

NOISE ASSESSMENT

on behalf of

THE ARCH COMPANY PROPERTIES LIMITED

for the site at

CORPORATION STREET, MANCHESTER

REPORT DATE: 17 MAY 2023

REPORT NUMBER: 102959_V3

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



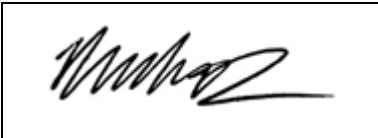
Summary

A noise assessment was undertaken to predict the potential impact of a proposed development consisting of the redevelopment of the arches below the railway line at Corporation Street, Manchester. This was requested by the local authority to support a planning application for the development.

Measurements were made at the location of the nearest residential dwellings to the proposed site to identify the pre-development background sound levels. A computer model has been developed for the site to include source noise levels. The source noise levels have been assumed as a worst-case scenario for all the Arches, as the end users for the site are not currently known.

Mitigation measures have been incorporated into the noise model to assist in protecting existing residential receptors. Since the end users for the site are currently unknown, it is suggested that full mitigation details are addressed at the reserved matters application or a planning condition placed on the site for future discharge.

Record of changes

Prepared By:	Jo Miller MIOA	Reviewed By:	Michael Rickard MIOA
Signed:		Signed:	
Date:	16 th February 2023	Date:	16 th February 2023

Version	Date	Change	Initials
1	16 th February 2023	First issue	JLM
2	24 February 2023	Minor amendments	JLM
3	17 May 2023	Amendments following MCC Comments	WW

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1 Introduction

- 1.1 Miller Goodall Ltd has on behalf of The Arch Company Properties Limited, undertaken a noise assessment in respect of the impact of noise from a redevelopment of the railway arches on Corporation Street, Manchester.
- 1.2 This noise assessment is to support a planning application for the development.
- 1.3 The development is for a scheme to enhance arches 1 - 4 & 6 - 11 at Corporation Street for retail/F&B use. The proposal is to create a run of arches with with a mixture of metal, glazing and louvring infills for letting to public-facing businesses such as restaurants, supermarkets, bars, competitive socialising operators, leisure operators, small studio gyms etc.

2 Site Description

- 2.1 The site comprises a series of railway arches (1 - 4 & 6 - 11) located along Corporation Street, Manchester. The site location is shown outlined in red in Appendix 1.
- 2.2 The site is located under the railway line to the east of Victoria Station. The surrounding area is a mixture of residential apartments and car parking to the south of the railway line. The high-rise residential apartments on the southern side of the railway line are located on the corner of Corporation Street and Mincing Street There is also residential accommodation directly opposite the site on Corporation Street, namely Ashton House and Manchester Court, off Crown Lane.
- 2.3 To the north of railway line are several high-rise residential and hotel developments including properties on Red Bank.

3 Proposed Development

- 3.1 The development is for a scheme to enhance arches 1 - 4 & 6 - 11 at Corporation Street for retail/F&B use. The proposal is to create a run of arches with a mixture of metal, glazing and louvring for letting to public-facing businesses such as restaurants, supermarkets, bars, competitive socialising operators, leisure operators, small studio gyms etc. The application is proposed as Sui Generis.
- 3.2 The site is below the existing railway line which has noise sources from passenger and haulage trains on the line. The diesel haulage will operate through the night-time period and are likely to be loud to those properties closest to the railway line.
- 3.3 No fixed end users have been identified for the development to date, the assessment has therefore been based on a worst-case assessment of bar/restaurant uses.

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 (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 taking into account the specific circumstances of a proposed development.

¹ Noise Policy Statement for England, Defra, March 2010

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:

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;

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, July 2021

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

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

- 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;
- 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.

5 Local Authority Consultation

5.1 MCC was consulted in respect of the methodology used in this assessment⁵. Due to the lack of site security, it was not possible to carry out unattended surveying. It was proposed to undertake the survey at a time when the background sound levels were considered the lowest, the times proposed were on a Sunday night for an hour between 00:00 and 02:30.

5.2 To date, the consultation has yet to be agreed however discussions with the Planning department over clarification off site address are ongoing.

⁵ Email to contact@manchester.gov.uk on 11th January 2023 with a proposed methodology and follow up email on 20th February 2023 to planning@manchester.gov.uk.

6 Relevant Criteria

6.1 Manchester City Council Criteria for Noise Breakout

- 6.1.1 Manchester City Council Planning & Noise Technical Guidance (December 2015) refers to noise from entertainment venues. Section 3.6.1.2 refers to Entertainment Venues and recommends the following criteria:

A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

'Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

7 Acoustic Standards and Guidance

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

- 7.1.1 This standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999)⁶. These guideline noise levels are shown in Table 1, below.

Table 1: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

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

- 7.1.2 BS 8233:2014 advises that:

"regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL^7 or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values".

⁶ World Health Organisation Guidelines for Community Noise, 1999

⁷ Sound exposure level or L_{AE}

- 7.1.3 BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens and patios. The standard states that it is “desirable” that the external noise does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ whilst recognising that development in higher noise areas such as urban areas or those close to the transport network may require a compromise between elevated noise levels and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas.

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

- 7.2.1 The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009⁸ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB L_{AFmax} . The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night.
- 7.2.2 The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq} .

8 Noise Survey

8.1 Measurements of Existing Noise Sources

- 8.1.1 Noise measurements were undertaken at a location consistent with the proposed development in accordance with BS 7445-1: 2003⁹ by Will Wright of Miller Goodall Ltd. The calibration of the sound level meter was checked before and after measurements with negligible deviation (<0.1 dB). Details of the equipment used are shown in Table 2, below.

Table 2: Noise monitoring equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 ^{10,11} Integrating Real Time 1/3 Octave Sound Analyser	NOR 140	Norsonic	1407510	15/12/2022	05552/1
Microphone	NOR 1225	Norsonic	384687	15/12/2022	05552/1
Class 1 Calibrator ¹²	NOR 1251	Norsonic	34123	13/10/2022	05409/1

⁸ WHO Night Noise Guidelines for Europe 2009

⁹ BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

¹⁰ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹¹ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

¹² IEC 60942 (2003) Electroacoustics – Sound calibrators

- 8.1.2 The survey was undertaken at the times specified in Table 3, below. Weather conditions were determined both at the start and on completion of the survey. It is considered that meteorological conditions were appropriate for environmental noise measurements. Measurement locations are shown in Appendix 1.

Table 3: Dates, times and weather conditions during survey

Measurement Locations	Date/Time	Weather conditions		
		Description	At Start of Survey	On Completion
Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view	22/1/2023 – 01:25 to 02:15	Temperature:	3 °C	3 °C
		Precipitation:	Dry	Dry
		Cloud cover (oktas – see opposite):	8	8
		Any fog/snow/ice?	No	No
		Any damp roads/wet ground?	No	No
		Wind speed:	None	None
		Wind direction:	N/A	
		Any conditions that may cause temp. inversion (e.g. calm nights with no cloud):	No	No

- 8.1.3 Measurements were taken at times considered to be representative of the periods during which the surrounding receptors would be subject to the lowest ambient and background sound levels. Measurements were made under free-field conditions at a height of 1.5 m above the ground.

- 8.1.4 The measurement locations are detailed below and indicated on Appendix 1.

- P1 Corner of Crown Lane and Corporation Street – in front of Ashton House
- P2 Corner of Little Nelson Street and Dantzic Street

8.1.5 The noise sources within the vicinity of the measurement locations are summarised in Table 4, below:

Table 4: Description of noise sources affecting the site

Measurement Locations	Noise Sources
P1	Road traffic noise and hum of plant at both locations. Source of plant noise at P1 unidentified but seemed to be located to the west of P1.
P2	Fire/burglar alarm sounding continuously. Plant noise dominated on east of site behind louvres of the residential apartment building opposite 10 Dantzic Street.

8.2 Monitoring Results

8.2.1 A summary of the broadband measurement data is provided in Table 5 below with full data in Appendix 2. All data are sound pressure levels in dB re 20 μ Pa.

Table 5: Summary of noise measurements

Measurement Position (MP)	Start Time	Elapsed Time (hr:min:)	$L_{Aeq,T}$ (dB)	Overall L_{AFmax} (dB)	$L_{AF90,T}$ (dB)
2	01:18	0:05:00	48.0	62.1	44.0
2	01:20	0:05:00	51.7	69.0	43.0
2	01:25	0:05:00	50.8	65.2	44.0
2	01:30	0:05:00	53.8	80.7	43.0
1	01:35	0:05:00	56.1	73.9	57.6
1	01:40	0:05:00	56.1	76.2	42.9
1	01:45	0:05:00	58.7	81.9	56.8
1	01:50	0:05:00	60.4	83.7	57.3
1	01:55	0:05:00	53.5	74.9	57.1
1	02:00	0:05:00	45.7	57.7	56.8
1	02:05	0:05:00	47.4	58.6	57.2
1	02:10	0:05:00	47.4	58.6	56.9
1	02:15	0:05:00	47.8	59.4	57.1

8.2.2 Due to the burglar/fire alarm at position 2 we have deemed the measurement in this location invalid. Notwithstanding this, the dominant noise source at this position was resulting from a nearby plant louvre.

8.2.3 Representative background sound levels in each octave band have been provided from the monitoring data. The lowest $L_{A90(5min)}$ is 43dB at MP1. This period is not impacted by the extraneous alarms which were audible at the site. Table 6 below provides the octave band data for the lowest 5 minute measurement during the survey (at position MP1).

Table 6: Representative L_{A90} Octave Band Background Sound Data

Position	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz	L_{A90}
1	53.2	51.0	45.0	39.3	36.2	30.5	21.0	12.2	44.1

- 8.3 The results from the above table have been utilised to provide an assessment criterion in line with the MCC guidelines.

Table 7: L_{90} Converted Spectrum and MCC Assessment Criteria

Description	Level, dB, at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
L_{90} NSR A	53	51	45	39	36	30	21	12
L_{eq} criteria for entertainment noise	≤ 43	≤ 41	≤ 35	≤ 29	≤ 26	≤ 20	≤ 11	≤ 2

9 Impact of Noise from the Proposed Development

9.1.1 Nearest Noise Sensitive Receptors

9.1.2 The site was attended on 22nd January 2023 and the nearest noise sensitive receptors (NSRs) were identified as shown in Figure 1 below.

Figure 1: Nearest identified NSRs to the proposed arches development (first-floor level – 4m height)



9.1.3 NSR A is a first-floor window (4m height) at Ashton House. NSR B is a first-floor residential window at 87 Dantizic Street (Manchester Court). NSR C is the residential development on corner of Mincing Street, Little Nelson Street and Corporation Street (The Stile – Meadowside).

9.2 Noise Modelling

9.2.1 Prediction of noise levels at sensitive receptors was carried out using CadnaA software package.

9.2.2 The general horizontal plan information of the area surrounding and including the proposed development site was imported from Google Earth. This was used to determine road positions, building footprint areas and relative locations and is considered accurate to within 5%. Building height information was based on site observations. Topography was not included in the design of the model as the proposed site is flat with little variation in terrain height. Sound reduction indices for the building envelope came from the Building Bulletin 93 materials database, or from Insul sound insulation prediction software.

9.2.3 The following parameters were assigned to the model:

- Propagation model: ISO 9613¹³
- Default ground absorption: 0.0 (acoustically reflecting)
- Two orders of reflection
- Buildings are reflecting (smooth, non-structured facade)

9.2.4 The distances between the noise sensitive receptors and respective nearest arches to them are as follows

- NSR A: 14m
- NSR B: 14m
- NSR C: 11m

9.2.5 The construction and assumed sound reduction indices of the elements making up the building envelope are shown in Table 8.

Table 8: Assumed sound reduction indices (SRI) of building façade elements

Façade element	Sound Reduction Index (SRI), dB in Octave Band Centre Frequency, Hz								R_w
	63	125	250	500	1k	2k	4k	8k	
External walls (min. 140 mm brick)	38	42	43	38	46	54	61	61	46
Glazing (SG Stadip Silence 8.4:12:10.8 mm)	22	28	29	39	44	50	61	64	42

9.2.6 The octave band L_{eq} source data shown in Table 9 were imported directly into the model. This data was obtained from the Little Red Book of Acoustics (2013).

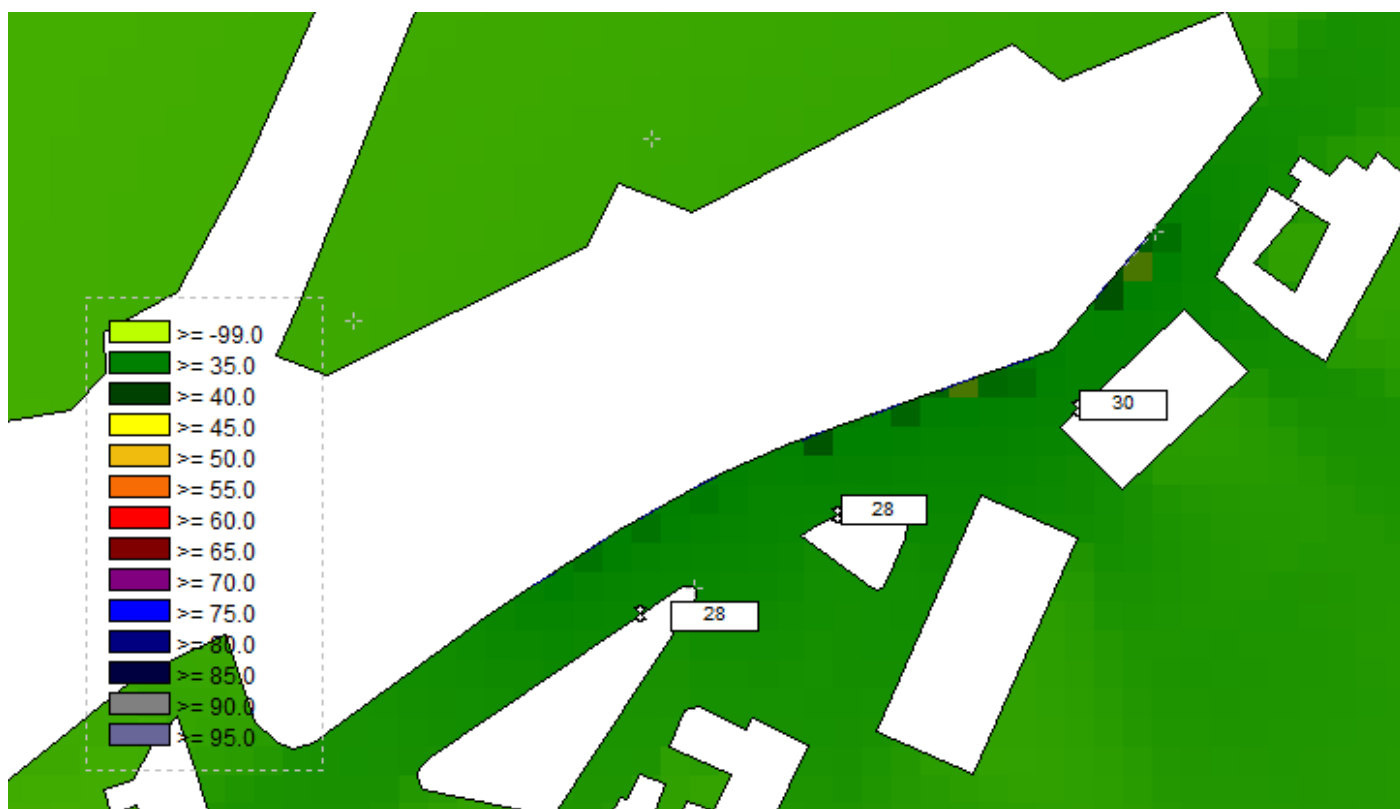
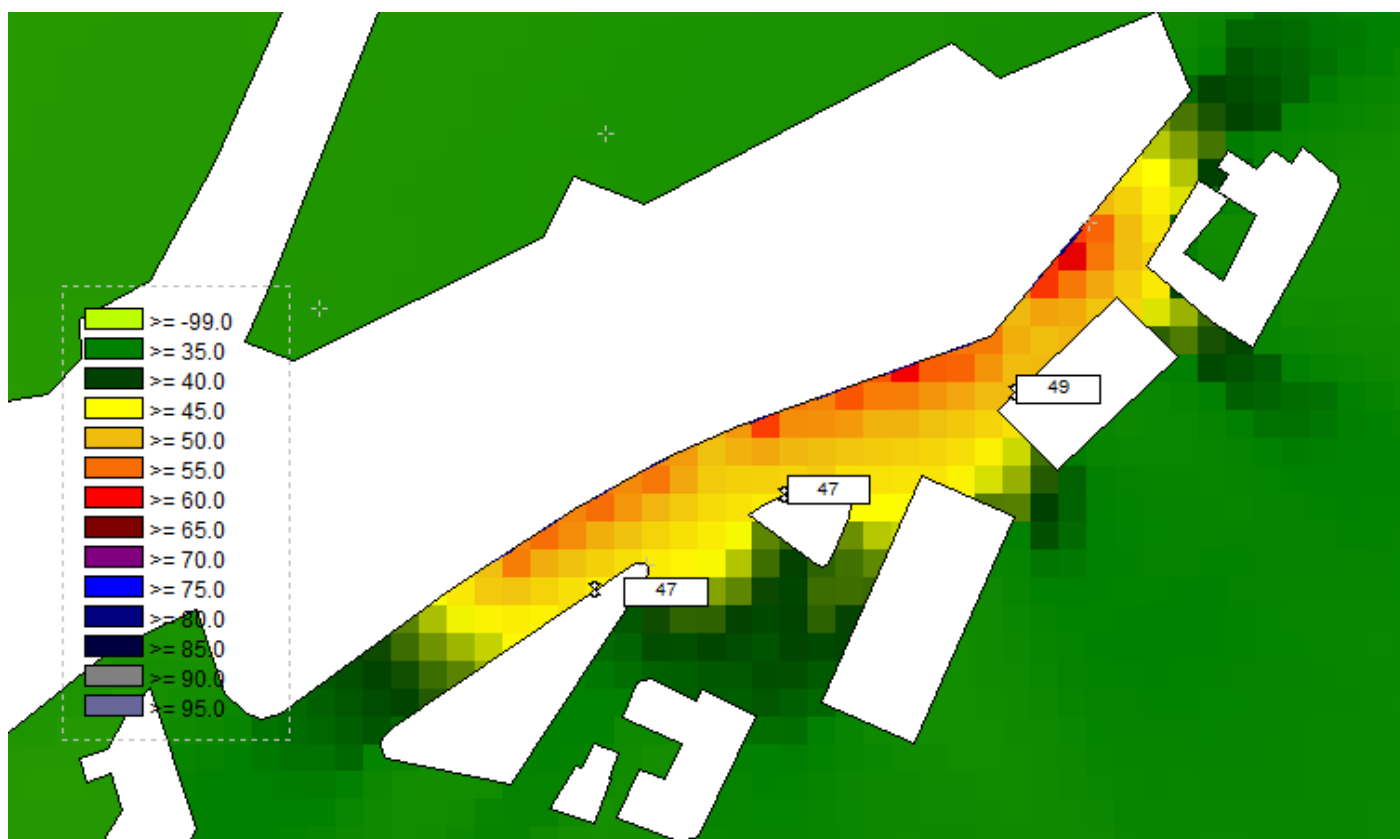
Table 9: Noise source data used within CadnaA

Description	Internal Reverberant Sound Pressure Level, dB in Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Busy Pub/Bar	80	85	85	85	85	80	70	70	88
Music Bar/Nightclub	110	110	100	100	95	90	85	85	101

¹³ ISO 9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation

9.3 Assessment to the Manchester Criteria

- 9.3.1 The predicted noise levels resulting from noise generated within the proposed units during busy operating periods are shown graphically in Figure 1 and 2 below. The predicted noise levels are based on the internal noise levels assumed in Table 9 and the façade insulation performance assumed in Table 8.

Figure 1: Predicted break-out noise levels from the Busy Pub/Bar**Figure 2: Predicted break-out noise levels from the Music Bar/Nightclub**

9.3.2 The predicted octave band L_{eq} levels at the receptors are shown in Table 10 and Table 11 and demonstrate the comparison with the MCC criteria.

Table 10: Predicted Octave-band Noise Levels at NSR A and Comparison to Background L_{90} - Busy Pub/Bar

Description	Sound Pressure Level, dB in Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Representative LA90 Octave Band Background Sound Data	53.2	51.0	45.0	39.3	36.2	30.5	21.0	12.2	44.1
Leq criteria; entertainment noise	≤ 43	≤ 41	≤ 35	≤ 29	≤ 26	≤ 21	≤ 11	≤ 2	-
NSR A L_{eq} noise level	36	35	34	24	19	8	0	0	-
Diff.	-7	-6	-1	-5	-7	-13	-11	-2	-
NSR B L_{eq} noise level	36	35	34	24	19	8	0	0	-
Diff.	-7	-6	-1	-5	-7	-13	-11	-2	-
NSR C L_{eq} noise level	38	37	36	26	21	10	0	0	-
Diff.	-5	-4	1	-3	-5	-11	-11	-2	-

Table 11: Predicted Octave-band Noise Levels at NSR A and Comparison to Background L_{90} - Nightclub

Description	Sound Pressure Level, dB in Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Representative LA90 Octave Band Background Sound Data	53.2	51.0	45.0	39.3	36.2	30.5	21.0	12.2	44.1
Leq criteria; entertainment noise	≤ 43	≤ 41	≤ 35	≤ 29	≤ 26	≤ 21	≤ 11	≤ 2	-
NSR A L_{eq} noise level	66	60	49	39	29	18	1	0	-
Diff.	+23	+19	+14	+10	+3	-3	-10	-2	-
NSR B L_{eq} noise level	66	60	50	39	30	18	2	0	-
Diff.	+23	+19	+15	+10	+4	-3	-9	-2	-
NSR C L_{eq} noise level	68	62	51	41	31	20	3	0	-
Diff.	+25	+21	+16	+12	+5	-1	-8	-2	-

9.3.3 The predicted noise levels achieve the MCC criteria at each octave band for the Busy Bar/Pub. The scenario with 10 nightclubs unsurprisingly exceeds the criteria at the majority of octave bands. All proposals use the mitigation proposed at that specified in Table 8, which includes high performance acoustic laminated glazing.

9.3.4 The results indicate that noise criteria at the receptors can be achieved assuming 'busy pub/ bar' noise levels; however, they are likely to be exceeded if 'music bar/ nightclub' noise levels are assumed. It may be necessary therefore to limit the levels of internal noise in these units by use of a suitably worded planning condition to

ensure that should these uses be required additional sound insulation measures are applied to these venues, which may include, but are not limited to:

- Inclusion of additional sound insulation within the development to provide a fully lobbied entrance to the nightclub
- Management controls of noise levels internally.

9.3.5 The prediction modelling assumes a fully sealed façade, and in practice this will not be the case with the presence of glazed doors, which would significantly reduce the performance of the façade. We would therefore recommend that any units which are proposed to be used for entertainment purposes should use lobbied doors, each with a minimum acoustic rating of R_w 30 dB which include an automatic closing mechanism and or are actively managed by door staff to ensure these remain closed when not in use.

9.3.6 No data has been provided at this stage of the development to include for plant related to extraction or air conditioning plant at the site. A suitably worded condition could be applied to the planning condition to ensure the rating level from plant does not exceed the existing background sound levels at the site.

9.3.7 It should be noted that the location of the site is below an existing active railway line which operates through the day with passenger trains and diesel haulage trains and through the night with diesel haulage trains, which will be loud for those properties close to the railway line.

9.4 Consideration of Other Discipline Requirements

9.4.1 It is recommended that you confirm the suitability of all recommended noise mitigation measures with your architects, structural engineers, building contractors, fire consultants and material manufacturers prior to procurement and field application so that when the recommended noise control measures are implemented on site they will satisfy the requirements of all disciplines, therefore, should not cause any health and safety issues.

10 Conclusions

10.1 Background sound measurements have been taken at the location of the nearest dwellings to a proposed site for the development of arches 1 - 4 & 6 - 11 at Corporation Street, Manchester. The background sound levels have been utilised to obtain noise criteria in each octave band in accordance with the MCC criteria for entertainment noise, which has been utilised at this site.

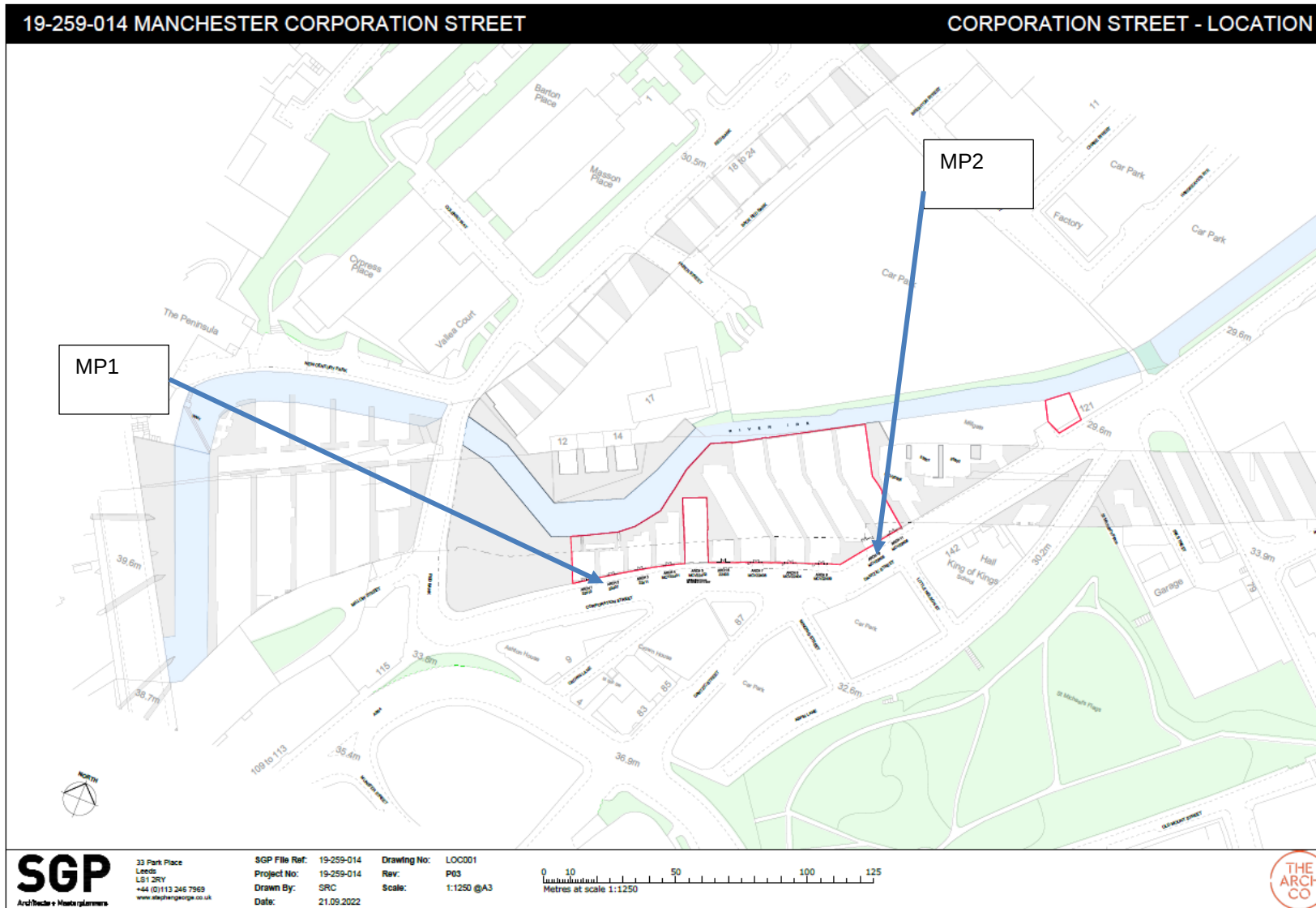
10.2 Noise modelling was used to predict the noise levels at the nearest dwellings and when assessed for a scenario where all the arches are used for a busy bar/pub, the levels achieve the noise criteria.

10.3 The noise modelling for the use of all the arches for night-clubs does not achieve the criteria. This scenario is based on a worst-case assessment and in reality is unlikely to happen. Our suggestion would be to provide a noise rating level where a noisy internal source is proposed, such as a night-club or music pub/bar. The condition would require the end user to provide sound insulation measures which would show how the rating level could be achieved.

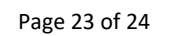
- 10.4 In conclusion, the potential impact of noise from the proposed development is not predicted to be significant for uses such as busy bars/pubs, however, for night-club or loud music bar uses in all the arches additional sound insulation measures would be required.

APPENDICES

Appendix 1: Site Location and Measurement Positions



[illegible]



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.

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 717-1:20-13.

