



Architectural & Environmental Acousticians
Noise & Vibration Engineers

PLANNING CONDITIONS 4 AND 5

YAPTON ROAD, BARNHAM, PO22 0AY

MATTHEW HOMES LTD

RP01-19268

PLANNING CONDITIONS 4 AND 5

PROJECT: YAPTON ROAD, BARNHAM, PO22 0AY

CLIENT: MATTHEW HOMES LTD

CLIENT ADDRESS: MATTHEW HOUSE
45-47 HIGH STREET
POTTERS BAR
EN6 5AW

COMPANY ADDRESS: CASS ALLEN ASSOCIATES LTD
BEDFORD I-LAB
PRIORY BUSINESS PARK
BEDFORD
MK44 3RZ

DOCUMENT CONTROL:

REVISION	ISSUE DATE	REPORT BY	CHECKED BY	NOTES
0	22 July 2019	Ronny Ospina Orozco, BSc TechIOA, Acoustics Consultant	Chris McNeillie, MSc CEng MIOA, Director	Initial issue

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1. INTRODUCTION

1.1 Cass Allen Associates has been instructed by Matthew Homes Ltd to assess the acoustic design of a new development at Yapton Road, Barnham, PO22 0AY.

1.2 The assessment has been carried out in accordance with the requirements of Planning Conditions that have been imposed on the development. The conditions state:

“4 – Development shall not begin until a scheme for protecting the proposed dwellings from noise from road traffic adjacent to the proposed development has been submitted and approved by the Local Planning Authority. Any works which form part of the scheme approved by the Authority shall be completed before any permitted dwelling is occupied unless an alternative period is agreed in writing by the Authority.

Reason: To safeguard the amenities of residents in accordance with Arun District Local Plan policies GEN7 and GEN32

5 – Each dwelling shall be provided with a garden area which has a predicted noise level of less than or equal to LAeq, 55 dB (measured over any 1 hour period) within the first 5 metres from the building façade.

Reason: To safeguard the amenities of residents in accordance with Arun District Local Plan policies DEN7 and GEN32”

1.3 This report contains technical terminology; a glossary of terms can be found at



2. NOISE AFFECTING THE DEVELOPMENT

Design criteria – Internal noise levels

- 2.1 Appropriate design criteria in line with Planning Condition 4 for acceptable noise levels in acoustically sensitive areas of new developments are given in BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’.

Table 1 BS8233:2014 Internal Noise Criteria

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	-
Dining	Dining room/area	40 dB LAeq, 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour

- 2.2 Appropriate design criteria for acceptable maximum noise levels in habitable rooms of new residential developments are given in the World Health Organisation (WHO) document ‘Guidelines for community noise’, which recommends that “noise exceeding 45dB LAFmax should be limited, if possible” and that “for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB LAmx more than 10-15 times per night”.

- 2.3 Limits for predicted noise levels in gardens are given in Planning Condition 5. This is in-line with the upper limit of the recommended noise levels for external amenity areas are given in BS8233:2014. BS8233:2014 states:

“It is desirable that external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T, which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.”

- 2.4 The following acoustic design criteria have therefore been adopted for the development:

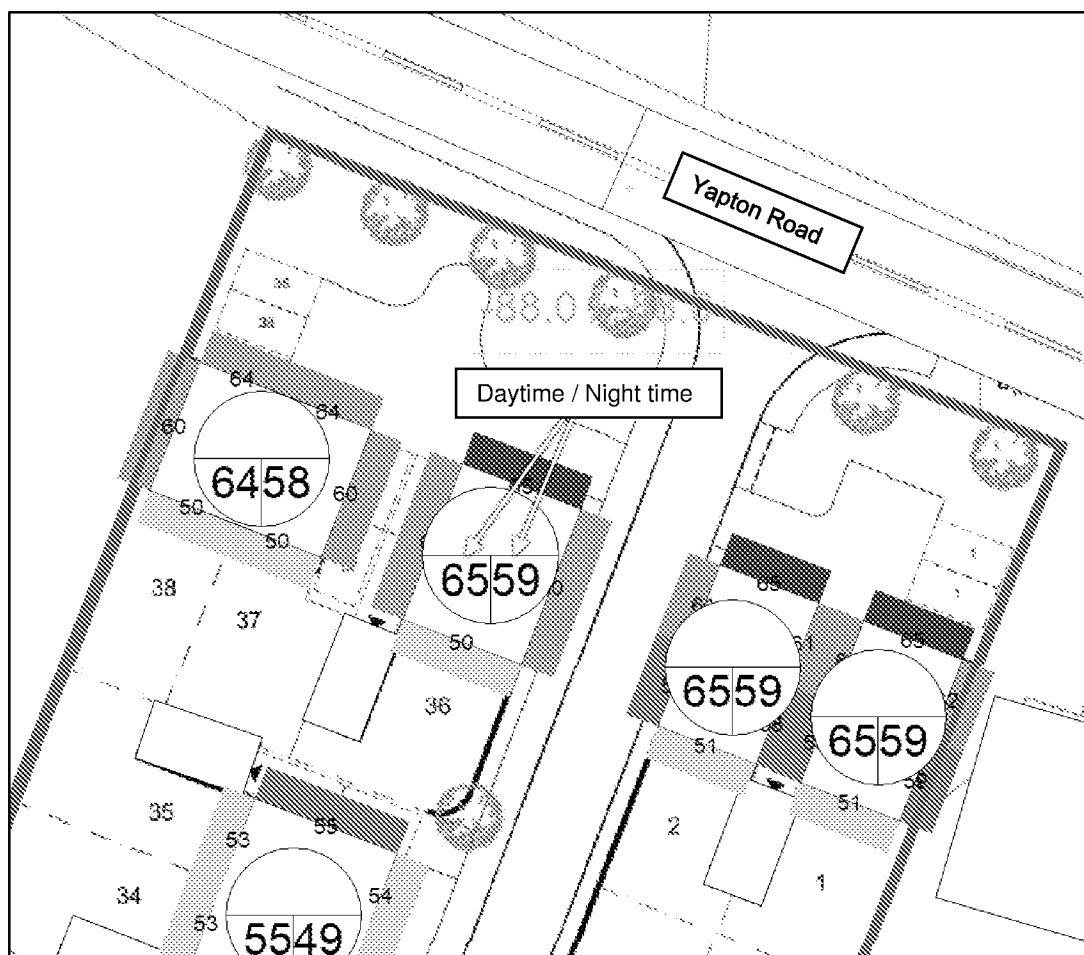
- Average noise levels in living rooms and dining rooms during the day should not exceed 35 dB LAeq,0700-2300hrs and 40 dB LAeq,0700-2300hrs respectively;
- Average noise levels in bedrooms should not exceed 30 dB LAeq,2300-0700hrs during the night;
- Maximum noise levels should not regularly exceed 45 dB LAmx in bedrooms during the night.
- Average noise levels in external amenity areas during the day should be less than or equal to 55 dB LAeq,1hour measured within the first five metres from the building façade.

Existing site noise levels

- 2.5 A noise survey was carried out at the site between the 27th June and 3rd July 2019 to assess existing noise levels in the area. The full methodology and results of the noise survey are provided in Appendix 1.

- 2.6 Noise levels at the unattended logging position were generally dictated by vehicles driving along Yapton Road. Natural ambient noises (i.e. birds and trees rustling in the wind) were audible at times when road traffic subsided. The logger was positioned closer to Yapton Road than the future façades (the main noise source in the area) due to the site conditions during the survey. As the future façades are going to be further away from Yapton Road, noise levels at these locations will be lower than what was measured. This is discussed further below.
- 2.7 Areas of the development at the northern edge of the site adjoining Yapton Road will be subject to the highest noise levels. The noise survey results show that noise levels at these positions are as follows:
- Northern edge of the site facing Yapton Road:
 - Average noise levels during the daytime - 69 dB LAeq,0700-2300hrs;
 - Average noise levels during the night-time - 63 dB LAeq,2300-0700hrs;
 - Typical maximum noise levels during the night-time - 83 dB LMax.
- 2.8 A 3D noise model was developed using Cadna/A 2019 environmental noise modelling software to calculate the noise levels across the development. The model was calibrated to the results of the site noise survey. The full methodology and results of the noise modelling are provided in Appendix 2.
- 2.9 The noise modelling results show that façades facing Yapton Road are predicted to be exposed to noise levels up to 65 dB LAeq,0700-2300hrs during the day and 59 dB LAeq,2300-0700hrs during the night. This is shown in Figure 1 below.

Figure 1 Daytime and Night Time Noise Levels at Façades



Internal noise levels in noise-sensitive rooms

- 2.10 It has been confirmed by Matthew Homes Ltd that the external walls of the development will be constructed using a standard masonry construction (e.g. 102mm brick, 100mm insulated cavity, 100mm concrete block). Consequently, internal noise levels would be dictated by external noise ingress via glazing and ventilators.
- 2.11 The ventilation scheme for the project will be ventilated via trickle ventilators in the external facades with openable windows for the provision of purge ventilation (as per System 1 or System 3 from Building Regulations Part F).
- 2.12 Calculations were carried out using façade modelling software in accordance with the “more rigorous” methodology given in BS8233:2014 to predict the internal noise levels in habitable rooms of the development. Full details of the calculations are shown in Appendix 3.
- 2.13 The calculations were carried out based on the dimensions/details for façade elements taken from project drawings ‘P1.p REV A’ and ‘P1.e REV A’ (Thrive Architects). The calculations include a 2 dB design margin.

- 2.14 Based in these calculations, façade sound insulation requirements for the development have been specified. This specification is summarised in Table 2 below and shown in full in Appendix 4

Table 2 Glazing / Ventilator Acoustic Specification

Façade Specification	Room	Min. Glazing Performance Requirements (inc. Frames)	Min. Ventilator Performance Requirements	Glazing Description / Example Ventilator
FS01 (facing Yapton Road)	Bedroom & Living room	30 dB Rw+Ctr	40 dB Dnew + Ctr	Acoustically upgraded double glazing / Greenwoof 2500EAW.AC1 Ventilator
FS02 (other facades)	Bedroom & Living room	27 dB Rw+Ctr	31 dB Dnew+Ctr	Standard thermal double glazing / Standard hit-and-miss trickle ventilator

- 2.15 It can be seen from Table 2 above and the calculations given in Appendix 3 that internal noise levels in habitable rooms of the development comply with BS8233:2014 criteria. The requirements of Planning Condition 4 are therefore fulfilled provided that the above specification is achieved.

Noise levels in external amenity areas

- 2.16 The layout of the development has also been reviewed in relation to the requirements of Planning Condition 5, which states that noise levels in external amenity areas should not exceed 55 dB LAeq,T within five metres from the building façade.
- 2.17 An image of the noise map created in the 3D noise model is given in Figure 1 of Appendix 2. The green areas in the noise map represent areas ≤ 55 dB LAeq,T. The results of the survey and 3D noise modelling therefore indicate that all gardens will comply with Planning Condition 5.

3. CONCLUSIONS

- 3.1 Cass Allen Associates was instructed by Matthew Homes Ltd to assess the acoustic design of the proposed development as required by Planning Conditions 4 and 5.
- 3.2 A noise survey was carried out at the site between 27th June and 3rd July 2019 to assess existing noise levels in the area. Ambient noise levels are generally dictated by road traffic on Yapton Road.
- 3.3 Internal noise levels compliant with the requirements of Planning Condition 4 are anticipated to be achieved subject to the installation of the glazing and ventilation compliant with the specification in Appendix 4.
- 3.4 Noise levels in external amenity areas are also predicted to comply with Planning Condition 5.
- 3.5 It is our view that this report contains the information required to discharge Planning Conditions 4 and 5.

Appendix 1 Survey Results

Survey Summary:

The survey comprised short-term operator attended noise measurements and longer-term unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic on surrounding roads.

Survey Period:

27/06/2019 to 03/07/2019

Survey Objectives:

- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used (Appendix 1, Table 1):

Type	Manufacturer	Model	Serial Number
Sound level meter ¹	Bruel & Kjaer	2250	2630237
Sound level meter ¹ (noise logger)	Rion	NL-32	01213688
Calibrator	01dB	CAL31	83380

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring.

Measurement Positions (Appendix 1, Table 2):

Position (refer plan below)	Description
N1	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Yapton Road. Approx. 2m away from the road.
L1	Unattended noise logging position. 3.5m above ground level. Free-field. Direct line of sight to Yapton Road. Approx. 3.8m away from road.

Site Plan showing Measurement Positions (Appendix 1, Figure 1):



Attended Noise Monitoring Results (Appendix 1, Table 3):

Date	Position	Time	Meas. Length	LAeq, dB	LAmix, dB	LA90, dB	Observations
27/06/2019	N1	15:52:08	00:00:04	72	76	66	Noise dictated by vehicles passing by along Yapton Road. Measurements were predominantly of small vehicles. Measurement at 15:52 was a large van passing.
		15:52:26	00:00:06	70	75	60	
		15:52:36	00:00:04	69	76	60	
		15:52:58	00:00:06	76	83	69	
		15:53:11	00:00:04	76	79	73	
		15:53:46	00:00:06	67	76	53	
		15:54:22	00:00:07	72	79	61	
		15:54:49	00:00:07	68	75	60	
		15:55:55	00:00:10	72	77	60	

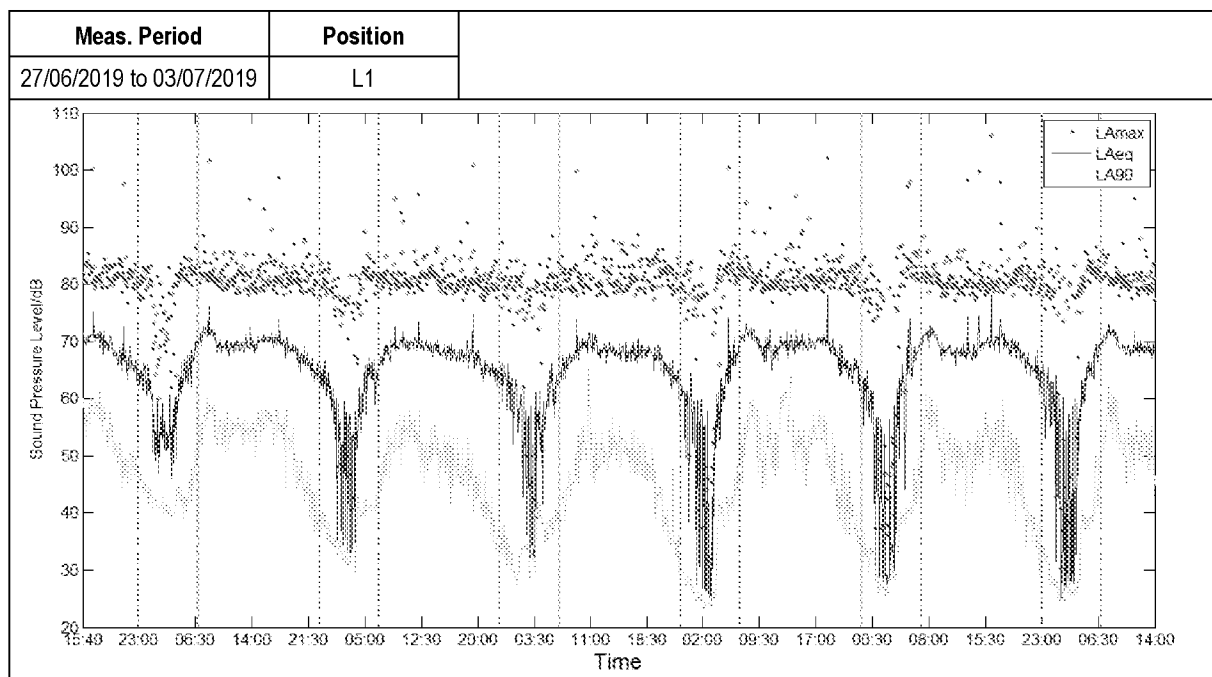
Unattended Noise Monitoring Results (Appendix 1, Table 4):

Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB ¹	LAeq,8hr, dB	LA90,5mins, dB ¹	LAmaz, dB ²
27/06/2019 to 03/07/2019	L1	69	55	63	40	83

Note 1: Typical lowest measured during the period shown.

Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Unattended Noise Monitoring Results (Appendix 1, Figure 2):



Appendix 2 Modelling Results

Modelling Software:

CADNA/A Version 2019

**Modelled
Scenarios:**

Day and night-time average noise levels across the site

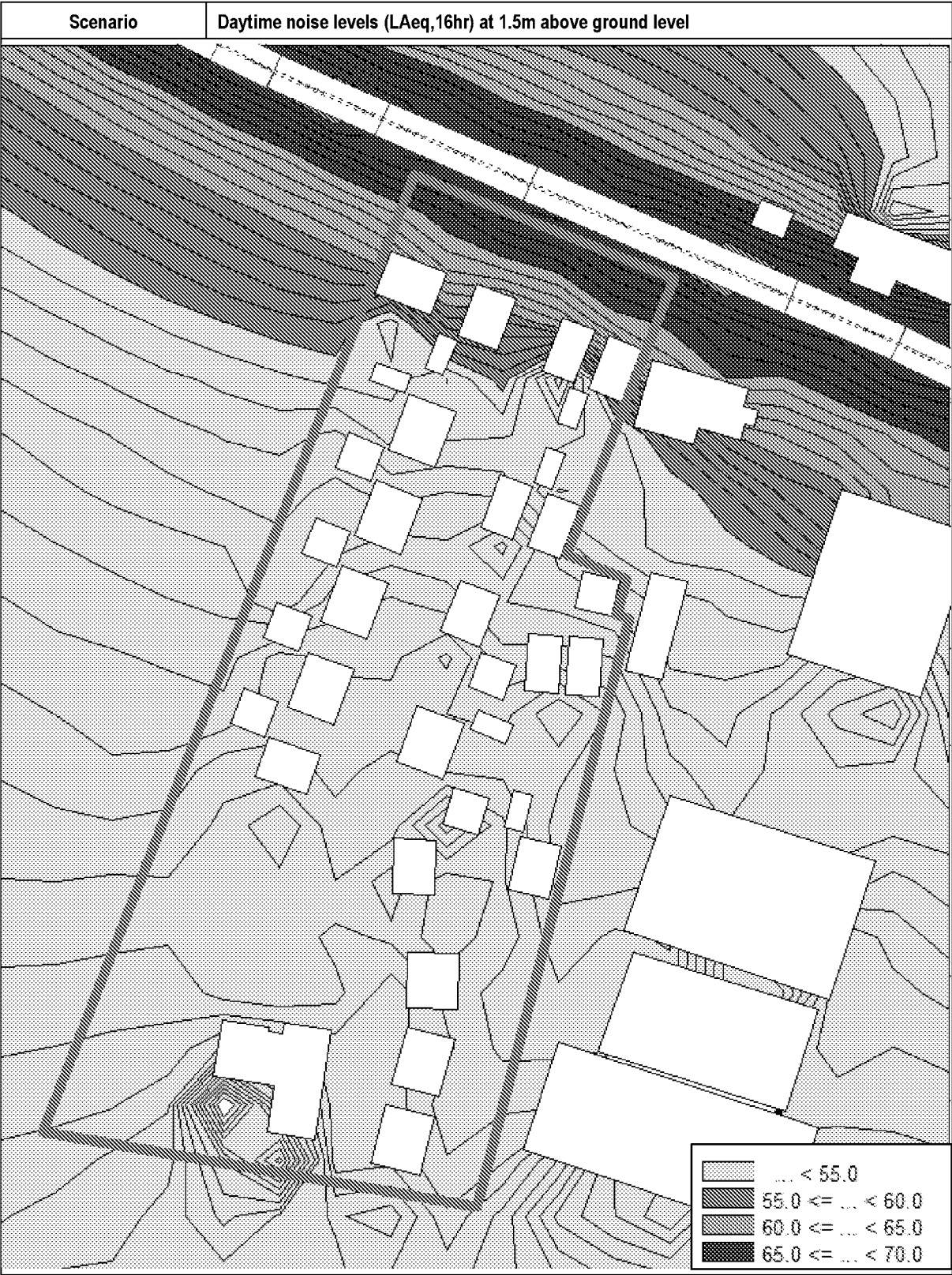
Data inputs:

- Noise survey results
- Development layout

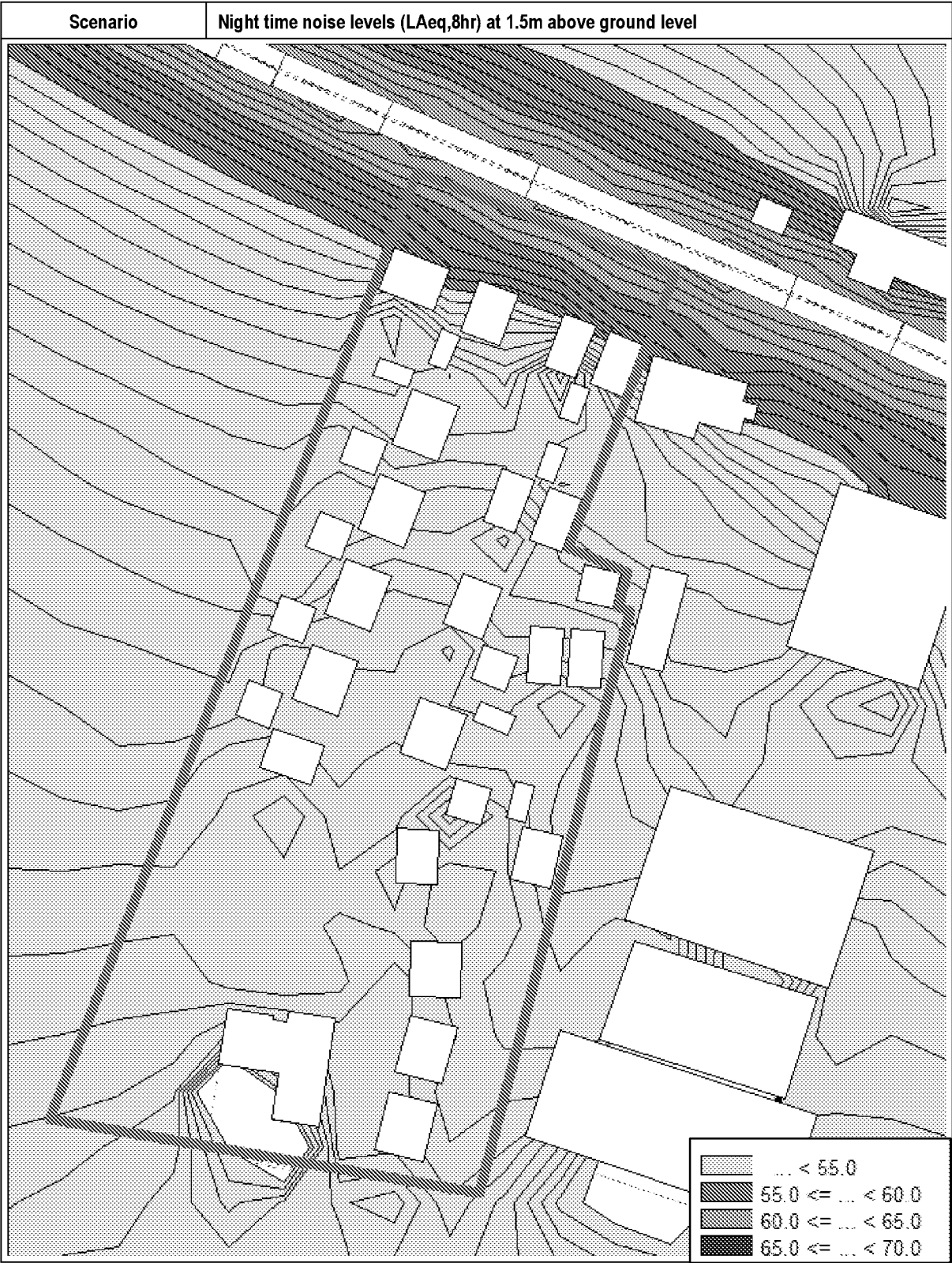
**Calculation Algorithms
Used:**

- Calculation of Road Traffic Noise 1988 – Department of Transport
- ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere
- ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

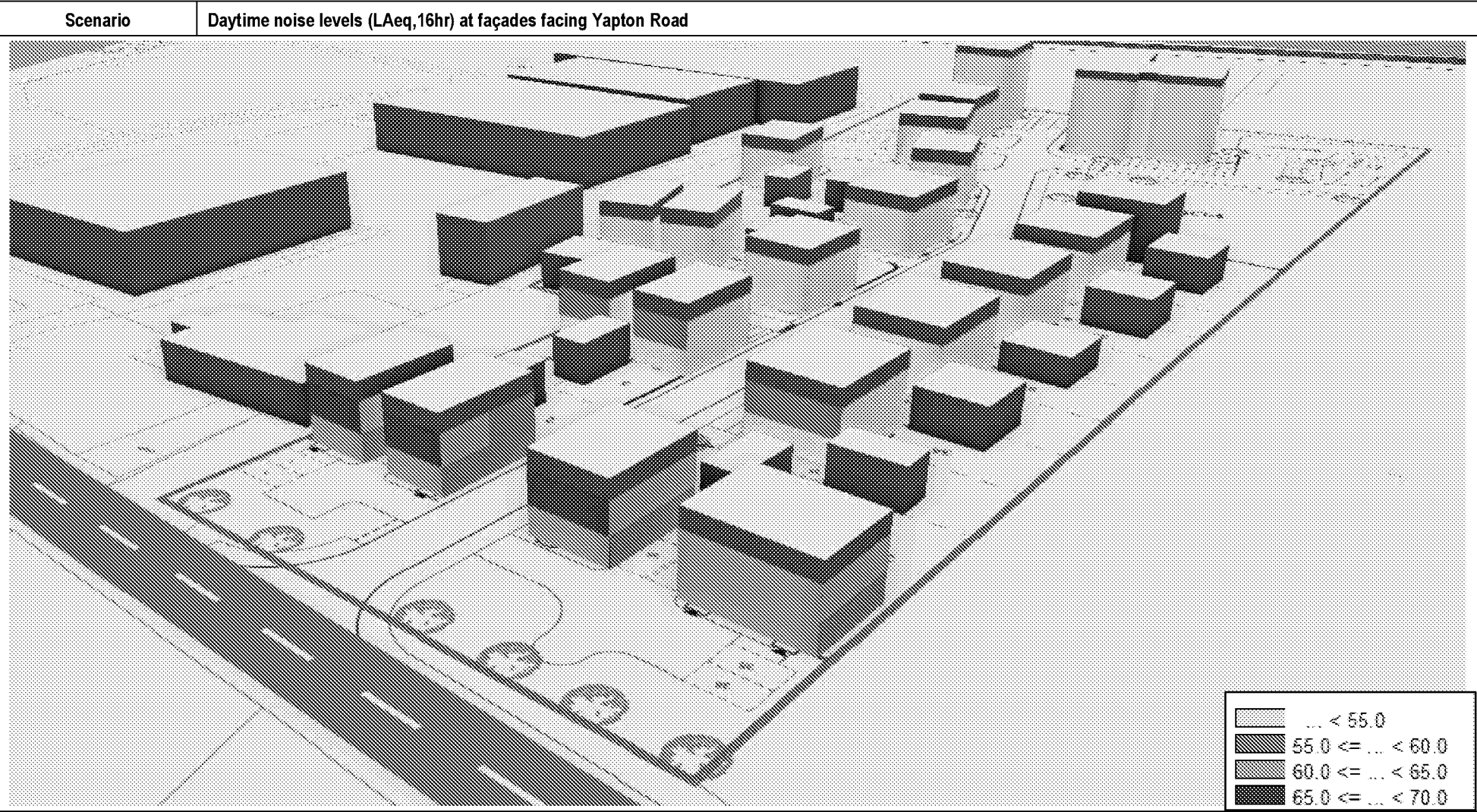
Modelling Printout (Appendix 2, Figure 1):



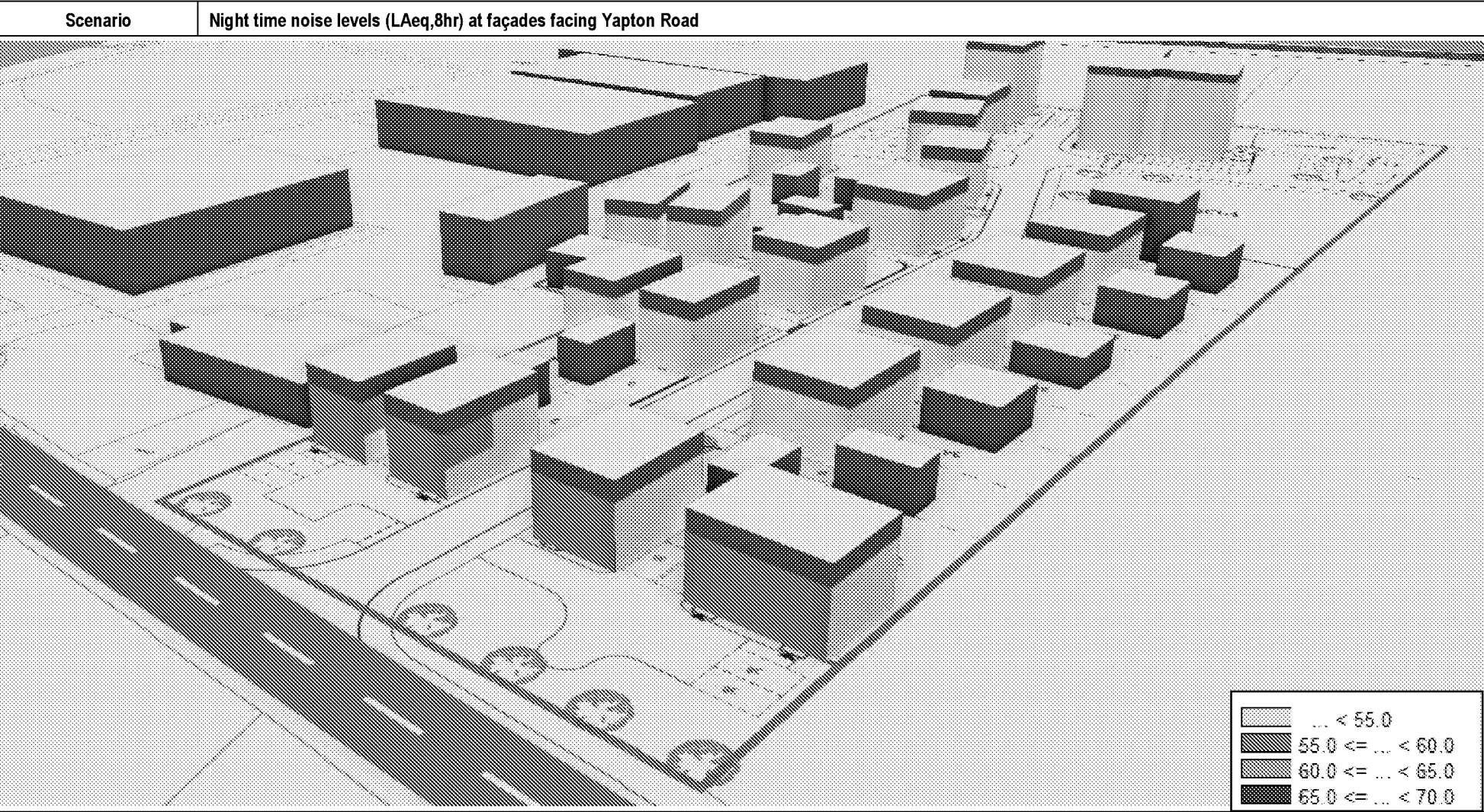
Modelling Printout (Appendix 2, Figure 2):



Modelling Printout (Appendix 2, Figure 3):



Modelling Printout (Appendix 2, Figure 4):



Modelling Printout (Appendix 2, Figure 5):



Appendix 3 FACSIM Calculations

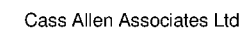
NOTES:

REVERBERATION TIME

DIRECT INPUT -----> [] [] [] [] [] [] [] [] No data

EQUAL RT for all bands -----> [] [0.5] [0.5] [0.5] [0.5] [0.5] [0.5] [0.5] Default - RT set to 0.5s

Ventilator Type		Num	D _{n,e} dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation	Greenwood 2500EAW.AC1 (Vent + 1 External Acoustic Module)	3	32	41	40	39	44	45	45	38%	42	-1	-2
	ATTENUATION												
Ventilation	VENTS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant SPL inside room through ventilators dB		29.3	10	10	16	25	26	20	10	38%			
Total SPL inside room		33.4	15	22	27	29	27	22	11				



CLIENT: Matthew Homes Ltd

PROJECT: Yapton Road, Barnham, PO22 0AY

ROOM: Living Room

RUN REF: Day Average (Laeq,T)

VARIANT: Standard

Room Dimensions [m]

W3.5

 X

L5.3

 X

H2.4

Room Volume = 44.5 m3

Partition Area = 12.7 m2

Ventilation ref area = 10.0 m2

Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ---->	57.7	27.6	37.5	42.2	49.7	55.3	50.6	41.0
Road traffic spectrum (according to BS 8233:1999 section 6)								
		27.6	37.5	42.2	49.7	55.3	50.6	41.0

REVERBERATION TIME

DIRECT INPUT -----> No data

EQUAL RT for all bands ----->

0.5

0.5

0.5

0.5

0.5

0.5

0.5

 Default - RT set to 0.5s

Façade Element		Area [m2]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1	Typical - 102mm brick/50mm cavity/100mm block	6.9	39	44	42	47	55	63	69	0%	53	0	0
	ATTENUATION												
Wall 2	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Wall 3	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 1	27 dB Rw + Ctr - Standard Thermal Double Glazing	5.8	20	20	19	27	38	37	40	26%	27 (inc Ctr)	-	-
	ATTENUATION												
Glazing 2	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 3	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Roof	ROOF / FLOOR		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant composite Façade SRI			23	23	22	30	41	41	43				
Resultant SPL inside room excluding ventilators dB			26.7	7	17	22	22	17	13	1	27%		

Ventilator Type	Num	Dn,e dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm^2)	3	30	35	35	36	34	29	33	73%	32	0	-1
ATTENUATION												
Ventilation VENTS		0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant SPL inside room through ventilators dB		31.1	4	9	13	20	28	28	14	73%		

Total SPL inside room

32.4

9

17

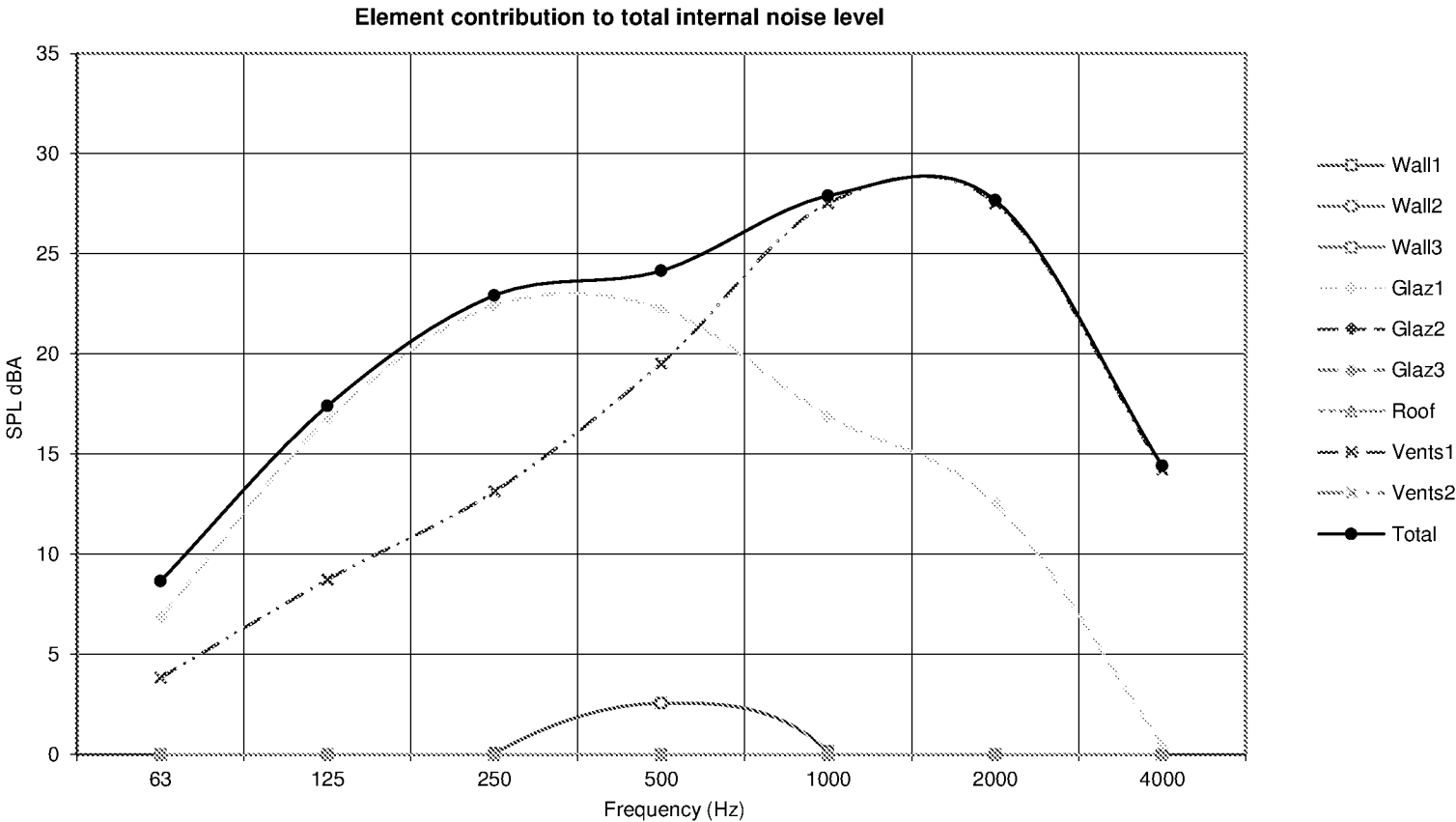
23

24

28

28

14



CLIENT: Matthew Homes Ltd

PROJECT: Yapton Road, Barnham, PO22 0AY

ROOM: Bedroom

RUN REF: Night Average (Laeq,T)

VARIANT: Upgraded

Room Dimensions [m]

W2.4

 X

L3.6

 X

H2.4

Room Volume = 20.7 m3

Partition Area = 5.8 m2

Ventilation ref area = 10.0 m2

Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ---->	59.7	29.6	39.1	44.2	51.7	57.4	52.6	43.0
Road traffic spectrum (according to BS 8233:1999 section 6)	59.0							
		29.6	39.1	44.2	51.7	57.4	52.6	43.0

REVERBERATION TIME

DIRECT INPUT -----> No data

EQUAL RT for all bands ----->

0.5

 Default - RT set to 0.5s

Façade Element		Area [m2]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1	Typical - 102mm brick/50mm cavity/100mm block	4.3	39	44	42	47	55	63	69	2%	53	0	0
	ATTENUATION												
Wall 2	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Wall 3	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 1	30 dB Rw + Ctr - Acoustically Upgraded Double Glazing	1.4	22	22	23	30	40	40	44	35%	30 (inc Ctr)	-	-
	ATTENUATION												
Glazing 2	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 3	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Roof	ROOF / FLOOR		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant composite Façade SRI			28	28	29	36	46	46	50				
Resultant SPL inside room excluding ventilators dB			22.6	4	13	18	18	14	9	-5	37%		

Ventilator Type		Num	Dn,e dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation	Greenwood 2500EAW.AC1 (Vent + 1 External Acoustic Module)	2	32	41	40	39	44	45	45	62%	42	-1	-2
	ATTENUATION												
Ventilation	VENTS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant SPL inside room through ventilators dB			24.8	5	6	12	20	21	15	6	63%		

Total SPL inside room

26.9

8

14

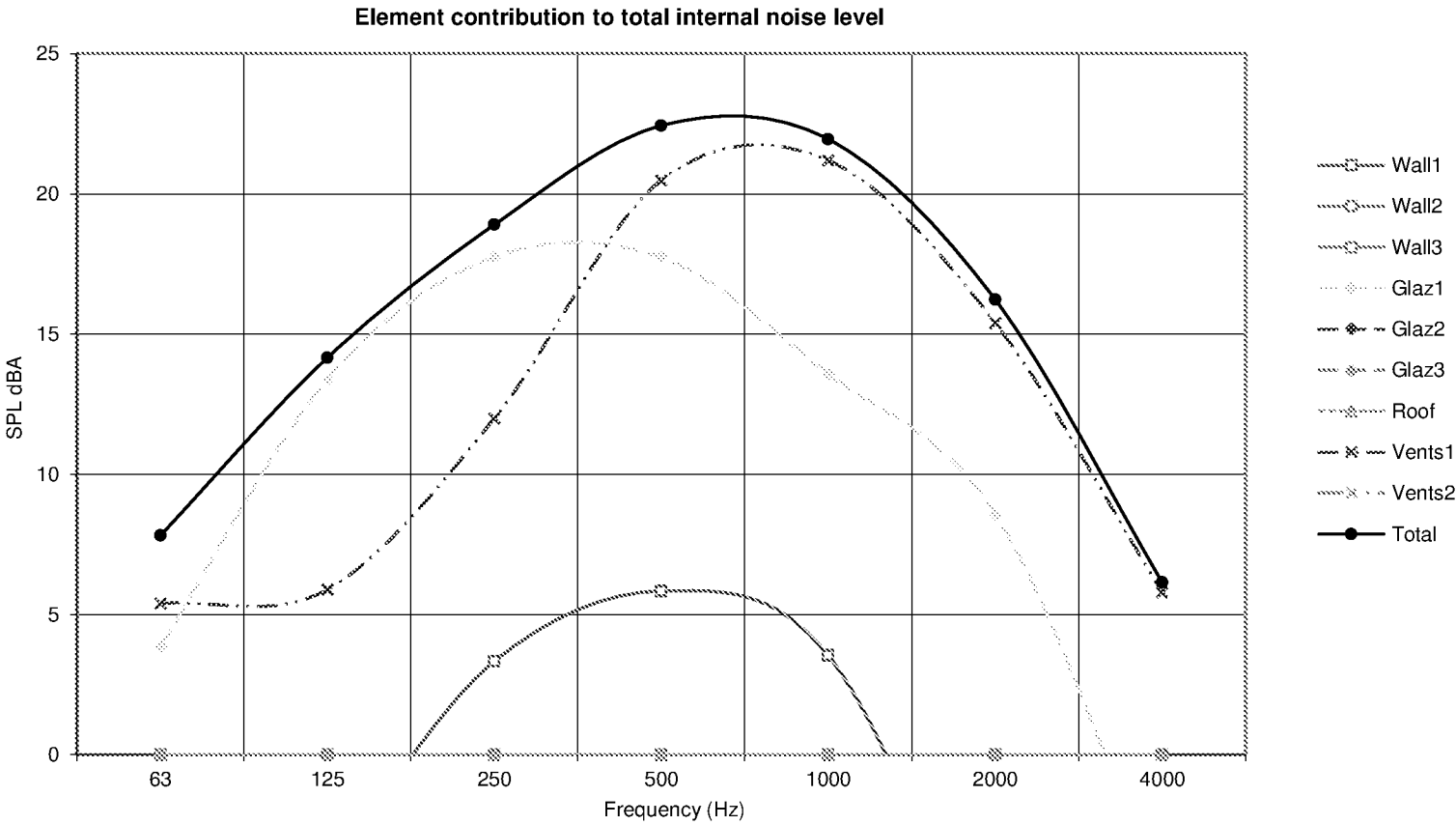
19

22

22

16

6



CLIENT: Matthew Homes Ltd

PROJECT: Yapton Road, Barnham, PO22 0AY

ROOM: Bedroom

RUN REF: Night Average (Laeq,T)

VARIANT: Standard

Room Dimensions [m]

W

L

H

2.4

X

3.6

X

2.4

Room Volume =

20.7

m3

Partition Area =

5.8

m2

Ventilation ref area =

10.0

m2

Free Field SPL K =

3

dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ----->	51.7	21.6	31.1	36.2	43.7	49.4	44.6	35.0
Road traffic spectrum (according to BS 8233:1999 section 6)								
		21.6	31.1	36.2	43.7	49.4	44.6	35.0
								Direct input

REVERBERATION TIME

DIRECT INPUT ----->

No data

EQUAL RT for all bands ----->

Default - RT set to 0.5s

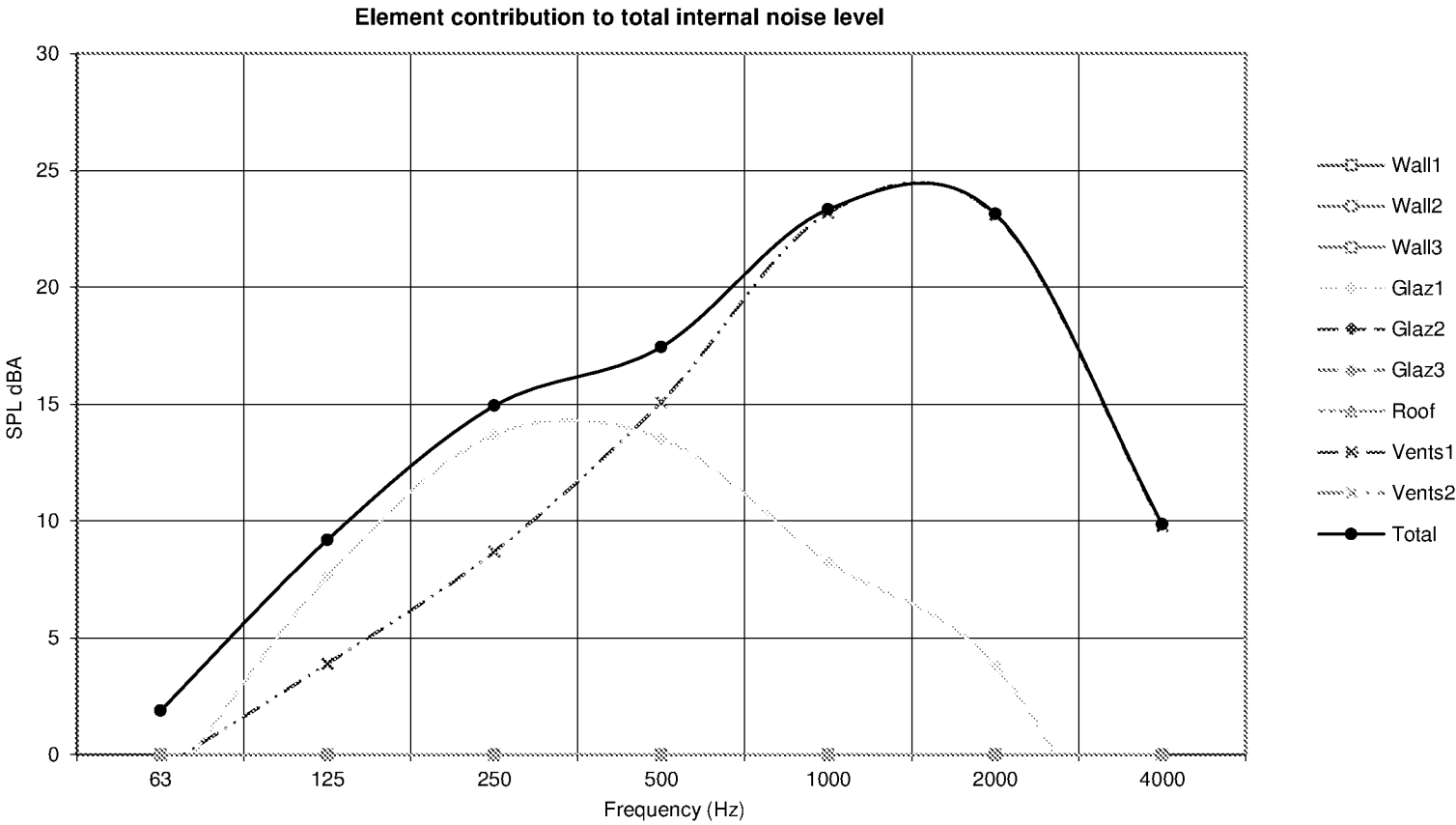
NOTES:

Façade Element		Area [m2]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1	Typical - 102mm brick/50mm cavity/100mm block	4.3	39	44	42	47	55	63	69	0%	53	0	0
	ATTENUATION												
Wall 2	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Wall 3	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 1	27 dB Rw + Ctr - Standard Thermal Double Glazing	1.4	20	20	19	27	38	37	40	12%	27 (inc Ctr)	-	-
	ATTENUATION												
Glazing 2	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 3	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Roof	ROOF / FLOOR		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant composite Façade SRI			26	26	25	32	43	43	46				
Resultant SPL inside room excluding ventilators dB			18.0	-2	8	14	14	8	4	-8	12%		

Ventilator Type	Num	Dn,e dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm^2)	2	30	35	35	36	34	29	33	37%	32	0	-1
ATTENUATION												
Ventilation VENTS		0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant SPL inside room through ventilators dB		26.7	-1	4	9	15	23	23	10	88%		

Total SPL inside room

27.22915172310



CLIENT: Matthew Homes Ltd

PROJECT: Yapton Road, Barnham, PO22 0AY

ROOM: Bedroom

RUN REF: Maximum Lamax

VARIANT:

Room Dimensions [m]

W2.4

 X

L3.6

 X

H2.4

Room Volume = 20.7 m3

Partition Area = 5.8 m2

Ventilation ref area = 10.0 m2

Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000
Direct input - Free Field SPL (A weighted octave bands) dB ----->	69.2	39.1	48.6	53.7	61.2	66.9	62.1
Road traffic spectrum (according to BS 8233:1999 section 6)							
	39.1	48.6	53.7	61.2	66.9	62.1	52.5

REVERBERATION TIME

DIRECT INPUT -----> No data

EQUAL RT for all bands ----->

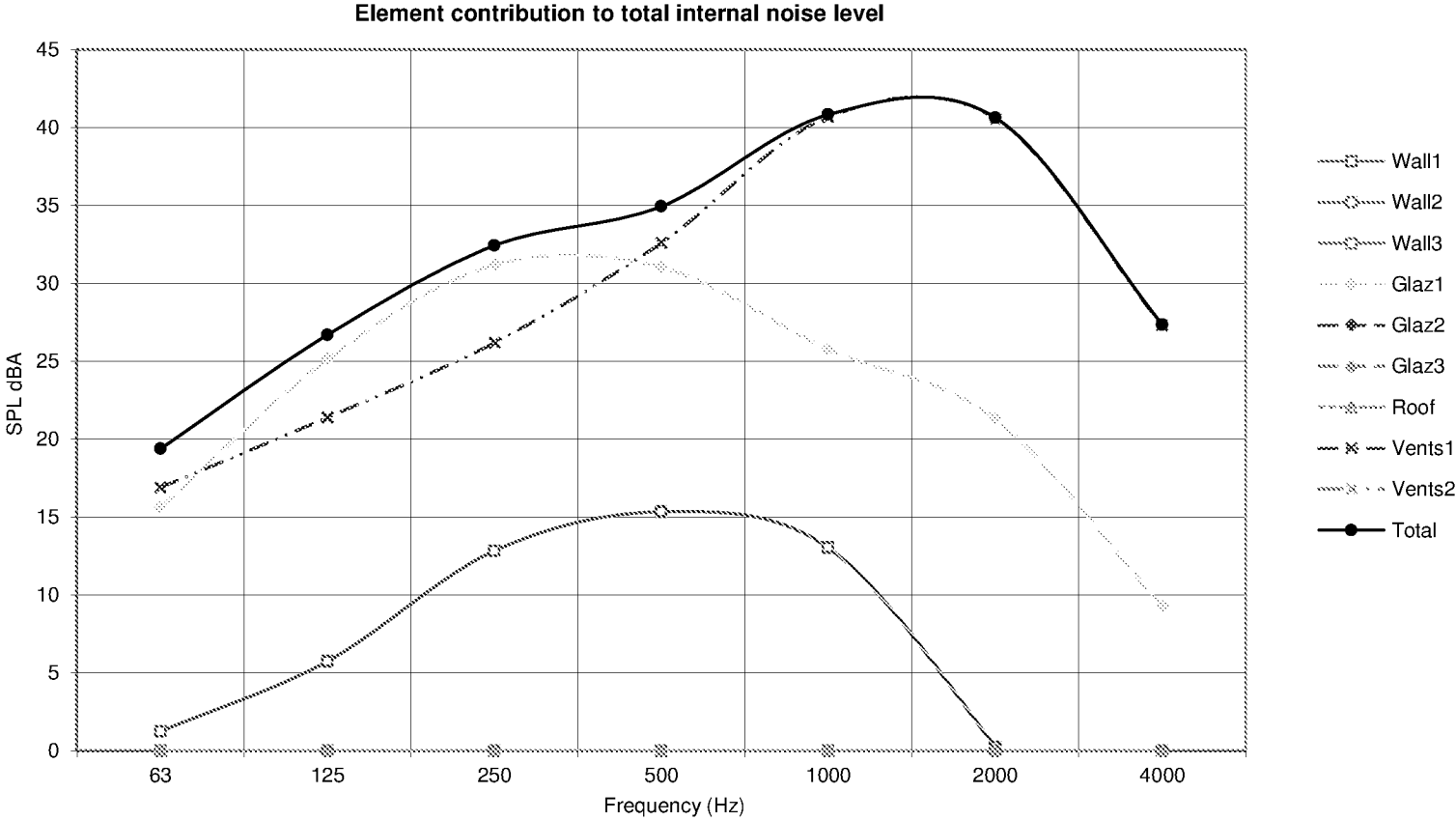
0.5

 Default - RT set to 0.5s

NOTES:

Façade Element		Area [m2]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1	Typical - 102mm brick/50mm cavity/100mm block	4.3	39	44	42	47	55	63	69	0%	53	0	0
	ATTENUATION												
Wall 2	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Wall 3	WALLS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 1	27 dB Rw + Ctr - Standard Thermal Double Glazing	1.4	20	20	19	27	38	37	40	12%	27 (inc Ctr)	-	-
	ATTENUATION												
Glazing 2	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Glazing 3	GLAZING		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Roof	ROOF / FLOOR		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant composite Façade SRI			26	26	25	32	43	43	46				
Resultant SPL inside room excluding ventilators dB			35.5	16	25	31	31	26	21	12%			

Ventilator Type		Num	D _{n,e} dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation	Hit and miss trickle (4000mm²)	2	30	35	35	36	34	29	33	88%	32	0	-1
	ATTENUATION												
Ventilation	VENTS		0	0	0	0	0	0	0	0%			
	ATTENUATION												
Resultant SPL inside room through ventilators dB			44.2	17	21	26	33	41	41	88%			
Total SPL inside room			44.7	19	27	32	35	41	41				

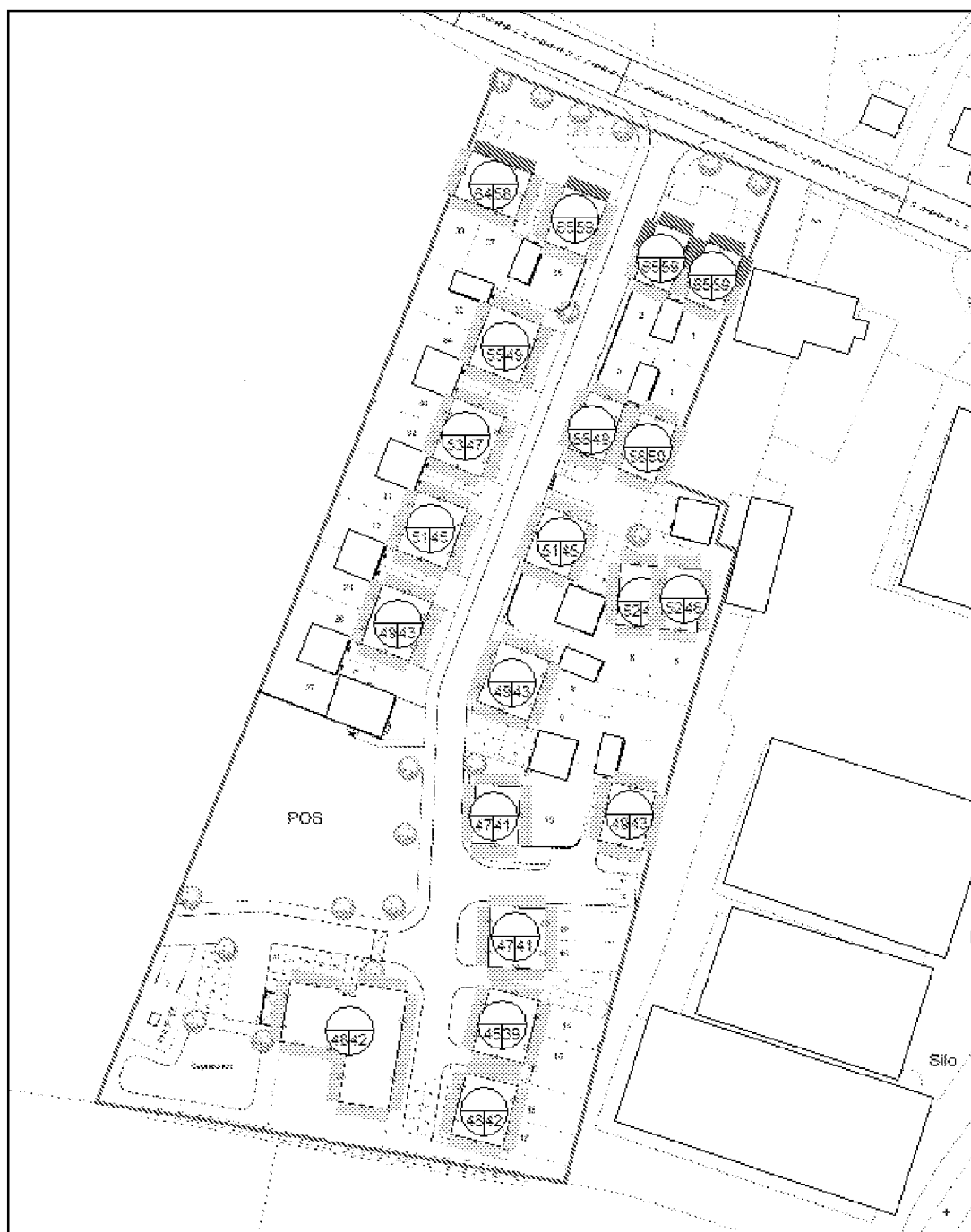


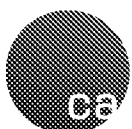
Appendix 4 Outline Acoustic Facade Specification

Reference	Ventilator Specification	Glazing Specification	Colour
FS01	40 dB Dnew+Ctr	30 dB Rw+Ctr	
FS02	31 dB Dnew+Ctr	27 dB Rw+Ctr	

Notes: Values must include the Ctr correction. Manufacturers or suppliers should provide laboratory test data demonstrating that the proposed systems are capable of achieving the values given. Windows should be tested as complete systems (rather than just the glazing in isolation).

All floors:





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