

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

023790-R03-B

2 May 2024

Victoria Point, Manchester

Planning noise report

London, Manchester, Edinburgh, Birmingham, Belfast Leeds

Sandy Brown Ltd

Registered in England & Wales

No. 13227735

post@sandybrown.com

www.sandybrown.com

Registered Office: 55 Charterhouse Street, London EC1M 6HA

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

Version	Date	Comments	Author	Reviewer
A	13 Mar 24		Tom Stephenson	Mark Howarth
B	2 May 24	Updated development proposals	Tom Stephenson	Mark Howarth

Disclaimer

This report has been prepared for the sole benefit and use of our client based on their instructions and requirements. Sandy Brown Ltd extends no liability in respect of the information contained in the report to any third party.

Summary

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at Victoria Point, Manchester.

An environmental noise survey has been carried out at the site. The noise survey was carried out between 29 September 2023 and 4 October 2023.

Representative background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the day and between $L_{A90,15min}$ 38 dB and $L_{A90,15min}$ 42 dB at night.

Based on the requirements of Manchester City Council (MCC) and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 44 dB during the day and $L_{Aeq,15min}$ 36 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

The average ambient noise levels measured during the survey were $L_{Aeq,16h}$ 51-54 dB during the day and $L_{Aeq,8h}$ 45-48 dB at night. Predicted external ambient noise levels to apartments vary from L_{Aeq} 45 to 68 dB during the day and night.

An initial assessment has been carried out to determine required acoustic performances for the facades and provide guidance on the ventilation strategy.

The most onerous overall facade sound insulation performance for the development is R_w+C_{tr} 35 dB, which occurs at the facade of Block 6 overlooking Hathersage Road. An example glazing and ventilation strategy to achieve this performance is 8.8 mm acoustic laminate/16 mm/10 mm glass with high performance acoustically attenuated passive ventilation.

Based on an initial assessment, open windows in bedrooms can likely not be relied upon as a method to remove excess heat for most apartments at night, and the 'dynamic thermal modelling method' (eg, a CIBSE TM59 assessment) will need to be used to demonstrate compliance with the requirements of Approved Document O 2021.

A plant noise assessment has been completed based on indicative plant item selections. Mitigation measures are proposed to ensure that the MCC noise egress criteria are met.

Contents

1	Introduction.....	5
2	Site description	5
3	Development proposals	6
4	Assessment criteria	7
5	Survey method.....	14
6	Measurement results	14
7	Plant noise egress	19
8	Facade sound insulation – noise ingress	26
9	Acoustics, ventilation and overheating.....	28
10	Conclusion	33
	Appendix A	34
	Survey details.....	34
	Appendix B	37
	Results of unattended measurements at Location L1	37
	Appendix C	39
	Results of unattended measurements at Location L2	39
	Appendix D	41
	BS 4142 corrections for attention catching features	41
	Appendix E.....	43
	Predicted external noise levels	43
	Appendix F.....	50
	AVOG SOAEL graphs.....	50
	Appendix G	60
	Locations where openable windows may be used to control overheating	60

1 Introduction

Sandy Brown has been commissioned by Empiric (Manchester Victoria Point) Ltd to provide acoustic advice in relation to the proposed development at Victoria Point, Manchester.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of Manchester City Council (MCC).

Ambient and maximum noise levels are used to assess building envelope sound insulation requirements to achieve appropriate internal noise levels for residences. These follow standards set in accordance with MCC guidelines.

This report provides a summary of the key points of the environmental noise survey.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. The Victoria Point development consists of 6 residential blocks for students, highlighted in red. Hathersage Road is to the south of the site and is shown in magenta. Carmoor Road is to the west of the site and is shown in yellow.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The majority of adjacent premises are residential, highlighted in green in Figure 1. Victoria Baths, a commercial space, is highlighted in blue. Octagon House, a healthcare building is highlighted in cyan.

3 Development proposals

3.1 Refurbishment proposals

The proposal is the redevelopment of existing student accommodation blocks (6 in total) to include the phased demolition and extension of existing buildings at a maximum height of 12 storeys for Purpose Built Student Accommodation (Use Class Sui Generis), including associated ancillary internal and external amenity space, ground floor community/commercial space (Use Class E, F1 and F2), hard and soft landscaping and associated highway works.

3.2 External plant items

New normally operating and emergency external plant items are proposed across the development at ground and roof level.

Based on the plant information received from Atelier Ten, it is understood the following plant items are proposed:

- 23 x air source heat pumps
- 3 x cooling systems
- 2 x VRF condensers
- 4 x life safety generators
- 5 x twin inline smoke extract fans

It is understood that regular testing of the generators will be completed on a monthly basis and on a quarterly basis for the smoke extract fans.

Further details of the proposals and an assessment of plant noise egress is provided in Section 7.

4 Assessment criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, December 2023 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF, clause 191 states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative 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 the 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.'*

and clause 193 states:

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship,

pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

The NPSE states that its aims are as follows:

'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

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

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

4.1 ProPG

ProPG *Planning & Noise (Professional Practice Guidance on Planning & Noise), New Residential Development, 2017* provides guidance to the management of noise within the planning system in England. It is restricted to consideration of new residential developments that will be exposed predominantly to airborne noise from transport sources.

The two stages of the approach are given below

- Stage 1 – Initial noise risk assessment of the proposed development site
- Stage 2 – Systematic consideration of four key elements
 - Element 1 – Demonstrating a "Good Acoustic Design Process"
 - Element 2 – Observing internal "Noise Level Guidelines"
 - Element 3 – Undertaking an "External Amenity Area Noise Assessment"
 - Element 4 – Consideration of "Other Relevant Issues".

Following this approach, there are four possible recommendations, the choice of recommendation is as follows:

- Grant without conditions
- Grant with conditions
- Avoid
- Prevent.

Guidance provided in ProPG has been used to assess the proposed development site and recommend mitigation measures to reduce noise levels.

4.2 Noise egress

4.2.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background sound level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2.2 Local Authority criteria

Manchester City Councils' plant noise egress criteria will be applicable at noise sensitive receptors outside Victoria Point.

Manchester City Council typically stipulate the following criteria for plant noise egress:

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location."

4.3 Noise ingress

4.3.1 Local Authority requirements

Manchester City Council stipulates the criteria provided in Table 1 with regards to internal noise in residential developments.

Table 1 Manchester City Council internal noise criteria for residential developments

Internal space	Internal noise limit, L_{Aeq} (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Living rooms	35	-
Bedrooms	-	30

It is also stipulated that individual noise events in bedrooms should not exceed L_{Amax} 45 dB more than 15 times per night.

4.3.2 British Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS 8233:2014 *Sound insulation and noise reduction for buildings*. The guidance limits are shown in Table 2.

These internal levels are based on annual average data and do not have to be achieved in all circumstances. It is normal to exclude occasional events, such as fireworks night or New Year's Eve.

Table 2 Internal noise criteria for sleeping/resting

Internal space	Indoor ambient noise level, L_{Aeq} (dB)	
	Day (07:00 – 23:00)	Night (23:00 – 07:00)
Living rooms	35	-
Dining room	40	-
Bedrooms	35	30 ^[1]

[1] BS 8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. For regular events, such as scheduled aircraft or passing trains, a guideline value may be set in terms of SEL or $L_{Amax,F}$. Sporadic noise events could require separate values.

The standard states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas, such as gardens and patios, the standard states:

'it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ 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. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

4.3.3 Approved Document O – Overheating

Approved Document O 2021 Edition (to the Building Regulations 2010) states the following in relation to noise ingress during overheating periods:

'In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the

overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (23:00-07:00 hours).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. $L_{Aeq,T}$ 40 dB average over 8 hours (between 23:00-07:00)
- b. L_{AFmax} 55 dB more than 10 times a night (between 23:00-07:00).'

The above applies to residential dwellings, institutional residential accommodation, and other types of residential accommodation, such as student accommodation.

4.3.4 Acoustics, ventilation and overheating

MCC *Planning and Noise Technical Guidance* includes discussion on the Association of Noise Consultants *Acoustics Ventilation and Overheating, Residential Design Guide* (AVO Guide) relation to ventilation and overheating. The AVO guide is also referenced within ADO2021.

The guidance for suitable internal noise levels in order that noise ingress can be suitably controlled for an overheating condition are provided in AVO Guide. These are adapted and summarised in Table 3, though are not supposed to be taken as limits, rather guidelines to be assessed while also considering the adverse effect of any overheating (duration and severity).

The lowest observed affect level (LOAEL) and the significant observed affect level (SOAEL) for increased noise levels associated with controlling overheating are specific to each project as these depend on the magnitude of the increased internal noise levels and the duration for which they occur.

Table 3 Guidance for Level 2 assessment of noise from transport sources relating to overheating condition

Effect level	Internal noise level from transport sources		
	Day (07:00 – 23:00)	Night (23:00 – 07:00)	
LOAEL (noise can be heard, but does not cause any change in behaviour)	$L_{Aeq} \leq 35$ dB	$L_{Aeq} \leq 30$ dB	L_{AFmax} 45 dB not normally exceeded
SOAEL upper limit for longer overheating durations	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 40$ dB	$L_{Aeq} > 30$ dB and $L_{Aeq} \leq 35$ dB	-
SOAEL upper limit for shorter overheating durations	$L_{Aeq} > 40$ dB and $L_{Aeq} \leq 50$ dB	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 42$ dB	-
Exceeds SOAEL (noise causes a material change in behaviour)	$L_{Aeq} > 50$ dB	$L_{Aeq} > 42$ dB	L_{AFmax} 65 dB normally exceeded

The AVO Guide illustrates that there is a link between adverse effects, increasing internal ambient noise levels and the duration of exposure to noise for an overheating condition. These are indicated in Figure 2.

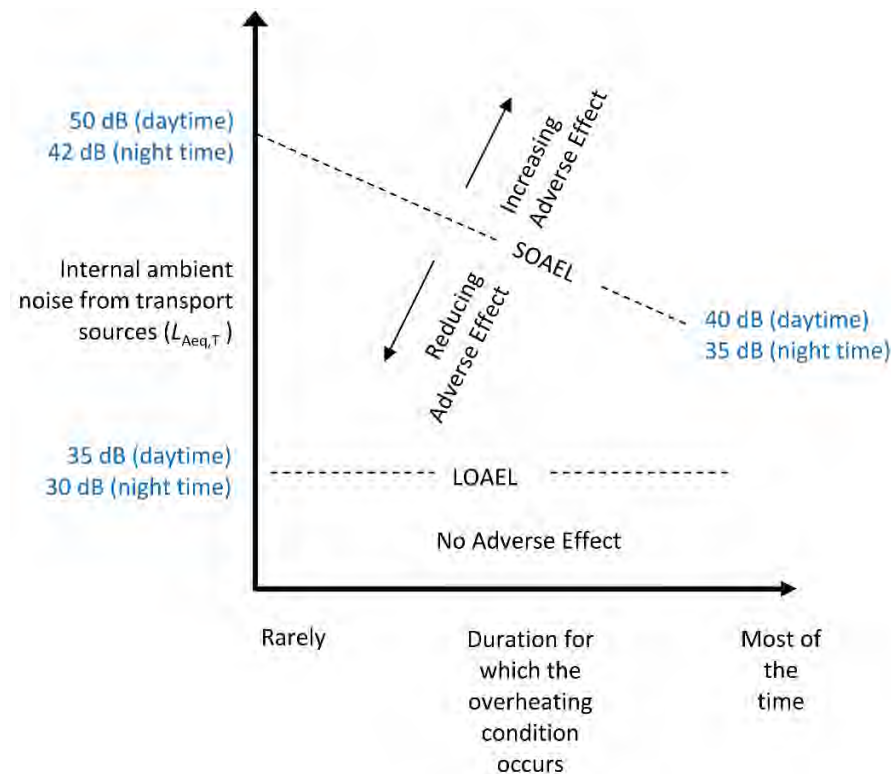


Figure 2 Internal ambient noise levels and increasing adverse effects for an overheating condition

When internal noise levels are above Significant Observed Adverse Effect Level (SOAEL), it is likely that there will be a high potential for an adverse outcome. These adverse outcomes will include:

- Material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion
- Where there is no alternative ventilation, having to keep windows closed most of the time because of the noise
- Potential for sleep disturbance and difficulty in getting back to sleep
- Quality of life diminished.

As illustrated, the potential for adverse risk increases with the duration of exposure to noise, ie, a shorter exposure will result in a lower risk of adverse outcomes.

5 Survey method

5.1 Noise survey method

The survey included unattended and attended noise measurements across the Victoria Point site.

5.1.1 *Unattended measurements*

Unattended noise monitoring was undertaken at the site at two positions over 5 days.

The measurement position used during the survey is indicated in Figure 1, denoted by the markers 'L1' and 'L2'. These locations were chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

At each position, the microphone was mounted on a tripod approximately 1.2 m above roof level and at least 3 m from any other reflective surface. At position L1, the microphone was approximately 15 m above the ground. At position L2, the microphone was approximately 10 m above the ground.

Details of the equipment used and the noise indices measured are provided in Appendix A.

5.1.2 *Attended measurements*

Attended sample measurements were taken at 4 locations around the site. These are indicated in Figure 1 as positions 1 to 4. The attended measurements were carried out on 4 October 2023, over 10-minute periods.

Dominant noise sources occurring during the measurements were noted.

6 Measurement results

6.1 Observations

6.1.1 *Noise*

The dominant noise source observed at the site during the survey was road traffic noise on Hathersage Road.

Less significant noise sources included road traffic noise on Carmoor Road and distant road traffic noise on the A34.

6.2 Noise measurement results

6.2.1 Unattended measurement results

Graphs showing the results of the unattended measurements are provided in Appendix B and Appendix C.

Ambient noise levels measured during the unattended surveys are presented in Table 4 and Table 5. The measurement results are presented as free-field levels.

Table 4 Ambient noise levels measured during the unattended survey at position L1

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 29 Sep 2023	53 ^[1]	48
Saturday 30 Sep 2023	54	50
Sunday 1 Oct 2023	53	47
Monday 2 Oct 2023	55	48
Tuesday 3 Oct 2023	55	47
Wednesday 4 Oct 2023	55 ^[1]	-
Average	54	48

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 29 September 23 was over 8 hours, and on 4 October 23 over 5 hours); not included in the average.

Analysis of night-time maximum noise levels indicates that the night-time maximum noise level not normally exceeded 15 times a night is L_{AFmax} 64 dB at the measurement position.

Table 5 Ambient noise levels measured during the unattended survey at position L2

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 29 Sep 2023	51 ^[1]	45
Saturday 30 Sep 2023	50	49
Sunday 1 Oct 2023	51	44
Monday 2 Oct 2023	50	44
Tuesday 3 Oct 2023	51	44
Wednesday 4 Oct 2023	50 ^[1]	-
Average	51	45

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 29 September 23 was over 7 hours, and on 4 October 23 over 4 hours); not included in the average.

Analysis of night-time maximum noise levels indicates that the night-time maximum noise level not normally exceeded 15 times a night is L_{AFmax} 63 dB at the measurement position.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Day and night statistical analysis of representative values for the two unattended measurement positions are given in Figure 3 and Figure 4.

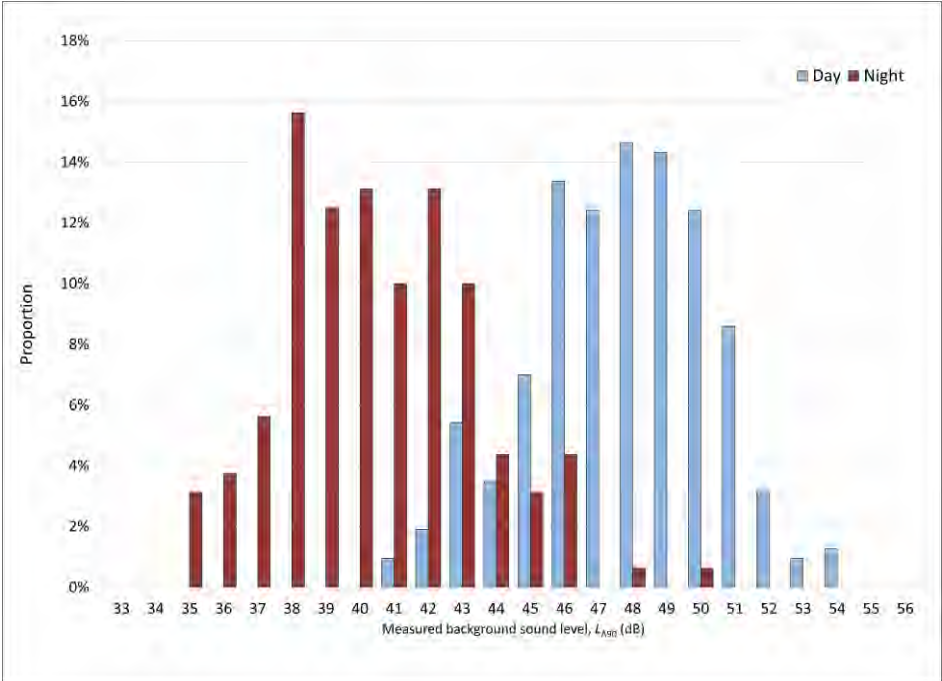


Figure 3 Day and night measured background level at unattended measurement position 'L1'

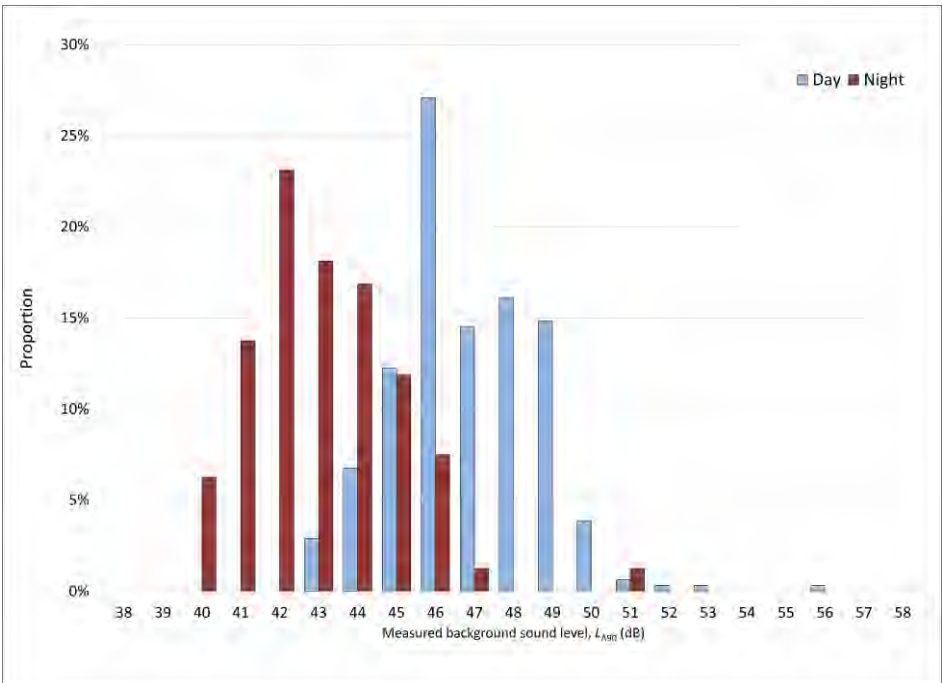


Figure 4 Day and night measured background level at unattended measurement position 'L2'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the daytime and between $L_{A90,15min}$ 38 dB at position 'L1' and $L_{A90,15min}$ 42 dB at position 'L2' at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements on 4 October 2023 are summarised in Table 6. All measurements were free-field.

Table 6 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,10min}$	$L_{AFmax,10min}$	$L_{A90,10min}$	
1	11:56	67	79	54	Road traffic noise on Hathersage Road dominant. Less significant road traffic noise at Victoria Point and A34, distant construction noise and sirens
	12:08	67	79	53	
	12:20	73	98	57	
2	12:26	58	71	48	No dominant sources. Ambient road traffic noise on Hathersage Road, Carmoor Road and A34 including infrequent sirens. Helicopter noise overhead during measurement at 12:36.
	12:36	56	67	48	
	12:46	52	60	47	
3	12:38	44	56	41	No dominant sources. Ambient road traffic noise on Hathersage Road including infrequent sirens.
	12:48	45	59	41	
	12:58	46	60	40	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,10min}$	$L_{AFmax,10min}$	$L_{A90,10min}$	
4	13:14	56	72	46	Road traffic noise on Hathersage Road. Less significant road traffic from Carmoor Road and A34. Infrequent sirens. Sub-station hum barely audible.
	13:26	57	73	47	
	13:36	56	71	48	

7 Plant noise egress

7.1 Limits

External noise limits for normally operating building services and emergency plant items are presented in the following section. The limits apply at nearby residential premises to the north, east and south as well as to Octagon House, a nearby NHS building which is understood to have wards and bedrooms. Victoria Baths, the nearest commercial premises, has also been considered, though the night-time limits will not be applicable here.

7.1.1 Normally operating plant items

Based on the local authority criteria and the environmental survey results presented in Section 6.2.1, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 7.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

Table 7 Normally operating plant noise limits at 1 m from the nearest noise sensitive premises

Receptor	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
	Day (07:00-23:00)	Night (23:00-07:00)
Residential premises to the south (Hathersage Road)	44	36
Octagon House		
Victoria Baths		

Receptor	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
	Day (07:00-23:00)	Night (23:00-07:00)
Residential premises to the east (Brandish Close, Keswick Close)	44	40
Residential premises to the north (Upper West Grove)		

^[1] The limits set out in Table 7 do not include any attention catching features. The penalty corrections for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed in Appendix D.

7.1.2 Emergency plant

For emergency plant items, Manchester City Council (MCC) typically permits a level 10 dB above the existing background noise level (L_{A90}) at the nearest noise sensitive location. This would be subject to MCC approval.

At this stage, it is understood that the life safety generators and smoke extract fans will be categorised as emergency plant.

Table 8 Emergency plant noise limits at 1 m from the nearest noise sensitive premises

Receptor	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
	Day (07:00-23:00)	Night (23:00-07:00)
Residential premises to the south (Hathersage Road)	59	51
Octagon House		
Victoria Baths		
Residential premises to the east (Brandish Close, Keswick Close)	59	55
Residential premises to the north (Upper West Grove)		

^[1] The limits set out in Table 8 do not include any attention catching features. The penalty corrections for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed in Appendix D.

7.2 Proposals

7.2.1 Operational hours

For the purposes of this assessment, it has been assumed that all proposed plant will be continuously operational, as such the assessment has been completed to ensure that the most onerous criteria shall be met.

7.2.2 Parapets

Based on the latest architectural drawings, it is understood that parapets are proposed to each of the block's roofs. The parapets typically extend 1.3 – 1.7 m above the roof level. The screening effects provided by these parapets have been considered as part of the 3D environmental noise model.

7.2.3 Plant screens

Based on the latest architectural and plant layouts, it is understood that plant screens have been proposed to the rooftops of Blocks 2 and 3, as well as around the Block 1 plant items. These screens have been considered as part of the following noise egress assessment.

7.2.4 Emergency plant items regular testing

It is understood that regular testing of the generators will be completed on a monthly basis and on a quarterly basis for the smoke extract fans.

7.2.5 Plant item locations

Based on the plant information received from Atelier Ten, it is understood that the indicative plant items set out in Table 9 are proposed.

Table 9 Proposed plant item locations

Location	Proposed plant items
Block 1 ground level	125 kVA life safety generator 2 x CND-01 ASHPs 1 x CND-02 cooling system
Block 2 roof level	3 x CND-01 ASHPs
Block 3 roof level	100 kVA life safety generator 3 x CND-01 ASHPs
Block 4 fourth floor terrace	125 kVA life safety generator 5 x CND-01 ASHPs 1 x CND-03 VRF system Twin inline smoke shaft fans

Location	Proposed plant items
Block 4 roof level	2 x twin inline smoke shaft fans
Block 5+6 ground level (next to bike/refuse store)	2 x CND-02 cooling system
Block 5+6 fourth floor terrace	1 x CND-03 VRF system (allowance for future fit-out items) Twin inline smoke shaft fans
Block 5+6 seventh floor terrace	125 kVA life safety generator Twin inline smoke shaft fans
Block 5+6 roof level	10 x CND-01 ASHPs 2 x twin inline smoke shaft fans

7.2.6 Noise data

The manufacturer's data provided for the 100 kVA and 125 kVA generators states that the sound pressure level at 1 m from the generator is less than L_{Aeq} 75 dB at 75% load. For the purposes of this assessment, a typical generator spectrum has been adjusted to match the stated single figure sound pressure level at 1 m, presented in Table 10.

Table 10 Assumed generator spectrum

Unit	Sound pressure level at 1 m, L_{eq} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Generator spectrum corrected to 75 dB at 1 m	84	80	72	66	59	66	69	69

Octave band noise data for the CND-02 cooling system has not been received. However, it is understood that the measured sound pressure level at 1 m is L_{Aeq} 47-49 dB.

The received noise level data for the remaining units are presented in Table 11 and Table 12.

Table 11 Plant item noise level data for CND-01 (Mitsubishi CAHV-R450YA-HPB)

Unit	Sound power level, L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
CND-01	78	79	80	73	68	65	65	60

Table 12 Plant item noise level data for CND-03 (Mitsubishi PURY-EP400YSNW-A2)

Unit	Sound pressure level at 1 m, L_{eq} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
CND-03 Standard cooling	74	64	66	64	59	55	49	45
CND-03 Standard heating	81	70	70	68	62	59	54	49

The CND-03 VRF system also has 'low noise mode' data which may be investigated should the standard operating modes exceed the noise egress criteria.

Noise data have not been provided for the smoke extract fans. At this stage it is recommended that the following limits are applied as this will allow for the emergency plant noise criteria in Table 8 to be met:

- Blocks 1-4 smoke extract fans - L_{WA} 88 dB at the atmospheric termination
- Blocks 5+6 smoke extract fans - L_{WA} 83 dB at the atmospheric termination.

7.3 Proposed mitigation measures

Based on previous iterations of the plant noise egress assessment, it has been established that mitigation measures would be required to meet the MCC criteria set out in Table 7. Proposed mitigation measures have been provided by Atelier Ten and are set out below.

7.3.1 Block 1 ground level

The proposed screen shall extend at least 0.9 m above the top of the normally operating plant items.

7.3.2 Block 4 fourth floor terrace and Block 5+6 roof level

It is understood that treatment can be applied individually to each plant item on the Block 4 fourth floor terrace and Block 5+6 roof level. A full acoustic kit can be applied to the CND-01 units to achieve up to 8 dBA reduction, or a 'top only' kit can be used to achieve up to 4 dBA reduction.

It is understood that a standard or upgraded acoustic enclosure is available for the CND-03 units, comprising of inlet and discharge attenuators, as well as acoustic panels. The noise reduction provided by each of these elements is presented in Table 13.

Table 13 CND-03 condenser mitigation measures

	Stated noise reduction (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Standard inlet louvre	7	8	11	12	15	16	13	11
Standard discharge attenuator	3	5	10	19	27	23	20	15
Standard panel	19	19	21	30	43	44	45	45
Upgraded inlet louvre	9	10	14	20	30	33	32	30
Upgraded discharge attenuator	5	9	18	28	30	30	27	20
Upgraded panel	26	24	29	40	52	56	56	57

The full acoustic kit should be applied to each of the CND-01 units and the standard acoustic enclosure should be applied to the CND-03 unit on the Block 4 fourth floor terrace.

The full acoustic kit should also be applied to each of the CND-01 units on the Block 5+6 roof level.

7.3.3 Block 5+6 fourth floor terrace

The future tenant plant shall be limited to a cumulative sound power level of L_{WA} 60 dB.

7.4 Assessment

Assessment has been carried out to predict plant noise egress at the nearby noise sensitive premises for normally operating plant noise. Calculations are based on all plant items running simultaneously.

A 3D environmental noise model of the site has been produced using the computational acoustic modelling package CadnaA (version 2023 MR 1).

The software carries out calculations using a ray tracing technique, and considers the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

A screenshot from the model is provided in Figure 5.



Figure 5 Screenshot from 3D environmental noise model

7.5 Results

7.5.1 Predicted noise levels at noise sensitive premises from normally operating plant

The predicted cumulative noise levels at 1 m from the facade of nearby worst affected premises with the mitigation measures presented in Section 7.3 applied, are shown in Table 14.

Table 14 Predicted noise egress level from proposed normally-operating plant equipment

Noise sensitive premises	Highest predicted plant noise egress level, L_{Aeq} (dB)
Residential premises to the east (Brandish Close, Keswick Close)	39
Residential premises to the north (Upper West Grove)	38
Residential premises to the south (Hathersage Road)	34
Victoria Baths	38
Octagon House	36

The predicted noise levels at 1 m from the facade of nearby residential premises and Octagon House meet the daytime and night-time proposed noise limits, provided that the mitigation measures presented in Section 7.3 are applied. The proposed noise limit at Victoria Baths, a commercial premises, is predicted to be met in the daytime.

7.5.2 Predicted noise levels at noise sensitive premises from emergency plant items

The predicted cumulative noise levels at 1 m from the facade of nearby worst affected premises due to emergency plant items are shown in Table 15.

Table 15 Predicted noise egress level from proposed emergency plant equipment

Noise sensitive premises	Highest predicted plant noise egress level, L_{Aeq} (dB)
Residential premises to the east (Brandish Close, Keswick Close)	46
Residential premises to the north (Upper West Grove)	48
Residential premises to the south (Hathersage Road)	44
Victoria Baths	45
Octagon House	51

The results presented in Table 15 show that the calculated noise levels from emergency plant would meet the night-time criteria presented in Table 8 will be met at nearby noise sensitive premises.

The highest noise level at the facade of the development due to emergency plant items is predicted to be L_{Aeq} 75 dB.

8 Facade sound insulation – noise ingress

This section describes an assessment of facade sound insulation to control noise ingress. The required facade specification largely depends on the external noise levels and the internal noise criteria.

The following assessment is based on achieving the internal noise levels recommended in BS 8233 and the requirements of Manchester City Council, which are set out in Section 4.

8.1 External noise levels

8.1.1 Ambient noise levels

Predicted external ambient noise levels at the facades of the proposed development are shown in Appendix E. The predicted external noise level facade zones are set out in Table 16.

Table 16 Predicted external noise level facade zones

Facade zone (refer to mark-up)	Day facade noise level, $L_{Aeq,16hr}$ (dB)	Night facade noise level, $L_{Aeq,8hr}$ (dB)
1 	66-70	61-65
2 	61-65	56-60
3 	56-60	51-55
4 	51-55	46-50
5 	≤ 50	≤ 45

8.1.2 Maximum noise levels

Based on observations made during the environmental noise survey, it is considered likely that the source of the highest night L_{AFmax} measurements is due to road traffic movements/events along on Hathersage Road.

An assessment has been carried out to predict the 10th highest $L_{AFmax,2min}$ noise level at the facades of the proposed development in line with the MCC criteria. The predicted 10th highest $L_{AFmax,2min}$ level for facade zone 1 is L_{AFmax} 78 dB. As this is less than 15 dB above the maximum ambient noise levels and is predicted to reduce accordingly for the other facade zones, the night-time maxima do not dictate the facade sound insulation requirements.

8.2 Facade sound insulation

Minimum facade sound insulation requirements have been calculated for the student rooms. These apply under the background ventilation conditions and are given in Table 17.

These have been determined to achieve the internal noise criteria using predicted external noise levels at the facades from the 3D model.

At this site, the facade performance requirements are dictated by the ambient noise levels rather than the night-time maxima.

Table 17 Facade sound insulation performance requirements

Facade zone	Minimum overall sound insulation performance, R'_w+C_{tr} (dB)
1 	35
2 	30
3 	25
4 	20
5 	15

It should be noted that these are the minimum facade sound insulation performances required to control environmental noise ingress only to meet with the criteria set in Table 1. While the model and facade zones have been marked throughout the development, it is understood that these will only apply to new-build elements.

Where student rooms are to be mechanically ventilated, minimum sound insulation performances at least 3 dB higher than those given in Table 17 are recommended. This would allow for equal noise contributions between environmental noise ingress and building services noise.

9 Acoustics, ventilation and overheating

ADO2021 sets out requirements for internal noise levels in bedrooms during the night, and therefore takes precedence over AVO Guide. For living rooms during the day, the guidance in AVO Guide has been used to inform the recommendations provided.

9.1 Approved Document O 2021 (during the night)

Although demonstrating compliance with ADO2021 is not strictly a requirement of planning, achieving the requirements will likely have implications on the building's design. This may include impacts on the appearance of the facade and requirements for additional building services plant (eg, external heat rejection plant, mechanical ventilation with/without cooling units within apartments).

The results of noise survey and acoustic modelling have been used to assess internal noise levels within bedrooms at night, based on inputs associated with the 'simplified method' set out above. The predicted typical external free-field external noise levels at night range between L_{Aeq} 42-62 dB and L_{AFmax} 55-75 dB. It should be noted that the levels presented in Table 18 differ with those shown on the mark-ups in Appendix E by 3 dB due to the free-field correction.

Table 18 Initial assessment against ADO2021 simplified method

Facade zone	Free-field noise levels predicted at night	Comparison to ADO 2021 simplified method
1	L_{Aeq} 62 dB and L_{AFmax} 75 dB	Windows to be closed overnight
2	L_{Aeq} 57 dB and L_{AFmax} 70 dB	Windows to be closed overnight
3	L_{Aeq} 52 dB and L_{AFmax} 65 dB	Windows to be closed overnight
4	L_{Aeq} 47 dB and L_{AFmax} 60 dB	Windows may be open overnight
5	L_{Aeq} 42 dB and L_{AFmax} 55 dB	Windows may be open overnight

For facade zones 1-3, it is predicted that open windows in bedrooms at night can likely not be relied upon as a method to remove excess heat, and the 'dynamic thermal modelling method' (eg, a CIBSE TM59 assessment) will need to be used to demonstrate compliance with the requirements of ADO2021.

Based on the results of the ADO2021 simplified assessment bedroom windows will likely need to be closed at night in most areas. Additionally, a mark-up is provided in Figure 6 where the contributions from the proposed Block 4 fourth floor terrace normally operating plant items bring the cumulative noise level above the threshold, assuming that the mitigation measures discussed above are applied to the CND-01 and CND-03 units. Openable windows cannot be used at night to remove excess heat for these two apartments.



Figure 6 Block 4 north facade apartments where openable windows cannot be used at night to remove excess heat

9.2 Recommendations

Based on the results of the ADO2021 simplified assessment bedroom windows will likely need to be closed at night in most areas.

It is recommended that measures other than the use of opening windows, that are to be incorporated within the design that reduce overheating within the apartments. Typically, these measures will include:

- Minimising internal heat generation through energy efficient designs
- Reducing the amount of heat entering the building by:
 - Reducing the proportion of glass and/or adjusting the depth of window reveal
 - Reducing the glazing's G-value
 - Installing internal blinds
 - Utilising fixed shading devices, eg shutters, external blinds, overhangs, awnings.
- Exposing thermal mass within the apartments
- Removing exceed heat via:
 - Ventilation louvres in external walls
 - A mechanical ventilation system
 - A mechanical cooling system (mechanical cooling is expected only to be used where insufficient heat is capable of being removed via openings).
- Providing shared amenity which will be comfort cooled.

Through a combination of the above the total amount of time that windows will need to be open to control overheating is expected to be reduced. It is recommended that the overheating strategies be developed during subsequent design phases provide feedback on the duration of time when overheating is expected to occur and the extent of opening required, so that further analyses of internal noise levels and their effects can be provided.

9.3 Acoustics, ventilation and overheating assessment (during the day)

9.3.1 Level 1 AVO assessment

The results of noise survey and acoustic modelling have been used to carry out a Level 1 assessment of noise ingress during an overheating condition to meet the 'living rooms' criterion during the day in line with Association of Noise Consultants *Acoustics Ventilation and Overheating, residential Design Guide*.

The Level 1 AVO assessment indicates that some of the elevations of blocks 4-6 fall into a high or medium risk category as the predicted external free-field noise level exceeds either L_{Aeq} 57 dB during the day or L_{Aeq} 52 dB at night.

Locations where a more detailed, Level 2 assessment were recommended will need to consider the following:

- Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a dynamic thermal model, eg, a CIBSE TM59 assessment)
- How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a dynamic thermal model, eg, a CIBSE TM59 assessment)
- Design, extent and construction of attenuated passive ventilation.

9.3.2 Level 2 AVO assessment

General background ventilation for control of humidity and pollutants is understood to be provided by a mechanical ventilation system to each apartment. When required, it is proposed that overheating be alleviated by use of opening tilted windows to provide additional ventilation.

The noise attenuation provided will depend on the degree of opening. Appendix C of the AVO guide provides the following information based on a field study in Switzerland:

They measured (free-field) outside-to-inside level differences of $10.0 \pm 2.9\text{dB}$ for open windows and $15.8 \text{ Open} \pm 2.7\text{dB}$ for tilted windows. A value of 13dB is consistent with a situation between 'open' and 'tilted'.

Based on the proposed window options, the calculated internal noise levels in this assessment are based on a free-field outside to inside level difference of 13 dB in the worst case.

The overheating analysis was carried out by the building services engineer, Atelier Ten, in accordance with CIBSE TM59:2017 *Design methodology for the assessment of overheating risk in homes*. The results of the thermal analysis demonstrate that with open windows the overheating risk could be mitigated and compliance with the TM59 criteria could be achieved.

The AVO guide provides a graphical format for assessing the significance of adverse effects, as shown in Figure 2. This plots the predicted internal ambient noise level during overheating conditions against the duration for which the overheating condition occurs.

Scaling of the x-axis is not specified in the AVO guide and is therefore open to interpretation. As overheating in England is largely an issue associated with summer months, the x-axis has been scaled based on the percentage time that windows would be opened to control internal temperatures over 22 °C during the period between May and September. This period aligns with the period used for the thermal assessments in TM52:2013 *The Limits of Thermal Comfort: Avoiding overheating in European Buildings*.

There are 153 days from May to September. In line with the acoustic requirements, daytime is considered to be 16 hours from 07:00 to 23:00. The daytime X-axis therefore extends to 100 % equalling a maximum of $153 \times 16\text{hrs} = 2448\text{ hrs}$. The number of hours windows could be open to control overheating has been calculated from the thermal assessment by the building

services consultant, Atelier Ten. These have been plotted on the x-axis as a percentage of hours open. So, for example, a bedroom with a point at 45% equates to windows being open for a total of 551 hrs (45% of 1224 hrs) between May and September for control of overheating.

It should be noted that, the guidance for internal noise levels during the night for an overheating condition set out in AVOG is superseded by the requirements set out in ADO2021.

Graphs based on the predicted minimum and maximum internal noise levels across the elevation are provided in Appendix F.

The graphs demonstrate that internal noise levels during the overheating condition with openable windows are not predicted to result in significant adverse effect for the north elevation of Block 5. As such, openable windows may be used to control overheating in these locations during the day.

The graphs also demonstrate that internal noise levels are predicted to result in significant adverse effect for the entire south and west elevations of Block 6. As such, openable windows may not be used to control overheating in these locations during the day.

The remaining elevations are predicted to partly fall under significant adverse effect. Mark-ups are provided in Appendix G to show areas where openable windows may be used to control overheating during the day under restrictions of AVO.

Openable windows may be used to control overheating during the day for any areas not mentioned above or shown in the mark-ups in Appendix G.

10 Conclusion

The minimum measured background sound levels were $L_{A90,15min}$ 46 dB during the day, and $L_{A90,15min}$ 38 dB during the night. Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are $L_{Aeq,15min}$ 44 dB during the day, and $L_{Aeq,15min}$ 36 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1). These limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent.

The most onerous overall facade sound insulation performance for the development is R_w+C_{tr} 35 dB, which occurs at the facade of block 6 overlooking Hathersage Road. An example glazing and ventilation strategy to achieve this performance is 8.8 mm acoustic laminate/16 mm/10 mm glass with high performance acoustically attenuated passive ventilation.

Based on an initial ADO assessment, open windows in bedrooms can likely not be relied upon as a method to remove excess heat for most apartments at night, and the 'dynamic thermal modelling method' (eg, a CIBSE TM59 assessment) will need to be used to demonstrate compliance with the requirements of ADO2021.

Appendix A

Survey details

Equipment

The unattended noise measurements were taken using a Rion NL-52 sound level meter. The attended noise measurements were taken using a Rion NL-52 sound level meter and a Brüel & Kjær 2250 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	2250/3011964	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Microphone	4189/3100176	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Pre-amp	ZC0032/26376	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Calibrator	4231/3019123	Brüel & Kjær	11 Sep 25	UCRT23/2162
Sound level meter	NL-52/00932326	Rion	9 Aug 25	TCRT23/1580
Microphone	UC-59/05549	Rion	9 Aug 25	TCRT23/1580
Pre-amp	NH-25/32354	Rion	9 Aug 25	TCRT23/1580
Calibrator	NC-74/34125432	Rion	9 Aug 25	TCRT23/1576
Sound level meter	NL-52/01143564	Rion	15 Dec 24	TCRT22/1766
Microphone	UC-59/10153	Rion	15 Dec 24	TCRT22/1766
Pre-amp	NH-25/43581	Rion	15 Dec 24	TCRT22/1766
Calibrator	NC-74/34257023	Rion	15 Dec 24	TCRT22/1765
Sound level meter	NL-52/01010788	Rion	20 Sep 25	TCRT23/1666
Microphone	UC-59/20416	Rion	20 Sep 25	TCRT23/1666
Pre-amp	NH-25/11436	Rion	20 Sep 25	TCRT23/1666
Calibrator	SV30A/10559	Svantek	20 Sep 25	TCRT23/1665

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

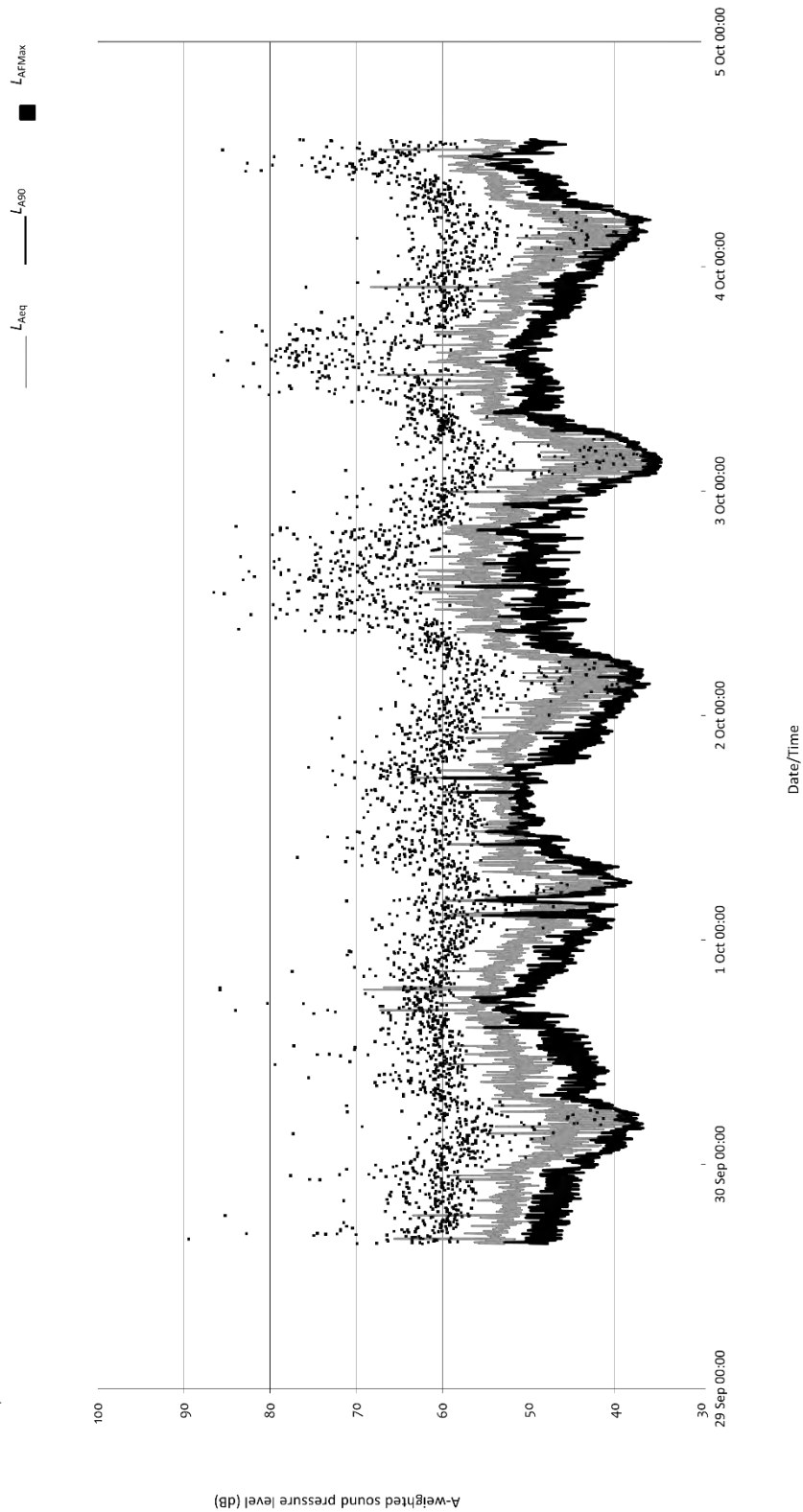
During the attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds did not exceed 10 m/s.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 10°C at night and 19°C during the day, and the wind speed was less than 10 m/s. Rain showers occurred throughout the survey however, the survey duration was sufficiently long to include periods unaffected by adverse weather and no variation in noise levels was seen to correlate with the weather. These measurements are consequently considered to have obtained a representative sample of noise data.

Appendix B

Results of unattended measurements at Location L1

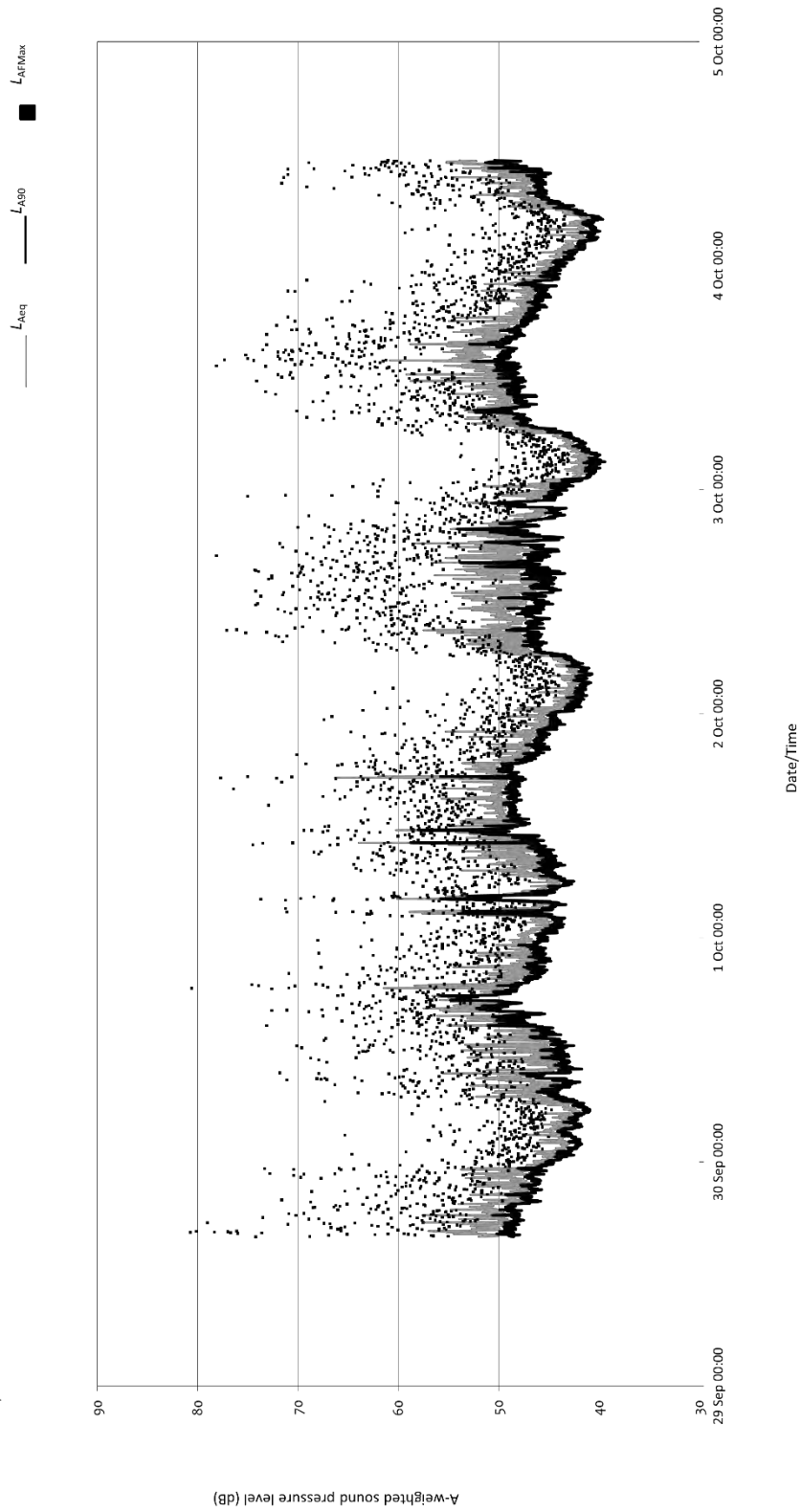
Victoria Point - Block 5
Results of noise logging survey at L1
29 September 2023 to 4 October 2023



Appendix C

Results of unattended measurements at Location L2

Victoria Point - Block 3
Results of noise logging survey at L2
29 September 2023 to 4 October 2023



Appendix D

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

Appendix E

Predicted external noise levels

Do not scale from this drawing. Use written dimensions only.
All dimensions to be checked on site. This drawing is based on
dimensional survey information provided by others. Bell Phillips
Architects cannot accept responsibility for the accuracy of this
survey information.

This drawing remains the copyright of Bell Phillips Architects.

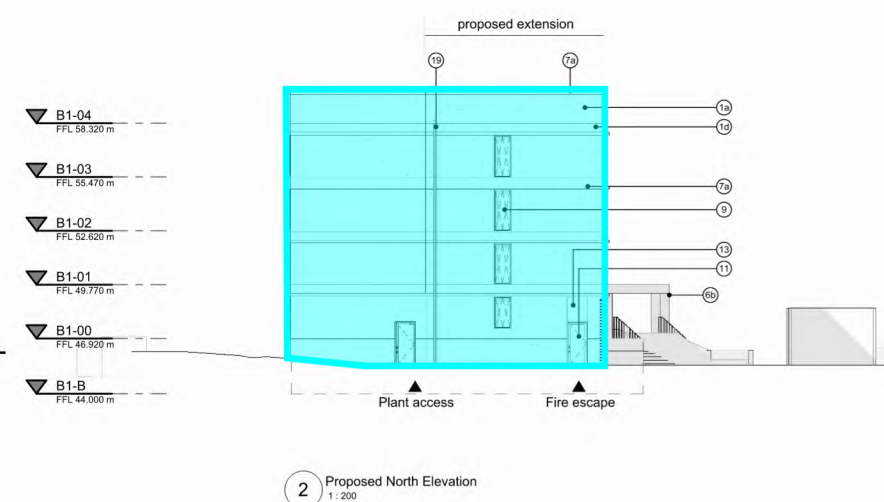
The diagram shows a building layout with six rooms numbered 1 to 6. Room 1 is highlighted in red. The layout is as follows: Room 1 is a small rectangular room on the right side. To its left is a larger room containing rooms 2, 3, and 4. Room 2 is at the top right of this section, room 3 is in the middle, and room 4 is at the bottom left. Below room 4 is room 5, and below room 5 is room 6. A north arrow is located at the bottom right of the diagram.

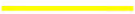
Project 0814 VICTORIA POINT
44 Hathersage Road, Manchester
M13 0FT

Date	Drawn by	Checked by	Scale at A1
	AW	RB	AS indicated

Unit 305, Metropolitan Wharf T 020 7234 9330
70 Wapping Wall E info@bellphillips.com
London E1W 3SS W www.bellphillips.com

Drawing Number	Revision
0814-BPA-ZZ-ZZ-DR-A-1210	P00



Title	Predicted facade level environmental external noise level mark-ups	
Project	Victoria Point, Manchester	
Project no.	023790	
Version	A	
Marked-up by	Tom Stephenson	
Reviewed by	Mark Howarth	
Date	13 March 2024	
Mark-up key	Daytime	Night
1 	L_{Aeq} 66-70 dB	L_{Aeq} 61-65 dB
2 	L_{Aeq} 61-65 dB	L_{Aeq} 56-60 dB
3 	L_{Aeq} 56-60 dB	L_{Aeq} 51-55 dB
4 	L_{Aeq} 51-55 dB	L_{Aeq} 46-50 dB
5 	$L_{Aeq} \leq 50$ dB	$L_{Aeq} \leq 45$ dB



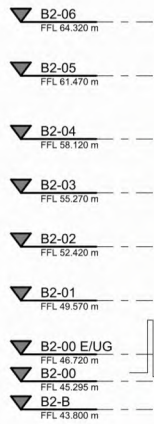
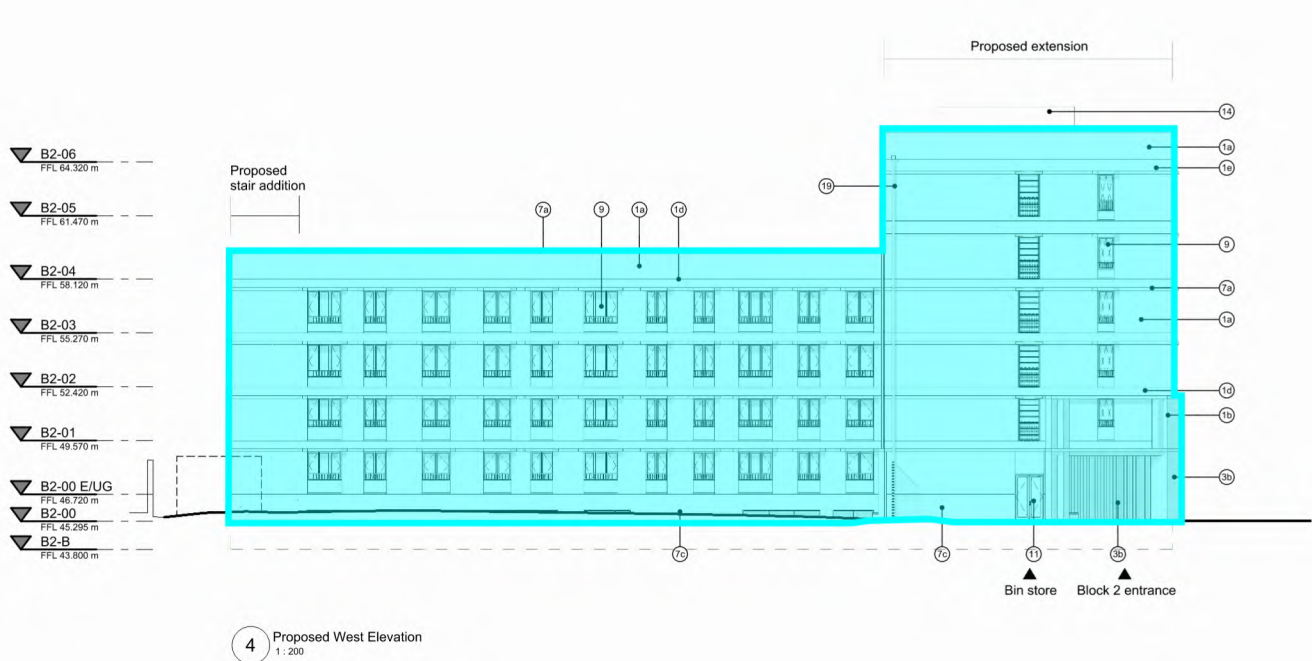
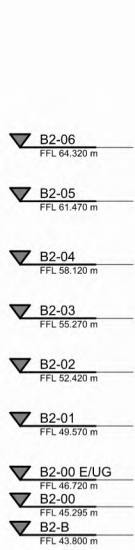
SANDY BROWN

Consultants in Acoustics, Noise & Vibration

Do not scale from this drawing. Use written dimensions only. All dimensions to be checked on site. This drawing is based on architectural survey information provided by others. Bell Phillips Architects cannot accept responsibility for the accuracy of this survey information.

This drawing remains the copyright of Bell Phillips Architects.

The diagram shows a building layout with six rooms. Room 2 is a central rectangular room, highlighted with a red border. It is connected to Room 1 (top right), Room 3 (top left), Room 4 (middle left), Room 5 (bottom left), and Room 6 (bottom center). A north arrow is located in the bottom right corner of the diagram.



PROPOSED MATERIAL KEY:

- 1A. Precast A (Hortusure Road Multi or similar approved) in stretcher bond
- 1B. Brick type A laid at 45° to create double serrated brick pier
- 1C. Brick type A laid at 45° to create serrated parapet
- 1D. Brick type A in double seaming
- 1E. Brick type A in triple soldier course
- 2A. Brick type B (Rusby Glazed or similar approved) in stretcher bond
- 2B. Brick type B laid at 45° to create serrated spandrel panel
- 2C. Brick type B seaming
- 3A. Brick type C (Willow Green Glazed or similar approved) in stretcher bond
- 3B. Brick type C laid at 45° to create serrated wall / seaming
- 3C. Brick type C laid at 45° to create similar approved in stretcher bond
- 4A. Brick type D laid at 45° to create serrated wall / seaming
- 4B. Brick type D (Atlantis Green Glazed or similar approved) in stretcher bond
- 4C. Brick type D laid at 45° to create serrated wall / seaming
- 5A. Brick type E (Green glazed or similar approved) in stretcher bond
- 6A. Brick type F laid at 45° to create serrated wall / seaming

- 7A. Precast pigmented concrete parapet / band / coping (colour: Cheshire Red)
- 7B. Precast pigmented concrete parapet / band / coping (colour: Cheshire Red)
- 7C. Precast pigmented concrete parapet / band / coping (colour: Cheshire Red)
- 7D. Precast pigmented seat top (colour: Cheshire Red)

- 8A. Precast pigmented soffit cladding to entrances (colour: Cheshire Red)

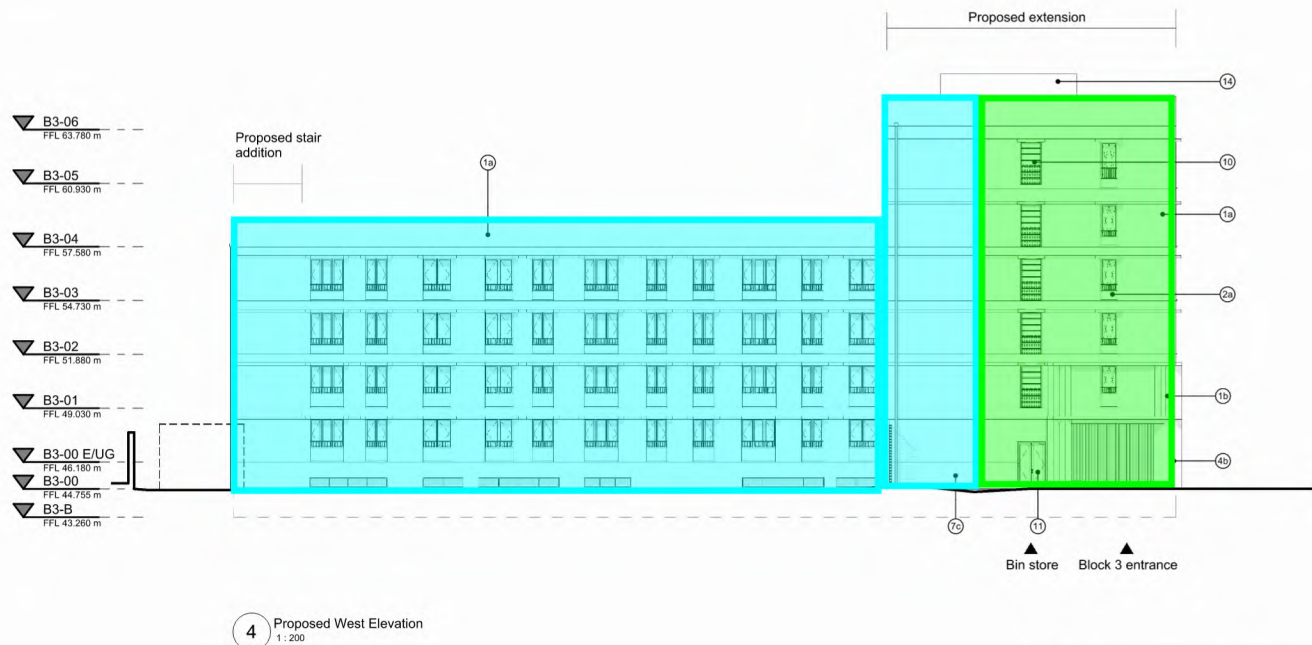
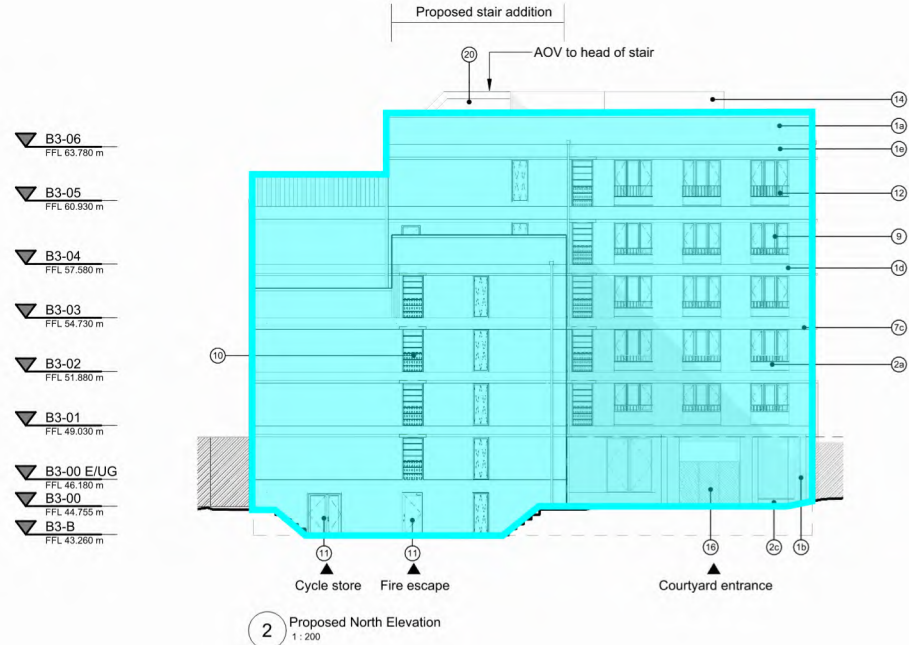
9. PPC: Aluminium composite window (RAL 3005)
10. PPC glazed automated opening vent (RAL 3005)
11. PPC metal door (RAL 3005)
12. PPC metal railing (RAL 3005)
13. PPC metal bowtie (RAL 3005)
14. PPC metal panel fence (RAL 3005)
15. PPC metal screen (RAL 3005)
16. PPC metal entrance and exit diagonal stanchions (RAL 3005)
17. PPC metal signage (RAL 3005)
18. PPC metal illuminated signage (colour and appearance TBC)
19. PPC rainwater goods (RAL 3005)

20. Stairs overrun
21. LIR Overrun

Do not scale from this drawing. Use written dimensions only. All dimensions to be checked on site. This drawing is based on dimensional survey information provided by others. Bell Phillips Architects cannot accept responsibility for the accuracy of this survey information.

This drawing remains the copyright of Bell Phillips Architects.

Figure 1 is a horizontal bar chart showing the distribution of the number of species per genus (0, 2, 4, 10, 20) for the 10 genera of the subgenus *Euphorbia*. The x-axis is labeled with the number of species per genus (0, 2, 4, 10, 20). The y-axis lists the genera: *Euphorbia*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, *Chamaecrista*, and *Chamaecrista*. The bars are black and white, representing different species counts.

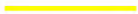


P00	RB	Planning Issue	03/24
Rev	Issued by	Description	Date
REVISIONS			

Title	Block 3 - Proposed Elevations		
Date	Drawn by AW	Checked by RB	Scale at A1 AS indicated

Status **PLANNING**

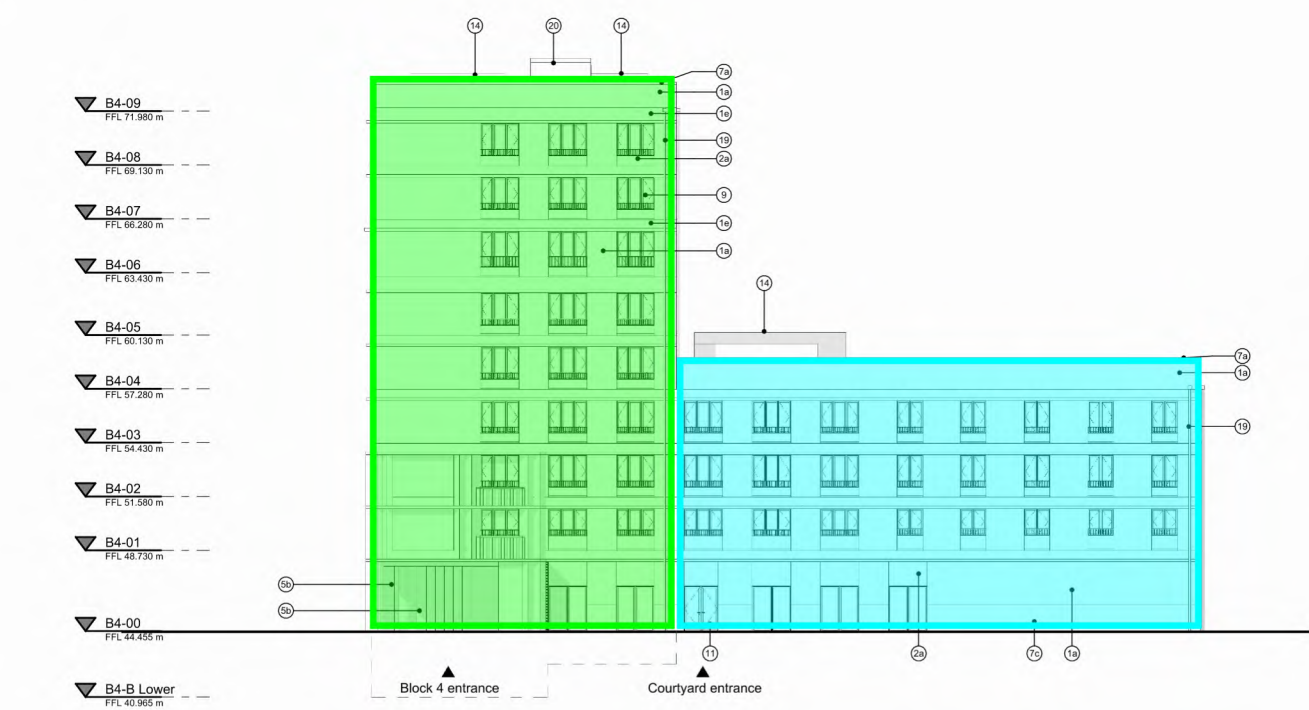
Drawing Number	Revision
0814-BPA-ZZ-ZZ-DR-A-1212	P00

Title	Predicted facade level environmental external noise level mark-ups	
Project	Victoria Point, Manchester	
Project no.	023790	
Version	A	
Marked-up by	Tom Stephenson	
Reviewed by	Mark Howarth	
Date	13 March 2024	
Mark-up key	Daytime	Night
1 	L_{Aeq} 66-70 dB	L_{Aeq} 61-65 dB
2 	L_{Aeq} 61-65 dB	L_{Aeq} 56-60 dB
3 	L_{Aeq} 56-60 dB	L_{Aeq} 51-55 dB
4 	L_{Aeq} 51-55 dB	L_{Aeq} 46-50 dB
5 	$L_{Aeq} \leq 50$ dB	$L_{Aeq} \leq 45$ dB



SANDY BROWN

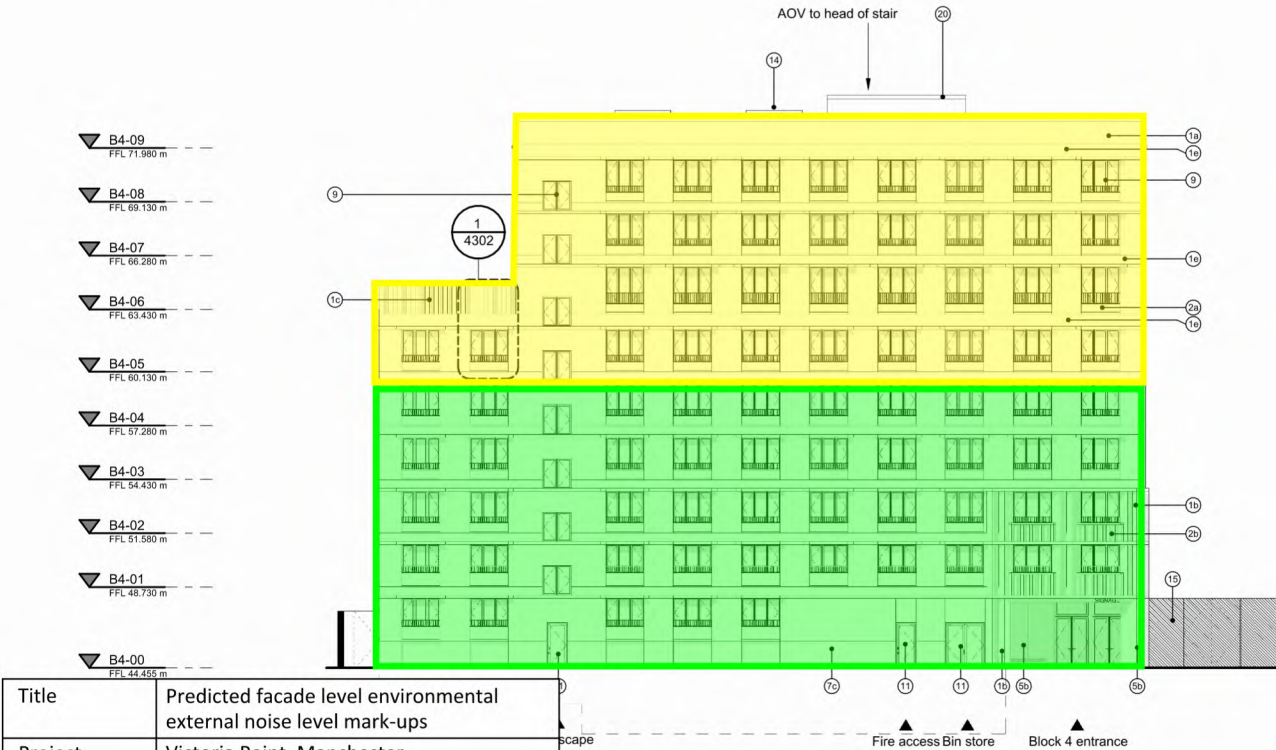
Consultants in Acoustics, Noise & Vibration



1 Proposed East Elevation
1 : 200



2 Proposed North Elevation
1 : 200



4 Proposed West Elevation
1 : 200

Title	Predicted facade level environmental external noise level mark-ups	
Project	Victoria Point, Manchester	
Project no.	023790	
Version	A	
Marked-up by	Tom Stephenson	
Reviewed by	Mark Howarth	
Date	13 March 2024	
Mark-up key	Daytime	Night
	1 — L_{Aeq} 66-70	L_{Aeq} 61-65 dB
	2 — L_{Aeq} 61-65 dB	L_{Aeq} 56-60 dB
	3 — L_{Aeq} 56-60 dB	L_{Aeq} 51-55 dB
	4 — L_{Aeq} 51-55 dB	L_{Aeq} 46-50 dB
	5 — L_{Aeq} ≤ 50 dB	L_{Aeq} ≤ 45 dB
SANDY BROWN Consultants in Acoustics, Noise & Vibration		

- PROPOSED MATERIAL KEY:
- Brick type A (Harbourne Red Multi or similar approved) in stretcher bond
 - Brick type A laid at 45° to create double serrated brick pier
 - Brick type A laid at 45° to create serrated parapet
 - Brick type A in double soldier course
 - Brick type A in triple soldier course
 - Brick type B (Ruby Glazed or similar approved) in stretcher bond
 - Brick type B laid at 45° to create serrated spandrel panel
 - Brick type B sealing
 - Brick type C (Willow Green Glazed or similar approved) in stretcher bond
 - Brick type C laid at 45° to create serrated wall / seating
 - Brick type D (Valley Green Glazed or similar approved) in stretcher bond
 - Brick type D laid at 45° to create serrated wall / seating
 - Brick type E (Atlantis Green Glazed or similar approved) in stretcher bond
 - Brick type E laid at 45° to create serrated wall / seating
 - Brick type F (Green glazed or similar approved) in stretcher bond
 - Brick type F laid at 45° to create serrated wall / seating
 - Precast pigmented concrete parapet / band / coping (colour: Cheshire Red)
 - Precast pigmented concrete brise soleil (colour: Cheshire Red)
 - Precast pigmented concrete panel (colour: Cheshire Red)
 - Precast pigmented concrete canopy (colour: Cheshire Red)
 - Precast pigmented seat top (colour: Cheshire Red)
 - Precast pigmented soffit cladding to entrances (colour: Cheshire Red)
 - PPC Aluminium composite window (RAL 3005)
 - PPC glazed automated opening vent (RAL 3005)
 - PPC metal door (RAL 3005)
 - PPC metal railing (RAL 3005)
 - PPC metal louvre (RAL 3005)
 - PPC metal plant screen (RAL 3005)
 - PPC metal fence (RAL 3005)
 - PPC metal entrance gate with diagonal stanchions (RAL 3005)
 - PPC metal signage (RAL 3005)
 - PPC metal illuminated signage (colour and appearance TBC)
 - PPC rainwater goods (RAL 3005)
 - Stairs overrun
 - Lift Overrun

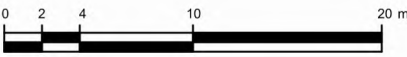
All drawings to be read in conjunction with specifications, schedules and all other consultant information.

Do not scale from this drawing. Use written dimensions only. All dimensions to be checked on site. This drawing is based on dimensional survey information provided by others. Bell Phillips Architects cannot accept responsibility for the accuracy of this survey information.

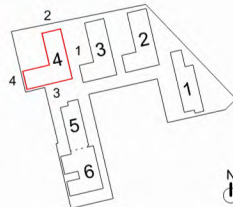
Any errors or omissions to be reported to Bell Phillips Architects immediately, prior to work being carried out.

This drawing remains the copyright of Bell Phillips Architects.

Notes



Key Plan



REVISIONS		
P00	RB	Planning Issue
Rev	Issued by	Description
		Date
03/24		

Project 0814 VICTORIA POINT
44 Hathersage Road, Manchester,
M13 0FT

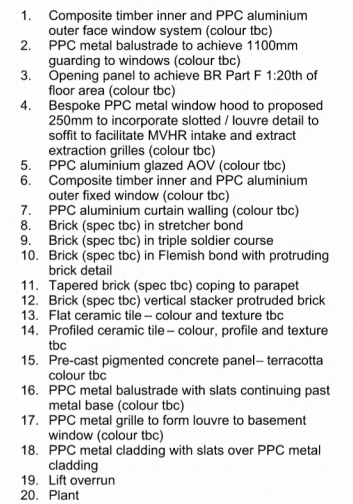
Title	Block 4 - Proposed Elevations		
Date	Drawn by	Checked by	Scale at A1
	AW	RB	As indicated

Unit 305, Metropolitan Wharf
70 Wapping Wall
London E1W 3SS

T 020 7234 9330
E info@bellphillips.com
W www.bellphillips.com

Status PLANNING

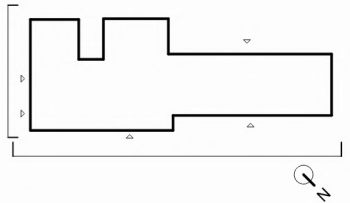
Drawing Number 0814-BPA-ZZ-ZZ-DR-A-1213
Revision P00



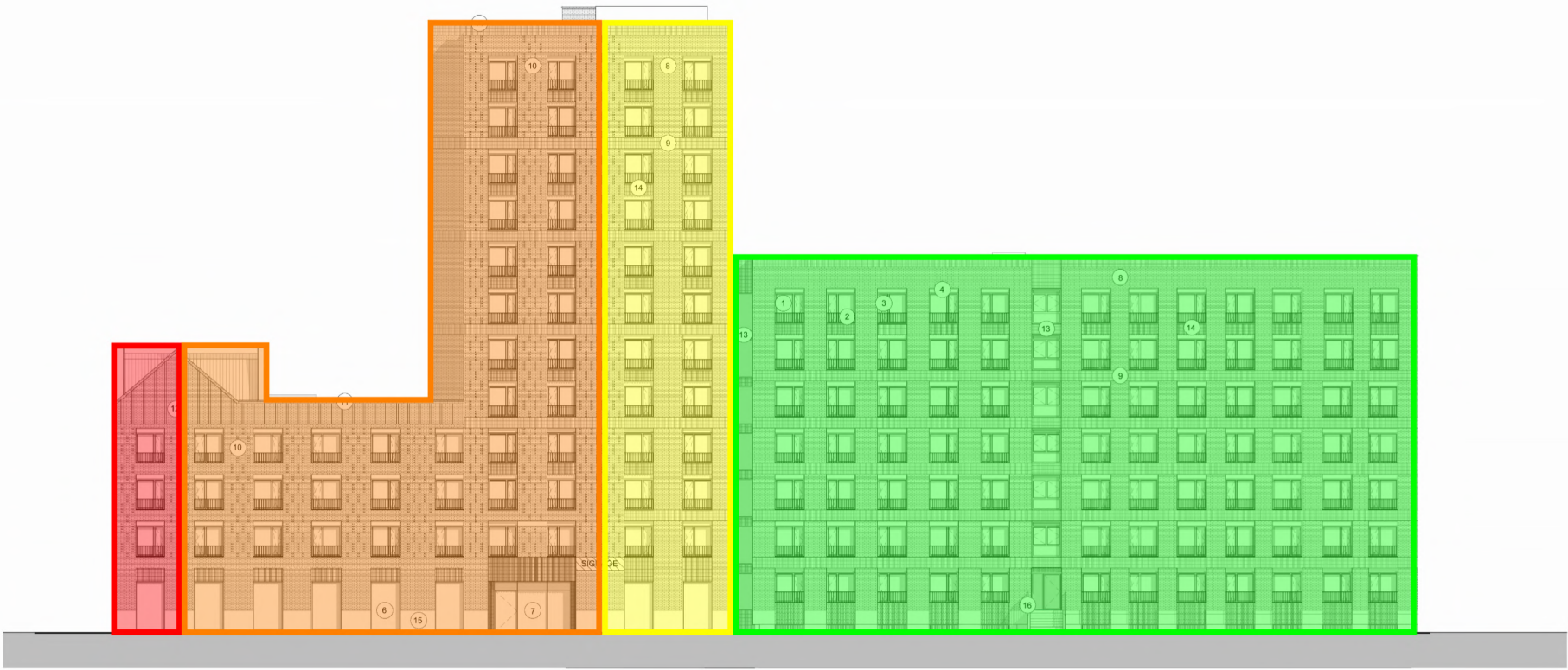
Title	Predicted facade level environmental external noise level mark-ups	
Project	Victoria Point, Manchester	
Project no.	023790	
Version	A	
Marked-up by	Tom Stephenson	
Reviewed by	Mark Howarth	
Date	13 March 2024	
Mark-up key	Daytime	Night
1 	L_{Aeq} 66-70 dB	L_{Aeq} 61-65 dB
2 	L_{Aeq} 61-65 dB	L_{Aeq} 56-60 dB
3 	L_{Aeq} 56-60 dB	L_{Aeq} 51-55 dB
4 	L_{Aeq} 51-55 dB	L_{Aeq} 46-50 dB
5 	$L_{Aeq} \leq 50$ dB	$L_{Aeq} \leq 45$ dB
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>		



Key Plan:



1. Composite timber inner and PPC aluminium outer face window system (colour tbc)
2. PPC metal balustrade to achieve 1100mm guarding to windows (colour tbc)
3. Opening panel to achieve BR Part F 1:20th of floor area (colour tbc)
4. Bespoke PPC metal window hood to proposed 250mm to incorporate slotted / louvre detail to soffit to facilitate MVHR intake and extract extraction grilles (colour tbc)
5. PPC aluminium glazed AOV (colour tbc)
6. Composite timber inner and PPC aluminium outer fixed window (colour tbc)
7. PPC aluminium curtain walling (colour tbc)
8. Brick (spec tbc) in stretcher bond
9. Brick (spec tbc) in triple soldier course
10. Brick (spec tbc) in Flemish bond with protruding brick detail
11. Tapered brick (spec tbc) coping to parapet
12. Brick (spec tbc) vertical stacker protruded brick
13. Flat ceramic tile – colour and texture tbc
14. Profiled ceramic tile – colour, profile and texture tbc
15. Pre-cast pigmented concrete panel – terracotta colour tbc
16. PPC metal balustrade with slats continuing past metal base (colour tbc)
17. PPC metal grille to form louvre to basement window (colour tbc)
18. PPC metal cladding with slats over PPC metal cladding
19. Lift overrun
20. Plant

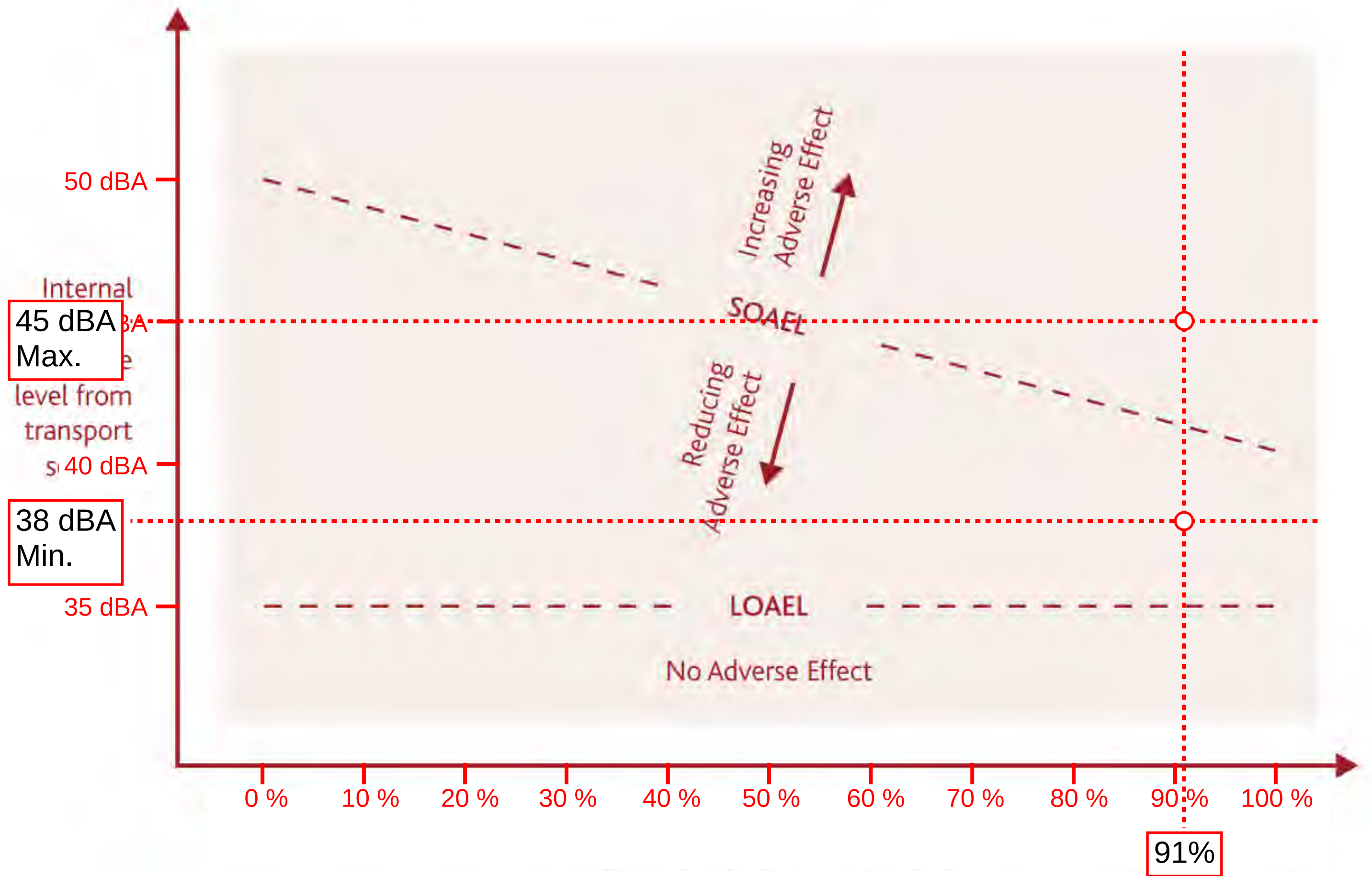


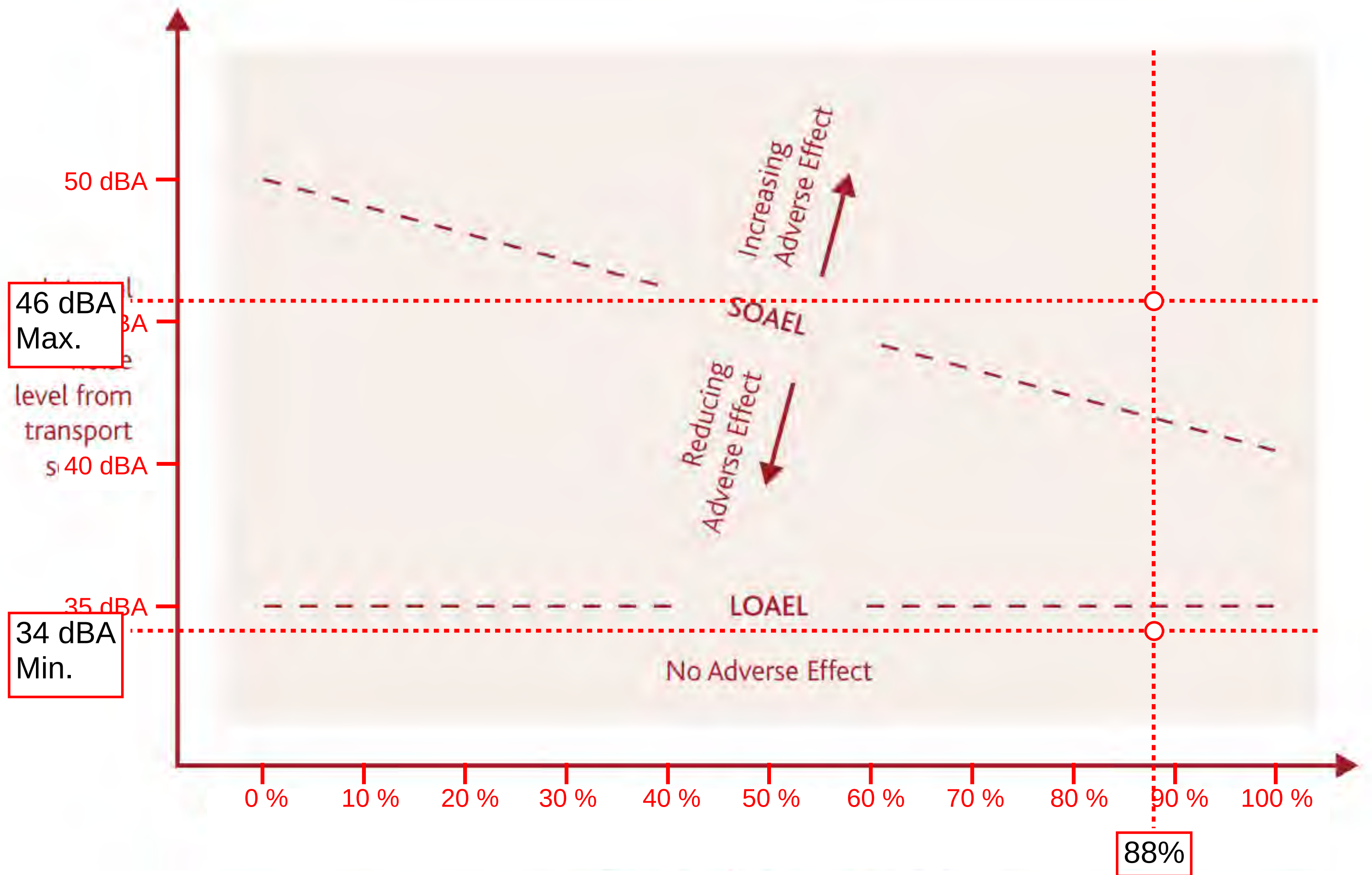
East Elevation

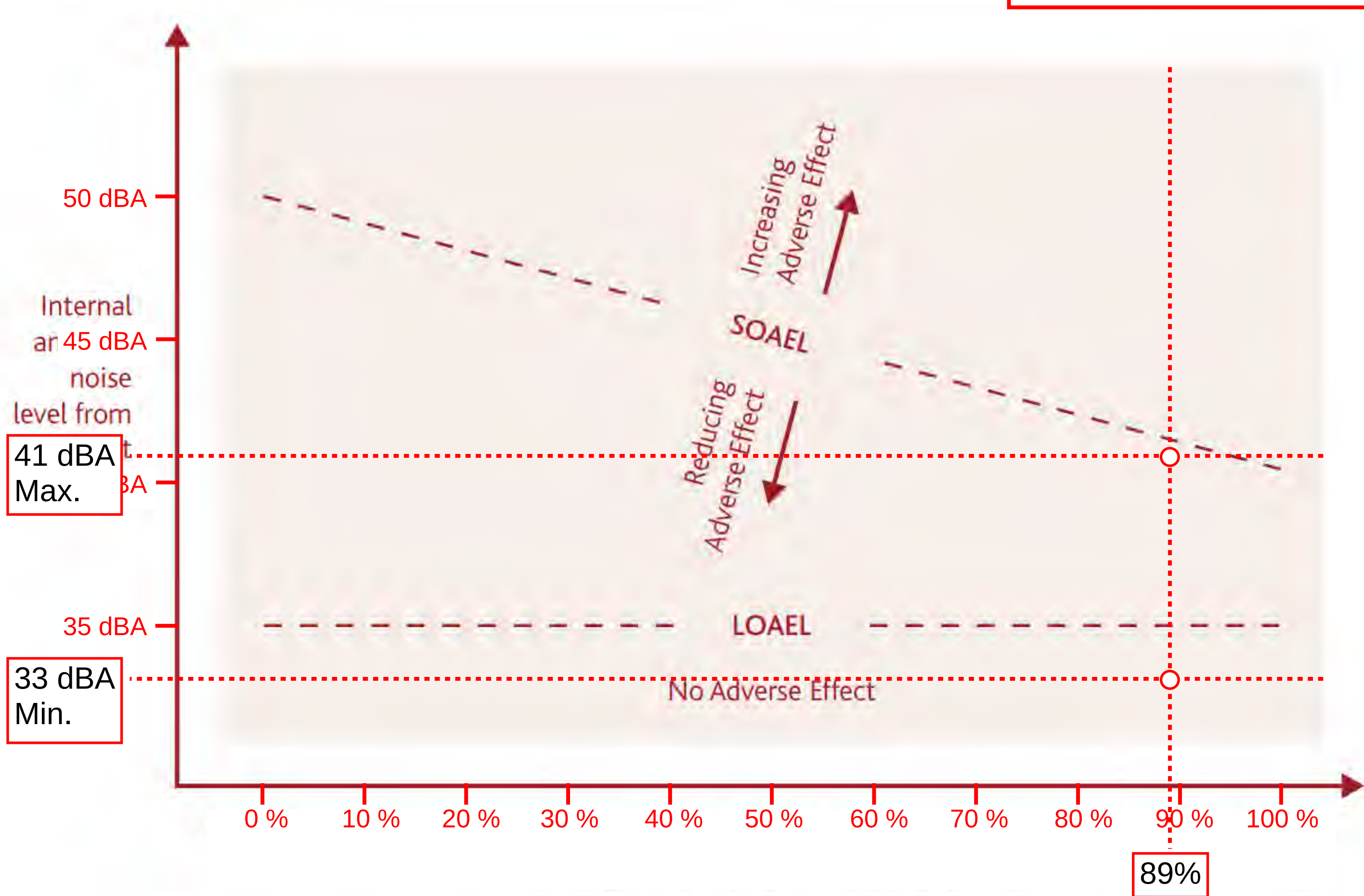
Title	Predicted facade level environmental external noise level mark-ups	
Project	Victoria Point, Manchester	
Project no.	023790	
Version	A	
Marked-up by	Tom Stephenson	
Reviewed by	Mark Howarth	
Date	13 March 2024	
Mark-up key	Daytime	Night
	1 — L_{Aeq} 66-70 dB	L_{Aeq} 61-65 dB
	2 — L_{Aeq} 61-65 dB	L_{Aeq} 56-60 dB
	3 — L_{Aeq} 56-60 dB	L_{Aeq} 51-55 dB
	4 — L_{Aeq} 51-55 dB	L_{Aeq} 46-50 dB
	5 — $L_{Aeq} \leq 50$ dB	$L_{Aeq} \leq 45$ dB
SANDY BROWN Consultants in Acoustics, Noise & Vibration		

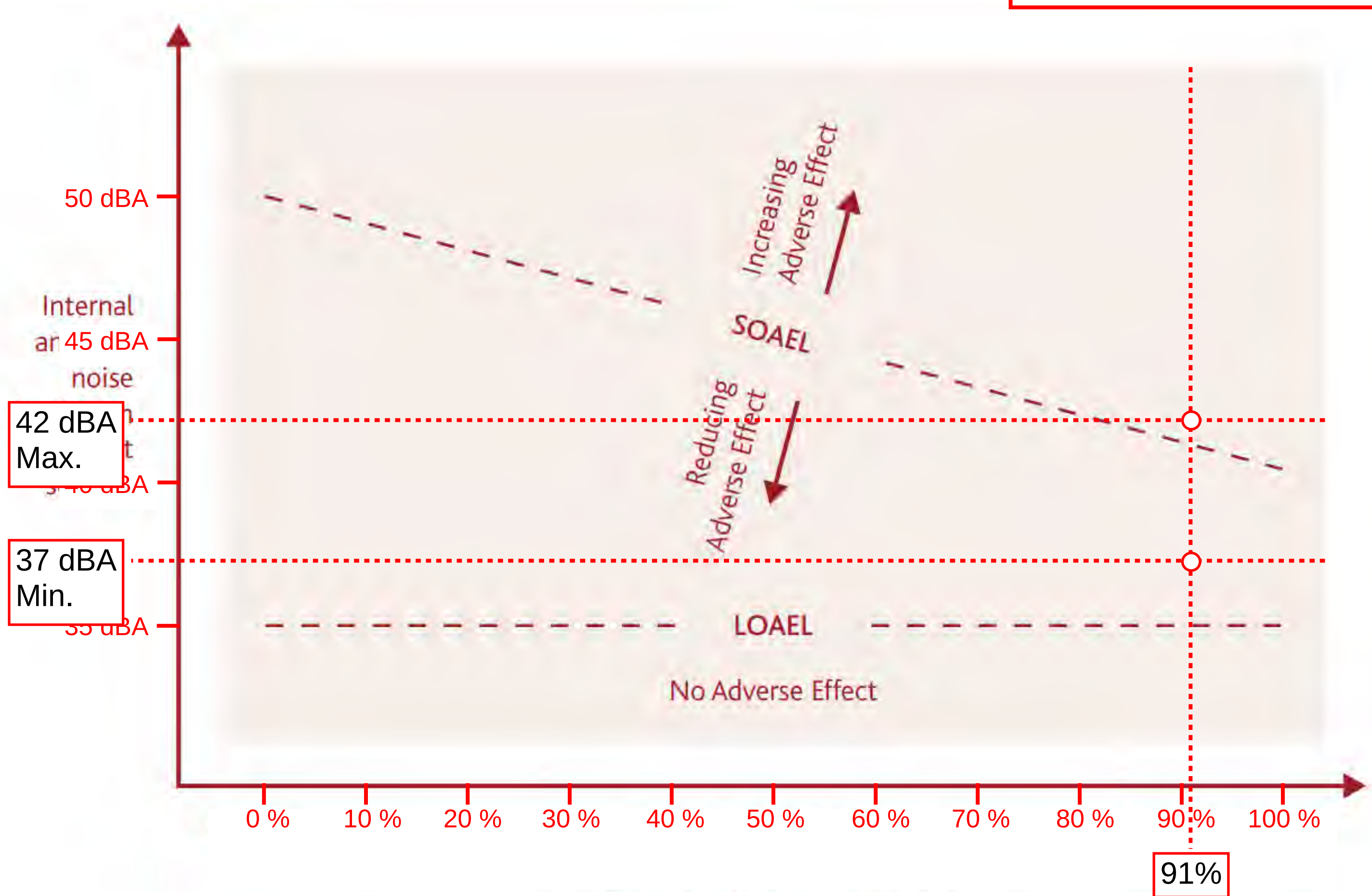
Appendix F

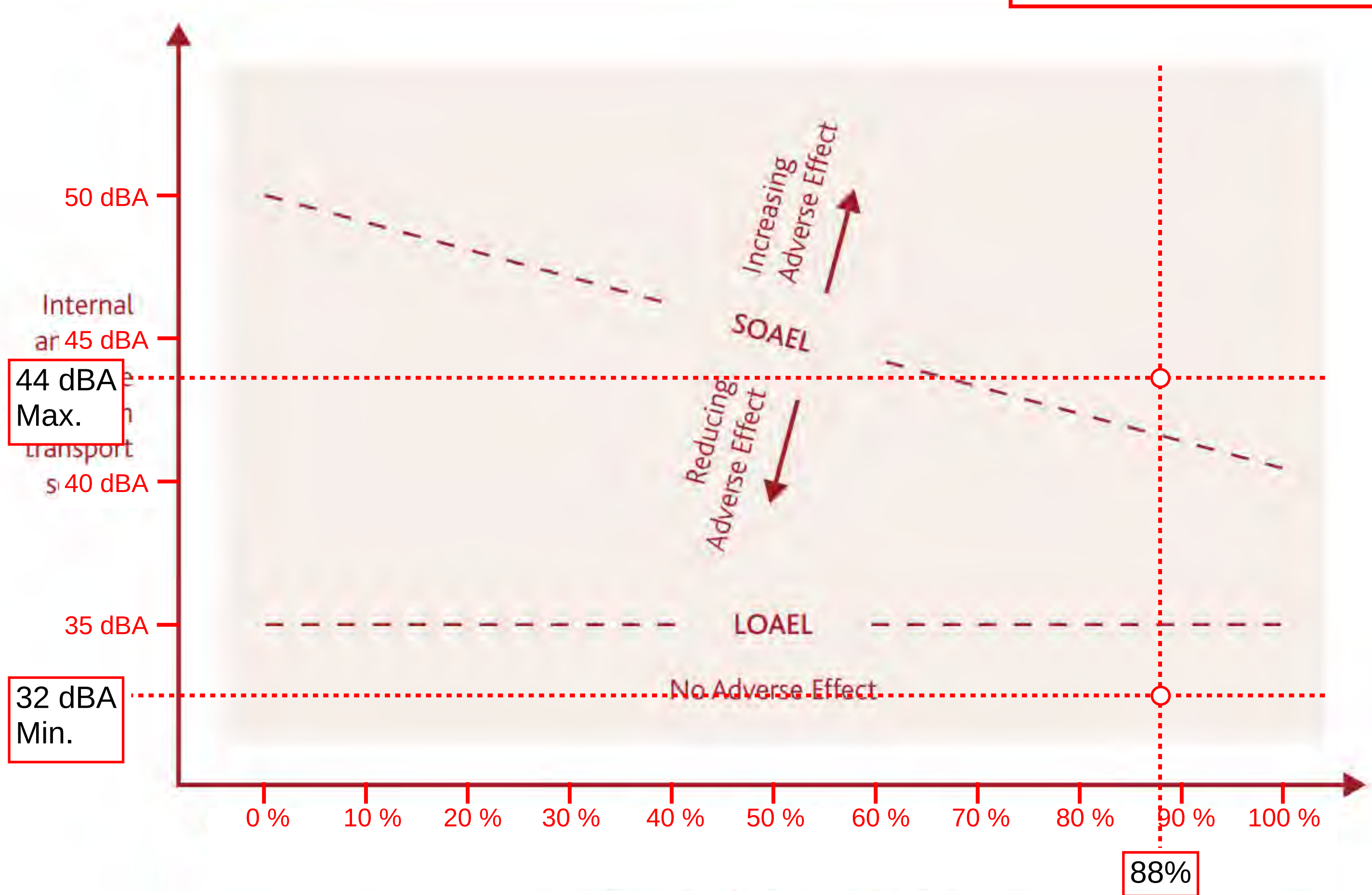
AVOG SOAEL graphs

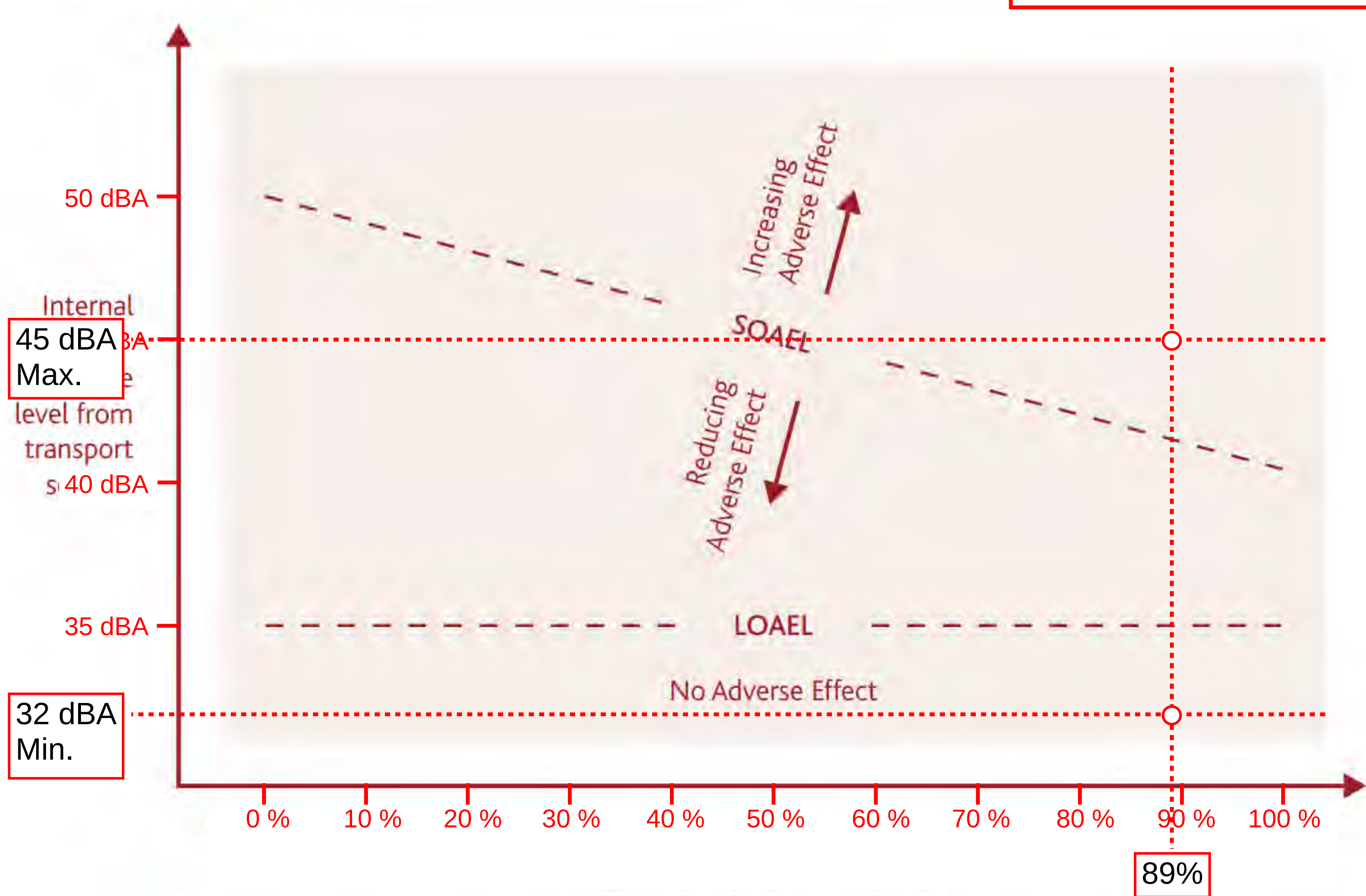


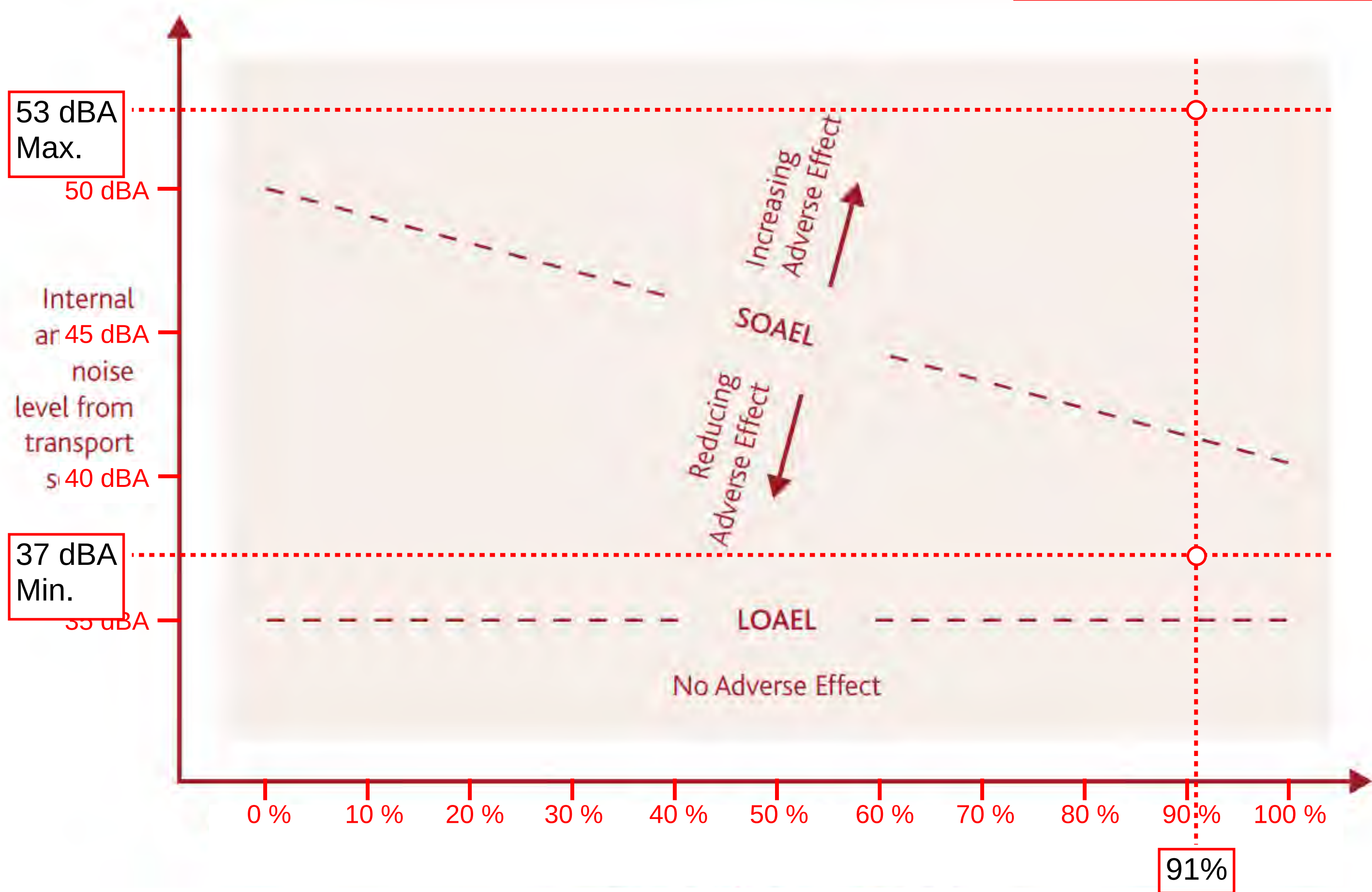


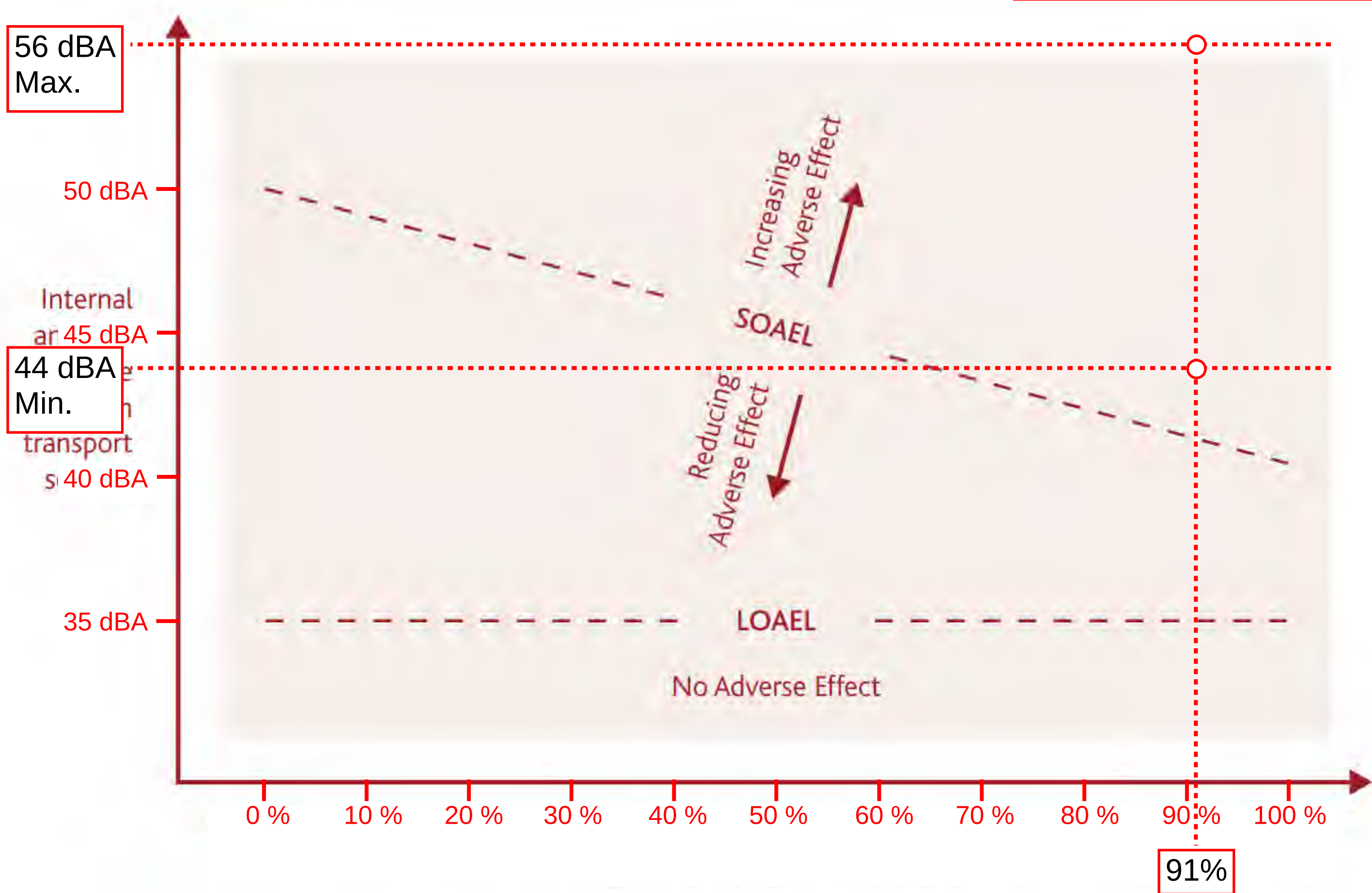


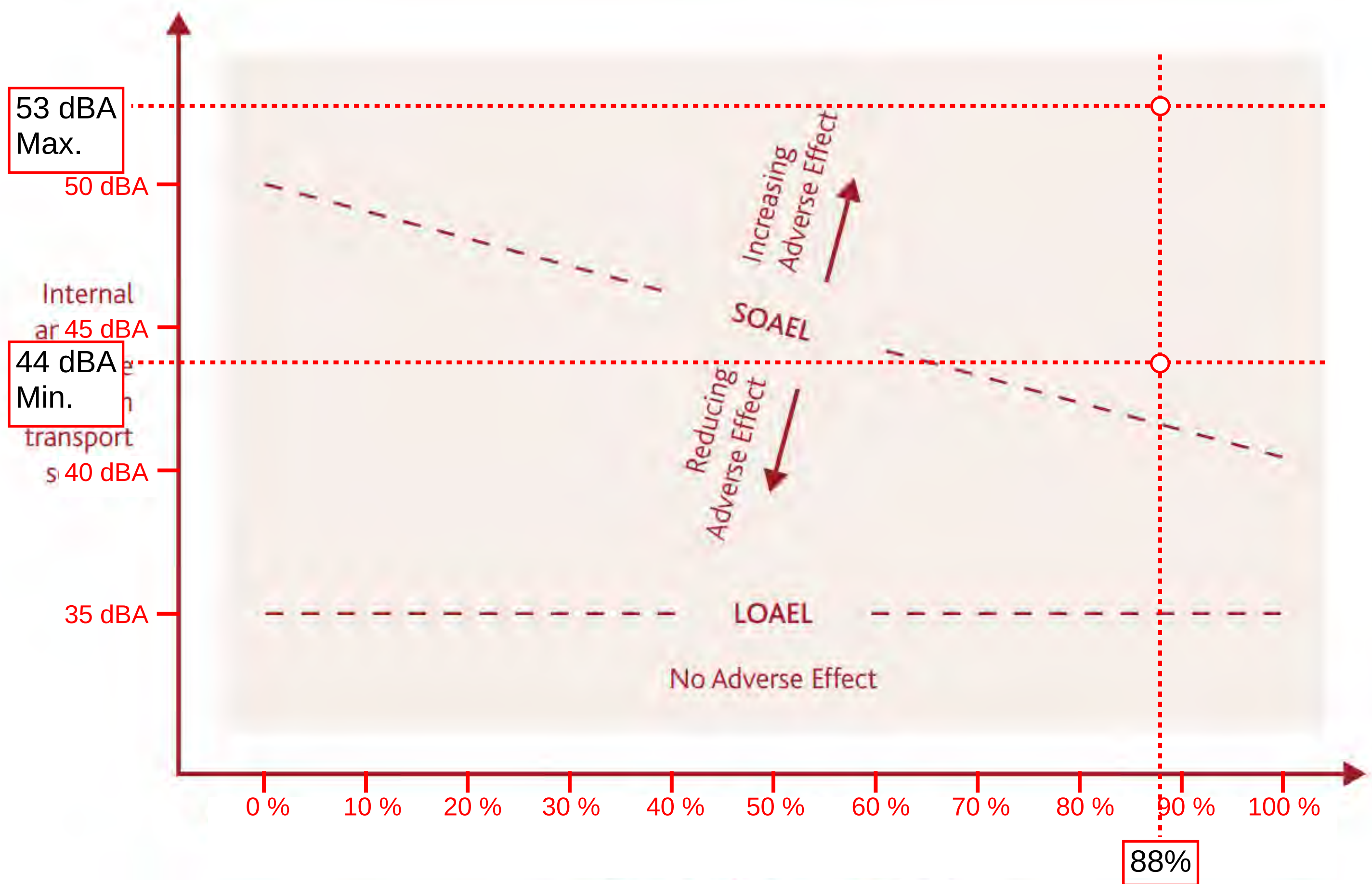












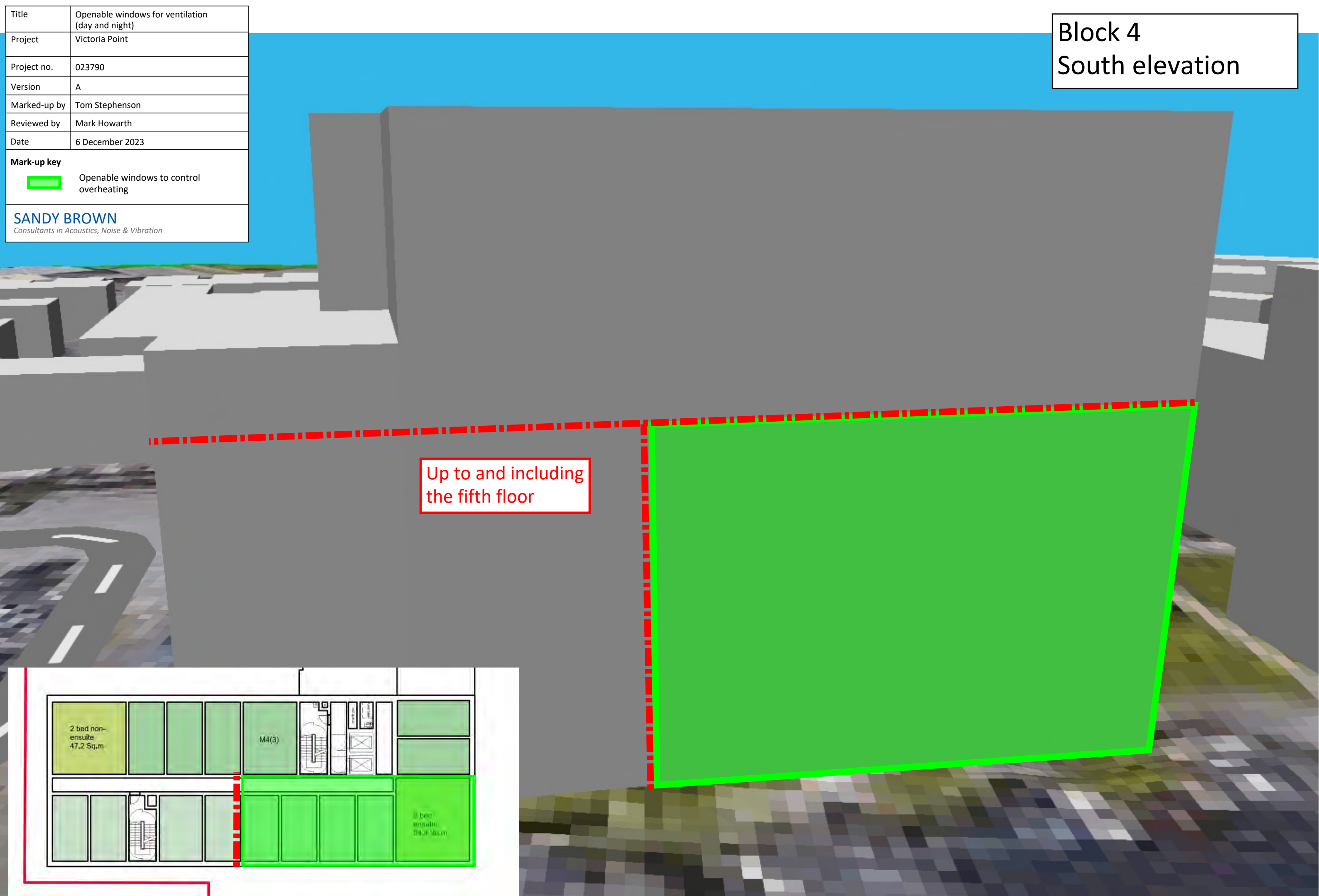
Appendix G

Locations where openable windows may be used to control overheating

Title	Openable windows for ventilation (day and night)
Project	Victoria Point
Project no.	023790
Version	A
Marked-up by	Tom Stephenson
Reviewed by	Mark Howarth
Date	6 December 2023
Mark-up key	
Openable windows to control overheating	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

Block 4

South elevation



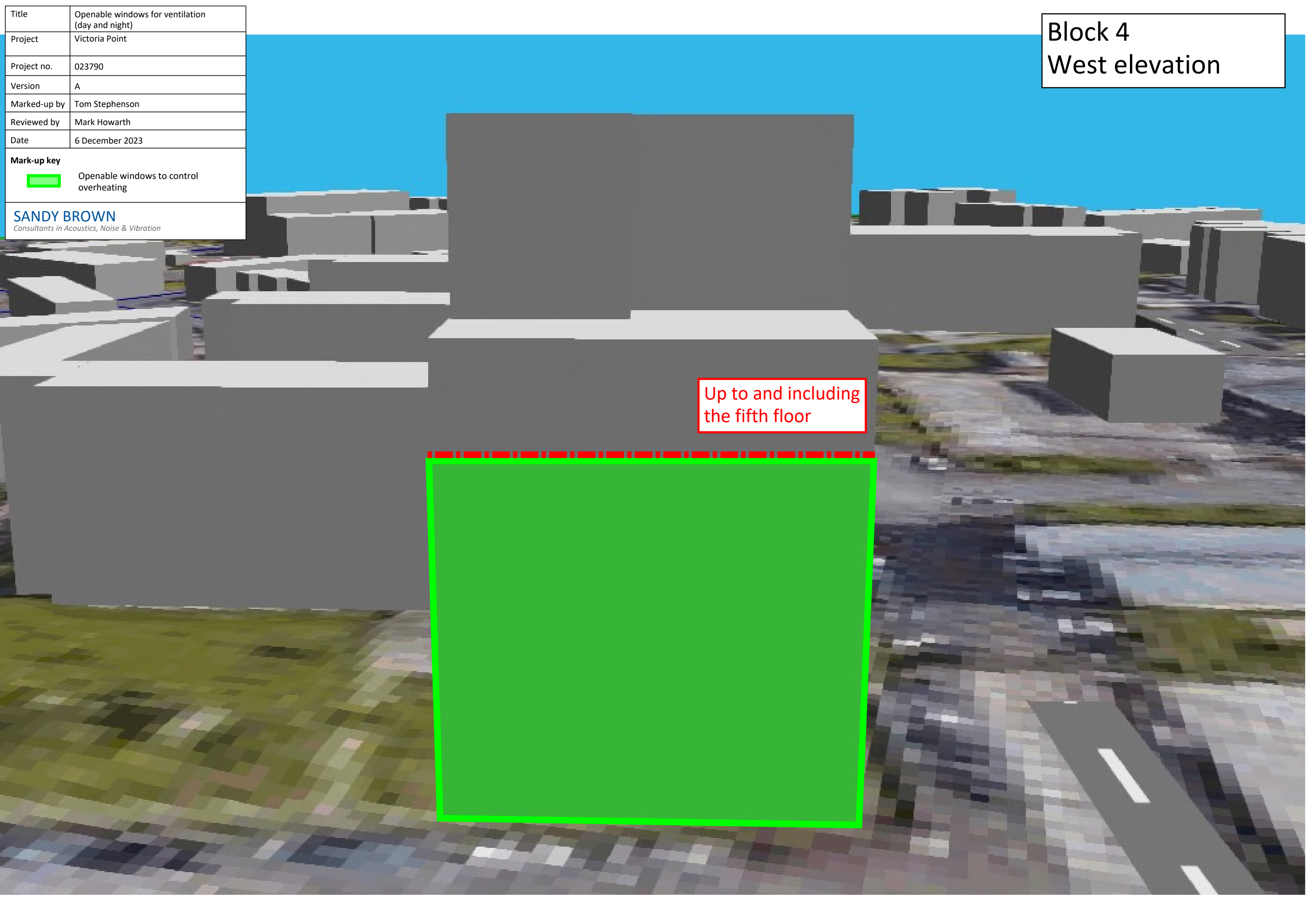
Up to and including
the fifth floor



Title	Openable windows for ventilation (day and night)
Project	Victoria Point
Project no.	023790
Version	A
Marked-up by	Tom Stephenson
Reviewed by	Mark Howarth
Date	6 December 2023
Mark-up key	
Openable windows to control overheating	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

Block 4

West elevation

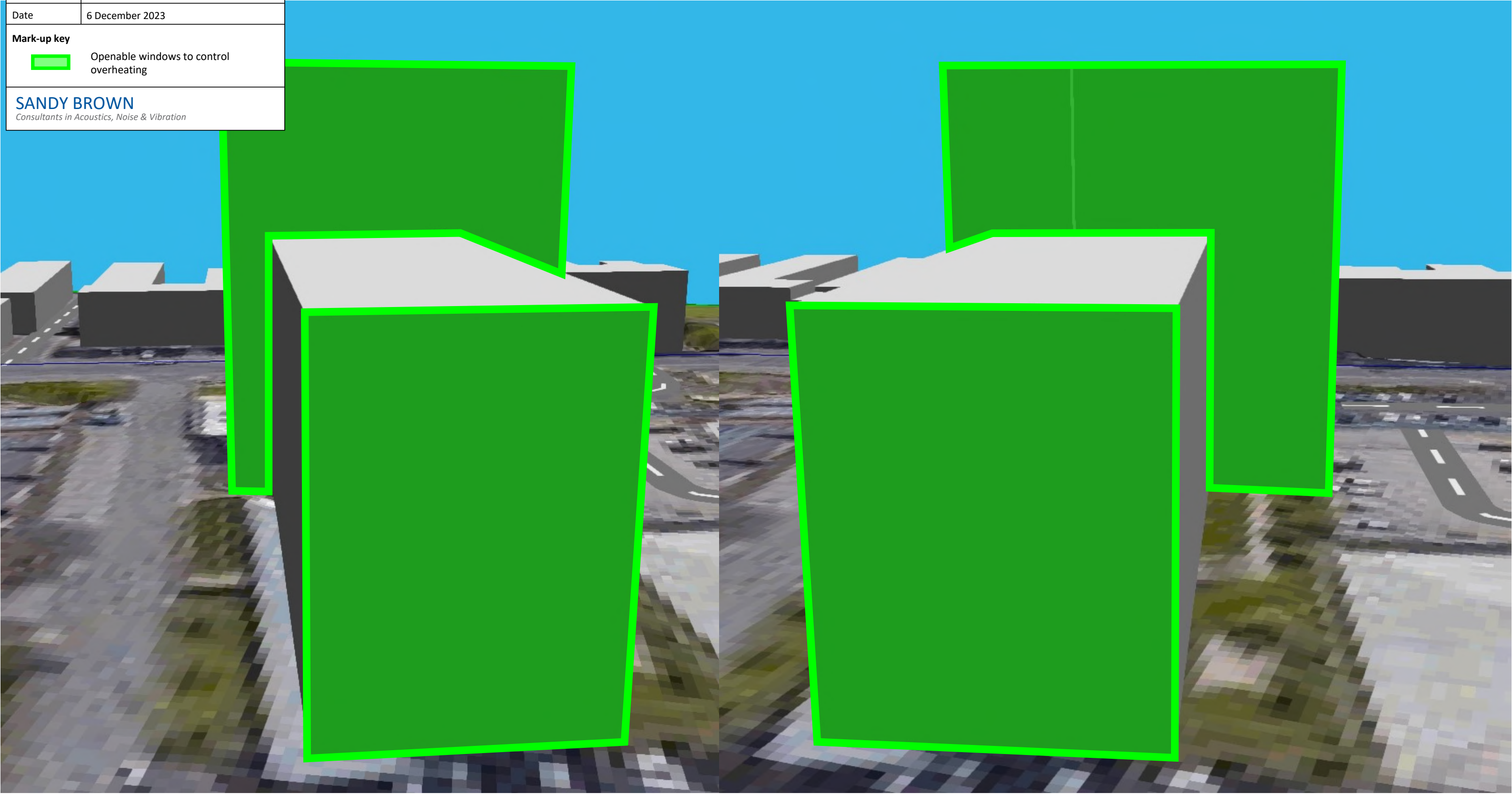


Up to and including
the fifth floor

Title	Openable windows for ventilation (day and night)
Project	Victoria Point
Project no.	023790
Version	A
Marked-up by	Tom Stephenson
Reviewed by	Mark Howarth
Date	6 December 2023
Mark-up key	
Openable windows to control overheating	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

Blocks 5+ 6

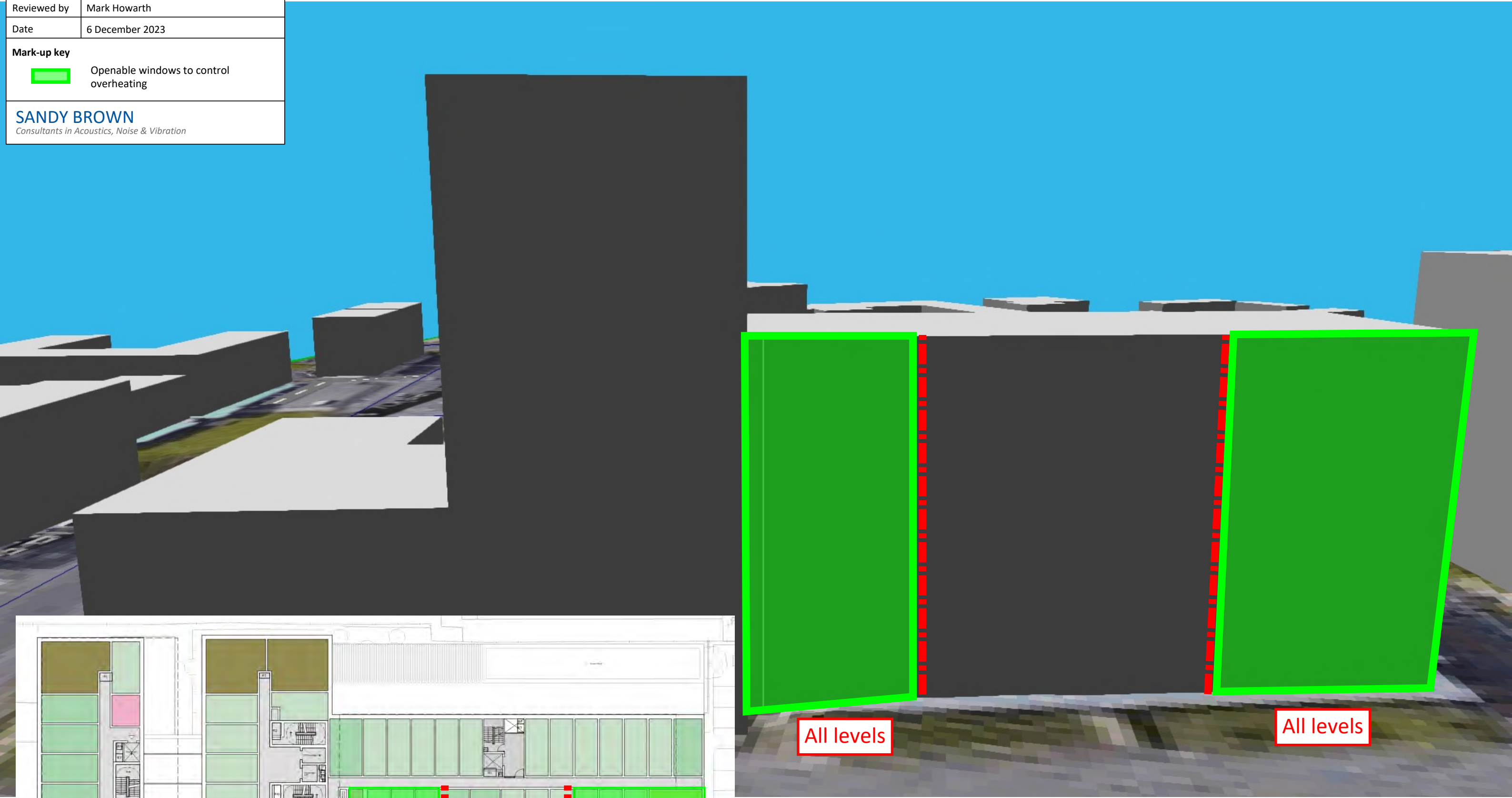
North elevation



Title	Openable windows for ventilation (day and night)
Project	Victoria Point
Project no.	023790
Version	A
Marked-up by	Tom Stephenson
Reviewed by	Mark Howarth
Date	6 December 2023
Mark-up key	
Openable windows to control overheating	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

Blocks 5+6

East elevation



All levels

All levels



Title	Openable windows for ventilation (day and night)
Project	Victoria Point
Project no.	023790
Version	A
Marked-up by	Tom Stephenson
Reviewed by	Mark Howarth
Date	6 December 2023
Mark-up key	
Openable windows to control overheating	
SANDY BROWN <i>Consultants in Acoustics, Noise & Vibration</i>	

Blocks 5+6

West elevation

