Azymuth Acoustics UK

Professional Acoustic Services

Approved by: Matthew Gibson
Date: 13.10.2020

Planning Noise Assessment Report
Ref: AA0278.1 Rev A

Conversion of Former Crossens Methodist Church into Recording Studio

Rufford Road

Southport

PR9 8HT

For

1880 Ltd

Former Crossens Methodist Church
Rufford Road

Southport

PR9 8HT



Azymuth Acoustics UK
Viridor House
No.3 Bolholt Terrace
Bury/Gtr Manchester
BL8 1PP
Tel: +44 (0)161-762 1055
Fax: +44 (0)161-761 1094
E-mail: dominic@acousticsuk.com
Web: www.acousticsuk.com

Document Status – Final

Document Verification	**Project Reference**		**AA0278.1 Rev A**
Document Revision / Status	1st Issue		
Version Date	13th October 2020		
Filename	AA0278.1 Rev A Studio, Former Crossens Methodist Church, Southport Noise Assessment Report 081020		
Description of Revisions	Final Issue - **Section 1.0** - refers to required external sound level - **Section 4.0** - Secondary Glazing specification amended 16.8mm from 12.8mm. - **Section 4.4** - reviews and assesses external M&E equipment. - **Section 6.0** – concludes finding from the assessment and comments on whether criteria has been met.		
	Prepared by	**Checked by**	**Approved by**
Name	Jamie Wilson AMIOA	Dominic McCann MIOA	Matthew Gibson
Signature			

Disclaimer

This report has been prepared by Azymuth Acoustics UK with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our Standard Terms and Conditions of Business and taking into account the resources devoted to it by agreement with the Client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own discretion and risk.

Contents

1.0 Introduction

Azymuth Acoustics UK is appointed by 1880 Ltd to provide a Noise Assessment Report of a proposed recording studio facility formed by change of use at Former Crossens Methodist Church, Southport. The studio will comprise a main live room, a control room, recording booths etc. The proposed operating times of the business are understood to be 10:00 – 22:00hrs 7 days a week (Monday – Sunday).

This report addresses the potential impact of entertainment noise on occupied dwellings adjacent to the premises. Analysis and recommendations on specifications of the building envelope are included, with the aim of compliance with local authority noise control criteria.

This acoustic assessment includes the following aspects:

- The results of a noise survey at the site covering daytime and late evening periods to midnight.
- Criteria developed to set acceptable noise levels at sensitive receptors in nearby property.
- An assessment of the impact resulting from predicted noise levels when compared with the relevant criteria.
- The results of a sound insulation test through the building façade between the existing façade and nearest receptors.
- Recommendations on noise mitigation measures.

The following section is taken from the Sefton Council planning policy document

As per policy EQ4 of sefton local plan - "Noise/ vibration, dust or odour can give rise to problems whether from premises adjoining a proposed development, or from the development proposed. Where this is the case, a suitable assessment should be carried out and submitted with the planning application. "

Additionally, it is understood that Sefton Council require noise levels propagating from the proposed studio facility shall be less than or equal to the worst-case background sound level at the nearest noise sensitive receptor.

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the environmental noise survey consisted of a SvanTek 959 Type 1 precision sound level meter. The equipment was calibrated before and after the noise measurements. The sound level meter measured at A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

The daytime ambient noise level survey was undertaken between 12:12 - 12:55hrs on the day of 30th June 2020, and the night-time survey was undertaken between 21:21 - 22:17hrs on the night of 30th.

June 2020. The survey covered a baseline noise survey over the maximum proposed operating hours of the premises.

The ambient noise measurements were undertaken using the sound level meter microphone at the locations shown in Figure 1 below.

Figure 1: Measurement location circled in red on master plan drawing

2.2 Measurement Results

A summary of averaged noise measurement data is presented in Table 1; full results are set out in Appendix B.

The following table summarises the results of the noise measurements undertaken at the site in terms of averaged day and night-time statistical noise levels.

Measurement Location	Time period	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
1) 2m from church North façade, near residents.	Day	61.9	48.7	57.0	51.7	45.6	40.8
	Late Evening	60.0	44.8	54.8	48.1	36.9	31.9

Table 1: Summary of averaged noise measurement results (dBA)

2.3 Description of Noise Climate

The daytime and late evening noise climate in the area is relatively quiet, with the dominant noise source being road traffic using Rufford Road (B5244). Additionally, Activity by nearby residents and businesses on Rufford Road contribute to noise levels, along with noise from bird song.

3.0 Assessment Criteria

In order to assess the extent of any measures which might be necessary in order to comply with suitable conditions relating to entertainment noise break-out / through, Azymuth Acoustics has reviewed the following guidance documents and standards:

- BS 8233: 2014
- World Health Organisation Guidelines on Community Noise
- Noise from Pubs and Clubs – IOA report for Defra (2005)
- BS41442: 2014

3.1 BS 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq,\,T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living rooms	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 2: Noise Limits for Residential Properties Suggested in BS 8233

3.2 W.H.O Guidelines on Community Noise

In 1980 the World Health Organisation proposed environmental health criteria for community noise including consideration of noise levels at which sleep disturbance may take place. These guidelines were amended by the World Health Organisation in 1999. The guidance suggests that an internal L_{Aeq} below 30dB is required to preserve the restorative process of sleep. This is equivalent to a free-field level of around 42 to 45dB L_{Aeq} or a façade level of 45 to 48dB L_{Aeq}, assuming open windows.

3.3 Noise from Pubs and Clubs – IOA report for Defra (2005)

Noise from Pubs and Clubs was the final report for a contract let by the Department for Environment, Food and Rural Affairs to review existing knowledge of noise from entertainment sources from Pubs and clubs. The overall aim of the publication was to recommend criteria and measurement Methods for assessing the noise from pubs and clubs for use by Environmental Health Officers (EHOs) and others.

Although the document does not relate to recording studio facilities / rehearsal rooms, the noise characteristics of activity are similar. The report considered it inappropriate to use only A-weighted target levels for music noise intrusion, because the impact of the bass elements of the noise.

The absolute limit suggested in the report was the use of Noise Rating Curve NR30 (07:00 to 23:00 hours) and Noise Rating Curve NR25 (0700 to 2300 hours). A target range of NR25 – 30 is suggested in this noise assessment in order to reflect the opening hours of the premises.

3.4 BS 4142: 2014

British Standard 4142: 2014 "Methods for assessing and rating industrial sound" describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

BS 4142 notes that: *Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.*

It should be noted however, BS 4142 states that the standard is not intended to be applied to the rating and assessment of sound from recreational activities or music and other entertainment. Hence, the standard is primarily presented here for guidance and to assist in the assessment of any proposed external mechanical equipment / atmosphere connections.

3.5 Recommended Noise Assessment Criteria

Based on the guidance above it is recommended that the following criteria would be reasonable with the aim of minimising the impact of the proposed operation:

- A predicted late evening external level due to entertainment noise from the premises will equate to the worst-case Background Sound Level (BSL, L_{A90}) at the nearest residential receptor, i.e. 29dBA.

- Noise levels inside the nearest dwelling not greater than 35 dBA or NR25-30 during the period 20:00 to 22:00hrs, i.e. nominally equal to the internal ambient noise levels in the living room with windows partly open.

- Calculated noise levels from proposed AC condensing unit will equate to the worst-case Background Sound Level (BSL, L_{A90}) at the nearest residential receptor, i.e. 29dBA.

4.0 Assessment of Noise Levels

4.1 Typical Noise Levels in Recording / Rehearsal Studios

Based on the proposal it would be assessed that continuous levels approx. 91dB $L_{Aeq,5min}$ could be expected internally during a rehearsal / recording session. The assessment draws reference to similar projects previously undertaken by Azymuth Acoustics. Table 3 details the predicted noise levels based on a typical noise spectrum for a live rock band performance.

Parameter	Period	Octave Band Centre Frequency (Hz)								Total dBA
		63	125	250	500	1k	2k	4k	8k	
Typical level estimate during busy periods $L_{Aeq,5min}$	Day / late evening period	88	91	91	86	85	82	80	82	91

Table 3: measure of likely internal level, typical noise levels in recording / rehearsal studio

4.2 Review of the Existing and Proposed Building Envelope

4.2.1 Existing Building Envelope (Walls, Windows and Doors)

The existing structure consists of stone / brick walls, the roof appears to be traditional slate tile roof above traditional lath plaster ceilings (it is unknown whether there is insulation in the void between layers) and as such would probably not require up-rating from a noise break-out perspective.

The north façade of the proposed live room has large arched windows on the north elevation, along with roof lights to the west. Additionally, the premises includes timber fire exit doors which lead to the external muster point, north of the building.

Azymuth Acoustics has carried out sound insulation tests between the proposed live room and external north façade, which is primarily glazed (near to the closest residential receptor).

- The overall sound insulation of the façade (as a D_{nw}) is 42 dB or better, with the weakest elements being the existing glazing. NB the overall measured D_{nw} was limited by the presence of traffic noise break-in and the actual value is likely to be 1 or 2 dB better.

- The test results indicate that the existing glazing is likely to provide a minimum reduction of approx. 40 - 42 dB R_w and as such an additional reduction of approximately 10-12 dBA noise break-out is required in order to provide satisfactory conditions in dwellings situated approx. 4m to the north/east façade.

- Additionally, the inner timber swing access doors situated at the entrance lobby will likely require upgrading from a sound insulation perspective. This will be discussed in greater detail in section 4.4 below.

4.3 Noise Break-out Calculations and Assessment against Criteria

Based on the proposed building envelope (primarily the glazed north façade) as described above, the noise limits for activity noise inside the Rehearsal / Recording Studio area should be 91 dBA or less in order comply with the targets described in Section 3.4. The limits would apply to noise from a live rock band performance.

The following table provides an assessment of calculated noise break-out from the proposed facility with recommended upgrades for late evening operation compared with background levels in the vicinity.

Parameter	Location	Octave Band Centre Frequency (Hz)							Total dBA
		63	125	250	500	1k	2k	4k	
Sound pressure level (max) limit $L_{Aeq,5min}$	Inside Studio facility (band rehearsing / recording)	88	91	91	86	85	82	80	91
Specific sound pressure level (calculated)	Outside (with upgrades to glazing and access door) @1m outside	46	44	38	27	19	13	4	33
Specific sound pressure level (calculated)	Nearest receptor (137 Rufford Road) @4m away	39	36	30	20	12	6	-4	26
Specific sound pressure level penalty +3 dB									29
Typical measured Background Sound Level $L_{A90,1hour}$	External level (late evening)	33	33	30	24	22	20	18	29
Specific level compared with BSL	Nearest receptor (137 Rufford Road) @4m away	6	3	1	-4	-10	-14	-22	0

Table 4: Assessment of predicted entertainment noise level break-out during late-evening: receptor 137 Rufford Road

As seen in table 4 above, with appropriate sound mitigation measures (see section 4.4) the noise break-out levels are likely to be in-line with the worst-case existing background sound level at the nearest residential receptor and as such noise level criteria has been met as relates to section 3.5 of this report.

4.4 Review and Assessment of proposed External M&E Equipment

Is it is understood that plant equipment associated with the development will be 1no. Daikin external AC condenser unit (unit ref: CU1REYQ10U). The condenser unit will be situated West to the rear of the existing building at ground level.

The following table provides an assessment of calculated noise Impact from the proposed condenser unit at the nearest noise sensitive receptor based on a manufactures sound power level of 58 dBA. 137 Rufford Road is screened by the existing church, as such the nearest noise sensitive receptor is assessed as 4 Brade Street.

Location	Results	Values	Commentary
1) 4 Brade Street	Background sound level	$L_{A90,\ 5mins}$ = 29 dB	Derived from typical background sound levels at pos 1 during late evening worst case
	Specific sound level @ ~26m	$L_{Aeq,\ 5mins}$ = 21 dB	
	Acoustic feature correction	+ 2 dB	The specific sound is slightly tonal in relation to the background sound level.
	Rating Level	(21 + 2) dB = 23 dB	The extract fans produce a steady hum
	Background sound level	$L_{A90,\ 5mins}$ = 29 dB	As above
	Excess of rating over background sound level	(23 – 29) dB = - 6 dB	As per clause 11 of BS4142
	Assessment indicates a likelihood of adverse impacts		The excess of the rating level over the background sound level is showing a negative result, as such the likelihood of adverse impact is low.

Table 5: Assessment of noise levels at nearest noise sensitive receptor from proposed AC condensing unit

4.5 Recommendations for Noise Control

The following bullet points set out the recommended noise control measures for the main studio lives room:

- Install a new layer of 16.8mm thick Pilkington Optiphon glazing to the inner side of the window reveal of the North facing windows. The air gap between the existing outer glazing and proposed inner glazing should have a minimum gap of approx. 175mm; Increasing the size of the air gap will slightly improve the sound insulation performance (see figure 2 below).

- Replace the existing inner timber swing access doors with good quality acoustic timber door-set. The recommended minimum sound reduction value for the acoustic door should be Rw 35 dB or better (see figure 3 below)

- Install approx. 3m2 of class A absorption panels to the ceiling and side wall of the existing lobbied area, between the proposed live room and outdoor area below (see figure 3 below)

Figure 2: Location for proposed 16.8mm glazing marked in blue

Figure 3: Locations for sound control measures marked in red, green, blue

5.0 Conclusions

Azymuth Acoustics has undertaken a Noise Assessment Report of a proposed recording studio facility formed by change of use at Former Crossens Methodist Church, Southport. The proposed operating times of the business are understood to be 10:00 – 22:00hrs 7 days a week (Monday – Sunday).

Daytime noise levels across the site are in the range of 47-50dB $L_{Aeq, 5min}$ and 39-41dB $L_{A90, 5min}$ and late evening noise levels are in the range of 43-45dB $L_{Aeq, 5min}$ and 29-33dB $L_{A90, 5min}$ Noise from general road traffic and nearby licensed premises made the largest contributions to the noise climate at the time of survey.

The existing building envelope would allow music levels to operate up to the limits shown in Table 3 above, provided that recommendations for sound control measures set out in section 4.4 are incorporated into the scheme.

Recommendations for noise mitigation are summaries below and should incorporated prior to operation:

- Install a new layer of 16.8mm thick Pilkington Optiphon glazing to the inner side of the window reveal of the North facing elevation. The air gap between the existing outer glazing and proposed inner glazing should have a minimum thickness of approx. 175mm; Increasing the thickness of the air gap will slightly improve the sound insulation performance - the predicted noise level at the nearest noise sensitive receptor is calculated to be approx. 29dBA i.e. equal to the worst-case background sound level, As such this should be deemed sufficient .

- Replace the existing inner timber swing access doors with good quality acoustic timber doors. The recommended minimum sound reduction value for the doors should be Rw 35 dB or better.

- Install approx. $3m^2$ of class A absorption panels to the ceiling and side wall of the existing lobbied area, between the proposed live room and outdoor area below (see figure 3 below).

- Noise levels from proposed AC condensing unit are calculated to be – 6dB below the worst-case background sound level at the nearest noise receptor, as such the likelihood of adverse impact is low as relates to BS 4142.

Appendix A – Glossary of Terms

Decibel (dB)
this is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)
This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level
The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. 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.

L_{Aeq}
this is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

SRI = L1 - L2 + 10 log (S/A)

Where: L1 = Noise level in the source room
L2 = Noise levels in the receiving room
S = Surface area of test specimen
A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)
this is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves. Appendix B – Graphical Results of Sound Insulation Tests

Appendix B – Full Tabulation of Results

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
30th June 2020 Daytime								
12:12'28	1	00:05'00	61	48.7	57.4	52.3	45.8	39.9
12:17'28	1	00:05'00	60	48.4	56.4	51.9	46.5	40.2
12:22'44	1	00:05'00	70.3	50.8	61.4	52.6	46	40.5
12:27'44	1	00:05'00	59	47.9	56.6	51.7	44.3	39.1
12:32'44	1	00:05'00	68	49.1	59.4	52	44.6	40.2
12:37'44	1	00:05'00	62.3	48.3	55.7	51.5	46.1	41.9
12:42'56	1	00:02'00	58.5	48.8	56.1	51.8	47.4	43.3
12:44'56	1	00:02'00	55.8	46.4	53.3	49.6	44.6	40.9
12:46'56	1	00:02'00	59.2	48.5	56.7	52.3	45.6	41.4
12:48'56	1	00:02'00	56.2	47.1	54.6	50.6	45.4	39.3
12:50'56	1	00:02'00	65.6	49.7	58.6	52.9	45.6	40.6
12:52'56	1	00:02'00	66.4	48.8	57.5	51.1	45	41.9
30th June 2020 Evening								
21:21'26	1	00:05'00	60.6	43.7	55.1	47.3	36.1	33
21:26'26	1	00:05'00	56.8	43.7	53.2	48.5	37.9	33.7
21:31'26	1	00:05'00	57.6	41.7	53.6	45.3	31.9	29.2
21:36'26	1	00:05'00	57.4	43.8	54.6	48.3	36.3	30.1
21:41'26	1	00:05'00	64	45.1	56	49.2	35.5	28.9
21:46'26	1	00:05'00	70.9	47.6	58.4	49.2	33.6	29.4
21:51'26	1	00:04'00	56.3	41	51	43.9	37.5	33.7
21:56'26	1	00:05'00	56.4	44	53.1	48.4	39.2	33.9
22:01'26	1	00:05'00	59.2	47.3	57.3	51.7	41.5	34.7
22:07'24	1	00:05'00	61.8	44.4	56	47.6	35.6	31.2
22:12'24	1	00:05'00	59.2	45.5	55	49.8	40.5	33.6

Appendix C – Noise Map from SoundPLAN 8.2

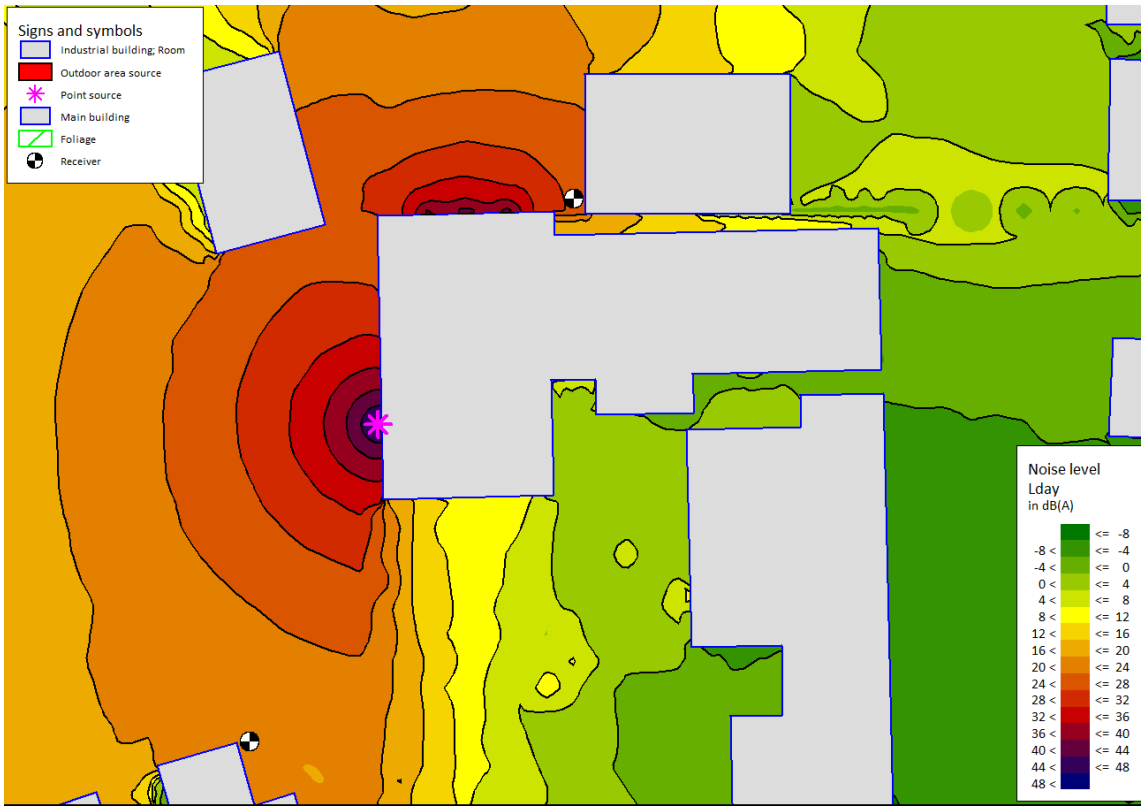

Figure 4: SoundPLAN Noise Map showing noise levels at nearest residential receptor (ground floor)

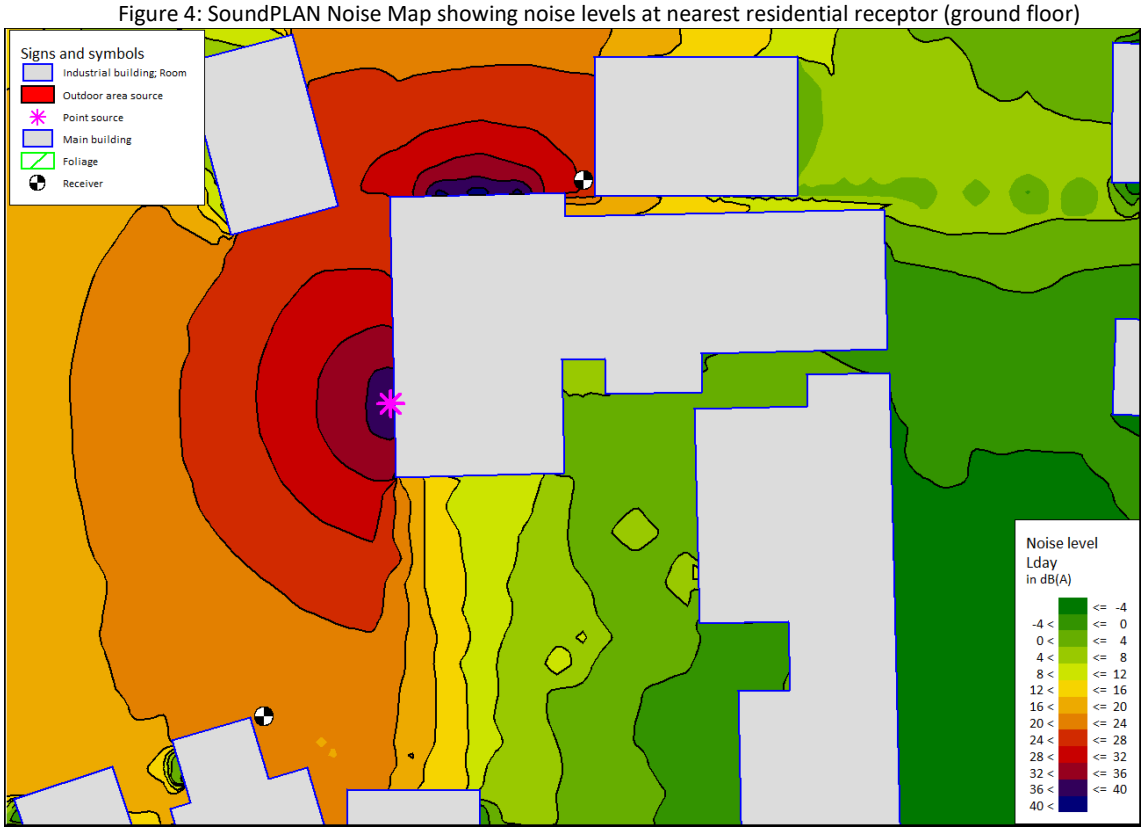

Figure 5: SoundPLAN Noise Map showing noise levels at nearest residential receptor (first floor)

Appendix C - Manufactures Noise Data for AC Condensing Unit

Condensing Unit Selection

Condensing Unit Ref	Cool/Heat Nominal (kW)	Associated Fan Coils	Index Capacity	Dimensions (H x W x D mm)	Weight (KG)	Noise (dBA)
CU 1 REYQ10U	28.0/28.0	AC 1 – 10	125 ~ 325	1685 x 930 x 765	218	58

Condensing Unit Location

The external condensing unit is to be located externally at ground floor level, positioned to enable adequate maintenance access and airflow.

We have assumed that a flat and level surface would be provided for our external plant and that there are no restrictions as to their location.

Figure 6: Manufactures noise data of proposed AC condensing unit