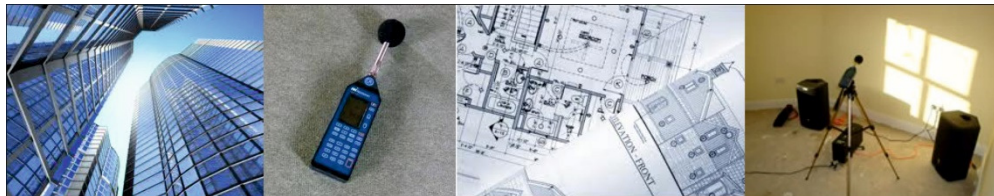


Ian Sharland LIMITED

Noise & Vibration Control Specialists

Ashfield House
Back Lane
Marlborough
Wiltshire SN8 1JJ
Telephone: (01672) 515761
Facsimile: (01672) 512761
Email: office@iansharland.co.uk



BATTLE HOSPITAL SITE PORTMAN ROAD READING

ASSESSMENT OF ENVIRONMENTAL NOISE

Client:

BELLWAY HOMES (THAMES VALLEY) LIMITED

Pacific House
Imperial Way
Oxfordshire
RG2 0TD

Date: 19 February 2018

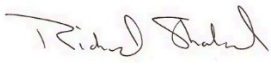
Report Ref: M3965-01

R Sharland MA(Cantab), CEng, MSc, MIOA
P Ashford BSc (Eng), MIOA
M Sharland
Ian J Sharland BSc (Eng), CEng, MRAes, FIOA (Associate)

Registered in England & Wales No. 1293250
Reg'd Office: 25 St Thomas St. Winchester SO23 9DD

CONTENTS

1. SUMMARY	2
2. INTRODUCTION	3
3. SURVEY OF EXISTING NOISE LEVELS.....	4
4. ASSESSMENT OF AMBIENT NOISE LEVELS	7
4.1 National Planning Policy Framework (March 2012)	7
4.2 National Policy Statement for England (March 2010)	8
4.3 DCLG Guidance Note, 2013 - 'Noise'	9
4.4 Local Authority Guidance	13
4.5 Quantification of Observed Action Effect Levels	14
4.6 Professional Practice Guidance on Planning & Noise.....	15
4.7 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings	17
4.8 World Health Organisation Guidelines.....	18
4.9 BS 4142:2014: Methods for rating and assessing industrial and commercial sound	18
5. ASSESSMENT OF AMBIENT NOISE.....	20
6. DISCUSSION ON COMMERCIAL NOISE ON SOUTH BOUNDARY	26
Figure 1 – Site Location Plan (including noise survey positions)	28
Figure 2 – Proposed Site Layout	29
Figure 3 - Measured Noise Levels adjacent to Portman Road	30
Figure 4 - Measured Noise Levels on Southern Boundary	31
Figure 5 - Noise Map, Daytime (+1.5m).....	32
Figure 6 - Noise Map, Night Time (+1.5m)	33
Figure 7 – Noise Map, Day Time (+4.5m)	34
Figure 8 – Noise Map, Night Time (+4.5m).....	35
Figure 9 – Noise Map, Day Time (+7.5m)	36
Figure 10 – Noise Map, Night Time (+7.5m).....	37
Figure 11 – Noise Map, Day Time (+10.5m)	38
Figure 12 – Noise Map, Night Time (+10.5m).....	39
Appendix 1 – Acoustic Trickle Ventilators	40

Project Reference	M3965
Issue No.	2
Author	Richard Sharland MA MSc CEng MIOA
Signature	
Reviewed	Eddie Oxborough MSc MIOA
Signature	
Date	19 February 2018

This report has been prepared by Ian Sharland Ltd with all reasonable skill, care and diligence, and taking account of the Services and the Terms agreed between Ian Sharland Ltd and the Client. This report is confidential to the client, and Ian Sharland Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Ian Sharland Ltd beforehand. Any such party relies upon the report at their own risk. Ian Sharland Ltd disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the Services.

1. SUMMARY

- 1.1 An assessment of noise has been undertaken at a site in Reading once occupied by the Battle Hospital.
- 1.2 The site lies adjacent to Portman Road, with commercial buildings to the north of this and the main GWR railway beyond. It is proposed that the site be developed with the construction of some 215 dwellings and there is a requirement to demonstrate that the amenity of residents would be protected from local noise sources.
- 1.3 Section 3 of this report describes the existing noise levels affecting the site, and Section 4 describes relevant planning policy guidance and the acoustic criteria which would typically be applied to such projects.
- 1.4 Section 5 of this report then provides a discussion of the noise sources affecting the site, and the means by which residents can be suitably protected. In summary, the following conclusions have been reached:
 - (a) External walls should be cavity masonry, or timber frame with a brick outer skin;
 - (b) Glazing to the majority of properties may be a standard sealed double-glazed unit, with an acoustic rating of 27 dB $R_w + C_{tr}$ (e.g. 4/16/4);
 - (c) Northerly facing windows to the five blocks of flats will require enhanced glazing, with performance targets of up to 31 dB $R_w + C_{tr}$;
 - (d) Background ventilation to the houses may be in the form of standard trickle ventilators.
 - (e) Background ventilation to the flats may be in the form of either acoustic trickle vents, with a performance target up to 39 dB $D_{n,e,w}$, or mechanical systems;
 - (f) Amenity noise levels will naturally be within the WHO guidelines throughout the development and no specific treatments are required.
 - (g) Noise levels on balconies overlooking Portman Road would experience noise levels above the WHO targets, but this can be partially mitigated by glazed screens to the front elevations.
- 1.5 A source of commercial noise has been identified on the southern boundary, arising from an extract system and air compressor of an adjacent metal workshop. Recommendations have therefore been provided for attenuating this noise to a suitable level, whether 'at source' or by means of screening.
- 1.6 It is therefore concluded that the site may be developed as proposed and that, with the recommended acoustic treatments in place, the future residents would be provided with an appropriate acoustic environment.

2. INTRODUCTION

- 2.1 An assessment of noise has been undertaken at a proposed residential development on the site of the former Battle Hospital in Reading (Figure 1).
- 2.2 The site is bordered by Portman Road to the north, a busy route which links the commercial estates on the south side of Caversham Bridge to Tilehurst and the west of Reading. A Tesco supermarket is located immediately to the west of the site, and there is housing to the south and east.
- 2.3 It is also noted that, midway along the most southerly boundary, there is an existing commercial building which is currently home to a small number of businesses. These include offices, a fitness gym, a welding shop and piano workshop. This building will be subject of particular discussion later in the report.
- 2.4 The scheme will comprise the construction of some 215 dwellings. These will be divided between five blocks of flats fronting Portman Road and housing distributed across the remainder of the site (Figure 2).
- 2.5 As a part of the environmental assessment of the proposed scheme, it is necessary to consider the impact of current noise sources on the amenity of the site, and to discuss how any adverse impact might be ameliorated.
- 2.6 Ian Sharland Limited has been instructed to investigate the current situation and, formally, the objectives may be summarised as follows:
- (i) To determine the existing ambient noise climate across the development site, due to existing ambient noise;
 - (ii) To calculate the noise levels incident on the proposed buildings;
 - (iii) To compare the measured levels against relevant design criteria;
 - (iv) As necessary, to specify measures which will attenuate the external noise to an acceptable level.
- 2.7 This report details the works undertaken in respect of these objectives, and the conclusions which have been reached.

3. SURVEY OF EXISTING NOISE LEVELS

- 3.1 The first step in the assessment of the proposal is to measure and describe the existing noise levels affecting the site.
- 3.2 Due to a lack of security on the site, a long term, unattended survey was not deemed possible.
- 3.3 A short-form survey was therefore undertaken, in accordance with the methodology set out in the Calculation of Road Traffic Noise (CRTN) document, published by the Department of Transport (Welsh Office).
- 3.4 It was apparent that the north boundary of the site will be subject to the highest levels of ambient noise, given its proximity to the traffic on Portman Road. A Rion NL52 Sound Level Meters was therefore set up on the boundary, as shown in Figure 1. The microphone was set on a tripod, 1.6m above ground level, with a clear line of sight to the road.
- 3.5 The acoustic climate becomes noticeably quieter as one moves away from the north boundary, but concern was also expressed regarding the small commercial building set on the southernmost boundary. A Norsonic 140 Sound level meter was therefore set up some 15m from the boundary, directly in line with this building (Figure 3). The microphone was positioned on a 1.6m high tripod, on open ground.
- 3.6 The meters were left to record the variation of noise over a 3-hour period on Wednesday 20th December 2017.
- 3.7 The equipment was configured to measure 5-minute samples of the following acoustic parameters:
- L_{Aeq} the A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.
- $L_{Amax, f}$ the A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).
- L_{A10} A statistical parameter representing the A-Weighted noise level exceeded for 10% of each sample period. This is commonly used to describe road traffic noise.
- L_{A90} A statistical parameter representing the A-Weighted noise level exceeded for 90% of each sample period. This is commonly used to describe background noise levels.

- 3.8 The equipment was calibrated before and after the survey. The weather during the survey was as described below:

Date	Ave. Temp °C	Rainfall mm	Wind Speed (m/sec)	
			Average	Direction
Wed 20/12	8	0	2	W

Table 1 - Weather Conditions During Survey

- 3.9 Figures 3 & 4 provides a trace of the variation in noise over the survey period at each survey position.
- 3.10 Table 2 below confirms these measured noise levels, expressed in terms of the 3-hour averages, and a typical peak noise level:

Location / Date	Day Time $L_{Aeq, 3hrs}$	Day Time $L_{A10, 3 hrs}$	Typical Peak L_{Amax}
North Boundary	67	70	80
South Boundary	48	51	63

Table 2 – Measured Noise Levels

- 3.11 The maximum noise levels quoted exclude the extreme peak noise events.
- 3.12 The CRTN document provides a formula for converting the individual values of L_{A10} into a day time 18-hour L_{A10} value. The result of this calculation is as follows:

$$\text{North Boundary } L_{A10, 18 \text{ hr}} = 69 \text{ dB(A)}$$

$$\text{South Boundary } L_{A10, 18 \text{ hr}} = 50 \text{ dB(A)}$$

- 3.13 In fact, assessments of road traffic noise are now more commonly based on the L_{Aeq} parameter, rather than the L_{A10} parameter. It is therefore necessary to convert the 18-hour L_{A10} into the more usual 16-hour day time L_{Aeq} and the 8-hour night time L_{Aeq} .

- 3.14 The TRL Project Report PR/SE/451/02¹ provides formulae for making the necessary adjustment, and using these relationships, the figures above equate to the following:

Location / Date	Day Time	Night Time
	L _{Aeq} , 0700 - 2300	L _{Aeq} , 2300 – 0700
North Boundary	66	58
South Boundary	48	41

Table 3 – Calculated Free Field Noise Levels

- 3.15 The significance of these values will be discussed in Section 5 below.
- 3.16 It is worth commenting that noise levels on the southern boundary of the site were dominated by distant traffic and other non-specific urban sources. There was no evidence of noise breaking out of the commercial building on Audley Street, which backs onto the site. On further site visits in December 2017 and January 2018, similar observations were recorded.
- 3.17 The building is home to a number of businesses including offices, a fitness gym, a piano repair workshop and a welding business. An inspection of the rear of the building identified grills to an apparent extract system, associated with the welding business. Enquiries to the owner revealed that these were working systems, though seldom used. However, a demonstration was kindly offered, and this revealed the following noise levels within the development site:

Source	Sound Pressure Level @2m
All off	50 dB(A)
Extract fans only	59 dB(A)
Extract fans and air compressor	65 dB(A)

Table 4 – Measured Noise from Commercial Unit

- 3.18 The particular impact of these noise sources will be discussed in Section 6 of the report.

¹ TRL Project Report PR/SE/451/02 CONVERTING THE UK TRAFFIC NOISE INDEX LA10,18h TO EU NOISE INDICES FOR NOISE MAPPING Prepared for DEFRA 2002

4. ASSESSMENT OF AMBIENT NOISE LEVELS

4.1 National Planning Policy Framework (March 2012)

4.1.1 The National Planning Policy Framework defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people, and their answerable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

4.1.2 Section 123 states

Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impact on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

4.1.3 The Framework states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution. It does not, however, provide any specific formal guidelines.

4.1.4 In respect of the fourth of the principal aims above, and in consideration of the past use of the site, it is questioned whether this area has any recreational or amenity value.

4.2 National Policy Statement for England (March 2010)

- 4.2.1 The document "Noise Policy Statement for England" sets out the following vision for on-going noise policy:

"Promote good health and quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"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".

- 4.2.2 To achieve these objectives the Noise Policy Statement sets out three noise levels to be defined by the assessor:

- **NOEL** - No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise.

- **LOAEL** - Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. Where levels lie between the LOAEL and SOAEL, the Statement requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, as set out in the NPPF.

- **SOAEL** - Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It notes, however, that "it is not possible to have a single objective noise-based measure that describes SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

- 4.2.3 Paragraph 2.7 states that "... the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications".

- 4.2.4 This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme, taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing noise to an excessively low level if this creates or increases some other adverse impact. Similarly, it may be appropriate in some cases for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development as a whole.
- 4.2.5 The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:
- "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.... This does not mean that such adverse effects cannot occur."*
- 4.2.6 Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change. An indication of the numerical definition of LOAEL may be derived from the following guidance.

4.3 DCLG Guidance Note, 2013 - 'Noise'

- 4.3.1 The Department of Communities and Local Government provided further guidance to support the NPPF. The section, Noise, published in August 2013 advises:

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Noise may override other planning concerns in certain circumstances, neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

This would include identifying whether the overall effect of the noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the no observed effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.

4.3.2 The table below summarises the noise exposure hierarchy, based on the likely average response:

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. 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 resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 5 - Impact Assessment Criteria

4.3.3 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- *the source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;*
- *for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;*
- *the spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.*

4.3.4 The adverse effects of noise may be mitigated in one of the four broad approaches:

- *engineering;*
- *layout;*
- *using planning conditions/obligations to restrict activities; and*
- *mitigating the impact on areas likely to be affected by noise.*

4.3.5 The noise impact on residential developments may be partially off-set if the residents of those dwellings have access to:

- *a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;*
- *a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;*
- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;*

a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

4.4 Local Authority Guidance

- 4.4.1 In the Pre-application enquiry to the Local Authority, the Environmental Health Officer commented as follows:

Noise impact on development

The Northern section of the proposed development is near the busy Portman Road, which apart from being a 40mph road with a constant traffic flow, is also home to a number of commercial/industrial units some of which are immediately opposite the proposed flats. For these reasons, a noise assessment would need to be submitted with the full application to ensure the noise levels are unlikely to cause disturbance to future residents.

At the most Southerly part of the proposed development, there are some proposed properties which look like they will back directly on to a factory unit on Audley Street. There appears to be around five businesses currently operating in this unit, including a commercial dry cleaner/laundromat, a piano restoration company and a specialist welding and metalwork company. These types of businesses are very likely to generate noise which could cause disturbance to the nearest residents. Therefore, a noise assessment would also be needed for the proposed residential units near Audley Street to make sure residents would not be unduly disturbed by noise from these businesses.

The noise assessment would be assessed against the recommendations for internal noise levels within dwellings and external noise levels within gardens / balconies in accordance with BS 8233:2014 and WHO guidelines for Community Noise. The report should identify any mitigation measures that are necessary to ensure that the recommended standard is met.

It may be possible though clever design to reduce the need for additional noise mitigation measures, for example, ensuring that noise sensitive rooms are located on the quieter façades and bathrooms, kitchens, hallways and cupboards etc on the noisiest façades.

Noise mitigation is likely to focus on the weak point in the structure; glazing. Given that the acoustic integrity would be compromised should the windows be opened, ventilation details must also be provided, where mitigation relies on closed windows. Ventilation measures should be selected which do not allow unacceptable noise ingress and should provide sufficient ventilation to avoid the need to open windows in hot weather, however non-openable windows are not considered an acceptable solution due to the impact on living standards.

The mitigation measures shall be installed in accordance with the approved specifications prior to occupation.

Noise generating development

If any noise generating plant for example, air conditioning units or condenser units, are proposed which would be located near noise sensitive receptors, we would expect to see an acoustic assessment carried out in accordance with BS4142:2014 methodology to be submitted with the full application. This would be to determine the likely impact of the noise from the plant and to ensure necessary measures have been put in place. Further information on the requirements/criteria of the assessment can be provided if it becomes necessary.

4.5 Quantification of Observed Action Effect Levels

- 4.5.1 There is much discussion how the observed actions levels might equate to ambient noise levels on any particular site. The documents referenced in Sections 3.1 - 3.3 deliberately avoided such a direct correlation, recognising that the impact of a noise is due to many more factors than simply the magnitude of the level.
- 4.5.2 Nonetheless, various Local Authorities have published tables which indicate their interpretation of the observed action levels for different development types.
- 4.5.3 As an example, the table below is taken from the Worcestershire Regulatory Services noise guide (Reading Council do not offer such information), relating to residential developments.

SOAEL and LOAEL values for residential properties have been derived for common noise sources. These are included in the table below. The criteria selected will depend upon the specific proposal (i.e. new residential development or introduction of a noise source to existing residential development).

Noise source	Assessment Location	LOAEL	SOAEL	Times
General environmental noise, road traffic, rail traffic	Outdoor living space	50 dB L _{Aeq,1hr}	55 dB L _{Aeq,1hr}	07:00 – 23:00
	Façade	50 dB L _{Aeq,16hr}	72 dB L _{Aeq,16hr}	07:00 – 23:00
	Façade	45 dB L _{Aeq,8hr}	67 dB L _{Aeq,8hr}	23:00 – 07:00
	Habitable room	30 dB L _{Aeq,8hr} *	40 dB L _{Aeq,8hr} *	23:00 – 07:00
	Habitable room	35 dB L _{Aeq,16hr}	45 dB L _{Aeq,16hr}	07:00 – 23:00

Table 6 - Interpretation of Observed Adverse Effect Levels

**It should be noted in addition to a steady level effects were also observed for transient events where maximum levels exceeded 42 dB LAFmax,inside, it is suggested that for sleep disturbance the LOAEL is 45 dB Lnight,outside, and 45 dB LAFmax,inside (i.e. 55 dB LAFmax,outside with open windows). When external levels increase above this level it will be necessary to close the*

windows and provide alternative ventilation to ensure that the internal noise levels continue to be acceptable.

4.6 Professional Practice Guidance on Planning & Noise

- 4.6.1 A recent publication by the Association of Noise Consultants and the Chartered Institute of Environmental Health, provides detailed guidance on the assessment of new residential sites, in respect their acoustic impact.
- 4.6.2 The document notes that noise is a material consideration in the planning process and a key aspect of sustainable development and it must therefore be considered and given serious attention when new developments might create additional noise and when new developments would be sensitive to the prevailing acoustic conditions.
- 4.6.3 The guide focuses on proposed new residential development and existing transport noise sources. It presents cross-sector guidance that seeks to assist, and increase the consistency of, plan-making and decision-taking. The context is primarily development control, although some of the content is relevant to strategic planning. Similarly, although the policy coverage is limited to England, the underlying approach may be useful in other parts of the UK.
- 4.6.4 The preparation of the ProPG acknowledges and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance.
- 4.6.5 At a preplanning stage, the ProPG provides a guide to the likely significance of ambient noise levels across the site, and hence the degree of detailed investigation required to progress the scheme design through planning. This information is repeated below:

Stage 1: Initial Site Risk Assessment (measured/predicted, empty site, pre-mitigation)		
Noise Risk Category*	Potential Effect if <u>unmitigated</u>	<u>Pre-Planning</u> Application Guidance
0 – Negligible $L_{Aeq,16hr} < 50dB$ $L_{Aeq,8hr} < 40dB$	May be noticeable but no adverse effect on health and quality of life	In this category the development is likely to be acceptable from a noise perspective, nevertheless a good acoustic design process is encouraged to improve the existing environment and/or safeguard against possible future deterioration and to protect any designated tranquil areas. A noise assessment may be requested to demonstrate no adverse impact from noise. Application need not normally be delayed on noise grounds.
1 – Low $L_{Aeq,16hr}$ 50-63dB $L_{Aeq,8hr}$ 40-55dB	Adverse effect on health and quality of life	In this category the development may be refused unless a good acoustic design process is followed and is demonstrated via a Level 1 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised and that a significant adverse noise impact will not arise in the finished development. Planning conditions and other measures to control noise may be required.
2 – Medium $L_{Aeq,16hr}$ 63-69dB $L_{Aeq,8hr}$ 55-60dB $L_{AFmax} > 80dB^{**}$	Significant adverse effect on health and quality of life	In this category the development is likely to be refused unless a good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised, and clearly demonstrates that a significant adverse noise impact will not arise in the finished development. Planning conditions and other measures to control noise will normally be required.
3 – High $L_{Aeq,16hr} > 69dB$ $L_{Aeq,8hr} > 60dB$ $L_{AFmax} > 80dB^{**}$	Unacceptable adverse effect on health and quality of life	In this category the development is very likely to be refused on noise grounds, even if a good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement. Applicants are advised to seek expert advice on possible mitigation measures. Advice on the circumstances when the refusal of new housing on noise grounds should normally be anticipated is included in the ProPG.

Table 7 - PRO-PG Noise Risk Categories

4.7 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 4.7.1 There is much guidance on the levels of intrusive noise which would be considered acceptable within residential accommodation such as this. Typical advice is found in British Standard 8233:2014 "Guidance on Sound Insulation and Noise Reduction for buildings". Following similar guidance in the 1999 World Health Organisation report "Guidelines for Community Noise", the Standard sets out the following limits for indoor ambient noise levels within living rooms and bedrooms. This suggests:

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	35 dB(A) LAeq, 16 hr	-
Dining	Dining room/Area	40 dB(A) LAeq, 16 hr	-
Sleeping	Bedroom	35 dB(A) LAeq, 16 hr	30 dB(A) LAeq, 8 hr

Table 8 - BS8233 Indoor Guideline Values

- 4.7.2 It is usually considered that an open window will provide a reduction of some 10-15 dB(A)². Therefore the 'good' internal standards quoted above would broadly equate to the following targets immediately outside the buildings:

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	48 dB(A) LAeq, 16 hr	-
Dining	Dining room/Area	53 dB(A) LAeq, 16 hr	-
Sleeping	Bedroom	48 dB(A) LAeq, 16 hr	43 dB(A) LAeq, 8 hr

Table 9 - BS8233 Derived Facade Guideline Values

- 4.7.3 BS8233 recognises that, where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB, and reasonable conditions will be achieved.
- 4.7.4 It should be noted that the levels quoted in BS8233 are intended to reflect the acceptability of steady, continuous noise. Sources of intermittent and tonal noise may generate greater annoyance for a similar overall magnitude. Whilst BS8233 does not explicitly state a correction for those circumstances, it may be appropriate to consider that the Good and Reasonable standards would be achieved with levels which are perhaps 5 dB lower than stated in the table above.
- 4.7.5 It is also noted that BS8233 was written from a view of designing new buildings to protect occupants from existing noise sources. This does not necessarily infer, however, that the acceptability of an occupant to an absolute level noise within a building will be different if the introduction of the noise source post-dates the construction of the building.

² Reference PPG24 Planning & Noise, which adopted a mid-range value of 13 dB(A)

4.8 World Health Organisation Guidelines

- 4.8.1 Further advice is provided in the 1999 WHO report "Guidelines for Community Noise"
- 4.8.2 This indicates that the steady noise level in external amenity areas, such as gardens or outdoor living areas should not exceed 55 dB(A) $L_{Aeq, t}$, and should preferably be designed below 50 dB(A) $L_{Aeq, t}$.
- 4.8.3 The document also provides guidance on the impact of peak noise levels on sleeping conditions. This suggests that levels above 45 dB(A) L_{Amax} inside a bedroom would be disturbing to sleep. With windows open, this would equate to a level of approximately 58 dB(A) L_{Amax} externally.

4.9 BS 4142:2014: Methods for rating and assessing industrial and commercial sound

- 4.9.1 Any formal assessment of commercial noise affecting residential properties would in all likelihood be based upon the recommendations of British Standard 4142:2014 "Methods for rating and assessing industrial and commercial sound".
- 4.9.2 In brief, this rating method determines "specific sound level" generated by the new plant, assessed immediately outside the residential properties most likely to be affected. For daytime (07.00 – 23.00) only operation of the new plant, this would be the equivalent continuous noise level of the new noise, evaluated over a 1-hour sampling period, its $L_{Aeq, 1hr}$. For plant operating during the night-time (23.00 – 07.00) only the reference time interval is 15 minutes.
- 4.9.3 Corrections of up to + 9 dB (A) are then made to this "specific sound level" if the new noise has certain acoustic features such as; tonality, impulsivity, intermittency and any other sound characteristics, to give the "rating level".
- 4.9.4 An assessment of the impact of the specific sound level can be determined by subtracting the measured background level from the rating level, and considering the following;
- a) Typically, the greater this difference, the greater the magnitude of the impact.
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse

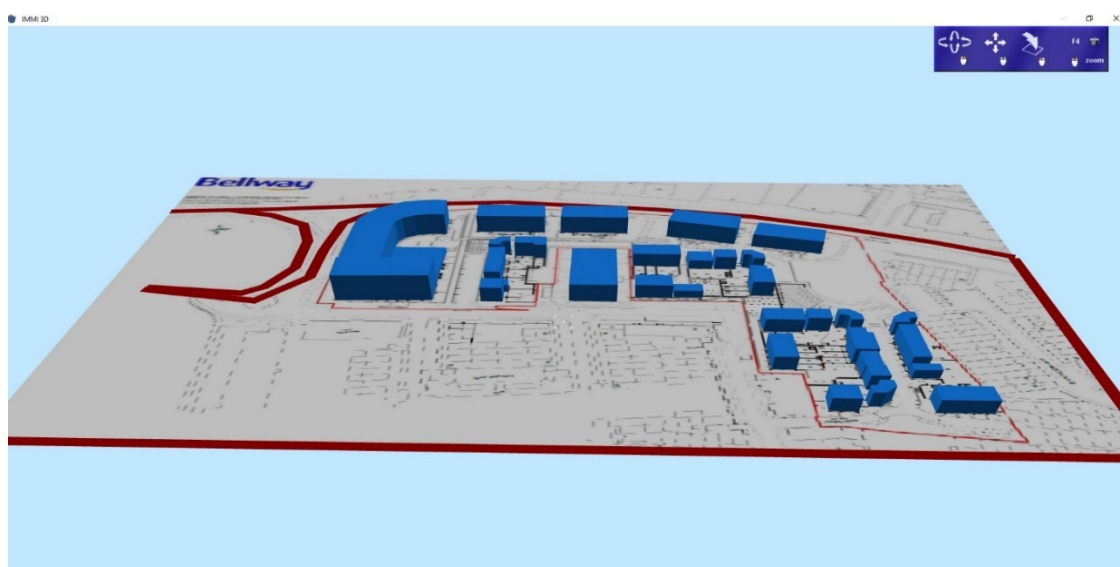
impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

NOTE: Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

- 4.9.5 It is likely that the Local Authority would seek to avoid marginal situations at the planning stage, and may try to ensure a positive likelihood that no complaints would be forthcoming. As such, they might recommend a noise target which limits the Rating Noise Level to a maximum which is as low as 5 - 10 dB(A) below the minimum background level currently experienced.

5. ASSESSMENT OF AMBIENT NOISE

- 5.1 This section of the report will consider the measured noise levels and provide guidance on the measures which should be incorporated into the scheme design to ensure acceptable acoustic conditions for new residential dwellings.
- 5.2 The Proposed Site Layout shown in Figure 2 indicates the location of the residential properties within the site. Using the survey data from Section 3 and the IMMI 2016 computer modelling software, a noise map of the site has been created. The software follows the methodology of BS EN ISO 9613: 2007 Acoustics - 'Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels'.



- 5.3 Noise levels have been calculated on the façade of each building. For convenience, the assessment will be grouped into three parts:

Block 1	The C-shaped block of flats in the north-west corner of the site
Blocks 2 – 5	The four blocks of flats along the Portman Road boundary
Houses	All of the other dwellings on the site.

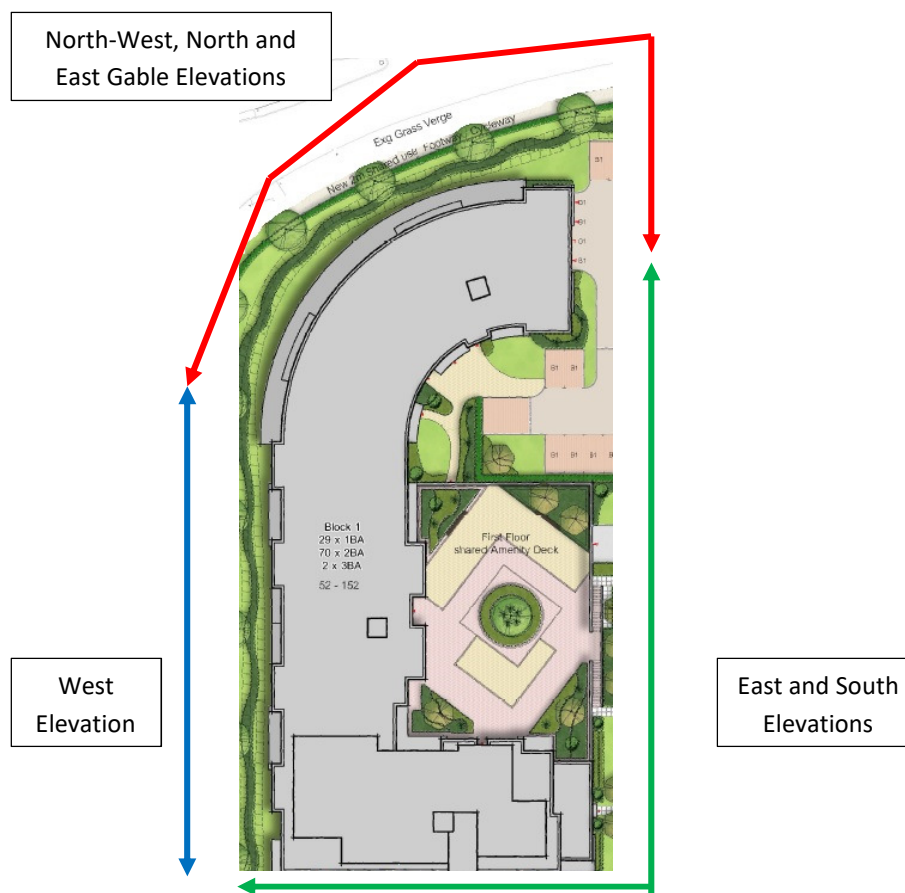
- 5.4 For the purposes of design, the internal noise targets of BS8233 will be adopted, namely:

Living Rooms/Dining Room	$\leq 35 \text{ dB(A)} L_{Aeq, 0700 - 2300}$
Bedrooms	$\leq 30 \text{ dB(A)} L_{Aeq, 2300 - 0700}$ and $\leq 45 \text{ dB(A)} L_{Amax}$ during the same period

- 5.5 With regard to ventilation, it is proposed here that the above levels should be achieved during background ventilation.

Block 1

5.6 The analysis of the IMMI software yields the following façade noise levels. For convenience, the building façade has been divided into three sections, as indicated below.



5.7 The table below confirms the highest façade levels, alongside the British Standard internal noise targets and hence the overall acoustic performance required from of the façade:

Elevation	Room Type	Highest Façade Level	Noise Target	Outside-to-Inside Sound Level Difference, dB(A)
North-West / North / East Gable	Living Room	63 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	28 dB(A)
	Bedrooms	55 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$	29 dB(A)
		74 dB(A) $L_{Aeq, 8 \text{ hrs}}$	45 dB(A) $L_{Amax, f}$	
East & South	Living Room	57 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	22 dB(A)
	Bedrooms	48 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$	22 dB(A)
		67 dB(A) $L_{Aeq, 8 \text{ hrs}}$	45 dB(A) $L_{Amax, f}$	
West	Living Room	58 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	23 dB(A)
	Bedrooms	48 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$	22 dB(A)
		67 dB(A) $L_{Aeq, 8 \text{ hrs}}$	45 dB(A) $L_{Amax, f}$	

Table 10 – Predicted Façade Noise Levels on Block 1

- 5.8 In order to achieve these sound level differences, the following constructions should be considered.
- 5.9 External walls should have a cavity masonry external wall, or a timber frame with brick external skin (lightweight cladding constructions would be subject to further detailed review).
- 5.10 For the north-west, north and east gable elevations, glazing to both bedrooms and living rooms should be specified with a weighted sound reduction index of 30 dB R_w + Ctr.
- 5.11 Glazing to all other rooms in the buildings may be a standard 4/16/4 double glazed configuration, rated at 27 dB R_w + Ctr.
- 5.12 In respect of ventilation, the required outside-to-inside sound level differences are greater than would be achieved through a partially open window or standard, open trickle ventilator. It will therefore be necessary to provide an alternative means of background ventilation. Options here would include:
- (i) An acoustic trickle ventilator, rated at 38 dB $D_{n,e,w}$ for the northerly elevations and 35 dB $D_{n,e,w}$ for the remaining habitable rooms (See Appendix 1 for further details);
 - (ii) A mechanical ventilation heat recovery (MVHR) system providing two air changes per hour to each habitable room. Such systems generally provide the background ventilation as well, eliminating the need for acoustic trickle vents.
 - (iii) A decentralised mechanical extract ventilation (dMEV) system. This relies on a single extract fan drawing air from bathrooms and kitchens, with make-up air provided into the habitable rooms via acoustic trickle vents. Again, the system should be designed to achieve two air changes per hour.

Blocks 2 – 5

5.13 The analysis of the IMMI software yields the following façade noise levels. The table also confirms the British Standard internal noise targets and hence the overall performance of the façade:

Elevation	Room Type	Highest Façade Level	Noise Target	Outside-to-Inside Sound Level Difference, dB(A)
North	Living Room	64 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	29 dB(A)
	Bedrooms	56 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 75 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 45 dB(A) $L_{Amax, f}$	30 dB(A)
East & West	Living Room	61 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	26 dB(A)
	Bedrooms	53 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 72 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 45 dB(A) $L_{Amax, f}$	27 dB(A)
South	Living Room	56 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	21 dB(A)
	Bedrooms	50 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 69 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 45 dB(A) $L_{Amax, f}$	24 dB(A)

Table 11 – Predicted Façade Noise Levels on Blocks 2 - 5

5.14 In order to achieve these sound level differences, the following constructions should be considered.

5.15 External walls should have a cavity masonry external wall, or a timber frame with brick external skin (lightweight cladding constructions would be subject to further detailed review).

5.16 For the north elevation, glazing to both bedrooms and living rooms should be specified with a weighted sound reduction index of 31 dB R_w + Ctr.

5.17 Glazing to all other rooms in the buildings may be a standard 4/16/4 double glazed configuration, rated at 27 dB R_w + Ctr.

5.18 In respect of ventilation, the required outside-to-inside sound level differences are greater than would be achieved through a partially open window or standard, open trickle ventilator. It will therefore be necessary to provide an alternative means of background ventilation. Options here would include (note, the 2nd and 3rd options should be considered if air flow rates above background ventilation are required):

- (i) An acoustic trickle ventilator, rated at 39 dB $D_{n,e,w}$ for the north elevation windows and 35 dB $D_{n,e,w}$ for the remaining habitable rooms (See Appendix 1 for further details);

- (ii) A mechanical ventilation heat recovery (MVHR) system providing two air changes per hour to each habitable room. Such systems generally provide the background ventilation as well, eliminating the need for acoustic trickle vents.
- (iii) A decentralised mechanical extract ventilation (dMEV) system. This relies on a single extract fan drawing air from bathrooms and kitchens, with make-up air provided into the habitable rooms via acoustic trickle vents. Again, the system should be designed to achieve two air changes per hour.

Houses

- 5.19 The analysis of the IMMI software indicates that noise levels in the central areas of the site will be very modest, such that all houses can be considered in the same fashion. The table below confirms the highest noise levels affecting any of the houses. Again, the British Standard internal noise targets are also included:

Elevation	Room Type	Highest Façade Level	Noise Target	Outside-to-Inside Sound Level Difference, dB(A)
All	Living Room	48 dB(A) $L_{Aeq, 16 \text{ hrs}}$	35 dB(A) $L_{Aeq, 16 \text{ hrs}}$	13 dB(A)
	Bedrooms	42 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 61 dB(A) $L_{Aeq, 8 \text{ hrs}}$	30 dB(A) $L_{Aeq, 8 \text{ hrs}}$ 45 dB(A) $L_{Amax, f}$	16 dB(A)

Table 12 – Predicted Façade Noise Levels on Houses

- 5.20 In order to achieve these very modest sound level differences, the following constructions should be considered.
- 5.21 External walls should have a cavity masonry external wall, or a timber frame with brick external skin (lightweight cladding constructions would be subject to further detailed review).
- 5.22 All glazing may be a standard 4/16/4 double glazed configuration, rated at 27 dB Rw + Ctr.
- 5.23 In respect of ventilation, it is confirmed that rooms could be ventilated using standard trickle ventilators and/or partially open windows.
- 5.24 In the circumstances of open windows, the level difference across the façade would be expected to be between 10 and 15 dB(A). Generally, residual noise internally would then be on the limit of the 'good' standard quoted in BS8233. At the loudest time, the residual noise might be slightly above this, but would still remain within the 'reasonable' conditions described in the same Standard. It is proposed that this form of ventilation would therefore be acceptable.

Amenity Space

- 5.25 With respect to private amenity space, the noise modelling (Figure 5) indicates that noise levels across all of the garden areas to the houses, and the first-floor amenity area of Block 1, would be below the 50 dB(A) threshold recommended in the WHO guidelines, below which the majority of people would not be moderately annoyed.
- 5.26 It is therefore concluded that no acoustic mitigation is required for the gardens.
- 5.27 There will be balconies provided to the flatted accommodation, and those overlooking Portman Road could experience levels in excess of the 55 dB(A) WHO guideline threshold.
- 5.28 For those sitting on the balcony, the situation could be ameliorated in part with the provision of a glass balustrade and the use of an acoustically absorptive soffit lining (e.g. a 50mm thickness of mineral fibre set behind a perforated timber (or similar) sheet.
- 5.29 Residual levels may not fall entirely to the 55 dB(A) target but it is noted within BS8233 that:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the 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. 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.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses.

- 5.30 Whilst balcony noise levels may not be ideal, their inclusion would still remain consistent with the guidance of BS8233.

6. DISCUSSION ON COMMERCIAL NOISE ON SOUTH BOUNDARY

- 6.1 The site surveys have identified one source of commercial noise, on the southern boundary of the site. This comprises an extract fan and the exhaust of an air compressor, both associated with The Welding Shop on Argyll Road.
- 6.2 Measurements of noise from the equipment indicated a steady sound pressure level of 65 dB(A) @2m.
- 6.3 Site plans indicate that the nearest residential houses on the new development would be some 15m from the southern boundary. At this distance, the predicted façade noise level due to the measured equipment would be 47 dB(A).
- 6.4 If this noise was assessed under the methodology of BS4142, the results would be as follows:

	Day Time Operation
Predicted Facade Noise Level, $L_{Aeq, t}$	50 dB(A)
Correction for Tonality	+2 dB ³
Rating Noise Level	51 dB(A)
Minimum Background Level, L_{A90}	39 dB(A)
RATING	+12 dB

- 6.5 This would therefore suggest that the equipment could have a significant adverse impact on the properties lying along the southern-most part of the site.
- 6.6 In order to ameliorate the situation, there are two very straight-forward options which could be considered:
- (i) Approach the owners of The Welding Shop, and agree to attenuate the fans and compressor exhaust at source. This would involve the addition of conventional duct attenuators to the outside of the building.
 - (ii) Erect a close boarded timber barrier along the site boundary, in front of the fan and exhaust (obviously with suitable clearance to avoid interference with air flows), sufficiently high and long to provide a generous line of sight obstruction from the plant to any of the new houses. Subject to detailed survey, it is estimated that a 3m high x 5m long barrier would be appropriate. The barrier would be specified as a proprietary acoustic fence (e.g. Jacksons Jakoustic or similar approved) or a bespoke construction comprising 25mm thick timber boards, butt jointed with 25mm thick cover strips at each

³ BS4142 correction for tonality which is clearly perceptible.

joint. The southern-facing side of the barrier would be lined with an acoustically absorptive material to prevent acoustics reflections back to the commercial building.

- 6.7 With such treatments it should be possible to attenuate current noise levels by some 10 - 15 dB(A). At that point the BS4142 noise rating would be reduced zero, which signifies 'a low impact, depending on context'. Here, it is noted that the owners had suggested that the equipment has been rarely used in the recent past, and therefore does not represent a constant and regular source of noise (as noted via the various site attendances).

Figure 1 – Site Location Plan (including noise survey positions)

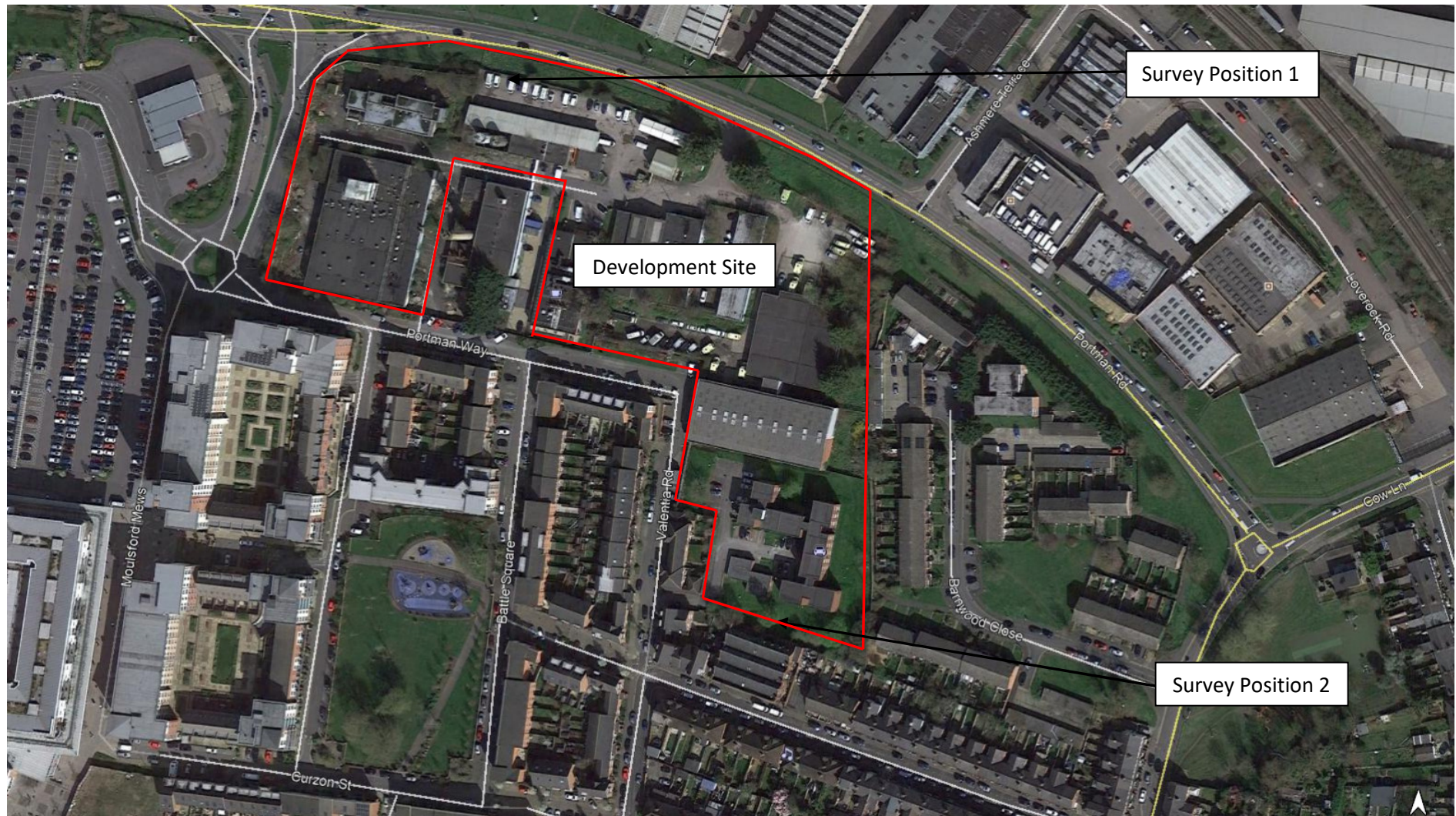




Figure 3 - Measured Noise Levels adjacent to Portman Road

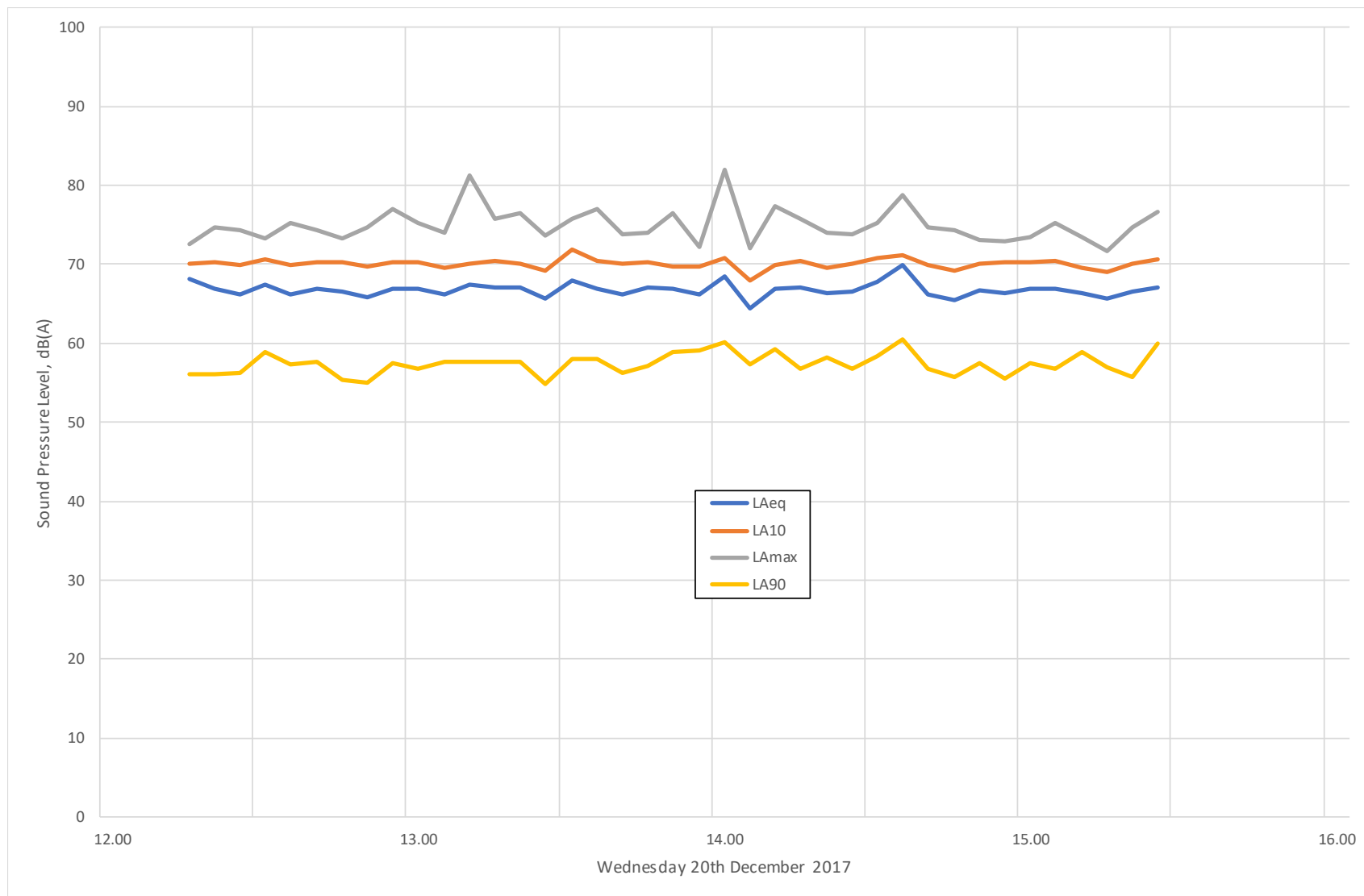


Figure 4 - Measured Noise Levels on Southern Boundary

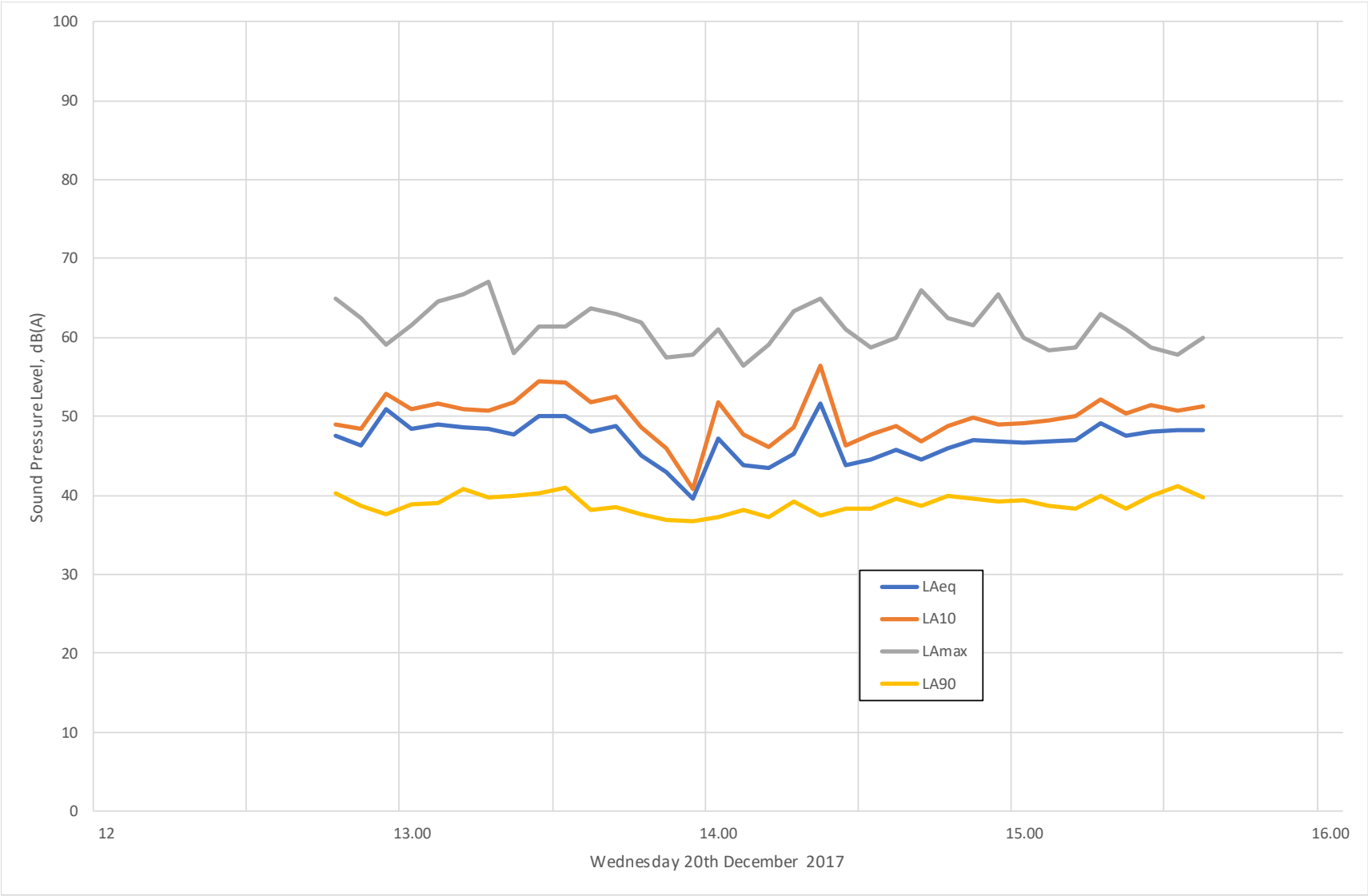


Figure 5 - Noise Map, Daytime (+1.5m)



Figure 6 - Noise Map, Night Time (+1.5m)

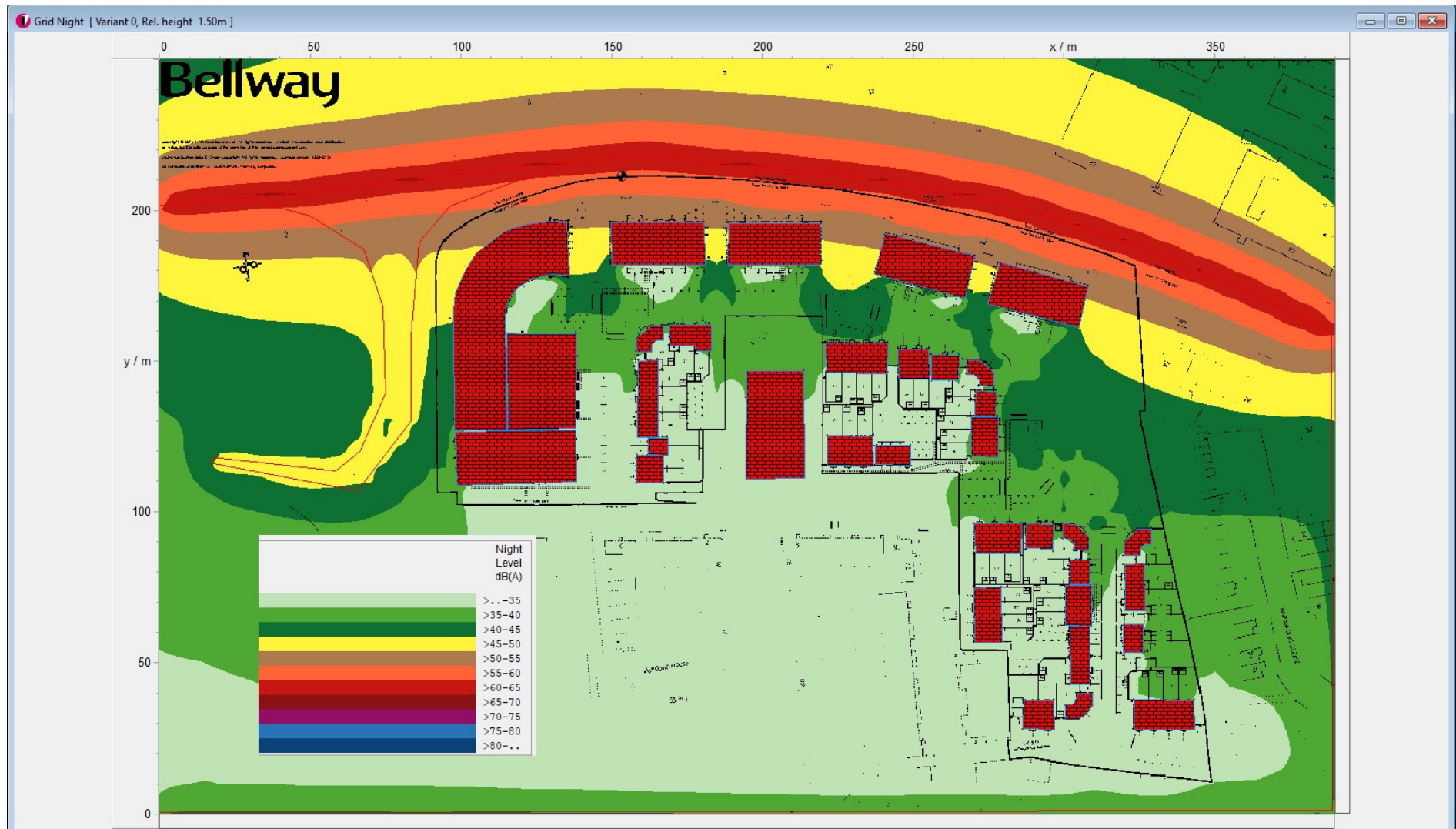


Figure 7 – Noise Map, Day Time (+4.5m)

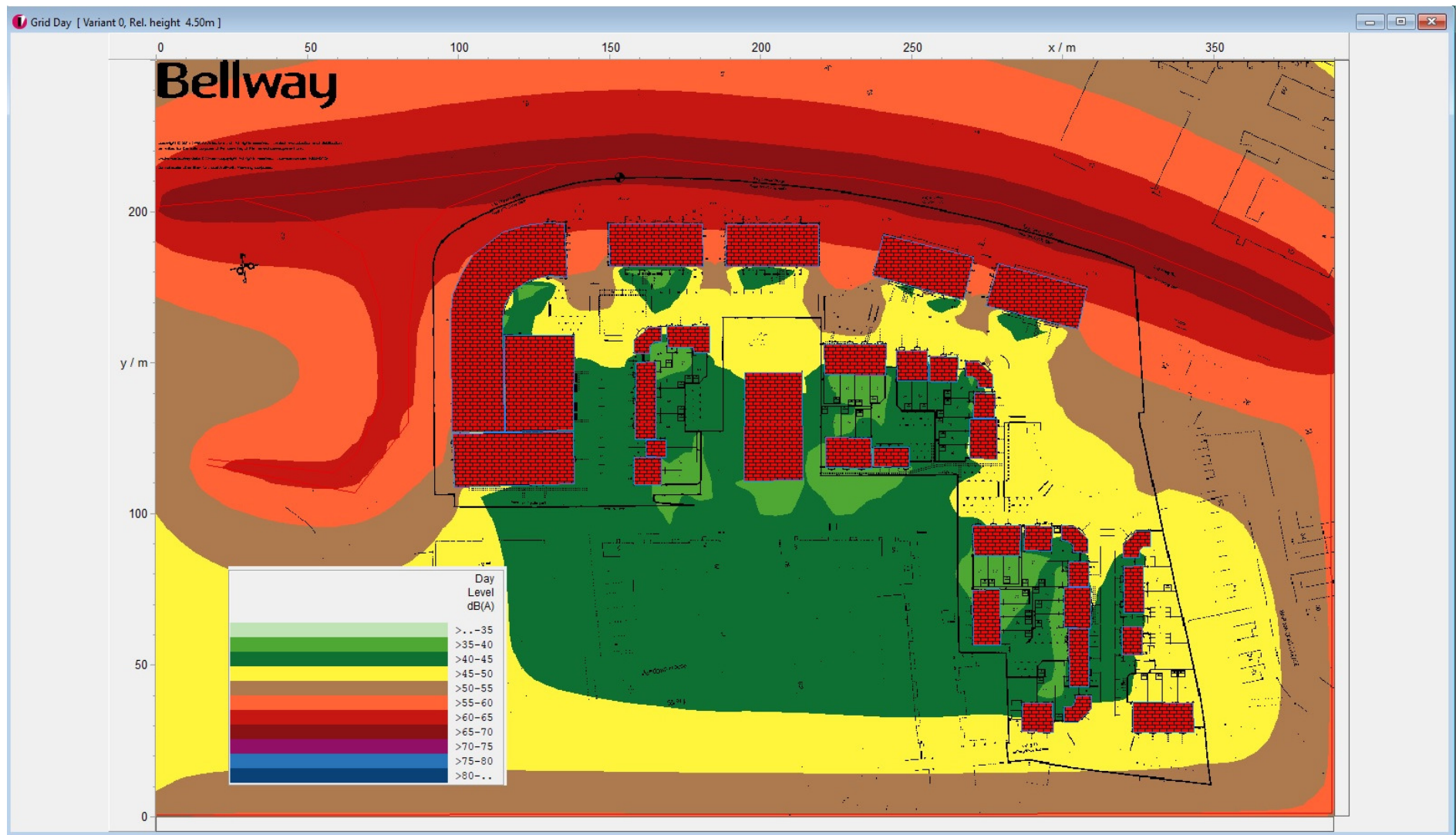


Figure 8 – Noise Map, Night Time (+4.5m)



Figure 9 – Noise Map, Day Time (+7.5m)



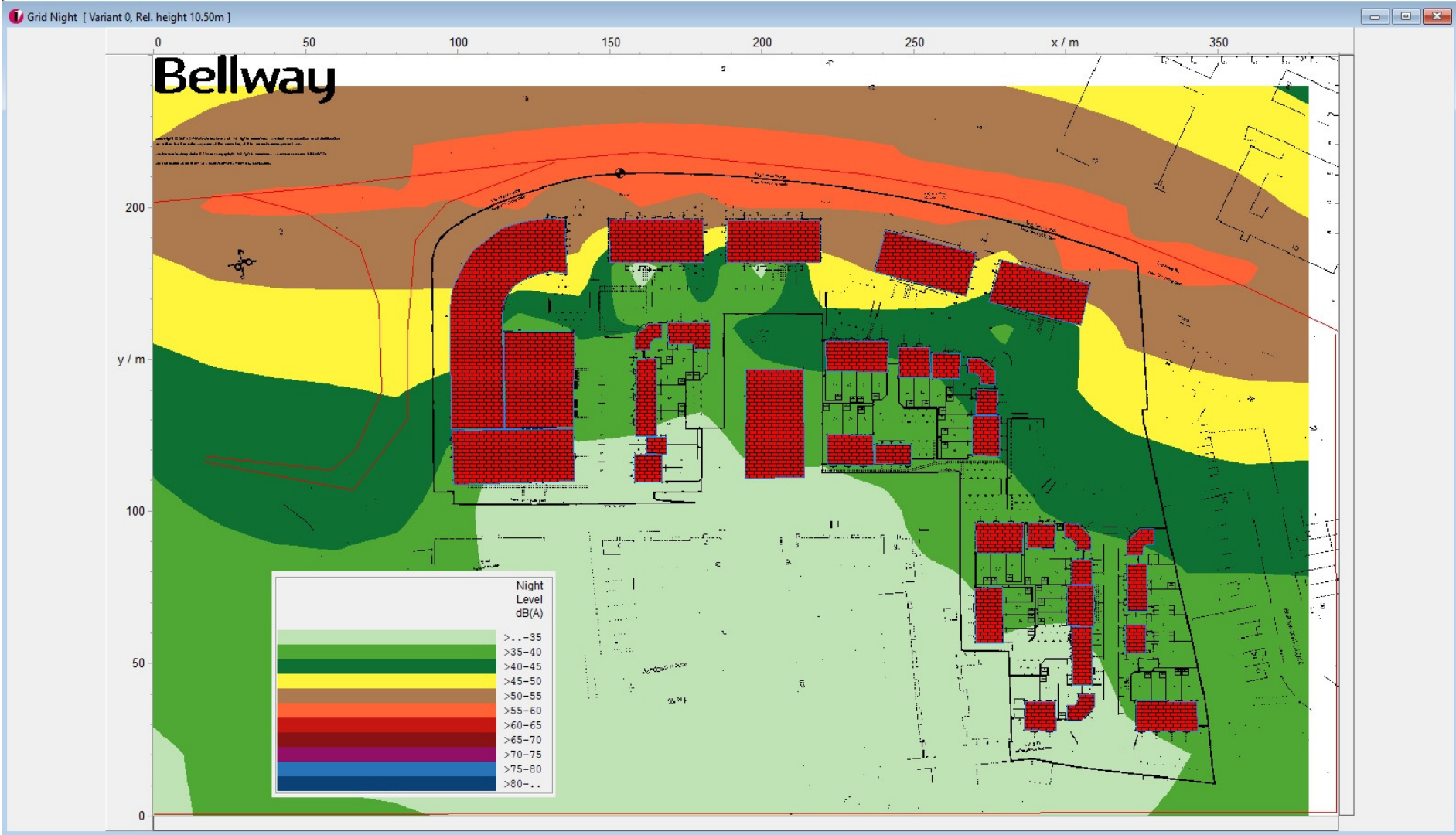
Figure 10 – Noise Map, Night Time (+7.5m)



Figure 11 – Noise Map, Day Time (+10.5m)



Figure 12 – Noise Map, Night Time (+10.5m)



Appendix 1- Acoustic Trickle Ventilators

Sonovent® < Acoustic flap ventilators glazed-in/at transom



Self-regulating flap ventilator with a superior sound absorption

Renson® has developed the Sonovent® range to meet with two aspects of living comfort:

- physical comfort: fresh and healthy air without draughts
- acoustic comfort: up to 56 dB sound reduction

The Sonovent® is an extensive range of self-regulating window vents with a superior air sound insulation. Four types of the Sonovent® are available; Small, Medium, Large and Xlarge, each model having 4 different air slot possibilities (10, 15, 20 or 25 mm). This comes up to 16 alternatives in total, each model with a different airflow and sound reduction. Furthermore, thermal breaks can be positioned differently, depending on the model and installation method. The Sonovent® range therefore offers an ideal solution for every situation.

Glazed-in or at transom

The Sonovent® is preferably placed at transom. By adding L-profiles to the upper and lower side, the Sonovent® can also be placed on glass.

Thermally broken

No cold air-transfer from outside to inside. Thermal breaks can be positioned differently depending on the model and installation method.

Self-regulating

Thanks to its self-regulating flap, the Sonovent® ensures the supply of fresh and healthy air without draughts.

Sound absorption

Various sound reduction levels (depending on the type), from 37dB up to 56 dB.

Insect mesh

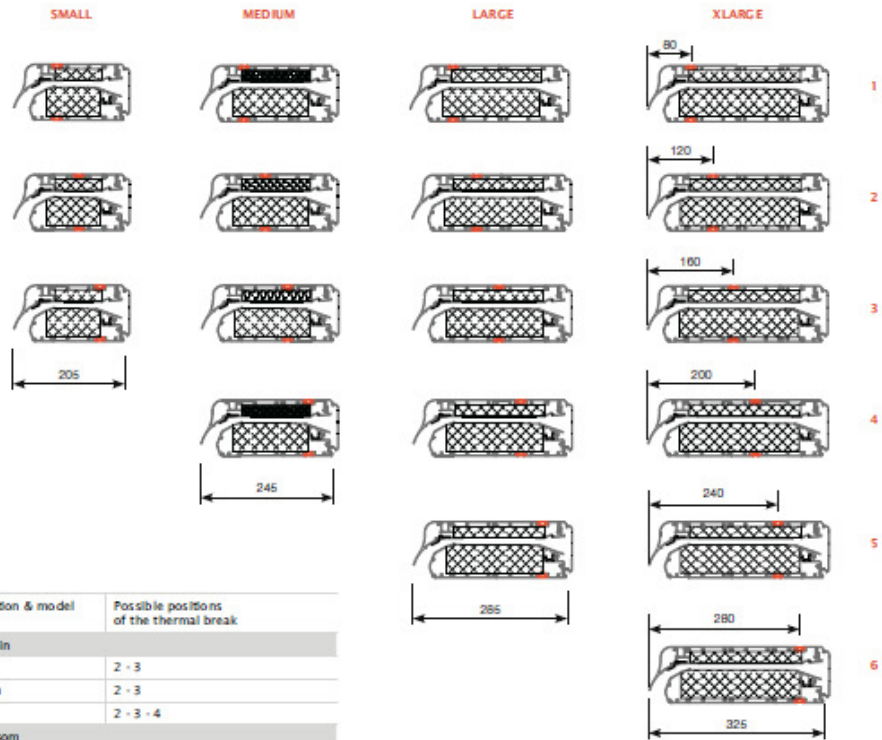


Acoustic flap ventilators glazed-in/at transom > Sonovent®

The versatile Sonovent® - range

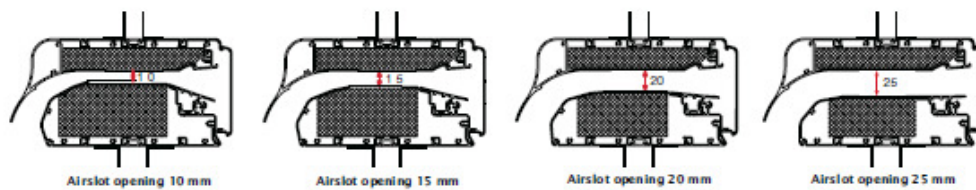
4 different models with different positions of the thermal break

- Models: Small - Medium - Large - Xlarge
- Thermal break: different positions 1 to 6

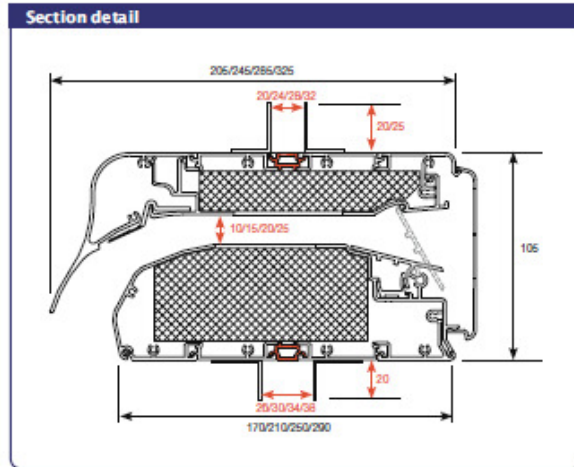


Installation & model	Possible positions of the thermal break
Glazed-in	
Small	2 - 3
Medium	2 - 3
Large	2 - 3 - 4
At transom	
Small	1 - 2 - 3
Medium	2 - 3 - 4
Large	2 - 3 - 4
Xlarge	2 - 3 - 4 - 5

- Airslot opening: 10 - 15 - 20 - 25 mm



Sonovent® < Acoustic flap ventilators glazed-in/at transom

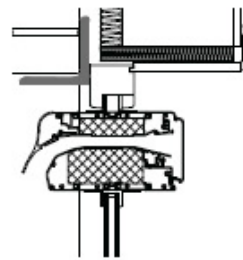


Installation

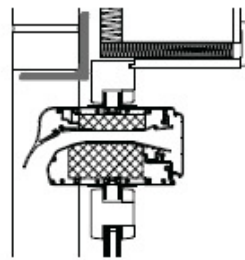
The Sonovent® is designed to be installed glazed-in or at transom (preferred installation).

Hidden installation behind louvers or in a ventilated panel of a curtain wall system is also possible and commonly applied in offices, schools, ...

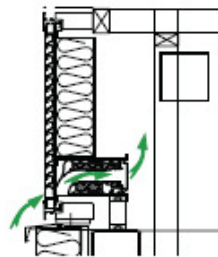
By choosing the right model of Sonovent® and varying the length, the required airflow together with the necessary acoustic performances can be reached.



Glazed-in



*Fully glazed-in (at transom)
(recommended installation)*



Hidden installation (behind louvers)

Acoustic flap ventilators glazed-in/at transom > Sonovent®

Technical characteristics				
Sonovent®	Small	Medium	Large	Xlarge
Airflow				
Equivalent area				
Air slot 10 mm	17756 mm²/m	17509 mm²/m	16153 mm²/m	14427 mm²/m
Air slot 15 mm	29593 mm²/m	26511 mm²/m	25524 mm²/m	21578 mm²/m
Air slot 20 mm	31813 mm²/m	33292 mm²/m	32059 mm²/m	31073 mm²/m
Air slot 25 mm	33786 mm²/m	34032 mm²/m	33416 mm²/m	32676 mm²/m
Q at 1 Pa				
Air slot 10 mm	14,0 l/s/m	13,8 l/s/m	12,7 l/s/m	11,3 l/s/m
Air slot 15 mm	23,3 l/s/m	20,8 l/s/m	20,1 l/s/m	17,0 l/s/m
Air slot 20 mm	25,0 l/s/m	26,2 l/s/m	25,2 l/s/m	24,4 l/s/m
Air slot 25 mm	26,6 l/s/m	26,7 l/s/m	26,3 l/s/m	25,7 l/s/m
Q at 1 Pa				
Air slot 10 mm	50,2 m³/h/m	49,5 m³/h/m	45,7 m³/h/m	40,8 m³/h/m
Air slot 15 mm	83,7 m³/h/m	75,0 m³/h/m	72,2 m³/h/m	61,0 m³/h/m
Air slot 20 mm	90,0 m³/h/m	94,2 m³/h/m	90,7 m³/h/m	87,9 m³/h/m
Air slot 25 mm	95,6 m³/h/m	96,3 m³/h/m	94,5 m³/h/m	92,4 m³/h/m
Q at 2 Pa				
Air slot 10 mm	14,0 l/s/m	13,8 l/s/m	12,7 l/s/m	11,3 l/s/m
Air slot 15 mm	23,3 l/s/m	20,8 l/s/m	20,1 l/s/m	17,0 l/s/m
Air slot 20 mm	25,0 l/s/m	26,2 l/s/m	25,2 l/s/m	24,4 l/s/m
Air slot 25 mm	26,6 l/s/m	26,7 l/s/m	26,3 l/s/m	25,7 l/s/m
Q at 10 Pa				
Air slot 10 mm	15,3 l/s/m	15,1 l/s/m	14,0 l/s/m	12,5 l/s/m
Air slot 15 mm	25,6 l/s/m	22,9 l/s/m	22,1 l/s/m	18,7 l/s/m
Air slot 20 mm	27,5 l/s/m	28,8 l/s/m	27,7 l/s/m	26,9 l/s/m
Air slot 25 mm	29,2 l/s/m	29,4 l/s/m	28,9 l/s/m	28,2 l/s/m
Q at 20 Pa				
Air slot 10 mm	22,9 l/s/m	n.p.d.	n.p.d.	n.p.d.
Air slot 15 mm	28,5 l/s/m	n.p.d.	n.p.d.	n.p.d.
Air slot 20 mm	29,2 l/s/m	n.p.d.	n.p.d.	n.p.d.
Air slot 25 mm	27,1 l/s/m	27,5 l/s/m	25,0 l/s/m	n.p.d.
Comfort				
Sound reduction $D_{p,av}$ (C _{tr}) in open position				
Air slot 10 mm	46 (-1;-5) dB	48 (-2;-6) dB	50 (-2;-6) dB	56 (-2;-6) dB
Air slot 15 mm	41 (-1;-2) dB	45 (-2;-6) dB	49 (-2;-7) dB	53 (-2;-6) dB
Air slot 20 mm	40 (-1;-3) dB	43 (0;-3) dB	44 (-2;-6) dB	46 (-2;-6) dB
Air slot 25 mm	37 (-1;-3) dB	39 (-1;-4) dB	41 (-2;-6) dB	45 (-2;-6) dB
Sound reduction $D_{p,av}$ (C _{tr}) in closed position				
n.p.d.				
Technical characteristics				
Controllable internal flap	Continuous adjustment			
Control options internal flap	Manual, cord, rod, motor			
U value	4,5 W/m²K	4,6 W/m²K	4,6 W/m²K	4,7 W/m²K
Air leakage at 50 Pa	<15% (in closed position)			
Watertightness in closed position, up to	650 Pa			
Watertightness in open position, up to	50 Pa			
Dimensions				
Glass reduction	130 mm (flange 20 mm), 135 mm (flange 25 mm)			
Height	105 mm (total height with flanges: 145 or 150 mm)			
Glass thickness	20, 24, 28, 32 (or more upon request)			
Max. length	2000 mm (glazed-in installation) / 2500 mm (installation at transom)			
Depth/Total depth	170/205 mm (Small), 210/245 mm (Medium), 250/285 mm (Large) or 290/325 mm (Xlarge)			