Edgar Wood Centre
Daisy Bank Road, Manchester

Noise Assessment Report

March 2018

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Client: J.P.S. Property Co. Ltd, 137 Barlow Moor Road, Manchester

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Contents

Section		Page
1.	**Introduction**	**4**
2.	**Assessment Guidance & Criteria**	**5**
	Manchester City Council: Planning & Noise Technical Guidance	5
3.	**Environmental Noise Survey**	**6**
	Survey methodology	6
	Survey equipment	6
	Weather conditions	6
	Measured indices	7
	Observations regarding the acoustic environment	7
	Results summary	7
4.	**Noise Assessment & Discussion**	**9**
	Nearest noise sensitive receptors	9
	Proposed venue operation	9
	Building envelope construction & acoustic performance	9
	Anticipated internal sound levels with a live band/amplified music	11
	Noise break-out and resulting sound levels at neighbouring dwellings	12
	Noise from building services plant	13
	Predicted noise levels from vehicles arriving & departing	14
5.	**Conclusion**	**15**

List of Tables, Figures & Appendices

Table 3.1 – Summary of measured background L_{A90} sound pressure levels 7
Table 3.2 – Summary of measured equivalent continuous L_{Aeq} sound pressure levels 8
Table 4.1 – Building envelope composite sound insulation 11
Table 4.2 – Predicted amplified music sound pressure level at nearest dwelling 12
Table 4.3 – Typical daytime L_{A90} octave band sound pressure levels (dB) 13
Figure 3.1 – Graph showing results of continuous sound level monitoring 8
Figure 4.1 – Main hall and existing raised platform 10
Figure 4.2 – Low level glazing to east and west facing elevations 10
Figure 4.3 – High level glazing to east and west facing elevations 11

Appendix A - Site location, surrounding area and survey measurement positions 16
Appendix B - Assessment terminology 18

1. Introduction

1.1 RS Acoustic Engineering has been appointed by J.P.S. Property Company Ltd to undertake a noise impact assessment with regard to using the Edgar Wood Centre as a venue for events such as weddings and similar celebratory functions.

1.2 The Edgar Wood Centre is located at 71 Daisy Bank Rd, Manchester, M14 5GH. The site is located within a mixed residential and commercial area on the fringe of the city centre.

1.3 The property is a Grade 1 listed building and was constructed in 1903. The building was formerly known as The Former First Church of Christ, Scientist. It is understood that the building was most recently used as office/business accommodation.

1.4 The nearest noise sensitive receptors to the site are dwellings (apartments) adjacent to the eastern and western boundary lines.

1.5 The main sources of noise associated with the proposals are anticipated to be amplified music break out from the main hall and intermittent vehicle movements from guests arriving and departing.

1.6 An indicative assessment has been undertaken with regard to amplified music break out from the main hall. The resulting sound levels at the nearest dwellings have been predicted for a four-piece band playing within the venue.

1.7 Sound control measures have been recommended, should it be deemed necessary to restrict or control the sound levels generated within the venue.

1.8 An indicative assessment with regard to vehicles arriving and departing has also been undertaken and the resulting sound levels predicted at the nearest dwellings.

1.9 This assessment is based on the results of an environmental noise survey undertaken at the site by RS Acoustic Engineering. The survey was conducted over a number of days to establish the typical acoustic environment at neighbouring dwellings.

1.10 The survey and assessment was conducted by Mr Ryan Swales ($BSc_{(Hons)}$, MIOA), Principal Acoustic Consultant and Member of the Institute of Acoustics.

1.11 This report provides the results of the noise survey, assessment criteria, predicted noise break out levels from the main hall and the predicted sound levels due to vehicles arriving and departing.

2. Assessment Guidance & Criteria

Manchester City Council: Planning & Noise Technical Guidance

2.1 Manchester City Council (MCC) has published the Planning & Noise Technical Guidance document in order to provide help and advice in relation to noise in a planning context and to encourage good acoustic design.

2.2 The document outlines what is expected in relation to current guidance and policy, with the aspiration that new developments achieve the highest possible standards without compromising the health and well being of local residents.

2.3 With regard to venues that generate music noise, Manchester City Council states the following:

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

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

2.4 With regard to noise from fixed building services plant, MCC have adopted the following criteria:

'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'.

3. Environmental Noise Survey

Survey methodology

3.1 An environmental noise survey has been undertaken by RS Acoustic Engineering to establish the prevailing acoustic environment at neighbouring dwellings.

3.2 Continuous sound level monitoring was conducted over a 52-hour period from 11:37 hours on Saturday 03rd through to 15:37 hours on Monday 05th February 2018.

3.3 The microphone was positioned at the eastern boundary line, directly adjacent to the apartment building off Hanover Crescent. The microphone was fixed to boundary fencing at a height of approximately 2 metres from the ground.

3.4 The measurement location was considered to be the most secure with regard to leaving the equipment unattended for an extended period and was considered to be representative of the background sound level experienced at adjacent dwellings.

3.5 Time-synchronised sample measurements were also conducted at the western boundary line, directly adjacent to Daisybank Villas (student accommodation).

3.6 A measurement interval of 15 minutes was used throughout the survey and measurements were obtained under free-field conditions.

3.7 The site location, surrounding area and survey measurement positions are shown in Appendix A.

Survey equipment

3.8 The survey was performed using the following Class-1 specification equipment:

- Casella CEL-633A sound level meter, with microphone type CEL-251 and pre-amplifier type CEL-495.
- Brüel & Kjaer 2260 sound level meter, with microphone type 4189 and pre-amplifier type ZC0026.
- Brüel & Kjaer 4231 acoustic calibrator.

3.9 Calibration of the sound level meter and microphone used for the measurements are traceable to accredited laboratories (calibration certificates are available on request).

3.10 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the measurements performed. The drift in calibration was less than 0.1 dB.

Weather conditions

3.11 The weather conditions during the survey were generally dry and fine with clear sunny spells.

3.12 Temperatures ranged between 4°C and 10°C and wind speed measurements on-site were less than 3 m/s^{-1}.

3.13 The overall weather conditions were considered suitable to obtain representative measurements.

Measured indices

3.14 Although a wide range of statistical sound level data was recorded during the survey, the L_{Aeq} and L_{A90} indices are of most interest here:

- $L_{Aeq,T}$ – The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period.
- $L_{A90,T}$ - The A-weighted sound pressure level that is exceeded for 90% of the measurement time, T. L_{A90} is often used to describe the 'background' sound level.

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

Observations regarding the acoustic environment

3.16 The dominant source of noise at the site is intermittent road traffic on Daisy Bank Road to the north and Anson Road (A34) to the west.

3.17 Intermittent road traffic on Hanover Crescent, Langdale Road and Milverton Road also contributes to the prevailing acoustic environment, but too a much lesser degree than Daisy Bank Road and the A34.

3.18 There was no perceptible commercial/industrial noise (e.g. from building services plant or machinery) along the site boundary.

3.19 Other noted noise sources include high altitude aircraft, passing pedestrians, cyclists and intermittent domestic activity at adjacent dwellings. Noise from such sources was generally insignificant.

Results summary

Continuous monitoring results

3.20 Table 3.1 and 3.2 present a summary of results for the continuous monitoring position. Measured values have been rounded to the nearest whole number.

Table 3.1 – Summary of measured background L_{A90} sound pressure levels

Date	Period (T, Hours)	Typical[1] $L_{A90,15min}$ dB	Lowest $L_{A90,15min}$ dB	Highest $L_{A90,15min}$ dB
Saturday 03/02/2018 - Sunday 04/02/2018	Daytime 07:00 - 23:00	42	38	46
	Night-time 23:00 - 07:00	39	36	41
Sunday 04/02/2018 – Monday 05/02/2018	Daytime 07:00 - 23:00	42	37	44
	Night-time 23:00 - 07:00	33	31	41
Monday 05/02/2018	Daytime 07:00 - 23:00	42	40	45

[1]Considered to be the representative background sound level (i.e. from a statistical analysis)

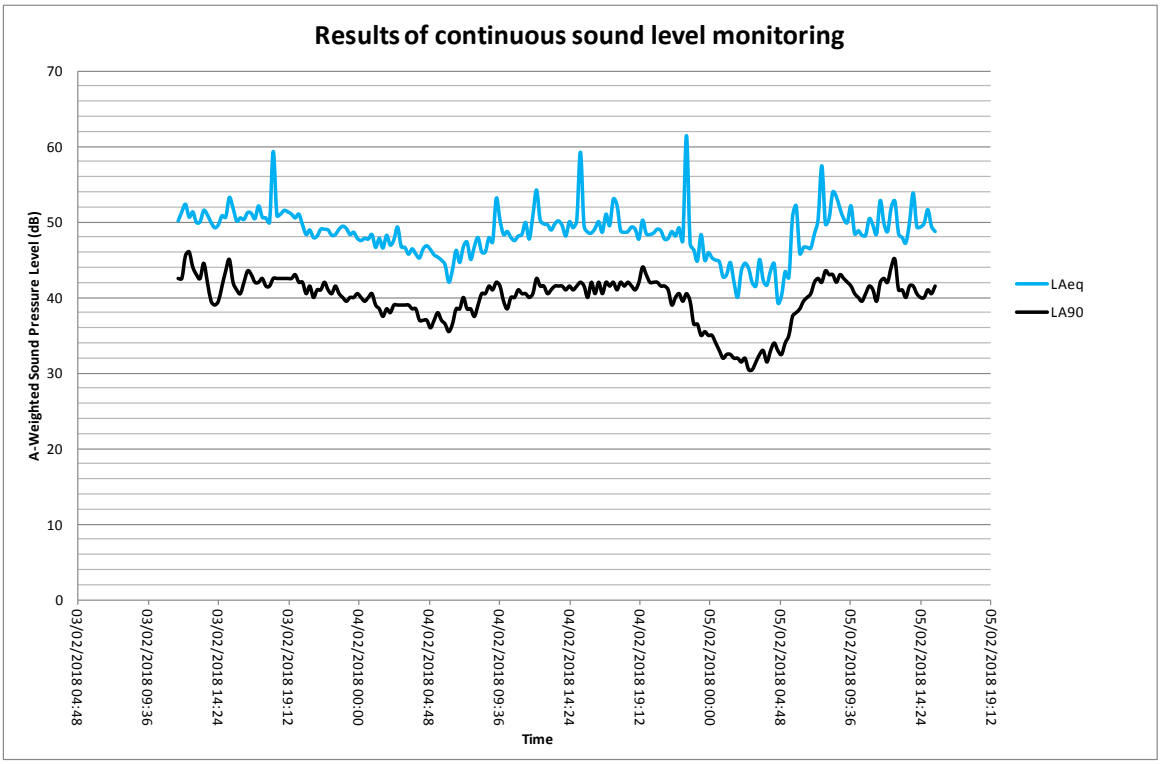
Table 3.2 – Summary of measured equivalent continuous L_{Aeq} sound pressure levels

Date	Period (T, Hours)	Average $L_{Aeq,T}$ dB	Lowest $L_{Aeq,15min}$ dB	Highest $L_{Aeq,15min}$ dB
Saturday 03/02/2018 - Sunday 04/02/2018	Daytime 07:00 - 23:00	51	45	59
	Night-time 23:00 - 07:00	47	42	49
Sunday 04/02/2018 – Monday 05/02/2018	Daytime 07:00 - 23:00	51	46	62
	Night-time 23:00 - 07:00	45	39	52
Monday 05/02/2018	Daytime 07:00 - 23:00	51	47	54

3.21 The results of the continuous sound level monitoring are presented graphically in Figure 3.1.

3.22 Additional tabulated survey data can be made available on request.

Figure 3.1 – Graph showing results of continuous sound level monitoring



Sample measurement results

3.23 The measured ambient ($L_{Aeq,T}$) and background ($L_{A90,T}$) sound pressure levels at the western boundary were typically 2 to 3 dB higher than those measured simultaneously at the eastern boundary (continuous monitoring position).

4. Noise Assessment & Discussion

Nearest noise sensitive receptors

4.1 The nearest noise sensitive receptors are dwellings (apartments) directly adjacent to the eastern boundary line. The apartments are accessed via Hanover Crescent.

4.2 The distance from the east facing elevation of the main hall to the nearest dwelling is approximately 19 metres. The distance from the eastern Annexe to the nearest dwelling is approximately 10 metres.

4.3 There are also apartments (Daisybank Villas) directly adjacent to the western boundary line. The apartments are accessed via Anson Road.

4.4 The distance from the west facing elevation of the main hall to the nearest dwelling is approximately 38 metres. The distance from the western Annexe to the nearest dwelling is approximately 45 metres.

4.5 There are also a number of dwellings to the north and south of the site, approximately 40 to 50 metres from the main hall.

Proposed venue operation

4.6 It is our understanding that the venue will be used for private social functions such as weddings and family celebrations. Amplified music and live bands/musicians will be associated with the proposed use.

4.7 It is anticipated that the venue will operate until approximately midnight, with live bands or amplified music playing until approximately 23:00 hours.

4.8 It is proposed that the venue will accommodate up to 300 guests, with 30 parking bays to the west of the main hall.

4.9 Noise breakout from the main hall and sporadic noise from vehicles arriving and departing are considered to be of most significance with regard to the venues operation.

Building envelope construction & acoustic performance

4.10 The building envelope construction comprises double-leaf brickwork (plastered internally), pitched timber truss roof with slate tiles and a lath/plaster finish.

4.11 External walls have a minimum thickness of approximately 300 mm and the external glazing is approximately 4 mm thick (single pane of glass).

4.12 The sound insulation performance of the brickwork elevation is expected to be approximately 55 to 60 dB R_w, whereas the sound insulation performance of the roof construction is expected to be approximately 40 to 45 dB R_w.

4.13 There is a lobbied timber double-door set on the west facing and north facing elevations of the main hall. The sound insulation performance of the lobbied door is expected to be approximately 40 to 45 dB R_w.

4.14 The sound insulation performance of the single glazed units is expected to be approximately 29 to 30 dB R_w.

4.15 The glazing is therefore expected to be the weakest element with regard to the sound insulation performance of the building envelope.

4.16 The sample photographs in Figure 4.1 to 4.3 show the main hall and external glazing to the east and west facing elevations.

Figure 4.1 – Main hall and existing raised platform





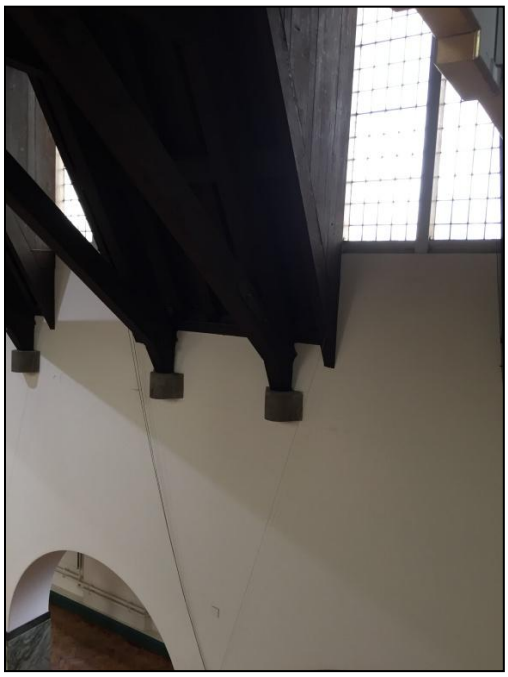
Figure 4.2 – Low level glazing to east and west facing elevations





Figure 4.3 – High level glazing to east and west facing elevations





4.17 Table 4.1 presents the calculation results with regard to the composite sound insulation provided by the building envelope (i.e. east facing external wall, glazing and roof construction combined).

4.18 The calculations take into account the approximate surface area and typical sound insulation performance of each building element.

Table 4.1 – Building envelope composite sound insulation

Title: Edgar Wood Centre **Sound Transmission Loss (ISO 12354-1)**												
Formula/Comment	***Single Value***		***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***	***Rw***	***(C,C_{tr})***
R = -10 log Σ 10^(-$R_{p,i}$ / 10)			21.1	27.7	31.5	35.3	41.0	44.3	40.0		**40**	**(-1,-4)**
$R_{Flanking}$	**ΔR**											
R			21.1	27.7	31.5	35.3	41.0	44.3	40.0		**40**	**(-1,-4)**
D_{nT} = R -10 log (S_{tot} / A)												
$D_{nT,flanking}$												
D_{nT}		**Mass**										
Materials with additional layer												
4 mm thick glass		28.4	13.0	20.0	22.0	25.0	31.0	34.0	29.0		**30**	**(-1,-3)**
Double-leaf brickw ork w alls		133.8	29.0	39.0	49.0	57.0	57.0	74.0	85.0		**58**	**(-2,-7)**
Pitched timber roof, slate tiles, plaster below		214.8	22.0	28.0	34.0	40.0	45.0	49.0	50.0		**44**	**(-2,-5)**

4.19 The composite sound insulation performance is predicted to be approximately 40 dB R_w.

Anticipated internal sound levels with a live band/amplified music

4.20 Taking into consideration the significantly large room volume, it is anticipated that the equivalent continuous sound level within the main hall will be in the region of 80 to 88 dB $L_{Aeq,60sec}$ with a live four-piece band playing (e.g. drums, guitar, keyboard and vocalist).

4.21 Similar sound pressure levels are also likely to be generated by a DJ using an amplified music and PA system. Sound pressure levels from acoustic instruments and performances are expected to be typically 75 to 85 dB $L_{Aeq,60sec}$.

4.22 Higher sound levels (e.g. 90 – 100 dB $L_{Aeq,60sec}$) are commonplace in smaller venues such as nightclubs, however, music sound levels at family functions such as weddings are typically below this level range, particularly where the venue is a large open reverberant space, such as a church hall or community centre.

4.23 For this indicative assessment, it is considered appropriate to use the octave-band sound pressure levels previously measured during a live band performance at a wedding reception (i.e. four-piece rock band). An equivalent continuous sound pressure level of approximately 88 dB $L_{Aeq,60sec}$ has been used in the calculations.

4.24 The venue was a large open function room and the survey date was September 2015. The microphone was positioned approximately 1 metre from the raised stage and approximately 1.5 metres from the ground. Measurement intervals of 60 seconds were considered appropriate.

Noise break-out and resulting sound levels at neighbouring dwellings

4.25 The sound pressure level at the nearest dwelling has been calculated using the following equation:

- $SPL_2 = SPL_1 – R_w + 10\ Log\ S – 20\ Log\ r - 14\ dB$

4.26 Where SPL_2 is the sound pressure level at the dwelling; SPL_1 is the internal sound pressure level adjacent to the wall where breakout will occur; R_w is the weighted sound reduction index (composite value); S is the combined surface area of the wall/roof; r is the distance from the main hall to the nearest dwelling.

4.27 The shortest distance from the east facing elevation of the main hall to the nearest dwelling is approximately 19 metres.

Table 4.2 – Predicted amplified music sound pressure level at nearest dwelling

	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Live band, sound pressure level (L_{eq} dB)	80	90	90	84	82	80	73
Composite sound reduction index (R_w dB)	-21	-28	-32	-35	-41	-44	-40
10log S (dB)	26	26	26	26	26	26	26
20log r (dB)	-26	-26	-26	-26	-26	-26	-26
-14 (dB)	-14	-14	-14	-14	-14	-14	-14
A-weighting (dB)	-26	-16	-9	-3	0	+1	+1
L_{Aeq} at dwelling (dB)	19	32	35	32	27	23	20
A-weighted sound pressure level $L_{Aeq,T}$ = 39 dB							

4.28 The calculation results indicate an equivalent continuous sound pressure level of 39 dB $L_{Aeq,T}$ at the nearest dwelling.

4.29 During the daytime period (07:00 – 23:00 hours), the typical background sound level was 42 dB $L_{A90,15min}$ (ref: Table 3.1).

4.30 The predicted sound pressure level at the nearest dwelling is approximately 3 dB below the typical background sound level.

4.31 The typical octave-band background sound level data is presented in Table 4.3.

Table 4.3 – Typical daytime L_{90} octave band sound pressure levels (dB)

Octave Band Centre Frequency (Hz)						
63	125	250	500	1000	2000	4000
52	49	45	42	38	33	31

4.32 The predicted sound pressure levels due to amplified music breakout are anticipated to be at least 10 dB below the typical background sound level in each octave band.

4.33 It is worth noting that the predicted 63 Hz and 125 Hz octave-band sound pressure level are significantly below the typical background sound level (33 dB and 17 dB below respectively).

4.34 On the basis of this assessment, the breakout sound pressure levels due to amplified music or live bands are generally expected to satisfy MCC's criteria and are considered unlikely to cause undue disturbance at neighbouring dwellings.

Sound level limiter

4.35 Since the composite sound insulation has been estimated and the source levels are indicative, it is recommended that an electronic limiter is installed within the venue so that the sound levels generated by amplified instruments and PA systems can be appropriately controlled.

4.36 It is anticipated that the limiter will need to be set to a broad-band level of between 80 and 90 dB $L_{Aeq,60sec}$.

4.37 As well as helping to protect the amenity of neighbouring dwellings, controlling the sound level within the venue will help to protect the hearing of guests/employees as well as providing a comfortable internal acoustic environment.

4.38 In addition to adjusting the overall L_{Aeq} sound level, an appropriate sound limiter will also allow the fine adjustment of tonal content (i.e. bass and treble frequencies).

4.39 As an example, common sound limiters used within music venues include the Formula Sound Sentry Mk2 and NLX SL2000 limiter.

- http://formula-sound.co.uk/system-protection-noise-control/
- http://www.soundlimiters.co.uk/www.soundlimiters.co.uk/info.php?p=3&pid=2540785&ack=9

Noise from building services plant

4.40 It is understood that there is no new building services plant associated with the proposals.

4.41 Should an item of new plant be required at a later date (e.g. a ducted kitchen extract fan), the sound rating level of all new plant should be at least 5 dB below the typical background sound level during the proposed times of operation.

4.42 On the basis of the survey results, it is recommended that the rating level does not exceed 37 dB $L_{Aeq,T}$ during the daytime hours.

4.43 Should plant operate during the night-time or early morning hours, the target rating level should be reduced accordingly.

Predicted noise levels from vehicles arriving & departing

4.44 It is understood that approximately 30 vehicles can be accommodated within the existing car park.

4.45 Previous sample measurements of a family-sized car manoeuvring within a small car park indicate an equivalent continuous sound level of approximately 60 dB $L_{Aeq,30secs}$.

4.46 With door closures and an engine start included, the equivalent continuous sound level increased to approximately 65 dB $L_{Aeq,30secs}$.

4.47 Assuming all 30 vehicles leave the car park (or arrive) in succession, the equivalent continuous sound pressure level over a 15-minute period is expected to be in the region 60 to 65 dB $L_{Aeq,15min}$ (due to engine starts, door closures and manoeuvres out of the car park etc).

4.48 Vehicles are a moving noise source and therefore the distance from the source to the receptor/dwelling will continuously vary.

4.49 For this assessment, it is considered appropriate to use a separation distance of approximately 29 metres, to represent the separation distance between the centre of the car park and the nearest dwelling.

4.50 Taking into consideration the level of sound attenuation due to distance separation (circa 29 dB), the resulting equivalent continuous sound pressure level is expected to be in the region 31 to 36 dB $L_{Aeq,15min}$ at the nearest dwelling.

4.51 The predicted sound pressure level is therefore notably below the typical daytime background ($L_{A90,T}$) sound level at the nearest dwelling and significantly below the typical ambient ($L_{Aeq,T}$) sound level.

4.52 It is worth noting that around midnight, the background sound level ranges between 35 and 41 dB $L_{A90,15min}$ and the ambient sound level ranges between 45 and 48 dB $L_{Aeq,15min}$.

4.53 Even during this worst-case quiet period, the resulting sound level from vehicles leaving the car park is expected to be generally below the existing background and ambient sound level.

4.54 On the basis of the above, sporadic noise due to vehicles arriving and departing is expected to have a negligible impact on adjacent dwellings.

5. Conclusion

5.1 Typical ambient and background sound levels have been determined at neighbouring noise sensitive properties.

5.2 Indicative sound levels from a four-piece band at a wedding reception have been used as a basis for this assessment.

5.3 The calculation results indicate an equivalent continuous sound pressure level of 39 dB $L_{Aeq,T}$ at the nearest dwelling due to amplified music break out from the main hall.

5.4 The predicted sound pressure levels due to amplified music breakout are anticipated to be at least 10 dB below the typical background sound level in each octave band.

5.5 Since the source levels used in this assessment are indicative, it is recommended that an electronic limiter is installed within the venue so that the sound levels generated by amplified instruments and PA systems can be appropriately controlled.

5.6 A limiter will help to protect the amenity of neighbouring dwellings and will also help to protect the hearing of guests/employees as well as providing a comfortable internal acoustic environment.

5.7 There are no new building services plant items associated with the proposals. Appropriate plant noise limits have been identified should new items of plant be deemed necessary at a later date.

5.8 Sporadic noise due to vehicles arriving and departing is expected to have a negligible impact on adjacent dwellings.

5.9 In terms of noise and the associated impacts, the venue is considered appropriate for the proposed events and activities.

Appendix A

Site location, surrounding area and survey measurement positions

Figure A.1 – Site location, surrounding area and survey measurement positions (source: Google Earth)

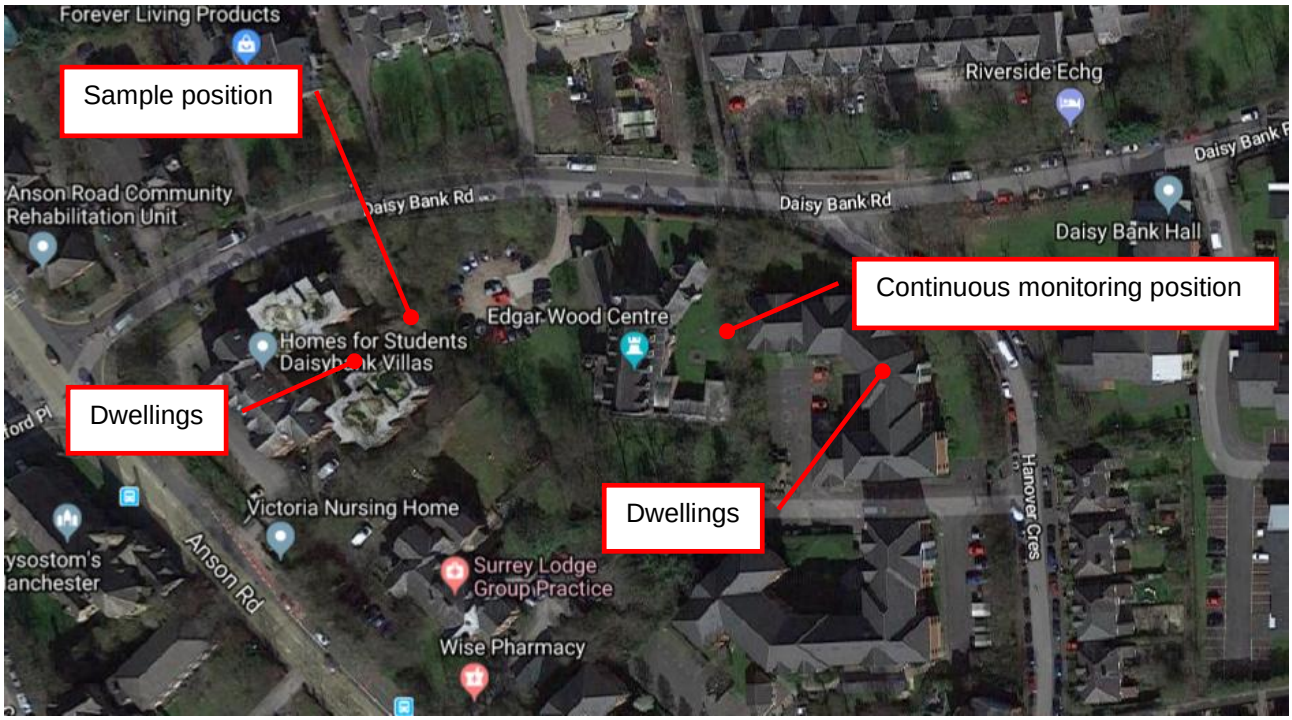
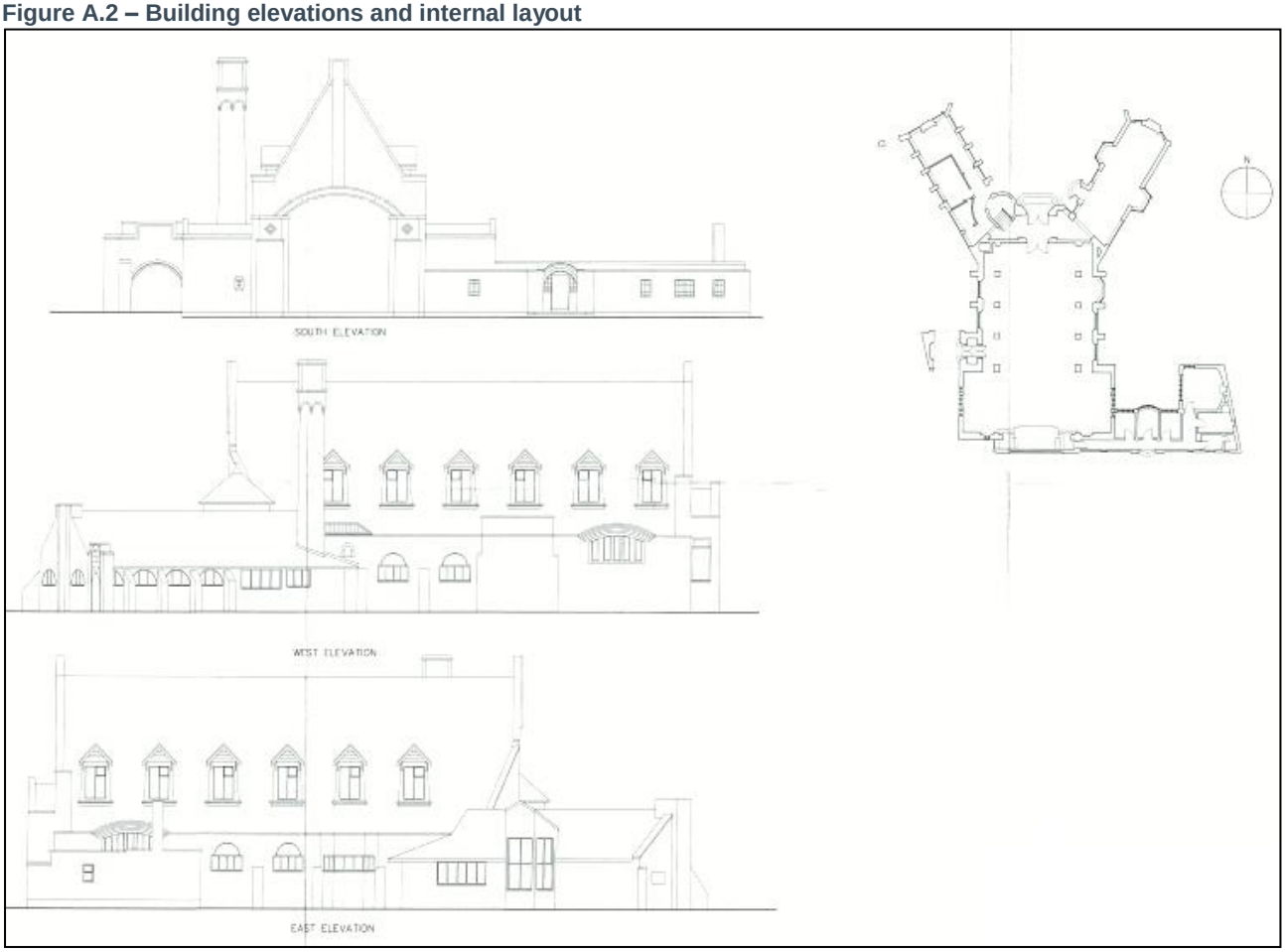


Figure A.2 – Building elevations and internal layout



Appendix B
Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Background sound level	The sound level in the absence of a specific noise source under consideration (e.g. plant/machinery), measured as $L_{A90,T}$.
Rating level $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.
Habitable Room	Any room used or intended to be used for sleeping, cooking, living or eating purposes (enclosed spaces such as bath or toilet facilities, service rooms, corridors, laundries, hallways, utility rooms or similar spaces are excluded from this definition).
R_w	The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.
Free-field level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other significant reflective surfaces. Generally as measured outside and away from buildings.