Papa John’s Pizza, Oxford Street, Manchester

Environmental Noise Assessment

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Contents

1 Introduction **1**
2 Noise measurements **1**
2.1 Site and Local Area Description 1
2.2 Survey Details 1
2.3 Site Plan and Measurement Positions 2
2.4 Survey Procedure 3
2.5 Description of Noise Climate 3
2.6 Survey Results 3
3 Noise Assessment Criteria **4**
3.1 BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' 4
3.2 LPA Requirements 4
4 Plant Noise Impact Assessment **4**
4.1 Assessment 4
5 Noise Break Out Assessment **5**
6 Conclusions **5**
Appendix I – Glossary of Acoustic Terms **6**
Appendix II – Detailed Noise Measurement Results **7**
Appendix III – Assumed Attenuator Performance **8**

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1 Introduction

BDP Acoustics has been commissioned by Papa John's (GB) Ltd to assess the potential acoustic impact of the proposed Papa John's Pizza Takeaway at Oxford Street in Manchester.

A condenser unit is proposed within the unit to be served by a louvred facade towards the rear of the building. An extract fan is also proposed to vent at this facade. This report has been prepared to address Planning Conditions NSE1 and NSE6.

In summary this report considers the following:

- The external noise climate in the vicinity of the proposed store.
- Assessment of the predicted noise level at the nearest residence with recommendations in order to comply with the requirements of Planning Conditions NSE1 and NSE6 stipulated by Manchester City Council, with reference to relevant guidance from BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' for external plant items.

A glossary of acoustic terms is provided in Appendix I.

2 Noise measurements

2.1 Site and Local Area Description

The proposed store faces onto Oxford Street, a busy main artery in the centre of Manchester. To the west is Lower Mosley Street, which has both road traffic and a tram line. Surrounding the south of the site is Hall Street/ Bale Street – a relatively quieter road which still sees sporadic but frequent traffic movements.

Two hotels are in the near vicinity of the restaurant, and are assumed to be the nearest noise sensitive receptors to which noise emanating from the restaurant has been assessed. Approximately 50m to the west is the Midland Hotel and 50m south west is a Premier Inn Hotel.

2.2 Survey Details

Manned noise level measurements were undertaken between 22:30 and 23:30 hours on Sunday 19 August 2012. It is proposed that the store will operate until 23:00 hours each night and so these measurements are assumed to be representative of the quietest operational period.

The weather conditions during the survey were calm and dry.

The readings were taken at a height of approximately 1.5m above the ground in free field positions.

2.3 Site Plan and Measurement Positions

A description of the noise monitoring locations is provided below

Position 1 – Adjacent to the Midland hotel on Lower Mosley Street

Position 2 – Adjacent to the Premier Inn Hotel on Bale Street

Position 3 – Opposite side of the road on Hall Street

The noise monitoring locations are presented in Figure 1 opposite.

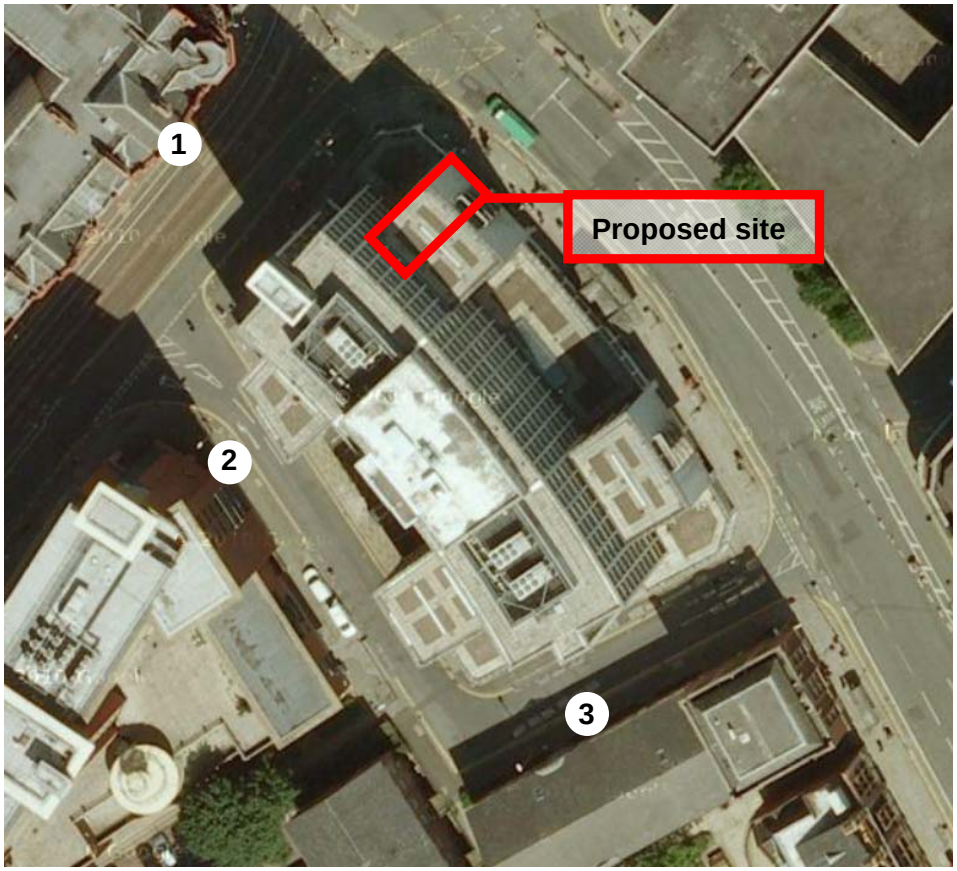


Figure 1: Site aerial view with measurement positions (1,2,3) (Google Maps)

2.4 Survey Procedure

The instrumentation used during the survey was 2 no. Bruel and Kjaer Type 2260 Class 1 sound level meters. Both meters were calibrated before and after the survey with no appreciable drift in level observed.

A-weighted fast response levels were measured throughout. Consecutive 5 minute sample measurements were recorded over a 1 hour duration at Position 1, with supplemental data collected at Positions 2 and 3 (2 x 5 minute sample measurements at each position).

2.5 Description of Noise Climate

Position 1:
The background noise level (L_{A90}) was dominated by plant from both large hotels (Midland and Premier Inn) as well as plant from the existing tenants in Peter House. However for the second half of the survey (23:00-23:30) plant at Peter House was turned off and hence no longer contributed.

Position 2:
The background noise level (L_{A90}) during the first 5 minute measurement (22:39-22:44) was dominated by plant from both large hotels (Midland and Premier Inn) as well as plant from the existing tenants in Peter House. During the second 5 minute measurement (23:12-23:17) plant at Peter House was turned off and hence no longer contributed.

Position 3:
The background noise level (L_{A90}) was dominated by distant plant and traffic noise.

2.6 Survey Results

Table 1 summarises the results of the spot measurements carried out between 22:30 and 23:30 hours on Sunday 19 August 2012.

Table 1: Summary of A-weighted statistical noise levels measured on 19/08/12

Location	***Measurement Duration***	***$L_{Aeq,\ 5\ mins}$ dB***	***Lowest $L_{A90,5\ mins}$ dB***
Position 1	60 minutes	63-68	56
Position 2	10 minutes	63-67	60
Position 3	10 minutes	61	56

Full noise measurement results can be found in Appendix II.

3 Noise Assessment Criteria

3.1 BS 4142:1997 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'

This code of practice describes a method of determining the level of noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from noise sensitive premises.

Section 9 of the code of practice, 'Assessment Method', assesses the likelihood of complaints by subtracting the measured background noise level (L_{A90}) from the rating level (L_{Aeq}). It states the following guidance:

- A difference of around + 10 dB or more indicates that complaints are likely.
- A difference of + 5 dB is of marginal significance.
- If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

3.2 LPA Requirements

Manchester City Council has stated the following criteria with regard to plant noise affecting nearby residences as part of planning condition NSE6:

> *Externally mounted ancillary plant, equipment and servicing shall be acoustically treated in accordance with a scheme designed so as to achieve a noise level of 5dB below the existing background (LA90) in each octave band at the nearest noise sensitive location.*

4 Plant Noise Impact Assessment

It is considered that the lowest measured background noise levels during our worst-case Sunday evening survey (56 dB L_{A90} at Position 1, 60 dB L_{A90} at Position 2 and 56 dB L_{A90} at Position 3) are suitably representative of nearby residential levels. Our assessment is carried out to the nearest noise sensitive facade, which is assumed as a second storey bedroom window at the Premier Inn hotel, overlooking the rear of the proposed development. Plant noise levels at this position are assessed against the lowest measured L_{A90} at this position: 60 dBA L_{A90}.

L_{A90} noise levels are typically used to evaluate the background noise level; they are representative of the noise level exceeded for 90% of the time in the absence of any higher level short duration events that occur during the period.

The table below summarises the calculated combined noise level at the nearest noise sensitive receiver for the proposed items of plant.

4.1 Assessment

Predicted noise levels from the condenser and the extract fan are considered together below.

Table 2: Calculated plant noise level at nearest noise sensitive receiver

	Octave Band Centre Frequency (Hz)						
	125	***250***	***500***	***1k***	***2k***	***4k***	***8k***
Condenser Level at receiver (dB)	28	29	29	27	24	21	14
Extract Fan Level at receiver (dB)	52	50	39	28	25	21	20
Combined Level at receiver (dB)	52	50	39	30	28	24	21
Background L_{90} at receiver (dB)	62	59	57	54	51	46	35
Rating Level difference (dB)	-11	-9	-18	-24	-24	-22	-14

The calculated plant noise levels are based on the following assumptions:

- The nearest noise sensitive receiver is a second storey hotel bedroom window overlooking Bale street and the rear of the proposed development.
- Both items of plant – the condenser and the extract fan – vent through a louvred facade to the rear of the development.
- Calculations are based on noise level data provided by the equipment manufacturer.
- The extract fan shall be fitted with the manufacturer's 'podded' high-attenuation option. (Insertion Loss (IL) found in Appendix III).

It can be seen in Table 2 that noise from the combined plant is predicted to be more than 5 dB below the measured L_{90} levels in each octave band and is therefore in accordance with the requirements of Manchester City Council's imposed plant noise limit.

5 Noise Break Out Assessment

MCC's planning condition, NSE1 states:

"The premises shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority"

A noise break out calculation for the proposed development has been carried out to the nearest noise sensitive receptor. The predicted level (L_{Aeq} dBA) at the ground floor facade of the Midland hotel, adjacent to the proposed takeaway, has been assessed against the lowest measured L_{A90} level at position 1. We have made the following assumptions in our calculation:

- Typical operating noise level within the takeaway of L_{Aeq} 70dBA, based on typical noise levels measured in occupied restaurants with low level music playing.
- Take-away door open (worst case scenario).

The predicted noise level at the Midland hotel ground floor facade is L_{Aeq} 24dBA; this is -32dBA below the lowest measured L_{A90} in the area and noise from the takeaway would be subjectively inaudible.

The assessment indicates that no special acoustic treatment is necessary to prevent noise nuisance to nearby residences due to internal ambient levels breaking out from the development.

6 Conclusions

BDP Acoustics has been commissioned by Papa John's (GB) Ltd to assess the potential acoustic impact of the proposed Papa John's Pizza Takeaway on Oxford Street in Manchester.

This report summarises the results of a baseline noise assessment of the site and surrounding area and addresses Manchester City Council's planning conditions NSE1 and NSE6.

Our assessment of the proposed development indicates that the conditions will be met providing that the 'Vent Axia' extract system is fitted with the manufacturer's 500mm diameter podded attenuator.

Appendix I – Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from about 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Decibel, dB

This is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10 dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level L_{eq} or L_{Aeq}

The continuous equivalent sound level, L_{Aeq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to measure any environmental noise which varies considerably with time and is denoted as the L_{Aeq}.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Statistical Level: L_{90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

Appendix II – Detailed Noise Measurement Results

Summary of noise measurements, 19/08/12

Position	Time (hh:mm)	L_{eq} dB, Octave Band Centre Frequency (Hz)									L_{90} dB, Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	A	63	125	250	500	1k	2k	4k	8k	A
Position 1	22:30	72.7	66.0	63.1	67.7	61.8	56.7	51.8	43.6	67.6	62.9	60.3	58.2	55.3	52.0	48.3	41.4	30.2	57.8
	22:35	71.2	66.0	63.4	62.2	61.2	55.9	49.9	42.4	65.0	62.4	60.2	58.5	54.6	50.5	47.3	40.8	29.6	56.8
	22:40	73.3	66.1	64.2	62.5	61.9	57.9	50.9	42.3	65.9	63.7	61.0	59.7	56.4	54.1	49.8	42.6	31.1	59.0
	22:45	73.7	66.6	64.6	62.1	61.8	57.7	52.1	44.9	65.8	62.6	60.0	58.7	54.5	51.0	47.5	41.1	30.1	57.0
	22:50	70.1	64.2	62.3	59.6	58.8	53.6	47.9	38.6	62.7	63.2	60.8	58.2	54.8	51.9	48.5	41.6	30.6	57.6
	22:55	74.2	65.9	65.9	63.0	62.2	57.4	54.5	46.8	66.4	63.4	59.9	58.2	55.0	52.7	48.9	41.9	30.9	57.7
	23:00	72.5	67.1	64.5	64.0	62.2	56.7	53.4	50.3	66.4	63.4	60.0	58.5	55.3	52.6	48.9	42.1	31.3	57.9
	23:05	71.4	64.9	63.5	63.4	60.4	56.5	51.4	45.7	65.1	63.3	59.2	56.7	54.2	51.6	47.7	40.7	29.3	56.8
	23:10	71.0	65.0	61.3	59.5	59.7	53.9	48.1	40.2	63.1	62.4	58.5	56.0	53.2	50.8	47.3	40.1	28.6	55.9
	23:15	73.0	65.2	61.9	60.7	60.9	54.7	47.9	40.2	64.1	62.9	59.2	56.7	53.7	50.5	47.3	40.5	29.3	56.1
	23:20	68.9	64.5	61.1	60.3	60.3	54.5	47.1	41.0	63.6	61.9	58.4	56.0	53.1	50.4	47.1	40.1	28.5	55.8
	23:25	71.9	67.0	72.7	65.7	62.2	56.6	51.3	43.8	67.9	62.6	59.1	56.5	53.4	51.2	47.5	40.5	28.8	56.2
Position 2	22:39	72.7	68.4	64.6	63.2	61.8	59.3	53.8	45.7	66.6	65.2	64.8	60.7	60.0	57.3	54.2	49.0	39.6	62.5
	23:12	69.6	68.1	61.8	59.7	58.2	55.0	49.6	40.1	63.1	64.0	62.4	58.8	57.0	54.1	51.4	46.1	34.6	59.8
Position 3	22:55	67.5	61.3	61.4	57.3	57.0	51.7	46.9	37.7	60.9	62.6	57.1	57.1	53.7	50.0	47.0	43.5	32.4	56.6
	23:28	66.6	60.5	61.7	57.9	57.5	52.1	46.5	36.8	61.3	62.2	56.2	56.4	53.2	49.3	46.3	43.1	31.6	56.0

Appendix III – Assumed Attenuator Performance

Insertion Loss (IL) dB							
63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***
4	8	14	20	29	26	23	19