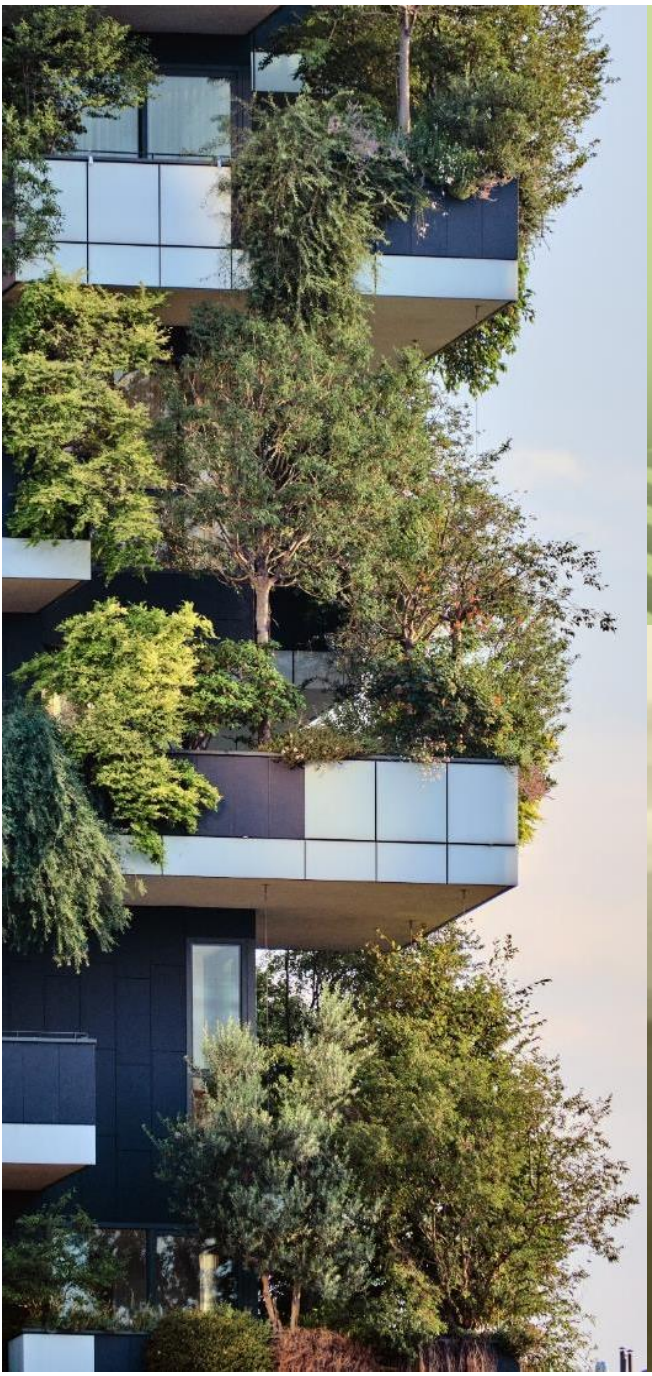
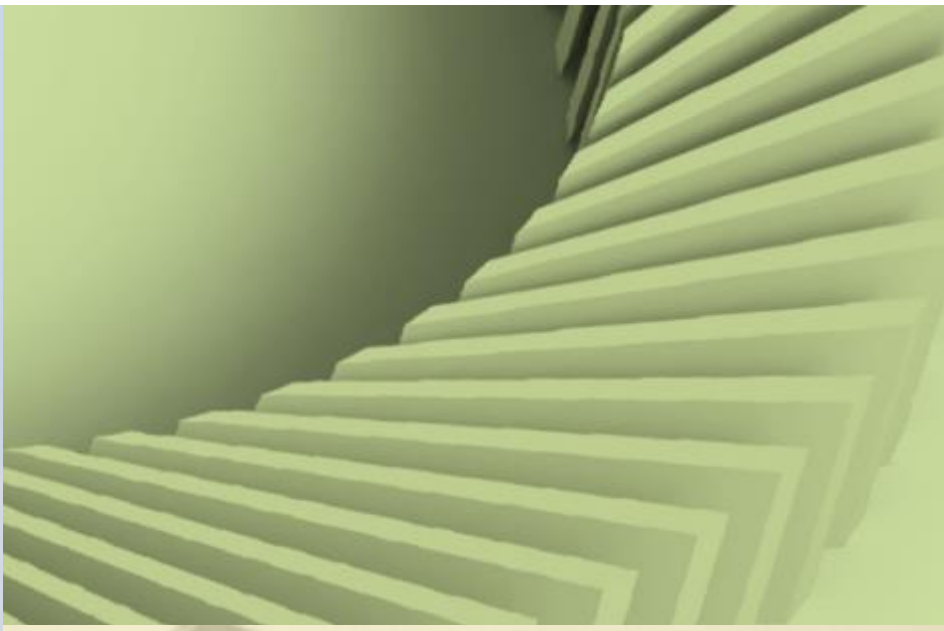
McCarthy Stone

Durrington-on-Sea

ADO Thermal Dynamic Analysis Report

October 2024







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1.0 Introduction

Focus Consultants 2010 LLP were instructed by McCarthy Stone to produce a report which responds to Approved Document O: Overheating for their new development in Durrington-on-Sea based on CIBSE TM59 methodology.

1.1 Purpose

Approved Document O: Overheating 2021 edition has come into force on the 15th June 2022.

The overheating risk assessment has been based on a dynamic thermal model created in IES Virtual Environment software, including all the external openings and shading elements, as well as internal partitions and doors. The assessment has been undertaken based on information provided by the design team. Where information has not been available, suitable assumptions have been made and are described within this report.

The aim of this report is to provide a standardised response to overheating assessment which responds directly to Approved Document O.

1.2 Approved Document O

Approved Document O sets out a clear route to demonstrate compliance through two specific requirements. These are listed below:

- Requirement O1 Overheating mitigation
- Regulation 40B: Providing information.

Both need to be met to comply with the legal requirement as set out within the Building Regulations.

1.3 Requirement O1 Overheating Mitigation

The text below is taken directly from the Approved Document guidance:

(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to—

(a) limit unwanted solar gains in summer.
(b) provide an adequate means to remove heat from the indoor environment.

(2) In meeting the obligations in paragraph (1)—

(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and

(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

The aim of requirement O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures. In the Secretary of State's view, requirement O1 is met by designing and constructing the building to achieve both of the following.

a. Limiting unwanted solar gains in summer.

b. Providing an adequate means of removing excess heat from the indoor environment.

The approved document then sets out the two methods for demonstrating compliance, they are:

1. The simplified method for limiting solar gains and providing a means of removing excess heat.

2. The dynamic thermal modelling method.

The simplified method is the first choice for compliance; however preliminary investigations had already ruled out the simplified method as a route for most scheme designs by McCarthy Stone.

This is predominately due to the single sided nature of the apartments with most restriction found in meeting the minimum threshold for removing excess heat. Therefore, the dynamic thermal model method was selected and forms the basis of this assessment.

1.4 Regulation 40B: Providing Information

Regulation 40B is set out below:

Information about overheating

40B. (1) This regulation applies to building work in respect of a building where Part O of Schedule 1 applies.

(2) The person carrying out the work must, not later than five days after the work has been completed, give sufficient information to the owner about the provision made in accordance with Part O so that the systems in place further to Part O can be operated in such a manner as to protect against overheating.

The intent of Regulation 40B is to ensure that adequate information about the building is given to the owner to allow them to use the overheating mitigation strategy effectively. The approved document provides an example of a possible overheating mitigation strategy.

- *Appropriately sized windows that do not let in too much direct sun, and therefore increase the internal temperature, but which open fully to allow cool air in.*
- *Roller shutters with ventilation louvres.*
- *The location of each element of the overheating mitigation strategy.*
- *Instructions for the operation of each element of the overheating mitigation strategy.*

- *The time of day that different parts of the strategy should be used. For example, the shutters*
- *should be used in the day and the windows opened only when it is cooler outside.*
- *The time of year when the strategy should be used. For example, all summer from May to September or only in hot weather.*
- *Manufacturer's contact details.*
- *The location of controls and instructions for setting of controls, e.g., timer controls.*
- *The location of sensors and how to recalibrate them.*
- *Cleaning and maintenance instructions.*

The guidance also highlights the need for a Home User Guide as required under Section 9 of Approved Document L and suggests that the mitigation strategy set out under Regulation 40B be included under the 'Staying Cool in Hot Weather' section.

1.5 Overheating Methodology

The approved document prescribes the methodology for compliance with the Dynamic Thermal Modelling. It suggests the following guidance is used:

a. CIBSE's TM59 methodology for predicting overheating risk.
b. The limits on the use of CIBSE's TM59 methodology set out in paragraphs 2.5 and 2.6.
c. The acceptable strategies for reducing overheating risk in paragraphs 2.7 to 2.11.
d. TM52; the limits of thermal comfort, avoiding overheating in European buildings.

The limitations set out above will be listed in the following section however the principle is that CIBSE's TM59 method is to be used to demonstrate compliance.

1.5.1 CIBSE TM59

The CIBSE TM59 guide defines a standardised approach to predicting overheating risk for residential building designs using thermal dynamic analysis. It provides a set of profiles that represent reasonable usage patterns for a home suitable for evaluating overheating risk, as well as the comfort parameters to be evaluated through the thermal model. For the purposes of the dynamic model, occupancy is dictated and set by TM59 Methodology and associated gains.

It also provides advice on the parameters to be introduced to the model and reporting requirements. The design comfort criteria are based on criteria previously specified by CIBSE in guides TM52 and Guide A.

Naturally Ventilated Criteria

For dwellings predominantly naturally ventilated, compliance is based on passing both of the following two criteria:

a) For living rooms, kitchens and bedrooms: the number of hours during which ΔT 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. (CIBSE TM52 Criterion 1: Hours of exceedance).

b) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

Fixed Temperature Test

This criterion is advised to be followed for homes that are predominantly mechanically ventilated because they have either no opportunity or extremely limited opportunities for opening windows (e.g., due to noise levels or air quality). The Fixed Temperature Test is based on CIBSE guide A (2015a) that sets the below criteria for occupied rooms.

Homes that are predominantly mechanically ventilated because they have either no opportunity or extremely limited opportunities for opening windows (e.g., due to noise levels or air quality) should be assessed for overheating using the fixed temperature method based on CIBSE Guide A (2015a),

1.5.2 Approved Document O Limitations to TM59

TM59 allows the modeller to make decisions over parameters covering when openings start to open and close based upon the occupancy of the room. AD O sets limits on these and prescribes these ranges for the modeller to apply for the purpose of compliance.

The limitations are:

a. *When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following.*
   i. Start to open when the internal temperature exceeds 22°C.
   ii. Be fully open when the internal temperature exceeds 26°C.
   iii. Start to close when the internal temperature falls below 26°C.
   iv. Be fully closed when the internal temperature falls below 22°C.

b. *At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.*
   i. The opening is on the first floor or above and not easily accessible.
   ii. The internal temperature exceeds 23°C at 11pm.

c. *When a ground floor or easily accessible room is unoccupied, both of the following apply.*
   i. In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below.
   ii. At night, windows, patio doors and balcony doors should be modelled as closed.

d. *An entrance door should be included, which should be shut all the time.*

The model parameters section will detail information on the construction types for both internal and external elements, covering U Values, G Values and Thermal Mass. This is also presented in Section 2.1 of this report.

1.5.3 AD O Acceptable Strategies Limiting Solar Gain

In the same way that AD O sets limitations on the model, it also sets out the acceptable strategies for reducing overheating risk within the model, they are listed below:

a. Fixed shading devices, comprising any of the following.
i. Shutters.
ii. External blinds.
iii. Overhangs.
iv. Awnings.

b. Glazing design, involving any of the following solutions.
i. Size.
ii. Orientation.
iii. g-value.
iv. Depth of the window reveal.

c. Building design – for example, the placement of balconies.

d. Shading provided by adjacent permanent buildings, structures or landscaping.

Therefore, only these methods are applied in the model for the purposes of demonstrating compliance. AD O also highlights that neither foliage nor blinds or curtains should not be considered when meeting requirement O1.

1.5.4 AD O Acceptable Strategies Removing Excess Heat

AD O wants the designer to utilise passive means to mitigate overheating and to remove excess heat, it does not want mechanical cooling and therefore should be viewed as the last resort. The following means are set out under Section 2.10 of the Approved Document:

a. Opening windows (the effectiveness of this method is improved by cross-ventilation).
b. Ventilation louvres in external walls.
c. A mechanical ventilation system.
d. A mechanical cooling system

1.5.5 CIBSE TM52 Guide

The following communal rooms are assessed against CIBSE TM52 criteria, as listed below.

- Residential Living GF
- Wellness Suite GF
- Office GF
- Staff Suite GF
- Staff Sleep GF.

The CIBSE TM52 guide defines a general procedure to assess the risk of summer overheating, in accordance with the adaptive comfort methodology. This methodology is based on the following three criteria, a room that fails any two of the three criteria is classed as overheating.

1. The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature by 1°K or more during the occupied hours of a typical non-heating season (1st May to 30th September). The number of hours shall not be more than 3% of the occupied hours.

2. The second criterion deals with the severity of overheating within any one day, the level of which is a function of both temperatures rise and its duration. This criterion sets a daily limit for acceptability. The weighted exceedance shall be less than or equal to 6 in any one day.

3. The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable. The operative temperature less the maximum acceptable temperature shall not exceed 4 °K.

TM52 also defines the methodology to model the operative temperatures within the rooms of a building. This methodology is implemented within the software used and takes account of the different factors involved in thermal comfort, i.e., air and radiant temperature, air velocity, relative humidity, metabolic rate (based on occupants' activity) and clothing level.

1.6 Building Services Plant Noise

To address the Noise requirement for the ADO document, 24 Acoustics have completed a Noise Survey report to determine the ambient noise levels on site. The full Noise Impact report can be found in Appendix 1.

Section 3.12 of the report sets below criteria for internal noise limits:

> *The World Health Organisation (WHO) [Reference 6] provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines suggest internal noise levels not exceeding 30 dB LAeq,8hr or regularly exceeding 45 dB LAmax, for 'a good night's sleep.*

Section 4.10 of the report summarises below results for the site. According to this, the noise levels are expected exceed the criteria during night hours, therefore, for the elevations facing the railway, the windows are only assigned to be openable during the day and shut at night.

The measured typical background noise levels at Location 1, representative of the existing noise sensitive properties to the north and west of the site, were in the order of 37 dB LA90,5min during daytime periods (07:00 – 23:00) and 29 dB LA90,5min during the night (23:00 to 07:00 hours).

1.7 Software

The dynamic thermal analysis has been undertaken using the Integrated Environmental Solutions Ltd software package as below:

IES Virtual Environment, Version 2023.3:0.0
- Suncast (solar shading analysis)
- MacroFlo (natural ventilation modelling)
- Apache (thermal modelling and simulation)
- VistaPro (advanced analysis of results).

This software is considered suitable to assess the building through dynamic thermal simulation in accordance with the selection criteria within CIBSE AM11.

A specific tool to obtain the operative temperatures and to assess the risk of overheating in accordance with the CIBSE TM52 adaptive comfort methodology is implemented within the VistaPro module of this software. The thermal analysis is based upon dynamic response using ten-minute simulation time steps over an annual period using hourly weather data.

1.8 Limitations

The thermal dynamic analysis is developed through a model based upon a set of theoretical in-built parameters and simplified system definitions, as well as sensible assumptions where further information is not available at the current design stage. Therefore, the accuracy of the temperatures obtained are constrained by the software and the available parameters, and the model provides only an indication of theoretical performance suitable for informing the building design team. The results cannot be considered a guarantee of future performance of the real building. This assessment has also been undertaken based on information provided by the design team. Where information has not been available, suitable assumptions have been made and are described within this report.

2.0 Model Parameters

2.1 Construction Specifications

This assessment is based upon a masonry construction.

Table 1: Construction Specifications			
Opaque Elements	U-value (W/m²/K)	Thermal Mass (kJ/m²/K)	
External Wall	0.19	128.85	
Ground Floor	0.11	240.00	
Internal Ceiling	3.77	7.22	
Internal Floor	1.00	141.78	
Roof	0.11	98.75	
Internal Door	2.20	13.87	
Party Wall	0.17	182.38	
Internal Partition lightweight	1.37	21.00	
Glazed Elements	U-value (W/m²/K)	G-Value (glazing only)	G-Value (BFRC)
External Window Apartment 03 - Bedroom 1 GF Apartment 49 - Bedroom 1 TF	1.30	0.60	0.38
External Window Residential Living GF	1.30	0.65	0.41
External Window Apartment 13 - Bedroom 1 FF Apartment 31 - Bedroom 1 SF	1.30	0.65	0.41
Opaque Lower Panel	1.30	0.16	0.11

2.2 Weather File

The latest CIBSE Design Summer Year (DSY) data has been utilised as specified by the TM59 guide. The weather file used for the analysis is Southampton DSY1 for the 2020s, high emissions, 50% percentile scenario, which can be considered the most appropriate for the site location and has been used in previous analyses. The thermal analysis is based upon dynamic response using six-minute simulation time steps over an annual period using hourly weather data.

2.3 Sample Selection Guidance from CIBSE TM59

CIBSE TM59 allows the assessment to be carried out on a sample approach based on the dwellings that are expected to be risk of overheating.

The sample selection criteria are as below:

a) Dwellings with large glazing areas
b) Top floor dwellings.
c) Dwellings having less/no shading.
d) Dwellings having large sun-facing windows.
e) Dwellings having single aspect windows.
f) Restricted openings on windows.

2.4 Representative Scheme

The representative model is based upon an orientation of 0 degrees from North. The following sample apartments have been selected to undertake CIBSE TM59 assessment using the guidelines mentioned in above section.

Table 2: Sample Apartments

Zone	Location (Storey)	Number of Bedroom	Facade
Apartment 2	Ground Floor	2 Bedroom	North
Apartment 3	Ground Floor	1 Bedroom	South
Apartment 6	Ground Floor	1 Bedroom	South
Apartment 13	First Floor	2 Bedroom	West
Apartment 16	First Floor	1 bedroom	East
Apartment 20	First Floor	2 Bedroom	North
Apartment 21	First Floor	2 Bedroom	South
Apartment 24	First Floor	1 bedroom	South
Apartment 27	First Floor	1 bedroom	South
Apartment 28	First Floor	2 Bedroom	North
Apartment 31	Second Floor	1 Bedroom	West
Apartment 34	Second Floor	1 Bedroom	East
Apartment 38	Second Floor	2 Bedroom	Northeast
Apartment 39	Second Floor	1 bedroom	South
Apartment 42	Second Floor	1 bedroom	South
Apartment 45	Second Floor	1 bedroom	South
Apartment 46	Second Floor	2 Bedroom	North
Apartment 49	Third Floor	2 Bedroom	West
Apartment 52	Third Floor	1 Bedroom	East
Apartment 56	Third Floor	2 Bedroom	Northeast
Apartment 57	Third Floor	1 bedroom	South
Apartment 60	Third Floor	1 bedroom	South
Apartment 62	Third Floor	1 bedroom	South
Guest Suite	Ground Floor	1 Bedroom	North

2.5 Reasons for Selection

2.5.1 Limited Natural Ventilation Opportunity

Ground floor bedrooms windows are considered closed in line with ADO section 2.6 and therefore Apartments 2, 3 and 6 were included in the sample apartments.

The apartments with windows towards the railway have windows assigned as closed during the night as per the noise report findings. Therefore, apartments 13, 16, 31, 34, 49 and 52 were selected as samples.

2.5.2 Solar Gain

West facing apartments are expected to be at risk of overheating due to the low sun angle. South facing apartments receive solar gain from the higher sun angle and therefore expected to be risk of overheating. Therefore, apartments 21, 24, 27, 39, 42, 45, 57, 60 and 62 have been selected.

2.5.3 Lower Risk Dwelling

In line with TM59, lower risk apartments are also included in the sample to compare the performance with the at-risk apartments. With a lower expected solar gain, apartments 20, 28, 38, 46 and 56 were selected as low risk apartments.

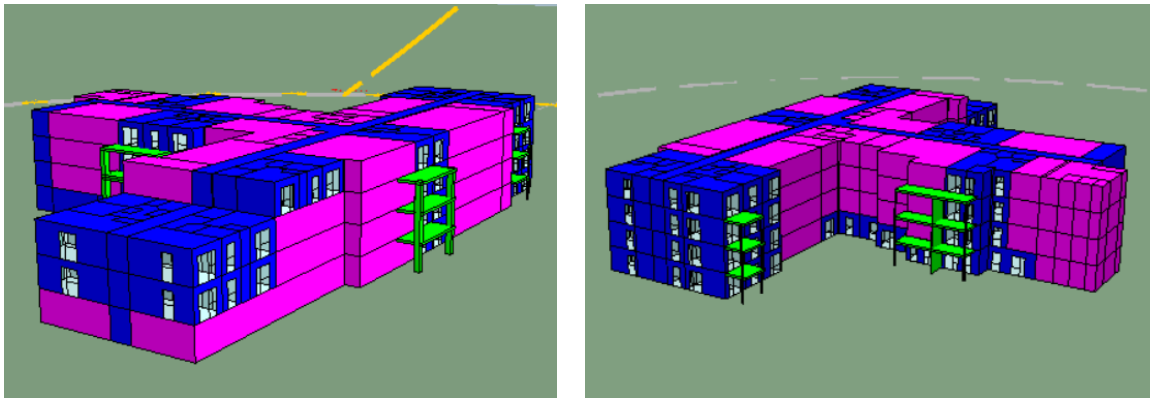

Figure 1: 3D images of the model geometry

2.6 Internal Gains and Occupancy Profiles

2.6.1 Thermal Comfort Category

Through TM52, TM59 offers options for categorisation for the thermal comfort category, the default CAT II has been applied base upon normal occupancy. CAT I is reflected of vulnerable residents. This is currently not applied as the building type is not identified as care facility.

Category	Explanation
I	High level of expectation (only used for spaces occupied by very sensitive and fragile persons)
II	Normal expectation (for new buildings and renovations)
III	A moderate expectation (used for existing buildings)
IV	Values outside the criteria for the above categories (only acceptable for a limited periods)

Figure 2: Suggested building categories, excerpt from CIBSE Guide A

2.6.2 Communal Corridors

TM59 stipulates that corridors should be included where there is communal heating pipework; the heating strategy for McCarthy Stone does not include communal heating therefore the gains are not included in this model.

2.6.3 Communal Spaces

The Communal Rooms are assessed against CIBSE TM52 Guide. The occupancy profiles and internal gains for the communal rooms have been based on the National Calculation Methodology (NCM).

Table 3: NCM Activities for Communal Rooms

Room Name	NCM Activity Assigned
Residential Living GF	NursHome: Office common
Wellness Suite GF	NursHome: Office common
Office GF	NursHome: Office cellular
Staff Suite GF	NursHome: Office common
Staff Sleep GF	NursHome: Bedroom

The Internal Gains for each activity are as listed in below table.

Table 4: Occupancy and Equipment Gain for Communal Rooms

	Office Common	Office Cellular	Bedroom
Lighting Gain (W/m2)	11.25	11.25	2.00
Occupancy Gain (W/person)	94.74	94.74	75.00
Equipment Gain (W/m2)	27.11	27.11	9.18

2.6.4 Residential Spaces

The occupancy profiles and internal gains for the bedrooms and living/kitchen spaces have been based on the CIBSE Guide TM59, as defined in the following table, which provides a standardised methodology for overheating analysis.

It is assumed that bedrooms with the same number of occupants are usually provided with the same appliances. Therefore, the heat loads given by appliances are assumed to be independent of the floor area for the purpose of overheating risk assessment and, therefore, the equipment loads are defined in watts (W) and not W/m². Lighting energy is assumed to be proportional to floor area and to be 2 W/m² from 6 pm to 11 pm as recommended by TM59.

Table 5: Occupancy and Equipment Gain Descriptions

Unit/Room Type	Occupancy	Equipment Load
Double Bedroom	2 people at 70% gains from 11 pm to 8 am; 2 people at full gains from 8 am to 9 am and 10 pm to 11 pm; 1 person at full gain from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm. Base load of 10 W during the sleeping hours.
Single Bedroom	1 person at 70% gains from 11 pm to 8 am; 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm. Base load of 10 W during the sleeping hours.
Living Room/ Kitchen	1 or 2 people dependent upon number of bedrooms at 75% gains from 9am to 10pm; room is unoccupied for the rest of the day	Peak load 450W, 6pm to 10pm. 60W, 9am to 6pm & from 10pm to 12pm. Base load of 35W rest of the day.
Kitchen	1 or 2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
Living	1 or 2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day

The heat gain profile for the above listed rooms is summarised in Appendix 2 of the report.

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2.7 Window and Door Openings

In accordance with Approved Document O limitations, the profiles for window and door openings are set to the following within the model.

When a room is occupied during the day (8am to 11pm), openings should be modelled to do all the following:

a. *Start to open when the internal temperature exceeds 22°C.*
b. *Be fully open when the internal temperature exceeds 26°C.*
c. *Start to close when the internal temperature falls below 26°C.*
d. *Be fully closed when the internal temperature falls below 22°C.*

At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.

a. *The opening is on the first floor or above and not easily accessible.*
b. *The internal temperature exceeds 23°C at 11pm.*

When a ground floor or easily accessible room is unoccupied, both of the following apply:

a. *In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely.*
b. *At night, windows, patio doors and balcony doors should be modelled as closed.*

An entrance door should be included, which should be shut all the time.

As instructed by the design team, the windows are assigned to be openable up to 30 degrees top hung. Below table summarises the technical specifications of each window.

Table 6: Opening Angles and Exposure Type

Opening Type	Opening Restriction (mm)	Eqv. Orifice Area (% of Gross)	Opening Profile
Bedroom - ground floor (1.0m x 1.4m)	100 mm	15.10	ADO. Section_26a (Open during day)
Bedroom - ground floor (1.1m x 1.0m)	100 mm	19.56	ADO. Section_26a (Open during day)
Bedroom - upper floors	30 degrees	87.09	ADO. Section_26ab (Open during day and night)
Living/Kitchen windows	30 degrees	87.09	ADO. Section_26a (Open during day)
Living/Kitchen Patio Door	90 degrees	92.90	ADO. Section_26a (Open during day)

In line with the Acoustic report, the windows towards railways are assigned to be opened only during the day (7am – 11pm).

Appendix 3 provides a visual representation of the openings and opening types which correspond with Table 6 for each orientation.

2.7.1 Security

Referring to Clause 2.6ci and Clause 3.6 of ADO. McCarthy Stone have a strategy which restricts window opens securely which mitigates the risk of intrusion by a casual or opportunistic burglar.

2.7.2 Ensure the Strategy is Usable

ADO Section 3 highlights the constraints that a site can be subject to from Noise, Pollution, Security and Protection from Falling. With the exception the restrictions set out above, no further limitations have been set in this reference model to openings other than manufactures own restrictions. Individual schemes, with site specific restrictions may choose to undertake their own assessment to model iterations to demonstrate compliance.

2.8 Infiltration, Air Speed and Comfort Parameters

The infiltration rate has been assumed to be 0.25 air changes per hour (ACH) throughout all rooms in the model, which is approximately equivalent to 3.0 $m^3/(h.m^2)$ @ 50 Pa as per CIBSE Guide A.

The operative temperature calculations used within CIBSE TM52 and TM59 require assumptions on air speed. The modelled air speed in a space is set at 0.1 m/s as advised in the guidance.

The comfort parameters introduced to the model to obtain the operative temperatures and the TM52 Adaptive Comfort results are listed in the table below. The activity and clothing levels are based on the recommendations in Table 1.5 of CIBSE Guide A.

Table 7: Comfort Parameters (Default from the CIBSE TM59 Profiles in IES software)

Parameter	Value
Metabolic Rate MET Type	Seated at rest
Metabolic Rate MET Value	1.00
Clothing Levels	Minimum 1.00 – Maximum 2.00
Nominal Air Speed	0.10 m/s

2.9 Auxiliary Ventilation

The auxiliary ventilation flow rates assigned to the residential and communal rooms are assigned as instructed by Vent Axia and appended in Appendix 4 of this report.

3.0 Results of the Analysis

3.1 Communal Spaces

The communal rooms assessed for CIBSE TM52 dynamic thermal simulation were Office, Residential Living, Staff Suite, Staff Sleep, Wellness Suite. The ventilation rates as instructed by the clients are listed in Appendix 4 of this report. Using the specifications as summarised in Section 2.0 of this report, all communal rooms are expected to pass CIBSE TM52 overheating criteria except the Residential Living. It is recommended that the g-value of the Residential Living is reduced to 0.60 for CIBSE TM52 compliance.

Detailed results are presented in Appendix 5 of this report.

3.2 Residential Spaces

As per Section 4.10 in CIBSE TM59 guide, homes that have limited ventilation opportunities and predominantly mechanically ventilated should be assessed against the Fixed Temperature Test. The Fixed Temperature Criteria requires operative temperatures of all rooms shall not exceed 26°C for more than 3% of the annual occupied hours.

The following rooms were assessed against the Fixed Temperature Test against TM59.

- Apartment 02 - Bedroom 1 GF
- Apartment 02 - Bedroom 2 GF
- Apartment 03 - Bedroom 1 GF
- Apartment 06 - Bedroom 1 GF
- Apartment 13 - Bedroom 1 FF
- Apartment 13 - Bedroom 2 FF
- Apartment 16 - Bedroom 1 FF
- Apartment 31 - Bedroom 1 SF
- Apartment 31 - Bedroom 2 SF
- Apartment 34 - Bedroom 1 SF
- Apartment 49 - Bedroom 1 TF
- Apartment 49 - Bedroom 2 TF
- Apartment 52 - Bedroom 1 TF
- Guest Suite GF.

With windows openable during the night hours as well, the rest of the occupied rooms are assessed against the Naturally Ventilated Criteria, criteria summarised in Section 1.5.1 of this report.

The overheating risk in the sample apartments is expected to be acceptable based on TM59 methodology and the input parameters and assumptions described in Section 2.0 of this report. The temperature ranges can be maintained within the recommended limits using the proposed whole house ventilation strategy with use of window openings.

Detailed results are presented in Appendix 6 of this report.

4.0 Conclusion

The aim of this assessment was to analyse the habitable rooms on Durrington-on-Sea site against the overheating requirements of the Approved Document O. The ADO specifies a set criterion of window opening profiles and acceptable mitigation strategies, summarised in Section 1.5 of this report. The 3D dynamic model of the development was based on the drawings provided by the design team.

The construction elements assigned to the building are as summarised in Section 2.0 of this report. As instructed by the design team, the windows are assigned to be openable up to 100mm on ground floor bedrooms and 30 degrees for upper floor bedroom. The elevations towards the railway are assigned to be openable only during the day.

The overheating risk in the sample apartments analysed is expected to be acceptable for all the bedrooms and living/kitchen spaces, based on TM59 methodology and the input parameters and assumptions described in Section 2.0. The temperature ranges can be maintained within the recommended limits through natural ventilation with the openings and model parameters used.

These results are subject to the building being constructed to the specifications described in this report, and to the occupancy, equipment and window opening profiles being similar to those specified in this report and Approved Document O. The limitations described within Section 1.8 of this report should also be taken into consideration when interpreting the results obtained.

Appendix 1

Noise Survey Report by 24 Acoustics

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PROPOSED SHELTERED HOUSING DEVELOPMENT AT DURRINGTON ON SEA, WORTHING

NOISE AND VIBRATION ASSESSMENT

Technical Report: R9776-1 Rev 1

Date: 23rd May 2023

For: McCarthy Stone
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24 Acoustics Document Control Sheet

Project Title: Proposed Sheltered Housing Development at Durrington on Sea, Worthing – Noise and Vibration Assessment

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by McCarthy Stone, to undertake a noise and vibration assessment for a development located at Durrington on Sea, Worthing. It is proposed to develop the site for sheltered housing.

1.2 The impact of noise and vibration from the nearby railway line has the potential to affect the proposed dwellings. Accordingly, this noise impact assessment has included:

- External environmental noise and vibration monitoring;
- Consideration of the noise arising from rail movements;
- Consideration of the vibration arising from rail movements;

1.3 This report presents the results of the assessment, following site visits and environmental noise and vibration surveys undertaken between 27th to 31st October 2022.

1.4 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μPa.

2.0 SITE DESCRIPTION

2.1 The site is located off Barrington Road in Durrington on Sea and currently comprises derelict buildings formerly used by West Sussex County Council. The north of the site is bounded by the railway line between Goring-by-Sea and Durrington-on-Sea. The site is part of a wider development for new housing and the existing building are currently under demolition.

2.2 The scheme is for a four-storey building comprising self-contained apartments with associated communal facilities including a bistro, kitchen and buggy storage.

2.3 The existing site and noise survey locations are shown in Figure 1. The proposed site layout is shown in Figure 2.

3.0 CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and quality of life
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'.

3.4 The Planning Practice Guidance (PPG) [Reference 3] was written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

3.6 None of the documents referred to above provide specific noise criteria. The following guidance documents are considered appropriate (technically and objectively) to assess noise impact on the proposed development.

Professional Practice Guidance on Planning & Noise (ProPG)

3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 4] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

3.8 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

(i) Good acoustic design process;
(ii) Internal noise level guidelines;
(iii) External amenity area noise assessment;
(iv) Assessment of other relevant issues.

3.9 The guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

British Standard 8233: 2014

3.10 BS 8233: 2014 [Reference 5] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16\ hour}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,\ 16\ hour}$ in dining rooms during the day and 30 dB $L_{Aeq,\ 8\ hour}$ in bedrooms at night.

3.11 BS 8233 also notes that *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$, depending on the character and number of events per night."*

3.12 The World Health Organisation (WHO) [Reference 6] provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines suggest internal noise levels not exceeding 30 dB $L_{Aeq,8hr}$ or regularly exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

3.13 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq,16\ hour}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

BS 4142:2014+A1:2019 - Methods for Rating Industrial and Commercial Sound

3.14 BS 4142:2014+A1:2019 [Reference 7] provides a method for rating the effects of industrial and commercial sound on residential areas.

3.15 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

3.16 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

3.17 BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night".*

British Standard BS 6472: 2008

3.18 The assessment of human response to vibration within buildings is currently guided by British Standard BS 6472:2008 [Reference 8]. The relevant criteria from the current version of the standard are summarised below.

3.19 Where vibration occurs as a series of events, as in the case of train pass-bys, BS 6472 indicates that Vibration Dose Values (VDVs) should be used. Human response to vibration in buildings is assessed in terms of VDVs defined over daytime and night-time periods.

3.20 The human body is most sensitive to vibration in the vertical direction (head to foot). The standard defines values of VDV which are likely to cause varying degrees of adverse comment and these are summarised in Table 1.

Place and Time	**Vibration Dose Value, $m/s^{1.75}$**		
	Low Probability Of Adverse Comment	**Adverse Comment Possible**	**Adverse Comment Probable**
Residential 16 hr day (07:00 to 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential 8 hr night (23:00 to 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 1: Vibration Dose Values and Subjective Response

Summary of Noise and Vibration Criteria

3.21 The impact of transport noise and vibration upon the proposed development has been assessed in accordance with the following methodology:

- BS 8233: 2014 and the WHO Guidelines for the following maximum noise levels inside the properties:
  - daytime level 35 dB $L_{Aeq, 16\ hour}$ in bedrooms and living rooms;
  - night-time level of 30 dB $L_{Aeq, 8\ hour}$ in bedrooms;
  - night-time internal level of 45 dB $L_{Amax, fast}$ in bedrooms for regular events.
- Noise from new fixed plant associated with the development will be assessed using the guidance of BS 4142: 2014.
- Vibration on the site has been assessed using the guidance of BS 6472: 2008, in terms of the vibration dose value (VDV).

3.22 The noise and vibration criteria summarised above are consistent with the requirements of the 'Planning Noise Advice Document: Sussex' [Reference 9] which is applicable to developments within the jurisdiction of Adur and Worthing Councils.

4.0 ENVIRONMENTAL NOISE AND VIBRATION MEASUREMENTS

Measurement Instrumentation and Procedure

4.1 Environmental noise and vibration measurements were undertaken at the site between 27th and 31st of October 2022 in order to establish existing ambient noise levels and vibration levels using the following equipment:

- Svantek (Class 1) precision sound & vibration level meter Type 958;
- Svantek tri-axial accelerometer Type SV84;
- Brüel and Kjær acoustic calibrator Type 4231.

4.2 The noise and vibration measurement location is shown in Figure 1 and described below:

- Location 1- North of the site, approximately 20m from the edge of the nearest railway track, at a height of approximately 2.5 m above local ground level;

4.3 Noise measurements were undertaken in samples of 5 minute in terms of free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ parameters. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 10].

4.4 The instrumentation's calibration was checked before and after the surveys in accordance with the manufacturers' instructions. No significant drift in calibration was recorded. Microphones were fitted with environmental weather shields during the measurement periods.

4.5 The weather conditions during the survey period were generally fine and dry, with wind speeds less than 5 m/s. A period of rainfall occurred on Monday 31st October therefore this period has been omitted from the analysis.

4.6 Long-term vibration measurements were obtained at Location 1 to measure vibration levels produced by train movements on the railway line. The accelerometer was mounted on the ground and well coupled. Measurements were undertaken in terms of the RMS acceleration in m/s in three axes of motion (defined as X (longitudinal), Y (lateral) and Z (vertical), all relative to the surroundings). The axes were orientated as follows:

x-axis - parallel to the train line;

y-axis - perpendicular to the train line;

z-axis – vertical.

Noise Measurement Results

4.7 The measured noise levels at Location 1 are shown in Table 2 below and are shown graphically in Appendix B.

Date	Sound Pressure Level (dB)		
	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)	
	$L_{Aeq,\ 16\ hour}$	$L_{Aeq,\ 8\ hour}$	Typical $L_{Amax,\ f}$
Thursday 27/10/2022	50*	43	68
Friday 28/10/2022	51	43	68
Saturday 29/10/2022	50	38	63
Sunday 30/10/2022	49	42	66
Monday 31/10/2022	51	*Removed due to weather*	
Representative	**50**	**42**	**67**

Table 2: Measured Noise Levels at Location 1 (Rail) (* = incomplete period)

4.8 24 Acoustics considers the typical max event to be the 10th highest noise level during the relevant night-time period.

4.9 The measured noise levels were primarily affected by noise from the railway. Noise from demolition works elsewhere on the site did not affect the overall measured noise and vibration levels.

4.10 The measured typical background noise levels at Location 1, representative of the existing noise sensitive properties to the north and west of the site, were in the order of 37 dB $L_{A90,5min}$ during daytime periods (07:00 – 23:00) and 29 dB $L_{A90,5min}$ during the night (23:00 to 07:00 hours).

Vibration

4.11 The measured vibration levels (VDVs) are shown graphically in Appendix C.

4.12 The vibration data (VDVs) has been used to determine the overall daytime and night-time VDVs in accordance with the methodology in BS 6472.

4.13 The measured overall vibration levels at Location 1 are shown below in Table 3 and are shown graphically in Appendix C.

Date	Direction of Motion and Vibration Dose Value, $m.s^{-1.75}$					
	Daytime (07:00 to 23:00)			Night-time (23:00 to 07:00)		
	X	Y	Z	X	Y	Z
Thursday 27/10/2022	0.02	0.01	0.03	0.02	≤0.01	0.03
Friday 28/10/2022	0.02	0.01	0.04	0.01	0.01	0.02
Saturday 29/10/2022	0.02	0.01	0.04	0.02	≤0.01	0.01
Sunday 30/10/2022	0.02	0.01	0.03	0.01	≤0.01	0.02
Monday 31/10/2022	0.02	0.01	0.03	*Removed due to weather*		

Table 3: Location 1 Daytime and Night-time Vibration Survey Results

5.0 NOISE AND VIBRATION ASSESMENT

External Noise Break-in

5.1 Calculations have been undertaken, using the noise measurement results corrected for distance, to determine the window and ventilation requirements facing the railway line, which will ensure that the noise levels inside the properties do not exceed BS 8233 and WHO guidelines.

5.2 The noise break in calculations are based on the room sizes and elevations shown on the drawings provided by Re-Format LLP in May 2023.

5.3 The analysis given below has been based on 24 Acoustics' understanding of the envelope construction to be used for this scheme (based on a cavity masonry construction), which is expected to achieve a minimum sound insulation performance of 52 dB R_w.

5.4 It is understood that mechanical ventilation (MVHR) is to be provided to all habitable rooms with no trickle ventilators or passive ventilation openings in the façades of habitable rooms within apartments.

5.5 The minimum required acoustic performances for the glazing are given in Table 4 below.

Glazing	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Glazing Type A	21	17	25	35	37	31

Table 4: Required Glazing Performances

5.6 In making a comparison with the values in Table 4, it is important that the glazing figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire glazing system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any external glazed doors to habitable rooms (i.e. from balcony areas).

5.7 For guidance, standard thermal double glazing (e.g. 4mm glass / 12mm cavity / 4mm glass, minimum 31 dB R_w) would be capable of achieving the required sound reduction performance.

5.8 Ventilation systems should allow for adequate ventilation to meet background ventilation requirements as per Part F of the Building Regulations [Reference 11].

External Amenity Areas

5.9 An external communal amenity space is proposed on the eastern side of the new building, as shown on the site plan in Figure 2. The noise measurement results indicate that external noise levels within the communal amenity space would be comfortably below 55 dB $L_{Aeq,\ 16\ hour}$ and therefore acceptable.

New Plant Noise Criteria

5.10 The cumulative noise from all new plant associated with the development should have a maximum rating noise level of 5 dBA below the background noise levels when assessed at the nearest sensitive property in accordance with BS 4142:2014. As night-time background noise levels are sufficiently low, a plant noise limit of no greater than 29 dB $L_{Aeq,\ 15\ min}$ is considered appropriate at noise-sensitive façades during night-time hours.

5.11 The daytime and night-time plant noise level criteria, for new plant associated with the development, are shown in Table 5 below.

Period	Maximum Rating Noise Level (dB)
Daytime (07:00 to 23:00)	32 dB $L_{Aeq, 1\ hour}$
Night-time (23:00 to 07:00)	29 dB $L_{Aeq, 15\ min}$

Table 5: Plant noise level criteria

5.12 The plant noise level criteria shown in Table 5 are to be achieved at the nearest noise sensitive properties to the site, namely the residential properties to the north and west. The noise levels in Table 5 apply to the cumulative noise level from all new plant associated with the development. Plant noise levels shall be assessed in accordance with BS 4142: 2014.

Vibration

5.13 As a worst-case screening tool, 24 Acoustics' experience indicates that the VDV levels measured on the internal floor of a building can be up to twice the measured free field level, in the vertical axis on the ground floor and up to four times on the first floor. This is as a result of the floors within the building amplifying the forcing vibration, although this will depend heavily upon the building construction type which is not yet confirmed. To provide a worst case scenario for indicative purposes only, these multiplying factors have been applied to the derived daytime and night-time VDV values measured (as reported above).

5.14 The predicted worst-case daytime and night-time internal VDVs at Location 1 are summarised in Table 6 for comparison with the probability of adverse comment.

Location	Predicted Worst Case Internal VDV ($ms^{-1.75}$)	
	Daytime (07:00 To 23:00 Hours)	**Night-Time (23:00 To 07:00 Hours)**
Closest Façade to the Railway (Upper Floors)	0.2	0.1
Range for low probability of adverse comment	**0.2 to 0.4**	**0.1 to 0.2**

Table 6: Predicted Worst Case Internal Daytime and Night-Time VDVs

5.15 Table 6 indicates that there is a low probability of adverse comment throughout the development from vibration, which is acceptable.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been instructed by McCarthy Stone, to undertake a noise and vibration assessment for a development located at Durrington on Sea, Worthing. It is proposed to develop the site for sheltered housing.

6.2 Ambient noise and vibration surveys have been undertaken to determine the level of noise and vibration from the railway line affecting the site.

6.3 Based on the measured noise levels, acceptable internal noise levels would be achieved within the proposed properties using standard thermal double glazing and the proposed use of mechanical ventilation (MVHR), in accordance with defined criteria (BS 8233:2014 and WHO:2000).

6.4 External noise levels within the communal garden areas will also be acceptable.

6.5 The levels of vibration within the proposed development would be within the range of the low probability of adverse comment defined in BS 6472, and therefore acceptable.

6.6 External noise criteria have been established for new plant associated with the scheme, based on the measured background noise levels and BS 4142: 2014.

6.7 On this basis, it is considered that an appropriate internal and external acoustic environment can be provided to the proposed residential properties on this site.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2021.

2. DEFRA. Noise Policy Statement for England, 2010.

3. Department of Communities and Local Government. Planning Practice Guidance, July 2019

4. 2014. ProPG Professional Practice Guidance on Planning and Noise (ProPG), ANC, IOA, CIEH, May 2017.

5. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.

6. World Health Organisation. Guidelines for Community Noise, 2000.

7. British Standards Institution. British Standard 4142: Methods for Rating Industrial and Commercial Sound, 2014+A1:2019.

8. British Standards Institution. British Standard 6472: Guide to Evaluation of Human Exposure to Vibration in Buildings, Part 1: Vibration Sources Other than Blasting: 2008.

9. Planning Noise Advice Document: Sussex, September 2021

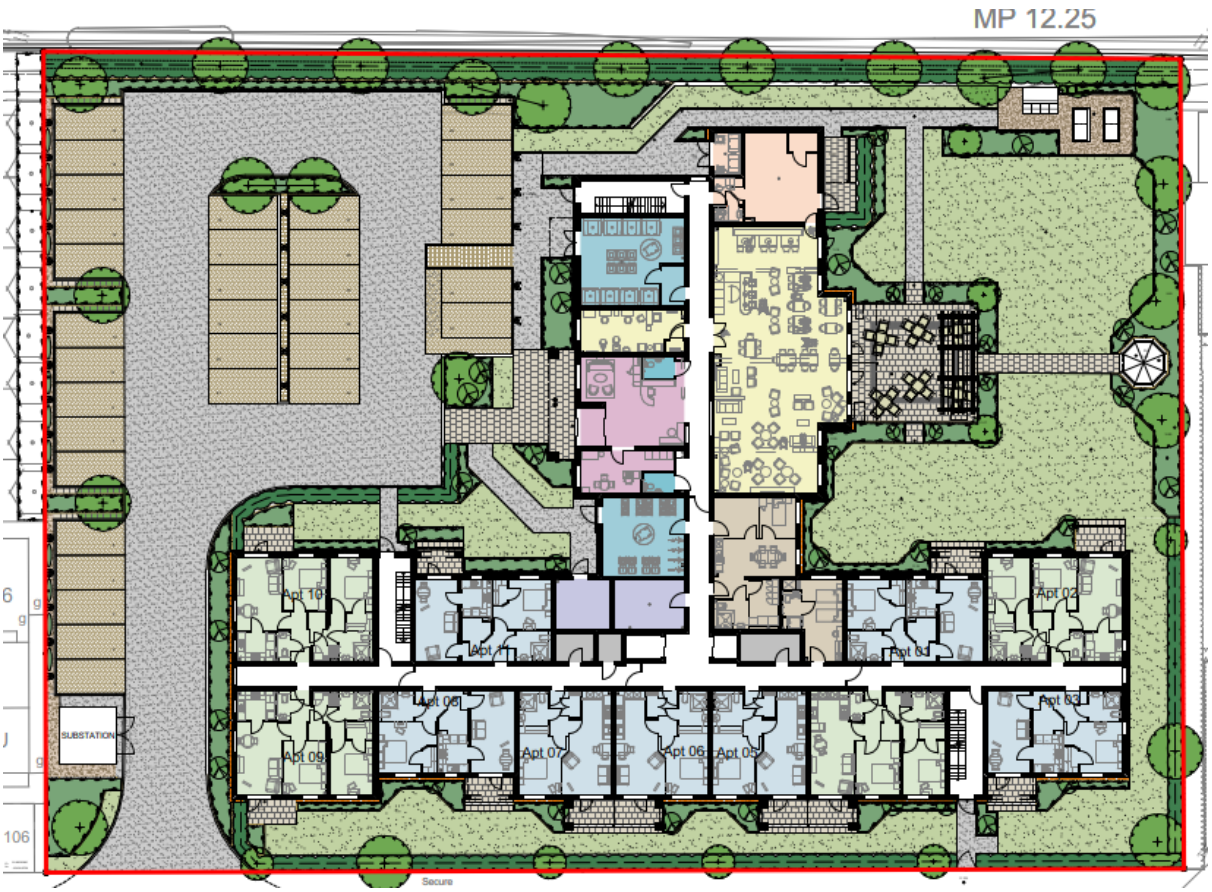
10. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' 1991.

11. Building Regulations, Approved Document F, 2021.

FIGURES



Project: Durrington on Sea	**Title:** Existing Site and Noise & Vibration Measurement Location		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** 1	
Date: May 2023	**Drawn By:** AP	**Job No:** 9776-1	



Project: Durrington on Sea	**Title:** Proposed layout		24Acoustics
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** 1	
Date: May 2023	**Drawn By:** AP	**Job No:** 9776-1	

APPENDIX A NOISE & VIBRATION TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in important by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the " value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

Vibration

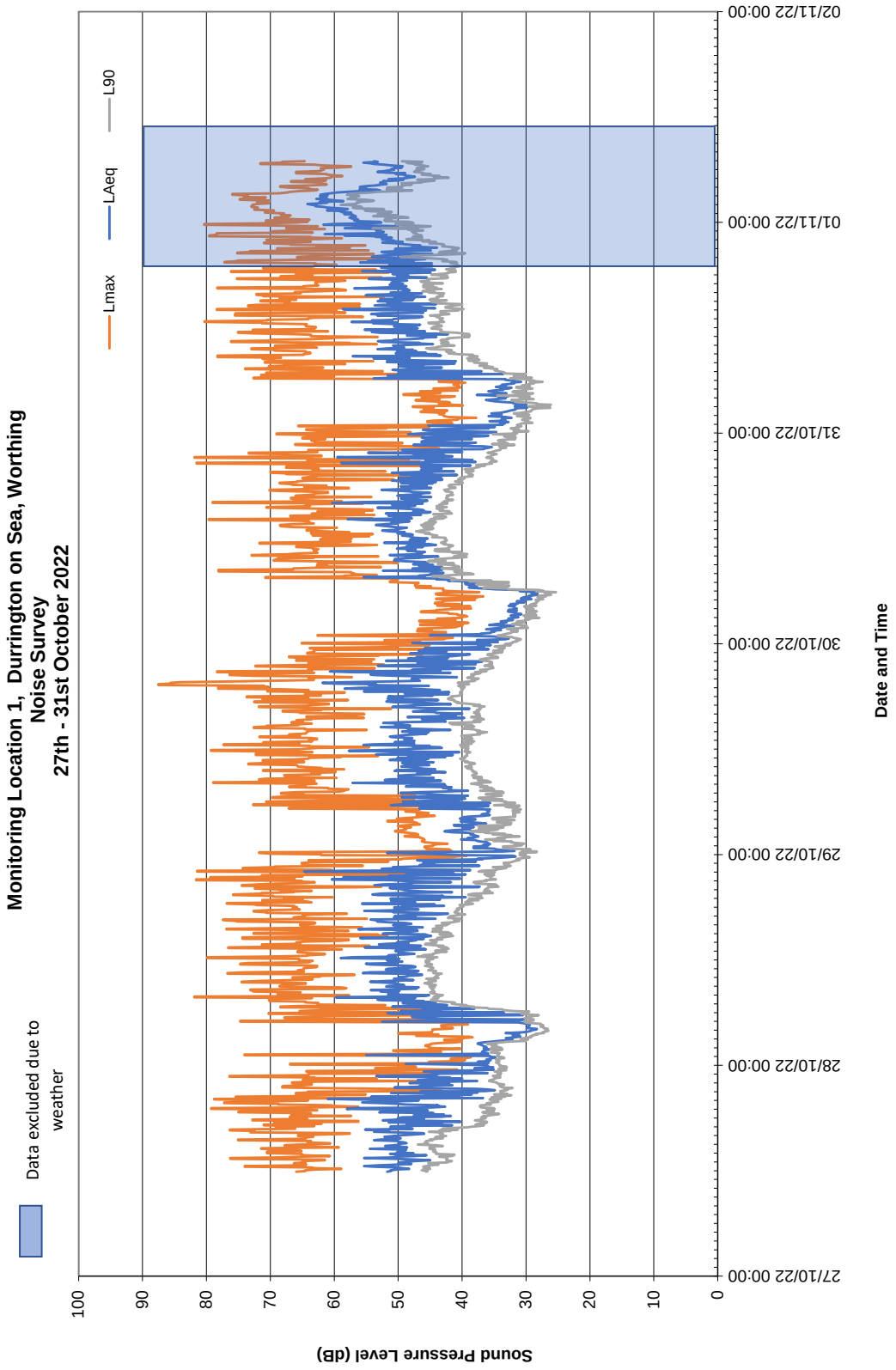
Vibration can be described as a mechanical isolation of a medium about an equilibrium point. Vibration may be periodic, such as the motion of a pendulum or random such as the response of ground to a force input on a construction or demolition site.

Vibration may be measured in terms of acceleration, velocity or displacement (most commonly acceleration or velocity) using either an accelerometer or a velocity transducer and suitable signal conditioning system.

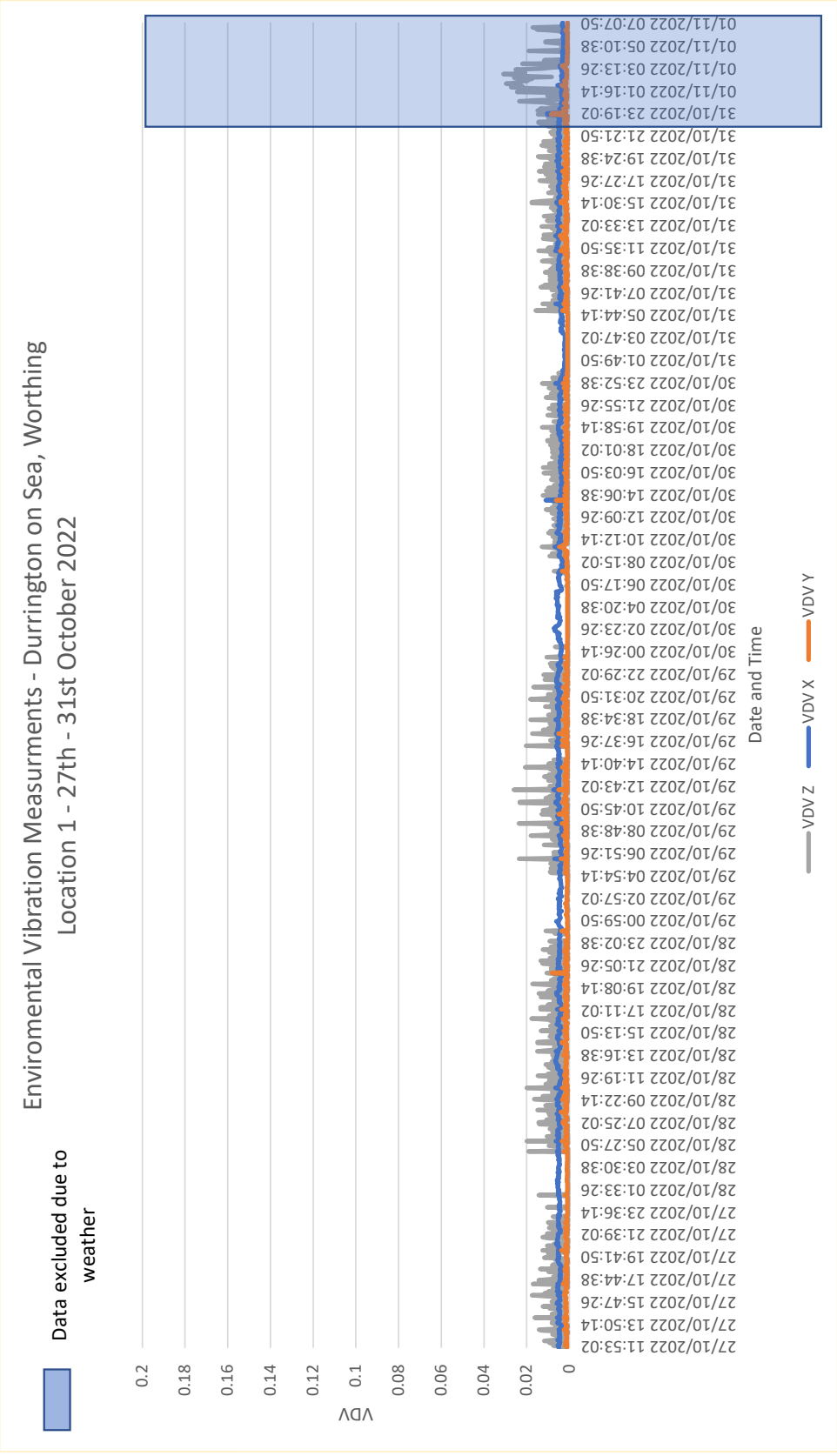
The measured data may be analysed to identify frequency content and considered in terms of a number of different parameters, including the root mean square (rms), maximum or peak.

In the UK British Standard 6472 Parts 1 and 2 provides methodology for measuring and assessing human exposure to vibration in buildings. The standard states that vibration should be measured in the three orthogonal axes of motion, two lateral and one vertical (with respective frequency weighting curves W_d and W_b), in terms of the vibration dose value (VDV) for overall daytime and night-time periods. Guidance is given on the relationship between daytime and night-time VDV exposures levels and the impacts on occupants.

APPENDIX B: NOISE MEASUREMENT RESULTS



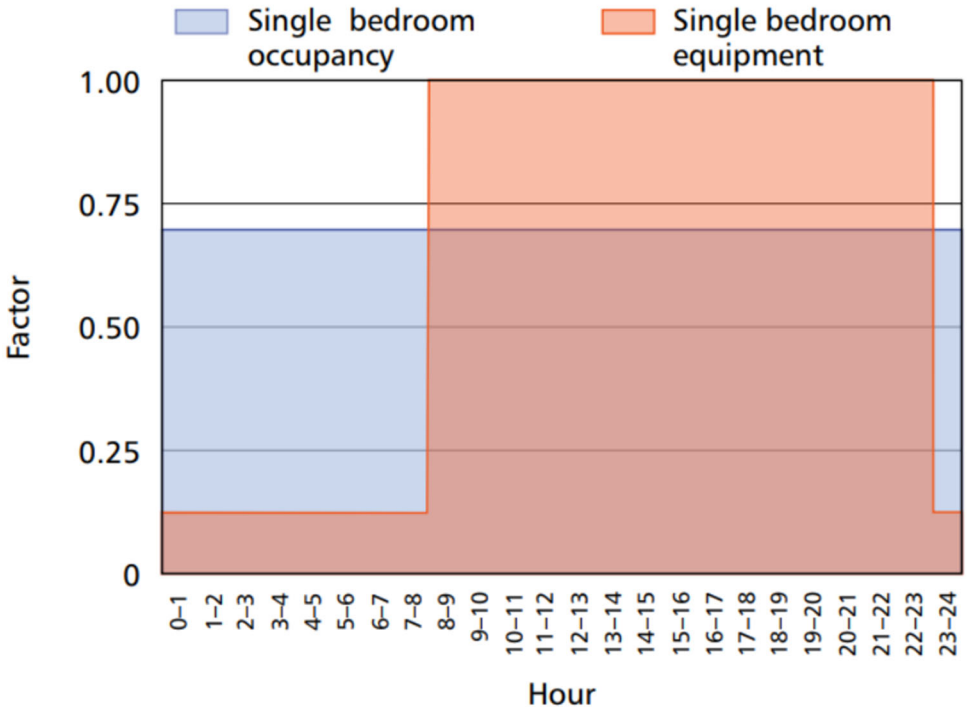
APPENDIX C VIBRATION MEASUREMENT RESULTS



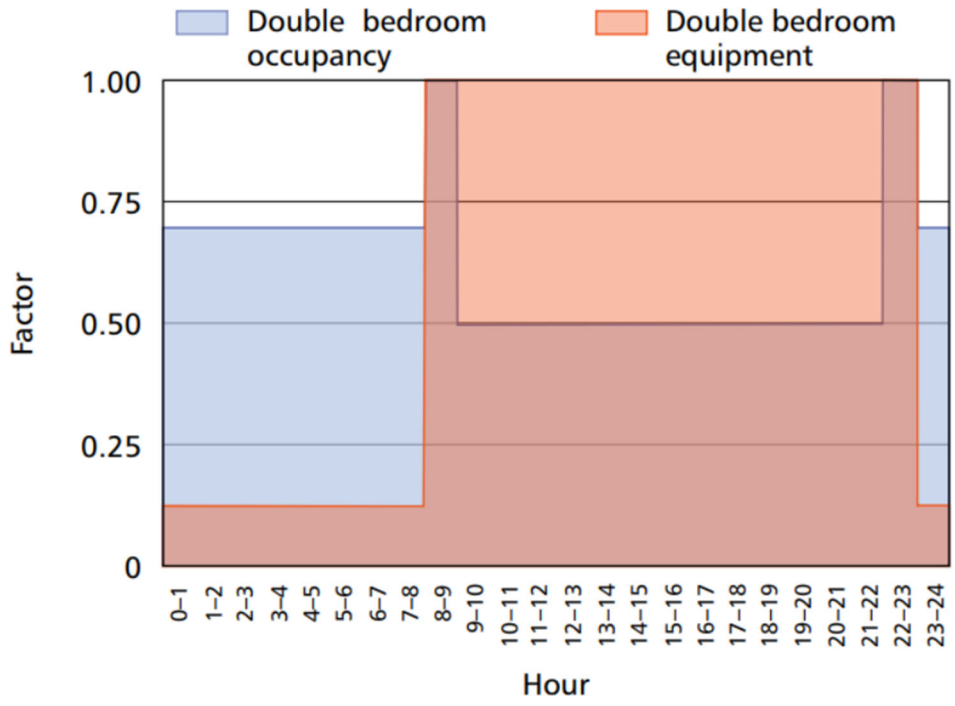
Appendix 2

Heat Gains

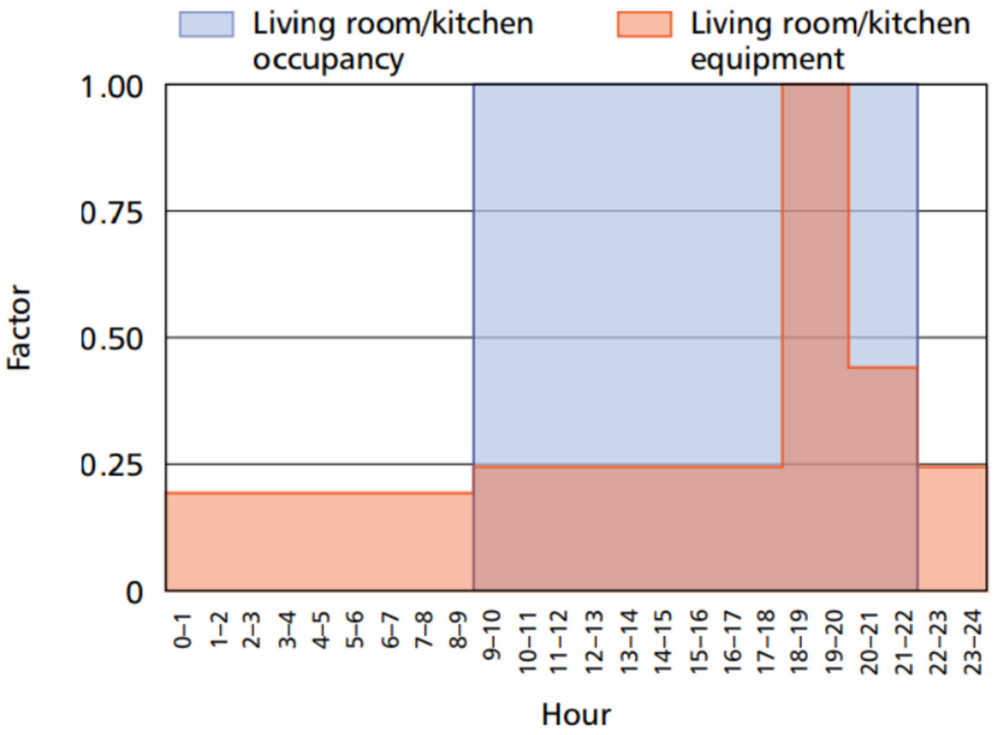
Focus Consultants 2010 LLP, Focus House, Millennium Way West, Phoenix Business Park, Nottingham NG8 6AS T. 0115 976 5050



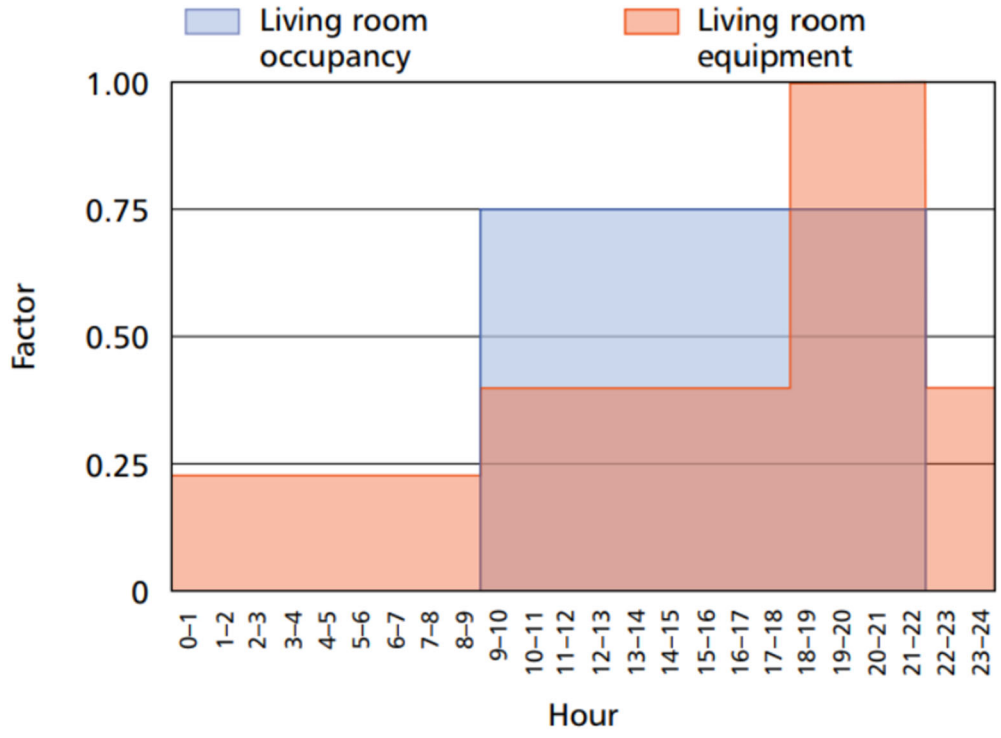
Heat Gain Profile: Single Bedroom



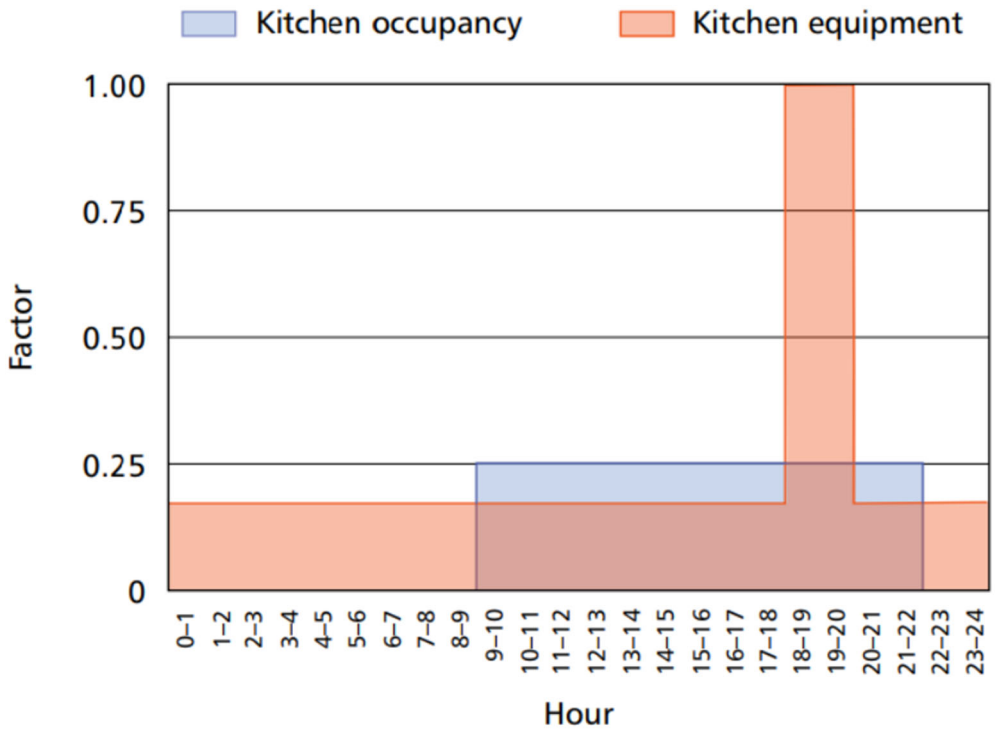
Heat Gain Profile: Double Bedroom



Heat Gain Profile: Living Room/ Kitchen



Heat Gain Profile: Living Room

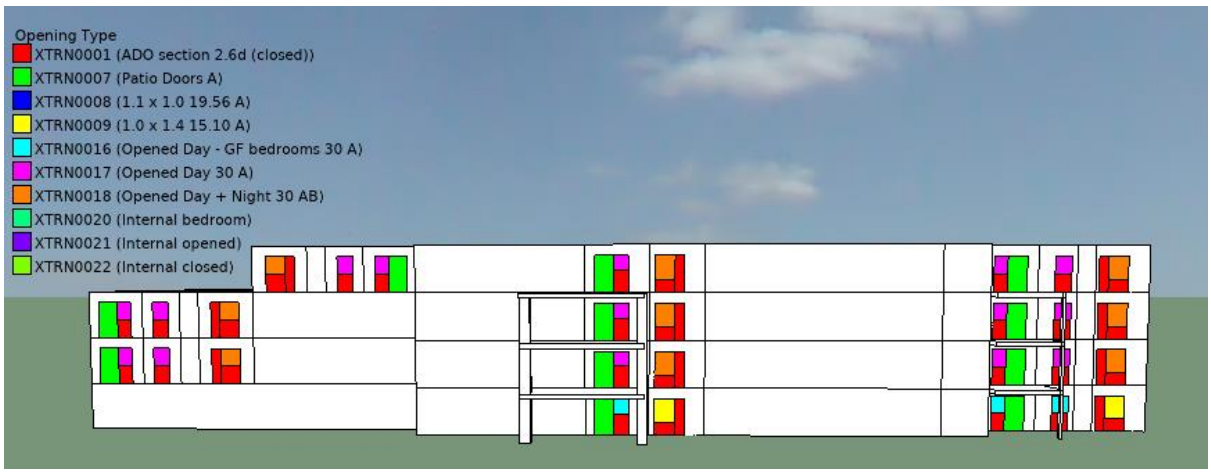


Heat Gain Profile: Kitchen

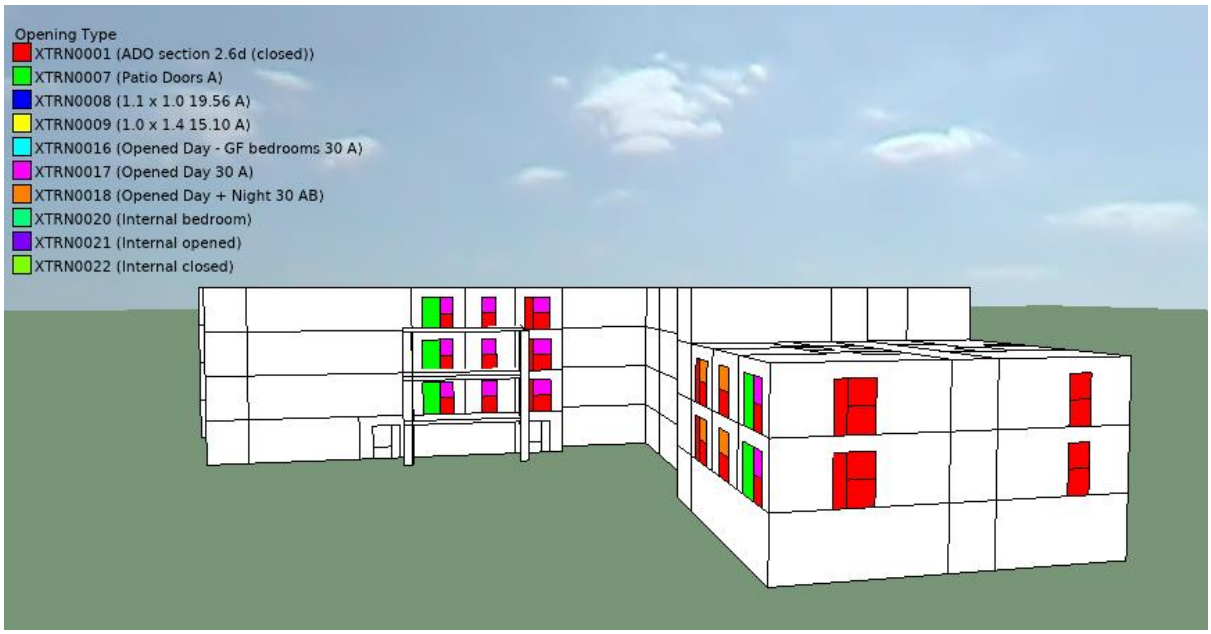
Appendix 3

Window Types

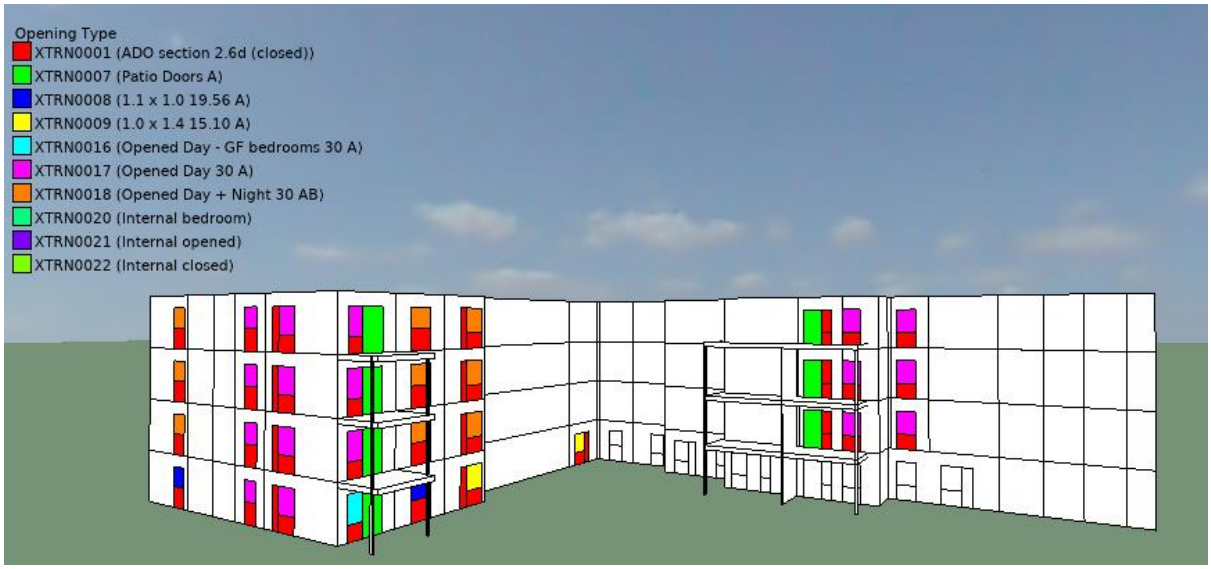
Focus Consultants 2010 LLP, Focus House, Millennium Way West, Phoenix Business Park, Nottingham NG8 6AS T. 0115 976 5050



South Perspective



West Perspective



North-east Perspective

Appendix 4

Mechanical Ventilation Flow Rates

Focus Consultants 2010 LLP, Focus House, Millennium Way West, Phoenix Business Park, Nottingham NG8 6AS T. 0115 976 5050

FOCUS CONSULTANTS 2010 LLP

Thermal Model - ADO Specifications

CLIENT:	McCarthy Stone
PROJECT:	Durrington-on-Sea
SOFTWARE:	IESVE
VERSION:	2023.0:0.0
SITE LOCATION:	Durrington-on-Sea
WEATHER FILE:	Southampton_DSY1_2020High50_.epw
DATE:	25 June 2024
BUILDING CATEGORY:	Category II (New Build)
REVISION:	B

MVHR Flow Rates Assigned - Residentials

Space Name	Infiltration (ach)	MVHR	Operation Profile	Notes
Apartment 02 - Bedroom 1 GF	0.30	8.80	on continuously	As per Vent Axia Design
Apartment 02 - Bedroom 2 GF	0.30	10.50	on continuously	As per Vent Axia Design
Apartment 02 - Kitchen GF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 02 - Living GF	0.30	15.80	on continuously	As per Vent Axia Design
Apartment 03 - Bedroom 1 GF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 03 - Kitchen GF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 03 - Living GF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 06 - Bedroom 1 GF	0.30	13.50	on continuously	As per Vent Axia Design
Apartment 06 - Kitchen/Living GF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 13 - Bedroom 1 FF	0.30	9.20	on continuously	As per Vent Axia Design
Apartment 13 - Bedroom 2 FF	0.30	11.10	on continuously	As per Vent Axia Design
Apartment 13 - Kitchen/Living FF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 16 - Bedroom 1 FF	0.30	11.80	on continuously	As per Vent Axia Design
Apartment 16 - Kitchen FF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 16 - Living FF	0.30	17.20	on continuously	As per Vent Axia Design
Apartment 20 - Bedroom 1 FF	0.30	8.80	on continuously	As per Vent Axia Design
Apartment 20 - Bedroom 2 FF	0.30	10.50	on continuously	As per Vent Axia Design
Apartment 20 - Kitchen FF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 20 - Living FF	0.30	15.80	on continuously	As per Vent Axia Design
Apartment 21 - Bedroom 1 FF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 21 - Kitchen FF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 21 - Living FF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 24 - Bedroom 1 FF	0.30	13.50	on continuously	As per Vent Axia Design
Apartment 24 - Kitchen/Living FF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 27 - Bedroom 1 FF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 27 - Kitchen FF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 27 - Living FF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 28 - Bedroom 1 FF	0.30	9.20	on continuously	As per Vent Axia Design
Apartment 28 - Bedroom 2 FF	0.30	11.10	on continuously	As per Vent Axia Design
Apartment 28 - Kitchen/Living FF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 31 - Bedroom 1 SF	0.30	9.20	on continuously	As per Vent Axia Design
Apartment 31 - Bedroom 2 SF	0.30	11.10	on continuously	As per Vent Axia Design
Apartment 31 - Kitchen/Living SF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 34 - Bedroom 1 SF	0.30	11.80	on continuously	As per Vent Axia Design
Apartment 34 - Kitchen SF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 34 - Living SF	0.30	17.20	on continuously	As per Vent Axia Design
Apartment 38 - Bedroom 1 SF	0.30	8.80	on continuously	As per Vent Axia Design
Apartment 38 - Bedroom 2 SF	0.30	10.50	on continuously	As per Vent Axia Design
Apartment 38 - Kitchen SF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 38 - Living SF	0.30	15.80	on continuously	As per Vent Axia Design
Apartment 39 - Bedroom 1 SF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 39 - Kitchen SF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 39 - Living SF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 42 - Bedroom 1 SF	0.30	13.50	on continuously	As per Vent Axia Design
Apartment 42 - Kitchen/Living SF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 45 - Bedroom 1 SF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 45 - Kitchen SF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 45 - Living SF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 46 - Bedroom 1 SF	0.30	9.20	on continuously	As per Vent Axia Design
Apartment 46 - Bedroom 2 SF	0.30	11.10	on continuously	As per Vent Axia Design
Apartment 46 - Kitchen/Living SF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 49 - Bedroom 1 TF	0.30	9.20	on continuously	As per Vent Axia Design
Apartment 49 - Bedroom 2 TF	0.30	11.10	on continuously	As per Vent Axia Design
Apartment 49 - Kitchen/Living TF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 52 - Bedroom 1 TF	0.30	11.80	on continuously	As per Vent Axia Design
Apartment 52 - Kitchen TF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 52 - Living TF	0.30	17.20	on continuously	As per Vent Axia Design
Apartment 56 - Bedroom 1 TF	0.30	8.80	on continuously	As per Vent Axia Design
Apartment 56 - Bedroom 2 TF	0.30	10.50	on continuously	As per Vent Axia Design
Apartment 56 - Kitchen TF	0.30	13.00	on continuously	As per Vent Axia Design

MVHR Flow Rates Assigned - Residentials				
Space Name	**Infiltration (ach)**	**MVHR**	**Operation Profile**	**Notes**
Apartment 56 - Living TF	0.30	15.80	on continuously	As per Vent Axia Design
Apartment 57 - Bedroom 1 TF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 57 - Kitchen TF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 57 - Living TF	0.30	16.10	on continuously	As per Vent Axia Design
Apartment 60 - Bedroom 1 TF	0.30	13.50	on continuously	As per Vent Axia Design
Apartment 60 - Kitchen/Living TF	0.30	14.00	on continuously	As per Vent Axia Design
Apartment 62 - Bedroom 1 TF	0.30	12.90	on continuously	As per Vent Axia Design
Apartment 62 - Kitchen TF	0.30	13.00	on continuously	As per Vent Axia Design
Apartment 62 - Living TF	0.30	16.10	on continuously	As per Vent Axia Design
Guest Suite GF	0.30	15.00	on continuously	As per Vent Axia Design

MVHR Flow Rates Assigned - Communals				
Space Name	**Infiltration (ach)**	**MVHR**	**Operation Profile**	**Notes**
Staff Sleep GF	0.30	0.00	on continuously	As per Vent Axia Design
Office GF	0.30	0.00	on continuously	As per Vent Axia Design
Wellness Suite GF	0.30	15.00	on continuously	As per Vent Axia Design
Residential Living GF	0.30	135.00	on continuously	As per Vent Axia Design
Staff Suite GF	0.30	15.00	on continuously	As per Vent Axia Design

Appendix 5

CIBSE TM52 Results

Focus Consultants 2010 LLP, Focus House, Millennium Way West, Phoenix Business Park, Nottingham NG8 6AS T. 0115 976 5050

FOCUS CONSULTANTS 2010 LLP

Thermal Model - Overheating Results (TM52 Methodology)

CLIENT:	McCarthy Stone
PROJECT:	Durrington-on-Sea
SOFTWARE:	IESVE
VERSION:	2023.0:0.0
SITE LOCATION:	Durrington-on-Sea
WEATHER FILE:	Southampton_DSY1_2020High50_.epw
DATE:	25 June 2024
BUILDING CATEGORY:	Category II (New Build)
REVISION:	A

The results for each of the occupied rooms according to CIBSE TM52 Adaptive Comfort Methodology are listed below

An occupied room that fails any two of the three following criteria is classed as overheating

Criterion 1: Limit of 3% of occupied hours that the Operative Temperature exceeds the Maximum Acceptable Temperature by 1°K

Criterion 2: Limit of 6 to the daily weighted exceedance, temperature rise over acceptable temperature (°K) multiplied by its duration (hours)

Criterion 3: Absolute maximum daily temperature, Operative Temperature less Maximum Acceptable Temperature < 4 °K

Communal Areas				
Room Name	Criterion 1	Criterion 2	Criterion 3	TM52
	%hrs Top-Tmax >= 1K	Max. daily °K x hrs	Absolute Max. ΔT	Pass
Office GF	2.50	7.00	2.00	Yes
Residential Living GF	2.80	9.00	2.00	Yes
Staff Suite GF	0.00	0.00	0.00	Yes
Wellness Suite GF	0.10	1.00	1.00	Yes
Staff Sleep GF	0.10	1.00	1.00	Yes

Appendix 6

Approved Document O Report

Focus Consultants 2010 LLP, Focus House, Millennium Way West, Phoenix Business Park, Nottingham NG8 6AS T. 0115 976 5050

Approved Document O report
Overheating risk in residential buildings
for
RL for Durrington-on-Sea

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RL for Durrington-on-Sea

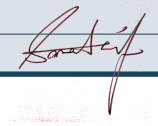
Building details

Project name: RL for Durrington-on-Sea	Date: 21-10-2024 15:09:03
Location: Southampton, United Kingdom	
Address: Duttington-on-Sea	
Building use: Retirement Living	
Are there any security, noise, or pollution issues: The apartments with windows towards the railway have windows assigned as closed during the night as per the noise report findings.	

Designer's details

Designer's name: Sana Arif
Designer's organisation: Focus Consultants 2010 LLP
Designer's address: Focus House, Millennium Way West, Phoenix Business Park, Nottingham, NG86AS

Dynamic thermal model

Software: IESVE version 2023.5.2.0	
Weather file: Southampton_DSY1_2020High50_.epw	
Results file: Annual 21.10.2024.aps	
Number of rooms analysed: 70	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy: Reduced G-value as summarised in the Thermal Model Report. Whole dwelling MVHR System.	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	YES
Designer's signature: 	

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, Tmax is reduced by 1K):

- 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
- 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 fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Apartment 02 - Bedroom 1 GF	-	-	Pass	-
Apartment 02 - Bedroom 2 GF	-	-	Pass	-
Apartment 02 - Kitchen GF	Pass	N/A	-	-
Apartment 02 - Living GF	Pass	N/A	-	-
Apartment 03 - Bedroom 1 GF	-	-	Pass	-
Apartment 03 - Kitchen GF	Pass	N/A	-	-
Apartment 03 - Living GF	Pass	N/A	-	-
Apartment 06 - Bedroom 1 GF	-	-	Pass	-
Apartment 06 - Kitchen/Living GF	Pass	N/A	-	-
Apartment 13 - Bedroom 1 FF	-	-	Pass	-
Apartment 13 - Bedroom 2 FF	-	-	Pass	-
Apartment 13 - Kitchen/Living FF	Pass	N/A	-	-
Apartment 16 - Bedroom 1 FF	-	-	Pass	-
Apartment 16 - Kitchen FF	Pass	N/A	-	-
Apartment 16 - Living FF	Pass	N/A	-	-
Apartment 20 - Bedroom 1 FF	Pass	Pass	-	-
Apartment 20 - Bedroom 2 FF	Pass	Pass	-	-

RL for Durrington-on-Sea

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Apartment 20 - Kitchen FF	Pass	N/A	-	-
Apartment 20 - Living FF	Pass	N/A	-	-
Apartment 21 - Bedroom 1 FF	Pass	Pass	-	-
Apartment 21 - Kitchen FF	Pass	N/A	-	-
Apartment 21 - Living FF	Pass	N/A	-	-
Apartment 24 - Bedroom 1 FF	Pass	Pass	-	-
Apartment 24 - Kitchen/Living FF	Pass	N/A	-	-
Apartment 27 - Bedroom 1 FF	Pass	Pass	-	-
Apartment 27 - Kitchen FF	Pass	N/A	-	-
Apartment 27 - Living FF	Pass	N/A	-	-
Apartment 28 - Bedroom 1 FF	Pass	Pass	-	-
Apartment 28 - Bedroom 2 FF	Pass	Pass	-	-
Apartment 28 - Kitchen/Living FF	Pass	N/A	-	-
Apartment 31 - Bedroom 1 SF	-	-	Pass	-
Apartment 31 - Bedroom 2 SF	-	-	Pass	-
Apartment 31 - Kitchen/Living SF	Pass	N/A	-	-
Apartment 34 - Bedroom 1 SF	-	-	Pass	-
Apartment 34 - Kitchen SF	Pass	N/A	-	-
Apartment 34 - Living SF	Pass	N/A	-	-
Apartment 38 - Bedroom 1 SF	Pass	Pass	-	-
Apartment 38 - Bedroom 2 SF	Pass	Pass	-	-
Apartment 38 - Kitchen SF	Pass	N/A	-	-
Apartment 38 - Living SF	Pass	N/A	-	-
Apartment 39 - Bedroom 1 SF	Pass	Pass	-	-
Apartment 39 - Kitchen SF	Pass	N/A	-	-
Apartment 39 - Living SF	Pass	N/A	-	-

RL for Durrington-on-Sea

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Apartment 42 - Bedroom 1 SF	Pass	Pass	-	-
Apartment 42 - Kitchen/Living SF	Pass	N/A	-	-
Apartment 45 - Bedroom 1 SF	Pass	Pass	-	-
Apartment 45 - Kitchen SF	Pass	N/A	-	-
Apartment 45 - Living SF	Pass	N/A	-	-
Apartment 46 - Bedroom 1 SF	Pass	Pass	-	-
Apartment 46 - Bedroom 2 SF	Pass	Pass	-	-
Apartment 46 - Kitchen/Living SF	Pass	N/A	-	-
Apartment 49 - Bedroom 1 TF	-	-	Pass	-
Apartment 49 - Bedroom 2 TF	-	-	Pass	-
Apartment 49 - Kitchen/Living TF	Pass	N/A	-	-
Apartment 52 - Bedroom 1 TF	-	-	Pass	-
Apartment 52 - Kitchen TF	Pass	N/A	-	-
Apartment 52 - Living TF	Pass	N/A	-	-
Apartment 56 - Bedroom 1 TF	Pass	Pass	-	-
Apartment 56 - Bedroom 2 TF	Pass	Pass	-	-
Apartment 56 - Kitchen TF	Pass	N/A	-	-
Apartment 56 - Living TF	Pass	N/A	-	-
Apartment 57 - Bedroom 1 TF	Pass	Pass	-	-
Apartment 57 - Kitchen TF	Pass	N/A	-	-
Apartment 57 - Living TF	Pass	N/A	-	-
Apartment 60 - Bedroom 1 TF	Pass	Pass	-	-
Apartment 60 - Kitchen/Living TF	Pass	N/A	-	-
Apartment 62 - Bedroom 1 TF	Pass	Pass	-	-
Apartment 62 - Kitchen TF	Pass	N/A	-	-

RL for Durrington-on-Sea

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Apartment 62 - Living TF	Pass	N/A	-	-
Guest Suite GF	-	-	Pass	-

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. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Apartment 02 - Kitchen GF	1989	0	0.0	Pass
Apartment 02 - Living GF	1989	0	0.0	Pass
Apartment 03 - Kitchen GF	1989	0	0.0	Pass
Apartment 03 - Living GF	1989	0	0.0	Pass
Apartment 06 - Kitchen/Living GF	1989	0	0.0	Pass
Apartment 13 - Kitchen/Living FF	1989	0	0.0	Pass
Apartment 16 - Kitchen FF	1989	0	0.0	Pass
Apartment 16 - Living FF	1989	0	0.0	Pass
Apartment 20 - Bedroom 1 FF	3672	0	0.0	Pass
Apartment 20 - Bedroom 2 FF	3672	0	0.0	Pass
Apartment 20 - Kitchen FF	1989	0	0.0	Pass
Apartment 20 - Living FF	1989	1	0.1	Pass
Apartment 21 - Bedroom 1 FF	3672	3	0.1	Pass
Apartment 21 - Kitchen FF	1989	0	0.0	Pass
Apartment 21 - Living FF	1989	0	0.0	Pass
Apartment 24 - Bedroom 1 FF	3672	0	0.0	Pass
Apartment 24 - Kitchen/Living FF	1989	0	0.0	Pass
Apartment 27 - Bedroom 1 FF	3672	0	0.0	Pass
Apartment 27 - Kitchen FF	1989	1	0.1	Pass
Apartment 27 - Living FF	1989	8	0.4	Pass
Apartment 28 - Bedroom 1 FF	3672	0	0.0	Pass
Apartment 28 - Bedroom 2 FF	3672	0	0.0	Pass
Apartment 28 - Kitchen/Living FF	1989	11	0.6	Pass

RL for Durrington-on-Sea

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Apartment 31 - Kitchen/Living SF	1989	0	0.0	Pass
Apartment 34 - Kitchen SF	1989	0	0.0	Pass
Apartment 34 - Living SF	1989	0	0.0	Pass
Apartment 38 - Bedroom 1 SF	3672	0	0.0	Pass
Apartment 38 - Bedroom 2 SF	3672	0	0.0	Pass
Apartment 38 - Kitchen SF	1989	0	0.0	Pass
Apartment 38 - Living SF	1989	1	0.1	Pass
Apartment 39 - Bedroom 1 SF	3672	3	0.1	Pass
Apartment 39 - Kitchen SF	1989	0	0.0	Pass
Apartment 39 - Living SF	1989	0	0.0	Pass
Apartment 42 - Bedroom 1 SF	3672	0	0.0	Pass
Apartment 42 - Kitchen/Living SF	1989	0	0.0	Pass
Apartment 45 - Bedroom 1 SF	3672	4	0.1	Pass
Apartment 45 - Kitchen SF	1989	9	0.5	Pass
Apartment 45 - Living SF	1989	18	0.9	Pass
Apartment 46 - Bedroom 1 SF	3672	0	0.0	Pass
Apartment 46 - Bedroom 2 SF	3672	0	0.0	Pass
Apartment 46 - Kitchen/Living SF	1989	23	1.2	Pass
Apartment 49 - Kitchen/Living TF	1989	14	0.7	Pass
Apartment 52 - Kitchen TF	1989	2	0.1	Pass
Apartment 52 - Living TF	1989	0	0.0	Pass
Apartment 56 - Bedroom 1 TF	3672	0	0.0	Pass
Apartment 56 - Bedroom 2 TF	3672	0	0.0	Pass
Apartment 56 - Kitchen TF	1989	1	0.1	Pass
Apartment 56 - Living TF	1989	3	0.2	Pass
Apartment 57 - Bedroom 1 TF	3672	8	0.2	Pass

RL for Durrington-on-Sea

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Apartment 57 - Kitchen TF	1989	2	0.1	Pass
Apartment 57 - Living TF	1989	1	0.1	Pass
Apartment 60 - Bedroom 1 TF	3672	3	0.1	Pass
Apartment 60 - Kitchen/Living TF	1989	4	0.2	Pass
Apartment 62 - Bedroom 1 TF	3672	2	0.1	Pass
Apartment 62 - Kitchen TF	1989	2	0.1	Pass
Apartment 62 - Living TF	1989	0	0.0	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 fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

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
Apartment 02 - Kitchen GF	N/A	N/A	N/A	N/A
Apartment 02 - Living GF	N/A	N/A	N/A	N/A
Apartment 03 - Kitchen GF	N/A	N/A	N/A	N/A
Apartment 03 - Living GF	N/A	N/A	N/A	N/A
Apartment 06 - Kitchen/Living GF	N/A	N/A	N/A	N/A
Apartment 13 - Kitchen/Living FF	N/A	N/A	N/A	N/A
Apartment 16 - Kitchen FF	N/A	N/A	N/A	N/A
Apartment 16 - Living FF	N/A	N/A	N/A	N/A
Apartment 20 - Bedroom 1 FF	0	0	0	Pass
Apartment 20 - Bedroom 2 FF	0	0	0	Pass
Apartment 20 - Kitchen FF	N/A	N/A	N/A	N/A
Apartment 20 - Living FF	N/A	N/A	N/A	N/A
Apartment 21 - Bedroom 1 FF	0	0	0	Pass
Apartment 21 - Kitchen FF	N/A	N/A	N/A	N/A
Apartment 21 - Living FF	N/A	N/A	N/A	N/A
Apartment 24 - Bedroom 1 FF	0	0	0	Pass
Apartment 24 - Kitchen/Living FF	N/A	N/A	N/A	N/A
Apartment 27 - Bedroom 1 FF	1	0	1	Pass
Apartment 27 - Kitchen FF	N/A	N/A	N/A	N/A
Apartment 27 - Living FF	N/A	N/A	N/A	N/A
Apartment 28 - Bedroom 1 FF	0	0	0	Pass
Apartment 28 - Bedroom 2 FF	0	0	0	Pass
Apartment 28 - Kitchen/Living FF	N/A	N/A	N/A	N/A

RL for Durrington-on-Sea

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
Apartment 31 - Kitchen/Living SF	N/A	N/A	N/A	N/A
Apartment 34 - Kitchen SF	N/A	N/A	N/A	N/A
Apartment 34 - Living SF	N/A	N/A	N/A	N/A
Apartment 38 - Bedroom 1 SF	0	0	0	Pass
Apartment 38 - Bedroom 2 SF	0	0	0	Pass
Apartment 38 - Kitchen SF	N/A	N/A	N/A	N/A
Apartment 38 - Living SF	N/A	N/A	N/A	N/A
Apartment 39 - Bedroom 1 SF	0	0	0	Pass
Apartment 39 - Kitchen SF	N/A	N/A	N/A	N/A
Apartment 39 - Living SF	N/A	N/A	N/A	N/A
Apartment 42 - Bedroom 1 SF	0	0	0	Pass
Apartment 42 - Kitchen/Living SF	N/A	N/A	N/A	N/A
Apartment 45 - Bedroom 1 SF	2	0	2	Pass
Apartment 45 - Kitchen SF	N/A	N/A	N/A	N/A
Apartment 45 - Living SF	N/A	N/A	N/A	N/A
Apartment 46 - Bedroom 1 SF	0	0	0	Pass
Apartment 46 - Bedroom 2 SF	0	0	0	Pass
Apartment 46 - Kitchen/Living SF	N/A	N/A	N/A	N/A
Apartment 49 - Kitchen/Living TF	N/A	N/A	N/A	N/A
Apartment 52 - Kitchen TF	N/A	N/A	N/A	N/A
Apartment 52 - Living TF	N/A	N/A	N/A	N/A
Apartment 56 - Bedroom 1 TF	0	0	0	Pass
Apartment 56 - Bedroom 2 TF	0	0	0	Pass
Apartment 56 - Kitchen TF	N/A	N/A	N/A	N/A
Apartment 56 - Living TF	N/A	N/A	N/A	N/A
Apartment 57 - Bedroom 1 TF	0	0	0	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
Apartment 57 - Kitchen TF	N/A	N/A	N/A	N/A
Apartment 57 - Living TF	N/A	N/A	N/A	N/A
Apartment 60 - Bedroom 1 TF	0	0	0	Pass
Apartment 60 - Kitchen/Living TF	N/A	N/A	N/A	N/A
Apartment 62 - Bedroom 1 TF	1	0	1	Pass
Apartment 62 - Kitchen TF	N/A	N/A	N/A	N/A
Apartment 62 - Living TF	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
Apartment 02 - Bedroom 1 GF	123	1.4	Pass
Apartment 02 - Bedroom 2 GF	108	1.2	Pass
Apartment 03 - Bedroom 1 GF	95	1.1	Pass
Apartment 06 - Bedroom 1 GF	144	1.6	Pass
Apartment 13 - Bedroom 1 FF	149	1.7	Pass
Apartment 13 - Bedroom 2 FF	101	1.2	Pass
Apartment 16 - Bedroom 1 FF	80	0.9	Pass
Apartment 31 - Bedroom 1 SF	152	1.7	Pass
Apartment 31 - Bedroom 2 SF	100	1.1	Pass
Apartment 34 - Bedroom 1 SF	78	0.9	Pass
Apartment 49 - Bedroom 1 TF	200	2.3	Pass
Apartment 49 - Bedroom 2 TF	205	2.3	Pass
Apartment 52 - Bedroom 1 TF	115	1.3	Pass
Guest Suite GF	54	0.6	Pass

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Apartment 02 - Bedroom 1 GF	12.19	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 02 - Bedroom 2 GF	12.47	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 02 - Kitchen GF	6.63	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 02 - Living GF	18.09	TM59 - 2 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 03 - Bedroom 1 GF	14.04	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 03 - Kitchen GF	6.43	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 03 - Living GF	20.37	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 06 - Bedroom 1 GF	15.69	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 06 - Kitchen/Living GF	23.92	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 13 - Bedroom 1 FF	13.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 13 - Bedroom 2 FF	12.87	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 13 - Kitchen/Living FF	26.24	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 16 - Bedroom 1 FF	14.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 16 - Kitchen FF	5.49	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 16 - Living FF	22.66	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 20 - Bedroom 1 FF	12.19	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 20 - Bedroom 2 FF	12.47	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

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Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Apartment 20 - Kitchen FF	6.63	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 20 - Living FF	18.09	TM59 - 2 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 21 - Bedroom 1 FF	14.04	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 21 - Kitchen FF	6.43	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 21 - Living FF	20.37	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 24 - Bedroom 1 FF	15.69	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 24 - Kitchen/Living FF	23.92	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 27 - Bedroom 1 FF	14.46	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 27 - Kitchen FF	6.33	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 27 - Living FF	19.66	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 28 - Bedroom 1 FF	13.03	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 28 - Bedroom 2 FF	12.87	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 28 - Kitchen/Living FF	24.41	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 31 - Bedroom 1 SF	13.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 31 - Bedroom 2 SF	12.87	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 31 - Kitchen/Living SF	26.24	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 34 - Bedroom 1 SF	14.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 34 - Kitchen SF	5.49	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 34 - Living SF	22.66	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 38 - Bedroom 1 SF	12.19	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

RL for Durrington-on-Sea

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Apartment 38 - Bedroom 2 SF	12.47	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 38 - Kitchen SF	6.63	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 38 - Living SF	18.09	TM59 - 2 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 39 - Bedroom 1 SF	14.04	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 39 - Kitchen SF	6.43	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 39 - Living SF	20.37	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 42 - Bedroom 1 SF	15.69	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 42 - Kitchen/Living SF	23.92	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 45 - Bedroom 1 SF	14.46	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 45 - Kitchen SF	6.33	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 45 - Living SF	19.66	TM59 - 2 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 46 - Bedroom 1 SF	13.03	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 46 - Bedroom 2 SF	12.87	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 46 - Kitchen/Living SF	24.41	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 49 - Bedroom 1 TF	13.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 49 - Bedroom 2 TF	12.87	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 49 - Kitchen/Living TF	26.24	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 52 - Bedroom 1 TF	14.13	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 52 - Kitchen TF	5.49	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 52 - Living TF	22.66	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h

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Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Apartment 56 - Bedroom 1 TF	12.19	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 56 - Bedroom 2 TF	12.47	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 56 - Kitchen TF	6.63	TM59 - 2 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 56 - Living TF	18.09	TM59 - 2 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 57 - Bedroom 1 TF	14.04	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 57 - Kitchen TF	6.43	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 57 - Living TF	20.37	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Apartment 60 - Bedroom 1 TF	15.69	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 60 - Kitchen/Living TF	23.92	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Apartment 62 - Bedroom 1 TF	14.46	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Apartment 62 - Kitchen TF	6.33	TM59 - 1 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h
Apartment 62 - Living TF	19.66	TM59 - 1 Bedroom - Living	Living Occupancy	Living Equipment	18-23h
Guest Suite GF	19.9	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 02 - Bedroom 1 GF	26.77	0.7412	1.0, 1.58, 0.99, 1.85, 1.85	20.0, 15.100000381469727, 20.0, 90.0, 90.0	32.54	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 02 - Bedroom 2 GF	29.57	0.7412	1.34, 1.39, 1.85	19.559999465942383, 20.0, 90.0	17.68	ADO.AlwaysOff, ADO.Section_26a, Opening Internal bedroom weekly
Apartment 02 - Kitchen GF	31.09	0.1687, 0.7412	1.85, 1.03, 1.07	90.0, 90.0, 20.0	42.32	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 02 - Living GF	32.53	0.7412, 0.7412	2.57, 1.09, 0.62, 0.98, 1.55, 0.97, 1.85, 1.81	90.0, 90.0, 20.0, 20.0, 90.0, 20.0, 90.0, 90.0	46.97	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 03 - Bedroom 1 GF	30.2	0.6037, 0.6037	1.19, 1.66, 0.9, 1.81, 1.03, 1.07, 1.89	20.0, 15.100000381469727, 20.0, 90.0, 19.559999465942383, 20.0, 90.0	31.44	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 03 - Kitchen GF	33.06	0.1687, 0.7412	1.89, 1.05, 1.09	90.0, 90.0, 20.0	44.54	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 03 - Living GF	45.59	0.7412	2.52, 0.85, 0.91, 1.89, 1.89	90.0, 90.0, 20.0, 90.0, 90.0	32.48	ADO.AlwaysOff, ADO.Section_26a, on continuously

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 06 - Bedroom 1 GF	41.32	0.7412	1.19, 1.66, 0.9, 1.85	20.0, 15.100000381469727, 20.0, 90.0	14.87	ADO.AlwaysOff, ADO.Section_26a, Opening Internal bedroom weekly
Apartment 06 - Kitchen/Living GF	40.84	0.7412	2.42, 0.76, 1.1, 1.81	90.0, 90.0, 20.0, 90.0	19.69	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 13 - Bedroom 1 FF	26.81	0.6553	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	38.35	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 13 - Bedroom 2 FF	22.72	0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	22.08	ADO.AlwaysOff, ADO.Section_26a, Opening Internal bedroom weekly
Apartment 13 - Kitchen/Living FF	44.27	0.7412	2.47, 0.89, 0.92, 1.89	90.0, 90.0, 20.0, 90.0	18.71	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 16 - Bedroom 1 FF	37.38	0.7412	1.23, 0.81, 1.89, 1.89	90.0, 20.0, 90.0, 90.0	33.06	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 16 - Kitchen FF	16.97	0.1687, 0.7412	1.23, 0.81, 1.89	90.0, 20.0, 90.0	54.1	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 16 - Living FF	47.25	0.7412	2.04, 0.69, 0.45, 1.89, 1.89	90.0, 20.0, 20.0, 90.0, 90.0	24.12	ADO.AlwaysOff, ADO.Section_26a, on continuously

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 20 - Bedroom 1 FF	26.77	0.7412	1.0, 1.58, 0.99, 1.85, 1.85	20.0, 90.0, 20.0, 90.0, 90.0	42.25	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 20 - Bedroom 2 FF	29.57	0.7412	1.34, 1.39, 1.85	90.0, 20.0, 90.0	25.25	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 20 - Kitchen FF	31.09	0.1687, 0.7412	1.85, 1.03, 1.07	90.0, 90.0, 20.0	42.32	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 20 - Living FF	32.53	0.7412, 0.7412	2.57, 1.09, 0.62, 0.98, 1.55, 0.97, 1.85, 1.81	90.0, 90.0, 20.0, 20.0, 90.0, 20.0, 90.0, 90.0	46.97	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 21 - Bedroom 1 FF	30.2	0.7412, 0.7412	1.19, 1.66, 0.9, 1.81, 1.03, 1.07, 1.89	20.0, 90.0, 20.0, 90.0, 90.0, 20.0, 90.0	45.46	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 21 - Kitchen FF	33.06	0.1687, 0.7412	1.89, 1.05, 1.09	90.0, 90.0, 20.0	44.54	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 21 - Living FF	45.59	0.7412	2.52, 0.85, 0.91, 1.89, 1.89	90.0, 90.0, 20.0, 90.0, 90.0	32.48	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 24 - Bedroom 1 FF	41.32	0.7412	1.19, 1.66, 0.9, 1.85	20.0, 90.0, 20.0, 90.0	22.8	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 24 - Kitchen/Living FF	40.84	0.7412	2.42, 0.76, 1.1, 1.81	90.0, 90.0, 20.0, 90.0	19.69	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 27 - Bedroom 1 FF	40.02	0.7412	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	34.83	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 27 - Kitchen FF	32.6	0.1687, 0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	44.9	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 27 - Living FF	24.49	0.7412, 0.7412	2.47, 0.89, 0.92, 1.03, 1.07, 1.89, 1.89	90.0, 90.0, 20.0, 20.0, 20.0, 90.0, 90.0	35.76	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 28 - Bedroom 1 FF	40.63	0.7412	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	38.65	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 28 - Bedroom 2 FF	29.57	0.7412	1.34, 1.39, 1.89	90.0, 20.0, 90.0	24.75	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 28 - Kitchen/Living FF	26.68	0.7412, 0.7412	2.47, 0.89, 0.92, 1.19, 1.26, 1.31, 1.89	90.0, 90.0, 20.0, 20.0, 20.0, 20.0, 90.0	23.19	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 31 - Bedroom 1 SF	26.81	0.6553	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	38.35	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 31 - Bedroom 2 SF	22.72	0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	22.08	ADO.AlwaysOff, ADO.Section_26a, Opening Internal bedroom weekly
Apartment 31 - Kitchen/Living SF	44.27	0.7412	2.47, 0.89, 0.92, 1.89	90.0, 90.0, 20.0, 90.0	18.71	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 34 - Bedroom 1 SF	37.38	0.7412	1.23, 0.81, 1.89, 1.89	90.0, 20.0, 90.0, 90.0	33.06	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 34 - Kitchen SF	16.97	0.1687, 0.7412	1.23, 0.81, 1.89	90.0, 20.0, 90.0	54.1	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 34 - Living SF	47.25	0.7412	2.04, 0.69, 0.45, 1.89, 1.89	90.0, 20.0, 20.0, 90.0, 90.0	24.12	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 38 - Bedroom 1 SF	26.77	0.7412	1.0, 1.58, 0.99, 1.85, 1.85	20.0, 90.0, 20.0, 90.0, 90.0	42.25	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 38 - Bedroom 2 SF	29.57	0.7412	1.34, 1.39, 1.85	90.0, 20.0, 90.0	25.25	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 38 - Kitchen SF	31.09	0.1687, 0.7412	1.85, 1.03, 1.07	90.0, 90.0, 20.0	42.32	on continuously, ADO.Section_26a, ADO.AlwaysOff

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 38 - Living SF	32.53	0.7412, 0.7412	2.57, 1.09, 0.62, 0.98, 1.55, 0.97, 1.85, 1.81	90.0, 90.0, 20.0, 20.0, 90.0, 20.0, 90.0, 90.0	46.97	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 39 - Bedroom 1 SF	30.2	0.7412, 0.7412	1.19, 1.66, 0.9, 1.81, 1.03, 1.07, 1.89	20.0, 90.0, 20.0, 90.0, 90.0, 20.0, 90.0	45.46	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 39 - Kitchen SF	33.06	0.1687, 0.7412	1.89, 1.05, 1.09	90.0, 90.0, 20.0	44.54	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 39 - Living SF	45.59	0.7412	2.52, 0.85, 0.91, 1.89, 1.89	90.0, 90.0, 20.0, 90.0, 90.0	32.48	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 42 - Bedroom 1 SF	41.32	0.7412	1.19, 1.66, 0.9, 1.85	20.0, 90.0, 20.0, 90.0	22.8	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 42 - Kitchen/Living SF	40.84	0.7412	2.42, 0.76, 1.1, 1.81	90.0, 90.0, 20.0, 90.0	19.69	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 45 - Bedroom 1 SF	40.02	0.7412	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	34.83	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 45 - Kitchen SF	32.6	0.1687, 0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	44.9	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 45 - Living SF	24.49	0.7412, 0.7412	2.47, 0.89, 0.92, 1.03, 1.07, 1.89, 1.89	90.0, 90.0, 20.0, 20.0, 20.0, 90.0, 90.0	35.76	ADO.AlwaysOff, ADO.Section_26a, on continuously

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 46 - Bedroom 1 SF	40.63	0.7412	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	38.65	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 46 - Bedroom 2 SF	29.57	0.7412	1.34, 1.39, 1.89	90.0, 20.0, 90.0	24.75	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 46 - Kitchen/Living SF	26.68	0.7412, 0.7412	2.47, 0.89, 0.92, 1.19, 1.26, 1.31, 1.89	90.0, 90.0, 20.0, 20.0, 20.0, 20.0, 90.0	23.19	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 49 - Bedroom 1 TF	26.81	0.6037	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	38.35	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly
Apartment 49 - Bedroom 2 TF	22.72	0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	22.08	ADO.AlwaysOff, ADO.Section_26a, Opening Internal bedroom weekly
Apartment 49 - Kitchen/Living TF	44.27	0.7412	2.47, 0.89, 0.92, 1.89	90.0, 90.0, 20.0, 90.0	18.71	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 52 - Bedroom 1 TF	37.38	0.7412	1.23, 0.81, 1.89, 1.89	90.0, 20.0, 90.0, 90.0	33.06	ADO.AlwaysOff, ADO.Section_26a, off continuously, Opening Internal bedroom weekly

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 52 - Kitchen TF	16.97	0.1687, 0.7412	1.23, 0.81, 1.89	90.0, 20.0, 90.0	54.1	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 52 - Living TF	47.25	0.7412	2.04, 0.69, 0.45, 1.89, 1.89	90.0, 20.0, 20.0, 90.0, 90.0	24.12	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 56 - Bedroom 1 TF	26.77	0.7412	1.0, 1.58, 0.99, 1.85, 1.85	20.0, 90.0, 20.0, 90.0, 90.0	42.25	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 56 - Bedroom 2 TF	29.57	0.7412	1.34, 1.39, 1.85	90.0, 20.0, 90.0	25.25	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 56 - Kitchen TF	31.09	0.1687, 0.7412	1.85, 1.03, 1.07	90.0, 90.0, 20.0	42.32	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 56 - Living TF	32.53	0.7412, 0.7412	2.57, 1.09, 0.62, 0.98, 1.55, 0.97, 1.85, 1.81	90.0, 90.0, 20.0, 20.0, 90.0, 20.0, 90.0, 90.0	46.97	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 57 - Bedroom 1 TF	30.2	0.7412, 0.7412	1.19, 1.66, 0.9, 1.81, 1.03, 1.07, 1.89	20.0, 90.0, 20.0, 90.0, 90.0, 20.0, 90.0	45.46	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 57 - Kitchen TF	33.06	0.1687, 0.7412	1.89, 1.05, 1.09	90.0, 90.0, 20.0	44.54	on continuously, ADO.Section_26a, ADO.AlwaysOff
Apartment 57 - Living TF	45.59	0.7412	2.52, 0.85, 0.91, 1.89, 1.89	90.0, 90.0, 20.0, 90.0, 90.0	32.48	ADO.AlwaysOff, ADO.Section_26a, on continuously

RL for Durrington-on-Sea

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Apartment 60 - Bedroom 1 TF	41.32	0.7412	1.19, 1.66, 0.9, 1.85	20.0, 90.0, 20.0, 90.0	22.8	ADO.Section_26ab, ADO.AlwaysOff, Opening Internal bedroom weekly
Apartment 60 - Kitchen/Living TF	40.84	0.7412	2.42, 0.76, 1.1, 1.81	90.0, 90.0, 20.0, 90.0	19.69	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 62 - Bedroom 1 TF	19.02	0.7412	1.19, 1.26, 1.31, 1.89, 1.89	20.0, 90.0, 20.0, 90.0, 90.0	34.83	ADO.Section_26ab, ADO.AlwaysOff, off continuously, Opening Internal bedroom weekly
Apartment 62 - Kitchen TF	32.6	0.1687, 0.7412	1.03, 1.07, 1.89	90.0, 20.0, 90.0	44.9	ADO.AlwaysOff, ADO.Section_26a, on continuously
Apartment 62 - Living TF	47.0	0.7412	2.47, 0.89, 0.92, 1.89, 1.89	90.0, 90.0, 20.0, 90.0, 90.0	33.62	ADO.AlwaysOff, ADO.Section_26a, on continuously
Guest Suite GF	35.29	0.7412	1.16, 1.54, 1.0, 1.81	20.0, 15.1000 00381469727, 20.0, 90.0	11.53	ADO.AlwaysOff, ADO.Section_26a, off continuously

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Apartment 02 - Bedroom 1 GF	0.3	0.93
Apartment 02 - Bedroom 2 GF	0.3	1.08
Apartment 02 - Kitchen GF	0.3	2.52
Apartment 02 - Living GF	0.3	1.12
Apartment 03 - Bedroom 1 GF	0.3	1.18
Apartment 03 - Kitchen GF	0.3	2.6
Apartment 03 - Living GF	0.3	1.02
Apartment 06 - Bedroom 1 GF	0.3	1.11
Apartment 06 - Kitchen/Living GF	0.3	0.75
Apartment 13 - Bedroom 1 FF	0.3	0.9
Apartment 13 - Bedroom 2 FF	0.3	1.11
Apartment 13 - Kitchen/Living FF	0.3	0.69
Apartment 16 - Bedroom 1 FF	0.3	1.07
Apartment 16 - Kitchen FF	0.3	3.05
Apartment 16 - Living FF	0.3	0.98
Apartment 20 - Bedroom 1 FF	0.3	0.93
Apartment 20 - Bedroom 2 FF	0.3	1.08
Apartment 20 - Kitchen FF	0.3	2.52
Apartment 20 - Living FF	0.3	1.12
Apartment 21 - Bedroom 1 FF	0.3	1.18
Apartment 21 - Kitchen FF	0.3	2.6
Apartment 21 - Living FF	0.3	1.02
Apartment 24 - Bedroom 1 FF	0.3	1.11
Apartment 24 - Kitchen/Living FF	0.3	0.75
Apartment 27 - Bedroom 1 FF	0.3	1.15
Apartment 27 - Kitchen FF	0.3	2.64
Apartment 27 - Living FF	0.3	1.05
Apartment 28 - Bedroom 1 FF	0.3	0.91
Apartment 28 - Bedroom 2 FF	0.3	1.11
Apartment 28 - Kitchen/Living FF	0.3	0.74
Apartment 31 - Bedroom 1 SF	0.3	0.9
Apartment 31 - Bedroom 2 SF	0.3	1.11
Apartment 31 - Kitchen/Living SF	0.3	0.69
Apartment 34 - Bedroom 1 SF	0.3	1.07
Apartment 34 - Kitchen SF	0.3	3.05
Apartment 34 - Living SF	0.3	0.98
Apartment 38 - Bedroom 1 SF	0.3	0.93
Apartment 38 - Bedroom 2 SF	0.3	1.08
Apartment 38 - Kitchen SF	0.3	2.52
Apartment 38 - Living SF	0.3	1.12

RL for Durrington-on-Sea

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Apartment 39 - Bedroom 1 SF	0.3	1.18
Apartment 39 - Kitchen SF	0.3	2.6
Apartment 39 - Living SF	0.3	1.02
Apartment 42 - Bedroom 1 SF	0.3	1.11
Apartment 42 - Kitchen/Living SF	0.3	0.75
Apartment 45 - Bedroom 1 SF	0.3	1.15
Apartment 45 - Kitchen SF	0.3	2.64
Apartment 45 - Living SF	0.3	1.05
Apartment 46 - Bedroom 1 SF	0.3	0.91
Apartment 46 - Bedroom 2 SF	0.3	1.11
Apartment 46 - Kitchen/Living SF	0.3	0.74
Apartment 49 - Bedroom 1 TF	0.3	0.9
Apartment 49 - Bedroom 2 TF	0.3	1.11
Apartment 49 - Kitchen/Living TF	0.3	0.69
Apartment 52 - Bedroom 1 TF	0.3	1.07
Apartment 52 - Kitchen TF	0.3	3.05
Apartment 52 - Living TF	0.3	0.98
Apartment 56 - Bedroom 1 TF	0.3	0.93
Apartment 56 - Bedroom 2 TF	0.3	1.08
Apartment 56 - Kitchen TF	0.3	2.52
Apartment 56 - Living TF	0.3	1.12
Apartment 57 - Bedroom 1 TF	0.3	1.18
Apartment 57 - Kitchen TF	0.3	2.6
Apartment 57 - Living TF	0.3	1.02
Apartment 60 - Bedroom 1 TF	0.3	1.11
Apartment 60 - Kitchen/Living TF	0.3	0.75
Apartment 62 - Bedroom 1 TF	0.3	1.15
Apartment 62 - Kitchen TF	0.3	2.64
Apartment 62 - Living TF	0.3	1.05
Guest Suite GF	0.3	0.97