NOISE IMPACT ASSESSMENT

Pharos House, 67 High Street, Worthing BN11 1DN

10th February 2025

ISSUE 01

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1.0 INTRODUCTION

DAA Group has been appointed to carry out a Noise Impact Assessment at Pharos House, 67 High Street, Worthing BN11 1DN to support a Class MA Application for change of use from offices (Class E) to 10 residential dwellings (Class C3) in accordance with the Permitted Development legislation requirement allowing Local Planning Authorities to consider potential impacts of noise specifically from commercial premises on intended occupiers of residential developments.

The purpose of this report is to satisfy the following comment/ refusal:

"The proposed change of use from commercial to residential and the resulting layout would result in the creation of dwellings in close proximity to a range of commercial uses including supermarkets and drinking establishments, on a busy street. Owing to the noise created by these uses with no noise assessment having been submitted the Local Planning Authority is not satisfied that satisfactory living conditions would be provided for the future occupiers of the residential dwelling. As a result, the proposed development would be contrary to policy DM22 of the Worthing Local Plan 2023 and the provisions of the National Planning Policy Framework (NPPF). As such the application does not accord with requirements of Paragraph MA (2) (d) and therefore the conditions of Schedule 2, Part 3, Class MA of the Town & Country Planning (General Permitted Development) Order 2015 (as amended) have not been met."

Under Permitted Development legislation there is no requirement to consider noise from transport infrastructure type sources such as road traffic. Notwithstanding this, assessment of noise to the proposed change of use residential development in this report unavoidably includes noise from road traffic as being the principle and dominant source. This is provided as good practice, for completeness and as informative to the developer, rather than as being required by Permitted Development legislation.

Using results of the noise survey, the sound insulation performance for the whole building envelope including glazing (windows) is assessed, and a scheme of noise mitigation measures is established and included in the report verified by BS8233:2014 rigorous method building envelope sound insulation calculations.

A scheme of noise mitigation measures in the report provides specification details as appropriate for sound insulation upgrade treatment to the separating walls and separating floors.

The technical content of this assessment has been provided by a Tech member of the Institute of Acoustics.

The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration

2.0 NOISE CRITERIA

2.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in March 2012. The latest revision of the NPPF is dated December 2024.

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework where local Councils can produce their own local and neighbourhood plans which reflect the needs of their communities.

In conserving and enhancing the natural environment, the planning system should prevent both new and existing development from contributing to, or being put at, unacceptable risk from environmental factors including noise.

Planning policies and decisions should aim to avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development. Conditions may be used to mitigate and reduce noise to a minimum so that adverse impacts on health and quality of life are minimised. It must be recognised 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. Reference is made within NPPF to the Noise Policy Statement for England (NPSE) as published by DEFRA in March 2023.

2.2 NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

The long-term vision of the NPSE is stated within the documents scope, to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development'. The policy aims are stated to:

- 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.

The application of NPSE should mean that noise is properly taken into account at the appropriate time (for example in planning applications or appeals) where it must be considered alongside other relevant issues. The guiding principles of Government policy on sustainable development should be used to assist in the implementation of the NPSE.

The NPSE should apply to all types of noise apart from occupational noise in the workplace. The types of noises defined in the NPSE includes:

- Environmental noise from transportation sources;
- Neighbourhood noise which includes noise arising from within the community; industrial premises, trade and business premises, construction sites and noise in the street

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- **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.

• SOAEL – Significant Observed Adverse Effect Level
o This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

2.3 ProPG: PLANNING AND NOISE

As outlined above, the National Planning Policy Framework encourages improved standards of design, although it provides no specific noise levels which should be achieved on site for varying standards of acoustic acceptability, or a prescriptive method for the assessment of noise.
ProPG: Planning and Noise was published in May 2017 in order to encourage better acoustic design for new residential schemes in order to protect future residents from the harmful effects of noise. This guidance can be seen as the missing link between the current NPPF and its predecessor, PPG24 (Planning Policy Guidance 24: Planning and Noise), which provided a prescriptive method for assessing sites for residential development, but without the nuance of 'good acoustic design' as outlined in ProPG.
ProPG allows the assessor to take a holistic approach to consider the site's suitability, taking into consideration numerous design factors which previously may not have been considered alongside the noise level measured on site, for example the orientation of the building in relation to the main source of noise incident upon it.
It should be noted this document is not an official government code of practice, and neither replaces nor provides an authoritative interpretation of the law or government policy, and therefore should be seen as a good practice document only.

2.4 ACOUSTICS VENTILATION AND OVERHEATING

The AVO Guide includes:

* an explanation of ventilation requirements under the building regulations and as described in Approved Document F, along with typical ventilation strategies and associated noise considerations;
* an explanation of the overheating assessment methodology described in CIBSE TM59; potential acoustic criteria and guidance relating to different ventilation and overheating conditions, for both environmental noise ingress and building services noise;
* and a worked example of the application of the AVO Guide including indicative design solutions.

The AVO Guide is intended for the consideration of new residential development that will be exposed predominantly to airborne sound from transport sources, and to sound from mechanical services that are serving the dwellings in question. Although the policy coverage is limited to England, the approach may be applicable in other parts of the UK.

The AVO Guide is intended to contribute to the practice of good acoustic design, as emphasised in the Professional Practice Guidance on Planning and Noise (ProPG). In particular

2.5 BRITISH STANDARD BS 8233:2014

British Standard Code of Practice BS8233:2014 'Sound insulation and noise reduction for buildings' provides recommended guideline value for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation Guidelines for Community Noise 1999 (WHO).

Activity	Location	07:00 to23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq, 16hour}$	
Dining	Dining room/area	40 dB $L_{Aeq, 16hour}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

2.4.1 Indoor ambient noise levels for dwellings

The WHO guideline noise criteria set an internal sleep disturbance noise limit of 45dB LAmax,F which should not be exceeded on a regular basis.

2.6 BRISTISH STANDARD BS 4142:2014

British Standard 4142: 2014 'Methods for rating and assessing industrial and commercial sound' [BS 4142] is typically used when a new noise generating development is introduced close to noise sensitive receptors. Guidance is given for new noise sensitive developments close to existing noise generating activities is Section 8.5 of BS4142:2014 as follows: "Introduction of a new noise-sensitive receptor Measure the background sound at the intended location of any new noise-sensitive receptor(s) in the absence of any specific sound.

Where a new noise-sensitive receptor is introduced and there is existing industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation." Based on the above guidance and the nature of existing noise levels, we would recommend that an appropriate internal environment can be achieved through compliance with the Local Authority condition (with the noted legal exceptions), and the specifications given according to British Standard 8233:2014 in Section 2.5.

3.0 SITE SURVEYS

3.1 SITE DESCRIPTION

The application relates to a two-storey detached building occupying a prominent site just off the roundabout at the junction of High Street, North Street and Lyndhurst Road. The building currently comprises a mixed use with a retail unit at ground floor and offices on the first floor. The area is a mix of commercial and residential properties, typical of an urban cityscape environment. The dominant noise source is road noise from the surrounding roads (A259). (See Figure 3.1)

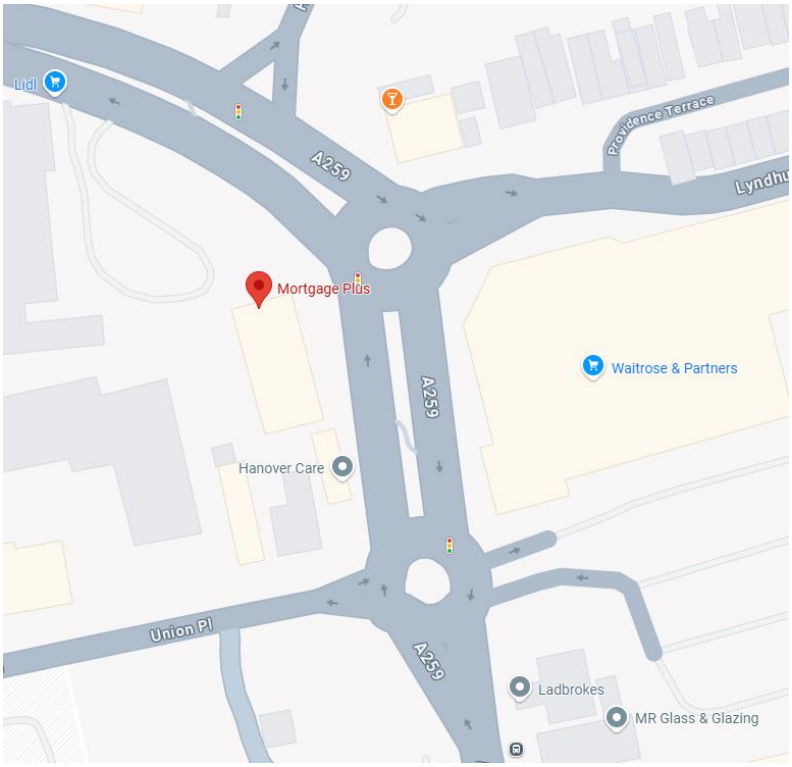


Figure 3.1 – Proposed Site

3.2 ENVIRONMENTAL SITE SURVEY PROCEDURE

In order to characterise the sound profile of the area an environmental sound survey has been carried out from 31/01/24 to 01/02/2025. The monitoring position was chosen in order to collect representative data for the potential noise break into the habitable rooms.
Noise Measurements were carried out free field. The external monitoring location is shown in Figure 3.2.

Figure 3.2 – Measurement Location

3.3 EQUIPMENT

Instrument manufacturer	**Cirrus Research Plc**
Model	**IEC 61672-3:2013**
Serial Number	**G302987**
Microphone Type	**MK:224**
Serial Number	**214457A**
Cirrus CK: 675 Outdoor Kit	
Type 1 Acoustic Calibrator	

The calibration of the sound level meters was verified in-situ before any measurements were taken, using the handheld calibrator and reference tone of 114dB at 1kHz. Validation checks at the end of the survey indicated that all instruments had operated within permitted tolerances for drift and measured level.

Copies of Calibration certificates are available upon request.

3.4 METEOROLOGICAL CONDITIONS

As the environmental noise survey was carried out over a long un-manned period no localized records of weather conditions were taken. However, during the set up and collection of the monitoring equipment, the weather conditions have been documented in the following table. All measurements have been compared with met office weather data of the area, specifically the closest weather station, the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions - Shoreham Airport Weather station				
Time Period	**Air Temp (◦C)**	**Rainfall mm/h**	**Prevailing Wind Direction**	**Wind Speed (m/s)**
31/01/2024 – 00:00 – 23:59	6-9	0.1	N	0-10
01/02/2025 – 00:00 – 23:59	4 - 6	0.0	SSE	0-9

Table 3.4 – Weather Summary

4.0 NOISE SURVEY

The following free-field sound levels have been derived for assessment of environmental noise break-in. It shall be noted that the data is 3dB below the information in Appendix A to equate from façade to free-field conditions.
A maximum value is provided for each night-time measurement period. Based on the World Health Organisation interpretation that for a noise to be regular it needs to occur several (i.e. more than two) times per hour; the LAmax(f) noise needs to be based upon an average of 10-15 events that are typical in nature. The aim of protecting against maximum noise levels is to ensure protection against typical intermittent noise levels rather than one-off events; whereby an arithmetic average of the 15 typical maximum events across each night period is used to determine values of dB LAmax(f) reported below. These have been summarised in table 4.1 below.

Measurement Data	Free Field Sound Pressure Level dB		
	MP 1		
Time	$L_{Aeq,15}$	$L_{AMAX,15}$	L90
07:00 – 23:00	60dB	73dB	57dB
23:00 – 07:00	55dB	68dB	51dB

Table 4.1 - Measurement Levels

Leq, ff noise levels are taken as the continuous equivalent free-field sound pressure level outside the room elements under consideration. These correspond to the highest reliable readings taken for day and night periods.

Location	T	Time	Free-Field Sound Pressure Level Leq, T dB re.20µPa						
			125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	A
MP1	16h	Day	65	59	58	56	51	43	60
	8h	Night	58	52	53	51	46	38	55
		Max	69	67	66	64	59	51	68

Table 4.2 Summary of Highest octave -band sound levels for break in assessment

5.0 PROPOSED RESIDENTIAL UNITS – LAYOUT DESIGN

Figure 5.0.1 – Proposed Ground Floor layout

Figure 5.0.2 – Proposed First Floor Layout

5.1 EXTERNAL SOUND LEVELS

It shall be read from Table 4.2 in Section 4.0 of this report, that the external sound levels taken by means of average equivalent or maximum sound levels exceed the World Health Organisation requirements for external noise as described by Community Noise Guidelines (1999) in Section 2.5 of this report.

5.1.1 Pro PG Acoustic Design Statement

The scope of ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources. New apartments, flats and houses are the most common type of new residential development, however the guidance can also be applied to other types of residential developments such as residential institutions, care homes etc. As such it is directly applicable to this development.

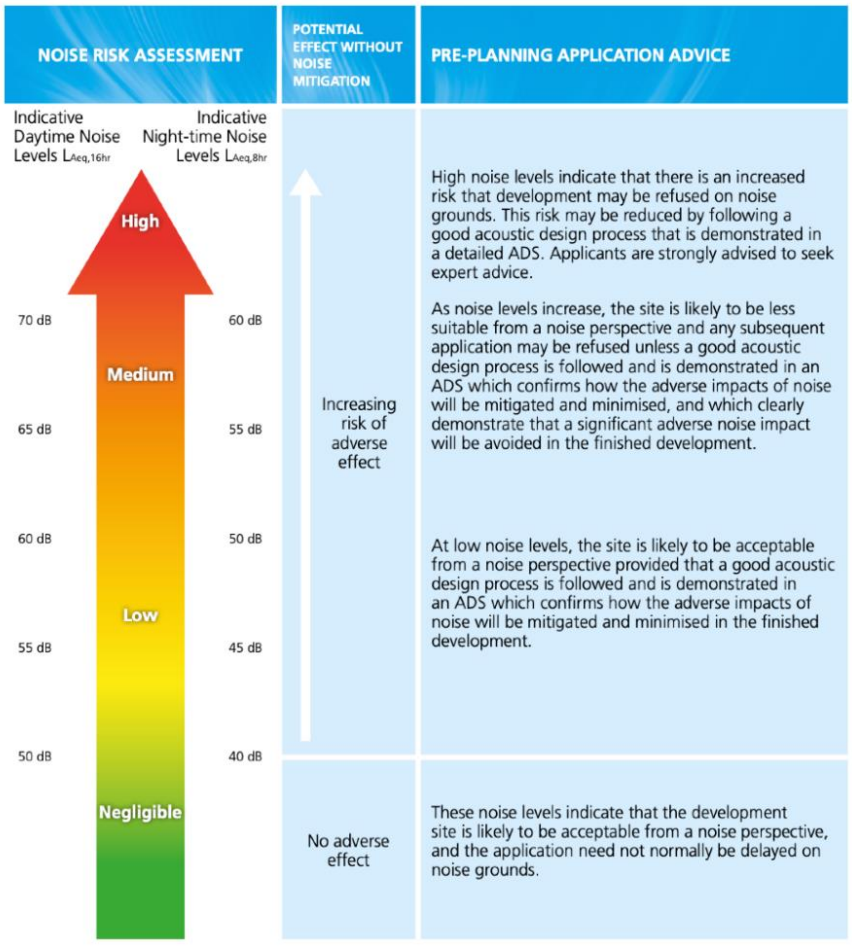


Figure 5.1 - ProPG Noise risk assessment guide

The following table assesses the ProPG noise risk for the measured data. The purpose of this is to

provide a view of the noise risk at the site.

MP1	Daytime $L_{Aeq, 16hr}$ 07:00 – 23:00	Night-time $L_{Aeq, 8hr}$ 23:00 – 07:00
Noise Level	60dB	55dB
ProPG Noise Risk	**HIGH**	**MEDIUM**

Table 5.1.1 : ProPG Stage 1 Assessment table

ProPG states that "Particular care should be taken to ensure that any noise events (as quantified by LAmax,F) have been properly identified and assessed".

5.1.2 ASSESSMENT OF COMMERCIAL SOURCES

Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to BS4142:2014 can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."
The observed commercial noise sources affecting the assessment areas are as follows:

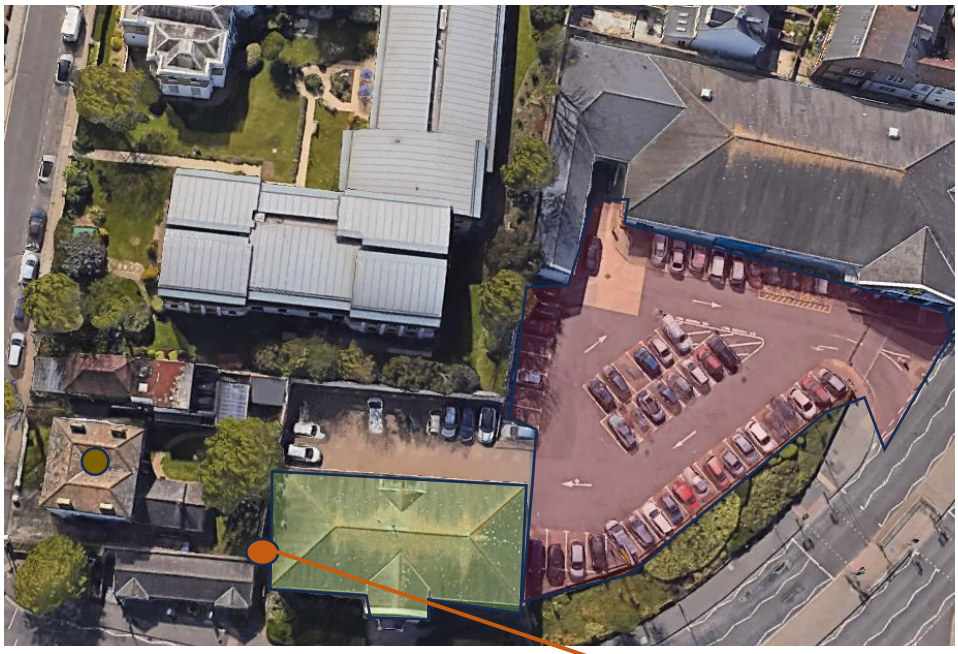


Figure 5.1.3- Existing Condenser Unit

Figure 5.1.2 – Commercial Noise Sources

	Lidl Car Park - 34 North Street
	Proposed Site – Pharos House – 67 High Street
	MacMillans Cocktail Bar & Grill - 3 Union Place
	Condenser Unit – 67 High Street – To be removed

Located approximately 12 meters away from the site is MacMillans Cocktail Bar & Grill situated on 3 Union Place.
The operating hours are:
Monday – Tuesday – Closed
Wednesday – 17:00 – 12:00am
Thursday – 17:00 – 01:30
Friday – Saturday – 17:00 – 02:30
Sunday – 14:00 – 21:00

It can be seen from google maps that there is a kitchen extraction system on the flat roof of the site. It was not possible to get near to the extraction system.

Located approximately 1 meter away from the site is the car Park that belongs to Lidl situated on 34 North Street.

On attendance to the site, the main noise is road noise. All commercial activity is recorded in the noise measurements. For a robust assessment, we will be mitigating the commercial noise by calculating the internal noise levels to be -10dB below the standard requirements.
The development will also have mechanical ventilation, this will negate the need to open windows for ventilation.

5.2 FAÇADE SOUND INSULATION

In accordance with the assessment guidance in Annex G of BS 8233:2014, the sound insulation performance of the building can be estimated by simple calculation from the free-field noise

CALCULATION		A	B	(A-B) +5
Location	Period	Free-Field Noise Levels LAeq,T dB	BS8233/WHO Internal Noise Guidance Criteria LAeq, T dB	Typical Insulation Specification dB Rw
1	**Day 07:00 – 23:00**	**60**	**35**	**30**
	Night 23:00 – 07:00	**55**	**30**	**30**
		68	**45**	**28**

Table 5.2 - Sound insulation estimate using the simple calculation method of BS8233

Following the rigorous calculation method of Annex G of BS 8233:2014, it can be shown that a suitable standard of residential amenity can be achieved with façade sound insulation with acoustic double glazing. $L_{AMAX,F}$ levels are not exceeded on a regular basis.

5.3 SPECIFICATION OF GLAZED UNITS

The minimum sound reduction index (SRI) value required for the glazed elements to be installed is shown in Table 5.2.

Required Glazing Performance							
Frequency, Hz/dB					Rw	Rw + C	Rw +Ctr
125	250	500	1K	2K	**40**	32	29
21	25	27	34	39			

Table 5.3 – Required Glazing Performance

The sound reduction performance stated above must be achieved by the gazing system as a whole in its installed condition. The specification therefore applies to both the glazing element and all seals on any openable part of the system. It should be confirmed with any supplier that the full glazing system supplied complies with the requirements stated in Table 6.3. Glazing data provided by Guardian Glass.

Please note that the above guidance only considers acoustic performance. Other disciplines, which consider thermal, safety, durability etc. should be consulted to ensure suitability.

For the daytime assessment for living areas, the desirable limit of BS8233:2014 suggests a guideline of 35 dB LAeq,16hr for resting conditions, and up to 40 dB is considered acceptable for necessary developments.
All results, with the proposed construction, would place the internal levels in kitchen/living areas as below 35 dB, therefore within the desirable category.
For the night-time assessment for bedrooms, BS8233:2014 suggests a desirable guideline of 30 dB LAeq, 8hr for sleeping conditions, with an acceptable limit of 35 dB LAeq, 8hr. Individual noise events (Measured with fast time-weighted Maximum) should not normally exceed 45 dB LAFmax (as in BS8233:1999).
The proposed construction would place the internal continuous levels in bedrooms as below 30 dB and the maximum noise events as typically below 45 dB LAFmax, therefore within the desirable category.

5.4 INTERNAL NOISE CRITERIA

Monitoring Period	Noise Criteria L_{AMAX}	No. times exceeded L_{AMAX}
07:00 – 23:00	55dB	2
23:00 – 07:00	45dB	1

Table 5.4 – Noise Criteria L_{AMAX}

Monitoring Period	Noise Criteria L_{Aeq}	Internal Noise Level
07:00 – 23:00	35dB	22dB
23:00 – 07:00	30dB	17dB

Table 5.4.1 - Noise Criteria L_{Aeq}

6.0 VENTILATION AND OVERHEATING

Guidance on ventilation and associated acoustic considerations is given in Acoustic Ventilation and Overheating – Residential Design Guide [AVO] issued jointly by the Association of Noise Consultants and the Institute of Acoustics. In this guide, the need for ventilation (as falls under the requirements of Approved Document F [ADF] are covered in three main requirements as follows:

- Whole Dwelling Ventilation - General ventilation – continuous ventilation of rooms or spaces at a relatively low rate

- Extract Ventilation - Removal of air from a space or spaces (typically stale air from bathrooms or kitchens) to outside

- Purge Ventilation - Manually controlled removal of air at a high rate to eliminate fumes and odours, e.g. during painting and decorating or from burnt food. May be provided by natural or mechanical means.

Four main template systems for providing each of the above ADF ventilation requirements are summarised in the AVO guide as shown in Table 6.0.

Ventilation System	Method Of Whole Dwelling Ventilation	Method of Extract Ventilation	Method of purge Ventilation
System 1 (Background Ventilators and intermittent extract Fans	Background ventilators (Trickle Vents)	Intermittent extract fans	Typically provided by opening windows
System 2 (Passive Stack)	Background ventilators (Trickle Vents) & Passive Stack	Continuous via passive stack	Typically provided by opening windows
System 3 (Contunuous Mechanical Extract (MEV)	Continuous mechanical extract (low rate), trickle vents provide fresh air	Continuous mechanical extract (high rate), trickle vents provide fresh air	Typically provided by opening windows
System 4 (Continuously mechanical supply and extract with heat recovery (MVHR)	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)	Typically provided by opening windows

Table 6.0 – Summary of ADF Ventilation Requirements

Where possible, natural forms of ventilation are typically preferred. However, in high noise areas, it may be necessary to recommend System 4, in order to minimise penetrations through the external building façade, which weaken the overall sound reduction performance.

Ventilation Strategy (according to ADF)	
System 1: Intermittent Extract Fans System 2: Passive Stack Ventilation	✗
System 3: Continuous Mechanical Extract (MEV)	✗
System 4: Continuous Mechanical Supply & Extract with Heat Recovery (MVHR)	✓

We therefore recommend provision of one of the following acoustic ventilation options:

• Acoustically screened wall mounted mechanical (i.e. powered) acoustic ventilators such as Titon 'Sonair F+'

• Mechanical Ventilation with Heat Recovery (MVHR) would be to provide each flat with whole house supply and extract ventilation. This comprises of mechanical unit/s that provide both supply and extract to each apartment individually; whereby inlet and outlet ducts would need to be run to the façade or in a riser to the roof. This type of system can also be incorporated with heat recovery built in if desired.

• Positive Input Ventilation (PIV) - Positive Input Ventilation (PIV) also sometimes known as positive pressure ventilation work as a whole house ventilation system and create fresh and healthy living environments by supplying fresh, filtered air into a property at a continuous rate throughout, such as the Envirovent Atmos System

Any ventilation system must be designed such that the noise generated by the system itself is controlled, such that when noise from the system is combined with noise from external sources, internal noise levels do not exceed the maximum noise levels suggested in BS 8233. To ensure that noise from services does not increase internal noise levels, the following guideline internal noise criteria should be utilised:

• Bedrooms NR20

• Living Rooms NR25

• Bathrooms/kitchens NR30-35

• Corridors NR30-35

It should be noted that windows to properties should not be sealed, as this can create an overly oppressive living environment.

Furthermore, it is recommended that windows are openable for times when additional purge ventilation is required, for example the purging of fumes from burnt food when cooking or removal of fumes when painting.

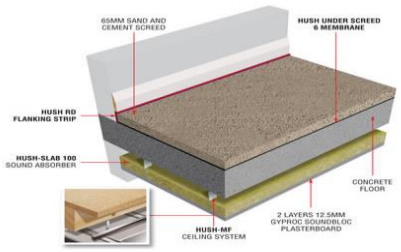
To stairwells, no specific acoustic measures would be necessary and standard trickle vents would be appropriate.

7.0 INTERNAL SOUND INSULATION ASSESSMENT

The floor and wall structure may be subject to pre-completion testing in accordance with requirements of The Building Regulations 2010 Approved Document E (2003 Edition & amendments). It should be expected that the proposed dwelling will exceed the minimum performance standards of the Regulations, as stipulated between dwellings in terms of dB DnT,w +Ctr.

7.1 PROPOSED FLOOR SYSTEM

A 150mm (125mm if only pendant lighting is required) suspended ceiling incorporating 100mm mineral wool with a density of 45kg/m3 rigid slab to be installed.



A separation gap with a minimum 3mm must be left between walls and floor and then filled with acoustic sealant to prevent flanking noise.

25mm Resilient bars to be installed and fitted with 2x layer of Soundbloc Plasterboard with staggered joins.

To mitigate impact noise a resilient layer no less than 8mm should be laid on the slab surface.

The acoustic modelling indicates that the expected performance of the proposed structure will be as follows:
Projected Airborne Sound Performance:
59 DnTw + Ctr dB.

Projected Impact Sound Performance:
54 L'nTw dB.

7.2 PROPOSED SEPARATING WALL CONSTRUCTION

It is understood that new build separating walls between flats is based on a twin timber stud construction and existing walls to be retained are formed from 100mm solid masonry. To meet the acoustic performance targets for separating walls the following wall specifications are provided:

Timber Stud Party Wall

- 1 x 12.5mm Gyproc Fire Line
- 1 x 15mm Gyproc Sound Bloc
- 2 x 75mm Studs
- Minimum 200mm Cavity between inner boards
- 100mm Mineral Wool Insulation, density ≥45Kg/m^3
- 1 x 15mm Sound Bloc
- 1 x 12.5mm Fire Line

Acoustic Rating - 57 dB Rw + Ctr

Masonry Party Wall

- 100mm Brick/Block
- 50mm Timber Stud – Not fixed to wall
- 25mm Mineral Wool Insulation, density ≥45Kg/m^3
- 1 x 12.5mm Fire Line

Acoustic Rating - 56 dB Rw + Ctr

Typical Party Wall Detail between Flats and Communal areas

It is understood that the proposed wall construction to be used between residences and communal areas (in area of column only) is as follows:

- 3mm plaster skim finish
- 2x12.5mm SoundBloc plasterboard
- Gypframe 'I' Stud (70 'I' 70) framework with 50mm Isover Steel
- Frame Infill Batts between studs
- 200mm RC concrete shear wall (fairfaced on staircase side) to SE design and spec
  The above construction is predicted to achieve a laboratory rated performance of 64dB Rw which approximates to an on-site performance of 52 dB Dn,Tw + Ctr,

7.3 DOOR REQUIREMENTS

Where a degree of sound insulation is deemed necessary, doors with rated acoustic performance would be required. Recommendations with regards to the necessary sound insulation performance of the door units to be installed are shown in Table 9.3.

Rw (dB)	Typical Door Construction
Entrance Doors	Solid Core timber door with drop seals and gaskets, or high quality acoustic perimeter and threshold seals
Internal Doors	Solid core timber door, no seals around the perimeter Solid core timber door, foam tape seals around the perimeter

.

Table 7.3 – Acoustic Specification of Door Systems

Some general points that should be followed regarding the acoustic performance of doors are as follows.

- Non-hardening caulk should be used to seal joints airtight
- If hollow metal frames are used, they should be fibre- or grout-filled
- Doors should be gasketed around the entire perimeter to be airtight when closed
- Seals should be adjustable to compensate for wear, thermal movement, settlement of building structure and other factors that cause misalignment of the doors
- Good quality hydraulic closers should be fitted on all doors likely to be subjected to heavy use

7.4 LIGHTWEIGHT WALL DETAILING

Socket backs in lightweight partitions should be boxed in using two layers of plasterboard of the same mass as the partition wall and should be staggered by at least 300mm. Party walls should 'break' any lightweight flanking constructions to ensure acoustic discontinuity between the leaves of the partition.

7.5 DOWNLIGHTERS

Downlighters should be installed in accordance with the manufacturer's guidelines at a density of no more than 1 light per 2m2 of ceiling and at centres not less than 0.75m. Openings should be no larger than 100mm diameter, or 10mm x 100mm.

7.6 WALL JUNCTIONS

Where party walls meet other constructions, the party wall construction must 'break' the flanking construction, such as the plasterboard lining of external walls. Blockwork for internal leaves of external and flanking walls should have a minimum density of 1850kg/m3 . With these proposed works implemented the flanking construction is expected to achieve the uprated performance

requirements. Cavity stops should be used at all junctions between walls and floors in the external cavity

7.7 HYDRAULIC SYSTEMS

Hydraulic systems shall be designed and installed to minimise audibility of water/waste noise within the residential areas of the apartments. The following controls shall be adopted to minimise noise emissions from hydraulic systems.

- Avoid hard grouting and chasing of water pipes in walls, particularly where walls are common with noise sensitive areas
- In noise sensitive areas, support pipes with clamps having a soft neoprene sleeve
- Route all rainwater down pipes outside the building or, alternatively, via service cupboards or risers boxed-in by means of 2x12.5mm layers of FireLine. Avoid bends and T-junctions in ceiling spaces above noise sensitive areas
- Do not support pipework from lightweight constructions

Where it is unavoidable that hydraulic systems pass through residential spaces, they must be concealed. As a minimum, bulkheads shall consist of minimum two layers of 12.5mm plasterboard with staggered and sealed joints. When concealing waste systems, the bulkhead shall also be lined internally with 50 mm mineral fibre insulation (30 – 40 kg/m3) Where pipework passes through floors, penetrations shall ensure effective acoustic sealing around the pipes. This would be achieved by initially providing all pipework with a resilient sleeve detail. Large floor openings can be in-filled using a proprietary cementitious firestopping compound to the depth of the slab, whilst smaller openings can be loosely packed with mineral fibre insulation and closed-off with plasterboard pattresses above and below the slab. If using fire-stopping compound, it must be ensured that pipework holes in the formwork are cut oversize to prevent contact with the pipes. Any gaps remaining around pipework penetrations must be sealed with a continuous bead of non-hardening mastic.

7.8 AIR VELOCITIES WITHIN DUCTWORK

Where passing through, or above habitable spaces, air velocities within ducts should be controlled to the values shown in Table 8.9, in parallel to the installation of a suitably selected silencer schedule, or via the installation of lagging as outlined in Section 8.10.

NR Criterion	NR35	NR30
Main Branch	5m/s	4m/s
Grille	2.5m/s	2m/s
Diffuser	2m/s	1.5m/s
Return air stub duct in ceiling	3m/s	2m/s

Table 7.8 Maximum airflow velocities

7.9 ACOUSTIC LAGGING OF DUCTWORK

Where lagging may be required to achieve a degree of attenuation, we would recommend the following:

Normal duty lagging

- Rockwool RockLap H&V
- Armaflex from Armacell

Heavy duty lagging

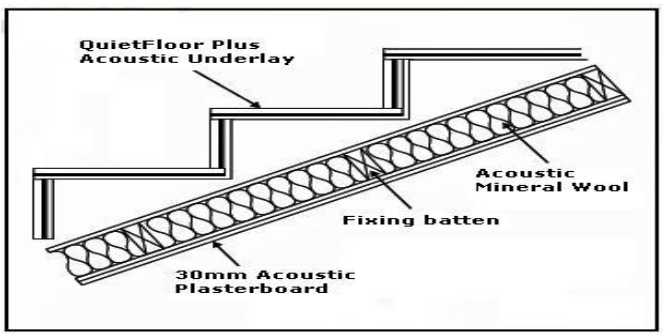
- Techwrap 2, or Techtube from Rockwool
- SuperLag Type FL from CMS-Danskin (this can also be used as a lagging for the casing of the FCU)
- MuftiLag from H&H

7.10 PARTY WALL DETAIL BETWEEN FLATS AND STAIRWELLS

It is understood that the proposed wall construction to be used between residences and communal areas (in area of column only) is as follows:

- 3mm plaster skim finish
- 2x12.5mm SoundBloc plasterboard
- Gypframe 'I' Stud (70 'I' 70) framework with 50mm Isover Steel
- Frame Infill Batts between studs
- 200mm RC concrete shear wall (fairfaced on staircase side) to SE design and spec
  The above construction is predicted to achieve a laboratory rated performance of 64dB Rw which approximates to an on-site performance of 52 dB Dn,Tw + Ctr, based on the following

The stair treads will have Acoustilay 8 or equivalent glued to each individual tread to prevent impact noise.



7.11 REVERBERATION CONTROL IN COMMON SPACES

Approved Document E of the Building Regulations provides two methods for providing reverberation control in common spaces. Method A states that for entrance halls, corridors, and hallways, an area equal to or greater than the floor area should be covered with a Class C absorber or better.

Method B provides a methodology for calculating the required percentage area of absorption in a space based on the proposed finishes. As carpet is proposed as the walking surface in the entrance halls, corridors, and hallways, Method A would result in excess reverberation treatment being installed. Therefore, calculations have been undertaken as per Method B, with the resultant percentage areas of absorption being shown in Table 9.3

Product	Absorber Class	Ceiling Coverage %
Gyptone Line 6 or Similar	D	100% of corridors ceiling
Gyptone Quattro 41 or Similar	C	50% of the entrance hall ceiling
Gyptone Quattro 42 or Similar	D	80% of the Stairwells

Table 7.11 – Gypsum Reverberation treatment Options

8.0 SUMMARY AND CONCLUSIONS

A baseline noise survey has been undertaken by DAA Group to establish the prevailing noise climate in the locality of Pharos House, 67 High Street, Worthing BN11 1DN in support of a Prior Approval Application for a proposed change of use to residential units in accordance with the Permitted Development legislation requirement allowing Local Planning Authorities to consider potential impacts of noise specifically from commercial premises on intended occupiers of residential developments.

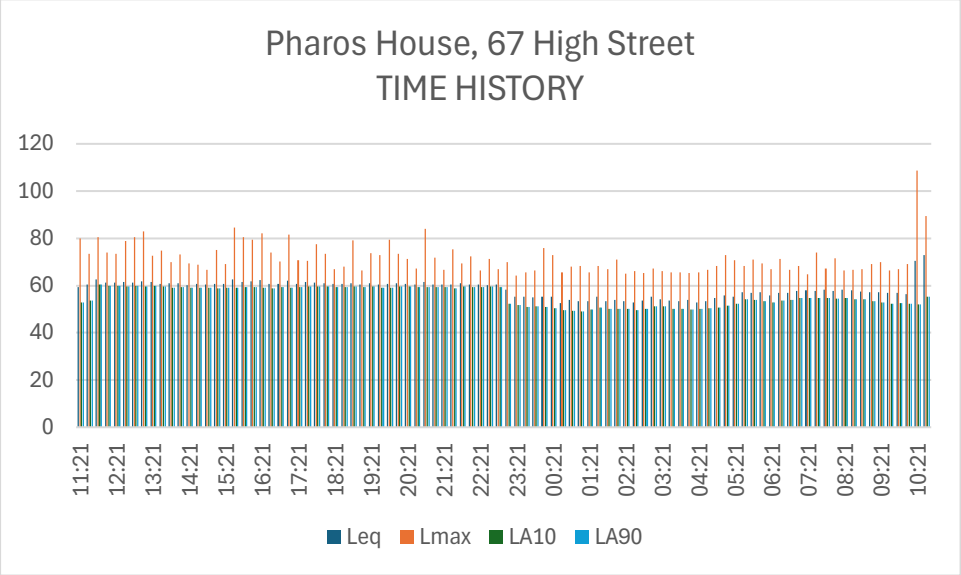
Under Permitted Development legislation there is no requirement to consider noise from transport infrastructure type sources such as road traffic. Notwithstanding this, assessment of noise to the proposed change of use residential development in this report unavoidably includes noise from road traffic as being the principle and dominant source. This is provided as good practice, for completeness and as informative to the developer, rather than as being required by Permitted Development legislation.

Using results of the noise survey, the sound insulation performance for the whole building envelope including glazing (windows) is assessed, and a scheme of noise mitigation measures is established and included in the report verified by BS8233:2014 rigorous method building envelope sound insulation calculations to -10dB below the standard criteria and mechanical ventilation has been specified to mitigate any effects of commercial noise.

A scheme of noise mitigation measures in the report provides specification details as appropriate for sound insulation upgrade treatment to the separating walls and separating floors.

It is concluded that, the impact of noise from commercial premises will not prejudice the amenities of any future occupants provided the above points are taken into consideration.

APPENDIX A – MEASUREMENTS



APPENDIX B - ACOUSTIC TERMINOLOGY

B.1 WEIGHTED DECIBEL, dB(A)

The unit generally used for measuring environmental, traffic or industrial noise is the A-weighted sound pressure level in decibels, denoted dB(A). The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective reactions to various sounds. An increase or decrease of approximately 10 dB corresponds to a subjective doubling or halving of the loudness of a noise, and a change of 2 to 3 dB is subjectively barely perceptible.

B.2 EQUIVALENT CONTINUOUS SOUND LEVEL, LAeq

Another index for assessment for overall noise exposure is the equivalent continuous sound level, L_{Aeq}. This is a notional steady level which would, over a given period, deliver the same sound energy as the actual time-varying sound over the same period.

B.3 MAXIMUM NOISE LEVEL, LAmax

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125 ms in duration.

B.4 NOISE RATING, NR

Noise ratings are used as a single figure criterion for specifying services noise in buildings. Each noise rating value has an associated spectrum of defined values in each third or octave frequency band. To determine the noise rating of a room the measured spectrum is compared to a set of noise rating curves. The highest NR curve that crosses any single frequency band of the measurement determines the noise rating for the room. The single figure noise rating is read at the 1 kHz band.

B.5 SOUND LEVEL DIFFERENCE (D)

The sound insulation required between two spaces may be determined by the sound level difference needed between them. A single figure descriptor which characterises a range of frequencies, the weighted sound level difference, D, is sometimes used (BS EN ISO 717-1). This parameter is not adjusted to reference conditions.

The standardized level difference, Dn, T is a measure of the difference in sound level between two rooms, in each frequency band, where the reverberation time in the receiving room has been normalised to 0.5 s. This parameter measures all transmission paths, including flanking paths.

The weighted standardized level difference, DnTw, is a measure of the difference in sound level between two rooms, which characterises a range of frequencies and is normalised to a reference reverberation time

B.6 SOUND REDUCTION INDEX (R)

The sound reduction index (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. The weighted sound reduction index, Rw, is a single figure description of sound reduction index characterising a range of frequencies, which is defined in BS EN ISO 717-1: 1997. The Rw is calculated from measurements in an acoustic laboratory

B.7 STATISTICAL NOISE LEVELS (L_{A90}, (T) L_{A1}, (T) L_{A10}, (T) etc.)

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{A10} is the level exceeded for ten per cent of the time under consideration, has historically been
adopted in the UK for the assessment of road traffic noise. The LA90 is the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level. The L_{A1} the level exceeded for one per cent of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted LA10, dB LA90, dB. etc. The reference time (T) is normally included, e.g. LA10, (5min), & LA90, (8hr).

B.8 TYPICAL NOISE LEVELS

Typical noise levels are given in the following table.

Noise Level dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-offs at 100 m
110	Chain saw at 1 m
100	Inside disco
90	Heavy lorries at 5 m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heaters at 1m
40	Living room
30	Ventilation Noise in Theatre
20	Remote countryside on still night
10	Sound insulated test chamber
0	Threshold of hearing.

APPENDIX C – GLAZING SPECIFICATION

GUARDIAN GLASS

Acoustic Performance

Glazing Configuration

8.38mm (44.1) LamiGlass (PVB)

14mm Cavity

10.38mm (46.1) LamiGlass (PVB)

Sound Reduction Indices

Frequency, Hz / dB*						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	40	0	-4	35	41
29	33	38	41	47	63					

*The values expressed in the frequency table correspond to the central values of the 1/3 octave band

Disclaimer: The acoustic performance data provided in the reports is based on a test protocol or an estimation and may be used if user actual glazing is identical to input data described herein. Acoustic performance data herein is only applicable for glazing dimensions 1,23 m x 1,48 m (as per testing standard). Estimation of acoustic performance is based on component-similarity assumptions which are derived from measured data and interpolation to expand the database of values from test protocols. Due to inherent variations in acoustic performance when testing in accordance with EN ISO 10140-3/EN ISO 10140-2, some variation in the calculated performance can also be expected. As such, the weighted performance, Rw, and adaptation terms, C and Ctr, should typically be considered to be accurate within ±2 dB. However, wider deviations can occur. Actual performance may vary according to the glazing dimensions, frame system, noise sources and many other parameters. The acoustic performance data herein should not be used as a substitute for tests of actual glazing. For more information, please consult Assumptions and Terminology section in Guardian Acoustic Assistant. By accessing this calculator, you agree not to alter or modify the generated report data and information, by any means. Any manual alteration will be your own responsibility and will annul all the content of the report.

Friday, February 14, 2025 | Acoustic database 20221229 | ASSUMPTION

APPENDIX D – CALCULATIONS

Calculation Sheet

MP1 23:00 - 07:00 to BR

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 23:00 - 07:00										
Noise Levels		**58.0**	**58.0**	**52.0**	**53.0**	**51.0**	**46.0**	**38.0**	**38.0**	**55.1 dBA**
Composite SRI										
Facade Width (m)	3.0									
Facade Height (m)	3.0									
Main Element - External Wall										
SRI		-	41.0	43.0	48.0	50.0	55.0	55.0	-	Rw 51
Window Width (m)	2.1									
Window Height (m)	1.0									
No. of Windows (no)	2.0									
Glazed Element - 40Rw										
SRI		-	29.0	33.0	38.0	41.0	47.0	63.0	-	Rw 42
		-	*-32.10*	*-35.92*	*-40.92*	*-43.81*	*-49.66*	*-57.10*	-	
10 log (S/A)										
Internal Receiver - BR										
		-	*-1.1*	*-1.1*	*-1.1*	*-1.1*	*-1.1*	*-1.1*	-	
+3										
		-	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	-	
Internal Receiver Noise										
Internal Receiver Noise - BR										
Reverberant Field, LPrev		-	**27.8**	**18.0**	**14.0**	**9.1**	**-1.8**	**-17.2**	-	**16.5 dBA**

Calculation Sheet

MP1 - 07:00 - 23:00 to LR

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - MP1 - 07:00 - 23:00										
Noise Levels		**65.0**	**65.0**	**59.0**	**58.0**	**56.0**	**51.0**	**43.0**	**43.0**	**60.4 dBA**
Composite SRI										
Facade Width (m)	4.0									
Facade Height (m)	3.0									
Main Element - External Wall										
SRI		-	41.0	43.0	48.0	50.0	55.0	55.0	-	Rw 51
Window Width (m)	2.1									
Window Height (m)	1.0									
No. of Windows (no)	2.0									
Glazed Element - 40Rw										
SRI		-	29.0	33.0	38.0	41.0	47.0	63.0	-	Rw 42
		-	*-33.08*	*-36.82*	*-41.82*	*-44.65*	*-50.44*	*-56.52*	-	
10 log (S/A)										
Internal Receiver - LR										
		-	*-1.1*	*-1.1*	*-1.1*	*-1.1*	*-1.1*	*-1.1*	-	
+3										
		-	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	-	
Internal Receiver Noise										
Internal Receiver Noise - LR										
Reverberant Field, LPrev		**-**	**33.8**	**24.1**	**18.1**	**13.3**	**2.5**	**-11.6**	**-**	**21.7 dBA**