

Bellway Homes Ltd, Thames Valley 6316 Dee Road Fire Station

Part O Compliance Checklist – Dynamic Method

AES Sustainability Consultants Ltd

Rev 00

November 2023



Part 1 – Building Details and Declarations

1.1 Building and site details	
Residential building name/number	All Applicable buildings/units on site
Street	Dee road (Plots 1 to 8 only), Spey road
Town	Tilehurst
County	Reading
Postcode	RG30 4 JQ, RG30 4DG, RG30 4NF, RG30 4NL
Proposed building use/type of building	Residential
Are there any security, noise, or pollution issues?	Yes, noise and security issues present and accounted for in the assessment
1.2 Designer's details	
Designer's name	Kostas Anastasakis
Company	AES Sustainability Consultants
Address line 1	4b Tiverton Way
Address line 2	Tiverton
Postcode	EX16 6TG
Telephone number	01884 242050
Email address	info@aessc.co.uk

Revision	Author	Date	Comment
Rev 00	Kostas Anastasakis	16.11.2023	Initial Issue
Rev 01			
Rev 02			
Rev 03			

Part 2 – Design Details

Part 2b – Dynamic Thermal Modelling Method

2b.1 Modelling details	
Dynamic software name and version	IES virtual environment, Version 2023.1.0.0
Weather file location used, including any additional, more extreme weather files	Swindon_Brize_Norton_DSY1_2020High50_epw See Appendix D for details
Number of sample units modelled, including an explanation of why the size/selection has been chosen	18 sample units with and without acoustic issues to cover all different unit types and configurations on site. Worst Case orientation(s) units selected
2b.2 Modelled occupancy	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	YES
Details of the occupancy profiles used	As per TM59 table 2 Larger or unusual apartments not included in the table above follow the same principles.
Details of the equipment profiles used	Additional profiles created for 4 bedroom living and kitchen areas. Occupancy increased to four and people respectively. Equipment and lighting loads taken from 3-bedroom kitchen & living templates. Additional profiles created for study rooms. Occupancy assumed as 1 person per study room. Equipment gains assumed as 80W and lighting loads taken from the 1 bedroom kitchen & living templates.
Details of the opening profiles used	APPENDIX B
2b.3 Modelled overheating mitigation strategy	
Free areas	APPENDIX B
Infiltration and mechanical flow rates	APPENDIX A
Window g-value	APPENDIX B
Shading strategy	APPENDIX A
Mechanical cooling	APPENDIX A
2b.4 Modelling results	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	YES
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	Natural ventilation through opening windows Reduced glazing G-value Mechanical ventilation Blacking out excessive glazing from suffering units.
2b.5 Designer's declaration	
Has the building construction proposal been modelled accurately?	YES
Designer's name	Kostas Anastasakis
Designer's organisation	AES Sustainability Consultants
Designer's signature	
Registration number (if applicable)	-
Date of design	16.11.2023

APPENDIX A – Inputs

Architectural Drawings			
Provider	The Noble Consultancy Ltd		
	Drawing number	Revision	Issue Date
Plans			
Coppersmith ground floor	COPP-SP1-11-0-01	T5	20.10.2023
Coppersmith first floor	COPP-SP1-11-0-02	T5	20.10.2023
Fisher ground floor	FISH-SP1-11-0-01	T2	20.10.2023
Fisher first floor	FISH-SP1-11-0-02	T3	20.10.2023
Lardner ground floor	LARD-SP3-11-0-01	T3	20.10.2023
Lardner first floor	LARD-SP3-11-0-02	T4	20.10.2023
Reedmaker ground floor	REED-SP1-11-0-01	T4	20.10.2023
Reedmaker first floor	REED-SP1-11-0-02	T4	20.10.2023
Walker ground floor	WALK-SP1-11-0-01	T5	20.10.2023
Walker first floor	WALK-SP1-11-0-02	T5	20.10.2023
Apartment Block 1 ground floor	APT-SP1-10-0-02	T5	18.10.2023
Apartment Block 1 first floor	APT-SP1-10-0-04	T5	18.10.2023
Apartment Block 1 second floor	APT-SP1-10-0-06	T5	18.10.2023
Apartment Block 2 ground floor	APT-SP1-05-0-01	T7	20.08.2023
Apartment Block 2 first floor	APT-SP1-10-0-03	T7	18.10.2023
Apartment Block 2 second floor	APT-SP1-10-0-05	T7	18.10.2023
Elevations			
Coppersmith	COPP-SP1-25-TC-01	T6	01.11.2023
Fisher	FISH-SP1-25-TC-01	T4	01.11.2023
Lardner	LARD-SP3-25-TC-01	T3	27.06.2023
Reedmaker	REED-SP1-25-TC-01	T5	20.10.2023
Walker	WALK-SP1-25-TC-01	T5	01.11.2023
Apartment Blocks 1 & 2	APT-SP1-25-0-01	T5	15.11.2023
Apartment Blocks 1 & 2	APT-SP1-25-0-02	T6	15.11.2023

Sections			
Coppersmith	COPP-SP1-20-0-02	T4	10.11.2023
Lardner	LARD-SP3-20-0-01	T3	10.11.2023
Reedmaker	REED-SP1-20-0-01	T4	20.10.2023
Apartment Blocks 1 & 2	APT-SP1-20-0-01	T4	15.11.2023
Apartment Blocks 1 & 2	APT-SP1-20-0-02	T5	15.11.2023
Apartment Blocks 1 & 2	APT-SP1-20-0-03	T4	18.10.2023
Apartment Blocks 1 & 2	APT-SP1-20-0-04	T2	18.10.2023

Building Fabric

Construction Elements	U-value in [W/ m²K]	Kappa in (kJ/m²K)
Ground Floor	0.10 - 0.11	75
External Wall	0.24 - 0.26	60
Main Roofs	0.09	9
Sloping Roofs	0.14	9
Int. Ceiling & Floor Houses	N/A	9
Int. Ceiling & Floor Apartments	N/A	95
Internal Partitions	N/A	9
Windows	1.3	N/A
French doors	1.4	N/A

Natural Ventilation

Natural Ventilation	
Window opening profiles	Appendix B

Thermal Comfort Category

CIBSE TM52 Thermal Comfort Category	Explanation	Modelled within assessment
I	High level of expectation only used for spaces occupied by very sensitive and fragile persons.	☐
II	Normal expectation (for new buildings and renovations).	☒
IV	Values outside the criteria for the above categories (only acceptable for a limited periods).	☐

As per CIBSE TM59 guidance, Category III for existing buildings should not be used for the purposes of overheating assessments and has therefore been excluded from the above table.

Ensuring the Overheating Mitigation Strategy is Usable

Protection from falling	
Windows considered in the overheating assessment that may pose a higher risk of falls from height and can be opened wider than 100mm, meet the minimum requirements for protection from falling within table 3.1 of Approved Document O	No
Guarding is to be introduced to all windows not meeting the minimum requirements for protection from falling.	Yes
Window handles on windows that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle.	Yes
Shading Strategy	
The building uses shading devices in the form of external shutters with means of ventilation/reduced g-value glazing/brise soleil/overhangs.	Yes
The building does not use any shading devices.	No
Security	
AES understand that certification shall be provided by the client to demonstrate that canopies and roofs above oriel windows cannot bear the weight of a person. Therefore, rooms above such canopies/ roofs are not considered accessible in the overheating assessment. These windows are deemed secure and can be modelled as openable during sleeping hours (unless other acoustic or air quality constraints apply).	No

Background Ventilation

Background Ventilation	
Proposed Ventilation system	MEV / MVHR
Maximum airflow required (trickle flow rate)	0.3 l/s/m ² in dwellings without additional ventilation requirements

Modelled Ventilation

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
00 Fisher Cloakroom	0.2	N/A
00 Coppersmith A Cloakroom	0.2	N/A
00 Coppersmith A Hall	0.2	N/A
00 Coppersmith A Kitchen/Dining	0.2	N/A
00 Coppersmith A Living	0.2	N/A
00 Coppersmith A Stair	0.2	N/A
00 Coppersmith A Store	0.2	N/A
00 Coppersmith A Store	0.2	N/A
00 Coppersmith Cloakroom	0.2	N/A
00 Coppersmith Hall	0.2	N/A
00 Coppersmith Kitchen/Dining	0.2	N/A
00 Coppersmith Living	0.2	N/A
00 Coppersmith Stair	0.2	N/A
00 Coppersmith Store	0.2	N/A
00 Coppersmith Store	0.2	N/A
00 Fisher Hall	0.2	N/A
00 Fisher Kitchen	0.2	N/A
00 Fisher Living	0.2	N/A
00 Fisher Stair	0.2	N/A
00 Fisher Store	0.2	N/A
00 Lardner SP1 Cloakroom	0.2	N/A
00 Lardner SP1 Hall	0.2	N/A
00 Lardner SP1 Kitchen/Dinner	0.2	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
00 Lardner SP1 Stair	0.2	N/A
00 Lardner SP1 Store	0.2	N/A
00 Lardner SP1 Store	0.2	N/A
00 Lardner SP1 Study	0.2	N/A
00 Lardner SP3 Cloakroom	0.2	N/A
00 Lardner SP3 Hall	0.2	N/A
00 Lardner SP3 Kitchen	0.2	N/A
00 Lardner SP3 Stair	0.2	N/A
00 Lardner SP3 Store	0.2	N/A
00 Lardner SP3 Store	0.2	N/A
00 Lardner SP3 Study	0.2	N/A
00 Reedmaker A Cloakroom	0.2	N/A
00 Reedmaker A Hall	0.2	N/A
00 Reedmaker A Kitchen/Dining	0.2	N/A
00 Reedmaker A Living room	0.2	N/A
00 Reedmaker A Stair	0.2	N/A
00 Reedmaker A Store	0.2	N/A
00 Reedmaker A Store	0.2	N/A
00 Reedmaker A Utility	0.2	N/A
00 Reedmaker Cloakroom	0.2	N/A
00 Reedmaker Hall	0.2	N/A
00 Reedmaker Kitchen/Dining	0.2	N/A
00 Reedmaker Living room	0.2	N/A
00 Reedmaker Stair	0.2	N/A
00 Reedmaker Store	0.2	N/A
00 Reedmaker Store	0.2	N/A
00 Reedmaker Utility	0.2	N/A
00 Walker Cloakroom	0.2	N/A
00 Walker Hall	0.2	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
00 Walker Kitchen/Dining	0.2	10
00 Walker Stair	0.2	N/A
00 Walker Store	0.2	N/A
00 Walker Store	0.2	N/A
00 Walker Study	0.2	N/A
01 Coppersmith A Bathroom	0.2	N/A
01 Coppersmith A Bedroom1	0.2	50
01 Coppersmith A Bedroom2	0.2	35
01 Coppersmith A Bedroom3	0.2	30
01 Coppersmith A Ensuite	0.2	N/A
01 Coppersmith A Landing	0.2	N/A
01 Coppersmith A Stair	0.2	N/A
01 Coppersmith A Store	0.2	N/A
01 Coppersmith Bathroom	0.2	N/A
01 Coppersmith Bedroom1	0.2	N/A
01 Coppersmith Bedroom2	0.2	N/A
01 Coppersmith Bedroom3	0.2	N/A
01 Coppersmith Ensuite	0.2	N/A
01 Coppersmith Landing	0.2	N/A
01 Coppersmith Stair	0.2	N/A
01 Coppersmith Store	0.2	N/A
01 Fisher Bathroom	0.2	N/A
01 Fisher Bedroom1	0.2	N/A
01 Fisher Bedroom3	0.2	N/A
01 Fisher Landing	0.2	N/A
01 Fisher Stair	0.2	N/A
01 Fisher Store	0.2	N/A
01 Lardner SP1 Bathroom	0.2	N/A
01 Lardner SP1 Bedroom1	0.2	50

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
01 Lardner SP1 Landing	0.2	N/A
01 Lardner SP1 Living	0.2	N/A
01 Lardner SP1 Stair	0.2	N/A
01 Lardner SP1 Store	0.2	N/A
01 Lardner SP3 Bathroom	0.2	N/A
01 Lardner SP3 Bedroom1	0.2	N/A
01 Lardner SP3 Landing	0.2	N/A
01 Lardner SP3 Living	0.2	N/A
01 Lardner SP3 Stair	0.2	N/A
01 Lardner SP3 Store	0.2	N/A
01 Reedmaker A Bathroom	0.2	N/A
01 Reedmaker A Bedroom1	0.2	50
01 Reedmaker A Bedroom2	0.2	40
01 Reedmaker A Bedroom3	0.2	30
01 Reedmaker A Bedroom4	0.2	30
01 Reedmaker A Ensuite1	0.2	N/A
01 Reedmaker A Ensuite2	0.2	N/A
01 Reedmaker A Landing	0.2	N/A
01 Reedmaker A Stair	0.2	N/A
01 Reedmaker A Store	0.2	N/A
01 Reedmaker Bathroom	0.2	N/A
01 Reedmaker Bedroom1	0.2	N/A
01 Reedmaker Bedroom2	0.2	N/A
01 Reedmaker Bedroom3	0.2	N/A
01 Reedmaker Bedroom4	0.2	N/A
01 Reedmaker Ensuite1	0.2	N/A
01 Reedmaker Ensuite2	0.2	N/A
01 Reedmaker Landing	0.2	N/A
01 Reedmaker Stair	0.2	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
01 Reedmaker Store	0.2	N/A
01 Walker Bathroom	0.2	N/A
01 Walker Bedroom1	0.2	40
01 Walker Landing	0.2	N/A
01 Walker Living	0.2	N/A
01 Walker Stair	0.2	N/A
01 Walker Store	0.2	N/A
02 Fisher Bedroom2	0.2	N/A
02 Fisher Stair	0.2	N/A
02 Fisher Store	0.2	N/A
02 Lardner SP1 Bedroom2	0.2	40
02 Lardner SP1 Bedroom3	0.2	50
02 Lardner SP1 Ensuite1	0.2	N/A
02 Lardner SP1 Landing	0.2	N/A
02 Lardner SP1 Stair	0.2	N/A
02 Lardner SP1 Store	0.2	N/A
02 Lardner SP1Ensuite2	0.2	N/A
02 Lardner SP3 Bedroom2	0.2	N/A
02 Lardner SP3 Bedroom3	0.2	N/A
02 Lardner SP3 Ensuite1	0.2	N/A
02 Lardner SP3 Ensuite2	0.2	N/A
02 Lardner SP3 Landing	0.2	N/A
02 Lardner SP3 Stair	0.2	N/A
02 Lardner SP3 Store	0.2	N/A
02 Walker Bedroom2	0.2	40
02 Walker Bedroom3	0.2	32
02 Walker Ensuite1	0.2	N/A
02 Walker Ensuite2	0.2	N/A
02 Walker Landing	0.2	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
02 Walker Stair	0.2	N/A
02 Walker Store	0.2	N/A
00 Flat74 Ensuite	0.3	N/A
00 Plot32 Bathroom	0.3	N/A
00 Plot32 Bedroom1	0.3	40
00 Plot32 Flat61 Store	0.3	N/A
00 Plot32 Flat61 Store	0.3	N/A
00 Plot32 Hall	0.3	N/A
00 Plot32 Living/Kitchen	0.3	N/A
00 Plot33 Bathroom	0.3	N/A
00 Plot33 Bedroom1	0.3	40
00 Plot33 Hall	0.3	N/A
00 Plot33 Living/ Kitchen	0.3	N/A
00 Plot33 Store	0.3	N/A
00 Plot33 Store	0.3	N/A
00 Plot35 Bathroom	0.3	N/A
00 Plot35 Bedroom1	0.3	40
00 Plot35 Hall	0.3	N/A
00 Plot35 Living/ Kitchen	0.3	N/A
00 Plot35 Store	0.3	N/A
00 Plot36 Bathroom	0.3	N/A
00 Plot36 Bedroom 1	0.3	38
00 Plot36 Bedroom2	0.3	23
00 Plot36 Ensuite	0.3	N/A
00 Plot36 Hall	0.3	N/A
00 Plot36 Living/Kitchen	0.3	N/A
00 Plot36 Store	0.3	N/A
00 Plot36 Store	0.3	N/A
00 Plot38 Bathroom	0.3	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
00 Plot38 Bedroom1	0.3	35
00 Plot38 Bedroom2	0.3	25
00 Plot38 Bedroom3	0.3	20
00 Plot38 Hall	0.3	N/A
00 Plot38 Hall	0.3	N/A
00 Plot38 Living/ Kitchen	0.3	N/A
00 Plot38 Store	0.3	N/A
02 Plot47 Bathroom	0.3	N/A
02 Plot47 Bedroom1	0.3	17
02 Plot47 Bedroom2	0.3	5
02 Plot47 Hall	0.3	N/A
02 Plot47 Living/ Kitchen	0.3	N/A
02 Plot47 Store	0.3	N/A
02 Plot47 Store	0.3	N/A
02 Plot48 Bathroom	0.3	N/A
02 Plot48 Bedroom1	0.3	25
02 Plot48 Hall	0.3	N/A
02 Plot48 Living/ Kitchen	0.3	15
02 Plot48 Store	0.3	N/A
02 Plot48 Store	0.3	N/A
02 Plot50 Bedroom1	0.3	12
02 Plot50 Flat Bathroom	0.3	N/A
02 Plot50 Flat Hall	0.3	N/A
02 Plot50 Flat Store	0.3	N/A
02 Plot50 Living/ Kitchen	0.3	20
02 Plot50 Store	0.3	N/A
02 Plot51 Bathroom	0.3	N/A
02 Plot51 Bedroom1	0.3	20
02 Plot51 Flat Store	0.3	N/A

Modelled Ventilation		
Room name	Infiltration rate ACH	Modelled ventilation flow rate* L/s
02 Plot51 Hall	0.3	N/A
02 Plot51 Living/ Kitchen	0.3	15
02 Plot54 Bathroom	0.3	N/A
02 Plot54 Bedroom1	0.3	N/A
02 Plot54 Bedroom2	0.3	N/A
02 Plot54 Bedroom3	0.3	N/A
02 Plot54 Flat Ensuite	0.3	N/A
02 Plot54 Flat Store	0.3	N/A
02 Plot54 Hall	0.3	N/A
02 Plot54 Living/ Kitchen	0.3	N/A
02 Plot54 Store	0.3	N/A

Mechanical Cooling

Mechanical Cooling	
Mechanical cooling was modelled in the assessment.	No

APPENDIX B – Modelled Openings

Room name	Window to wall ratio %	Window g-value (EN410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
00 Plot36 Living/Kitchen	32.2	0.73, 0.73	0.81, 1.08, 2.1, 0.85, 1.14, 1.14, 0.85, 1.8, 1.8	0.0, 80.0, 80.0, 0.0, 80.0, 80.0, 0.0, 90.0, 0.0	25.28	off continuously, on continuously, Openable windows ADO Living
00 Plot36 Bedroom 1	19.44	0.73	0.81, 1.08, 1.8, 1.8	0.0, 80.0, 0.0, 90.0	17.62	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Plot38 Bedroom3	21.54	0.73	0.27, 1.08, 1.8	0.0, 80.0, 90.0	32.09	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Plot38 Bedroom2	21.51	0.73	0.27, 1.08, 1.8	0.0, 80.0, 90.0	32.05	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Plot38 Living/ Kitchen	24.75	0.65, 0.65, 0.65	0.85, 1.14, 1.14, 0.85, 0.81, 0.81, 1.08, 1.08, 0.94, 1.8	0.0, 80.0, 80.0, 0.0, 0.0, 80.0, 80.0, 80.0, 90.0	21.46	off continuously, on continuously, Openable windows ADO Living
00 Plot35 Bedroom1	17.42	0.73	0.81, 1.08, 1.8	0.0, 80.0, 90.0	19.39	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Plot47 Living/ Kitchen	14.18	0.52, 0.52	0.95, 1.04, 1.04, 0.95, 1.0, 1.8	80.0, 0.0, 0.0, 80.0, 80.0, 90.0	15.64	off continuously, on continuously, Openable windows ADO Living
02 Plot47 Bedroom1	28.42	0.73	0.95, 1.04, 1.8	80.0, 0.0, 90.0	18.74	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Plot54 Bedroom3	21.1	0.73	0.9, 0.45, 1.8	80.0, 0.0, 90.0	30.23	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Plot54 Bedroom2	21.07	0.73	0.9, 0.45, 1.8	80.0, 0.0, 90.0	30.19	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Plot54 Living/ Kitchen	24.25	0.63, 0.63, 0.63	0.95, 1.04, 1.04, 0.95, 0.9, 0.9, 0.99, 0.99, 0.94, 1.8	80.0, 0.0, 0.0, 80.0, 80.0, 80.0, 0.0, 0.0, 80.0, 90.0	19.32	off continuously, on continuously, Openable windows ADO Living
02 Plot48 Living/ Kitchen	23.44	0.55	0.95, 1.04, 1.8	80.0, 0.0, 90.0	9.91	off continuously, on continuously, Openable windows ADO Living
02 Plot51 Bedroom1	24.68	0.73	0.9, 0.99, 1.8	80.0, 0.0, 90.0	18.27	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
00 Plot38 Bedroom1	21.47	0.73	0.95, 1.04, 1.8, 1.8	80.0, 0.0, 90.0, 0.0	19.8	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Plot36 Bedroom2	30.22	0.73	1.8, 0.85, 1.14	90.0, 0.0, 80.0	30.51	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Plot35 Living/ Kitchen	37.8	0.73	2.1, 0.81, 1.08, 1.8	80.0, 0.0, 80.0, 90.0	13.97	off continuously, on continuously, Openable windows ADO Living
02 Plot54 Bedroom1	21.03	0.73	0.95, 1.04, 1.8, 1.8	80.0, 0.0, 90.0, 0.0	19.8	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom

Room name	Window to wall ratio %	Window g-value (EN410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
02 Plot51 Living/ Kitchen	17.54	0.55	0.9, 0.99, 1.8	80.0, 0.0, 90.0	7.85	off continuously, on continuously, Openable windows ADO Living
02 Plot48 Bedroom1	27.59	0.73	0.95, 1.04, 1.8	80.0, 0.0, 90.0	16.53	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
00 Plot33 Living/ Kitchen	50.84	0.73	2.1, 0.85, 1.14, 1.8	80.0, 0.0, 80.0, 90.0	18.2	off continuously, on continuously, Openable windows ADO Living
02 Plot47 Bedroom2	28.24	0.73	1.04, 0.95, 1.8	0.0, 80.0, 90.0	22.65	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
00 Plot33 Bedroom1	28.18	0.73	0.85, 1.14, 0.96, 0.84	0.0, 80.0, 90.0, 0.0	12.34	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Plot50 Bedroom1	28.78	0.52	0.95, 1.04, 1.8	80.0, 0.0, 90.0	18.55	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Plot50 Living/ Kitchen	22.15	0.52	1.04, 0.95, 0.95, 1.04, 0.51, 0.37, 0.93	0.0, 80.0, 80.0, 0.0, 90.0, 90.0, 90.0	10.61	off continuously, on continuously, Openable windows ADO Living
00 Lardner SP3 Study	18.7	0.73	0.94, 1.8	80.0, 90.0	47.54	on continuously, Openable windows ADO Living
00 Lardner SP3 Kitchen	29.6	0.52	1.57, 1.57, 1.8, 1.8	80.0, 80.0, 90.0, 0.0	25.76	off continuously, on continuously, Openable windows ADO Living
00 Fisher Kitchen	8.19	0.73	1.31, 1.8	80.0, 90.0	33.94	on continuously, Openable windows ADO Living
00 Fisher Living	8.36	0.73, 0.73	0.73, 0.75, 0.75, 2.1, 1.8, 1.8	80.0, 80.0, 0.0, 80.0, 0.0, 90.0	23.37	off continuously, on continuously, Openable windows ADO Living
00 Walker Study	37.39	0.73	0.99, 0.9, 1.8	80.0, 0.0, 90.0	50.78	off continuously, on continuously, Openable windows ADO Living
00 Coppersmith A Kitchen/Dining	18.8	0.52	1.57, 1.57, 0.66, 0.66, 1.8	80.0, 80.0, 80.0, 0.0, 90.0	25.03	off continuously, on continuously, Openable windows ADO Living
00 Coppersmith A Living	16.12	0.52	1.21, 0.41, 0.41, 1.21, 1.8	80.0, 0.0, 0.0, 0.0, 90.0	17.97	off continuously, on continuously, Openable windows ADO Living
00 Reedmaker A Living room	15.94	0.52, 0.52	0.75, 0.75, 1.0, 1.0, 1.8	80.0, 0.0, 80.0, 0.0, 90.0	18.24	off continuously, on continuously, Openable windows ADO Living
00 Reedmaker A Kitchen/Dining	25.97	0.52	1.57, 1.57, 0.9, 0.9, 0.66, 0.66, 1.8, 1.8, 1.4	80.0, 80.0, 0.0, 0.0, 80.0, 0.0, 90.0, 0.0, 0.0	19.56	off continuously, on continuously, Openable windows ADO Living
00 Walker Kitchen/Dining	24.41	0.44, 0.44	1.31, 1.57, 1.57, 1.8, 1.8	80.0, 80.0, 80.0, 90.0, 0.0	32.38	off continuously, on continuously, Openable windows ADO Living
01 Lardner SP3 Living	25.38	0.73	0.85, 0.85, 0.49, 0.49, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	27.41	off continuously, on continuously, Openable windows ADO Living
01 Fisher Bedroom3	21.41	0.73	0.73, 1.19, 1.37, 1.8	80.0, 80.0, 0.0, 90.0	29.75	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
01 Fisher Bedroom1	13.82	0.73, 0.73	0.73, 0.72, 0.72, 0.72, 1.8	80.0, 80.0, 80.0, 0.0, 90.0	22.57	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom

Room name	Window to wall ratio %	Window g-value (EN410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
01 Walker Bedroom1	24.67	0.73, 0.73	1.19, 0.69, 0.72, 0.72, 0.72, 1.8, 1.8	80.0, 0.0, 80.0, 80.0, 0.0, 90.0, 0.0	30.68	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Coppersmith A Bedroom1	26.57	0.73	0.72, 0.72, 0.72, 1.8, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	23.49	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Coppersmith A Bedroom2	18.45	0.73, 0.73	0.73, 1.19, 0.61, 1.8	80.0, 80.0, 0.0, 90.0	36.19	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Coppersmith A Bedroom3	20.96	0.73	1.5, 1.8	80.0, 90.0	34.26	Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Reedmaker A Bedroom3	17.95	0.52	0.75, 0.75, 1.8	80.0, 0.0, 90.0	26.75	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Reedmaker A Bedroom4	19.27	0.52	1.5, 1.8	80.0, 90.0	36.86	Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Reedmaker A Bedroom2	10.69	0.52	0.75, 0.75, 1.8, 1.6	80.0, 0.0, 90.0, 0.0	22.65	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Reedmaker A Bedroom1	20.43	0.52	0.85, 0.76, 0.76, 0.85, 1.8, 1.6	80.0, 0.0, 0.0, 80.0, 90.0, 0.0	24.53	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
01 Lardner SP3 Bedroom1	20.3	0.73	0.72, 0.72, 0.72, 1.8, 1.8	80.0, 80.0, 0.0, 90.0, 0.0	22.72	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Walker Bedroom3	40.43	0.73, 0.73	1.04, 1.04, 0.9, 0.9, 1.19, 0.71, 1.8, 1.6, 1.6	0.0, 0.0, 80.0, 80.0, 0.0, 90.0, 0.0, 0.0	42.14	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Walker Bedroom2	23.81	0.73, 0.73	0.72, 0.72, 0.72, 1.19, 0.69, 1.8, 1.6	80.0, 80.0, 0.0, 80.0, 0.0, 90.0, 0.0	29.42	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Lardner SP3 Bedroom3	28.97	0.73	0.85, 0.85, 0.49, 0.49, 1.6, 1.8, 1.6	80.0, 80.0, 0.0, 0.0, 0.0, 90.0, 0.0	30.69	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
02 Lardner SP3 Bedroom2	23.17	0.73	0.72, 0.72, 0.72, 1.6, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	21.72	off continuously, NightVent.Occupied_Day_Se cure_Night2, Internal Door Bedroom
01 Walker Living	31.21	0.44, 0.44	0.9, 0.9, 1.04, 1.04, 1.19, 1.8	80.0, 80.0, 0.0, 0.0, 80.0, 90.0	37.18	off continuously, on continuously, Openable windows ADO Living
02 Fisher Bedroom2	14.57	0.73	1.16, 0.31	80.0, 0.0	5.1	off continuously, NightVent.Occupied_Day_Se cure_Night2
00 Plot32 Living/Kitchen	14.48	0.73, 0.73	1.0, 0.85, 1.14, 1.14, 0.85, 0.68	80.0, 0.0, 80.0, 80.0, 0.0, 90.0	12.14	off continuously, on continuously, Openable windows ADO Living
00 Plot32 Bedroom1	25.94	0.73	0.85, 1.14, 0.85, 1.14, 0.68	0.0, 80.0, 0.0, 80.0, 90.0	15.26	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Lardner SP1 Study	19.51	0.73	0.94, 1.8	80.0, 90.0	47.54	on continuously, Openable windows ADO Living
00 Lardner SP1 Kitchen/Dinner	17.28	0.52	1.57, 1.57, 1.8, 1.8	80.0, 80.0, 90.0, 0.0	25.76	off continuously, on continuously, Openable windows ADO Living
01 Lardner SP1 Living	22.48	0.73	0.85, 0.85, 0.99, 0.99, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	27.41	off continuously, on continuously, Openable windows ADO Living

Room name	Window to wall ratio %	Window g-value (EN410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
01 Lardner SP1 Bedroom1	13.14	0.73	0.72, 0.72, 0.72, 1.8, 1.8	80.0, 80.0, 0.0, 90.0, 0.0	22.72	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Lardner SP1 Bedroom3	25.71	0.73	0.85, 0.85, 0.99, 0.99, 1.6, 1.8, 1.6	80.0, 80.0, 0.0, 0.0, 0.0, 90.0, 0.0	30.69	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
02 Lardner SP1 Bedroom2	12.86	0.73	0.72, 0.72, 0.72, 1.6, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	21.72	off continuously, Openable windows ADO Bedroom GF, Internal Door Bedroom
00 Coppersmith Kitchen/Dining	18.8	0.52	1.57, 1.57, 0.66, 0.66, 1.8	80.0, 80.0, 80.0, 0.0, 90.0	25.03	off continuously, on continuously, Openable windows ADO Living
00 Coppersmith Living	16.12	0.52	1.21, 0.41, 0.41, 1.21, 1.8	80.0, 0.0, 0.0, 0.0, 90.0	17.97	off continuously, on continuously, Openable windows ADO Living
00 Reedmaker Living room	15.94	0.52, 0.52	0.75, 0.75, 1.0, 1.0, 1.8	80.0, 0.0, 80.0, 0.0, 90.0	18.24	off continuously, on continuously, Openable windows ADO Living
00 Reedmaker Kitchen/Dining	25.97	0.52	1.57, 1.57, 0.9, 0.9, 0.66, 0.66, 1.8, 1.8, 1.4	80.0, 80.0, 0.0, 0.0, 80.0, 0.0, 90.0, 0.0, 0.0	19.56	off continuously, on continuously, Openable windows ADO Living
01 Coppersmith Bedroom1	26.57	0.73	0.72, 0.72, 0.72, 1.8, 1.8	80.0, 80.0, 0.0, 0.0, 90.0	23.49	off continuously, NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Coppersmith Bedroom2	18.45	0.73, 0.73	0.73, 1.19, 0.61, 1.8	80.0, 80.0, 0.0, 90.0	36.19	off continuously, NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Coppersmith Bedroom3	20.96	0.73	1.5, 1.8	80.0, 90.0	34.26	NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Reedmaker Bedroom3	17.95	0.52	0.75, 0.75, 1.8	80.0, 0.0, 90.0	26.75	off continuously, NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Reedmaker Bedroom4	19.27	0.52	1.5, 1.8	80.0, 90.0	36.86	NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Reedmaker Bedroom2	10.69	0.52	0.75, 0.75, 1.8, 1.6	80.0, 0.0, 90.0, 0.0	22.65	off continuously, NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom
01 Reedmaker Bedroom1	20.43	0.52	0.85, 0.76, 0.76, 0.85, 1.8, 1.6	80.0, 0.0, 0.0, 80.0, 90.0, 0.0	24.53	off continuously, NightVent.Occ upied_Day_Se cure_Night2, Internal Door Bedroom

APPENDIX C – Results

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. occupied hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion (a) check
00 Plot36 Living/Kitchen	1989	54	2.7	Pass
00 Plot36 Bedroom 1	3672	33	0.9	Pass
00 Plot38 Bedroom3	3672	43	1.2	Pass
00 Plot38 Bedroom2	3672	49	1.3	Pass
00 Plot38 Living/ Kitchen	1989	52	2.6	Pass
00 Plot35 Bedroom1	3672	34	0.9	Pass
02 Plot47 Living/ Kitchen	1989	58	2.9	Pass
02 Plot47 Bedroom1	3672	76	2.1	Pass
02 Plot54 Bedroom3	3672	65	1.8	Pass
02 Plot54 Bedroom2	3672	72	2.0	Pass
02 Plot54 Living/ Kitchen	1989	59	3.0	Pass
02 Plot48 Living/ Kitchen	1989	59	3.0	Pass
02 Plot51 Bedroom1	3672	63	1.7	Pass
00 Plot38 Bedroom1	3672	36	1.0	Pass
00 Plot36 Bedroom2	3672	44	1.2	Pass
00 Plot35 Living/ Kitchen	1989	38	1.9	Pass
02 Plot54 Bedroom1	3672	48	1.3	Pass
02 Plot51 Living/ Kitchen	1989	51	2.6	Pass
02 Plot48 Bedroom1	3672	67	1.8	Pass
00 Plot33 Living/ Kitchen	1989	58	2.9	Pass
02 Plot47 Bedroom2	3672	81	2.2	Pass
00 Plot33 Bedroom1	3672	54	1.5	Pass
02 Plot50 Bedroom1	3672	50	1.4	Pass
02 Plot50 Living/ Kitchen	1989	55	2.8	Pass
00 Lardner SP3 Study	1989	35	1.8	Pass
00 Lardner SP3 Kitchen	1989	51	2.6	Pass
00 Fisher Kitchen	1989	37	1.9	Pass
00 Fisher Living	1989	45	2.3	Pass
00 Walker Study	1989	54	2.7	Pass
00 Coppersmith A Kitchen/Dining	1989	48	2.4	Pass
00 Coppersmith A Living	1989	59	3.0	Pass
00 Reedmaker A Living room	1989	54	2.7	Pass
00 Reedmaker A Kitchen/Dining	1989	42	2.1	Pass
00 Walker Kitchen/Dining	1989	59	3.0	Pass
01 Lardner SP3 Living	1989	54	2.7	Pass
01 Fisher Bedroom3	3672	59	1.6	Pass
01 Fisher Bedroom1	3672	79	2.2	Pass
01 Walker Bedroom1	3672	78	2.1	Pass
01 Coppersmith A Bedroom1	3672	66	1.8	Pass

Room name	Occupied hours	No. occupied hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion (a) check
01 Coppersmith A Bedroom2	3672	62	1.7	Pass
01 Coppersmith A Bedroom3	3672	57	1.6	Pass
01 Reedmaker A Bedroom3	3672	53	1.4	Pass
01 Reedmaker A Bedroom4	3672	48	1.3	Pass
01 Reedmaker A Bedroom2	3672	45	1.2	Pass
01 Reedmaker A Bedroom1	3672	54	1.5	Pass
01 Lardner SP3 Bedroom1	3672	77	2.1	Pass
02 Walker Bedroom3	3672	78	2.1	Pass
02 Walker Bedroom2	3672	85	2.3	Pass
02 Lardner SP3 Bedroom3	3672	57	1.6	Pass
02 Lardner SP3 Bedroom2	3672	78	2.1	Pass
01 Walker Living	1989	57	2.9	Pass
02 Fisher Bedroom2	3672	85	2.3	Pass
00 Plot32 Living/Kitchen	1989	39	2.0	Pass
00 Plot32 Bedroom1	3672	54	1.5	Pass
00 Lardner SP1 Study	1989	37	1.9	Pass
00 Lardner SP1 Kitchen/Dinner	1989	43	2.2	Pass
01 Lardner SP1 Living	1989	55	2.8	Pass
01 Lardner SP1 Bedroom1	3672	62	1.7	Pass
02 Lardner SP1 Bedroom3	3672	58	1.6	Pass
02 Lardner SP1 Bedroom2	3672	69	1.9	Pass
00 Coppersmith Kitchen/Dining	1989	48	2.4	Pass
00 Coppersmith Living	1989	56	2.8	Pass
00 Reedmaker Living room	1989	54	2.7	Pass
00 Reedmaker Kitchen/Dining	1989	44	2.2	Pass
01 Coppersmith Bedroom1	3672	70	1.9	Pass
01 Coppersmith Bedroom2	3672	59	1.6	Pass
01 Coppersmith Bedroom3	3672	61	1.7	Pass
01 Reedmaker Bedroom3	3672	58	1.6	Pass
01 Reedmaker Bedroom4	3672	47	1.3	Pass
01 Reedmaker Bedroom2	3672	51	1.4	Pass
01 Reedmaker Bedroom1	3672	52	1.4	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a failure).

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion (b) check
00 Plot36 Bedroom 1	16	13	29	Pass
00 Plot38 Bedroom3	16	14	30	Pass
00 Plot38 Bedroom2	16	11	27	Pass
00 Plot35 Bedroom1	19	10	29	Pass
02 Plot47 Bedroom1	24	6	30	Pass
02 Plot54 Bedroom3	16	5	21	Pass
02 Plot54 Bedroom2	16	5	21	Pass
02 Plot51 Bedroom1	25	6	31	Pass
00 Plot38 Bedroom1	15	16	31	Pass
00 Plot36 Bedroom2	14	16	30	Pass
02 Plot54 Bedroom1	17	9	26	Pass
02 Plot48 Bedroom1	25	6	31	Pass
02 Plot47 Bedroom2	24	5	29	Pass
00 Plot33 Bedroom1	19	12	31	Pass
02 Plot50 Bedroom1	22	6	28	Pass
01 Fisher Bedroom3	9	0	9	Pass
01 Fisher Bedroom1	8	1	9	Pass
01 Walker Bedroom1	16	13	29	Pass
01 Coppersmith A Bedroom1	14	10	24	Pass
01 Coppersmith A Bedroom2	16	12	28	Pass
01 Coppersmith A Bedroom3	18	12	30	Pass
01 Reedmaker A Bedroom3	14	11	25	Pass
01 Reedmaker A Bedroom4	17	11	28	Pass
01 Reedmaker A Bedroom2	14	11	25	Pass
01 Reedmaker A Bedroom1	18	11	29	Pass
01 Lardner SP3 Bedroom1	14	3	17	Pass
02 Walker Bedroom3	13	18	31	Pass
02 Walker Bedroom2	14	13	27	Pass
02 Lardner SP3 Bedroom3	12	2	14	Pass
02 Lardner SP3 Bedroom2	14	1	15	Pass
02 Fisher Bedroom2	17	5	22	Pass
00 Plot32 Bedroom1	17	13	30	Pass
01 Lardner SP1 Bedroom1	18	12	30	Pass
02 Lardner SP1 Bedroom3	14	11	25	Pass
02 Lardner SP1 Bedroom2	15	15	30	Pass
01 Coppersmith Bedroom1	15	5	20	Pass
01 Coppersmith Bedroom2	9	1	10	Pass
01 Coppersmith Bedroom3	15	2	17	Pass
01 Reedmaker Bedroom3	17	6	23	Pass
01 Reedmaker Bedroom4	14	1	15	Pass
01 Reedmaker Bedroom2	19	11	30	Pass

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion (b) check
01 Reedmaker Bedroom1	16	4	20	Pass