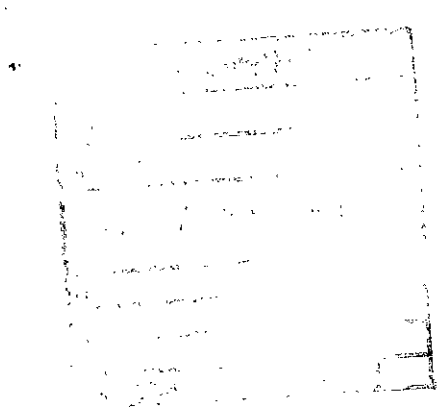
RPS

Noise Assessment for a Proposed Entertainment Venue at Woodlands Mill

Off Hazelbottom Road, Crumpsall

On behalf of Evo Architects



Prepared by:
M Hyden BSc MIOA

Checked by:
P Tallantyre BSc (Hons) AMIOA

RPS Manchester
52 Princess Street
Manchester
M1 6JX

RPS Ref: DLE1374/001/250608/MBH/NM
Date: 25th June 2008

Tel 0161 237 9858
Fax 0161 237 3315
Email rpsmr@rpsgroup.co.uk

Planning & Development

Proposed Entertainment Venue
Crumpsall, Manchester

M. Hyden BSc MIOA, 25th June 2008

DLE1374

This report has been prepared under the Framework of BS EN ISO 9001:2000		
Prepared By: Name Date	 M Hyden 25th June 2008	Signature
Approved for Issue By: Name Date	 P Tallantyre 25th June 2008	Signature

1 Introduction

1.1 The Northern Acoustics Group of RPS Planning & Development has been commissioned by Evo Architects to undertake an assessment of the impact of the proposed Woodlands Mill development on the surrounding residential properties.

1.2 In order to assess the suitability of the site for the proposed development, the existing background noise climate at the nearest noise sensitive receivers has been measured during both weekday and weekend periods.

1.3 Noise levels generated by the development have been predicted, based on information provided by Evo Architects, and compared to the measured pre-existing background noise levels.

1.4 This report describes the results of a noise assessment undertaken at the proposed development site.

2 Noise Units, Standards and Guidance

a) Noise Units

2.1 Noise is defined as unwanted sound. The range of audible sound is from 0dB to 140dB. The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with human subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

2.2 For variable noise sources such as traffic, a difference of 3dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3dB. The "loudness" of a noise is a purely subjective parameter but it is generally accepted that an increase / decrease of 10dB corresponds to a doubling/halving in perceived loudness.

2.3 External noise levels are rarely steady but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

2.4 This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

2.5 This is the "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time"

2.6 It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise

Contents

	Summary	**1**
1	**Introduction**	**2**
2	**Noise Units, Standards and Guidance**	**3**
3	**Site Description and Development Proposals**	**6**
4	**Analysis of Existing Noise Climate**	**7**
5	**Noise Impact Assessment**	**10**
6	**Conclusion**	**16**

Tables

Table 4.1: Background Noise Measurement Periods 7

Table 4.2: Summary of On-Site Noise Monitoring Results - Weekend 8

Table 4.3: Summary of On-Site Noise Monitoring Results - Weekday 9

Table 5.1: Absolute L_{Aeq} Levels for Acceptability 10

Table 5.2: Assumed Façade Elements 12

Table 5.3: Predicted Entertainment Noise Levels 13

Table 5.4: Predicted Entertainment Noise Levels Inside Residential Properties 13

Table 5.5: Predicted L_{A90} Noise Levels at Residential Properties 13

Table 5.6: Lowest Measured Background Noise Levels 14

Appendices

Appendix 1: References

Appendix 2: Instrument Calibration Documentation

Appendix 3: Calculation Tables

Figures

Figure 1: Noise Monitoring Location Map

Summary

RPS Planning and Development has been requested to undertake a noise assessment and prediction exercise at the proposed Woodlands Mill development in Crumpsall, Manchester

Within the scope of this assessment, the impact of the proposed Restaurant and banqueting venue will be predicted at the nearby noise sensitive residential receivers.

Monitoring of ambient noise levels was undertaken at 3No. locations in the area surrounding the proposed development. This was required in order to monitor pre-existing background noise levels at the identified nearest noise sensitive receptors to the proposed development.

Noise levels, due to entertainment noise in the proposed Woodlands Mill development, have been predicted at the nearby noise sensitive receivers. The predicted noise levels have then been assessed based on the recommendations of the DEFRA 'Noise from Pubs and Clubs (Phase II)' document and where necessary suitable remedial measures have been proposed.

At present, there is no information available regarding plant and equipment associated with the proposed development. Therefore, suitable noise emission limits have been proposed. Further to this, it is proposed that the majority of plant will be located internally and as such, controlling noise emission should be relatively simple.

Due to the low number of delivery vehicles (two per day) and the daytime delivery hours (0700 to 2300 hours), it is unlikely that noise as a result of deliveries will have a negative impact on the nearby residential receivers.

iii) The L_{A90} noise level

2.7 This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

iv) The L_{A10} noise level

2.8 This is the noise level that is exceeded for 10% of the measurement period. It is the index generally adopted in assessing traffic related noise.

b) Standards and Guidance

i) British Standard 4142:1997

2.9 This British Standard provides a methodology for assessing the likelihood of complaints arising from sensitive receptors due to industrial and commercial activities. It states that 'complaints are likely' when a noise from one of these sources, corrected for tonal, impulsive or irregularity characteristics (to provide the 'rating' level), exceeds the existing 'background' level, referred to as the L_{A90} (the noise level exceeded for 90% of the time), by 10dB(A) or more. Increases of 5dB(A) above background are deemed by the Standard to be of 'marginal significance', whilst a rating level of more that 10dB(A) below the measured background level provides a 'positive indication that complaints are unlikely'.

2.10 The source noise is assessed in terms of $L_{Aeq,T}$, where 'T' is a reference period of one hour during daytime hours (0700 - 2300hrs) and five minutes at night-time (2300 – 0700hrs).

2.11 However, the Standard states that the assessment methodology provided is not suitable where the background and rating noise levels are both very low (i.e. below 30dB L_{A90} and approximately 35dB $L_{Ar,T}$ respectively). Where this occurs, it is considered appropriate to reference the guidance provided in British Standard BS8233: 1999 – Sound Insulation and Noise Reduction for Buildings – Code of Practice. BS8233: 1999 recommends an internal 'good' to 'reasonable' design range of 30-40dB $L_{Aeq,\ 16\text{-hours}}$ during the daytime and 30-35dB $L_{Aeq,\ 8\text{-hours}}$ at night. For a reasonable standard in bedrooms at night, the Standard states that individual noise events should not normally exceed 45dB L_{Amax}.

2.12 Similarly, the World Health Organisation (WHO) recommends, in their publication Guidelines for Community Noise, a noise level outside a bedroom window of no more than 45dB $L_{Aeq,\ 8hour}$ or 60dB $L_{Amax,\ fast}$ in order to minimise sleep disturbance with a window open. The WHO also considers that 'general daytime outdoor noise levels of less than 55dB $L_{Aeq,\ 16\ hour}$ are desirable to prevent significant community annoyance'. Simplistically, a window partially open for

ventilation provides between 10 and 15dB(A) attenuation. The WHO considers that when referring to an internal noise level 'night time noise levels should not exceed 30dB $L_{Aeq,\ 8\ hour}$, if negative effects of sleeping are to be avoided.'

ii) Noise from Pubs and Clubs (Phase II) - DEFRA

2.13 This DEFRA document examines a number of existing methodologies for assessing entertainment noise associated with pubs and clubs. Based on subjective studies and mathematical analysis of both laboratory and field measurements, the document recommends the most suitable methodologies for assessing entertainment noise to be as follows:

i) Absolute L_{Aeq}

ii) Comparison of L_{A90} (with entertainment noise) – L_{A90} (no entertainment noise)

2.14 Both of the assessment methodologies proposed above will be used to analyse the potential impact of entertainment noise on noise sensitive receptors around the proposed Woodlands Mill development.

3 Site Description and Development Proposals

Site Description

3.1 It is proposed to develop the existing Woodlands Mill site in Crumpsall, Manchester, into a Restaurant and banquet venue.

3.2 The site is located off Hazelbottom Road in Crumpsall and is broadly centred on national grid reference 385005, 401165.

3.3 The surrounding area of the site is described as follows:

- To the west, the site is bounded by Hazelbottom Road with a number of residential properties located beyond.
- To the north, east and south, the site is surrounded by existing industrial and commercial operations within the Hendham Vale Industrial Park.

Development Proposals

3.4 Within the scope of the development, it is proposed to redevelop the existing Woodlands Mill site into a venue comprising Restaurant, Banquet Hall and Dance Hall. The Restaurant will be open most evenings and the venue will also host weddings and parties etc. in the banquet and Dance Hall areas.

3.5 Within the scope of the development, it is proposed to retain the existing Woodlands Mill main building, which will accommodate the proposed Restaurant, and create a new building to the east containing the dance and banqueting halls. Parking facilities will be located within the northern portion of the site accessed off Hazelbottom Road.

4 Analysis of Existing Noise Climate

4.1 In order to determine the existing noise climate of the area, a noise monitoring survey was carried out.

4.2 The monitoring was undertaken at two locations on Hazelbottom Road representing the nearest noise sensitive residential properties. Further snapshot measurements were also made at a third location on Chime Bank, to assess background noise at more distant receptors. The monitoring locations are presented visually marked on the plan within Figure 1.

4.3 As agreed with Harry Cooke of Manchester City Council (MCC) Environmental Health Department, background noise levels were measured between 1200 and 0400 hours on a weekday and again during the weekend. The following survey periods were completed:

Table 4.1: Background Noise Measurement Periods

Measurement Period	Measurement Start	Measurement End
Weekend	Saturday 7th June 2008 1200 hours	Sunday 8th June 2008 0400 hours
Weekday	Monday 9th June 2008 1200 hours	Tuesday 10th June 2008 0400 hours

4.4 The instrumentation used for the noise survey was a 01dB Solo (Serial Number 10513) Type 1 Data Logging Sound Level Meter (SLM) and a Norsonic Nor-118 (Serial Number 31314) Type 1 Data Logging SLM. Both items of equipment were used in order to undertake the noise monitoring survey at the proposed development site.

4.5 The meters were externally calibrated both before and after the monitoring periods and no significant deviations in calibration levels were noted. The instrumentation calibration documentation is included within Appendix 2.

4.6 During all measurements, the microphone was mounted on a tripod at a height of 1.5m above the site ground level and at least 3.5m from any reflecting surface. The Sound Level Meter was set to measure L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} parameters.

4.7 All noise monitoring undertaken in association with this report was undertaken and attended by a competently trained RPS field technician.

4.8 Weather conditions were noted during the survey periods as detailed below.

7th and 8th June 2008

Overcast weather conditions with occasional light showers. During the survey, the temperature was measured to range between 12°C and 18°C. Wind speeds were measured to be below 5m/s throughout the survey. Road surfaces were dry at the beginning of the survey period but were damp by the end.

9th and 10th June 2008

Dry weather conditions with temperatures ranging between 20°C and 22°C. Wind speeds were measured to be below 5m/s throughout the survey. Cloud cover varied between 0% and 40% throughout the survey.

4.9 The following tables detail the lowest measured 15-minute dB L_{A90} values recorded during the daytime at each location and the lowest measured five-minute L_{A90} levels during the night-time at each location:

Table 4.2: Summary of On-Site Noise Monitoring Results - Weekend

Location	Date	Time Period	L_{A90}
1	7th June 2008	Daytime (before 2300 hours)	46.4
	7th/8th June 2008	Night-time (after 2300 hours)	36.3
2	7th June 2008	Daytime (before 2300 hours)	47.4
	7th/8th June 2008	Night-time (after 2300 hours)	38.3
3	7th June 2008	Daytime (before 2300 hours)	55.3
	7th/8th June 2008	Night-time (after 2300 hours)	37.0

Table 4.3: Summary of On-Site Noise Monitoring Results - Weekday

Location	Date	Time Period	L_{A90}
1	9th June 2008	Daytime (before 2300 hours)	42.3
	9th/10th June 2008	Night-time (after 2300 hours)	35.0
2	9th June 2008	Daytime (before 2300 hours)	46.8
	9th/10th June 2008	Night-time (after 2300 hours)	37.6
3	9th June 2008	Daytime (before 2300 hours)	61.3
	9th/10th June 2008	Night-time (after 2300 hours)	36.1

4.10 Throughout the monitoring periods it was subjectively noted by the field engineer that during the daytime the principal noise source affecting the locality was traffic movements on Hazelbottom Road and other surrounding routes. Other audible noise sources included noise from nearby industrial sites, more distant traffic noise and occasional aircraft noise.

4.11 During the night-time the noise climate mainly consisted of passing traffic on Hazelbottom Road and noise from more distant traffic movements.

5 Noise Impact Assessment

Restaurant, Banquet Hall and Dance Hall – Entertainment Noise Assessment

Absolute Noise Level Assessment

5.1 Entertainment noise generated by the venue will be assessed based on the guidance contained in the DEFRA 'Noise from Pubs and Clubs – Phase 1' document. The document recommends that an assessment of the absolute L_{Aeq} of entertainment noise be carried out.

5.2 In order to fully assess the impact of the noise, we have also undertaken a comparative assessment of the entertainment noise based on the comparative method recommended in the DEFRA document. This involves comparing L_{A90} entertainment noise with L_{A90} background noise.

Absolute Noise Level Assessment

5.3 The 'Noise from Pubs and Clubs – Phase 2' document produced by the BRE/Capita Symonds for DEFRA assessed a number of methods of assessing the effects of entertainment noise. The document concluded that the best of the available assessment methodologies was 'absolute L_{Aeq}'.

5.4 This methodology consisted of a comparison of absolute L_{Aeq} with set criteria. The document also contains a table detailing subject's perception of entertainment noise ranging from clearly acceptable to clearly unacceptable. The table is summarised below:

Table 5.1: Absolute L_{Aeq} Levels for Acceptability

Semantic Descriptor	Absolute $L_{Aeq(5mins)}$
Clearly Acceptable	17.0
Just Acceptable	30.6
Just Unacceptable	34.0
Clearly Unacceptable	47.5

5.5 However, in order to carry out an assessment based on the above criteria, it will be necessary to predict noise levels due to the operation of the proposed development at the nearest residential properties.

5.6 Firstly, source noise levels in each of the internal spaces needs to be established. The DEFRA document states the following:

'Noise levels measured in bars and restaurants during quiet periods showed noise levels of 65 -70 dB L_{Aeq}. Noise levels of up to 88 dB L_{Aeq} were measured during busy periods in bars not playing music i.e. just customer noise. Many bars playing music had noise levels of 90 -95 dB L_{Aeq}.'

5.7 The information in these statements will be used as the basis for the source noise levels in this report. The following A-weighted L_{Aeq} noise levels will be assumed for each of the three potentially noisy spaces in the proposed development.

Restaurant:	70dB L_{Aeq}
Banqueting Hall:	88dB L_{Aeq}
Dance Hall:	95dB L_{Aeq}

5.8 In order to carry out a full accurate assessment, taking into account the low frequency performance of the proposed building envelope (this will be likely to control the L_{Aeq} due to the low frequency content of entertainment noise), it is necessary to establish one third octave band frequency spectra for the above source levels. In the 'Noise from Pubs and Clubs – Phase 2' document typical third octave band spectra are used in the assessment of noise. To assess noise generated in the Banquet Hall and Restaurant areas, the non-music entertainment noise spectrum from the 'Noise from Pubs and Clubs – Phase 2' document will be used. To assess noise generated in the Dance Hall, the 'Karaoke' type noise spectrum will be utilised. For more information on the source levels assumed, please see the calculation tables in Appendix 1.

5.9 These source levels were then used to create a computer model to predict the level of noise incident upon the nearby residential properties.

5.10 In the prediction model, the sound insulation of various areas of the building envelope has been used to calculate a composite sound insulation figure for the radiating façades in question. The following façade elements have been assumed (please see the calculation table in Appendix 1 for more information regarding composite sound insulation performance):

Table 5.2: Assumed Façade Elements

Façade Element	Assumed Construction
Dance/Banquet Hall Glazing	6/16/6mm sealed double glazing
Dance/Banquet Hall Rainscreen Cladding	Rainscreen cladding element with additional cement board mass layer on 150mm metal section with two layers of 15mm sound resistant plasterboard internally
Restaurant (existing Woodlands Mill building) Glazing	6mm single glazing
Restaurant (existing Woodlands Mill building) External Wall	225mm brick
Restaurant (existing Woodlands Mill building) doors	6/16/6mm glazed doors
Restaurant (existing Woodlands Mill building) Rainscreen Cladding	Rainscreen cladding element with additional cement board mass layer on 150mm metal section with two layers of 15mm sound resistant plasterboard internally

5.11 The sound insulation of the façade elements detailed in the above table has been predicted using the commercially available Marshall Day Acoustics 'Insul 6.2' software package.

5.12 In addition to the above comments, the following assumptions have been made in the prediction model:

a) All dimensions taken from Evo Architects' drawings numbers EV1176 002, 003, 004 and 005.

b) Distance from source to receiver has been taken as the centre of the radiating façade to the closest residential façade.

c) Due to screening effects and the high sound insulation performance (relative to the glazing), no contribution from sound radiated from roofs has been included.

d) Only the north facing Banquet/Dance Hall façade has been included for in the model as the east facing façade is entirely screened form the nearby residential properties.

e) Hemispherical radiation has been assumed in all calculations.

f) It has been assumed that all windows are closed and ventilation is provided by a suitably attenuated system with inlets and outlets on non-sensitive façades of the development.

5.13 The predicted noise levels in terms of L_{Aeq} are detailed in the following table. Please note that the Restaurant level is the summation of the ground and first floor Restaurant predicted noise levels.

Table 5.3: Predicted Entertainment Noise Levels

Source	Predicted Noise Level at nearest Residential Receiver in L_{Aeq}
Banquet Hall	28
Dance Hall	38
Restaurant	24

5.14 In order to predict noise levels inside a typical habitable room with windows open, a reduction factor of between 10-15dB (Ref. WHO Guidelines, PPG24) is applied. So as to represent a worst-case assessment, the following table details predicted noise levels inside a habitable room due to entertainment noise from the three spaces in the proposed Woodlands Mill development.

Table 5.4: Predicted Entertainment Noise Levels Inside Residential Properties

Source	Predicted Noise Level at nearest Residential Receiver in L_{Aeq}
Banquet Hall	18
Dance Hall	28
Restaurant	14

5.15 When comparing the predicted noise levels in the table above to the values in Table 5.1, it can be seen that noise levels generated as a result are below the 'just acceptable' threshold.

Comparative Assessment

5.16 The 'Noise from Pubs and Clubs – Phase 2' document also recommends a comparative assessment method for assessing entertainment noise. This involves the comparison of L_{A90} of entertainment noise against the L_{A90} without entertainment noise.

5.17 In the 'Noise from Pubs and Clubs – Phase 2', various examples of the two entertainment (non-music and karaoke) type noise are detailed. In a number of the examples, the L_{Aeq} of the entertainment noise is identical to the L_{A90} of the noise. Therefore, to assess a worst-case scenario, it will be assumed that the L_{A90} of the entertainment noise is identical to predicted L_{Aeq}.

5.18 The following table details the predicted entertainment noise in terms of L_{A90} just outside the nearby residential properties and also the lowest measure background noise level in terms of $L_{A90(5min)}$ measured during both weekday and weekend noise surveys.

Table 5.5: Predicted L_{A90} Noise Levels at Residential Properties

Dance Hall Predicted Noise Level	38dB L_{A90}
Banquet Hall Predicted Noise Level	28dB L_{A90}
Restaurant Noise Level	24dB L_{A90}
Lowest Measured Existing Background Noise Level	35dB $L_{A90(5min)}$

5.19 As can be seen in the table above, the predicted L_{A90} noise levels, due to the Restaurant and Banquet Hall, are below the lowest measured $L_{A90(5min)}$ at the nearby residential receivers. The noise level due to the Dance Hall is 3dB above the lowest measured existing background noise levels.

5.20 In order to reduce noise levels at the nearby residential properties, due to the operation of the Dance Hall, the sound insulation performance of the external façade could be upgraded. If the glazing in the Dance Hall was upgraded to 10/12/6mm (performance taken form Pilkington Glazing specification), noise levels at the residential property would be reduced to 34dB L_{A90} and, as such, be below the lowest measured background noise level.

Plant Noise Assessment

5.21 Plant noise is normally assessed in accordance with BS4142 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'.

5.22 At present, there is no information available for potentially noisy plant and equipment associated with the development. Therefore, the measured background noise levels will be used to suggest a suitable plant noise emission limit

5.23 The lowest background noise levels measured during the monitoring periods were at Position 1 during the weekday period. The following table details the lowest measured daytime and night-time L_{A90} background noise levels:

Table 5.6: Lowest Measured Background Noise Levels

Lowest Measured Daytime Background Noise Level in dB $L_{A90(15mins)}$	Lowest Measured Night-time Background Noise Level in dB $L_{A90(5mins)}$
42.3	35.0

5.24 Based on the BS4142 assessment methodology, it is suggested that the 'Rating Level' of any plant associated with the development does not exceed the existing background noise levels +5dB at the nearest noise sensitive receiver. Therefore, a plant noise emission limit is suggested as follows:

Daytime: Plant noise 'Rating Level' should not exceed 47.3dB $L_{A90(1hour)}$

Night-time: Plant noise 'Rating Level' should not exceed 40.0dB $L_{A90(5mins)}$

5.25 On discussion with the architect, it is likely that the majority of noisy plant will be situated inside the building. Therefore, with appropriate positioning of plant rooms (i.e. façades facing away from sensitive receivers) and suitable attenuation measures, it should be relatively simple to meet the proposed noise emission limits.

Delivery Vehicle Noise

5.26 RPS has been informed that deliveries to the proposed development will consist of approximately two vehicles per day between 0700 and 2300 hours.

5.27 Frequent passing traffic noise form Hazelbottom Road is the dominant source of noise in all measurement locations during the day. It is extremely unlikely that noise due to two additional vehicle movements during daytime hours will have a negative impact on the nearby sensitive residential receivers.

6 Conclusion

6.1 A noise survey has been completed around the site of the proposed Woodlands Mill Restaurant / Entertainment Venue in Crumpsall to assess the existing level of background noise. Measurements have been made between 1200 and 0400 hours over a weekend period and a weekday period.

6.2 Noise levels due to the operation of the Restaurant, Banquet Hall and Dance Hall areas of the proposed development have been predicted at the nearby residential properties. The predicted noise levels have been assessed in terms of absolute LAeq as recommended in the DEFRA 'Noise from Pubs and Clubs (Phase II)' document.

6.3 It has been shown that noise levels due to the operation of the proposed venue meet the 'just acceptable' criteria proposed in the 'Noise from Pubs and Clubs (Phase II)' document.

6.4 Further to the above, a comparative assessment of entertainment noise as recommended in the DEFRA 'Noise from Pubs and Clubs (Phase II)' document has also been completed. The L_{A90} of the entertainment noise from the proposed development has been compared to the lowest measured $L_{A90(5min)}$ background noise level at the nearest residential receiver. It has been shown that noise from the proposed Banquet Hall and Restaurant are clearly below existing background levels. Noise levels due to operation of the Dance Hall were found to exceed the background noise levels by 3dB.

6.5 In order to reduce predicted L_{A90} Dance Hall levels to below existing background noise levels, it will be necessary to increase the sound insulation of the external façade in this space. It has been calculated that using 10/12/6mm sealed double glazing units (Pilkington Specification or similar) will reduce noise levels to below existing background levels.

6.6 At present, there is no information available regarding plant and equipment associated with the proposed development. Therefore, suitable noise emission limits have been proposed. Further to this, it is proposed that the majority of plant will be located internally and, as such, controlling noise emission should be relatively simple.

6.7 Due to the low number of delivery vehicles (two per day) and the daytime delivery hours (0700 to 2300 hours), it is unlikely that noise as a result of deliveries will have a negative impact on the nearby residential receivers.

Appendix 1

References

References

1. British Standards Institution. British Standard 7445: Description and Measurement of Environmental Noise, Part 1. Guide to Quantities and Procedures, 2003.

2. PPG24. Planning policy guidance: planning and noise, Department of the Environment, September 1994.

3. British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 1999.

4. British Standards Institution. British Standard 4142: Rating Industrial Noise Affecting Mixed Residential and Industrial Areas, 1997.

5. World Health Organisation. Guidelines for Community Noise, 2000.

Appendix 2

Instrument Calibration Documentation

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION LTD

Date of issue 14 April 2008 Certificate N° 03802

UKAS CALIBRATION
0653

AV Calibration Ltd
13c Old Bridge Way
Shefford
Bedfordshire SG17 5HQ
England
Telephone (01462) 638600
Fax (01462) 638601
E-mail lab@avcalib.co.uk

Approved Signatory
R.G.Tyler

CLIENT	RPS Group 52 Princess Street Manchester M1 6JX
F.A.O.	Peter Tallantyre
REF.	Job N° UKAS08/03077/02
DATE OF RECEIPT	11 March 2008
PROCEDURE	AV Calibration Engineer's Handbook, Section 3: verification of sound level meters to BS 7580:Part 1:1997
IDENTIFICATION	Sound level meter 01dB type Solo (Master) [serial no. 10513] connected via an extension lead type EXA010 and preamplifier type PRE21S [serial no. 10335] to a half-inch microphone type MCE212 [serial no. 51734]. Associated calibrator B&K type 4231 [serial no. 2393954] with one-inch housing and adapter type UC 0210 for half-inch microphone.
CALIBRATED ON	14 April 2008
PREVIOUS CALIBRATION	Calibrated on 1 February 2006 Certificate N° 02222 issued by UKAS laboratory N° 0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories.
This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Appendix 3

Calculation Tables

Noise Breakout Calculation Banquet Hall

North Facade

Surface Area of Facade	111.5																				
Distance to Receiver	74																				
		Third Octave Band Frequency (Hz)																			
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
A Reverberant Noise level inside Space	87.6	87	89	85.5	85	87.5	88	86	82.5	79	86	88	82	79	75	72	69.75	66.5	65.25	66	65	64.5	65.5
B Composite Sound Insulation of Façade		14.5	17.5	18.3	20.3	20.5	21.6	19.7	22.7	28.6	30.7	33.7	34.7	36.7	37.7	38.7	40.7	40.7	35.6	37.6	40.6	43.6	46.7
C Surface Area Correction (10 Log S)		20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
D Distance Correction (20 log R)		-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4
F -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
F Noise Level at Receiver (A-B+C+D)	27.7	41.6	40.6	36.3	33.8	36.1	35.5	35.4	28.9	19.4	24.4	23.4	16.4	11.4	6.4	2.4	-1.8	-5.1	-2.3	2.5	-6.5	-10.1	-12.1

Noise Break-out Calculation Dance Hall

North Facade

Surface Area of Facade	111.5																				
Distance to Receiver	74																				
		Third Octave Band Frequency (Hz)																			
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
A Reverberant Noise Level Inside Space	94.7	90.5	102	111.5	100.5	97	94	86	89.5	83.5	91.5	96	88.5	85	74	71	69.5	68.5	66	67	66	65.5	66.5
B Composite Sound Insulation of Façade		14.5	17.5	18.3	20.3	20.5	21.6	19.7	22.7	28.6	30.7	33.7	34.7	36.7	37.7	38.7	40.7	40.7	36.6	37.6	40.6	43.6	45.7
C Surface Area Correction (10 Log S)		20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
D Distance Correction (20 log R)		-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4
E -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
F Noise Level at Receiver (A-B+C+D)	38.4	45.1	53.6	62.3	49.3	45.6	41.5	37.4	35.9	23.9	29.9	31.4	22.9	17.4	5.4	1.4	-2.1	3.1	-1.5	-1.9	-5.5	-9.1	11.1

Noise Break-out Calculation Restaurant Ground Floor

Hazlebottom Road Facing Facade

Surface Area of Facade	135																				
Distance to Receiver	36																				
		Third Octave Band Frequency (Hz)																			
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
A Reverberant Noise level Inside Space	74.6	74	76	72.5	72	74.5	75	73	69.6	66	73	75	69	66	62	59	56.75	53.5	52.25	53	52	51.5	52.5
B Composite Sound Insulation of Façade		17.1	20.1	22.0	23.0	23.9	24.9	26.8	28.6	29.7	30.5	31.1	33.5	35.1	36.5	37.9	40.0	40.2	36.4	37.4	40.4	43.4	46.4
C Surface Area Correction (10 Log S)		21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
D Distance Correction (20 log R)		-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1
E -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
F Noise Level at Receiver (A-B+C+D)	20.0	33.1	32.1	26.7	25.2	26.8	26.3	22.4	17.1	12.5	18.8	20.1	11.7	7.1	1.6	-2.7	-7.0	-10.5	-8.0	-8.2	-12.2	-15.7	-17.7

North Facing Facade

Surface Area of Facade	55																				
Distance to Receiver	45																				
		Third Octave Band Frequency (Hz)																			
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
G Reverberant Noise level Inside Space	53.3	18.2	21.2	20.6	22.3	24.1	25.5	28.0	30.2	31.7	33.9	35.0	37.1	38.2	39.2	40.1	42.1	42.0	37.7	38.6	41.7	44.9	46.0
H Composite Sound Insulation of Façade		15.9	21.9	22.9	24.1	25.0	25.7	27.3	27.2	30.9	33.2	34.4	36.4	37.5	38.8	39.6	41.6	41.6	37.6	38.6	41.6	44.6	47.6
I Surface Area Correction (10 Log S)		21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
J Distance Correction (20 log R)		-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1
K -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
L Noise Level at Receiver (A-B+C+D)	-17.4	-21.6	-24.6	-25.9	-25.6	-24.6	-24.1	-23.1	-20.7	-23.0	-23.1	-23.2	-23.1	-23.2	-23.2	-23.2	-23.2	-23.3	-23.6	-23.8	-23.6	-23.5	-23.4
M Total Noise Level at Receiver (F + M)	20.0	33.1	32.1	26.7	25.2	26.8	26.3	22.4	17.1	12.5	18.8	20.1	11.7	7.1	1.7	2.6	-6.9	-10.3	-7.8	-8.1	-11.9	-15.0	-16.7

Noise Break-out Calculation Restaurant First Floor

Hazelbottom Road Facing Facade

Surface Area of Facade	136																					
Distance to Receiver	36																					
		Third Octave Band Frequency (Hz)																				
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
A Reverberant Noise level Inside Space	74.6	74	76	72.5	72	74.5	75	73	69.5	66	73	75	69	66	62	59	56.75	53.5	52.25	53	52	51.5	52.5
B Composite Sound Insulation of Façade		17.5	20.5	21.4	22.4	23.4	24.3	26.4	28.4	29.4	31.4	32.4	34.4	35.5	36.5	37.5	39.5	39.5	36.5	36.5	39.5	42.5	45.5
C Surface Area Correction (10 Log S)		21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
D Distance Correction (20 log R)		-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1
E -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
F Noise Level at Receiver (A-B+C+D)	19.5	32.8	31.8	27.3	25.8	27.4	26.9	22.9	17.4	12.8	17.8	18.8	10.8	6.8	1.7	-2.3	-6.5	-9.8	-7.0	-7.3	-11.5	-14.8	-16.8

North Facing Facing Facade

Surface Area of Facade	55																					
Distance to Receiver	46																					
		Third Octave Band Frequency (Hz)																				
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
G Reverberant Noise level Inside Space	74.6	74	76	72.5	72	74.5	75	73	69.5	66	73	75	69	66	62	59	56.75	53.5	52.25	53	52	51.5	52.5
H Composite Sound Insulation of Façade		15.8	21.9	22.9	24.1	25.0	25.7	27.3	27.2	30.9	33.2	34.4	36.4	37.5	38.6	39.6	41.6	41.6	37.6	38.6	41.6	44.6	47.6
I Surface Area Correction (10 Log S)		21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3
J Distance Correction (20 log R)		-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1	-31.1
K -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
L Noise Level at Receiver (A-B+C+D)	18.1	34.3	30.3	25.8	24.1	25.7	25.5	21.9	16.5	11.3	16.0	16.8	8.8	4.7	-0.4	-4.4	-8.6	-11.9	-9.1	-9.4	-13.4	-16.9	-18.9
M Total Noise Level at Receiver (F + M)	21.9	35.6	34.1	29.8	28.0	29.6	29.2	25.4	21.0	15.1	20.0	20.9	12.9	8.8	3.8	-0.2	4.4	-7.7	-4.9	-5.2	-9.2	-12.7	-14.7

Noise Break-out Calculation Banquet Hall - 10/12/6

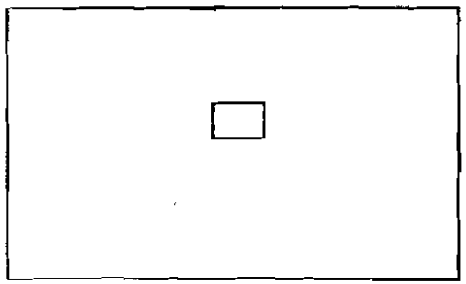
North Façade

Surface Area of Façade	111.5																					
Distance to Receiver	74																					
											Third Octave Band Frequency (Hz)											
	broadband dB(A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
A Reverberant Noise level Inside Space	94.7	90.5	102	111.5	108.5	97	94	88	89.5	83.5	91.5	96	86.5	85	74	71	69.5	68.5	66	67	66	65.5	66.5
B Composite Sound Insulation of Façade		20.8	23.8	24.1	25.4	26.8	27.1	24.5	24.8	29.6	31.7	33.7	34.7	37.7	39.7	41.7	41.7	33.7	37.6	40.5	43.5	53.1	56.2
C Surface Area Correction (10 Log S)		20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
D Distance Correction (20 log R)		-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4	-37.4
E -14 dB		-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0	-14.0
F Noise Level at Receiver (A-B+C+D)	34.0	38.8	47.3	56.5	44.2	39.3	36.0	32.5	33.9	23.0	28.9	31.4	22.9	16.4	3.4	-1.6	-3.1	-2.1	-2.5	-4.4	-8.4	-18.5	-20.7

Figure 1

Noise Monitoring Location Map





Key

- Site Boundary
- 1 - Location 1
- 2 - Location 2
- 3 - Location 3

RPS

N

Client: Evo Architects

Project: Woodlands Mill

Title: Noise Monitoring Locations

Date: June 08 Scale: NTS Paper Size: A4

Drawn: MH Checked: PT Job Ref: DLE1374

Figure Number: 01 Rev: 01