 of the local plan.

The policy CC2 (Adapting to climate change) is intended to apply to all development. In addition, the London Plan also elevates these considerations.

Applicants should provide sufficient justification to argue the case/need and first exhaust/demonstrate that 'passive' alternatives that contribute less to the global warming that might be seen to be justifying these measures. This is to be examined through what policy CC2 terms as the 'cooling hierarchy'.

The justification for this is set out in policy CC2 which states that "…All development should adopt appropriate climate change adaptation measures such as: …measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy." A statement should therefore be included in all relevant applications to show how the hierarchy has been addressed -for example why can't shading be introduced through shutters or canopies? Or solar powered ceiling fans?

For clarity the statement should reference the cooling hierarchy, and how it has been addressed. Passive measures that have been explored (included/discounted) should be clearly referenced in the statement. Further justification about its listing/age should also be provided. The evidence should justify the applicant's belief that overheating is a realistic prospect without it."

And,

"All new-build development, and any development where air-conditioning is proposed, must demonstrate how the London Plan 'cooling hierarchy' has been applied and informed design."

And,

*"**Efficient ventilation and cooling***

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."

Overheating Assessment

11. New development should seek to reduce the impact of the urban heat island effect, and places and spaces should be designed to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

12. In order to reduce overheating and reliance on air conditioning, proposed development should follow the Cooling Hierarchy approach, as set out within London Plan Policy SI4, and the supplementary text supporting Policy CC2 of the Camden Local Plan, to ensure the risk of overheating is passively minimised as far as possible before using active solutions:

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

Cooling Hierarchy

13. The buildings at 2 – 7 Montague Street have been qualitatively assessed against the Cooling Hierarchy, as below:

Minimisation of internal heat generation through energy efficient design

- Heat gain from lighting will be kept to a minimum as a result of an energy-efficient (LED) lighting design solution.

- Glazing is present within the façade, which will ensure natural light is provided to spaces, and aid in minimising heat gains from artificial light.

- The scheme will employ air source heat pump (ASHP) technology to provide hot water, whilst space heating will be provided using electric radiators. This will aid in minimising the

- Where applicable, low energy systems will be specified, which will aid in minimising heat gains from equipment.

Reduction of the amount of heat entering the building in summer

- The buildings' facades have a limited amount of glazing to mitigate direct solar heat gain while optimising daylight penetration.

Management of the heat within the building through exposed thermal mass and high ceilings

- The majority of the hotel spaces have high ceilings, which will promote increased air movement and stratification, whereby warmer air rises, thus aiding to mitigate overheating.

- Due to the terraced nature of the buildings, there is little external exposed thermal mass within the building structures, minimising thermal transmission.

Passive ventilation

- Openable windows on the multiple aspects, albeit with secondary glazing on the front elevation, will provide a passive ventilation strategy that has the potential to utilise crossflow ventilation. It is noted, however, that it is intended that mechanical ventilation with heat recovery (MVHR) be provided for all occupied spaces.

Mechanical and active cooling

- Due to the nature of the proposed scheme as a hotel, and the potential for overheating to occur, active cooling is proposed for all bedroom and occupied front of house (FOH) spaces. At this stage, it is expected that a Variable Refrigerant Volume (VRV) / Variable Refrigerant Flow (VRF) system, using ducted Fan Coil Units (FCUs) will be employed.

Overheating Criteria

14. TM52 'The limits of thermal comfort: avoiding overheating in European buildings' is a design methodology for the assessment of overheating risk in buildings, published by the Chartered Institution of Building Services Engineers (CIBSE), in 2013.

15. This is a standardised approach to predict overheating risk for building designs using dynamic thermal analysis. It provides a baseline which includes specific weather files, defined internal gains and a set of profiles that represent reasonable usage patterns for a building suitable for evaluating overheating risk. In addition, defined thresholds to provide a pass / fail result are clearly provided as detailed below.

16. Non-residential buildings should be assessed against the following three criteria as set out in TM52 based on the adaptive thermal comfort model. Those rooms that fail any two of the three criteria are classed as overheating:

- **Criterion 1: Hours of exceedance (He).** The number of hours (He) during which ΔT, the difference between the actual operative temperature in the room at any time (Top) and Tmax the limiting maximum acceptable temperature, 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 2: Daily weighted exceedance (We).** To allow for the severity of overheating the weighted exceedance (We) shall be less than or equal to 6 in any one day where:

  $$We = (\Sigma\, he) \times WF = (he0 \times 0) + (he1 \times 1) + (he2 \times 2) + (he3 \times 3),$$

  where the weighting factor WF = 0 if ΔT ≤ 0, otherwise WF = ΔT, and hey is the time (h) when WF = y.

- **Criterion 3: Upper limit temperature (Tupp).** To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4 K.

17. Criterion 1 provides an understanding of how often a building is likely to exceed its comfort range during the summer months, which is a good first assessment of acceptability. The second criterion sets an acceptable level for the severity of overheating during a day. The value of 6 is an initial assessment of what constitutes an acceptable limit of overheating on any single day. Finally, Criterion 3 sets a limit beyond which normal adaptive actions will be insufficient to restore personal comfort and the vast majority of occupants will complain of being 'too hot'.

18. The CIBSE Guide A 'Environmental Design' (2015) gives general guidance and recommendations for air conditioned buildings on suitable winter and summer temperatures for a range of room and building types. The table below summarises the comfort criteria in terms of dry resultant temperature for bedroom and occupied FOH spaces, as these are the spaces for which comfort cooling is proposed.

Table 1 CIBSE Guide A Thermal Comfort Criteria

	Winter (Oct – Apr)	**Summer (May – Apr)**
Hotel Bathrooms		
Dry Resultant Temperature	20 – 22	23 – 25
Activity	1.2	1.2
Clothing	0.25	0.25
Hotel Bedrooms		
Dry Resultant Temperature	19 – 21	21 – 23
Activity	1.0	1.0
Clothing	1.0	1.2
Conference / Board Rooms		
Dry Resultant Temperature	22 – 23	23 – 25
Activity	1.1	1.1
Clothing	1.0	0.65
Bars / Lounges		

Dry Resultant Temperature	20 – 22	22 – 24
Activity	1.3	1.3
Clothing	1.0	0.65
Corridors		
Dry Resultant Temperature	19 – 21	21 – 23
Activity	1.4	1.4
Clothing	1.0	0.65
Entrance Halls / Lobbies		
Dry Resultant Temperature	19 – 21	21 – 23
Activity	1.4	1.4
Clothing	1.0	0.65

Methodology

19. The TM52 methodology provides a baseline and guidance for non-domestic overheating risk assessment. In line with this methodology, this section includes model inputs used to assess overheating risks to the buildings at 2 – 7 Montague Street.

20. The images below show the floorplans of the buildings:

Figure 1 Lower ground floor plan

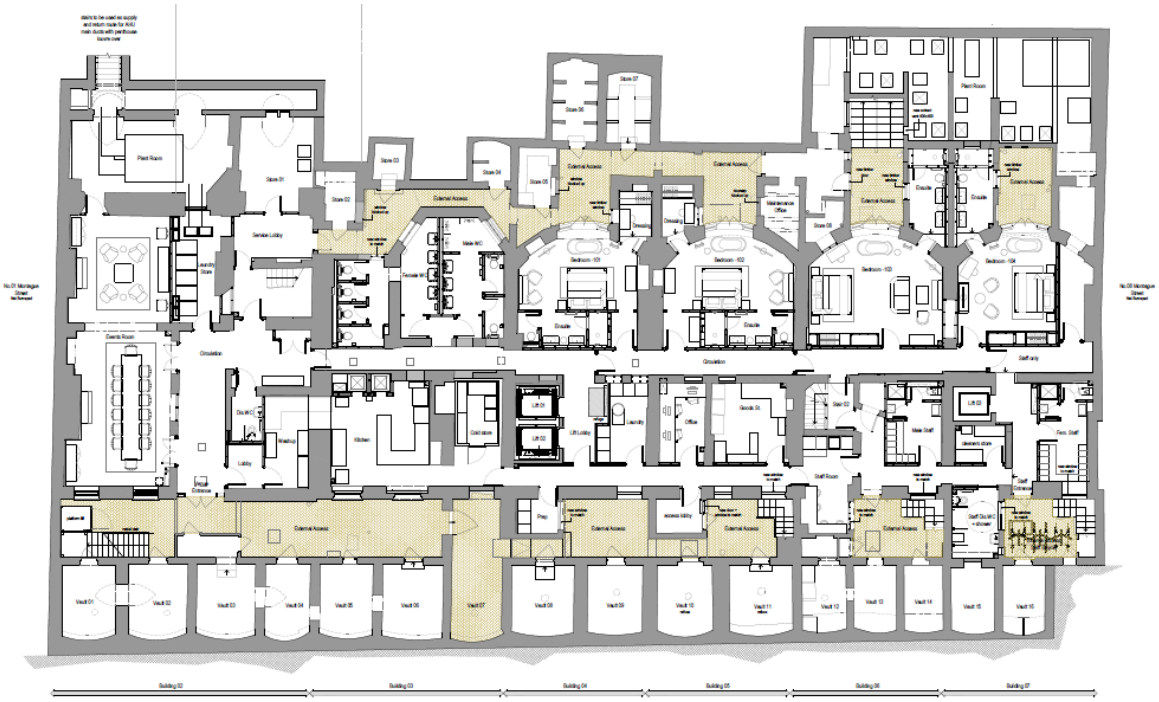


Figure 2 Upper ground floor plan

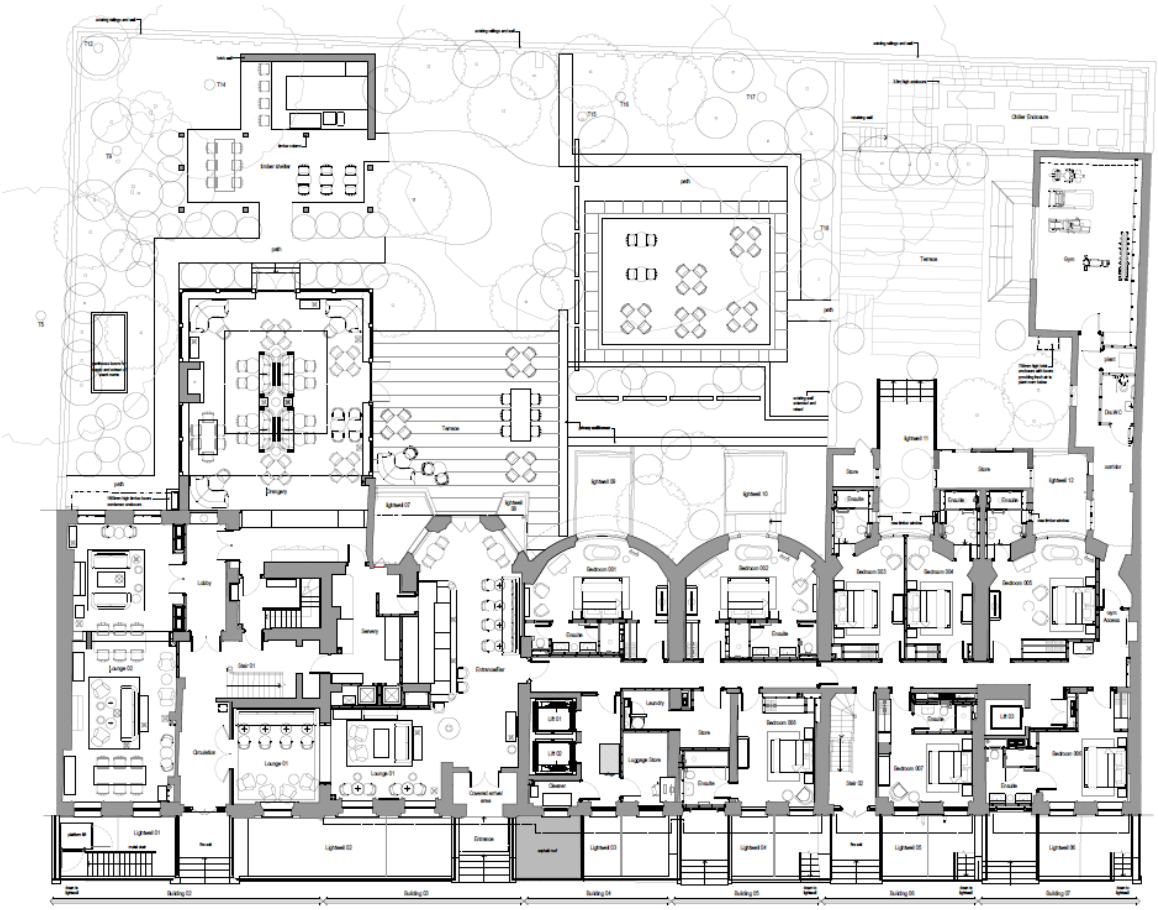


Figure 3 First floor plan

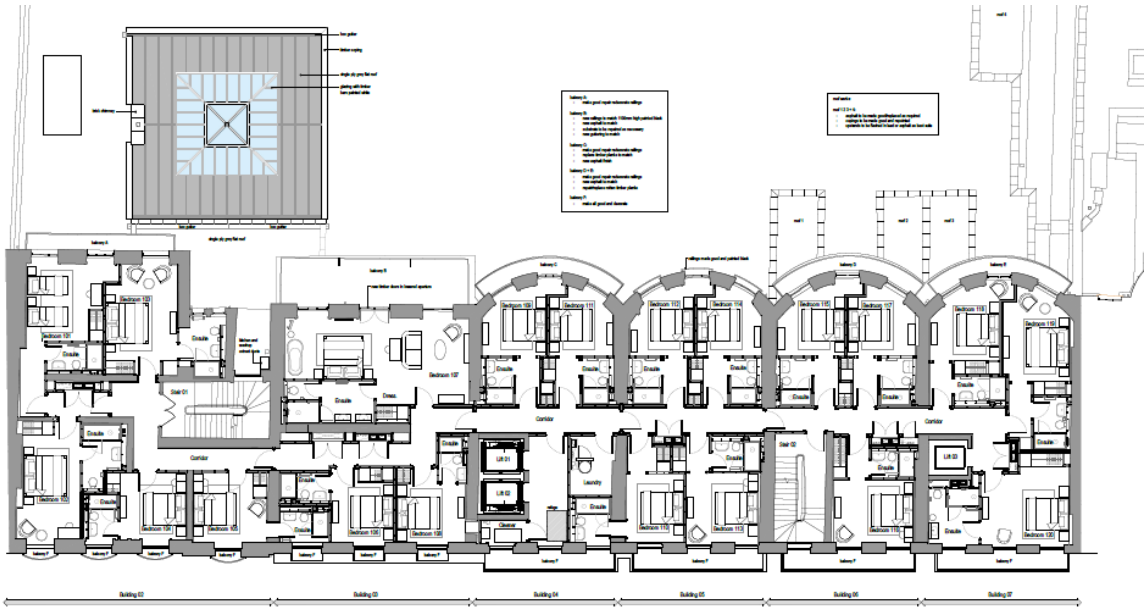


Figure 4 Second floor plan

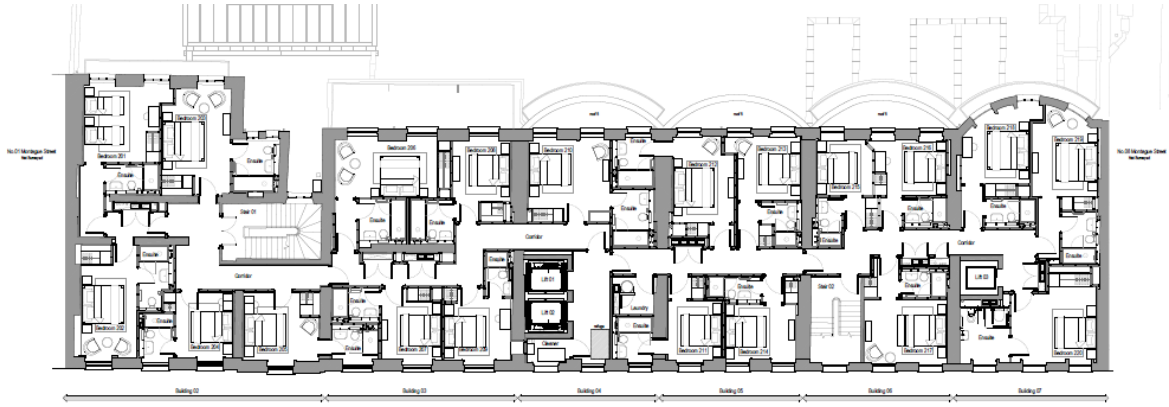
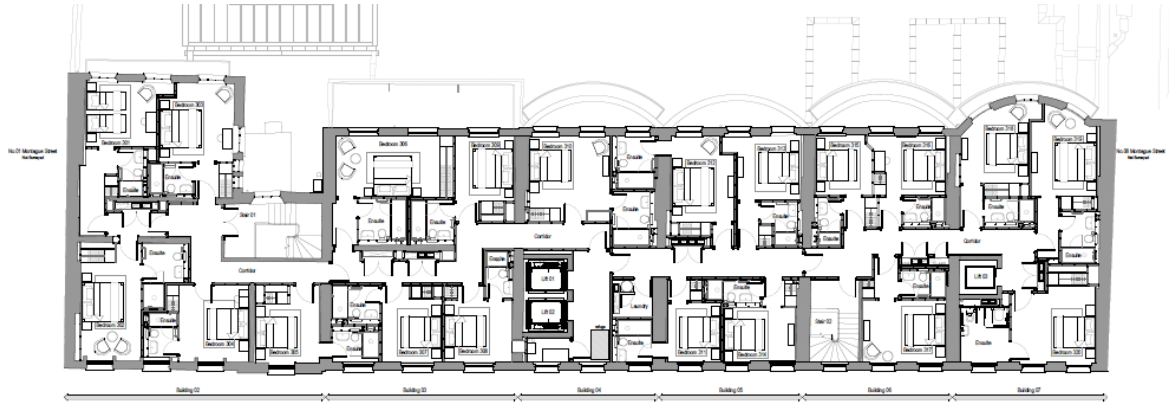


Figure 5 Third floor plan



21. The model was created in EDSL TAS to simulate the internal conditions in the bedroom and occupied FOH spaces and the geometry has been modelled based on planning submission issue drawings from Atelierdb Architects.

22. The weather files used for the simulation have been based on the guidance contained within CIBSE TM49:2014 (Design Summer Years for London) as follows:

- Design summer year weather file for London Heathrow, based on a peri-urban location for 1989 (DSY1), has been used on the simulations as required by TM49 methodology. The CIBSE DSY1 represents a moderately warm summer under 2020s high emissions scenario, 50th percentile.

- Design summer year weather file for London Heathrow, based on a peri-urban location for 1976 (DSY2), has been used on the simulations as required by TM49 methodology. The CIBSE DSY2 represents summer with a long period of persistent warmth under 2020s high emissions scenario, 50th percentile.

- Design summer year weather file for London Heathrow, based on a peri-urban location for 2003 (DSY3), has been used on the simulations as required by TM49 methodology. The CIBSE DSY3 represents a summer with a single intense warm spell under 2020s high emissions scenario, 50th percentile

23. Due to the retained nature of the building, which is Grade II Listed, the building fabric parameters associated with the retained building elements have been based on the threshold values contained within Part L:2021 of the Building Regulations for existing buildings, with the exception of the roof, for which refurbishment is proposed. The targeted building fabric parameters for the new build portion of the proposed scheme, which comprises an orangery to the rear of the

buildings, have been confirmed by Atelierdb Architects. A summary of the thermal envelope values used in the assessment is shown in Table 2.

Table 2 Proposed building fabric parameters

Building Fabric Element	Proposed value for retained elements	Proposed value for new build elements
Ground floor	0.70	0.25
External wall	0.70	0.15
Roof	0.18	0.12
Windows	1.60	1.60
Air Tightness	10	5

24. In line with the TM52 methodology, and based on the National Calculation Methodology (NCM) profiles for hotel areas, the following internal gains and time periods have been employed for this analysis.

Table 3 Internal gains

	Hotel Reception	Banquet / Conference	Restaurant / Dining	Bars / Lounges
Occupancy rate	0.1 people/sqm 20 W/person (Sensible) 15 W/person (Latent)	1.2 people/sqm 67 W/person (Sensible) 50 W/person (Latent)	3 people/sqm 27 W/person (Sensible) 20 W/person (Latent)	3 people/sqm 27 W/person (Sensible) 20 W/person (Latent)
Lighting	15 W / sqm as per CIBSE Guide A	15 W / sqm as per CIBSE Guide A	15 W / sqm as per CIBSE Guide A	15 W / sqm as per CIBSE Guide A
Small power	5 W / sqm as per CIBSE Guide A	3 W / sqm as per CIBSE Guide A	5 W / sqm as per CIBSE Guide A	5 W / sqm as per CIBSE Guide A

25. It has been assumed that the proposed spaces will be provided with openable sash windows on the rear elevation, with a maximum potential openable area of 50%, and with fixed secondary glazing to the sash windows on the front elevation. For the purposes of this overheating assessment, it has been assumed that the provision of the secondary glazing will result in the windows on the front elevation being essentially un-openable.

26. An infiltration rate of 0.30 air changes per hour has been used for the tested spaces, and has been derived from CIBSE Guide A (2015) for hotels with an air permeability of 10 m^3 /hr per m^2 @ 50Pa for five storey buildings.

27. Background mechanical ventilation will be provided by MVHR units as required by Part F of the Building Regulations. The ventilation rate included in the model is 1.5 air changes per hour for the tested spaces.

28. Cooling will be provided using a variable refrigerant volume (VRV) / variable refrigerant flow (VRF) system, utilising ducted Fan Coil Units (FCU). Further details of the proposed system will be provided during the detailed design stage.

Results

29. The following table provides a summary of the results obtained when not including for the proposed cooling system. The full results are provided in Appendix 1.

Table 4 Summary of results when not accounting for proposed cooling system

	Number of Spaces Assessed	Number of Spaces Failing			Overall Compliance
		Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	
DSY1	112	60	96	52	Fail
DSY2	112	65	102	59	Fail
DSY3	112	65	94	60	Fail

30. The above demonstrates that, when relying on mechanical ventilation only, with openable windows on the rear façade only, the proposed spaces for which cooling is proposed would be at risk of overheating. This is due to the fact that mechanical ventilation with heat recovery does not have enough cooling capacity to remove excessive heat gains and provide thermal comfort.

31. As detailed above, it is intended that comfort cooling be provided via a VRV / VRF system, using ducted FCUs. Further details of the systems to be specified will be provided during the detailed design stage, however it is noted that staff can control comfort within the hotel spaces by switching on the VRV / VRF system when the internal air temperature exceeds 22°C. Mechanical ventilation, which is intended to be employed within all occupied spaces, will also provide an additional level of cooling to further remove excessive heat gains.

32. The following table provides a summary of the results obtained when not including for the proposed cooling system. The full results are provided in Appendix 2.

Table 5 Summary of results when accounting for proposed cooling system

	Number of Spaces Assessed	Number of Spaces Failing			Overall Compliance
		Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	
DSY1	112	0	0	0	Pass
DSY2	112	0	1	0	Pass
DSY3	112	0	1	0	Pass

33. The results show that the internal dry resultant temperature within the tested spaces fall within the recommended CIBSE Guide A summer comfort range when including for the proposed cooling system, and the spaces therefore fully comply with all TM52 overheating criteria.

34. The above strategy allows staff and guests to manually control comfort levels within specific hotel spaces, by making use of the comfort cooling system to be provided. Therefore, the proposed comfort cooling system is expected to be switched on only during limited periods when internal air temperatures are high, and the mechanical ventilation system cannot provide adequate cooling. The proposed system will be of high efficiency to ensure that energy consumption for cooling is low and will be adequately sized to provide enough capacity by taking into consideration the climate change impact on ambient temperature over its lifespan. As a result, the buildings comply with the overheating criteria i.e. the risk of overheating has been eliminated while reducing energy consumption in comparison to a fully air-conditioning building.

Summary

35. This Sustainability Statement Technical Note provides details of how the proposed development at the Zetter Hotel, 2 – 7 Montague Street has been designed to minimise the risk of overheating. The strategy has followed the Cooling Hierarchy in Policy SI4 of the London Plan and Policy CC2 of the Camden Local Plan.

36. TM52:2013 has been adopted for this overheating study as it is the recommended methodology for the assessment of overheating risk in non-residential buildings.

37. The methodology aims to produce a test that encourages good design that is comfortable within sensible limits, without being so stringent that it over-promotes the use of mechanical cooling.

38. A dynamic thermal model was created in EDSL TAS to simulate the internal conditions in the occupied spaces for which the use of active cooling is intended within the proposed development.

39. The modelling incorporated inputs provided within the TM52 methodology guidance and information provided by Atelierdb Architects.

40. The proposed development has been designed to minimise the risk of overheating, in accordance with the London Plan Policy SI4 ‘cooling hierarchy’. Passive cooling design measures have however been constrained by the heritage status of the building (Grade II Listed). To ensure the special interest of the building is preserved the application has not implemented further cooling/overheating measures such as new windows or external shading being incorporated. Nevertheless, the building fabric and building services designs have maximised all available measures to minimise heat generation within the tested spaces, to reduce the amount of heat entering the building, and to mechanically ventilate these spaces in line with the cooling hierarchy in Policy SI4 of the London Plan and Policy CC2 of the Camden Local Plan.

41. The results were then compared to the CIBSE TM52 overheating criteria for the three weather files specified in CIBSE TM49, as required by the Greater London Authority (GLA).

42. When discounting the proposed cooling system, which will comprise a variable refrigerant flow (VRF) system, the tested spaces are demonstrated to fail the TM52 overheating criteria for all three tested weather files.

43. However, when including for the proposed cooling system, the tested spaces are shown to pass the TM52 overheating criteria for all three tested weather files, therefore meeting the requirements of the GLA. In this way, despite the adoption of an approach employing the cooling hierarchy, overheating of the building is a realistic prospect when not including for active cooling, and there is therefore a clear need for air conditioning in this instance.

44. Overall, the proposals for the scheme are in line with the policy requirements of the planning authority for mitigating the risk of overheating and will provide a development that seeks to promote these principles in operation.

APPENDIX 1 FULL OVERHEATING RESULTS WITH NO COOLING

Table A1.1 Results when not accounting for proposed cooling – DSY1

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	1,253	47	90	Fail
Circulation 6	78	38	10	0	Pass
Circulation 7	78	1,470	41	68	Fail
Circulation 8	78	49	12	0	Pass
Circulation 9	78	2,366	44	1,832	Fail
Circulation 10	78	12	7	0	Pass
Circulation 11	78	175	30	0	Fail
Circulation 12	78	1,119	51	0	Fail
Circulation 13	78	38	14	0	Pass
Circulation 14	78	824	47	0	Fail
Circulation 15	78	326	27	0	Fail
Circulation 16	78	1,761	45	163	Fail
Circulation 17	78	912	42	31	Fail
Circulation 18	78	997	43	52	Fail
Circulation 19	78	2,251	49	1,686	Fail
Circulation 20	78	550	37	0	Fail
Circulation 21	78	1,533	51	118	Fail
Circulation 22	78	42	18	0	Pass
Circulation 23	78	1,038	46	1	Fail
Circulation 24	78	2,167	50	665	Fail
Circulation 25	78	1,796	43	214	Fail
Circulation 26	78	1,570	46	128	Fail
Circulation 27	78	2,441	49	1,745	Fail
Circulation 28	78	390	43	0	Fail
Circulation 29	78	1,373	51	81	Fail
Circulation 30	78	42	18	0	Pass
Circulation 31	78	876	49	0	Fail
Circulation 32	78	1,824	50	241	Fail
Circulation 33	78	1,799	49	166	Fail
Circulation 34	78	1,637	49	126	Fail
Circulation 35	78	2,440	50	1,757	Fail
Orangery	73	329	21	48	Fail
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 5	55	0	0	0	Pass
Bedroom 6	55	0	0	0	Pass
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	0	0	0	Pass
Bedroom 10	55	546	29	2	Fail
Bedroom 11	55	1,331	36	581	Fail
Bedroom 12	55	504	21	0	Fail
Bedroom 13	55	1	1	0	Pass
Bedroom 14	55	0	0	0	Pass
Bedroom 15	55	1	1	0	Pass
Bedroom 16	55	1	1	0	Pass
Bedroom 17	55	1	1	0	Pass
Bedroom 18	55	1	1	0	Pass
Bedroom 19	55	1	1	0	Pass
Bedroom 20	55	1	1	0	Pass
Bedroom 21	55	1	1	0	Pass
Bedroom 22	55	1	1	0	Pass
Bedroom 23	55	2	1	0	Pass
Bedroom 24	55	857	27	149	Fail
Bedroom 25	55	1,328	36	580	Fail
Bedroom 26	55	1,243	36	366	Fail
Bedroom 27	55	1,130	33	191	Fail
Bedroom 28	55	599	29	1	Fail
Bedroom 29	55	732	35	65	Fail
Bedroom 30	55	931	33	151	Fail
Bedroom 31	55	973	29	217	Fail
Bedroom 32	55	655	36	13	Fail
Bedroom 33	55	2	1	0	Pass
Bedroom 34	55	0	0	0	Pass
Bedroom 35	55	2	1	0	Pass
Bedroom 36	55	2	1	0	Pass
Bedroom 37	55	3	2	0	Pass
Bedroom 38	55	3	2	0	Pass
Bedroom 39	55	3	2	0	Pass
Bedroom 40	55	4	2	0	Pass
Bedroom 41	55	3	2	0	Pass
Bedroom 42	55	1	1	0	Pass
Bedroom 43	55	4	2	0	Pass
Bedroom 44	55	1,042	33	241	Fail
Bedroom 45	55	1,408	33	720	Fail
Bedroom 46	55	1,424	36	722	Fail
Bedroom 47	55	1,389	36	570	Fail
Bedroom 48	55	872	32	11	Fail
Bedroom 49	55	1,054	35	158	Fail
Bedroom 50	55	1,179	33	394	Fail
Bedroom 51	55	1,172	33	441	Fail

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 52	55	931	30	84	Fail
Bedroom 53	55	1	1	0	Pass
Bedroom 54	55	0	0	0	Pass
Bedroom 55	55	1	1	0	Pass
Bedroom 56	55	1	1	0	Pass
Bedroom 57	55	2	2	0	Pass
Bedroom 58	55	1	1	0	Pass
Bedroom 59	55	1	1	0	Pass
Bedroom 60	55	2	2	0	Pass
Bedroom 61	55	2	2	0	Pass
Bedroom 62	55	1	1	0	Pass
Bedroom 63	55	2	2	0	Pass
Bedroom 64	55	1,096	36	304	Fail
Bedroom 65	55	1,426	32	769	Fail
Bedroom 66	55	1,460	35	828	Fail
Bedroom 67	55	1,405	36	655	Fail
Bedroom 68	55	866	36	7	Fail
Bedroom 69	55	1,092	35	187	Fail
Bedroom 70	55	1,237	36	499	Fail
Bedroom 71	55	1,195	36	460	Fail
Bedroom 72	55	952	33	92	Fail
Gym	55	1,823	36	1,678	Fail
Lounge 1	55	1,521	35	54	Fail
Lounge 2	55	224	26	6	Fail
Events Room	55	354	25	34	Fail

Table A1.2 Results when not accounting for proposed cooling – DSY2

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	1,261	43	288	Fail
Circulation 6	78	169	27	0	Fail
Circulation 7	78	1,479	37	114	Fail
Circulation 8	78	221	28	0	Fail
Circulation 9	78	2,318	44	1,800	Fail
Circulation 10	78	66	21	0	Pass
Circulation 11	78	393	50	0	Fail
Circulation 12	78	1,143	51	259	Fail
Circulation 13	78	142	27	0	Fail
Circulation 14	78	922	50	149	Fail
Circulation 15	78	388	41	0	Fail
Circulation 16	78	1,778	44	216	Fail
Circulation 17	78	994	39	161	Fail
Circulation 18	78	1,082	40	209	Fail
Circulation 19	78	2,297	50	1,563	Fail
Circulation 20	78	629	51	74	Fail
Circulation 21	78	1,393	51	362	Fail
Circulation 22	78	151	30	0	Fail
Circulation 23	78	1,108	49	158	Fail
Circulation 24	78	2,195	47	746	Fail
Circulation 25	78	1,738	44	331	Fail
Circulation 26	78	1,478	46	307	Fail
Circulation 27	78	2,325	46	1,699	Fail
Circulation 28	78	497	47	58	Fail
Circulation 29	78	1,325	51	307	Fail
Circulation 30	78	150	33	1	Fail
Circulation 31	78	953	49	150	Fail
Circulation 32	78	1,736	49	353	Fail
Circulation 33	78	1,673	48	303	Fail
Circulation 34	78	1,476	50	306	Fail
Circulation 35	78	2,314	49	1,689	Fail
Orangery	73	358	22	114	Fail
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass
Bedroom 5	55	4	2	0	Pass
Bedroom 6	55	4	2	0	Pass
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	4	2	0	Pass
Bedroom 10	55	569	31	113	Fail

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 11	55	1,328	34	615	Fail
Bedroom 12	55	530	29	19	Fail
Bedroom 13	55	8	5	0	Pass
Bedroom 14	55	7	5	0	Pass
Bedroom 15	55	8	5	0	Pass
Bedroom 16	55	5	5	0	Pass
Bedroom 17	55	7	5	0	Pass
Bedroom 18	55	6	5	0	Pass
Bedroom 19	55	8	5	0	Pass
Bedroom 20	55	6	5	0	Pass
Bedroom 21	55	8	5	0	Pass
Bedroom 22	55	6	5	0	Pass
Bedroom 23	55	8	5	0	Pass
Bedroom 24	55	835	33	277	Fail
Bedroom 25	55	1,334	34	610	Fail
Bedroom 26	55	1,218	33	436	Fail
Bedroom 27	55	1,072	33	312	Fail
Bedroom 28	55	615	30	101	Fail
Bedroom 29	55	729	28	192	Fail
Bedroom 30	55	878	33	281	Fail
Bedroom 31	55	916	32	331	Fail
Bedroom 32	55	664	36	184	Fail
Bedroom 33	55	8	5	0	Pass
Bedroom 34	55	7	5	0	Pass
Bedroom 35	55	8	5	0	Pass
Bedroom 36	55	8	5	0	Pass
Bedroom 37	55	8	7	0	Pass
Bedroom 38	55	8	7	0	Pass
Bedroom 39	55	8	7	0	Pass
Bedroom 40	55	11	8	0	Pass
Bedroom 41	55	8	7	0	Pass
Bedroom 42	55	7	6	0	Pass
Bedroom 43	55	8	7	0	Pass
Bedroom 44	55	968	29	339	Fail
Bedroom 45	55	1,416	36	722	Fail
Bedroom 46	55	1,421	34	729	Fail
Bedroom 47	55	1,366	30	604	Fail
Bedroom 48	55	826	31	167	Fail
Bedroom 49	55	987	32	290	Fail
Bedroom 50	55	1,088	33	444	Fail
Bedroom 51	55	1,089	33	478	Fail
Bedroom 52	55	889	36	244	Fail
Bedroom 53	55	8	5	0	Pass
Bedroom 54	55	7	5	0	Pass
Bedroom 55	55	7	5	0	Pass
Bedroom 56	55	7	5	0	Pass
Bedroom 57	55	8	7	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 58	55	8	7	0	Pass
Bedroom 59	55	8	7	0	Pass
Bedroom 60	55	10	7	0	Pass
Bedroom 61	55	8	8	0	Pass
Bedroom 62	55	7	6	0	Pass
Bedroom 63	55	8	6	0	Pass
Bedroom 64	55	1,014	33	359	Fail
Bedroom 65	55	1,419	36	740	Fail
Bedroom 66	55	1,439	34	791	Fail
Bedroom 67	55	1,381	33	667	Fail
Bedroom 68	55	814	36	180	Fail
Bedroom 69	55	1,003	33	299	Fail
Bedroom 70	55	1,153	33	504	Fail
Bedroom 71	55	1,095	33	482	Fail
Bedroom 72	55	913	36	251	Fail
Gym	55	1,830	35	1,533	Fail
Lounge 1	55	1,186	35	127	Fail
Lounge 2	55	262	24	49	Fail
Events Room	55	400	27	114	Fail

Table A1.3 Results when not accounting for proposed cooling – DSY3

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	1,121	46	159	Fail
Circulation 6	78	90	22	0	Fail
Circulation 7	78	1,349	41	58	Fail
Circulation 8	78	95	26	0	Fail
Circulation 9	78	2,464	43	1,636	Fail
Circulation 10	78	52	22	0	Pass
Circulation 11	78	281	44	0	Fail
Circulation 12	78	874	50	52	Fail
Circulation 13	78	84	23	2	Fail
Circulation 14	78	662	49	19	Fail
Circulation 15	78	267	37	0	Fail
Circulation 16	78	1,591	46	112	Fail
Circulation 17	78	722	39	72	Fail
Circulation 18	78	816	42	100	Fail
Circulation 19	78	2,448	50	1,462	Fail
Circulation 20	78	479	50	0	Fail
Circulation 21	78	1,430	51	195	Fail

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 22	78	96	28	5	Fail
Circulation 23	78	839	44	42	Fail
Circulation 24	78	2,187	49	526	Fail
Circulation 25	78	1,482	43	213	Fail
Circulation 26	78	1,254	45	169	Fail
Circulation 27	78	2,489	47	1,509	Fail
Circulation 28	78	305	46	17	Fail
Circulation 29	78	1,108	50	127	Fail
Circulation 30	78	89	27	5	Fail
Circulation 31	78	721	48	29	Fail
Circulation 32	78	1,570	49	224	Fail
Circulation 33	78	1,402	46	198	Fail
Circulation 34	78	1,274	46	184	Fail
Circulation 35	78	2,478	50	1,520	Fail
Orangery	73	253	19	72	Fail
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass
Bedroom 5	55	0	0	0	Pass
Bedroom 6	55	0	0	0	Pass
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	0	0	0	Pass
Bedroom 10	55	456	30	12	Fail
Bedroom 11	55	1,182	36	468	Fail
Bedroom 12	55	375	29	2	Fail
Bedroom 13	55	4	2	0	Pass
Bedroom 14	55	1	1	0	Pass
Bedroom 15	55	3	2	0	Pass
Bedroom 16	55	0	0	0	Pass
Bedroom 17	55	2	1	0	Pass
Bedroom 18	55	0	0	0	Pass
Bedroom 19	55	2	1	0	Pass
Bedroom 20	55	0	0	0	Pass
Bedroom 21	55	2	1	0	Pass
Bedroom 22	55	0	0	0	Pass
Bedroom 23	55	2	1	0	Pass
Bedroom 24	55	698	33	150	Fail
Bedroom 25	55	1,153	36	472	Fail
Bedroom 26	55	1,101	36	293	Fail
Bedroom 27	55	948	29	167	Fail
Bedroom 28	55	476	31	16	Fail
Bedroom 29	55	577	27	68	Fail
Bedroom 30	55	743	33	148	Fail
Bedroom 31	55	794	30	204	Fail
Bedroom 32	55	527	29	44	Fail

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 33	55	4	2	0	Pass
Bedroom 34	55	1	1	0	Pass
Bedroom 35	55	4	2	0	Pass
Bedroom 36	55	4	2	0	Pass
Bedroom 37	55	4	3	0	Pass
Bedroom 38	55	4	3	0	Pass
Bedroom 39	55	4	3	0	Pass
Bedroom 40	55	7	4	0	Pass
Bedroom 41	55	4	3	0	Pass
Bedroom 42	55	2	1	0	Pass
Bedroom 43	55	5	2	0	Pass
Bedroom 44	55	891	30	220	Fail
Bedroom 45	55	1,271	33	585	Fail
Bedroom 46	55	1,298	33	591	Fail
Bedroom 47	55	1,244	36	450	Fail
Bedroom 48	55	686	33	31	Fail
Bedroom 49	55	905	33	150	Fail
Bedroom 50	55	1,088	36	335	Fail
Bedroom 51	55	1,087	36	372	Fail
Bedroom 52	55	759	36	108	Fail
Bedroom 53	55	3	2	0	Pass
Bedroom 54	55	0	0	0	Pass
Bedroom 55	55	2	1	0	Pass
Bedroom 56	55	3	2	0	Pass
Bedroom 57	55	3	2	0	Pass
Bedroom 58	55	3	2	0	Pass
Bedroom 59	55	3	2	0	Pass
Bedroom 60	55	6	3	0	Pass
Bedroom 61	55	4	2	0	Pass
Bedroom 62	55	2	1	0	Pass
Bedroom 63	55	4	3	0	Pass
Bedroom 64	55	927	33	253	Fail
Bedroom 65	55	1,274	36	615	Fail
Bedroom 66	55	1,319	35	651	Fail
Bedroom 67	55	1,242	36	517	Fail
Bedroom 68	55	683	30	35	Fail
Bedroom 69	55	956	33	179	Fail
Bedroom 70	55	1,111	36	400	Fail
Bedroom 71	55	1,091	36	376	Fail
Bedroom 72	55	785	35	117	Fail
Gym	55	1,829	35	1,560	Fail
Lounge 1	55	1,343	35	79	Fail
Lounge 2	55	173	21	34	Fail
Events Room	55	294	24	70	Fail

APPENDIX 2 FULL OVERHEATING RESULTS WITH COOLING

Table A2.1 Results when accounting for proposed cooling – DSY1

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	0	0	0	Pass
Circulation 6	78	0	0	0	Pass
Circulation 7	78	0	0	0	Pass
Circulation 8	78	0	0	0	Pass
Circulation 9	78	0	0	0	Pass
Circulation 10	78	0	0	0	Pass
Circulation 11	78	0	0	0	Pass
Circulation 12	78	0	0	0	Pass
Circulation 13	78	0	0	0	Pass
Circulation 14	78	0	0	0	Pass
Circulation 15	78	0	0	0	Pass
Circulation 16	78	0	0	0	Pass
Circulation 17	78	0	0	0	Pass
Circulation 18	78	0	0	0	Pass
Circulation 19	78	0	0	0	Pass
Circulation 20	78	0	0	0	Pass
Circulation 21	78	0	0	0	Pass
Circulation 22	78	0	0	0	Pass
Circulation 23	78	0	0	0	Pass
Circulation 24	78	0	0	0	Pass
Circulation 25	78	0	0	0	Pass
Circulation 26	78	0	0	0	Pass
Circulation 27	78	0	0	0	Pass
Circulation 28	78	0	0	0	Pass
Circulation 29	78	0	0	0	Pass
Circulation 30	78	0	0	0	Pass
Circulation 31	78	0	0	0	Pass
Circulation 32	78	0	0	0	Pass
Circulation 33	78	0	0	0	Pass
Circulation 34	78	0	0	0	Pass
Circulation 35	78	0	0	0	Pass
Orangery	73	53	12	0	Pass
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass
Bedroom 5	55	0	0	0	Pass
Bedroom 6	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	0	0	0	Pass
Bedroom 10	55	0	0	0	Pass
Bedroom 11	55	0	0	0	Pass
Bedroom 12	55	0	0	0	Pass
Bedroom 13	55	0	0	0	Pass
Bedroom 14	55	0	0	0	Pass
Bedroom 15	55	0	0	0	Pass
Bedroom 16	55	0	0	0	Pass
Bedroom 17	55	0	0	0	Pass
Bedroom 18	55	0	0	0	Pass
Bedroom 19	55	0	0	0	Pass
Bedroom 20	55	0	0	0	Pass
Bedroom 21	55	0	0	0	Pass
Bedroom 22	55	0	0	0	Pass
Bedroom 23	55	0	0	0	Pass
Bedroom 24	55	0	0	0	Pass
Bedroom 25	55	0	0	0	Pass
Bedroom 26	55	0	0	0	Pass
Bedroom 27	55	0	0	0	Pass
Bedroom 28	55	0	0	0	Pass
Bedroom 29	55	0	0	0	Pass
Bedroom 30	55	0	0	0	Pass
Bedroom 31	55	0	0	0	Pass
Bedroom 32	55	0	0	0	Pass
Bedroom 33	55	0	0	0	Pass
Bedroom 34	55	0	0	0	Pass
Bedroom 35	55	0	0	0	Pass
Bedroom 36	55	0	0	0	Pass
Bedroom 37	55	0	0	0	Pass
Bedroom 38	55	0	0	0	Pass
Bedroom 39	55	0	0	0	Pass
Bedroom 40	55	0	0	0	Pass
Bedroom 41	55	0	0	0	Pass
Bedroom 42	55	0	0	0	Pass
Bedroom 43	55	0	0	0	Pass
Bedroom 44	55	0	0	0	Pass
Bedroom 45	55	0	0	0	Pass
Bedroom 46	55	0	0	0	Pass
Bedroom 47	55	0	0	0	Pass
Bedroom 48	55	0	0	0	Pass
Bedroom 49	55	0	0	0	Pass
Bedroom 50	55	0	0	0	Pass
Bedroom 51	55	0	0	0	Pass
Bedroom 52	55	0	0	0	Pass
Bedroom 53	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 54	55	0	0	0	Pass
Bedroom 55	55	0	0	0	Pass
Bedroom 56	55	0	0	0	Pass
Bedroom 57	55	0	0	0	Pass
Bedroom 58	55	0	0	0	Pass
Bedroom 59	55	0	0	0	Pass
Bedroom 60	55	0	0	0	Pass
Bedroom 61	55	0	0	0	Pass
Bedroom 62	55	0	0	0	Pass
Bedroom 63	55	0	0	0	Pass
Bedroom 64	55	0	0	0	Pass
Bedroom 65	55	0	0	0	Pass
Bedroom 66	55	0	0	0	Pass
Bedroom 67	55	0	0	0	Pass
Bedroom 68	55	0	0	0	Pass
Bedroom 69	55	0	0	0	Pass
Bedroom 70	55	0	0	0	Pass
Bedroom 71	55	0	0	0	Pass
Bedroom 72	55	0	0	0	Pass
Gym	55	0	0	0	Pass
Lounge 1	55	0	0	0	Pass
Lounge 2	55	0	0	0	Pass
Events Room	55	0	0	0	Pass

Table A2.2 Results when accounting for proposed cooling – DSY2

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	0	0	0	Pass
Circulation 6	78	0	0	0	Pass
Circulation 7	78	0	0	0	Pass
Circulation 8	78	0	0	0	Pass
Circulation 9	78	0	0	0	Pass
Circulation 10	78	0	0	0	Pass
Circulation 11	78	0	0	0	Pass
Circulation 12	78	0	0	0	Pass
Circulation 13	78	0	0	0	Pass
Circulation 14	78	0	0	0	Pass
Circulation 15	78	0	0	0	Pass
Circulation 16	78	0	0	0	Pass
Circulation 17	78	0	0	0	Pass
Circulation 18	78	0	0	0	Pass
Circulation 19	78	0	0	0	Pass
Circulation 20	78	0	0	0	Pass
Circulation 21	78	0	0	0	Pass
Circulation 22	78	0	0	0	Pass
Circulation 23	78	0	0	0	Pass
Circulation 24	78	0	0	0	Pass
Circulation 25	78	0	0	0	Pass
Circulation 26	78	0	0	0	Pass
Circulation 27	78	0	0	0	Pass
Circulation 28	78	0	0	0	Pass
Circulation 29	78	0	0	0	Pass
Circulation 30	78	0	0	0	Pass
Circulation 31	78	0	0	0	Pass
Circulation 32	78	0	0	0	Pass
Circulation 33	78	0	0	0	Pass
Circulation 34	78	0	0	0	Pass
Circulation 35	78	0	0	0	Pass
Orangery	73	54	8	0	Pass
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass
Bedroom 5	55	0	0	0	Pass
Bedroom 6	55	0	0	0	Pass
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	0	0	0	Pass
Bedroom 10	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 11	55	0	0	0	Pass
Bedroom 12	55	0	0	0	Pass
Bedroom 13	55	0	0	0	Pass
Bedroom 14	55	0	0	0	Pass
Bedroom 15	55	0	0	0	Pass
Bedroom 16	55	0	0	0	Pass
Bedroom 17	55	0	0	0	Pass
Bedroom 18	55	0	0	0	Pass
Bedroom 19	55	0	0	0	Pass
Bedroom 20	55	0	0	0	Pass
Bedroom 21	55	0	0	0	Pass
Bedroom 22	55	0	0	0	Pass
Bedroom 23	55	0	0	0	Pass
Bedroom 24	55	0	0	0	Pass
Bedroom 25	55	0	0	0	Pass
Bedroom 26	55	0	0	0	Pass
Bedroom 27	55	0	0	0	Pass
Bedroom 28	55	0	0	0	Pass
Bedroom 29	55	0	0	0	Pass
Bedroom 30	55	0	0	0	Pass
Bedroom 31	55	0	0	0	Pass
Bedroom 32	55	0	0	0	Pass
Bedroom 33	55	0	0	0	Pass
Bedroom 34	55	0	0	0	Pass
Bedroom 35	55	0	0	0	Pass
Bedroom 36	55	0	0	0	Pass
Bedroom 37	55	0	0	0	Pass
Bedroom 38	55	0	0	0	Pass
Bedroom 39	55	0	0	0	Pass
Bedroom 40	55	0	0	0	Pass
Bedroom 41	55	0	0	0	Pass
Bedroom 42	55	0	0	0	Pass
Bedroom 43	55	0	0	0	Pass
Bedroom 44	55	0	0	0	Pass
Bedroom 45	55	0	0	0	Pass
Bedroom 46	55	3	2	0	Pass
Bedroom 47	55	0	0	0	Pass
Bedroom 48	55	0	0	0	Pass
Bedroom 49	55	0	0	0	Pass
Bedroom 50	55	0	0	0	Pass
Bedroom 51	55	0	0	0	Pass
Bedroom 52	55	0	0	0	Pass
Bedroom 53	55	0	0	0	Pass
Bedroom 54	55	0	0	0	Pass
Bedroom 55	55	0	0	0	Pass
Bedroom 56	55	0	0	0	Pass
Bedroom 57	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 58	55	0	0	0	Pass
Bedroom 59	55	0	0	0	Pass
Bedroom 60	55	0	0	0	Pass
Bedroom 61	55	0	0	0	Pass
Bedroom 62	55	0	0	0	Pass
Bedroom 63	55	0	0	0	Pass
Bedroom 64	55	0	0	0	Pass
Bedroom 65	55	0	0	0	Pass
Bedroom 66	55	0	0	0	Pass
Bedroom 67	55	0	0	0	Pass
Bedroom 68	55	0	0	0	Pass
Bedroom 69	55	0	0	0	Pass
Bedroom 70	55	0	0	0	Pass
Bedroom 71	55	0	0	0	Pass
Bedroom 72	55	0	0	0	Pass
Gym	55	0	0	0	Pass
Lounge 1	55	0	0	0	Pass
Lounge 2	55	0	0	0	Pass
Events Room	55	0	0	0	Pass

Table A2.3 Results when accounting for proposed cooling – DSY3

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 1	78	0	0	0	Pass
Circulation 2	78	0	0	0	Pass
Circulation 3	78	0	0	0	Pass
Circulation 4	78	0	0	0	Pass
Circulation 5	78	0	0	0	Pass
Circulation 6	78	0	0	0	Pass
Circulation 7	78	0	0	0	Pass
Circulation 8	78	0	0	0	Pass
Circulation 9	78	0	0	0	Pass
Circulation 10	78	0	0	0	Pass
Circulation 11	78	0	0	0	Pass
Circulation 12	78	0	0	0	Pass
Circulation 13	78	0	0	0	Pass
Circulation 14	78	0	0	0	Pass
Circulation 15	78	0	0	0	Pass
Circulation 16	78	0	0	0	Pass
Circulation 17	78	0	0	0	Pass
Circulation 18	78	0	0	0	Pass
Circulation 19	78	0	0	0	Pass
Circulation 20	78	0	0	0	Pass
Circulation 21	78	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Circulation 22	78	0	0	0	Pass
Circulation 23	78	0	0	0	Pass
Circulation 24	78	0	0	0	Pass
Circulation 25	78	0	0	0	Pass
Circulation 26	78	0	0	0	Pass
Circulation 27	78	0	0	0	Pass
Circulation 28	78	0	0	0	Pass
Circulation 29	78	0	0	0	Pass
Circulation 30	78	0	0	0	Pass
Circulation 31	78	0	0	0	Pass
Circulation 32	78	0	0	0	Pass
Circulation 33	78	0	0	0	Pass
Circulation 34	78	0	0	0	Pass
Circulation 35	78	0	0	0	Pass
Orangery	73	26	7	0	Pass
Bedroom 1	55	0	0	0	Pass
Bedroom 2	55	0	0	0	Pass
Bedroom 3	55	0	0	0	Pass
Bedroom 4	55	0	0	0	Pass
Bedroom 5	55	0	0	0	Pass
Bedroom 6	55	0	0	0	Pass
Bedroom 7	55	0	0	0	Pass
Bedroom 8	55	0	0	0	Pass
Bedroom 9	55	0	0	0	Pass
Bedroom 10	55	0	0	0	Pass
Bedroom 11	55	0	0	0	Pass
Bedroom 12	55	0	0	0	Pass
Bedroom 13	55	0	0	0	Pass
Bedroom 14	55	0	0	0	Pass
Bedroom 15	55	0	0	0	Pass
Bedroom 16	55	0	0	0	Pass
Bedroom 17	55	0	0	0	Pass
Bedroom 18	55	0	0	0	Pass
Bedroom 19	55	0	0	0	Pass
Bedroom 20	55	0	0	0	Pass
Bedroom 21	55	0	0	0	Pass
Bedroom 22	55	0	0	0	Pass
Bedroom 23	55	0	0	0	Pass
Bedroom 24	55	0	0	0	Pass
Bedroom 25	55	0	0	0	Pass
Bedroom 26	55	0	0	0	Pass
Bedroom 27	55	0	0	0	Pass
Bedroom 28	55	0	0	0	Pass
Bedroom 29	55	0	0	0	Pass
Bedroom 30	55	0	0	0	Pass
Bedroom 31	55	0	0	0	Pass
Bedroom 32	55	0	0	0	Pass

	Max Exceedable Hours	Criteria 1 (%Hrs Top-Tmax>=1K) ≤ 3%	Criteria 2 (Max. Daily Deg. Hrs) ≤ 6	Criteria 3 (Max. Delta T) ≤ 4	Overall Compliance
Bedroom 33	55	0	0	0	Pass
Bedroom 34	55	0	0	0	Pass
Bedroom 35	55	0	0	0	Pass
Bedroom 36	55	0	0	0	Pass
Bedroom 37	55	0	0	0	Pass
Bedroom 38	55	0	0	0	Pass
Bedroom 39	55	0	0	0	Pass
Bedroom 40	55	0	0	0	Pass
Bedroom 41	55	0	0	0	Pass
Bedroom 42	55	0	0	0	Pass
Bedroom 43	55	0	0	0	Pass
Bedroom 44	55	0	0	0	Pass
Bedroom 45	55	0	0	0	Pass
Bedroom 46	55	0	0	0	Pass
Bedroom 47	55	0	0	0	Pass
Bedroom 48	55	0	0	0	Pass
Bedroom 49	55	0	0	0	Pass
Bedroom 50	55	0	0	0	Pass
Bedroom 51	55	0	0	0	Pass
Bedroom 52	55	0	0	0	Pass
Bedroom 53	55	0	0	0	Pass
Bedroom 54	55	0	0	0	Pass
Bedroom 55	55	0	0	0	Pass
Bedroom 56	55	0	0	0	Pass
Bedroom 57	55	0	0	0	Pass
Bedroom 58	55	0	0	0	Pass
Bedroom 59	55	0	0	0	Pass
Bedroom 60	55	0	0	0	Pass
Bedroom 61	55	0	0	0	Pass
Bedroom 62	55	0	0	0	Pass
Bedroom 63	55	0	0	0	Pass
Bedroom 64	55	0	0	0	Pass
Bedroom 65	55	0	0	0	Pass
Bedroom 66	55	0	0	0	Pass
Bedroom 67	55	0	0	0	Pass
Bedroom 68	55	0	0	0	Pass
Bedroom 69	55	0	0	0	Pass
Bedroom 70	55	0	0	0	Pass
Bedroom 71	55	0	0	0	Pass
Bedroom 72	55	0	0	0	Pass
Gym	55	0	0	0	Pass
Lounge 1	55	0	0	0	Pass
Lounge 2	55	0	0	0	Pass
Events Room	55	0	0	0	Pass

APPENDIX 3 GENERAL NOTES

1. The report is based on information available at the time of the writing and discussions with the client during any project meetings. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by Iceni Projects Ltd for inaccuracies in the data supplied by any other party.

2. The review of planning policy and other requirements does not constitute a detailed review. Its purpose is as a guide to provide the context for the development and to determine the likely requirements of the Local Authority.

3. No site visits have been carried out, unless otherwise specified.

4. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in guidance may necessitate a re-interpretation of the report in whole or in part after its original submission.

5. The copyright in the written materials shall remain the property of Iceni Projects Ltd but with a royalty-free perpetual licence to the client deemed to be granted on payment in full to Iceni Projects Ltd by the client of the outstanding amounts.

6. The report is provided for sole use by the client and is confidential to them and their professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any person other than the client, unless otherwise agreed.

7. These terms apply in addition to the Iceni Projects Ltd "Standard Terms of Business" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms of Business the said Standard Terms of Business shall prevail.). In the absence of such a written contract the Standard Terms of Business will apply.