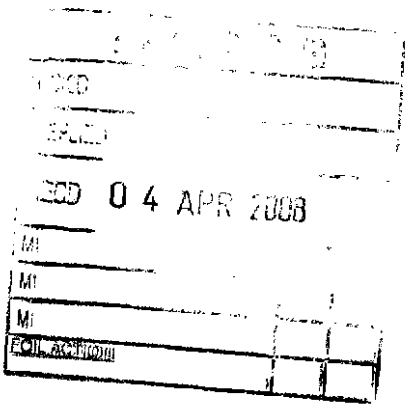
PLANET PROPERTY

NOISE ASSESSMENT

PROPOSED GROUND FLOOR RETAIL USES

CITYGATE BUILDING 2, CASTLEFIELD, MANCHESTER

23 July 2007



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1.0 INTRODUCTION

1.1 Acoustic & Engineering Consultants Limited (AEC) have been instructed by Planet Property to assess the potential noise associated with the proposed ground floor uses of Building 2 at the Citygate residential development site, Castlefield, Manchester.

1.1 This report deals with the issues associated with noise from the types of uses which are:

- noise breakout to adjacent uses and externally;
- noise from external equipment.

1.2 A previous study reported by AEC in 2003 (P881-R1) primarily dealt with the impact of external noise on the residential accommodation on the floors above the ground floor uses. However, it also provided outline advice on the implications of the proposed ground floor uses and this advice has been developed in this report.

2.0 SITE DESCRIPTION

2.1 The development of Building 2 at Citygate comprises retail units on the ground floor and up to twelve floors of residential apartments above. The location of the building in relation to others on the development site is identified on Figure 1.

2.2 The site is bounded on the western and southern boundaries by the slip road from Egerton Street (A57) onto the Mancunian Way circulatory system and the Mancunian Way circular road itself, refer to Figure 1. Building 2 is close to the junction of these roads.

2.3 Also to the north, about 175m away, are two railway viaducts which carry freight and local trains into and out of Deansgate and Metrolink trams. Only parts of the viaducts are visible from the site, since other buildings screen the viaducts.

3.0 NOISE CLIMATE

3.1 The major noise source in the area was road traffic on Egerton Street and the Mancunian Way. Occasional tram passbys are noticeable on the site but these are a secondary source.

3.2 Noise levels were measured over the night-time period between 2300 to 0100h on Thursday/Friday 20/21 March 2003 and over the early morning period between 0630 to 0915h on Wednesday 26 March 2003. These were detailed in the AEC report P881-R1, and the measurement procedure and a summary of the data is presented in Appendix A. Acoustic terminology is outlined in Appendix B.

3.3 The ambient noise levels at the elevations onto Egerton Street and the Mancunian Way were 62-64dBL_{Aeq} at night and 68-70dBL_{Aeq} during the early morning, and the background noise levels were 53dBL_{A90} and 64dBL_{A90} during the same periods respectively. At the rear of the building the ambient noise levels were 55dBL_{Aeq} at night and 60dBL_{Aeq} during the early morning, and the background noise levels were 45dBL_{A90} and 56dBL_{A90} during the same periods respectively

4.0 BASIS OF ASSESSMENT

4.1 The noise issues regarding the proposed A3 use are:

- noise transmission to the adjacent occupiers,
- noise breakout from the building envelope externally,
- noise from plant serving the retail units.

4.2 The appropriate guidance for assessment of noise from this type of development is Planning Policy Guidance PPG 24 'Planning and Noise' issued by the Department of the Environment in 1994. Advice on sound insulation of buildings is given in Annex 6 of PPG 24 and advises that *"guidance on suitable internal noise levels can be found in BS8233:1987"*. BS 8233 'Sound insulation and noise reduction for buildings – Code of practice' was updated in 1999.

4.3 BS8233 provides design criteria for various types of spaces for good to reasonable acoustic conditions. In residential accommodation, it proposes 30-40dBL_{Aeq} in living rooms and 30-35dBL_{Aeq} in bedrooms. This is reflected in the criteria set by local authorities for residential developments and the World Health Organisation's (WHO) document "Guidelines for Community Noise", which proposes guideline values for noise both inside and outside dwellings. These are to achieve acceptable internal noise levels to avoid annoyance and sleep disturbance. Inside dwellings, the noise level should not exceed 30dBL_{Aeq} and 45dBL_{Amax} at night and 35dBL_{Aeq} during the day.

4.4 With regard to breakout noise from the retail units, it seems reasonable that if maximum noise levels breaking out of premises do not exceed the typical ambient, or average, noise levels in the area, the situation should be acceptable.

4.5 Guidance on the control of noise from plant serving the retail units is also given in PPG24, which comments on noise from industrial and commercial developments in paragraph 19 (of Annex 3) stating:

> "*The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS4142:1997. Tonal or impulsive characteristics of the noise are likely to increase the scope of complaints and this is taken into account by the "rating level" defined in BS4142. The "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that: "A difference of around 5dB is of marginal significance". Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development*".

4.6 With regard to noise from plant, Manchester City Council would propose a condition based on the following:

> *"Externally mounted ancillary plant, equipment and servicing (i.e. air conditioning plant, extract systems and ventilation equipment) shall be acoustically treated in accordance with a scheme submitted to and approved by City Council. The scheme shall be designed so as to achieve a noise level of 5dB below the existing background (L_{A90}) at the nearest noise sensitive location."*

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

Retail Unit Noise

5.1 The potential use of the ground floor retail units is unclear. It is understood that the uses could range from a car showroom or offices to restaurants. Of these, the restaurant use would potentially be the noisiest and this provides the basis of the subsequent assessment.

5.2 There are three issues that need to be considered as identified earlier, these are noise being transmitted to the residential accommodation above, noise breaking out via the external envelope, and noise from external plant. To assess the noise being transmitted to above and breaking out via the external envelope, it is necessary to assume operating noise levels in restaurant units. Based on typical noise levels measured in other restaurants or café bars with low background music levels, the noise level in the restaurant would be expected to be similar to the data presented in Table 1 below.

Table 1 – Anticipated Typical Maximum Noise Levels in the Restaurant

Location	Maximum Noise Level, dB, At Octave Band Centre Frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Restaurant	75	75	76	77	79	77	75	75

5.3 However, in noisier restaurants, these noise levels could be exceeded and the data presented in Table 2, below, may be appropriate. Also stated are the anticipated noise levels in a kitchen.

Table 2 – Summary of Measured Maximum Noise Level Data

Location		Maximum Noise Level L_{max}, dB, at Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
Restaurant -Noisy Party	Typical	85	83	79	84	85	84	75	73
	Highest	87	85	83	87	88	86	81	79
Kitchen	Typical	88	93	90	89	88	89	88	86
	Highest	91	99	95	93	95	93	92	88

5.4 The basic building structure would be expected to provide a sound insulation performance of at least 55dB$D_{nT,w}$. Therefore, the allowable maximum noise levels in any of the retail units to control noise in apartments situated directly above to NR30L_{max} during the day and NR20L_{max} at night would be as presented in Table 3 below.

Table 3 – Allowable Internal Noise Levels in the Retail Unit

Time of Day	Allowable Noise Level in Retail Unit, dB							
	Overall A-weighted	At Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Day	85	90	85	80	80	80	80	80
Night	75	80	75	70	70	70	70	70

5.5 Thus, during the day and up to 2300h, typical restaurant activity noise levels, as identified in Table 1, would be controlled adequately by the basic building structure. Therefore, the noise from any other retail use, which would be quieter, would also be adequately controlled.

5.6 At night, i.e. after 2300h, although general retail use is likely to be acceptable, restaurant use would not be acceptable with the basic building structure. This would also be the case for the kitchen operating during the day.

5.7 To control noise from restaurant activity at night, or where noisier activity is likely, i.e. similar to that identified in Table 2, it will be necessary to incorporate fit out measures to enhance the sound insulation of the basic building structure. This could be achieved by introduction of a plasterboard underlining system to the shell floor soffit of the retail unit. The underlining in this case could comprise the equivalent of two layers of 12.5mm thick plasterboard, i.e. a mass of at least 16kg/m^2, on an mf suspension system via straps about 150mm below the floor soffit with 50mm of mineral wool in the cavity. A similar installation would be required in the kitchen area.

5.8 Thus, it will be necessary to incorporate noise limits in the tenancy agreements based on the data presented in Table 3 above. Where noise levels would exceed these values then the fitout would need to provide a plasterboard underlining to the floor soffit, and the tenant would need to demonstrate that a noise level of NR30L_{max} during the day and NR20L_{max} at night would be achieved within the residential accommodation above. It would appear to be impractical to operate a kitchen after 2300h and adequately control noise to residents above. It would also be necessary to control any music levels in the restaurant, or any other tenancy, by the use of a noise-limiting device.

5.9 The external envelope would need to be designed to achieve a sound insulation performance of 35dBR'_w. This would control noise breakout externally at 5 metres to below 45dBL_{Aeq}, significantly below the noise levels for road traffic in the area, which should be acceptable. This should easily be achievable with a curtain walling system. It may be necessary to provide lobbied doors where internal noise levels would meet the data identified in Table 2.

Noise Levels from Mechanical Services and Electrical Plant

5.10 There could be mechanical plant serving the retail units. During the night-time, the background noise level, L_{A90}, in the area away from the main roads is typically 45dB. The noise level from all future mechanical and electrical plant serving the proposed development should, therefore, not exceed 40dB$L_{Aeq,5\ mins}$, at night, with no distinguishing characteristics e.g. tone or intermittency, at the nearest residential building with ventilation via opening windows. For plant only operating during the daytime period, the noise level should not exceed 50dB$L_{Aeq,1\ hour}$, with no distinguishing characteristics, at the nearest residential building. These requirements would also ensure that the apartments directly above are also being protected.

5.11 Based on the assumption that the nearest residential building with ventilation via opening windows is at a distance of at least 12m, a noise limit of NR45 at 3 metres from plant, or louvres, serving the individual retail units at night would need to be set in the tenancy agreement. During the day, 0700 to 2300h, this limit could be relaxed to about NR50 at 3 metres from plant, or louvres.

5.12 These criteria could also be relaxed if external plant or louvres face onto Egerton Street or Mancunian Way, where the background noise levels are higher. In this instance, the noise limit for plant and louvres could be relaxed by a further 5dB, i.e. to NR50 at 3 metres during the night.

5.13 It will also be necessary to control noise levels in the risers, if there are any access doors onto residential accommodation. A maximum noise limit of 65dBA should be included in the tenancy agreement for this situation.

6.0 CONCLUSIONS

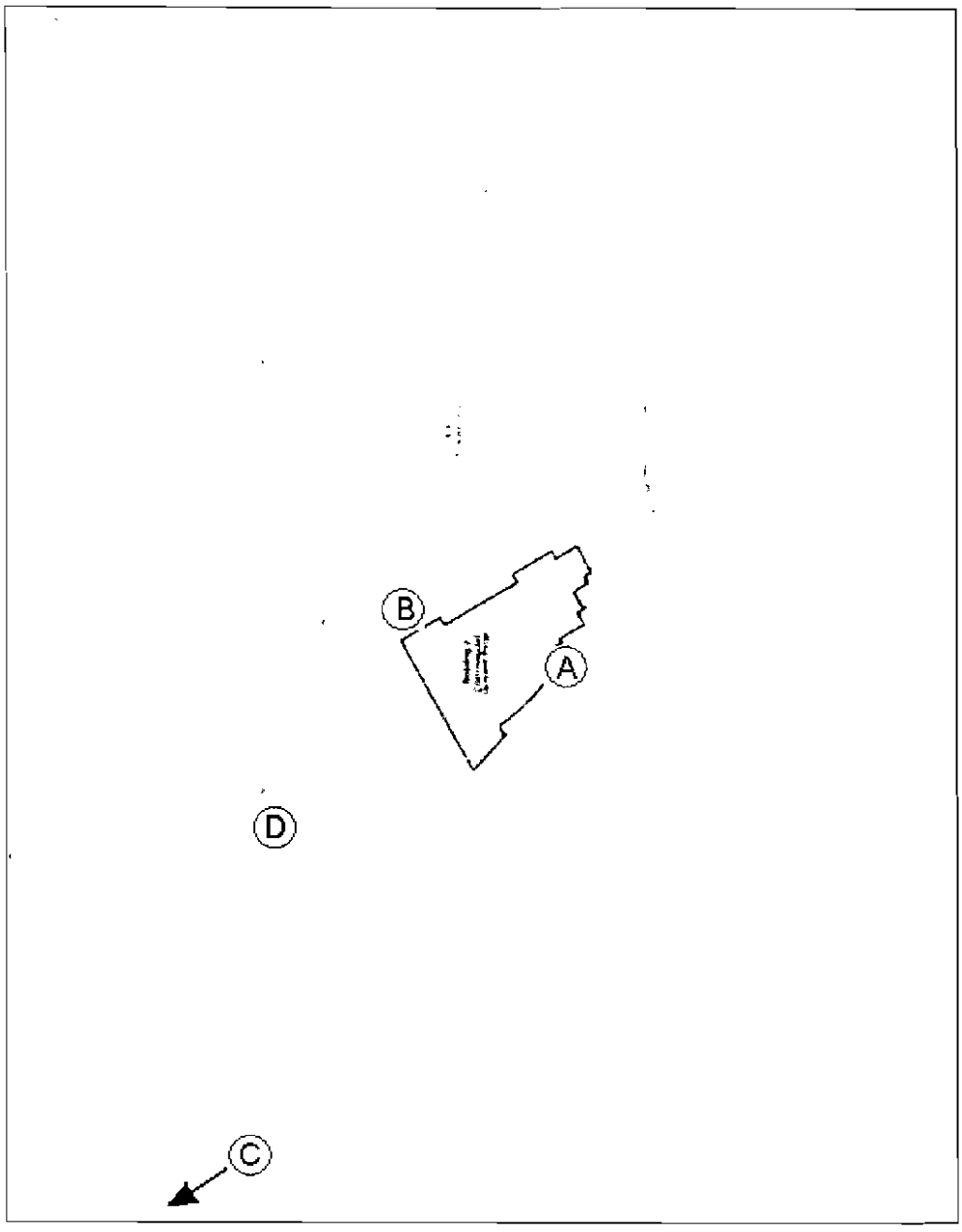
6.1 In the residential accommodation at the Citygate 2 development noise from retail unit operation on the ground floor of the building can be controlled by setting an appropriate noise limit in any tenancy agreement. The basic requirements are stated in Table 3. Where this level could be exceeded in restaurants for example the tenant must demonstrate that the fitout will control noise levels to NR30L_{max} during the day and NR20L_{max} at night within the residential accommodation.

6.2 An example of a fitout construction has been provided above in Section 5, together with an indication of the limiting noise levels that would need to be achieved with this proposed fitout. Any music system would require a noise-limiting device.

6.3 The external envelope to the retail units would be expected to provide a sound insulation value not lower than 35dBR'_w and, as such, would adequately control noise levels which satisfy the above limits.

6.4 Noise from mechanical plant serving the retail units can be controlled to meet acceptable levels, and a suggested noise limit has been determined which can be incorporated into any tenancy agreement.

FIGURE 1 – Site Layout Showing Monitoring Locations



APPENDIX A - Measurement Procedure

Date & Time of Survey:	Night-time: Thursday/Friday 20/21 March 2003	2300 – 0130 hours.
	Daytime: Wednesday 26 March 2003	0630 – 0930 hours.
Personnel Present:	Night-time: Andy Burke and Peter Sacre, AEC	
	Daytime: Andy Burke, AEC	
Equipment Used:	B & K 2260 Real Time Analysers (AEC Kits 1 and 2)	
Weather Conditions:	Night-time: Dry, clear, little or no wind, 3°C Daytime: Dry, clear, little or no wind, 5°C	

Measurement Procedure: Road traffic noise levels were measured, primarily, at one location, identified as A on Figure 1. Additional spot measurements were also undertaken at a further two locations, on and close to the development site, identified as B and C on Figure 1. All these locations are described below:

A. At the existing site hoarding along Egerton Street. The microphone was fixed at 1.3m above the hoarding and a total of 3.4m above the road level and 2m back from the edge of the carriageway. Thus the location was about 5 metres from the Egerton Street facade of the proposed building.

B. On Blantyre Street, at the entrance gate to the existing Building 1, at a height of approximately 1.8m.

C. On the opposite side of Egerton Street to the site. In front of the Urban Splash development, 3m from the edge of the carriageway.

All the measurements, unless otherwise stated, were taken in semi-free field at a height of 1.5m above ground.

The sound level analysers, which conform to BS EN 60651:1994 "Specification for sound level meters" and BS EN 60804:2001 "Integrating-averaging sound level meters" were in calibration and check calibrated before and after the measurement periods using a Bruel & Kjaer type 4231 (94dB) calibrator. There was no significant drift of calibration.

Measured Data: A summary of the measured data is presented in Table A1 below. All data is held on file by AEC.

Table A1 – External Noise Levels at First Floor Level

Building 2 Elevation	Noise Level, dB			
	Night		Early Morning	
	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}
Egerton Street	62-64	53	68-70	64
Rear of Building	55	45	60	56

APPENDIX B - Acoustic Terminology in Brief

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. May be thought of as the "average" sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the "ambient" noise level.
L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to describe background noise.
L_{Amax}	The maximum (A-weighted) sound level measured during the measurement period.
NR	Noise Rating is method of describing a noise level as a single number. Noise rating describe curves which state specific noise levels at individual octave frequency bands.
Free-field Level	This refers to the sound level measured outside, far away from reflecting surfaces
R_w	Single number rating used to describe the airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz, when measured in a laboratory.
$D_{nT,w}$	Single number rating used to describe the on site airborne sound insulation properties of a structure over a range of frequencies, typically 100-3150Hz.