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REVISED NOISE IMPACT ASSESSMENT

at

PROPOSED WEDDING VENUE AND RESTAURANT, FIELDHEAD, LIDGET STREET, LINDLEY, HUDDERSFIELD.

Date of measurements:	23rd January & 12th February 2015
Date of original report:	16th February 2015
Date of this revision:	11th October 2016
Prepared for:	Robinsons Property Services Ltd.
Kirklees Council ref:	**2014/65/93327/W**

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1.0 Summary and Conclusions

It is proposed to convert existing vacant buildings at Fieldhead, Lidget Street, Lindley into a wedding venue and restaurant. If permission is granted then the completed development would feature internal music for entertainment and dancing. The developer commissioned our original survey and report dated 16th February 2015 to predict the outdoor sound levels at the nearest dwellings caused by the proposal. This current revision takes account of more recent changes to the proposal. Much of the text of this revision is identical to the original report and is repeated here for convenience.

1.1 The acceptance criteria called for by the LPA for music from licensed premises is that the music as received at the nearest noise-sensitive receptors must not exceed the background sound levels as an overall dBA value or in the region of bass music.

1.2 The existing background sound levels have been measured at the nearest receptors to the proposed development during daytime and night periods when music is expected for dancing and entertainment.

1.3 It is predicted that if a live music band were to perform inside the proposed function room at the interior sound levels measured at other premises then the outdoor sound levels at the nearest receptors would exceed the night background by up to 12 dB at the frequencies of bass music. This assumes that the windows of the function room are fitted with a very high specification of acoustic glazing, ie. secondary glazing using 10mm and 6mm float glass separated by a 200mm airgap to the function room windows or the acoustic equivalent. It is recommended that if live music is to be featured inside the function room then an electronic sound limiter will be necessary to control the level of bass music.

1.4 It is predicted that recorded music played for dancing through a typical disco sound system in the function room can be controlled within the LPA's outdoor sound requirements by fitting reinforced double glazing to the function room windows consisting of one pane of 10mm float glass and one pane of 4mm float glass separated by a 12mm or 16mm airgap, ie. 10-12-4, 10-16-4 etc., or the acoustic equivalent.

1.5 Background music played inside the restaurant will comply with the LPA's outdoor sound requirements with no special noise mitigation.

1.6 It is predicted that the sound insulation of the ground-to-first floor above the restaurant will need to be reinforced in order to achieve the LPA's indoor sound requirements in bedrooms. Outline specifications are given in this report and detailed proposals can be provided at the appropriate stage if required.

1.7 The proposal to locate a gymnasium adjacent to and below bedrooms will require a high standard of sound and vibration insulation to the dividing floor and all walls of the gymnasium. In order to achieve the design target in bedrooms when the gymnasium in in normal unrestricted use it is recommended that a new suspended ceiling of double plasterboard should be added underneath the existing ceiling and new floating floors are added above the existing boards to bedrooms at the first floor directly above the gymnasium. A floating floor should also be added to form the working surface of the gymnasium and all internal walls of the gymnasium should be fitted with independent wall linings. If acoustical treatment of this standard is unacceptable because of the listed nature of the building then it may be necessary to combine the best practicable acoustical treatment with a management regime such as restricting the hours of gymnasium usage to times when the bedrooms are unlikely to be needed for sleep. Detailed sound insulation proposals can be provided at the appropriate stage if required.

1.8 The Local Planning Authority has not published specific requirements for sound generated outdoors at licensed premises and so this report uses national guidelines published by the Institute of Acoustics. From these guidelines it is recommended that the proposed roof terrace and outdoor seating area are not used after dusk or 21.00 hours whichever is the earlier, there is no lighting in these areas other than for safety and security reasons and no music is played in these areas.

1.9 No details are available at this stage of the locations or sound levels of fixed plant items or ventilation proposals. The background results of this survey can be used at a later stage to determine sound limits on fixed plant items. Open windows and doors must not be relied on for ventilation to the function room when music is being played.

2.0 Acceptance Standard on Noise

Kirklees Council "Noise Design Advice"

Section 4 of the document "Noise Design Advice" published by Kirklees Council describes the acceptance standard adopted for the sound levels caused by music where new entertainment premises are proposed near to existing residential properties. The Council calls for the entertainment premises to be designed to ensure that music and associated noise is controlled so as to be inaudible inside any residetial premises in the vicinity. A summary of the Council's technical definition of inaudibility is:

- The noise caused by entertainment alone (when measured and time-averaged as an overall dBA value over a one-minute period) should not exceed the background sound level when no music is being played (measured as a dB LA_{90} value).

- At the sound frequencies of bass music from 40 Hz to 160 Hz there is a more stringent requirement in which the music (when measured as a more precise dB L_{10} value in each frequency band) should not exceed the background dB L_{90} value.

The Kirklees Council document calls for the above sound levels to be measured inside the appropriate dwelling with the dwelling windows either open or closed, "whichever makes the music appear louder".

3.0 Sound From Proposed Wedding Venue

3.1 Sound Sources

The sound sources anticipated inside the development are amplified recorded music and the possibility of live music bands in the function room mainly during weekend evenings for wedding receptions. Typically the live bands would finish at 2300 hours and recorded music would continue after 2300 hours. The function room will consist of the former coach house converted for this purpose and a new single storey extension to the coach house.

There will be a restaurant and bar in the former main house which will be linked to the function room by a new building forming a foyer and

guest reception area. Sound sources in the restaurant, bar and reception area will be background music and customers' voices only.

Since the development is at the proposal stage it is not possible to measure existing sound levels of sources at the premises. For the purpose of sound predictions this report uses the results of sound measurements taken at other premises with similar sound sources to those proposed at this development.

Live Music

Sound levels were measured inside the lounge bar of The Junction public house at Golcar near Huddersfield on Sunday 9th March 2014 when a live music band was performing to a crowded audience. The 5-piece band consisted of electric guitars, bass guitar, combined male / female vocals with amplification and live drums. The sound levels inside the bar were measured at 5m from the stage at:

Music source	**Overall dB LA_{eq}**
Live music band	100.7

Full frequency spectrum, dB linear, Leq:

Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Live band Leq	99.7	102.1	100.8	98.5	94.6	89.8	84.6	77.8

Low frequencies of bass music, dB linear, L10:

Frequency (Hz)	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Live band L10	86	103	100	95	102	99	103

Disco Music

Sound levels were measured inside the lounge bar of The Manor Barn public house in Rotherham during a Friday evening on 9th March 2014 when a disco with a DJ was providing music for a private party. The sound levels inside the bar at 5m from the music source was:

Music source	**Overall dB LA_{eq}**
Disco with DJ	86.1

Full frequency spectrum, dB linear, Leq:

Frequency (Hz)	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Disco Leq	76.0	84.1	85.2	84.8	80.8	76.5	70.3	67.8

Low frequencies of bass music, dB linear, L10:

Frequency (Hz)	40	50	63	80	100	125	160
Disco L10	66.5	68.1	72.1	78.6	83.1	84.8	82.9

Background Music

Sound levels were measured inside the city-centre restaurant of Las Iguanas, Cloth Hall Lane, Leeds, during a Friday evening when music was being played through a fixed speaker system as a background feature only. There was no DJ or dancing. All tables were occupied by diners resulting in a relatively loud interior sound level as voices were being raised above the general background music level. The overall sound levels in the restaurant were:

Music source	**Overall dB LA_{eq}**
Background music only	80.0

Full frequency spectrum, dB linear, Leq:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Backg'nd music	67	69	70	76	74	70	66	57

3.2 Receptors

The nearest noise-sensitive receptors are:

- Dwellings at 75m distance at the opposite side of Lidget Street which have a direct sightline to the front elevation of the development interrupted only by trees and vegetation.

- Dwellings at 10m and a residential care home at 20m adjacent to the development which will be shielded from the function room and restaurant/bar by existing buildings to be converted into guest accommodation and service facilities.

- A childrens' care home at 20m which has a direct sightline to the front elevation of the development.

- Dwellings at 90m on Farnlee which have a direct sightline to the front elevation of the development.

- We are advised that residential development is proposed on land adjacent to the western boundary of the development site.

If the residential development takes place adjacent to the western boundary of the site then it will bring noise-sensitive receptors nearer than the existing dwellings to the front elevation of the function room. For this reason the proposed residential development land is considered as a potential receptor in this report and is included in the noise impact predictions.

3.3 Sound Transmission Paths

Function Room

The main transmission paths by which music from inside the function room will reach outdoors will be through glazing and doors proposed in the south and west elevations of the function room and through the new roof over its central area. Sound transmission from the function room north and eastwards will be insignificant since service areas and toilets will shield any sound leakage towards the north and there will be a lobby with two sets of double doors leading to the reception foyer and the rest of the development in the eastern direction.

Restaurant & Bar

Sound from inside the dining room and the bar/dining room will reach outdoors through the glazing and doors in the east and south elevations of the former main house. Sound transmission in other directions will be controlled by adjacent buildings. Sound from inside the function / community room which is attached to the restaurant and bar will be through the bay window in its south elevation.

The revision to this report includes predictions of sound generated at an outdoor roof terrace that is now proposed at first floor level and an outdoor seating area.

Glazing

Glazing specifications have not been finalised at this stage. The minimum acoustical requirements of glazing to the function room and restaurant / bar are recommended in a later section of this report, based on the anticipated indoor sound levels and the requirements of the LPA on sound levels reaching noise-sensitive properties.

Ventilation

No ventilation proposals are available at this stage. Open windows or doors should not be used for ventilation to the function room when music is being played.

4.0 **Background Sound Levels**

Background sound levels were measured at the nearest dwellings during the daytime of Friday 23rd January and late at night on Thursday 12th February 2015. Conditions during both survey periods were dry with no wind. All results were taken using a Bruel & Kjaer precision sound level analyser type 2260 for which current calibration certificates are held. Measurement positions were used at:

1. The nearest dwellings on Lidget Street.

2. Childrens' care home adjacent to the west site boundary, also representing the proposed residential development site.

3. Rear of dwellings on Farnlee.

The results are shown below as overall dB LA_{90} values and at the low frequencies of bass music as called for by the LPA.

Receptor Location	**Background dB LA_{90}**	
	Daytime **1400-1600**	**Night** **2300-0030**
Lidget Street	54.4 dBA	39.0 dBA
West boundary	48.6 dBA	36.2 dBA
r/o dwellings on Farnlee	49.9 dBA	34.0 dBA

Sound pressure levels, dB linear, L90

Frequency (Hz)	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Daytime							
Lidget Street	54.7	52.8	50.5	46.7	47.1	46.9	46.8
West boundary	53.8	52.7	49.9	46.6	43.3	41.6	39.8
r/o Farnlee	51.2	50.1	47.6	45.8	44.2	45.1	45.3
Night							
Lidget Street	41.4	40.9	43.1	41.2	36.8	34.0	32.2
West boundary	38.8	41.3	39.0	37.1	36.7	32.4	31.0
r/o Farnlee	39.3	41.0	36.8	35.4	33.1	31.0	29.7

5.0 Noise Impact at Dwellings

The LPA's Noise Design Advice calls for the sound levels of music not to exceed the background from other environmental sources, measured as overall dB LA_{eq} values and at bass music frequencies from 40 Hz to 160 Hz as described in 2.0 of this report. The positions at which these requirements apply are stated as being inside the appropriate dwellings with windows open or closed, whichever makes the music appear louder.

Although workable as a noise monitoring requirement, this exact criteria cannot be used at the design stage since the music levels inside the dwellings cannot be predicted indoors with such accuracy, particularly at low frequencies from 40 to 160 Hz, and we cannot expect to be allowed access into the dwellings late at night to measure the background sound levels with windows open and closed. The LPA's Advice is based on the 'Good Practice Guide on the Control of Noise from Pubs and Clubs, March 2003' which allows measurements to be made indoors or outdoors, in order to cater for this practical situation. For this reason we have used outdoor background sound levels and predictions of music reaching the outdoor elevations of the nearest dwellings.

5.1 Music from Function Room

Calculations of the outdoor sound levels at the nearest dwellings are given in Appendix A to the report for the situations where (a) live music bands and (b) disco music are playing inside the proposed function room.

Live Music Bands

It is predicted that if live music is performed inside the function room as measured at other premises and described in section 3.1 then, even if the highest available acoustic specification of glazing is used in the function room elevations, bass music would exceed the measured night-time background sound levels at the nearest noise-sensitive receptor. The calculation in A.1 of the appendix assumes the sound insulation of secondary glazing using 10mm and 6mm float glass separated by a 200mm airgap to the function room windows. Bass music reaching the western boundary of the site is predicted to exceed the night background by 9 to 12 dB at the bass music frequencies between 50 and 160 Hz. This would fail to comply with the requirement of the LPA summarised in 2.0 of this report that bass music must not exceed the background.

It is concluded that if live music bands are to perform in the function room then it will need the highest available acoustic specification of glazing to the function room windows (10-200-6 secondary glazing was used in the illustration of this report) coupled with electronic limiting of the bass music frequencies generated by the live band.

Disco Music

It is predicted that if recorded music is played through a typical disco sound system inside the function room as measured at other premises and described in section 3.1 then music reaching the nearest noise-sensitive receptor would not exceed the measured night-time background sound levels and would thereby comply with the LPA's requirements. It will be necessary to fit reinforced double glazing to the function room windows in order to ensure this (10-16-4 double glazing was used in the illustration of this report).

5.2 Music from Restaurant and Bar

Calculations of the outdoor sound levels at the nearest dwellings are given in Appendix B to the report for the situation where background music is being played in the restaurant & bar and the function / community room. The predicted outdoor sound at the nearest receptor caused by interior sound sources in the restaurant is 8 dB LA_{eq} which is well below the night background sound level.

5.3 Sound from Roof Terrace and Outdoor Seating Area

The guidance of the Local Planning Authority, summarised in 2.0 of this report, does not give specific requirements for sound generated by customers or other entertainment sources located outside licensed premises. Recommendations are given in the authoritative document "Good Practice Guide on the Control of Noise from Pubs and Clubs" published by the Institute of Acoustics. It recommends:

- "The use of gardens and external areas from which noise disturbance may arise should not commence before the start of normal trading hours and should normally cease at dusk ot at 21.00 hours, whichever is the earlier."

- "The use of lighting in gardens and external areas late into the evening can be undesirable, unless required for health and safety or security reasons. The provision of such lighting may encourage

patrons to congregate in these areas and cause noise disturbance at this more sensitive time."

- "If noise levels produced outside a noise-sensitive property due to the general use of gardens regularly exceed 55 dB LA_{eq}(5-min) when measured at least 3.5m from a building façade this may indicate that unacceptable disturbance is occurring."

The proposed roof terrace is 20m from the nearest dwelling and the outdoor seating area is around 50m. In order not to exceed 55 dB LA_{eq}(5-min) outdoors at the dwellings it will be necessary for sound on the terrace and in the outdoor seating area not to exceed 80 dB LA_{eq}(5-min). It is recommended that to ensure this there should be no music played in these areas, either reproduced music played through fixed speakers or relayed music from the interior of the function room or restaurant. It would also be recommended that organisational measures are put in place to control sound generated by the handling of empty bottles which should not be tipped or handled by any impulsive means in these areas.

6.0 **Music Reaching Bedrooms in This Development**

The requirement of the LPA for music reaching bedrooms wihin this development is based on the same criteria as music reaching external noise-sensitive properties, ie. that it must be inaudible inside them. The same comparisons between background sound levels and music levels should be used but they cannot be applied at the design stage since they rely on a comparison of music noise against background sound levels, and the background levels inside bedrooms cannot be measured since they have not been constructed or converted. It is suggested that a satisfactory background level in bedrooms with no music would be NR20 and that the design target becomes an upper limit of NR20 caused by music reaching bedrooms.

6.1 **Music from Function Room**

Music from the function room travelling internally to bedrooms will be reduced by the adjacent reception area and a series of corridors, lobbies and staircases. The residual music level reaching bedrooms via this path will be well below (ie. better than) the NR20 requirement

Music from the function room travelling to bedrooms via the outdoor path through the sound insulation of the south elevation of the function

room will be forced to diffract around buildings and roofs and to travel at least the same outdoor distance as that considered in section 5.1 to the nearest dwellings. It is concluded that music from the function room reaching bedrooms within this development will comply with the LPA's requirements.

6.2 Music from Restaurant and Bar

Bedrooms are proposed at the first floor of the former main house directly above the dining room and the bar / dining room. The main transmission path will be directly through the sound insulation of the dividing floor. At this stage no details are available on the materials of the existing ground-to-first floor. In order to form a starting point for acoustic design it is assumed at this stage that the existing floor is timber joisted with floor boards above and a plasterboard or lath-and plaster ceiling underneath, and that this construction will form the base floor of an upgrade. If the sound levels inside the bar and restaurant are as described for background music in 3.1 of this report then in order to ensure that the design target of NR20 in bedrooms it is anticipated that the sound level difference across the floor will need to be around:

Sound pressure levels dB linear, Leq:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
G'nd floor gym	67	69	70	76	74	70	66	57
Bedroom NR20	51	39	31	24	20	17	14	13
Difference needed	16	30	39	52	54	53	52	44

If the existing floor is timber joisted as outlined above then it is unlikely to provide the necessary sound insulation as anticipated in the above table. The usual acoustic treatment to reinforce the sound insulation of the floor would be to add a new suspended ceiling of double plasterboard underneath the existing ceiling or to add new floating floors above the existing boards at the first floor. Since the building is listed it is anticipated that neither of these solutions may be acceptable. A third option would be to add the necessary mass and isolation in the form of a proprietary acoustic floor incorporating metal channels fitted over the upper edge of the existing floor joists and supporting plasterboard planks between the joists underneath the replacement floor boards. A system of this sort would be expected to achieve the necessary sound insulation to allow background music and a relatively lively restaurant / bar interior as quantified in 3.1 of this report and retain the interior sound levels in first floor bedrooms as required by the LPA.

These tentative proposals are based on assumptions about the sound insulation of the existing floor. It is recommended that the sound insulation of the existing floor is tested prior to finalising the proposals.

6.3 **Sound from Gymnasium**

Bedrooms are proposed at the first floor directly above the gymnasium and at the ground floor directly adjacent to it. The main transmission paths will be airborne through the sound insulation of the dividing floor and dividing wall. As described in the above section 6.2, there are no details on the existing materials and so the same assumptions have been made. If the sound levels inside the gymnasium are as measured at other premises then in order to ensure that the design target of NR20 in bedrooms it is anticipated that the sound level difference across the floor and wall will need to be around:

Sound pressure levels dB linear, Leq:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
G'nd floor music	75	78	80	86	83	78	72	59
Bedroom NR20	51	39	31	24	20	17	14	13
Difference needed	24	39	49	62	63	61	58	46

This will require a high standard of sound and vibration insulation to the dividing floor and all walls of the gymnasium.

If the existing floor is timber joisted as outlined in 6.2 above then it is recommended that a new suspended ceiling of double plasterboard should be added underneath the existing ceiling and new floating floors are added above the existing boards to bedrooms at the first floor directly above the gymnasium. If the ground floor of the gymnasium is timber joisted then a floating floor should also be added to form the working surface of the gymnasium. All internal walls of the gymnasium should be fitted with independent wall linings consisting of two layers of 12.5mm acoustic plasterboard supported off the existing wall surfaces on timber or metal frames with a quilt of mineral wool fitted in the cavities between the existing walls and the linings.

If acoustical treatment of this standard is unacceptable because of the listed nature of the building then it is unlikely that the design target of NR20 could be achieved inside the adjacent bedrooms when the gymnasium in in normal unrestricted use. Under such circumstances it may be necessary to combine the best practicable acoustical treatment with a management regime such as restricting the hours of gymnasium usage to times when the bedrooms are unlikely to be needed for sleep.

7.0 **Sound Limits on Outdoor Plant Items**

The acceptance criteria of Kirklees Council on sound generated by fixed plant items at new entertainment premises is that an assessment of the sound from them must be assessed by the method of BS 4142 and the rating level of the plant sound be at least 5 dB lower than the existing background sound level.

The plant items to be installed at the development have not been specified at this stage. It will be necessary when the plant items and their locations have been decided to submit calculations of:

- the sound decay over the distance from each plant item to the nearest receptor including the shielding attenuation of structures,
- the sum of the sound levels from all of the plant items,
- details of any noise mitigation measures needed to reduce the overall sound at flat windows to the limits quantified above.

APPENDIX 1

SOUND LEVEL CALCULATIONS

A. Sound Reaching Dwellings from Function Room Interior

Sound levels at the nearest dwellings are calculated by taking the predicted sound levels inside the function room as predicted in section 3.1 of this report and translating them through the sound insulation of the proposed building exterior fabric to outdoors, then over the outdoor distance to dwellings. The formulae are:

Outdoors-to-indoors:

$$SPL_{outdoors} = SPL_{indoors} - R - 6 \quad dB$$

Distance calculation:

$$SPL_1 - SPL_2 = 10 \log (r_1/r_2) \quad dB$$

for distances 1.5m to 8m from the building where it is a line source,

$$SPL_2 - SPL_3 = 20 \log (r_3/r_2) \quad dB$$

for distances greater than 8m where the building is a point source.

$SPL_{1,\ 2\ \&\ 3}$ are sound pressure levels at distances $r_{1,\ 2\ \&\ 3}$ from the building façade and R is its average sound reduction index. Sound reduction indices which are typical of the building construction are assumed in the sound predictions.

A.1 Live Music Bands

For the theoretical situation where live music bands are performing in the function room we have assumed in the following caculations that the maximum sound insulation of glazing is used, consisting of secondary glazing with 10mm and 6mm float glass panes separated by a 200mm airgap.

Sound reduction indices dB:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Outer Walls	34	41	45	50	56	65	69	72
Roof	29	35	40	45	50	55	59	62
10-200-6 glazing	29	35	46	46	46	56	65	69
Average SRI	31	37	45	48	49	58	67	70

Live Music Band - overall sound levels

The calculation of sound from the interior of the function room to the nearest receptor at the childrens' home or to dwellings proposed at the western boundary of the site is shown below.

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	100	102	101	99	95	90	85	78
Elevation loss	37	43	51	54	55	61	73	76
Outdoors at 1m	63	59	50	45	40	29	12	2
Decay over 20m	15	15	15	15	15	15	15	15
SPL at receptors	48	44	35	30	25	14	0	0

The above predictions across the sound frequency range are outdoors at the nearest receptor. As a single-figure value this is **33 dB LA_{eq}.**

Live Music Band - bass music

The same calculation as above for the levels of bass music gives the following predictions at the receptor:

Sound pressure levels dB linear, L10:

Frequency (Hz)	40	50	63	80	100	125	160
SPL in building	86	103	100	95	102	99	103
Elevation loss	33	35	37	39	41	43	45
Outdoors at 1m	53	68	63	56	61	56	58
Decay over 20m	15	15	15	15	15	15	15
SPL at receptor	38	53	48	41	46	41	43

Live Music Band - comparison with background

The existing background sound levels against which the above outdoor sound predictions are compared are described in section 4.0 of this report. The predicted overall 33 dB LA_{eq} from live music bands reaching the nearest receptor at the western boundary is 3 dBA lower than the night background of 36 dB LA_{90} and this aspect of the Council's requirements wil be met. However as the frequencies of bass music the comparison at night shows:

Sound pressure levels, dB linear

Frequency (Hz)	40	50	63	80	100	125	160
Music L10	38	53	48	41	46	41	43
Background L90	39	41	39	37	37	32	31
Difference	-1	+12	+9	+4	+9	+9	+12

Bass music is predicted up to **12 dB above the night background** which would fail to comply with the Council's requirements.

A.2 **Disco Music**

Secondary Glazing to Function Room

Substituting the measured sound levels when a disco was playing into the above calculation predicts sound levels at the nearest receptor of

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	76	84	85	85	81	77	70	68
SPL at dwellings	24	26	19	16	11	1	0	0

The overall prediction at the receptors is **17 dB LA_{eq}** with bass music at:

Sound pressure levels dB linear, L10:

Frequency (Hz)	40	50	63	80	100	125	160
SPL at dwellings	19	18	20	25	27	27	23

The high values of sound insulation provided by secondary glazing would ensure that disco music from inside the function room would be well below the night background both as an overall sound level and at the frequencies of bass music.

Reinforced Double Glazing

If disco music only is to be played in the function room, not live music, then the acoustical specification of the glazing can be reduced. The following calculation assumes the minimum glazing specification which will ensure compliance with the Council's requirements - double glazing using 10mm and 4mm float glass.

Sound reduction indices dB:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Outer Walls	34	41	45	50	56	65	69	72
Roof	29	35	40	45	50	55	59	62
4-16-10 glazing	24	28	27	32	38	42	44	48
Average SRI	27	32	30	36	41	45	47	51

Disco Music - overall sound levels

The calculation of sound from the interior of the function room to the nearest receptor at the childrens' home or to dwellings proposed at the western boundary of the site is shown overleaf.

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	76	84	85	85	81	77	70	68
Elevation loss	33	38	36	42	47	51	53	57
Outdoors at 1m	43	46	49	43	34	26	17	11
Decay over 20m	15	15	15	15	15	15	15	15
SPL at receptor	28	31	34	38	19	11	2	0

The above predictions across the sound frequency range are outdoors at the nearest receptor. As a single-figure value this is **36 dB LA_{eq}.**

Disco Music - bass music

The same calculation as above for the levels of bass music gives the following predictions at the receptor:

Sound pressure levels dB linear, L10:

Frequency (Hz)	40	50	63	80	100	125	160
SPL in building	66.5	68.1	72.1	78.6	83.1	84.8	82.9
Elevation loss	29	31	33	34	36	38	40
Outdoors at 1m	38	37	39	45	47	47	43
Decay over 20m	15	15	15	15	15	15	15
SPL at receptor	23	22	24	30	32	32	28

Disco Music - comparison with background

The predicted overall 36 dB LA_{eq} from disco music reaching the nearest receptor at the western boundary through 10-16-4 double glazing to the function room exactly equals the night background value measured during our survey. The comparison at bass music frequencies at night shows:

Sound pressure levels, dB linear

Frequency (Hz)	40	50	63	80	100	125	160
Music L10	23	22	24	30	32	32	28
Background L90	39	41	39	37	37	32	31
Difference	-16	-19	-15	-7	-5	0	-3

Music from a disco is predicted **not to exceed the night background** either as an overall dB LA_{eq} value or at the frequencies of bass music which complies with the Council's requirements.

B. **Sound Reaching Dwellings from Restaurant Interior**

Sound levels at the nearest dwellings are calculated by taking the predicted sound levels inside the restaurant as predicted for "Background Music" in section 3.1 of this report and translating them through the sound insulation of the proposed building exterior fabric to outdoors, then over the outdoor distance to dwellings. The formulae are as used in Appendix A above. It is assumed that windows in the restaurant buildings will be fitted with conventional thermal double glazing or its acoustic equivalent. The sound insulation of the buildings will be:

Sound reduction indices dB:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Outer Walls	34	41	45	50	56	65	69	72
4-16-4 glazing	18	22	20	26	36	39	31	35
Average SRI	25	29	27	33	43	46	38	42

The calculation of sound levels outdoors at the nearest receptors at the opposite side of Lidget Street is:

Sound pressure levels, dB linear:

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
SPL in building	67	69	70	76	74	70	66	57
Elevation loss	31	35	33	39	49	52	44	48
Outdoors at 1m	36	34	37	37	25	18	22	9
Decay over 75m	26	26	26	26	26	26	26	26
SPL at receptor	10	9	11	11	0	0	0	0

The above predictions across the sound frequency range are outdoors at the nearest receptors. As a single-figure value this is **8 dB LA_{eq}.**

The predicted overall sound level outdoors at the nearest receptor caused by interior sound sources in the restaurant will be well below the night background sound level.

APPENDIX 2

EQUIPMENT AND QUALIFICATIONS

S & D Garritt Ltd are members of the Association of Noise Consultants (ANC). All work related to this report was undertaken by Elizabeth Garritt, Stephen Garritt and David Garritt.

Elizabeth Garritt is an Associate Member of the Institute of Acoustics and holds an honours degree in Biomedical Science. Stephen Garritt has been a member of the Institute of Acoustics (MIOA) since 1977 and holds an honours degree in Electrical Engineering. David Garritt has been a member of the Institute of Acoustics since 2005 and holds an honours degree in Electronic and Computer Systems Engineering. Both Stephen and David Garritt teach acoustics at post graduate level on a part time basis.

All three consultants have extensive experience in the preparation of noise surveys for residential planning applications directly comparable to the subject of this report.

The equipment used during the site visits is shown in the table below. The sound level meter was calibrated before and after each period of use; no drift was apparent.

Equipment Description	Type number	Manufacturer	Date of expiration of Calibration	Calibration Certificate Number
Sound Level Meter	2260 s/n 2409281	Bruel & Kjaer	05.10.17	27618 (MTS)
Microphone	4189 s/n 2395266	Bruel & Kjaer	05.10.17	27618 (MTS)
Calibrator	4231 s/n 2402706	Bruel & Kjaer	05.10.16	27618 (MTS)
