PROPOSED NEW DWELLING

9 REDINGTON ROAD

LONDON

NW3 7QX

OVERHEATING ASSESSMENT

FOR

AMOS GOLDREICH ARCHITECTURE

September 2021

Project no. 13049

C80 solutions
Straightforward Building Compliance

PROPOSED NEW DWELLING
9 REDINGTON ROAD
LONDON
NW3 7QX

ENERGY ASSESSMENT

AMOS GOLDREICH ARCHITECTURE

REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	26/09/2021	Harry Hinchliffe	M Heptonstall	For Comment

The current report provides a brief overview of the wide range of opportunities for renewable energy and is not intended as detailed design advice. As such data and information should only be treated as INDICATIVE at this stage of the process. Further investigation can be undertaken when more accurate and detailed information is required on specific measures.

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C80 solutions

Straightforward Building Compliance

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1.0 Introduction

1.1 About C80 Solutions Ltd

C80 Solutions are independent Sustainability and Energy Consultants providing carbon reduction solutions to help the UK achieve its carbon emission reduction target of 80% by 2050 - as set out in the Government's Climate Change Act 2008.

Our range of affordable but comprehensive solutions for the construction industry are broken down into two sectors; i) Building Compliance and ii) Consultancy.

Building Compliance:

Our Building Compliance services include; Code for Sustainable Homes Assessments, SAP Calculations, On Construction Energy Performance Certificates, Water Efficiency Calculations, SBEM Calculations, Commercial EPCs, BREEAM assessments and Air Tightness Testing.

Consultancy:

Our experience and exposure to building compliance combined with previous experience and IEMA accredited training means we have built up a vast amount of knowledge which enables us to provide our clients with invaluable advice. Our Consultancy services include; Renewable Energy Feasibility Reports, Energy Statements for planning, Sustainability Statements and Building Compliance Advisory Reports.

1.2 Introduction to Developments

C80 Solutions have been instructed to prepare an Energy Statement by Solape Shodunke for the 2 proposed new build home at Alesworth Road, Oxford, OX3 9RD.

The project anticipates the provision of 1 residential home.

The site is located in a predominantly residential area of Oxford.

The plan of the proposed development can be seen in Figures 1-2 below.

Figure 1; Proposed Floor Plans

Ground Floor

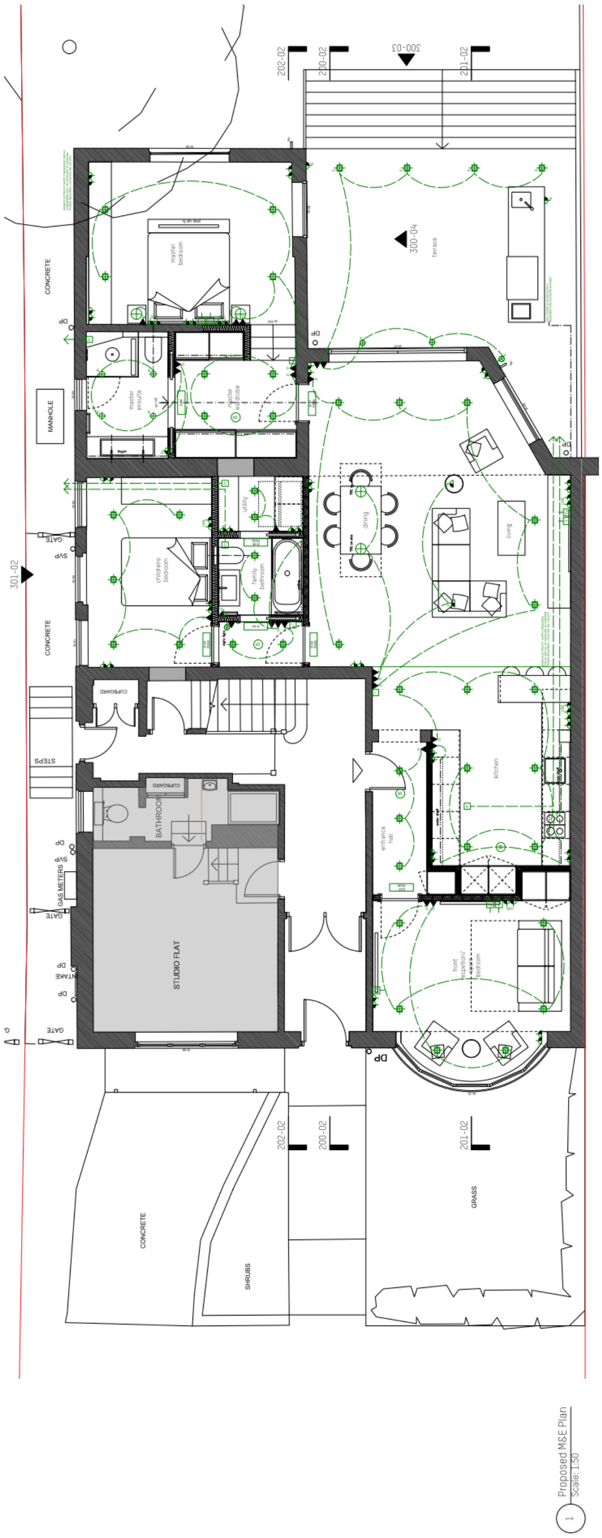

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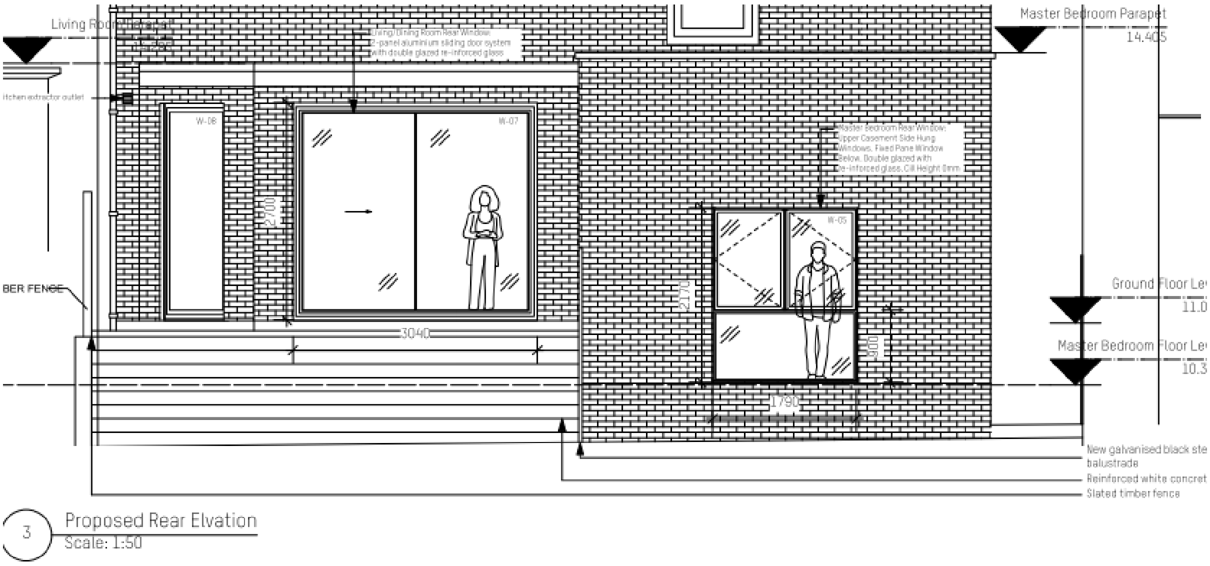
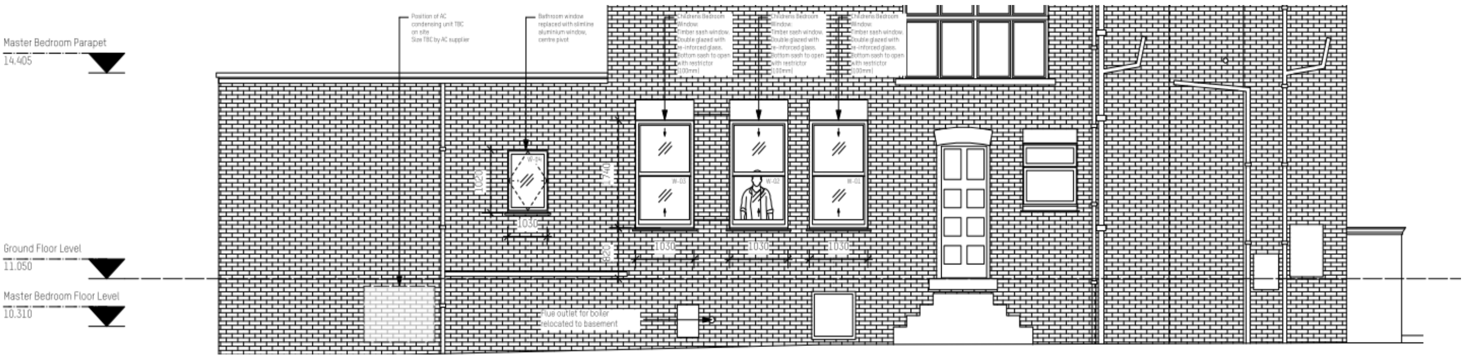
Figure 2; Proposed Elevations

Rear Elevation



Side Elevation



This statement will demonstrate the chance of overheating for the dwelling above a 'liveable' temperature, and how different design amendments will affect the probability of the dwelling overheating.

1.3 Planning Policy

Policy 5.9 Overheating and cooling

Policy

Strategic

A The Mayor seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces 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.

Planning decisions

B Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1 minimise internal heat generation through energy efficient design

2 reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls

3 manage the heat within the building through exposed internal thermal mass and high ceilings

4 passive ventilation

5 mechanical ventilation

6 active cooling systems (ensuring they are the lowest carbon options).

C Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Further details and guidance regarding overheating and cooling are outlined in the London Climate Change Adaptation Strategy.

LDF preparation

D Within LDFs boroughs should develop more detailed policies and proposals to support the avoidance of overheating and to support the cooling hierarchy.

1.4 Methodology

The methodology that has been applied in this report is as follows:

1. Prepare baseline calculations for the site based on a Part L 2013 compliant construction specification designed for the development. The chance of overheating is then determined using the SAP model.
2. Introduce measures outlined in the Mayor's cooling hierarchy to determine the effect on the dwellings chance of overheating and it's DER ($kgCO_2/m^2$).
3. Identify the most appropriate method of ensuring that the dwelling has a low chance of overheating without exponentially increasing the DER.

2.0 Predicted Overheating Risk

Below are the results from the SAP models produced for the proposed dwelling, which outline the chance of overheating with each measure outline in the cooling hierarchy applied;

Baseline; DER: 20.44 kgCO2/m²

Property Details: 13049 - Overheating Assessment

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	**(P1)**
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	180.35	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (Rear Windows)	1	0.9	1	0.9	**(P8)**
East (E Windows)	1	0.9	1	0.9	**(P8)**
North (Front Windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	**(P5)**
Summer gain/loss ratio	9.87	9.42	9.02	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	26.12	27.57	27.07	**(P7)**
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

1- Energy Efficient Design

DER – 19.27 kgCO2/m²

Property Details: 13049 - 1 Energy Efficient Design

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	**(P1)**
Transmission heat loss coefficient:	88.9	
Summer heat loss coefficient:	169.31	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (Rear Windows)	1	0.9	1	0.9	**(P8)**
East (E Windows)	1	0.9	1	0.9	**(P8)**
North (Front Windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	**(P5)**
Summer gain/loss ratio	10.52	10.03	9.61	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	26.77	28.18	27.66	**(P7)**
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

2- Reduction of Heat Entering

DER – 21.20 $kgCO_2/m^2$

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 24 September 2021

Property Details: 13049 - 2 Reduction of Heat Entering

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	More than average
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Dark-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	**(P1)**
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	180.35	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (Rear Windows)	0.85	0.9	1	0.76	**(P8)**
East (E Windows)	0.85	0.9	1	0.76	**(P8)**
North (Front Windows)	0.85	0.9	1	0.76	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (Rear Windows)	0.9 x	13.51	112.21	0.63	0.7	0.76	460.27	
East (E Windows)	0.9 x	6.85	117.51	0.63	0.7	0.76	244.4	
North (Front Windows)	0.9 x	4.91	81.19	0.63	0.7	0.76	121.03	
						Total	825.7	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	549.57	526.84	537.04	
Total summer gains	1417.06	1352.54	1304.58	**(P5)**
Summer gain/loss ratio	7.86	7.5	7.23	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	24.11	25.65	25.28	**(P7)**
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

3- Reduction of Thermal Mass

DER – 19.21 $kgCO_2/m^2$

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 24 September 2021

Property Details: 13049 - 3 Reduction of Thermal Mass

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Low
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	(P1)
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	180.35	(P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
South (Rear Windows)	1	0.9	1	0.9	(P8)
East (E Windows)	1	0.9	1	0.9	(P8)
North (Front Windows)	1	0.9	1	0.9	(P8)

Solar gains:

Orientation		Area	Flux	g_	FF	Shading	Gains	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	(P3/P4)

Internal gains:

	June	July	August	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	(P5)
Summer gain/loss ratio	9.87	9.42	9.02	(P6)
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	1.3	1.3	1.3	
Threshold temperature	27.17	28.62	28.12	(P7)
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

4- Passive Ventilation

DER – 21.67 $kgCO_2/m^2$

Property Details: 13049 - 4 Passive Ventilation

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	**(P1)**
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	180.35	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (Rear Windows)	1	0.9	1	0.9	**(P8)**
East (E Windows)	1	0.9	1	0.9	**(P8)**
North (Front Windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	**(P5)**
Summer gain/loss ratio	9.87	9.42	9.02	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	26.12	27.57	27.07	**(P7)**
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

5- Mechanical Ventilation

DER – 22.76 $kgCO_2/m^2$

Property Details: 13049 - 5 Mechanical Ventilation

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	0.8 (Windows slightly open (50 mm))

Overheating Details:

Summer ventilation heat loss coefficient:	80.41	**(P1)**
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	180.35	**(P2)**

Overhangs:

Orientation:	Ratio:	Z_overhangs:
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
South (Rear Windows)	1	0.9	1	0.9	**(P8)**
East (E Windows)	1	0.9	1	0.9	**(P8)**
North (Front Windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		Area	Flux	g_	FF	Shading	Gains	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	**(P3/P4)**

Internal gains:

	June	July	August	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	**(P5)**
Summer gain/loss ratio	9.87	9.42	9.02	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	26.12	27.57	27.07	**(P7)**
Likelihood of high internal temperature	**High**	**High**	**High**	

Assessment of likelihood of high internal temperature: High

6- Active Cooling System

DER – 20.44 $kgCO2/m^2$

Property Details: 13049 - 6 Active Cooling Systems

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	None
Ventilation rate during hot weather (ach):	3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	301.54	**(P1)**
Transmission heat loss coefficient:	99.9	
Summer heat loss coefficient:	401.47	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (Rear Windows)	0	1
East (E Windows)	0	1
North (Front Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (Rear Windows)	1	0.9	1	0.9	**(P8)**
East (E Windows)	1	0.9	1	0.9	**(P8)**
North (Front Windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (Rear Windows)	0.9 x	13.51	112.21	0.76	0.7	0.9	653.23	
East (E Windows)	0.9 x	6.85	117.51	0.76	0.7	0.9	346.86	
North (Front Windows)	0.9 x	4.91	81.19	0.76	0.7	0.9	171.77	
						Total	1171.86	**(P3/P4**

Internal gains:

	June	**July**	**August**	
Internal gains	549.57	526.84	537.04	
Total summer gains	1780.73	1698.7	1626.36	**(P5)**
Summer gain/loss ratio	4.44	4.23	4.05	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	20.69	22.38	22.1	**(P7)**
Likelihood of high internal temperature	**Slight**	**Medium**	**Medium**	

Assessment of likelihood of high internal temperature: Medium

3.0 Conclusion

As a single storey dwelling, with a high proportion of glazing on the South elevation, reducing the chance of overheating is a key challenge to ensure a comfortable living temperature year round.

As can be seen in the results outlined in this report, the minor design changes suggested by the cooling hierarchy do not have the desired effect of reducing the chance of overheating to an acceptable level.

The introduction of an air conditioning system does have the desired effect of reducing the chance that the proposed dwelling will overheat, whilst also not having an impact on the notional carbon emissions of the building. Both of these points show that the introduction of an AC system is not only acceptable, but is a requirement to ensure the dwelling operates at it's optimal level.