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Consultants in Acoustics, Noise & Vibration

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Downley Drive, Manchester

Acoustic planning report

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A	29 Mar 21		José M. González	Matthew Robinson
B	30 Mar 21	Updates to proposed number of residential units	José M. González	Matthew Robinson
C	30 Mar 21	Updates to unattended monitoring position description	José M. González	Matthew Robinson
D	13 Apr 21	Updates to site description and ventilation strategy	José M. González	Matthew Robinson
E	19 Apr 21	Minor updates	José M. González	Matthew Robinson

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Summary

Sandy Brown has been commissioned by Great Places Housing Association to provide acoustic advice in relation to the proposed development at Downley Drive, Manchester.

An environmental noise survey has been carried out to determine the existing sound levels in the area of the proposed development, and setting appropriate plant noise limits in line with the requirements of Manchester City Council.

The survey has been carried out during a period of restricted movement due to the Covid-19 pandemic and consequently background noise levels may have been affected compared to the usual conditions.

A robust estimate of the environmental noise climate is therefore required, in line with the *'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments'* produced by the Association of Noise Consultants and the Institute of Acoustics.

The unattended noise survey was carried to determine the existing sound levels to the west of the site, over 15 minute periods between 13:50 on 25 February 2021 and 10:10 on 5 March 2021.

The representative background sound levels measured during the survey to the west (Rochdale Canal) were $L_{A90,15min}$ 42 dB during the daytime and $L_{A90,15min}$ 36 dB at night.

The representative maximum noise levels at the site during the night-time vary between $L_{AFmax,5min}$ 61 dB to the south (Woodward Pl) and $L_{AFmax,5min}$ ≤ 52 dB to the west (St Vincent Street), to the north (Rochdale Canal), and to the east (Downley Drive).

Based on the requirements of Manchester City Council, all plant must be designed such that the cumulative noise levels at 1 m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the typical background noise levels measured.

These limits are cumulative and apply with all plant operation under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent that those set.

An initial assessment has been carried out to determine required acoustic performances for the facades and provide guidance on the ventilation strategy.

The overall sound insulation requirements range between R'_w+C_{tr} 9 dB and R'_w+C_{tr} 24 dB depending on the location of the facade. Standard thermal double glazing is expected to be suitable to all windows in the terrace houses and apartment building.

It is understood that background ventilation is to be provided by mechanical ventilation via MVHR units for all houses and apartments. However, openable windows may be used for purge ventilation.

A Level 1 Acoustics, Ventilation and Overheating assessment has been undertaken, the development falls within negligible and low risk categories. This indicates that additional ventilative cooling can be provided via openable windows with a limited increase in the internal noise levels.

An assessment of noise levels in external amenity spaces has been undertaken, the results of which indicate that generally, external noise levels are within the lower and upper guidance limits recommended by BS 8233: 2014.

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1 Introduction

Sandy Brown has been commissioned by Great Places Housing Association to provide acoustic advice in relation to the proposed development at Downley Drive, Manchester.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of the Manchester City Council.

Ambient and maximum noise levels are used to assess building envelope sound insulation requirements to achieve appropriate internal noise levels for residences. These follow standards set in accordance with Manchester City Council guidelines.

This report provides details of the noise survey, including measurement results, and provides recommendations.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1. The proposed development comprises a new apartment block with 45 units, over 4 floors and 23 terraced houses.

The site is bounded by St Vincent Street and the Rochdale Canal to the north, edges of existing dwellings on Woodward Place to the west, Downley Drive to the south and Kingham Drive to the east. The western portion of the Site is currently vacant and secured by fencing, comprising predominantly of overgrown shrubland with a limited amount of hard standing. The eastern portion of the Site is comprised of grassland with a limited number of trees. An unadopted path cuts through the Site from St Vincent to the north to Donwley Drive to the south.

Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is located within a mixed residential, and industrial area. A summary of the nearby premises are set out below in reference to Figure 1.

- Residential premises on Downley Drive and Kingham Drive highlighted in red in Figure 1
- Residential premises on Woodward Place approximately 6 m from the site boundary to the south, highlighted in dark blue in Figure 1.
- Residential premises on St Vincent St approximately 7 m from the site boundary to the west, highlighted in orange in Figure 1.
- Residential premises Miles Platting area 4.1 (under development) on Fulmer Drive, approximately 45 m from the site boundary to the north east, highlighted in purple in Figure 1.
- Residential premises on Mozart Close approximately 75 m from the site boundary to the north, highlighted in brown in Figure 1.
- Residential block (Woodward Court) approximately 85 m from the site boundary to the east highlighted in light blue in Figure 1.

- Industrial premises on Jersey Street approximately 30 m to the west, highlighted in pink in Figure 1.

There is residential block and office building at 62-64 Jersey St (Flint Glass Works), these buildings are screened from the proposed development, highlighted in yellow in Figure 1.

3 Development proposals

The proposed development will deliver sixty-eight Affordable Homes, comprising of twenty-three houses and forty-five apartments within a four-storey building, alongside associated landscaping, boundary treatment, car parking, and cycle parking.

The proposed development is highlighted in red in Figure 2.

Figure 2 Excerpt of drawing *8801-BA-00-00-DR-A-(04) 001- Site Plan_Proposed*

3.1 Potential noise sources

The potential noise sources associated with the scheme are building services plant. Noise egress limits have been set out to minimise the noise impact at the nearest sensitive premises around the development

4 Assessment criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, February 2019 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

> *'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:*
>
> - *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.*
> - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

and

> *'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'*

The NPSE states that its aims are as follows:

> *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *Avoid significant adverse impacts on health and quality of life*
> - *Mitigate and minimise adverse impacts on health and quality of life and*
> - *Where possible, contribute to the improvement of health and quality of life.'*

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

4.2 Noise egress

4.2.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2.2 Local Authority criteria

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in *Planning and Noise Technical Guidance* document dated December 2015. It states the following in relation to plant noise egress:

> *'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.'*

4.3 Noise ingress

4.3.1 Local Authority requirements

Manchester City Council stipulates the criteria provided in Table 1 with regards to internal noise in residential developments due to background ventilation.

Table 1 Manchester City Council internal noise criteria for residential developments

Internal space	Internal noise limit, L_{Aeq} (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living rooms	35	35
Bedrooms	35	30

It is also stipulates that individual noise events in bedrooms should not exceed L_{AFmax} 45 dB by more than 15 times.

It is understood from discussion with Manchester City Council that the above noise criteria do not apply during purge ventilation (ie, when windows are open to get rid of cooking /paint smells, etc) and that during rapid ventilation for summertime cooling, MCC permit a 5 dB relaxation on the criteria.

4.3.2 British Standard guidance

Guidance on acceptable internal noise levels in residential dwellings is given in BS 8233:2014 *Sound insulation and noise reduction for buildings*. The guidance limits are shown in Table 2.

These internal levels are based on annual average data and do not have to be achieved in all circumstances. It is normal to exclude occasional events, such as fireworks night or New Year's Eve.

Table 2 Internal noise criteria for sleeping/resting

Internal space	Indoor ambient noise level, L_{Aeq} (dB)	
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
Living rooms	35	-
Dining room	40	-
Bedrooms	35	30[1]

[1] BS 8233 notes that individual noise events can cause sleep disturbance, and that a guideline value may be set depending on the character and number of events per night, although no specific limit is provided. For regular events, such as scheduled aircraft or passing trains, a guideline value may be set in terms of SEL or $L_{Amax,F}$. Sporadic noise events could require separate values.

The standard states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas, such as gardens and patios, the standard states:

> *'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.'*

4.3.3 Acoustics, ventilation and overheating

Guidance on external noise levels from transport noise sources and the assessment of risk in an overheating condition is given in the Association of Noise Consultants *Acoustics Ventilation and Overheating, Residential Design Guide* (AVOG).

A Level 1 assessment comprises assessing the external free-field noise levels to guideline thresholds. External noise levels and the associated risk categories for a Level 1 assessment are adapted and summarised in Table 3, though consideration also has to be given the duration and frequency of any overheating periods.

Table 3 Guidance for Level 1 assessment of noise from transport sources relating to overheating condition

Risk category for Level 1 assessment	External free-field noise level	
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
Negligible	$L_{Aeq} \leq 52$ dB	$L_{Aeq} \leq 47$ dB
Low	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 57$ dB	$L_{Aeq} > 47$ dB and $L_{Aeq} \leq 52$ dB
Medium	$L_{Aeq} > 57$ dB and $L_{Aeq} \leq 62$ dB	$L_{Aeq} > 52$ dB and $L_{Aeq} \leq 55$ dB
High	$L_{Aeq} > 62$ dB	$L_{Aeq} > 55$ dB

If a Level 1 assessment finds that the development falls into a 'Medium' or 'High' risk category a Level 2 assessment should be carried out, assessing the expected internal noise levels for an overheating condition and the associated risk of adverse effect. The Level 2 assessment would consider the following:

- Duration of period where additional ventilative cooling is required (to be assessed by others, typically part of a CIBSE TM59 assessment)
- How wide the external windows would need to be open to control overheating (to be assessed by others, typically part of a CIBSE TM59 assessment).

The guidance for suitable internal noise levels in order that noise ingress can be suitably controlled for an overheating condition are provided in AVOG. These are adapted and summarised in Table 4, though are not supposed to be taken as limits, rather guidelines to be assessed while also considering the adverse effect of any overheating (duration and severity).

The lowest observed affect level (LOAEL) and the significant observed affect level (SOAEL) for increased noise levels associated with controlling overheating are specific to each project as these depend on the magnitude of the increased internal noise levels and the duration for which they occur.

Table 4 Guidance for Level 2 assessment of noise from transport sources relating to overheating condition

Effect level	Internal noise level from transport sources		
	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)	
LOAEL (noise can be heard, but does not cause any change in behaviour)	$L_{Aeq} \leq 35$ dB	$L_{Aeq} \leq 30$ dB	L_{AFmax} 45 dB not normally exceeded
SOAEL upper limit for longer overheating durations	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 40$ dB	$L_{Aeq} > 30$ dB and $L_{Aeq} \leq 35$ dB	-
SOAEL upper limit for shorter overheating durations	$L_{Aeq} > 40$ dB and $L_{Aeq} \leq 50$ dB	$L_{Aeq} > 35$ dB and $L_{Aeq} \leq 42$ dB	-
Exceeds SOAEL (noise causes a material change in behaviour)	$L_{Aeq} > 50$ dB	$L_{Aeq} > 42$ dB	L_{AFmax} 65 dB normally exceeded

The AVOG illustrates that there is a link between adverse effects, increasing internal ambient noise levels and the duration of exposure to noise for an overheating condition. These are indicated in Figure 3**.**

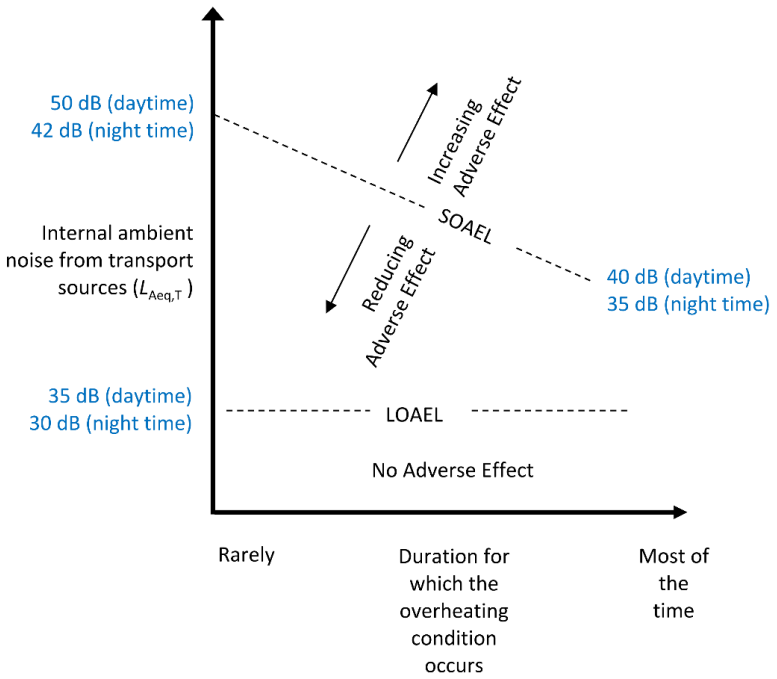

Figure 3 Internal ambient noise levels and increasing adverse effects for an overheating condition

When internal noise levels are above Significant Observed Adverse Effect Level (SOAEL), it is likely that there will be a high potential for an adverse outcome. These adverse outcomes will include:

- Material change in behaviour and/or attitude, eg avoiding certain activities during periods of intrusion
- Where there is no alternative ventilation, having to keep windows closed most of the time because of the noise
- Potential for sleep disturbance and difficulty in getting back to sleep
- Quality of life diminished.

As illustrated, the potential for adverse risk increases with the duration of exposure to noise, ie, a shorter exposure will result in a lower risk of adverse outcomes.

5 Survey method

5.1 Noise survey method

The survey included unattended and attended day, evening and night-time noise measurements.

5.1.1 Unattended measurements

Unattended measurements were carried out at Plot C overlooking Jersey Street over nine days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were carried out over 15 minute periods between 13:50 on 25 February 2021 and 10:10 on 5 March 2021. The equipment was installed by José M. González and Kane Mitchel and collected by José M. González. This measurement position had a clear line of sight of Jersey Street and considered to be representative of noise levels outside the nearest noise sensitive premises to the west of the site.

This measurement position is located outside the proposed development site. This is considered to be representative of the ambient and background sound level in the vicinity of the proposed site, as there are no major noise sources (ie, main roads, railways, etc) that affect the proposed development site or the measurement position. The measured noise levels will supplement the attended day, evening and night-time measurements carried out around the proposed site (see Section 5.1.2).

The measurement position used during the survey is indicated in Figure 1, denoted by the letter ‘L’. A photograph showing the measurement location is provided in Figure 4. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises to the west.

The microphone was installed on a tripod and approximately 2 m from the local ground and at least 5 m from any other reflective surface.

Figure 4 Photograph showing the unattended measurement position at Jersey Street

5.1.2 Attended measurements

Attended day, evening and night-time sample measurements were carried out by José M. González at 4 locations around the site. These are indicated in Figure 1 as positions 1 to 4.

The daytime and evening measurements were carried out between 16:57 and 21:34 on 9 March 2021, over 5 minute periods.

The night-time measurements were carried out on between 23:00 on 17 March 2021 and 01:46 on 18 March 2021, over 5 minute periods.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level. For position 1, the microphone was located approximately 3 m from a reflective surface. For positions 2, 3 and 4 the microphone was located at least 5 m from a reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

5.2 Weather conditions

Weather conditions during the survey are described in Appendix A. Measurement results

5.3 Observations

5.3.1 Noise

During the attended daytime, the dominant noise sources observed at the site during the survey consisted of cars passing by, distant road traffic, pedestrian passing by talking and occasional aircraft overhead.

Less significant noise sources included bird song and occasional car slamming doors

During the attended night-time, the dominant noise sources observed at the site during the survey consisted of cars pass by, distant road traffic, and occasional honking from wildlife.

Less significant noise sources included pedestrian passing by talking.

5.4 Noise measurement results

5.4.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 5.

Table 5 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 25 February 2021	53[1]	49
Friday 26 February 2021	55	52
Saturday 27 February 2021	53	48
Sunday 28 February 2021	55	51
Monday 1 March 2021	54	51
Tuesday 2 March 2021	56	50
Wednesday 3 March 2021	54	48
Thursday 4 March 2021	53	48
Friday 5 March 2021	55[1]	-
Average	54	50

[1] Measurement not made over full period due to monitoring start and end time (the measurement on Thursday 25 February 2021 was over 9 hours, and on Friday 5 March 2021 over 3 hours); not included in the average.

In line with BS 4142:2014+A1:2019, for the purpose of analysis and establishing representative background sound levels, day and night-time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night-time statistical analysis of representative values for the site are given in Figure 5 and Figure 6.

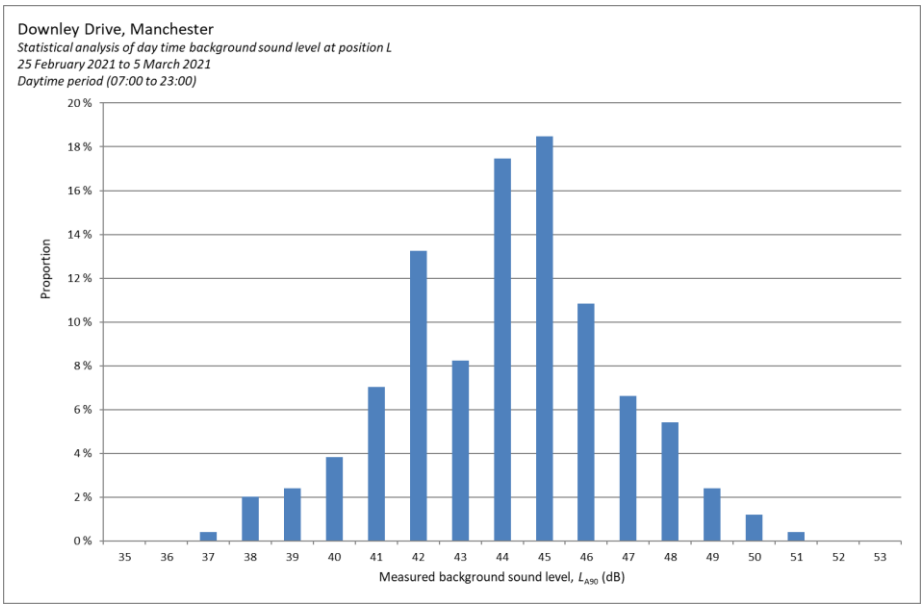

Figure 5 Statistical analysis of daytime background sound levels

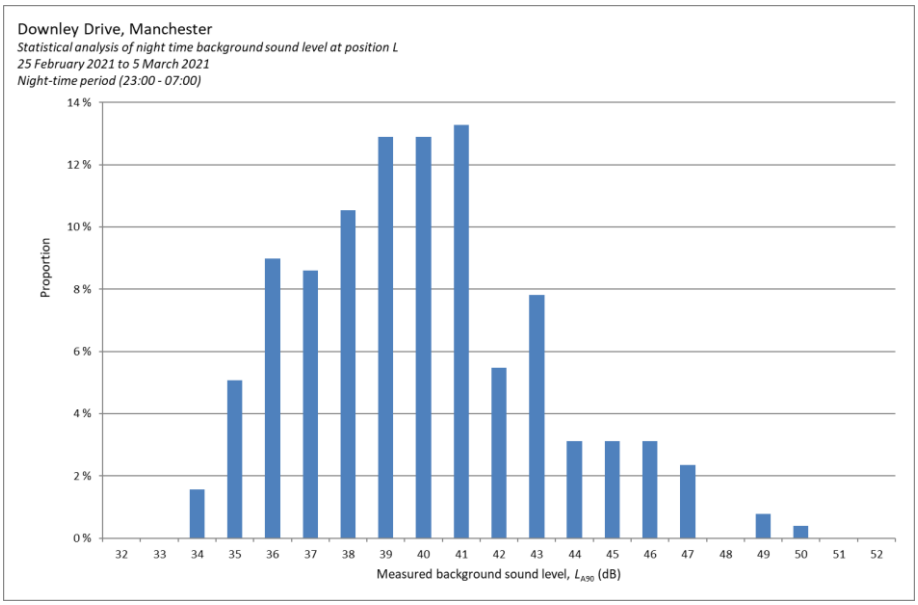

Figure 6 Statistical analysis of night-time background sound levels

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 42 dB during the daytime and $L_{A90,15min}$ 36 dB at night.

5.4.2 Attended measurement results Daytime – 9 March 2021

Noise levels and key sources recorded during the attended measurements are summarised in Table 6.

Table 6 Noise levels and key noise sources from attended measurements (Daytime and evening)

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	17:13	46	68	43	Distant road traffic, pedestrians passing by talking, distant siren, metal door closing ($L_{AFmax,5min}$ 72-73 dB)
	17:18	47	73	44	
	17:23	48	72	44	
	18:18	56	75	45	Car slamming door, metal door closing, pedestrians passing by talking loudly ($L_{AFmax,5min}$ 95 dB)
	18:23	48	70	45	
	18:28	65	95	45	
	19:50	48	67	43	Distant road traffic, car passing by with amplified music, metal door closing, car slamming door ($L_{AFmax,5min}$ 75 dB), pedestrians passing by talking loudly ($L_{AFmax,5min}$ 77 dB)
	19:55	54	77	43	
	20:00	54	75	43	
	21:19	43	51	42	Distant road traffic, distant pedestrians talking
	21:24	44	53	42	
	21:29	43	49	42	
2	16:57	51	75	43	Distant road traffic, pedestrians passing by talking, bird song, geese honks ($L_{AFmax,5min}$ 75 dB)
	17:02	44	56	43	
	17:07	45	61	43	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
2	18:02	47	58	46	Distant road traffic, pedestrians passing by talking, distant car slamming door, car horn ($L_{AFmax,5min}$ 68 dB)
	18:07	48	68	45	
	18:12	47	59	45	
	20:08	45	54	44	Distant road traffic, pedestrians passing by
	20:13	45	53	43	
	20:18	45	50	43	
	21:02	43	52	41	Distant road traffic, distant geese honk ($L_{AFmax,5min}$ 70 dB)
	21:07	44	57	41	
	21:12	44	70	41	
3	17:46	46	58	45	Distant road traffic, bird song, aircraft overhead
	17:51	47	59	45	
	17:56	48	59	45	
	18:51	44	55	42	Distant road traffic, distant house slamming door, distant bin droppings, distant car horn.
	18:56	45	63	42	
	19:01	45	58	42	
	19:15	45	55	43	Distant road traffic, distant dog barking
	19:20	44	56	42	
	19:25	49	67	43	
	20:27	45	59	42	Distant road traffic, pedestrians talking, car slamming door, aircraft overhead
	20:32	49	67	42	
	20:37	44	56	42	
4	17:29	56	81	43	Car passing by, distant car engine, pedestrians passing by talking, Car passing by accelerating ($L_{AFmax,5min}$ 81 dB)
	17:34	53	72	42	
	17:39	49	69	43	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
4	18:34	46	69	41	Distant road traffic, TV and people talking within residential premises, distant car horn ($L_{AFmax,5min}$ 69 dB)
	18:39	43	56	41	
	18:44	44	64	40	
	19:33	40	57	39	As above + car slamming door, car engine, car passing by.
	19:38	53	69	39	
	19:43	49	67	40	
	20:45	39	63	37	Distant road traffic, distant siren, distant pedestrians talking, aircraft overhead
	20:50	39	55	37	
	20:55	45	63	36	

The average daytime ambient noise levels are summarised below for each measurement position:

- Position 1 – L_{Aeq} 50 dB
- Position 2, 3 and 4 – L_{Aeq} 46 dB.

5.4.3 Attended measurement results Night-time – 17 to 18 March 2021

Noise levels and key sources recorded during the attended measurements are summarised in Table 7.

Table 7 Noise levels and key noise sources from attended measurements (night-time)

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	23:45	36	46	35	Distant road traffic, distant electric hum, aircraft overhead
	23:50	36	42	35	
	23:55	37	52	36	
	01:12	37	49	36	Distant road traffic, distant electric hum, pedestrians passing by talking
	01:17	38	46	36	
	01:22	40	51	37	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
2	00:06	39	51	37	Distant road traffic, distant wildlife
2	00:11	39	48	37	
	00:16	38	47	36	
	01:31	40	49	37	Distant road traffic, distant siren, geese honk ($L_{AFmax,5min}$ 68 dB)
	01:36	38	44	37	
	01:41	44	68	38	
3	23:00	39	59	35	Distant road traffic
	23:05	38	48	36	
	23:10	37	49	36	
	00:30	35	42	33	Distant road traffic, distant siren
	00:35	36	44	33	
	00:40	36	41	34	
4	23:22	51	71	35	Distant road traffic, distant siren, car engine and passing by, distant car with amplified music, pedestrian passing by talking ($L_{AFmax,5min}$ 71 dB).
	23:27	37	43	35	
	23:32	40	59	35	
	00:51	38	61	36	Distant road traffic, distant dog barking ($L_{AFmax,5min}$ 61 dB).
	00:56	37	53	34	
	01:01	36	44	34	

The average night-time ambient noise levels are summarised below for each measurement position:

- Position 1 and 3- L_{Aeq} 37 dB
- Position 2 and 4- L_{Aeq} 40 dB.

The representative maximum noise levels at the site during the night-time vary between $L_{AFmax,5min}$ 61 dB to the south (Woodward Pl) and $L_{AFmax,5min}$ ≤ 52 dB to the west (St Vincent Street), to the north (Rochdale Canal), and to the east (Downley Drive).

6 Plant noise egress

6.1 Plant noise limits

The background measurement results from the attended measurements are very similar to the representative background levels in the statistical analysis. On this basis the representative background levels have been used to set plant noise limits at the nearest noise sensitive premises.

Based on the above the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 8.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background noise levels by the addition of 3 dB.

Table 8 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	40
Night-time (23:00-07:00)	34

[1] The limits set out in Table 8 do not include any attention catching features. The penalty corrections for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed in Appendix C.

6.2 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

7 Facade sound insulation – noise ingress

This section describes an assessment of facade sound insulation to control noise ingress. The required facade specification largely depends on the external noise levels and the internal noise criteria.

Based on the measured external noise levels and internal noise ingress assessment has been carried out to determine the required sound insulation of the envelopes to the proposed residential to achieve the internal noise levels recommended by Manchester City Council and BS 8233: 2014 as set out in Section 4.3.

7.1 Impact of Covid-19

The survey has been carried out during a period of restricted movement due to the Covid-19 pandemic, and consequently background noise levels may have been affected compared to the usual conditions.

A robust estimate of the environmental noise climate is therefore required, in line with the *'Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments'* produced by the Association of Noise Consultants and the Institute of Acoustics.

Historic noise data from other surveys in the vicinity of the site has therefore been reviewed. This is from acoustic reports available of the Manchester City Council planning portal. The details of these surveys are summarised below.

7.1.1 Previous environmental noise survey details

The following environmental noise surveys have been investigated to assess potential changes in the noise climate around the site:

- New Little Mill (Arup), 8 and 21 October 2014 and 11 November and 1 December 2016
- Blossom Street (Arup) 14 to 21 July 2015

The approximate measurement location and for each survey are indicated in Figure 7.

Figure 7 Historical noise survey measurement locations (courtesy of Google Earth Pro)

The minimum background noise levels recorded during each survey are summarised in Table 9.

Table 9 Minimum background noise levels

Location	Background sound pressure level	
	Daytime (07:00 – 19:00)	Night (23:00 – 07:00)
A) New Little Mill (Arup) Logger A	$L_{A90,T}$ 45 dB	$L_{A90,T}$ 38 dB
A) New Little Mill (Arup) Logger B	$L_{A90,T}$ 44 dB	$L_{A90,T}$ 41 dB
B) Blossom Street (Arup)	$L_{A90,15min}$ 42 dB	$L_{A90,15min}$ 37 dB

Also, there is available survey measurement results for Miles Platting area 4.1 (to the north) included in the *Noise Survey and Acoustic Design Advice* report from Resonance Acoustic dated 17 April 2019 in the Manchester City Council planning portal, however, the report does not provide with background measurement results, therefore, this has not been included in this noise survey data review.

7.1.2 Assessment of changes in the noise climate

The site is surrounded by local roads and difficult to quantify the reduction in traffic. However, the measured background levels are considered worst-case scenario, as the road traffic is expected to eventually return to typical levels before the Covid-19 pandemic.

Based on the measurement results summarised in Table 9, the background noise levels measured during the attended noise survey are broadly in line with previous measurements in the vicinity. On this basis, the background noise levels measured can be considered suitably representative of the worst-case background levels for the typical noise climate on the site.

Based on DEFRA online transport modes data available for the dates of the attended environmental noise surveys, the road traffic in the UK was estimated to be 75% in comparison to pre-Covid-19 pandemic. On this basis, a 1.2 dB correction (increase) has been included to the measured ambient noise levels, to assess the incident noise levels at the proposed development, and determine the required facade sound insulation performance for the proposed terrace houses and apartment building.

7.2 Environmental noise modelling

A computer model of the site and its surrounding has been built using CadnaA software by Datakustik, with the purposes of calculating the external noise levels at the different facades of the proposed development based on the results of the environmental noise surveys.

The software carries out calculation using a ray tracing technique. This takes into account the effects to topography, reflections, screening and distance attenuation for noise sources to predicts noise levels in three dimensions. Calculations are carried out in accordance with

ISO 9613 *Attenuation of sound during propagation outdoors*. An image of the computer model is provided in Figure 8 and Figure 9.

Figure 8 Screenshot of 3D environmental noise model – Predicted facade noise levels, daytime, L_{Aeq} (dB)

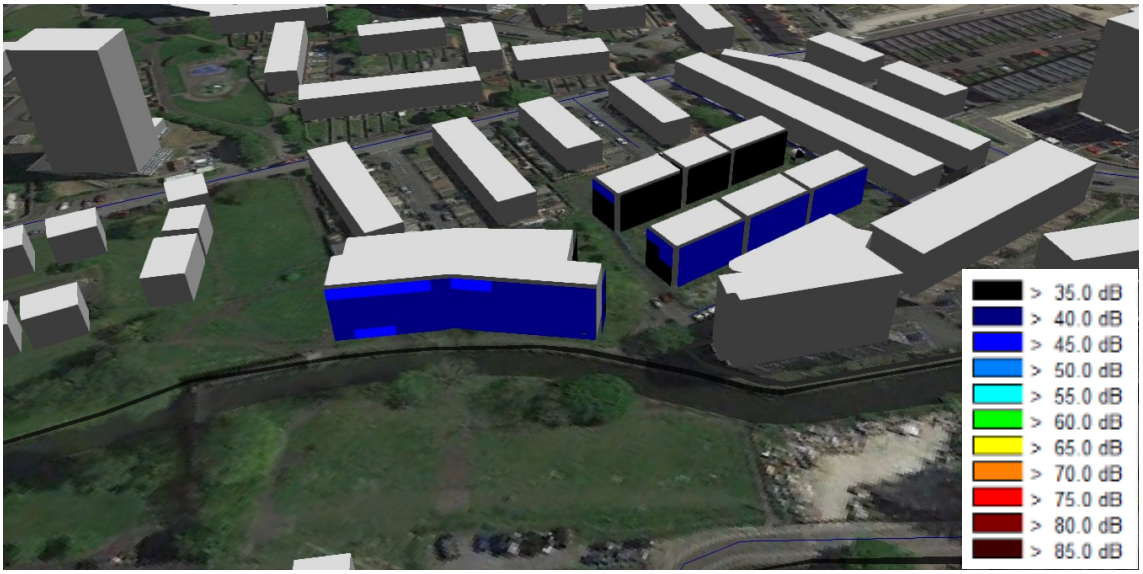

Figure 9 Screenshot of 3D environmental noise model – Predicted facade noise levels, night-time, L_{Aeq} (dB)

7.3 External noise levels

The external noise level zones indicating the predicted external noise levels at the facades of the proposed development for daytime and night-time are marked-up in Appendix D.

7.4 Facade sound insulation

Minimum facade sound insulation requirements for the facades, under the background ventilation condition are given in Table 10. These have been determined to achieve the internal noise criteria for bedrooms and living areas using predicted external noise levels at the facades.

At this site, the facade performance requirements are driven by the daytime ambient noise levels for living rooms and night-time ambient noise levels for bedrooms. For bedrooms overlooking Woodward Place, maximum noise levels drive the facade performance requirements.

The facade specification has been determined to ensure that $L_{AFmax\ 5\ min}$ criteria is exceeded no more than 15 occasions based on measured representative maximum night levels.

Based on the indicated glazing areas, the sound insulation performance for residential apartments with dual aspect rooms have been predicted, and indicated in brackets in Table 10**.**

Table 10 Facade zones and minimum overall facade sound insulation performances

Facade zone (Appendix D)	Predicted noise level		Overall sound insulation performance R'_w+C_{tr} (dB)			
	L_{Aeq} (dB)	$L_{AFmax,5min}$ (dB) not normally exceeded at night-time	Living room		Bedroom	
			Single aspect	Dual aspect	Single aspect	Dual aspect
A	52	-	20	24	17	21
B	48-50	-	18	22	15	19
C	45-47	-	15	19	12	16
D	≤ 44	-	12	16	9	13
AA		61	-	-	16	20
BB		≤52	-	-	7	11

7.5 Guidance on facade construction, glazing, and ventilation strategy

Table 11 sets out some examples of glazing configurations and ventilation strategies that could achieve the required sound insulation performances.

Table 11 Example glazing configurations and ventilation strategies for overall facade sound insulation

Overall facade sound insulation, R'_w+C_{tr} (dB)	Example glazing configuration	Ventilation strategy
≤10	6 mm glass/16 mm cavity/6 mm glass	Limited open area opening windows
10-15	6 mm glass/16 mm cavity/6 mm glass	Limited open area opening windows
15-24	6 mm glass/16 mm cavity/6 mm glass	Acoustically attenuated passive ventilation (eg, trickle vents)

The attenuation of sound provided by an open window is typically in the region of 10 to 15 dB, depending on the open area. As such, where the required facade sound insulation performance is less than R'_w+C_{tr} 10 dB, it is likely that opening windows can be used for ventilation while achieving the necessary internal noise levels.

In areas where the required facade sound insulation is between R'_w+C_{tr} 10 and 15 dB, partially open windows may be used for ventilation purposes. However, it is understood that background ventilation to bedrooms and living areas are to be provided by mechanical ventilation via MVHR units for all houses and apartments, and purge ventilation and summertime cooling will be provided via opening windows.

A more detailed facade assessment will be needed as the design develops to ensure the overall performance requirements are met.

7.6 Acoustics, ventilation and overheating assessment

A Level 1 assessment of noise ingress during an overheating condition has been carried out in line with Association of Noise Consultants *Acoustics Ventilation and Overheating, residential Design Guide*.

Residential terrace houses overlooking St Vincent Street (Blocks 1 to 3): During the daytime, these terrace houses fall into the low risk category. During the night-time, these terrace houses fall into the negligible risk category. On this basis a Level 2 assessment is not needed.

Residential terrace houses overlooking Woodward Place and Downley Drive: During the daytime and at night, these terrace houses fall into the negligible risk category. On this basis a Level 2 assessment is not needed.

Residential apartment block: During the daytime and at night, this residential apartment block fall into the negligible risk category. On this basis a Level 2 assessment is not needed.

For all areas of the development the assessment indicates that additional ventilative cooling can be provided via limited area openable windows with a limited increase in the internal noise levels.

8 External amenity areas

The residential terrace houses are to have external areas, there is also landscaped private amenity space adjacent to the apartment block.

The noise levels in the proposed terrace houses are expected to range between L_{Aeq} 38-53 dB during the daytime and $L_{Aeq} \leq 50$ dB at night. These levels are in line with guidance on acceptable levels for external amenity areas.

The noise levels in the proposed apartment houses are expected to range between L_{Aeq} 42-47 dB during the daytime and $L_{Aeq} \leq 50$ dB at night. These levels are in line with guidance on acceptable levels for external amenity areas.

9 Conclusion

An environmental noise survey has been carried out to determine the existing sound levels in the area of the proposed development, and setting appropriate plant noise limits in line with the requirements of Manchester City Council.

An environmental noise survey has been carried out to determine the existing sound levels to the west of the site. The unattended noise survey was carried out over 15 minute periods between 13:50 on 25 February 2021 and 10:10 on 5 March 2021.

The representative background sound levels measured during the survey to the west (Rochdale Canal) were $L_{A90,15min}$ 42 dB during the daytime and $L_{A90,15min}$ 36 dB at night.

Based on the requirements of Manchester City Council, all plant must be designed such that the cumulative noise levels at 1 m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the typical background noise levels measured.

The overall sound insulation requirements range between R'_w+C_{tr} 9 dB and R'_w+C_{tr} 24 dB depending on the location of the facade. Standard thermal double glazing is expected to be suitable to all windows in the terrace houses and apartment building.

It is understood that background ventilation to bedrooms and living areas are to be provided by mechanical ventilation via MVHR units for all houses and apartments, and purge ventilation and summertime cooling will be provided via opening windows.

A Level 1 Acoustics, Ventilation and Overheating assessment has been undertaken, the development falls within negligible and low risk categories. This indicates that additional ventilative cooling can be provided via openable windows with a limited increase in the internal noise levels.

An assessment of noise levels in external amenity spaces has been undertaken, the results of which indicate that external noise levels are within the lower and upper guidance limits recommended by BS 8233: 2014.

Appendix A

Survey details

Equipment

The unattended noise measurements were taken using a Rion NL-52 sound level.

The daytime attended noise measurements were taken on 9 March 2021 using a Rion NL-52 sound level meter. The night-time attended noise measurements were taken between 17 and 18 March 2021 using a Norsonic 118 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	16 Mar 23	TCRT21/1182
Microphone	UC-59/05549	Rion	16 Mar 23	TCRT21/1182
Pre-amp	NH-25/32354	Rion	16 Mar 23	TCRT21/1182
Calibrator	NC-74/34125432	Rion	16 Mar 23	TCRT21/1181
Sound level meter	NL-52/01143564	Rion	15 Dec 22	TCRT20/1738
Microphone	UC-59/10153	Rion	15 Dec 22	TCRT20/1738
Pre-amp	NH-25/43581	Rion	15 Dec 22	TCRT20/1738
Calibrator	NC-74/34257023	Rion	14 Dec 22	TCRT20/1736
Sound level meter	Nor118/31754	Norsonic	16 Feb 23	UCRT21/1226
Microphone	40AF/62396	Gras	16 Feb 23	UCRT21/1226
Pre-amp	1206/30873	Norsonic	16 Feb 23	UCRT21/1226
Calibrator	1251/31322	Norsonic	16 Feb 23	UCRT21/1224

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between -3°C at night and 12°C during the day, and the wind speed was less than 4 m/s.

During the attended daytime and evening noise measurements on 9 March 2021, the weather was overcast and mainly dry, however, occasional light rain occurred. Wind speeds varied between 0 m/s and 3 m/s.

During the attended night-time noise measurements on 17 and 18 March 2021, the weather was clear and dry and no rain occurred. Wind speeds varied between 0 m/s and 2 m/s.

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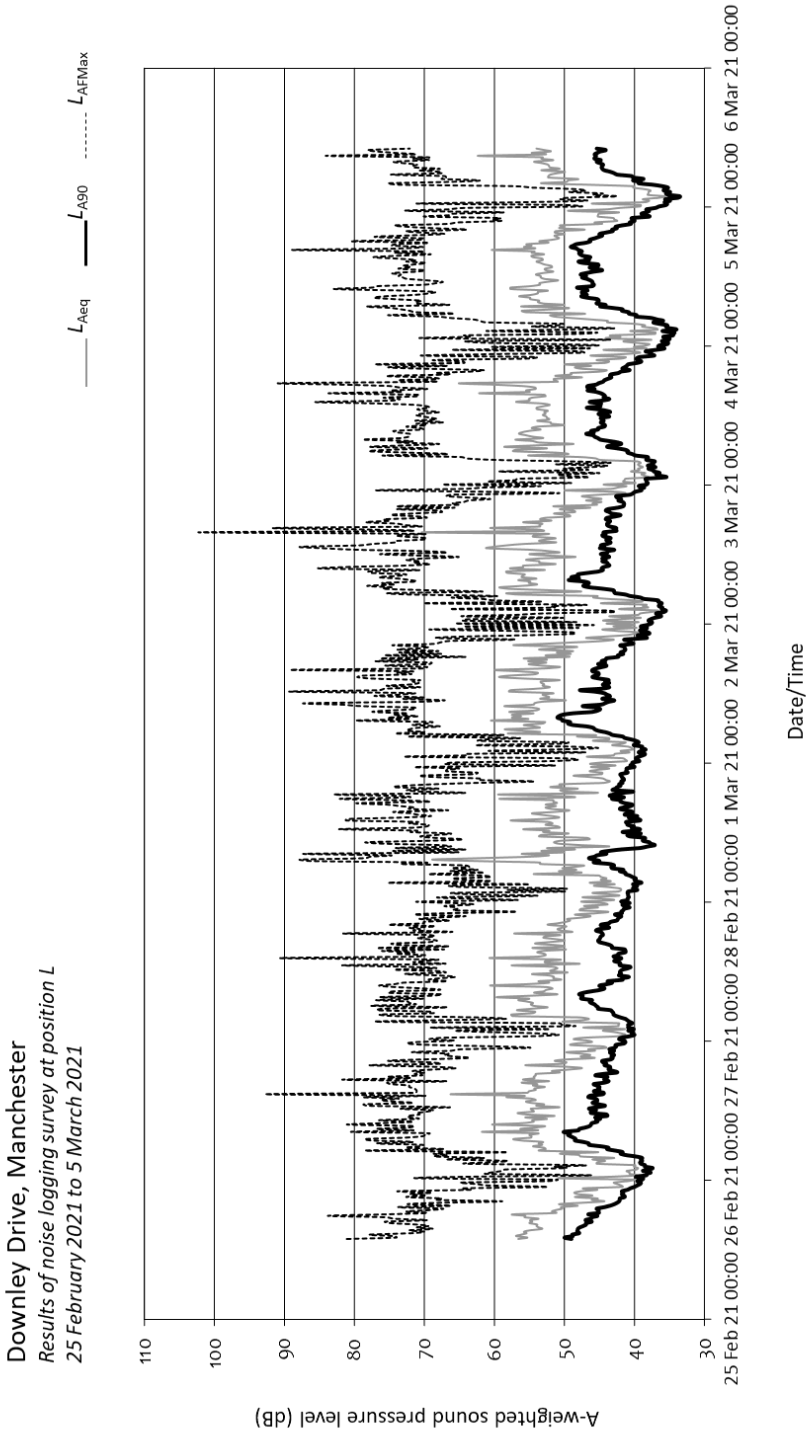
Appendix B

Results of unattended measurements at position L


Downley Drive, Manchester
Results of noise logging survey at position L
25 February 2021 to 5 March 2021
LAeq
LA90
LAFMax
110
100
90
80
70
60
50
40
30
A-weighted sound pressure level (dB)
25 Feb 21 00:00
26 Feb 21 00:00
27 Feb 21 00:00
28 Feb 21 00:00
1 Mar 21 00:00
2 Mar 21 00:00
3 Mar 21 00:00
4 Mar 21 00:00
5 Mar 21 00:00
6 Mar 21 00:00
Date/Time

Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

Appendix D

Predicted facade noise levels

Title	Predicted daytime facade noise levels
Project	Downley Drive, Ancoats, Manchester
Project no.	21058
Version	B
Marked-up by	José M. González
Reviewed by	Matthew Robinson
Date	13 April 2021

Mark-up key

Predicted daytime facade noise levels L_{Aeq} (dB)

- 52
- 50-48
- 47-45
- ≤ 44

SANDY BROWN
Consultants in Acoustics, Noise & Vibration

Rev	Date	Intls	Details
			comments
6	16/12/20	IB	STAGE 2 Report
5	08/12/20		WIP Landscaping to apartments update. Issue for review
4	07/12/20	MG	WIP issue for review
3	04/12/2020	IB	WIP issue for review
2	12/11/20	IB	DRAFT
1	11/10/20		Preliminary Issue

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Project Title Downley Drive
Client Manchester Life | Great Places
Location Ancoat - Manchester

Drawing Title Site Plan_Proposed

Date 01/04/2021 11:07:13 **Scale** 1 : 500
Checked Checker **Orig Paper Size** A3

Job No: **8801** **Status WIP**

Project: Origin: Zone: Level: Type: Disc: Number: Rev:

8801-BA-00-00-DR-A-(04) 001-11

Title	Predicted night time facade noise levels
Project	Downley Drive, Ancoats, Manchester
Project no.	21058
Version	B
Marked-up by	José M. González
Reviewed by	Matthew Robinson
Date	13 April 2021

Mark-up key

Predicted night time facade noise levels L_{Aeq} (dB)

- 52
- 50-48
- 47-45
- ≤ 44

L_{AFmax} (dB) not normally exceeded at night time

- 61
- ≤ 52

SANDY BROWN
Consultants in Acoustics, Noise & Vibration

Rev	Date	Intls	Details
1	11/10/20		Preliminary Issue

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Project Title	Downley Drive
Client	Manchester Life | Great Places
Location	Ancoat - Manchester
Drawing Title	Site Plan_Proposed

Date	01/04/2021 11:07:13	**Scale**	1 : 500
Checked	Checker	**Orig Paper Size**	A3
Job No:	**8801**	**Status**	**WIP**

Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:
8801	BA	00	00	DR	A	(04) 001	11

8801-BA-00-00-DR-A-(04) 001-11