

NOISE ASSESSMENT

on behalf of

REDBANK MANCHESTER LTD

for the site at

**JEFFERSON PLACE, MANCHESTER, M4
4AZ**

REPORT DATE: 20 SEPTEMBER 2021

REPORT NUMBER: 102624

Miller Goodall Ltd
Ground Floor
Ashworth House
Deakins Business Park
Blackburn Road
Egerton
Bolton
Lancashire
BL7 9RP

Tel: 01204 596166

www.millergoodall.co.uk

Company registration number 5201673



Summary

Miller Goodall Ltd has on behalf of Redbank Manchester Ltd, undertaken a noise assessment in connection with a planning appeal concerning the refused change of use from storeroom to one bedroom apartment (Use Class C3) at Jefferson Place, Manchester, M4 4AZ.

Measurements undertaken on site found that noise from vehicles arriving/departing the car park, the roller shutter door, and communal bins slamming shut were significant. Assessment of the measured noise levels has found that MCC's internal noise design criteria can only be met with windows closed. It was also found that the sound insulation of the existing separating wall between the proposed apartment and car park would need to be improved and ensure that the airborne sound insulation requirements of E1 of ADE can be met.

Based on the measured noise levels, assumptions, recommendations and calculations, it is concluded that MCC's internal noise design criteria can be achieved in the proposed apartment.

Therefore, whilst noise is a material consideration in the planning decision process, it should not be considered a valid reason for refusal of the proposed development that is the subject of the appeal, provided suitable noise mitigation and sound insulation measures are incorporated into the design of the site, which can be secured by a suitably worded planning condition.

Record of changes

Prepared By: David Sproston MIOA MCIEH **Reviewed By:** Michael Rickard MIOA

Signed:



Signed:



Date:

20 September 2021

Date:

20 September 2021

Version	Date	Change	Initials
1	20 September 2021	First issue	DS

This page is left blank intentionally

Contents

Summary	1
Contents	3
1 Introduction.....	4
2 Site Description	4
3 Proposed Development	5
4 Policy Context.....	5
4.1 Noise Policy Statement for England	5
4.2 National Planning Policy Framework.....	6
4.3 Planning Practice Guidance – Noise	7
4.4 Local Planning Policy	8
5 Acoustic Standards, Guidance and Regulations	9
5.1 Building Regulations: Approved Document E (ADE)	9
5.7 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings	10
5.8 World Health Organisation (WHO) Guidelines for Community Noise 1999	11
5.9 Manchester City Council, Planning & Noise, Technical Guidance (Dec 2015)	12
6 Noise Survey.....	12
6.1 Survey Details	12
6.2 Local Conditions.....	13
6.3 Monitoring Results.....	14
7 Assessment and Recommendation.....	15
7.1 Existing Sound Insulation Performance of Separating Wall and Floor	15
7.2 Noise Ingress	16
8 Conclusions	18
APPENDICES	19
Appendix 1: Site Location, Proposed Layout and Noise Measurement Locations	21
Appendix 2: Measurement Data	23
Appendix 3: Sample Noise Ingress Calculations	24
Glossary of Terms	28

1 Introduction

1.1 Miller Goodall Ltd has on behalf of Redbank Manchester Ltd, undertaken a noise assessment in connection with a planning appeal concerning the refused change of use from storeroom to one bedroom apartment (Use Class C3) at Jefferson Place, Manchester, M4 4AZ.

1.2 The site falls within the administrative boundary of Manchester City Council. The application (planning reference: 129542/FO/2021) was refused on 6 April 2021. The reason given for refusal was;

“1) The creation of a one-bedroom apartment would result in an unacceptable standard of living accommodation for the proposed occupants and would not have a positive impact on the supply of high quality homes in this part of the city centre. Small windows would provide the only source of light and ventilation to the apartment, and the door and a window which is also located adjacent to the car park entrance would be particularly effected by noise, disturbance and fumes which would also contribute to the poor standard of accommodation. The proposal would therefore have an unduly harmful impact on residential amenity by not meeting the required standard of accommodation. The proposal therefore conflicts with policies SP1, CC3, H3 and DM1 of the Manchester Core Strategy (2012), saved policy DC5 and DC26 of the Unitary Development Plan for the City of Manchester (1995), the Residential Quality Guide (2019) and the National Planning Policy Framework.”

1.3 This assessment has been prepared in support of the proposals and considers potential noise impact from the car park entrance. Furthermore, noise from the use of communal bins located to the rear of the storeroom in the car park has the potential to be a significant source of noise affecting the amenity of the future incoming residents, and has also been included in the assessment, although this aspect of noise was not specifically a reason for planning refusal.

2 Site Description

2.1 The site location is shown in Appendix 1, and is currently an unused storeroom located at Jefferson Place, Manchester, M4 4AZ, formerly referred to as ‘Block 4’ of the larger Green Quarter development towards the centre of Manchester.

2.2 Adjacent to the site is a perforated steel roller shutter door used to access the off-street car park associated with Jefferson Place. Existing apartments are located on upper floors of the building, including the floor above the site, some of which overlook the car park entrance and therefore the principal of residential development in close proximity to the car park entrance has already been established.

2.3 We understand that all existing apartments within Jefferson Place are provided with;

- continuous mechanical ventilation in the form of Nuaire's MEV-S units; and,
- standard thermal double glazing.

2.4 Jefferson place is surrounded, primarily by residential development within the wider Green Quarter development. A Texaco PFS and Cheetham Hill Road (A665) located to the west at an elevated level (compared to that of the site). The main sources of noise affecting the site are;

- road traffic from surrounding roads,

- irregular noise from vehicles arriving/departing Jefferson Place.
- irregular noise from the use of large communal bins within the car park at to the rear of the existing storeroom.

3 Proposed Development

- 3.1 The proposal is for a change of use from a storeroom to a 1-bedroom apartment. Floor plans of the proposed development (Appendix 1) show that;
- the apartment will be provided with windows on the north facing elevation, well away from the car park entrance.
 - access to the apartment will be via a lobbied entrance.
- 3.2 Appropriate continuous mechanical ventilation will also be incorporated into the site, such as that already provided for existing apartments with windows that overlook the car park entrance.
- 3.3 For the purposes of this assessment the following have been assumed;
- Glazing will be thermal double glazing, 6mm glass – 12mm cavity – 6mm glass.
 - The front door will be a 40mm thick (min) solid core door with good perimeter seals.
 - The lounge/diner will have 2no. standard in-frame passive trickle vents.
 - The bedroom will have 1no. standard in-frame passive trickle vents.
- 3.4 No new external amenity spaces are proposed, and therefore, the scope of the assessment is limited to the consideration of internal amenity in respect to noise, for the future incoming resident(s) of the proposed apartment.

4 Policy Context

4.1 Noise Policy Statement for England

- 4.1.1 The Noise Policy Statement for England (NPSE¹), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

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

- *avoid significant adverse effects on health and quality of life;*
- *mitigate and minimise adverse effects on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

- 4.1.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL

¹ Noise Policy Statement for England, Defra, March 2010

(Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

- 4.1.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

“...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”.

- 4.1.4 Importantly, the NPSE goes on to state:

“This does not mean that such adverse effects cannot occur”.

- 4.1.5 The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor, and the time in question. NPSE advises that:

“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”

- 4.1.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also considering the specific circumstances of a proposed development.

4.2 National Planning Policy Framework

- 4.2.1 The National Planning Policy Framework (NPPF²) initially published in March 2012, was updated in July 2021. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise”³.

- 4.2.2 The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

- 4.2.3 At par. 174 we are advised that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, June 2019

³ Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”

4.2.4 Par. 185 goes on to state:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

4.3 Planning Practice Guidance – Noise

4.3.1 As of March 2014, a Planning Practice Guidance⁴ for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- 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.

4.3.2 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

“...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”.

4.3.3 Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2> 22nd July 2019.

- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

4.3.4 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

"Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed".

4.3.5 The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

4.4 Local Planning Policy

4.4.1 Manchester Core Strategy: Policy DM1, states that;

All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:-

- *..... Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*

4.4.2 Unitary Development Plan Policy DC26 (Development and Noise) States:

"DC26.1 The Council intends to use the development control process to reduce the impact of noise on people living and working in, or visiting, the City. In giving effect to this intention, the Council will consider both:

- a. the effect of new development proposals which are likely to be generators of noise; and*
- b. the implications of new development being exposed to existing noise sources which are effectively outside planning control.*

DC26.2 New noise-sensitive developments (including large-scale changes of use of existing Landor buildings), such as housing, schools, hospitals or similar activities, will be permitted subject to their not being in locations which would expose them to high noise levels from existing uses or operations, unless the effects of the noise can realistically be reduced. In giving effect to this policy, the Council will take account both of noise exposure at the time of receiving a planning application and of any increase that may reasonably be expected in the foreseeable future.

DC26.3 Developments likely to result in unacceptably high levels of noises will not be permitted:

- a. in residential areas;*
- b. near schools, hospitals, nursing homes and similar institutions;*

c. near open land used frequently for recreational purposes.

DC26.4 Where the Council believes that an existing noise source might result in an adverse impact upon a proposed new development, or where a new proposal might generate potentially unacceptable levels of noise, it will in either case require the applicant to provide an assessment of the likely impact and of the measures he proposes to deal satisfactorily with it. Such measures might include the following:

a. engineering solutions, including reduction of noise at source, improving sound insulation of sensitive buildings or screening by purpose-built barriers;

b. layout solutions, including consideration of the distance between the source of the noise and the buildings or land affected by it; and screening by natural barriers or other buildings or non-critical rooms within a building; and

c. administrative steps, including limiting the operating times of the noise source, restricting activities allowed on the site or specifying an acceptable noise limit. Any or all of these factors will be considered appropriate for inclusion in conditions on any planning permission.

DC26.5 The Council will control noise levels by requiring, where necessary, high levels of noise insulation in new development as well as noise barriers where this is appropriate.

DC26.6 Exceptions to the general policy will be considered on their merits. The Council accept, as an example, that the occasional use of outdoor facilities such as sports stadia for concerts can be acceptable in certain circumstances. Any such proposal will be considered in the light of consultation with local residents and others, and the practicability of appropriate conditions on any approval."

4.4.3 Residential Quality Guide (2019), Section 4, (Ensure Visual and Acoustic Privacy) states;

"Homes are places of retreat. Residents should be able to 'shut out' the external world and enjoy sleep without suffering from either external noise generated by traffic or the public realm; or from neighbouring homes, common spaces or other functions in the building."

5 Acoustic Standards, Guidance and Regulations

5.1 Building Regulations: Approved Document E (ADE)

5.2 The proposed apartment is considered as being '*formed by material change of use*' in the context of ADE and will therefore be required to satisfy requirements E1 to E2 of ADE of the Building Regulations (BR). Requirement E2 concerns the sound insulation of internal walls of the apartments and is not needed to be considered in the noise assessment.

5.2.1 Requirement E1

5.3 In order to satisfy Requirement E1, ADE provides the minimum sound insulation performance criteria for separating walls/floors which must be met. Separating walls and floors are defined as those which separate a dwelling from other dwellings and/or from other parts of the same or adjoining building(s), including corridors.

5.4 The minimum airborne sound insulation and impact sound transmission performance criteria for party walls and floors that separate dwellings are reproduced in Table 1. Note that;

- the airborne sound insulation criteria are a minimum that must be achieved,
- the impact sound transmission criteria are a maximum that should not be exceeded.

Table 1: Building Regulations, Approved Document E, Sound Insulation Performance Criteria

	Sound Insulation Requirement	
	$D_{nT,w} + C_{tr}$ (dB)	$L'_{nT,w}$ (dB)
Dwelling-houses and flats formed by material change of use		
Walls	≥ 43	-
Floors and stairs	≥ 43	≤ 64

5.5 The performance standards set out in Table 1 are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. For walls and floors that provide a separating function between an apartment and other non-residential parts of the same building, ADE states that;

“A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space.

Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level.”

5.6 The minimum sound insulation performance requirements of ADE may, therefore, need to be significantly improved upon so as to reduce internal noise transmission from the car park to the proposed apartment to an acceptable level.

5.7 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

5.7.1 This standard carries the full weight of an adopted British Standard, provides guideline acoustic design criteria for new dwellings, and is supported by guidance contained within WHO GCN. The guideline noise design criteria of BS 8233 apply to external noise “without a specific character” (previously and sometimes termed or referred to as “anonymous noise”) such as that associated with road and rail traffic.

Internal Amenity

5.7.2 The Standard states that for external noise without a specific character, such as rail traffic, it is desirable that the internal ambient noise level does not exceed the guideline values shown in Table 2.

Table 2: BS 8233: 2014 guideline indoor ambient noise level limits for new dwellings

Location	Activity	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Living Rooms	Resting	35 dB $L_{Aeq,16hr}$	-
Bedrooms	Sleeping (daytime resting)	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

5.7.3 Note 7 to Table 4 of BS 8233 states:

“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 internal conditions still achieved.”

5.7.4 Guidance on reasonable acoustic design criteria for individual noise events are also provided, and the Standard advises that:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL^5 or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

5.7.5 For Internal spaces, the Standard states that;

“..to avoid sleep disturbance, sound pressure levels at the outside facades of living spaces should not exceed 45 dB L_{Aeq} (taken as a façade level, and equating to a free-field external level of 42 dB L_{Aeq}) and 60 dB L_{AFmax} so that people may sleep with bedroom windows open.”

5.8 World Health Organisation (WHO) Guidelines for Community Noise 1999

5.8.1 WHO document ‘Guidelines for Community Noise’ (1999)(WHO GCN) provides guidance to environmental health authorities and practitioners tasked with protecting people from the harmful effects of noise. WHO defines ‘health’ as;

“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” and clearly state that “the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being...”

⁵ Sound exposure level or L_{AE}

5.8.2 GCN states that a noise measure based only on the L_{Aeq} noise level alone is not enough to characterize most noise environments and that *'It is equally important to measure the maximum values of noise fluctuations, preferably combined with a measure of the number of noise events.'*

5.8.3 GCN provides guideline for internal noise exposure levels aimed at protecting people from the harmful effects of noise, such as that associated with road and rail traffic. For proposed new residential developments, the effects of noise are typically sleep disturbance, annoyance, and speech interference. The guideline values take into consideration the identified health effects and are set, based on the lowest levels of noise that affect health, and states that for internal spaces;

"For bedrooms, the critical effect is sleep disturbance....

For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night....

For a good night's sleep, the equivalent sound level should not exceed 30 dB(A) for continuous background noise, and individual noise events exceeding 45 dB(A) should be avoided...

To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB $L_{Aeq,T}$."

5.9 Manchester City Council, Planning & Noise, Technical Guidance (Dec 2015)

5.9.1 Section 3.6.1.1 provides absolute internal noise level design limits for new residential development, based on the guidance contained with BS 8233 and WHO GCN, and are;

- Bedrooms (night-time – 23:00 – 07:00) 30 dB L_{Aeq}
- Individual noise events should not normally exceed 45 dB L_{AFmax} by more than 15 times
- Living Rooms (daytime – 07:00 – 23:00) 35 dB L_{Aeq}

6 Noise Survey

6.1 Survey Details

6.1.1 Attended noise measurements were undertaken in the daytime on Monday 2nd August 2021 to establish noise levels associated with the use of the car park, and communal bins located within the car park.

6.1.2 The noise monitoring was undertaken using 'Type 1' instrumentation calibrated to nationally traceable standards within two years of the survey, and in general accordance with BS 7445-1: 2003⁶. Details of the instrumentation used in the survey are detailed in Table 3. Prior to and following the noise measurements acoustic field-calibration of the sound level meter, microphone and pre-amp used was performed using an acoustic calibrator that itself had been calibrated within the preceding 12 months. No significant drift (i.e., >0.1dB) in the field-calibrated noise level was observed. Calibration certificates can be provided on request. The measurement

⁶ BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

microphones were fitted with a suitable windshield for the duration of the noise monitoring, with the microphones orientated vertically. All measurements were undertaken 1.4m above local ground.

- 6.1.3 Details of the sample measurement locations, their purpose, and the noise sources at each location are summarised in Table 4.

6.2 Local Conditions

- 6.2.1 There were no abnormal/atypical local traffic restrictions (e.g., roadworks or temporary speed limits) in place during the surveys on any nearby roads. The prevailing traffic conditions during the survey were therefore judged to be acceptable for the purpose of the survey and subsequent assessment.
- 6.2.2 Weather conditions were observed at the start and on completion of the survey and were dry, mild, and calm.
- 6.2.3 The prevailing traffic and weather conditions during the survey were therefore judged to be acceptable for the purpose of the survey and subsequent assessment.

Table 3: Noise survey equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 Calibrator ⁷	CAL 200	Larson Davies	14154	07/09/2020	04796/1
Class 1 ^{8,9} Integrating Real Time 1/3 Octave Sound Analyser	XL2-TA	NTi Audio	A2A-15860-E0	01/03/2021	05145/1
Microphone	MC230A		A16445	01/03/2021	N/A*

*No reference number available, but the certificate is available upon request.

⁷ IEC 60942 (2003) Electroacoustics – Sound calibrators

⁸ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

⁹ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

Table 4: Description and purpose of noise measurement locations, and noise sources

Measurement Location	Location Description	Measurement Condition(s)	Purpose	Main Noise Source(s)
NML1	Adjacent to stairs	Free-field conditions	To establish noise levels representative of the south facing glazed façade areas.	Distant road traffic. Infrequent vehicles arriving/departing the car park, and roller shutter door
NML2	Adjacent to door of existing storeroom	Façade conditions	To establish noise levels representative of the development façade closest to the car park entrance.	Sample measurements of roller shutter door
NML3	Within the storeroom	Internal reverberant sound levels	To establish existing internal noise levels attributable to the roller shutter door and communal bins.	Sample measurements of roller shutter door and use of communal bins

6.3 Monitoring Results

6.3.1 Noise data are sound pressure levels in dB re 20 µPa, and rounded to the nearest dB(A) as fractions of decibels are imperceptible to the human ear. Full survey results are provided in Appendix 2, and are summarised as follows;

NML1

6.3.2 Noise levels were measured at NML1 for a 1hr period in the daytime.

6.3.3 The measured ambient noise level;

- ranged between 53-59 dB $L_{Aeq,5min}$.
- was 55 dB $L_{Aeq,1hr}$ with all noise sources included.
- ranged between 53-55 dB $L_{Aeq,5min}$ in the absence of any noise associated with vehicles arriving/departing the car park and were attributable to road traffic on surrounding roads.
- ranged between 54-59 dB $L_{Aeq,5min}$ with vehicles arriving/departing the car park, with the highest ambient noise level (59 dB $L_{Aeq,5min}$) due to an idling motorcycle outside the car park access.
- noise levels attributable to the opening/closing of the car park roller shutter door in isolation to all other noise were 55-59dB $L_{Aeq,T}$, with the operation of the shutter taking 15-17s to complete in either direction (i.e. opening or closing).

6.3.4 The measured peaks in noise were;

- In the range of 61-68 dB $L_{AFmax,5min}$ in the absence of any noise associated with vehicles arriving/departing the car park and were attributable to road traffic on surrounding roads, pedestrians, or impact noise well away from the site, with the highest L_{AFmax} (73 dB) attributable to a noisy car exhaust on a nearby road.
- Ranged between 66-76 dB $L_{AFmax,5min}$ with vehicles arriving/departing the car park and were attributable to those vehicles or roller shutter door opening/closing.
- Peaks in Noise levels attributable to the opening/closing of the car park roller shutter door were 55-60 dB $L_{Aeq,T}$ and 60-66 dB $L_{AFmax,T}$

NML2

6.3.5 Sample noise measurements were undertaken at NML2 to measure noise attributable to the opening/closing of the car park roller shutter door and were.

- 68-72 dB $L_{Aeq,17s}$ with an average of 70 dB $L_{Aeq,T}$; and,
- 75-77 dB $L_{AFmax,T}$, again, taking around 17s to open/close.

NML3

6.3.6 Sample noise measurements were undertaken at NML3 within the existing storeroom to measure noise attributable to the opening/closing of the car park roller shutter door and slamming shut of communal bins.

6.3.7 The measured noise levels associated with the roller shutter door opening or closing was;

- 43-48 dB $L_{Aeq,T}$ and 50-56 dB $L_{AFmax,T}$

6.3.8 The measured noise levels associated with the communal bins slamming shut was;

- 44-54 dB $L_{Aeq,T}$ and 54-63 dB $L_{AFmax,T}$ (where $T = 2-3$ s).

6.3.9 It was noted that the transmission path of the noise attributable to the roller shutter door and bins slamming shut was predominantly via the poorly fitted steel door to the storeroom that faces the car park entrance.

7 Assessment and Recommendation

7.1 Existing Sound Insulation Performance of Separating Wall and Floor

7.1.1 Assessment

7.1.2 The construction of the separating floor with the apartment above is unknown. Nevertheless, this aspect of noise is a matter for building control, was not the subject/reason for planning refusal, and is not therefore needed to be considered further in this assessment.

7.1.3 However, the existing separating wall between the storeroom and car park is single leaf concrete block of unknown density and thickness, built off the structural concrete floor to the underside of the concrete soffit. For the purposes of this assessment the blockwork is assumed to be medium density (1360 kg/m²) 100mm thick.

7.1.4 The airborne sound insulation of the existing blockwork wall is expected to be circa 43 dB R_w , and will not achieve the ADE requirement (as summarised in Table 1) alone, and must, therefore, be improved.

7.1.5 Recommendation

7.1.6 To achieve the minimum sound insulation requirements of ADE we therefore recommend that;

- The density of the existing blockwork to the separating wall to the car park is first confirmed. If the blockwork density is less than 1360 kg/m^2 , it should be taken down and replaced with medium or, ideally, high-density blockwork, built from the structural floor to the soffit with all gaps around the perimeter well sealed with mortar.
- Install an independent wall lining to the inside of the blockwork separating wall consisting of $2 \times 15\text{mm}$ Gyproc SoundBloc (or alternative lining with an overall surface mass of $\geq 24\text{kg/m}^2$) fixed to a metal/timber frame with 50mm (min) mineral wool in the cavity, with a 10mm gap (min) between the existing blockwork wall and new independent frame.

7.1.7 The sound insulation of this separating wall construction has been calculated using Insul and is 73 dB Rw ($63 \text{ dB Rw} + C_{tr}$). This construction will be approximately 10 dB better than the minimum requirement of E1 of ADE and is considered to provide a suitable degree of sound insulation to the bin store and roller shutter door.

7.1.8 We also recommend that, subsequent to the installation of the independent wall lining that;

- The new ceiling is formed by $2 \times 15\text{mm}$ Gyproc SoundBloc (or alternative lining with an overall surface mass of $\geq 24\text{kg/m}^2$) with 50mm (min) mineral wool in the ceiling cavity fixed via resilient hangers or an independent metal/timber frame.
- A floating floor treatment is installed within the rooms of the apartment, such as 18mm thick floorboards laid on acoustic battens with mineral wool laid between.

7.2 Noise Ingress

7.2.1 Noise ingress calculations have been carried out using the rigorous calculation methodology of BS 8233:2014 (which is based on that given in BS EN 12354-3¹⁰) to predict the resulting internal noise level within the apartment. Areas of elements on external elevations (walls, glazing) and room volumes have been determined from plans and elevations provided by the client. Sample noise ingress calculations are provided in Appendix 3.

7.2.2 The calculations assume each room has a typical reverberation associated with reasonably well-furnished rooms with all windows and doors well fitted with effective perimeter seals and are tightly closed.

7.2.3 Daytime Noise Ingress

7.2.4 MCC's internal daytime noise design criteria is $35\text{dB } L_{Aeq,16hr}$.

7.2.5 Assuming the measured $L_{Aeq,1hr}$ daytime noise level at NML1 would prevail outside the new large windows on the northern facing façade (although the actual noise level over a 16hr daytime period is expected to be marginally lower due to the additional distance from the measurement location to the windows, screening by the building façade, and longer assessment period), and that a partially open window would result in an internal

¹⁰ BS EN 12354-3:2000 Building acoustics. Estimation of acoustic performance in buildings from the performance of elements - Airborne sound insulation against outdoor sound

noise level around 12dB below the external noise level, the resulting internal daytime noise level would be around 43 dB $L_{Aeq,1hr}$.

7.2.6 Therefore, the councils daytime noise design criteria may only be met with windows closed. It is important to note here that this will also be the case for existing apartments that also overlook the car park entrance.

7.2.7 The calculated internal daytime noise level attributable to noise break-in via the windows on the northern façade is calculated to be 29dB $L_{Aeq,1hr}$ in the lounge/dining area, and 30dB $L_{Aeq,1hr}$ in the bedroom.

7.2.8 Noise break-in via the apartment façade facing the car parking access has also been undertaken. The measured noise level from the operation of the roller shutter door, measured outside the front door of the storeroom (NML2) was 70 dB L_{Aeq} , based on the average of 2no. 17s measurements of the door opening/closing, which is significantly higher than the L_{Aeq} noise level that would prevail over the day (or night-time) period. This noise level has been used as a worst-case in order to provide a robust calculation of resulting noise ingress from the irregular operation of the roller shutter door. Access to the apartment will be via a lobbied door, however the calculation has been simplified and assumes that the internal lobby door is left open. The calculated internal noise level during the brief operation of the roller shutter door is 35dB $L_{Aeq,17s}$. Therefore, MCC's internal noise design criteria are capable of being met, even when considering noise levels in the short-term during the operation of the roller shutter door, and with the internal lobby door left open. In practice we would expect the internal lobby door to be closed and this would provide significantly more benefit.

7.2.9 Therefore, MCC's daytime noise design criteria will be met.

7.2.10 Night-time Noise Ingress

7.2.11 The bedroom will be well away from the roller shutter door of the car park.

7.2.12 Assuming the measured $L_{Aeq,1hr}$ daytime noise level at NML1 would be present outside the new bedroom windows at night on the northern facing façade (although it is reasonable to assume the $L_{Aeq,8hr}$ noise level would be lower) the calculated internal noise level is 30dB $L_{Aeq,1hr}$. Therefore, MCC's internal noise criteria can only be met with windows closed. It is again important to note that this will also be the case for bedrooms of existing apartments that also overlook the car park entrance.

7.2.13 At NML1, peaks in noise were typically up to (i.e. worst-case) 75 dB L_{AFmax} and were attributable to the car park roller shutter door opening/closing and a bike idling outside the car park access. Noise from passing vehicles was considerably less.

7.2.14 The resulting peaks in noise outside the bedroom window of the apartment will be lower due to distance attenuation and screening attenuation provided by the building envelope. Assuming a conservative 5dB reduction for screening attenuation, resulting peaks in noise outside the bedroom window would be up to 64 dB L_{AFmax} . Noise ingress calculations indicate that peaks in night-time noise in the bedroom would be up to 41dB L_{AFmax} , and consequently MCC's noise design criteria of 45 dB L_{AFmax} should be met with windows closed.

7.2.15 As noted in the introduction, we consider it prudent to also consider internal noise levels arising from the use of communal bins slamming shut to the rear of the proposed apartment. Internally, the measured peaks in noise were 54-63 dB L_{AFmax} , with the main transmission path via the existing, poorly fitted steel door to the storeroom.

7.2.16 Calculations indicate that the installation of an independent wall lining will increase the sound insulation of the separating wall by 30dB. On the basis that the noise transmission path from the bins to the proposed bedroom

is via the separating wall, the resulting internal L_{AFmax} noise levels would be well below 45dB L_{AFmax} (i.e. 63 dB L_{AFmax} – sound insulation improvement provided by independent wall lining (30 dB) = 33dB L_{AFmax}).

7.2.17 Therefore, with windows closed, the proposed mechanical ventilation provided, and the installation of the recommendations in Section 7.1, the councils night-time noise design criteria will also be met.

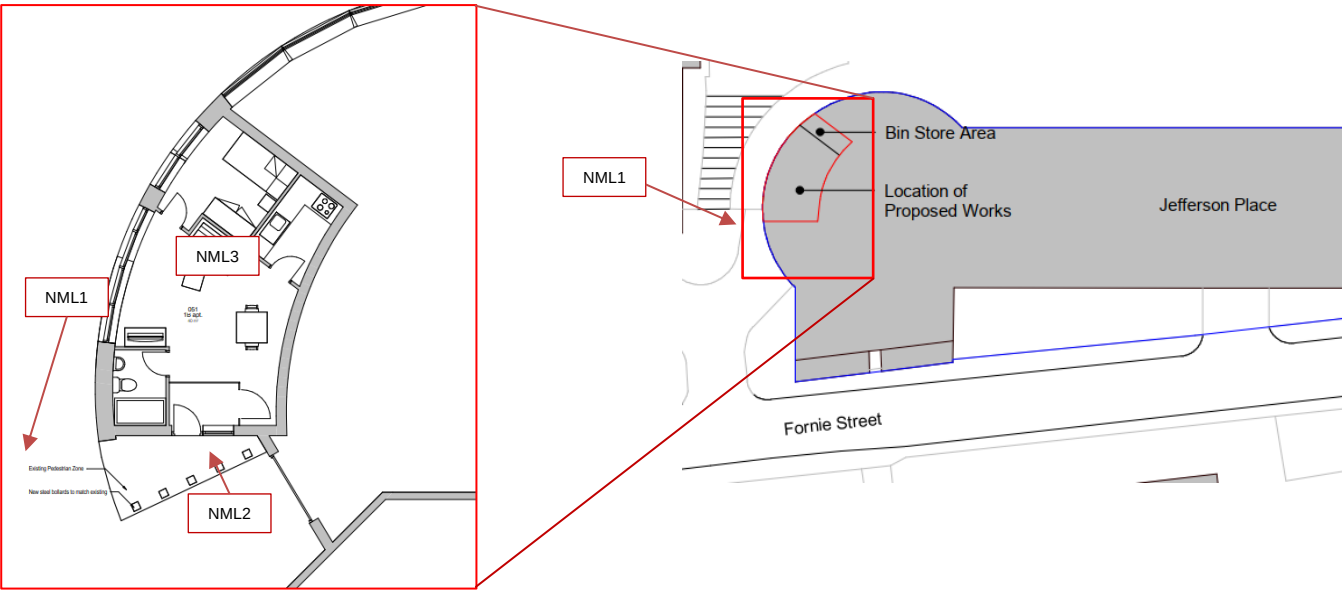
8 Conclusions

- 8.1 A noise assessment was undertaken to determine the sound insulation and noise mitigation measures needed to secure a reasonable degree of amenity for the future resident(s) of the proposed apartment.
- 8.2 It was first established that the sound insulation of the existing separating wall between the apartment and car park would not meet the airborne sound insulation requirements of E1 of ADE. Recommendations have been provided to ensure that the airborne sound insulation requirements of E1 of ADE can be met and have been used further in the assessment of noise impact on the proposed development.
- 8.3 Measurements undertaken on site found that noise from vehicles arriving/departing the car park, the roller shutter door, and communal bins slamming shut were significant. Assessment of the measured noise levels has found that MCC's internal noise design criteria can only be met with windows closed.
- 8.4 Based on the measured noise levels, assumptions, recommendations and calculations, it is concluded that as MCC's internal noise design criteria can be met, an adequate degree of internal amenity is capable of being secured for the future incoming occupant(s) of the proposed apartment.
- 8.5 Furthermore, it is also important to note that existing apartments above the car park are exposed to noise levels of the same character and comparable orders of magnitude, that the principal of residential development in close proximity to the car park entrance has already been established.
- 8.6 Therefore, whilst noise is a material consideration in the planning decision process, provided suitable noise mitigation and sound insulation measures are incorporated into the design of the site, which can be secured by a suitably worded planning condition, noise should not now be considered a valid reason for refusal of the proposed development.

APPENDICES

This page is left blank intentionally

Appendix 1: Site Location, Proposed Layout and Noise Measurement Locations



This page is left blank intentionally

Appendix 2: Measurement Data

Description	Start Time	Elapsed Time (min:sec)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Comment
NML1	12:00	04:32	54.7	72.7	56	49.8	Distant and local road traffic. Roller shutter door (x1)
	12:05	05:00	54.3	66.3	57	51	Distant and local road traffic. Roller shutter door (x3)
	12:10	04:50	54.9	65.7	58.1	50	Distant and local road traffic. Roller shutter door (x2). L_{AFmax} from distant bang at construction site
	12:15	05:00	55.5	70.8	58.5	50.9	Distant and local road traffic.
	12:20	05:00	52.7	64.1	54.8	49.6	Distant and local road traffic.
	12:25	05:00	54	68.1	55.2	50	Distant and local road traffic.
	12:30	04:30	52.8	60.9	55	50.2	Distant and local road traffic.
	12:35	05:00	53.3	61.2	55.3	50.7	Distant and local road traffic.
	12:40	05:00	54.1	65.7	56.6	51.3	Distant and local road traffic. Roller shutter door (x1)
	12:45	05:00	59.1	75.6	63.5	52.3	Distant and local road traffic.
	12:50	05:00	54.7	67.5	56.8	51.3	Distant and local road traffic.
	12:55	05:00	53.0	61.8	55.1	49.8	Distant and local road traffic. Roller shutter door (x1)
NML1 – Sample data	12:05	00:32	58.3	64.5			
	12:10	00:34	57.5	64.8			
	12:12	00:21	57.8	64.3			
	12:12	00:20	58.2	65.7			Roller shutter door
	12:19	00:15	59.2	63.7			
	12:19	00:15	55.1	59.8			
	12:48	00:17	58.2	64.4			
	12:09	00:05	56	63.5			Distant train horn
	12:23	00:32	55.7	64.1			
	12:47	00:14	63.6	75.6			Pedestrians
	12:48	00:31	65.2	69.4			Idling bike at car par entrance
NML2 – Sample data	11:58	00:17	71.6	77.3			Roller shutter opening
	11:59	00:17	68.1	74.9			Roller shutter closing
	Average		70.2	-			
NML3 – internal sample data	13:01	00:15	46.5	53.8			
	13:02	00:15	43.2	50.0			
	13:03	00:15	48.7	55.6			Roller shutter opening/closing
	13:03	00:21	42.9	50.3			
	13:02	00:03	45.4	54.7			
	13:03	00:03	52.1	61.7			
	13:03	00:03	44.2	53.5			
	13:03	00:02	53.4	61.8			Communal bins slamming shut
	13:03	00:02	47.6	56.1			
	13:03	00:02	48.5	56.7			
	13:03	00:02	54.2	62.7			

Appendix 3: Sample Noise Ingress Calculations

Daytime noise ingress calculation (via external wall on northern façade) into Lounge/Diner

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value	Project: 102624-1 Jefferson Place Description: Noise ingress via external wall with window by: D. Sproston Date: 17/09/2021 Space: Lounge/Diner Period: Daytime
S_f	Total facade area (m ²)	12.27	
S_{wi}	Window area (m ²)	4.00	
S_{ew}	External wall area ($S_f - S_{wi}$) (m ²)	8.27	
S_{rr}	Area of the roof (m ²)	0.00	
S	Total area exposed to noise ingress ($S_f + S_{rr}$)	12.27	
x	Room dimension x	4.19	
y	Room dimension y	4.80	
z	Room dimension z	2.40	
V	Volume of receiving room (m ³)	48.27	
K	Facade Measurement Correction	0.00	Results: 29 dB L _{Aeq}
A_0	Ref. qbs area (m ²)	10.00	
k	$k=3$ in BS 8233:2014 + Tolerance	3.00	
	No. of vents in external wall	2.00	
r	Distance to window / vent (m)	0.00	

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room	Measured daytime LAeq1hr at NML1	64	57	52	51	51	48	41	37	55	55
L_{max}	Free-field L_{max} outside room										7	5

Term	Description	Specification										
$D_{n,e}$	$D_{n,e}$ of each ventilator:	Titon Trimvent Select S13 2700EA vent & C13 canopy (standard in frame trickle vent)	29	35	36	36	34	30	32	32	-	-
	Cumulative $D_{n,e}$ for all ventilators		26	32	33	33	31	27	29	29		
R_{wi}	SRI of glazing/window:	6:12:4 mm	17	23	22	27	38	40	41	41	-	-
	SRI of external wall:	100mm med. density block with 2 x 15mm soundblock on independent frame with 50mm mineral wool in the cavity	27	47	56	76	82	87	87	87	-	-
R_{rr}	SRI of roof	Ignore roof	130	130	130	130	130	130	130	130	-	-

Daytime noise ingress calculation (via wall facing car park entrance) into Lounge/Diner (short-term noise from roller shutter)

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value	Project: 102624-1 Jefferson Place Description: Noise ingress via external wall facing car park ac by: D. Sproston Date: 17/09/2021 Space: Lounge/Diner Period: Daytime
S_f	Total facade area (m ²)	5.60	
S_{wi}	Window area (m ²)	1.80	
S_{ew}	External wall area ($S_f - S_{wi}$) (m ²)	3.80	
S_{rr}	Area of the door (m ²)	2.20	
S	Total area exposed to noise ingress ($S_f + S_{rr}$)	7.80	
x	Room dimension x	4.19	
y	Room dimension y	4.80	
z	Room dimension z	2.40	
V	Volume of receiving room (m ³)	48.27	
K	Facade Measuremet Correction	0.00	Results: 35 dB L _{Aeq}
A_0	Ref. qbs area (m ²)	10.00	
k	k=3 in BS 8233:2014 + Tolerance	3.00	
	No. of vents in external wall	0.00	
r	Distance to window / vent (m)	0.00	

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room	Average of 2 x 15s measurements outside existing steel door of RSD Opening/Closing	65	59	57	59	62	66	62	62	70	69
L_{max}	Free-field L_{max} outside room										7	5

Term	Description	Specification										
$D_{n,e}$	$D_{n,e}$ of each ventilator:	Ignore trickle vent	130	130	130	130	130	130	130	130	-	-
	Cumulative $D_{n,e}$ for all ventilators		180	180	180	180	180	180	180	180		
R_{wi}	SRI of glazing/window:	6:12:4 mm	17	23	22	27	38	40	41	41	-	-
	SRI of external wall:	100mm med. density block with 2 x 15mm soundblock on independat frame with 50mm mineral wool in the cavity	27	47	56	76	82	87	87	87	-	-
R_{rr}	SRI of door	Solid core door, 40mm, with perimeter and threshold seals	11	17	21	26	29	31	34	34	-	-

Daytime/Night-time noise ingress calculation (via external wall on northern façade) into Bedroom

BS 8233:2014 - Noise Ingress Calculation

Term	Description	Value	Project: 102624-1 Jefferson Place Description: Noise ingress via external wall with window by: D. Sproston Date: 17/09/2021 Space: Bedroom Period: Daytime/Night-time
S_f	Total facade area (m ²)	10.50	
S_{wi}	Window area (m ²)	1.80	
S_{ew}	External wall area ($S_f - S_{wi}$) (m ²)	8.70	
S_{rr}	Area of the roof (m ²)	0.00	
S	Total area exposed to noise ingress ($S_f + S_{rr}$)	10.50	
x	Room dimension x	2.60	
y	Room dimension y	2.70	
z	Room dimension z	2.40	
V	Volume of receiving room (m ³)	16.85	
K	Facade Measurement Correction	0.00	Results: 30 dB L_{Aeq} 41 dB L_{AFmax}
A_0	Ref. qbs area (m ²)	10.00	
k	$k=3$ in BS 8233:2014 + Tolerance	3.00	
	No. of vents in external wall	1.00	
r	Distance to window / vent (m)	0.00	

Term	Description	Description of noise level	Octave Band Centre Frequency (Hz)								Broadband	
			63	125	250	500	1000	2000	4000	8000	dB(A) 63-8k	dB(A) 125-2k
$L_{eq,ff}$	Free-field L_{eq} outside room	Measured daytime $L_{Aeq}1hr$ at NML1	64	57	52	51	51	48	41	37	55	55
L_{max}	Free-field L_{max} outside room	Measured noise level at NML1 from idling motorbike	77	70	56	57	58	62	53	44	65	65

Term	Description	Specification										
$D_{n,e}$	$D_{n,e}$ of each ventilator:	Titon Trimvent Select S13 2700EA vent & C13 canopy (standard in frame trickle vent)	29	35	36	36	34	30	32	32	-	-
	Cumulative $D_{n,e}$ for all ventilators		29	35	36	36	34	30	32	32		
R_{wi}	SRI of glazing/window:	6:12:4 mm	17	23	22	27	38	40	41	41	-	-
	SRI of external wall:	100mm med. density block with 2 x 15mm soundblock on independant frame with 50mm mineral wool in the cavity	27	47	56	76	82	87	87	87	-	-
R_{rr}	SRI of Roof	Ignore roof	130	130	130	130	130	130	130	130	-	-

This page is left blank intentionally

Glossary of Terms

- Decibel (dB)** The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μPa , the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.
- dB L_A** Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A ; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A .
- $L_{A90,T}$** The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.
- $L_{Aeq,T}$** The equivalent continuous sound level. The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.
- L_{Amax}** The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.
- R_w** Single number rating used to describe the sound insulation of building elements and is defined in BS EN ISO 10140-2: 2010 (formerly BSEN ISO 140-3:1995). It is derived by measurement under laboratory conditions and does not take into account the effects of flanking transmissions.
- $D_{nT,w}$** The weighted standardized level difference is a single figure rating used to describe the sound insulation of a construction separating two rooms, for example a wall or floor, and is defined in BS EN ISO 16283-1:2014 (formerly BSEN ISO 140-4:1998). It is derived by measurement of an in-situ construction and therefore takes into account the effects of flanking transmissions, workmanship etc.
- $D_{ne,w}$** The weighted element-normalized level difference is a single figure rating used to describe the sound insulation of small elements within a larger construction and is defined in BS EN ISO 10140-2:2010 (BSEN ISO 140-10:1991). It is most often used to rate the sound insulation performance of ventilator units e.g. trickle vents.
- C_{tr}** A single-number spectrum adaptation term used to characterise the sound insulation rating with respect to urban traffic. It is defined in ISO 717-1:2013.

This page is left blank intentionally

