

London office

1B(c) Yukon Road
London
SW12 9PZ
Tel: 0203 475 2280

Manchester office

Suite 34 Europa House
Barcroft Street
Bury BL9 5BT
Tel: 0161 850 2280

Peary Street, Manchester

17 July 2024

18397-NIA-01 RevD

Noise Impact Assessment

Project Number
18397

Issued For
Social Sports Society

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a use of proposed padel and multi-use courts at Peary Street, Manchester.

The description of the proposed development is as follows:

"Full planning application for the temporary use of land, comprising padel courts, multi-use courts, and boule/pétanque courts; the erection of canopies; the installation of containers to include ancillary food and beverage use, portaloos, and reception area; and the inclusion of car and cycle parking, outdoor seating area, refuse area, lighting, and associated infrastructure."

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of Manchester City Council.

Calculations were undertaken using the proprietary noise modelling software package CadnaA for the nearest identified receivers. It should be noted that if there are closer receivers than those assessed in this report, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependent on the courts being used between 06:00 and 23:00 only.

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

CONTENTS

1.0 INTRODUCTION1

2.0 SITE DESCRIPTION1

3.0 ENVIRONMENTAL NOISE SURVEY2

3.1 ATTENDED NOISE SURVEY PROCEDURE..... 2

3.2 WEATHER CONDITIONS 2

3.3 EQUIPMENT 2

4.0 RESULTS.....3

4.1 ATTENDED NOISE SURVEY RESULTS 3

5.0 NOISE CRITERIA3

5.1 LOCAL AUTHORITY CRITERIA..... 3

5.2 BRITISH STANDARD 4142 4

5.3 RESIDENTIAL RECEIVERS - ARTIFICIAL GRASS PITCHES (AGP) 4

5.4 RESIDENTIAL RECEIVERS - BRITISH STANDARD 8233 5

5.5 COMMERCIAL RECEIVERS – BRITISH STANDARD 8233 5

5.6 ADOPTED CRITERIA..... 6

5.6.1 RESIDENTIAL RECEIVERS.....6

5.6.2 NON-DOMESTIC RECEIVERS6

6.0 DESCRIPTION OF PROPOSALS7

6.1 SOURCE NOISE 7

6.1.1 PADEL COURTS.....7

6.1.2 MULTI-USE PITCHES.....7

6.2 RECEIVER LOCATIONS..... 8

6.2.1 EXISTING RECEIVERS8

6.2.2 PROPOSED AND CONSENTED DEVELOPMENTS8

6.3 3-DIMENSIONAL NOISE MODEL..... 10

7.0 NOISE IMPACT ASSESSMENT11

8.0 CONCLUSION.....12

LIST OF ATTACHMENTS

18397-SP1	Indicative Site Plan
Appendix A	Glossary of Acoustic Terminology
Appendix B	Image of Modelled Operational Noise Emissions

Issue	Date of Issue	Author	Reviewed	Authorised
RevD	17/07/2024			
		Duncan Martin Director BSc (Hons) MIOA	Jamie Newton Senior Consultant BEng (Hons) MIOA	Andrew Thomas Director BSc (Hons) MIOA

Issue	Comment
0	First Issue
RevA	Updated to reflect latest layout
RevB	Minor amendments to description of proposals
RevC	Inclusion of additional proposed and consented developments as receivers
RevD	Updates to consider minor amendments to site layout and description of proposals

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Social Sports Society to measure existing background noise levels at Peary Street, Manchester. Measured noise levels have been used to determine noise emissions criteria for proposed padel courts and multi-use pitches in agreement with the planning requirements of Manchester City Council.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures. An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is bound by Burstock Street to the north-west, Peary Street to the north-east, Back St George Road to the south west and a car park to the south-west which is understood to operate 24 hours. The surrounding area is predominantly commercial in nature.

The description of the proposed development is as follows:

"Full planning application for the temporary use of land, comprising padel courts, multi-use courts, and boule/pétanque courts; the erection of canopies; the installation of containers to include ancillary food and beverage use, portaloos, and reception area; and the inclusion of car and cycle parking, outdoor seating area, refuse area, lighting, and associated infrastructure."

Figure 2.1 shows the proposed arrangement of the courts, with courts that will be covered highlighted in green.



Figure 2.1 Figure showing proposed court and pitch locations

Existing residential blocks on Gould Street, and houses on Shilford Drive have been identified as the nearest affected existing receivers. A review has also been conducted of current planning applications in order to identify any proposed or committed developments in the area, which could present new sensitive receptors. The nearest noise sensitive receivers were identified through observations on-site and a review of available online information. If there are any receivers closer than those identified within this report, then a further assessment will need to be carried out.

Locations are shown in attached site plan 18397-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Attended Noise Survey Procedure

Attended noise measurements were undertaken on 18 May 2023 to provide an understanding of the prevailing noise environment.

The sound level meter was mounted on a tripod approximately 1.5 m above ground level under free-field conditions at the locations described in Table 3.1.

Position No.	Description
1	The sound level meter was located at the entrance kerb to land previously used as a car park directly east of Peary Street
2	The sound level meter was located at the western corner of the site

Table 3.1 Description of attended monitoring locations

The locations of the measurement positions are shown on attached site plan 18397-SP1.

3.2 Weather Conditions

At the time of the attended measurements, the weather conditions were dry with maximum wind speeds of 3.5 m/s.

It is considered that the weather conditions were suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 977 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Attended Noise Survey Results

Table 4.1 presents the results of the measurements carried out at the attended positions shown in attached site plan 18397-SP1. For each measurement position, the $L_{Aeq,1 \text{ hour}}$ noise levels have been obtained.

Position	Period	Noise Source Description	Average ambient noise level, $L_{Aeq, T}$
1	06:00 – 07:00	Road traffic noise from Rochdale Road, regular train and tram passes on rail lines to the north of the site, and occasional car passes on the Peary Street	52 dB
	21:00 – 22:00		53 dB
2	08:00 – 09:00	Road traffic noise from Rochdale Road, regular train and tram passes on rail lines to the north of the site, and occasional vehicle movements within the carpark site	52 dB
	09:00 – 10:00		51 dB
	10:00 – 11:00		50 dB
	11:00 – 12:00		54 dB
	12:00 – 13:00		52 dB
	13:00 – 14:00		52 dB
	14:00 – 15:00		55 dB

Table 4.1 Average ambient noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Criteria

The Manchester City Council document ‘Planning and Noise – Technical Guidance’, issued in October 2022 details appropriate criteria to be used for different types of noise source.

The proposed noise source of padel Courts is best categorised by ‘Other potentially noisy activities’, which includes Multi-Use Games Areas [MUGAs], sports stadia and gymnasias.

The guidance for these types of noise sources is as follows:

“[These] types of development proposals or applications may have additional specific guidance published to review noise impacts or may otherwise be a potential source of noise.”

A review has therefore been undertaken of possible applicable guidance in order to determine suitable criteria for noise emissions.

5.2 British Standard 4142

British Standard 4142:2014 +A1:2019 'Methods for rating and assessing industrial and commercial sound' [BS 4142] is typically used to provide an assessment of proposed commercial activities and their impact on residential receptors.

BS 4142 is also stated as preferred method of assessing commercial and industrial noise in the 'Industrial / commercial developments' section of the City of Manchester guidance.

However, Paragraph 1.3 of BS 4142 lists a number of activities that the standard should not be applied to. This list includes 'recreational activities'. BS 4142 therefore cannot be applied to the assessment of padel and multi-use court noise, and alternative guidance has therefore been sought.

5.3 Residential Receivers - Artificial Grass Pitches (AGP)

Noise emissions from sports pitches to existing and proposed residential dwellings will be assessed according to the recommendations of Sport England document 'Artificial Grass Pitches (AGP) Acoustics – Planning Implications'.

This document gives recommended methodologies for calculating the noise level due to AGP use at different receivers.

Although the Padel Courts do not use artificial grass, the guidance of this document is considered the most relevant applicable to a proposed noise source of sports activity. The sports mentioned in the document are Football, Rugby and Hockey, sports which all include ball impacts, particularly Hockey.

The guidance of the document with regards to setting a noise limit for noise emissions is as follows:

"The determining noise criteria for AGPs proximity to residential properties, to avoid moderate annoyance in the daytime and evenings, as set by the World Health Organisation's 'Guidelines for Community Noise': 50 dB $L_{Aeq(1hour)}$ upper noise limit external to residential properties and within external living areas."

5.4 Residential Receivers - British Standard 8233

British Standard 8233: 2014: 'Guidance on sound insulation and noise reduction for buildings' [BS 8233] describes recommended acceptable internal noise levels for residential spaces during daytime and night-time hours. These levels are shown in Table 5.1.

Activity	Location	Design range $L_{eq,T}$	
		Daytime (07:00-23:00)	Night-time (23:00-07:00)
Resting	Living Room	35 dB(A)	-
Dining	Dining Room/Area	40 dB(A)	-
Sleeping	Bedroom	35 dB(A)	30 dB(A)

Table 5.1 BS 8233 recommended internal background noise levels - residential

The guidance of BS 8233, with regards to external amenity spaces, is as follows:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

5.5 Commercial Receivers – British Standard 8233

BS 8233 also describes recommended acceptable internal noise levels for different non-domestic spaces for different activities during daytime hours.

Relevant guidance for identified affected receivers are shown in Table 5.2.

Activity	Location	Design range $L_{eq,T}$
Study and work requiring concentration	Meeting room / training room	35-45 dB(A)

Table 5.2 BS 8233 recommended internal background noise levels – non-domestic

5.6 Adopted Criteria

5.6.1 Residential Receivers

As stated in Section 5.4, BS 8233 gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233 recommends $L_{Aeq:16hr}$ 35 dB(A) as being acceptable internal resting conditions during daytime and $L_{Aeq:8hr}$ 30 dB(A) for night-time.

With a design target of 50 dB(A) at the nearest residential façade during daytime hours, as stated by APG guidance, acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233, a typical building facade with a partially open window offers 15 dB attenuation, resulting in an internal level of 35 dB(A). This is comparable to the AGP guidance, of 50 dB(A) as well as the lowest daytime $L_{Aeq, 1 \text{ hour}}$ measured on the site, and so will also be adopted as the criterion to be achieved at residential facades during daytime hours.

The guidance of BS 8233 for external amenity space is also comparable to that of APG, as such we would recommend the lower guideline value of $L_{Aeq,T}$ 50 dB(A) would be an appropriate target to achieve in outdoor garden areas during daytime hours.

Due to the lower night-time internal noise levels recommended in BS 8233, a criterion of $L_{Aeq,t}$ 45 dB(A) will be adopted for night-time hours. In order to provide a robust assessment, this night-time criterion will be used to assess the noise impact of the proposed site.

In order to provide additional protection to existing residential amenity, the calculated noise emission levels will also be compared with the ambient noise levels shown in Table 4.1.

5.6.2 Non-Domestic Receivers

As stated in Section 5.5, BS 8233 also gives recommendations for acceptable internal noise levels in non-domestic properties. BS 8233 recommends $L_{Aeq,T}$ 35-45 dB(A) as being acceptable internal conditions for study or work requiring concentration in a meeting room.

According to BS 8233, a typical building facade with a partially open window offers 15 dB attenuation, resulting in an acceptable design range for noise outside a non-domestic façade of $L_{Aeq,T}$ 50-60 dB(A).

6.0 DESCRIPTION OF PROPOSALS

6.1 Source Noise

6.1.1 Padel Courts

Measurements of padel courts taken during a previous assessment of proposed courts. The measurements were taken of an existing padel court with a doubles game under way. The measurements include talking, running and the sound of the ball hitting the racket and hitting the fence.

A seven-minute measurement of a padel court game provided a source noise level of L_{Aeq} 61 dB(A) at 4 m from the edge of the court. The measurement at 4 m is considered the most representative way to consider noise propagation away from the padel court.

It should be noted that measurements were taken at the open side, where mesh entrance doors are the only barrier into the Court. Other sides of the Court benefit from glass or canopy screening. By assuming the measured levels are apparent at all sides of the proposed courts, a particularly robust assessment will be presented. Measured spectral levels are shown in Table 6.1.

Noise Source	Sound Pressure Level (at 4 m from court perimeter, dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Padel Courts	54	53	55	57	58	53	47	38	61

Table 6.1 Measured padel court noise levels

6.1.2 Multi-Use Pitches

The guidance of the AGP document is that the noise level emanating from a sports pitch can be considered as follows:

*“A typical free-field noise level from an AGP (at 10 m from the sideline halfway marking)
= 58 dB $L_{Aeq}(1\text{ hour})$ ”*

This is comparable to source noise measurements of a football pitch taken during a previous assessment of noise impact of a pitch.

Attended noise measurements of football games were undertaken at two positions on 17 April 2021, on the existing site at Fulbrook Sports Field, to provide an understanding of the prevailing noise environment. The measurements include shouting, running and the sound of the ball being kicked. A level of $L_{Aeq,90\text{ min}}$ 60 dB was measured during this assessment.

This louder measured level has been used in this assessment in order to provide a robust assessment. The Measured spectral levels are shown in Table 6.2.

Noise Source	Sound Pressure Level (at 10 m from edge of pitch, dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Football Pitch	57	55	53	55	56	55	48	35	60

Table 6.2 Measured football pitch noise levels

6.2 Receiver Locations

A combination of existing and proposed receivers has been identified at various locations around the development site. These are discussed in subsequent sections.

6.2.1 Existing Receivers

Two sets of existing residential buildings have been identified as the nearest affected residential receivers, as described in Table 6.3. These nearest noise sensitive receivers were identified through on-site observations.

Receiver Number	Descriptions
1	Four residential buildings on Gould Street, understood to be named The Tobacco Factory, The Citadel, The Red Building and The Marble Arch, all a minimum of 175 m from the proposed site boundary. A level of attenuation to these locations will be provided by an existing wall of minimum 3 m high along the western boundary of the site.
2	Residential houses on cul-de-sac Shilford Drive, a minimum of 145 m from the site. These receivers will have line of sight to the site.

Table 6.3 Nearest existing noise sensitive receivers

6.2.2 Proposed and Consented Developments

6.2.2.1 Receiver 3: Victoria Riverside (126944/FO/2020)

Two residential buildings are currently under construction as part of the Victoria Riverside, both a minimum of 85 m from the proposed site boundary. A level of screening attenuation to lower storeys at these locations will be provided by an existing wall of minimum 3 m high following the adjacent rail line.

A receiver will be placed on the proposed building facades, at a height of 10 m, overlooking any screening.

6.2.2.2 Receiver 4: 87 Rochdale Road (131708/FO/2021)

A residential development of a block of residential apartments and separate blocks of mews houses. The development is currently under construction, due for completion in late 2025.

Receivers will be placed at a position indicative of the closest proposed façade of the apartment block (Receiver 4A), at a height of 10 m, and a position indicative of the closest proposed façade of the mews houses (Receiver 4B), at a height of 4 m.

6.2.2.3 Receiver 5: The Gas Works, New Town (128248/FO/2020)

A residential development of 9 buildings ranging from 8 to 34 storeys to form 1202 apartments in total. The development will be undertaken in 4 phases over an anticipated period of 8 years. Initial proposals were to commence construction in Q1 2022; however, planning consent was only granted in December 2023 and we understand that works have not yet commenced on site.

Based on the original phasing plan, Phase 1 is due to complete approximately 18 months after commencement, and Phase 2 approximately 40 months after commencement. Phases 3 and 4 will be later again.

Based on the proposed 3-year temporary use of the site, Phase 1 has been included as a potential sensitive receptor. Receivers have been placed at positions indicative of the closest proposed façade of the Phase 1 block, at a height of 10 m. The loudest receiver noise level at any point will be included in the assessment of residential receivers.

6.2.2.4 Receiver 6: Land At Bromley Street, Manchester (138695/FO/2023)

An application currently under consideration, comprising proposals for a number of shipping container units, to be used as temporary working spaces.

Receivers will be placed along the closest site boundary, at a height of 1.5 m, indicative of a container placed on the ground. The loudest receiver noise level at any point will be included in the assessment of non-domestic receivers.

6.3 3-Dimensional Noise Model

In order to assess the noise impact of proposed courts, noise emissions have been assessed by developing a noise map.

The noise model was constructed using the proprietary noise modelling software package CadnaA. The noise model was constructed utilising the following assumptions and parameters:

- Noise source modelled as area sources at a height of 1.5 m above ground,
- Proposed canopies have been modelled as horizontal reflectors above the identified padel courts
- Existing western wall is present, at a height of 3 m
- Façade Assessment:
 - Apartment receivers are 10 m above ground, shown to be the loudest part of the facades
 - Receiver 3A is 4.5 m above ground on northern façade of 2 Shilford Drive
 - Receiver 4B is 4 m above ground, on the closest façade of the mews houses
 - Receiver 6 is 1.5 m above ground, representative of a container façade position
- Garden Assessment:
 - Receiver 3B is 1.5 m above ground in the garden of 2 Shilford Drive
- Topography of the site has been taken from DEFRA LIDAR Composite DTM
- Hardness of the ground between the sources and receivers has been modelled as reflective

It should be noted that all calculations in the CadnaA model, including those for distance and screening of intermediate building envelopes are undertaken according to International Standard ISO 9613-2:1996 '*Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation*'. This standard is the preferred method stated in BS 4142 to minimise uncertainty.

The specific noise level has been derived by the use of the 3D noise map model following the calculation method stated in ISO 9613. Calculations are performed over single octave band from 63 Hz to 8 kHz.

Figure 6.1 shows a 3D view of the created noise model.

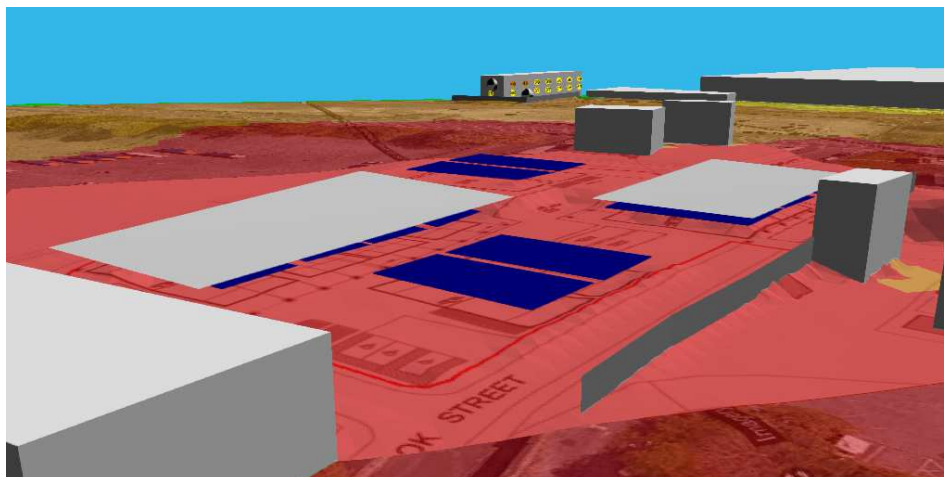


Figure 6.1 Plan view of noise propagation in 3D noise mapping model

7.0 NOISE IMPACT ASSESSMENT

Receiver levels have been calculated using the constructed noise model, as shown in Table 7.1. Detailed model images of noise propagation and levels at the receivers are shown in Appendix B.

Receiver	Design Criterion	Noise Level at Receiver (due to proposed activities)
Receiver 1: Western façade of The Citidel	50 dB(A) Daytime / 45 dB(A) Night-Time	39 dB(A)
Receiver 2A: Northern façade of 2 Shilford Drive		40 dB(A)
Receiver 2B: Garden of 2 Shilford Drive		38 dB(A)
Receiver 3: Victoria Riverside		45 dB(A)
Receiver 4A: 87 Rochdale Road: Apartments		40 dB(A)
Receiver 4B: 87 Rochdale Road: Mews Houses		40 dB(A)
Receiver 5: The Gas Works – Phase 1	50-60 dB(A)	46 dB(A)
Receiver 6: Land at Bromley Street		57 dB(A)

Table 7.1 Noise levels and project criterion at noise sensitive receivers

As shown in Table 7.1, the proposals in terms of the number of courts and site zoning are such that existing attenuation features such as distance and existing screening are expected to sufficiently reduce noise emissions to all receivers, including at residential receivers during night-time operations (06:00 to 07:00), with the exception of Receiver 5, which marginally exceeds the night-time design target by 1 dB.

A 1 dB exceedance would not be considered significant and would not be expected to negatively impact residential amenity. Further, as shown in Table 4.1, the existing ambient noise level measured between 06:00 and 07:00 was $L_{Aeq,1hr}$ 52 dB(A). A receiver level of 46 dB(A) would therefore not be dominant against the existing level of noise in the surroundings.

It is further noted that when Phase 1 is complete and inhabited, Phases 2-4 of the same development will be under construction, which will further increase ambient noise levels in the area.

8.0 CONCLUSION

Attended noise measurements have been undertaken at Peary Street, Manchester. Criteria have been set for noise emissions arising from the use of 9 padel courts and 2 multi-use courts, based on the set requirements of relevant guidance documents and standards.

A noise impact assessment has then been undertaken using library noise data to predict the noise levels, due to the proposed operations, at the nearby noise sensitive receivers.

Calculations according to the guidance from the relevant documents indicate that internal and external noise levels are expected to comply with relevant criteria with the site as currently proposed. A marginal exceedance at one proposed receiver has been considered in terms of the existing noise climate and no negative impacts are anticipated for the residential receivers as a result.



Not to scale

Description:

Indicative site plan showing noise monitoring position and nearest existing sensitive receivers

Date	17 July 2024
Reference	18397-SP1
Project Name	Peary Street, Manchester
Image ©	Google Earth

Key:

	Site Location
	Noise Sensitive Receiver (existing)
	Attended Noise Survey Position



GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3 dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

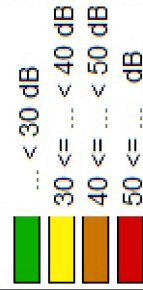
Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.



Notes:

- The noise model was constructed using the proprietary noise modelling software package Cadna A.
The potential noise mitigation of a barrier at the nearby proposed buildings has been predicted using the methodology outlined in ISO 9613-2.
The noise model was constructed utilising the following assumptions and parameters:
- Locations of obstacles such as screens or barriers in the propagation path
 - Presence of reflecting surfaces
 - Hardness of the ground between the sources and receivers
 - Attenuation due to atmospheric absorption



- Area Source
- Building
 - Barrier
 - 3D-Reflector
 - Receiver
 - Building Evaluation
 - Calculation Area

18397 Appendix B2
Mitigated Operations



113c Yukon Road, London SW12 9PZ
T: 0203 475 2280
info@clementacoustics.co.uk
www.clementacoustics.co.uk

