

NOISE IMPACT ASSESSMENT FOR
PLANNING APPLICATION
REFERENCE NUMBER
200474/DPP

CHANGE OF USE OF EXISTING
OFFICES ON BASEMENT, FIRST,
SECOND AND THIRD FLOOR TO
FORM SEVENTEEN RESIDENTIAL
FLATS WITH CAR PARKING AND
ASSOCIATED WORKS, INCLUDING
REPLACEMENT WINDOWS

181 UNION STREET
ABERDEEN
AB11 6BB

REPORT PREPARED BY:
GROSLE ENVIRONMENTAL SERVICES



ISSUE AND REVISION RECORD

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1	28.07.20	T Grosle BSc (Hons) Ch.EHO MREHIS	Draft Report
2	17.08.20	T Grosle BSc (Hons) Ch.EHO MREHIS	Final Report
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Proposal number	TTG 130720

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1.0 BRIEF

- 1.1 To produce a Noise Impact Assessment that shall be used as a supplementary supporting document for Planning Application Reference Number 200474/DPP submitted to Aberdeen City Council relating to the change of use of the existing offices on the basement, first, second and third floors to form seventeen residential flats with car parking and associated works, including replacement windows at 181 Union Street, Aberdeen, AB11 6BB.

2.0 SUMMARY

- 2.1 Using the methodology contained within the Calculation of Road Traffic Noise memorandum and pre-lockdown road traffic noise data from a previous report, the level of significance of road traffic noise for the future residential flats was deemed as Large/Very Large during the day time and night time. With the specified glazing units provided (in the closed position), the internal noise levels of road traffic noise shall not exceed the target noise levels contained in table 4 of BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.
- 2.2 No noise from the Coral bookmakers (operating on COVID-19 restrictions), on the ground floor, was noted at various locations throughout the first floor during the day time survey period. Within the same building adjacent to the bookmakers is an empty retail unit; the separating floor construction was confirmed as a concrete slab. It is assumed for the purpose of this report that the bookmakers separating floor construction is the same. Therefore, it is considered likely that the other noise sources within the bookmakers shall also be inaudible inside the proposed flats above.
- 2.3 Faint mechanical plant noise was noted on the east elevation facing into the courtyard. Noise measurements were taken during the day time and night time of this plant. It was confirmed that with the specified glazing units provided (in the closed position), the internal noise levels of the mechanical plant should not exceed NR35 during the day time and NR25 during the night time, plus the target noise levels contained in table 4 of BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.
- 2.4 Music and crowd noise are a significant noise impacting on the development from the Windmill Brae direction. Using pre-lockdown noise data from a previous report of this music and crowd noise and with the specified glazing units provided (in the closed position), the internal noise levels of music and crowd noise shall not exceed NR25 during the night time, plus the target noise levels contained in table 4 of BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.
- 2.5 Mechanical ventilation shall be provided inside all residential flats. Therefore, it is assumed for the purpose of this report that windows shall be in the closed position. The option of purge ventilation is open to all residents.

2.0 SUMMARY (continued)

- 2.6 The applicant seeks a planning condition in relation to mechanical ventilation. Once planning permission has been granted, and before works commence, an augmented report shall be provided detailing the noise impact of the mechanical ventilation inside the residential flats. This report shall provide all details including the model and manufacturer of the mechanical ventilation. The report shall demonstrate that the target internal noise levels, taking into account the internal noise level from all sources, shall not exceeded:

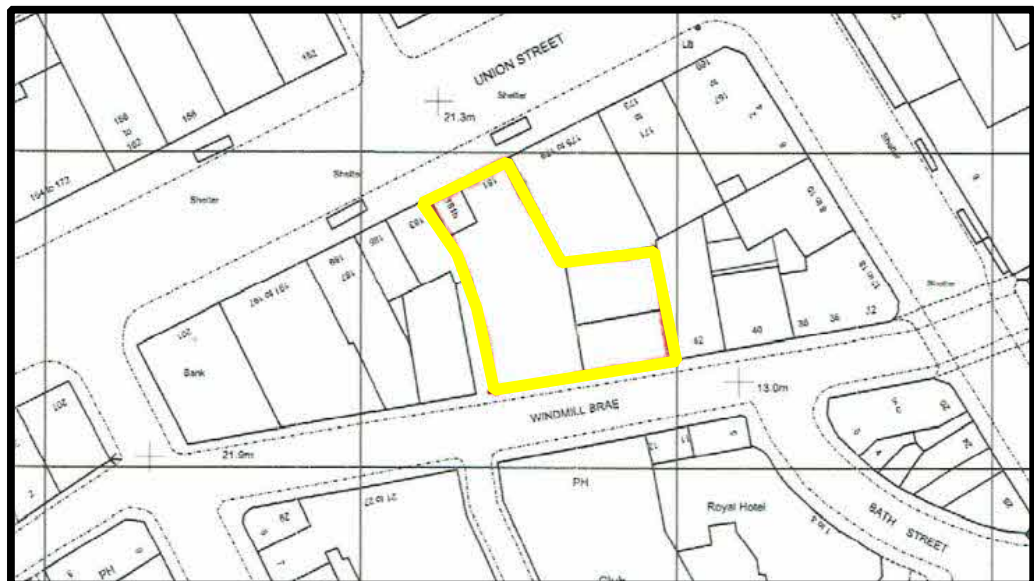
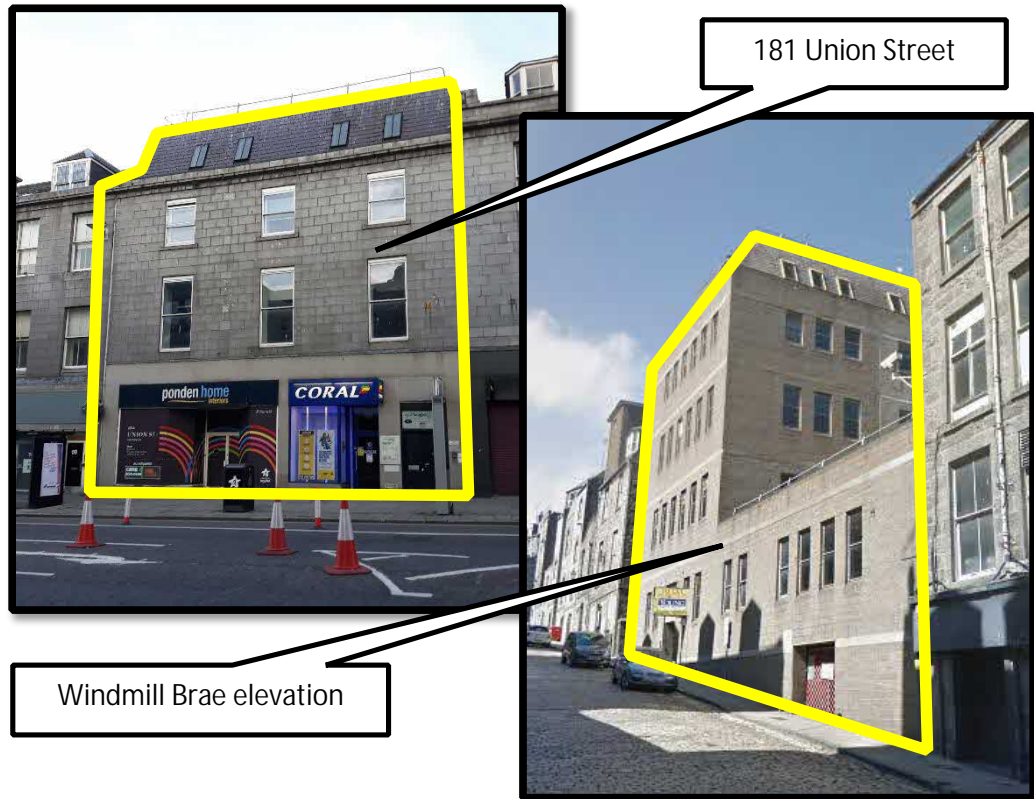
The internal noise level shall not exceed Noise Rating 35 during the day time.

The internal noise level shall not exceed Noise Rating 25 during the night time.

- 2.7 In conclusion, it is considered that with the recommended mitigations, the residents shall live in a suitable acoustic environment and consequently, no adverse impact is predicted. This document is therefore considered suitable to support the planning application for this proposed development.

3.0 INTRODUCTION

3.1 A Noise Impact Assessment was commissioned for Planning Application Reference Number 200474/DPP submitted to Aberdeen City Council relating to the change of use of the existing offices on the basement, first, second and third floors to form seventeen residential flats at 181 Union Street, Aberdeen, AB11 6BB. Photographs of the front and rear of the development, and a location map are outlined below in yellow:



3.0 INTRODUCTION (continued)

3.2 The proposed residential flats, at the front of the development face onto a major road in Aberdeen, called Union Street, and at the rear, they face onto a side road called Windmill Brae. This area is classified as urban. On the Union Street elevation, located underneath the development are Coral bookmakers and an empty retail unit. Surrounding the building are residential flats and a variety of commercial businesses, some of which have musical entertainment. The closest mechanical plant to the building, affecting noise-sensitive rooms, is on the east elevation at an approximate distance of 10 metres.

3.3 Comments from Aberdeen City Council Environmental Health Department are within APPENDIX A – ENVIRONMENTAL HEALTH COMMENTS.

3.4 Grosle Environmental Services contacted Aberdeen City Council Environmental Health Department and confirmed the agreement on the methodology for this Noise Impact Assessment report. Due to the COVID-19 lockdown, it was proposed that noise data used in the report shall be a combination of (1) noise data from measurements contained in two previous Noise Impact Assessment reports, and (2) current noise measurements. Justification for the use of these noise measurements is within this report. The two previous Noise Impact Assessment reports used are detailed below:

Report 1 entitled 'NOISE IMPACT ASSESSMENT FOR PLANNING APPLICATION REFERENCE NUMBER 161524/DPP - ALTERATION TO FORM FOUR FLAT; REPLACEMENT WINDOWS AND FORMATION OF REAR DORMER - 472 UNION STREET, ABERDEEN, AB10 1TS'

Report 2 entitled 'NOISE IMPACT ASSESSMENT FOR PLANNING APPLICATION REFERENCE NUMBER 190444/DPP - CHANGE OF USE FROM MIXED CLASSES OF (3, 4 AND 11) TO FORM SEVENTEEN RESIDENTIAL FLATS (SUI GENERIS) - 171-173 UNION STREET INCLUDING (40-42 WINDMILL BRAE), ABERDEEN, AB11 6BB'

3.5 For the report, the following noise sources were assessed:

- (A) Road traffic noise from Union Street and Windmill Brae,
- (B) Noise from the Coral bookmakers located on the ground floor,
- (C) Mechanical plant noise, and
- (D) Music entertainment and crowd noise on Windmill Brae.

3.0 INTRODUCTION (continued)

- 3.6 For this report, Sections 4.0 to 6.0 are detailed below with a summary of content:

Section 4.0 – NOISE IMPACT ASSESSMENT METHODOLOGY provides an overview of the assessment methodology used for the road traffic noise, the Coral bookmakers, mechanical plant and music entertainment and crowd noise on Windmill Brae. Also, this section details the target noise levels to be achieved inside the residential flats as per Table 4 of BS 8233:2014 Guidance on sound insulation and noise reductions for buildings and Noise Rating Curves.

Section 5.0 – NOISE IMPACT ASSESSMENT details the assessment results and the Noise Rating Curves for mechanical plant and entertainment music and crowd noise.

Section 6.0 – DISCUSSION OF MITIGATIONS AND CONCLUSION highlights the primary mitigations for noise control and provides the conclusion to this report.

4.0 NOISE IMPACT ASSESSMENT METHODOLOGY

(1) NOISE IMPACT ASSESSMENT METHODOLOGY - ROAD TRAFFIC

- 4.1 For this Noise Impact Assessment, Planning Advice Note 1/2011: Planning and Noise was referenced. This document presents high-level guidance for considering noise aspects of proposed developments. The associated Technical Advice Note: Assessment of Noise, details procedures with a five-stage process. These stages are detailed in Table 1 below:

Table 1: Technical Advice Note - five stages of Assessing Noise Impacts	
Stage 1: Initial Process	The identification of sensitive receptors and their sensitivity
Stage 2: Quantitative Assessment	Determining the magnitude of impact in accordance with an appropriate procedure for the type of development considered
Stage 3: Qualitative Assessment	The inclusion of factors that may modify the assigned magnitudes of impact such as frequency characteristics, timing, intermittency
Stage 4: Level of Significance	Determined by considering the magnitude of impact and sensitivity of receptor and is intended to inform the decision-making process
Stage 5: The Decision Process	An overview of the number of receptors that fall within each level of significance, usually set out in a Summary Table of Significance

4.0 NOISE IMPACT ASSESSMENT METHODOLOGY (continued)

- 4.2 Stage 1: Initial Process, this involved the identification of all noise-sensitive receptors. There are three levels of sensitivity 'High', 'Medium' and 'Low'. The ranking is primarily based on the relationship between the amenity associated with a noise-sensitive receptor and its susceptibility to noise. Noise sensitive receptors which have amenities associated with low noise levels, such as residential properties, are allocated with a 'High' level of sensitivity. In contrast, nightclubs are allocated with a 'Low' level of sensitivity.
- 4.3 For Stage 2: Quantitative assessment, this involved the assessment of external road traffic noise from Union Street and Windmill Brae. The road traffic noise data used was from previous Noise Impact Assessment reports; for Union Street page 15 of report 1, and for the east elevation and the Windmill Brae elevation from page 15 of report 2 (full reference titles contained within Section 3.4 of this NIA report). The magnitude of the impact of the road traffic noise was assessed using the shortened technique detailed in the Calculation of Road Traffic Noise. Table 2 was used to determine the amount by which the L_{Aeq} exceeds 50 dB(A) during the day-time (07:00 – 23:00) and 40 dB(A) during the night-time (23:00 – 07:00) based on the Royal Environmental Health Institute of Scotland Briefing Note 017 for free field noise levels of road traffic noise.

Table 2: Magnitude of Impacts Associated with Night and Day Exceedances

Noise Level $x = (\text{Existing} - 50) L_{Aeq}$	Night Noise Level $x = (\text{Existing} - 40) L_{Aeq}$	Magnitude of Impact
> 5	> 5	Major
≤ 5 but ≥ 3	≤ 5 but ≥ 3	Moderate
< 3 but ≥ 1	< 3 but ≥ 1	Minor
< 1 but ≥ 0	< 1 but ≥ 0	Negligible
0	0	No adverse

4.0 NOISE IMPACT ASSESSMENT METHODOLOGY (continued)

- 4.4 For Stage 3: Qualitative Assessment, Table 3 was used to determine the effect/perception of the existing noise climate that may have on the amenity value of the proposed development.

Table 3: Qualitative Impacts from Noise on Residential Properties		
Perception	Criteria of Descriptor for residential dwellings	Qualitative impact
Noticeable (Very disruptive)	Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm.	Major
Noticeable (Disruptive)	Causes an important change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Moderate
Noticeable (Mildly intrusive)	Noise can be heard and may cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows more often. Potential for non-awakening sleep disturbance. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Minor
Just Noticeable (Non-intrusive)	Noise can be heard but does not cause any change in behaviour or attitude, e.g. increasing volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Negligible
Not noticeable	None	No Impact

4.0 NOISE IMPACT ASSESSMENT METHODOLOGY (continued)

- 4.5 For Stage 4: Level of Significance, Table 4 was used to assess the likely significance of the noise impact at the development.

Table 4: Significance of Effects

Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor		
	Low	Medium	High
Major	Slight / Moderate	Moderate / Large	Large / Very Large
Moderate	Sight	Moderate	Moderate / Large
Minor	Neutral / Slight	Slight	Slight / Moderate
Negligible	Neutral / Slight	Neutral / Slight	Slight
No change	Neutral	Neutral	Neutral

- 4.6 For Stage 5: The Decision Process, a Summary Table of Significance was compiled. Further discussion regarding acoustical parameters is within APPENDIX B – ACOUSTICAL PARAMETERS.

(2) NOISE IMPACT ASSESSMENT METHODOLOGY - COMMERCIAL PREMISES

- 4.7 For the assessment of noise from the Coral bookmakers on the ground floor of 181 Union Street, noise measurements were carried out during the day time when this shop was open and operational on lockdown mode with an announcement speaker was being used. A point to note is that the separating floor between the ground and first floor flats was investigated.

4.0 NOISE IMPACT ASSESSMENT METHODOLOGY (continued)

(3) NOISE IMPACT ASSESSMENT METHODOLOGY - MECHANICAL PLANT

- 4.8 Noise measurements of the mechanical plant close to the east elevation were obtained during the day and night. These results were compared to the mechanical plant noise data taken from a previous Noise Impact Assessment report, this being report 1 (full reference title contained within Section 3.4 of this NIA report). This report shall demonstrate that the internal noise level for mechanical plant shall not exceed Noise Rating Curve 35 between 07:00 and 22:00 and Noise Rating Curve 25 between 22:00 and 07:00. The target noise is to be achieved with windows in the closed position.
- 4.9 It can be confirmed that mechanical ventilation shall be installed in all residential flats. The applicant seeks a planning condition in relation to this matter and this is discussed fully in Section 6.3.

(4) NOISE IMPACT ASSESSMENT METHODOLOGY - MUSIC AND CROWD NOISE

- 4.10 For entertainment music and crowd noise impacting upon the east elevation and the Windmill Brae elevation, the noise data was taken from a previous Noise Impact Assessment report, this being page 23 of report 1 (full reference title contained within Section 3.4 of this NIA report). This noise data was from a noise measurement taken during the late evening when the surrounding licensed entertainment venues were operating to ensure the capture of a 'worst case' scenario. Using the above noise data plus a distance reduction, the internal noise level, with the windows in the closed position, was plotted. This report shall demonstrate that the internal noise level for entertainment music and crowd noise shall not exceed the target noise level of Noise Rating Curve 25 between 22:00 and 07:00.
- 4.11 The report shall demonstrate that the internal noise levels shall not exceed the target noise levels contained within Table 4 of BS 8233:2014 as specified below:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16hour}$	-
Sleeping(day-time resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

5.0 NOISE IMPACT ASSESSMENT

(1) NOISE IMPACT ASSESSMENT - ROAD TRAFFIC

Stage 1: Initial Process

- 5.1 The key sensitive receptors for this noise impact assessment report are the future residents at 181 Union Street, Aberdeen, AB11 6BB (including east elevation facing courtyard and Windmill Brae elevation). The level of sensitivity was deemed as high.

Stage 2: Quantitative Assessment

- 5.2 For Union Street, the noise data used for the quantitative assessment of road traffic noise was from page 15 of report 1 (full reference title contained within Section 3.4 of this NIA report). This road traffic survey was conducted during 19 November 2019 using the shortened technique method detailed in the Calculation of Road Traffic Noise memorandum. The justification for using this data is that it was taken within the last year and is the most recent (pre-lockdown for COVID-19) road traffic measurements of Union Street taken by Grosle Environmental Services. Details of the road traffic survey are within APPENDIX C - CRTN - EXTERNAL NOISE LEVEL CALCULATION – UNION STREET. From the survey results for Union Street, the day time free-field LAeq, 16 hours was 70 dB(A) and the night time free-field LAeq, 8 hours was 61 dB(A).
- 5.3 For Windmill Brae, the noise data used for the quantitative assessment of road traffic noise was from page 15 of report 2 (full reference title contained within Section 3.4 of this NIA report). This road traffic survey was conducted during 11 April 2019 using the shortened technique method detailed in the Calculation of Road Traffic Noise memorandum. The justification for using this data is that it is the most recent (pre-lockdown for COVID-19) road traffic measurements of Windmill Brae taken by Grosle Environmental Services. Details of the road traffic survey are within APPENDIX D - CRTN - EXTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE. From the survey results for Windmill Brae, the day time free-field LAeq, 16 hours was 62 dB(A) and the night time free-field LAeq, 8 hours was 54 dB(A).

5.0 NOISE IMPACT ASSESSMENT (continued)

- 5.4 Using the criteria contained within Table 2: Magnitude of Impacts Associated with Night and Day Exceedances, the magnitude of the impact was determined for Union Street and the east elevation and Windmill Brae elevation as detailed below.

UNION STREET		
Day Noise Level, $x = (\text{Existing} - 50) L_{Aeq}$	Night Noise Level, $x = (\text{Existing} - 40) L_{Aeq}$	Magnitude of Impact
70 – 50 = 20	-	Major
-	61 – 40 = 21	Major

EAST ELEVATION AND WINDMILL BRAE ELEVATION		
Day Noise Level, $x = (\text{Existing} - 50) L_{Aeq}$	Night Noise Level, $x = (\text{Existing} - 40) L_{Aeq}$	Magnitude of Impact
62 – 50 = 12	-	Major
-	54 – 40 = 14	Major

5.0 NOISE IMPACT ASSESSMENT (continued)

Stage 3: Qualitative Assessment

- 5.5 Using the criteria in Table 3: Qualitative Impacts from Noise on Residential Properties, the qualitative impact of the development was determined for Union Street and the East elevation and Windmill Brae elevation as detailed below:

UNION STREET		
Day Perception	Night Perception	Descriptor for qualitative impact
Noticeable (Very Disruptive)	-	Major
-	Noticeable (Very Disruptive)	Major

EAST ELEVATION AND WINDMILL BRAE ELEVATION		
Day Perception	Night Perception	Descriptor for qualitative impact
Noticeable (Disruptive)	-	Moderate
-	Noticeable (Disruptive)	Moderate

5.0 NOISE IMPACT ASSESSMENT (continued)

Stage 4: Level of Significance

5.6 Using the criteria in Table 4: Significance of Effects, the level of significance of the road traffic noise was determined for Union Street and the East elevation and Windmill Brae elevation as detailed below:

UNION STREET	
Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor
	High
Major	Large / Very Large – day time
Major	Large / Very Large – night time

EAST ELEVATION AND WINDMILL BRAE ELEVATION	
Magnitude of Impact	Level of Significance Relative to Sensitivity of Receptor
	High
Major	Large / Very Large – day time
Major	Large / Very Large – night time

5.0 NOISE IMPACT ASSESSMENT (continued)

Stage 5: Decision Process

- 5.7 The Summary Table of Significance for the development using the criteria in Table 4: Significance of Effects is detailed below:

Summary Table of Significance		
Level of Significance	Number of Residential Properties	
	Day	Night
Large/Very Large	17	17

- 5.8 The mitigation of road traffic noise on the Union Street elevation shall be controlled through the replacement of the existing windows with secondary glazing units with a configuration of 6 mm glass / 100 mm air gap / 4 mm glass. The sound reduction index is Rw 46. The mitigation of road traffic noise on the east elevation facing the courtyard and the Windmill Brae elevation shall be controlled through the provision of glazing units with a configuration of 12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon. The sound reduction index is Rw 51. It can be confirmed that mechanical ventilation shall be installed in all residential flats. The applicant seeks a planning condition in relation to this matter and this is discussed fully in Section 6.3.
- 5.9 For the Union Street elevation and the east elevation facing the courtyard and the Windmill Brae elevation, the details of the internal noise level calculations and the interior noise level graphs for road traffic noise are within APPENDIX E – INTERNAL NOISE CALCULATIONS FOR ROAD TRAFFIC NOISE and APPENDIX F – INTERNAL NOISE LEVEL GRAPH (ROAD TRAFFIC NOISE). For the various elevations of the development, the results indicate that the target noise levels (based on the World Health Organisation guidelines) contained in table 4 of BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings, shall be achieved with the windows closed.

5.0 NOISE IMPACT ASSESSMENT (continued)

(2) NOISE IMPACT ASSESSMENT – COMMERCIAL PREMISES

5.10 For the assessment of noise from the Coral bookmakers on the ground floor of 181 Union Street, noise measurements were taken at five locations on the first floor, during the day time on the 23 July 2020. No noise from Coral bookmakers was noted during the survey period. Details of the survey are contained in APPENDIX G - SURVEY DETAILS, APPENDIX H - CALIBRATION CERTIFICATES, APPENDIX I - MEASUREMENT LOCATIONS AND PHOTOGRAPHS and APPENDIX J – SURVEY REPORT.

5.11 It was confirmed that Coral bookmakers were operating on COVID-19 restrictions; an announcement speaker was in use within the shop. Other noise sources, not in operation within the shop, were TV screens (displaying live footage of races) and four slot machines located to the front of the bookmakers. It was confirmed by Coral bookmakers that these would not be switched on for the purpose of assessing the noise. Therefore, for the purpose of this report, the separating floor between the Coral bookmakers and the upper floor was investigated. Within the same building, adjacent to Coral bookmakers, is an empty retail unit; the separating floor construction was examined at the front, middle and rear of this unit. It was confirmed that the separating floor was concrete slab (this fact is also confirmed in the Heritage Statement), and it is assumed for the purpose of this report that the bookmakers are the same. Details of the floor investigation are within APPENDIX K – SEPARATING FLOOR. Therefore, it is considered likely that the other noise sources within the bookmakers shall be inaudible inside the proposed flats above.

(3) NOISE IMPACT ASSESSMENT – MECHANICAL PLANT

5.12 It was confirmed that the only mechanical plant impacting on noise-sensitive rooms within the proposed development are two air conditioning units located approximately 10 metres from the east elevation facing into the courtyard. This plant belongs to Paddy Powers bookmakers at 175 Union Street and operates from 08:00 to 22:00 hours. Noise measurements were obtained during the day time and night time, at the window of the nearest noise sensitive room facing into the courtyard (Flat 3, bedroom on the first floor) at a distance of one metre from the window facade.

5.0 NOISE IMPACT ASSESSMENT (continued)

- 5.13 The noise measurement results for the mechanical plant were compared to the highest mechanical plant noise measurement taken on the Windmill Brae elevation as detailed in measurement number 20 at Location 4, page 55 of report 2 (full reference title contained within Section 3.4 of this NIA report). It was confirmed that the highest result for the mechanical plant is from report 2, therefore using this result, the internal noise level for the mechanical plant was plotted for Flat 3, bedroom on the first floor. It can be confirmed that the target Noise Rating Curve 35 between 07:00 to 22:00 hours and Noise Rating Curve 25 between 22:00 to 07:00 hours is not exceeded. The plotted graph is within APPENDIX L – INTERNAL NOISE LEVEL GRAPH (MECHANICAL WINDMILL BRAE).

(4) NOISE IMPACT ASSESSMENT – MUSIC AND CROWD NOISE

- 5.14 Entertainment music and crowd noise are other noise sources impacting on the development. A night club operates on the lower floors of the Bridge Street Social Club and patrons gather outside this club, resulting in the break out of entertainment music and crowd noise at the lower end of Windmill Brae. For this assessment, noise data used was from a noise measurement taken on the Windmill Brae elevation during the late evening when the surrounding licensed entertainment venues were operating to ensure the capture of a ‘worst case’ scenario with entertainment music and crowd noise. The noise data used was from Section 5.17 of report 2 (full reference title contained within Section 3.4 of this NIA report).
- 5.15 Using the noise data discussed above from report 2, the internal noise level for entertainment music and crowd noise was plotted for Flat One, Bedroom on the Basement Floor. A point to note is that five decibels were subtracted from the octave bands noise data from report 2 due to distance attenuation. The location in report 2, and the location for this report (Flat One, bedroom on the Basement Floor facing onto Windmill Brae) is farther away from the entertainment music and crowds. It can be confirmed that the target Noise Rating Curve 25 between 22:00 to 07:00 hours is not exceeded. The plotted graph is within APPENDIX M – INTERNAL NOISE LEVEL GRAPH (MUSIC AND CROWD NOISE WINDMILL BRAE). Therefore, for the east elevation facing the courtyard and the Windmill Brae elevation, the results indicate that the target noise levels (based on the World Health Organisation guidelines) contained in table 4 of BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings is not exceeded.

6.0 DISCUSSION OF MITIGATION AND CONCLUSION

DISCUSSION OF MITIGATIONS

- 6.1 The noise sources impacting on this development are road traffic noise, mechanical plant, entertainment music and crowd noise. It is considered that noise mitigation can be achieved by the provision of the specified glazing units to the Union Street elevation, the east elevation facing the courtyard and the Windmill Brae elevation, as detailed below:

Union Street elevation – glazing units that achieve Rw 46 (4 mm glass / 100 mm air gap / 6 mm glass)

East elevation facing the courtyard and the Windmill Brae elevation – glazing units that achieve Rw 51 (12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon).

- 6.2 Mechanical ventilation shall be provided inside all residential flats. Therefore, it is assumed for the purpose of this report that windows shall be in the closed position. The option of purge ventilation is open to all residents.
- 6.3 The applicant seeks a planning condition in relation to mechanical ventilation. Once planning permission has been granted, and before works commence, an augmented report shall be provided detailing the noise impact of the mechanical ventilation inside the residential flats. This report shall provide all details including the model and manufacturer of the mechanical ventilation. The report shall demonstrate that the target internal noise levels, taking into account the internal noise level from all sources, shall not exceeded:

The internal noise level shall not exceed Noise Rating 35 during the day time.

The internal noise level shall not exceed Noise Rating 25 during the night time.

6.0 DISCUSSION OF MITIGATION AND CONCLUSION (continued)

CONCLUSION

- 6.4 This Noise Impact Assessment details that with the recommendations for mitigation, noise break-in from the various noise sources shall not exceed the target noise levels (based on the existing guidelines issued by the World Health Organisation) as contained in table 4 of BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings, relating to road traffic noise. Also, regarding noise from the commercial premises underneath, mechanical plant, entertainment music and crowd noise, the internal noise level of these noise sources shall not exceed the target Noise Rating Curve 35 between 07:00 to 22:00 hours and Noise Rating Curve 25 between 22:00 to 07:00 hours. This document is therefore considered suitable to support the planning application for the proposed development.

APPENDIX A – ENVIRONMENTAL HEALTH COMMENTS

1 of 4

A1 ENVIRONMENTAL HEALTH COMMENTS

Aberdeen City Council – Development Management
Consultation Request

From: Rebecca Kerr	Date: 28 April 2020
Email: rekerr@aberdeencity.gov.uk	Ref: 200474/DPP
Tel.: 01224 522241	Expiry Date: 19 May 2020

Detailed Planning Permission

200474/DPP: Change of use of existing offices on basement, first, second & third floors to form 17no. residential flats with car parking and associated works, including replacement windows at 181 Union Street
Aberdeen
AB11 6BB

All plans and supporting documentation available at the following link:

<https://publicaccess.aberdeencity.gov.uk/online-application/applicationDetails.do?activeTab=summary&keyVal=Q8VZ1QBZHF00>

Please select one of the following

No observations/comments.	
Would make the following comments (please specify below).	
Would recommend the following conditions are included with any grant of consent.	
Would recommend the following comments are taken into consideration in the determination of the application.	√
Object to the application (please specify reasons below).	

COMMENTS

Regarding the above Detailed Planning Permission Application, the relevant information has been received and has been assessed by the Environmental Protection Team. The following comments are considered appropriate and proportionate;

1. Noise Impact Assessment

This proposed development has residential units on both Union Street and Windmill Brae both within a designated Noise Management Area and may therefore be impacted on by road traffic noise from Union Street and also noise from commercial premises on Windmill Brae including entertainment noise and fixed plant noise.

I am however of the opinion that provision of suitable mitigation measures can address these noise issues. This Service requires an appropriate noise assessment by a suitably qualified noise consultant in order to ascertain the predicted impacts of

APPENDIX A – ENVIRONMENTAL HEALTH COMMENTS

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A2 ENVIRONMENTAL HEALTH COMMENTS

likely noise sources on the proposed residential development and the necessary control measures.

This assessment should:

- 1) Be in accordance with Planning Advice Note (PAN) 1/2011 Planning and Noise and its accompanying Technical Advice Note.
- 2) Identify the existing sources of noise potentially impacting on the proposed development
- 3) Detail the noise mitigation measures to reduce noise from the existing noise sources to an acceptable level to reasonably protect the amenity of the occupants of the proposed residences.
- 4) The methodology for the noise assessment should be submitted and agreed in writing with the Environmental Protection Team in advance of the assessment.
- 5) In relation to music noise the standard to be achieved within the proposed residential accommodation is a music noise level limit of 10 dB(A) below background L_{A90} .

2. Local Air Quality Impact on Receptors

In relation to the impact of air quality and vehicle emission pollutants on the future residents of the proposed development a number of factors have been considered including the outcome of the Local Air Quality Management – Annual progress report 2019.

Both Union Street and Bridge Street have previously been declared part of the City Centre - Air Quality Management Area (AQMA) due to exceedances of air quality objectives for 'Particulate Matter' 10 micrometres or less in diameter (PM_{10}) annual and 24 Hour mean concentrations and Nitrogen Dioxide (NO_2) annual and 1 Hour mean concentration.

Within this AQMA the NO_2 annual mean concentration levels at the nearest diffusion tube at the Music Hall Union Street (DT13) and 335 Union St (DT30) have exceeded the objectives for the 4 years 2013 to 2016 (data not available for subsequent years) and the 5 years 2014 to 2018 respectively. Additionally, the levels at the continuous monitoring station on Union Street (CM2) have exceeded the objectives for the 5 years 2013 to 2017.

I am however of the opinion that provision of suitable mitigation measures can help protect future occupants of these properties from long-term exposure to current and possibly future road traffic pollution. I would therefore recommend the following;

- a) As the primary means of ventilation other than open windows and/or window vents, provision of suitable and adequate means of alternative ventilation, installed throughout all living/sleeping spaces on the north westerly elevations of the proposed units on Union Street.

Note: Where the findings of a Noise Impact Assessment advise the relevant internal noise standards can be achieved within the union street units with an open window strategy the applicant may undertake an appropriate air quality assessment (by a suitably qualified consultant with a methodology agreed

APPENDIX A – ENVIRONMENTAL HEALTH COMMENTS

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A3 ENVIRONMENTAL HEALTH COMMENTS

with this Service) at the Union Street façade of the proposed properties to determine the units at which controlled ventilation may not be required.

- b) The fresh air intake for the alternative ventilation system should be suitably located to provide fresh air from elsewhere than from Union Street (as a designated AQMA).
- c) The alternative ventilation must be capable of achieving the necessary air changes as required by the relevant building standards.
- d) Any alternative ventilation installed must be capable of achieving the relevant noise level emission limits, namely NR25 night-time and NR 35 daytime.

Having calculated the NO₂ drop off with distance from Bridge Street It is unlikely the NO₂ annual mean concentration objective will be exceeded at the proposed property facades on Windmill Brae.

Additionally, The PM₁₀ annual mean concentration levels at the continuous monitoring station on Union Street (CM2) have been below the objectives for the years 2015 to 2018. The PM₁₀ 24 Hour mean concentration levels at the continuous monitoring station on Union Street (CM2) have been below the objectives for the 5 years 2014 to 2018. Furthermore, The PM_{2.5} annual mean concentration levels at the monitoring station CM2 were exceeded in 2015 but not in 2016 to 2018.

Therefore, given the improvements in PM levels in recent years and the distance to the façade of the building from bridge street it is unlikely the PM concentration objectives will be exceeded at the Windmill Brae facades of the proposed property. I am therefore of the opinion that mitigation measures for air quality purposes are not required on the Windmill Brae façade.

3. Air Quality Impact of Proposal

In relation to the impact of the proposal on local air quality from motor vehicle usage the application documentation advises of 17 parking spaces associated with the development. Traffic originating from the proposed development is therefore not considered to significantly increase concentrations of PM₁₀ and NO₂ on the wider network.

4. Noise from Construction Works

In order to protect amenity of the occupants of the neighbouring residences from noise produced as a result of demolition, site/ground preparation works and construction works, I recommend the following controls:

- a) Operations creating noise which is audible at the site boundary should not occur outside the hours of 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays.

I trust this meets with your satisfaction. If you have any queries, please call me on the number above.

APPENDIX A – ENVIRONMENTAL HEALTH COMMENTS

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A4 ENVIRONMENTAL HEALTH COMMENTS

Responding Officer: Mark Nicholl
Date:05-05-20
Email:
Ext:

Please note: Unless agreed with the Case Officer, should no response be received by the expiry date specified above it will be assumed your Service has no comments to make.

Should further information be required, please let the Case Officer know as soon as possible in order for the information to be requested to allow timeous determination of the application.

APPENDIX B – ACOUSTICAL PARAMETERS

1 of 1

B1 ACOUSTICAL PARAMETERS

$L_{Aeq, T}$ A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time

L_{Amax} Maximum A-weighted sound level measured during the measurement period

$L_{A90, T}$ A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for 90% of a specified time interval

L_{A10} A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for 10% of a specified time interval

A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing

All quoted noise levels are relative to 2×10^{-5} Pa.

APPENDIX C – CRTN - EXTERNAL NOISE LEVEL CALCULATION – UNION STREET

1 of 1

C1 CRTN - EXTERNAL NOISE LEVEL CALCULATION – UNION STREET

The magnitude of impact of the road traffic noise was calculated using the shortened technique detailed in the Calculation of Road Traffic Noise. The road traffic noise was measured from the window façade of the future lounge/kitchen of Flat One on the First Floor. The microphone of the sound level meter was placed horizontal, at a distance of 1 metre from the window facade. The sound was measured over three consecutive hourly periods. The calculated day time noise level between 07:00 and 23:00 was 70 dB(A) (free field) and the night time level between the hours of 23:00 and 07:00 was 61 dB(A) (free field).

The start time of measurement and duration	Octave Band Centre Frequency (Hz)										LAeq dB(A)	LAF10 dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000			
11:30 – 60 mins, 00 secs	79.9	77.9	72.2	69.0	67.4	63.4	64.3	58.3	53.5	71.9	75.0	
12:30 – 61 mins, 01 secs	77.8	77.1	71.1	69.3	67.6	68.7	64.6	58.5	52.9	72.2	75.2	
13:31 – 60 mins, 20 secs	78.1	77.4	73.5	71.1	69.5	68.8	64.8	59.0	53.0	72.8	75.2	
The arithmetic mean of three consecutive hours LA10 (3-hours) (free field)											75.1	

The method described in paragraph 43 of the Calculation of Road Traffic Noise was used to convert the LA10 (3-hour) to LA10 (18-hour), using the formulae below

$$L_{A10} (18\text{-hour}) = L_{A10} (3\text{-hour}) - 1 \text{ dB(A)}, \text{ therefore}$$

$$L_{A10} (18\text{-hour}) = 74.1 \text{ dB(A) (facade)}$$

The calculation to convert the LA10 from facade to free field, was used below –

$$L_{A10} (18\text{-hour}) (\text{free field}) = L_{A10} (18\text{-hour}) (\text{facade}) - 2.5 \text{ dB}, \text{ therefore}$$

$$L_{A10} (18\text{-hour}) = 71.6 \text{ dB(A) (free field)}$$

The calculation to convert LA10 (18-hour) to LAeq (16hr, 07:00 to 23:00), was used below –

$$L_{Aeq} (16\text{-hour}) = L_{A10} (18\text{-hour}) - 2 \text{ dB}, \text{ therefore}$$

$$L_{Aeq} (16\text{hr}, 07:00 \text{ to } 23:00) = 69.6 \text{ DAY-TIME (free field)}$$

To calculate the LAeq (8hr, 23:00 to 07:00) noise level at night time from the LA10 (18-hour) free field external sound level, the method described in the Method for Converting the UK Road Traffic Noise Index LA10, 18h to the EU Noise Indices for Road Noise Mapping was used.

$$L_{Aeq} (8\text{hr}, 23:00 \text{ to } 07:00) = 0.90 \times L_{A10} (18\text{-hour}) - 3.77 \text{ dB} = 0.90 \times 71.6 - 3.77, \text{ therefore}$$

$$L_{Aeq} (8\text{hr}, 23:00 \text{ to } 07:00) = 60.7 \text{ dB(A) NIGHT-TIME (free field)}$$

APPENDIX D – CRTN - EXTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE

1 of 1

D1 CRTN - EXTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE

The magnitude of impact of the road traffic noise was calculated using the shortened technique detailed in the Calculation of Road Traffic Noise. The road traffic noise was measured from the window façade of the future lounge/kitchen of Flat Nine on the First Floor. The microphone of the sound level meter was placed horizontal, at a height of 1 metre above the living room floor. The sound was measured over three consecutive hourly periods. The calculated day time noise level between 07:00 and 23:00 was 62 dB(A) (free field) and the night time level between the hours of 23:00 and 07:00 was 54 dB(A) (free field).

Start time of measurement and duration	Octave Band Centre Frequency (Hz)										LAeq dB(A)	LAF10 dB(A)
	31.5	63	125	250	500	1000	2000	4000	8000			
13:50 – 60 mins, 05 secs	73.4	70.6	66.2	62.0	60.4	59.7	53.5	47.4	39.8	63.3	67.4	
14:52 – 61 mins, 27 secs	74.8	72.0	67.0	62.8	61.4	60.7	54.7	48.1	41.4	64.3	67.8	
15:56 – 60 mins, 02 secs	74.2	72.2	67.3	62.1	61.9	61.0	54.9	48.0	40.9	64.9	68.0	
Arithmetic mean of three consecutive hours LA ₁₀ (3-hours) (free field)											67.7	

The method described in paragraph 43 of the Calculation of Road Traffic Noise was used to convert the LA₁₀ (3-hour) to LA₁₀ (18-hour), using the formulae below

$$LA_{10} (18\text{-hour}) = LA_{10} (3\text{-hour}) - 1 \text{ dB(A)}, \text{ therefore}$$

$$LA_{10} (18\text{-hour}) = 66.7 \text{ dB(A) (facade)}$$

The calculation to convert the LA₁₀ from facade to free field, was used below –

$$LA_{10} (18\text{-hour}) (\text{free field}) = LA_{10} (18\text{-hour}) (\text{facade}) - 2.5 \text{ dB}, \text{ therefore}$$

$$LA_{10} (18\text{-hour}) = 64.2 \text{ dB(A) (free field)}$$

The calculation to convert LA₁₀ (18-hour) to LA_{Aeq} (16hr, 07:00 to 23:00), was used below –

$$LA_{Aeq} (16\text{-hour}) = LA_{10} (18\text{-hour}) - 2 \text{ dB}, \text{ therefore}$$

$$LA_{Aeq} (16\text{hr}, 07:00 \text{ to } 23:00) = 62.2 \text{ DAY-TIME (free field)}$$

To calculate the LA_{Aeq} (8hr, 23:00 to 07:00) noise level at night time from the LA₁₀ (18-hour) free field external sound level, the method described in the Method for Converting the UK Road Traffic Noise Index LA₁₀, 18h to the EU Noise Indices for Road Noise Mapping was used.

$$LA_{Aeq} (8\text{hr}, 23:00 \text{ to } 07:00) = 0.90 \times LA_{10} (18\text{-hour}) - 3.77 \text{ dB} = 0.90 \times 64.2 - 3.77, \text{ therefore}$$

$$LA_{Aeq} (8\text{hr}, 23:00 \text{ to } 07:00) = 54.0 \text{ dB(A) NIGHT-TIME (free field)}$$

APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E1 INTERNAL NOISE LEVEL CALCULATION – UNION STREET

Assumptions of calculations

Using the Simple Calculation detailed in Annex G of BS8233:2014: Guidance on sound insulation and noise reduction for buildings, the internal noise level for the proposed bedroom of Flat Two on the first floor facing Union Street was calculated as detailed below.

The following assumptions are made for the basis of these calculations:

- (1) The external noise transmission path will be through the windows only. No account was taken place of noise transmission paths through the granite wall facade.
- (2) For sound reduction purposes, the windows facing Union Street shall be closed (except for purge ventilation by residents).
- (3) For the windows, it is proposed to replace the existing windows and replace them with secondary glazing unit with a configuration of 6mm glass / 100mm air gap / 4 mm glass. The sound reduction index is assumed to be R_w 46 taken See table from Pilkington Glass and Noise Control. Technical Bulletin.

Table 3 – Double Windows (Secondary Sashes)

Thirdoctaveband Centre Frequency (Hz)	Sound Insulation (dB) for Glass Thickness (mm)					
	6/100/4		6/150/4		10/200/6	
100	25		27		32	
125	27	26	30	29	37	35
160	27		30		39	
200	33		34		45	
250	33	34	34	35	46	46
315	37		39		46	
400	41		42		47	
500	46	44	46	45	45	46
630	50		50		45	
800	54		54		44	
1000	57	56	57	56	45	46
1250	59		58		50	
1600	58		58		53	
2000	52	53	52	52	58	56
2500	51		49		58	
3150	48		47		64	
4000	57	52	52	50	64	65
R_m (dB)	44		44		47	
R_w (dB)	46		47		49	
R_{TRA} (dBA)	37		39		45	

British Standard 8233:2014 – Annex G.1 Simple Calculation

DAY TIME

The free field external sound level, L_{Aeq} (16hr, 07:00 to 23:00) = 70 dB(A)

The internal day time noise level is calculated as L_{Aeq} (internal) = 70 – 46 (R_w) = 24 dB(A)

NIGHT TIME

The free field external sound level, L_{Aeq} (8hr, 23:00 to 07:00) = 61 dB(A)

The internal night time noise level is calculated as L_{Aeq} (internal) = 61 – 46 (R_w) = 15 dB(A)

APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E2 INTERNAL NOISE LEVEL CALCULATION – UNION STREET

British Standard 8233:2014 – Annex G.1 Rigorous Calculation

Term from equation (G.1)	Reference letter of result	Octave Band Centre Frequency						
		125	250	500	1000	2000		
Leq, ff	A	72.4	69.9	68.3	67.6	64.6		
Dn,e		0	0	0	0	0		
Ao/S 10 -Dn,e/10	B	0	0	0	0	0		
Rwi		26	34	44	56	53		
Swi/S 10 -Rwi/10	C	0.000854041	0.000135356	1.35356E-05	8.54041E-07	1.70404E-06		
Rew		0	0	0	0	0		
Sew/S 10 -Rew/10	D	0	0	0	0	0		
Rrr		0	0	0	0	0		
Srr/S 10 -Rrr/10	E	0	0	0	0	0		
10 log 10 (B + C + D + E)	F	-30.68521083	-38.68521083	-48.68521083	-60.68521083	-57.68521083		
A (furnished)		25.4	17.2	14.1	8.1	13		
10 log (S/A)	G	-2.587056809	-0.894004112	-0.03091077	2.376430168	0.321846834		
Leq,2	A + F + G + 3	42.12773236	33.32078506	22.5838784	12.29121934	10.236636		
A-weighting dB		-16	-9	-3	0	1		
Leq,2 + A-weighting		26.12773236	24.32078506	19.5838784	12.29121934	11.236636		
$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_n}{S} 10^{-\frac{-D_n}{10}} + \frac{S_{wi}}{S} 10^{-\frac{-R}{10}} + \frac{S_{rr}}{S} 10^{-\frac{-R}{10}} + \frac{S_{sew}}{S} 10^{-\frac{-R}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$					LAeq = 29.03925326			
Terms that are frequency dependent								
Term	Description	Single Figure Rating	Octave Band Centre Frequency					LAeq dB(A)
			125	250	500	1000	2000	
Leq, ff	Free Field Octave Bands	-	72.4	69.9	68.3	67.6	64.6	72.3
Dn,e	-	-	0	0	0	0	0	-
Rwi	Secondary glazing 6mm / (100mm) / 4mm	44	26	34	44	56	53	-
Rew	Concrete wall	-	0	0	0	0	0	-
A	Equivalent absorption area of receiving room	-	25.4	17.2	14.1	8.1	13	-
Terms that are not frequency dependent								
Sf	Facade area (including window)						14 m ²	
Sr	Roof area (exposed side)						0 m ²	
Swi	Window area						3.4 m ²	
Sew	Sf - Swi						10.6 m ²	
S	Sf + Srr						14 m ²	
Ao	Reference absorption area given in BS EN ISO 10140-2						10 m ²	

APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E3 INTERNAL NOISE LEVEL CALCULATION – UNION STREET

EQUIVALENT ABSORPTION AREA OF RECEIVING ROOM CALCULATION

Absorbent		Absorption					
Item	Area	125		250Hz		500Hz	
		Absorption coefficient	Absorption	Absorption coefficient	Absorption	Absorption coefficient	Absorption
Plastered walls/ceiling	79.6	0.3	23.88	0.2	15.92	0.15	11.94
Flooring (composite carpeting)	20	0.05	1	0.05	1	0.1	2
Windows	3.4	0.15	0.51	0.07	0.238	0.04	0.136
A			25.39		17.158		14.076

Item	Area	1000Hz		2000Hz		Absorption coefficients are taken from Woods Practical Guide to Noise Control
		Absorption coefficient	Absorption	Absorption coefficient	Absorption	
Plastered walls/ceiling	79.6	0.05	3.98	0.05	3.98	
Flooring (composite carpeting)	20	0.2	4	0.45	9	
Windows	3.4	0.03	0.102	0.02	0.068	
A			8.082		13.048	

APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E4 INTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE

Assumptions of calculations

Using the Simple Calculation detailed in Annex G of BS8233:2014: Guidance on sound insulation and noise reduction for buildings, the internal noise level for the proposed living kitchen area of the Flat One on the basement floor was calculated as detailed below.

The following assumptions are made for the basis of these calculations:

- (1) The external noise transmission path will be through the windows only. No account was taken place of noise transmission paths through the concrete wall facade.
- (2) For sound reduction purposes, the windows shall be closed (except for purge ventilation by residents).
- (3) For the windows, it is proposed to replace the existing windows to provide windows with a configuration of 12.8 mm Pilkington Optiphon / 20 mm argon / 16.8 mm Pilkington Optiphon. The sound reduction index is assumed to be R_w 51 taken from Pilkington Optiphon Laminated Glass for noise control.

Glass	Octaveband Centre Frequency (Hz)						R_w (C; C _v)	R_w	$R_w + C$	$R_w + C_v$
	125	250	500	1000	2000	4000				
Single glazing										
6.8 mm Pilkington Optiphon™	22	26	31	37	40	40	36 (-1; -4)	36	35	32
8.8 mm Pilkington Optiphon™	27	29	34	38	40	43	37 (0; -2)	37	37	35
10.8 mm Pilkington Optiphon™	26	30	35	39	40	46	38 (-1; -3)	38	37	35
12.8 mm Pilkington Optiphon™	29	32	36	41	42	51	40 (-1; -3)	40	39	37
16.8 mm Pilkington Optiphon™	31	33	38	41	43	54	41 (-1; -3)	41	40	38
Insulating glass units										
6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™	21	28	37	48	48	54	40 (-2; -6)	40	38	34
6 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	25	27	38	48	47	55	41 (-2; -6)	41	39	35
8 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	21	30	39	47	50	55	42 (-3; -8)	42	39	34
10 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	28	31	42	45	50	58	44 (-2; -6)	44	42	38
10 mm / 20 mm argon / 8.8 mm Pilkington Optiphon™	28	36	43	47	49	58	46 (-2; -6)	46	44	40
8.8 mm Pilkington Optiphon™ / 16 mm argon / 12.8 mm Pilkington Optiphon™	28	36	45	53	56	64	48 (-2; -7)	48	46	41
10.8 mm Pilkington Optiphon™ / 24 mm argon / 16.8 mm Pilkington Optiphon™	35	41	48	53	55	65	52 (-2; -6)	52	50	46
12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon™	35	45	49	50	54	65	51 (-1; -4)	51	50	47

British Standard 8233:2014 – Annex G.1 Simple Calculation

DAY TIME

The free field external sound level, L_{Aeq} (16hr, 07:00 to 23:00) = 62 dB(A)

The internal day time noise level is calculated as L_{Aeq} (internal) = 62 – 51 (R_w) = 11 dB(A)

NIGHT TIME

The free field external sound level, L_{Aeq} (8hr, 23:00 to 07:00) = 54 dB(A)

The internal night time noise level is calculated as L_{Aeq} (internal) = 54 – 51 (R_w) = 3 dB(A)

APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E5 INTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE

British Standard 8233:2014 – Annex G.1 Rigorous Calculation

Term from equation (G.1)	Reference letter of result	Octave Band Centre Frequency				
		125	250	500	1000	2000
Leq, ff	A	66.9	62.3	61.3	60.5	54.4
Dn,e		0	0	0	0	0
Ao/S 10 - Dn,e/10	B	0	0	0	0	0
Rwi		35	45	49	50	54
Swi/S 10 - Rwi/10	C	6.32456E-05	6.32456E-06	2.51785E-06	0.000002	7.96214E-07
Rew		0	0	0	0	0
Sew/S 10 - Rew/10	D	0	0	0	0	0
Rv		0	0	0	0	0
Srr/S 10 - Rrr/10	E	0	0	0	0	0
10 log 10 (B + C + D + E)	F	-41.98970004	-51.98970004	-55.98970004	-56.98970004	-60.98970004
A (furnished)		21.6	14.6	11.9	6.6	10.4
10 log (S/A)	G	-0.79181246	0.909196493	1.797255437	4.357285696	2.382391658
Leq,2	A + F + G + 3	27.1184875	14.21949645	10.10755539	10.86758565	-1.207308385
A-weighting dB		-16	-9	-3	0	1
Leq,2 + A-weighting		11.1184875	5.21949645	7.107555394	10.86758565	-0.207308385
$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_s}{S} 10^{-\frac{D_n}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{sew}}{S} 10^{-\frac{R_{sew}}{10}} + \frac{S_{srr}}{S} 10^{-\frac{R_{srr}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$					LAeq = 15.38646596	

Terms that are frequency dependent								
Term	Description	Single Figure Rating	Octave Band Centre Frequency					LAeq dB(A)
			125	250	500	1000	2000	
Leq, ff	Free Field Octave Bands	-	66.9	62.3	61.3	60.5	54.4	67.7
Dn,e	-	-	0	0	0	0	0	-
Rwi	12.8 mm Pilkington Optiphon™ / 20 mm argon / 16.8 mm Pilkington Optiphon™	51	35	45	49	50	54	-
Rew	Concrete wall	-	0	0	0	0	0	-
A	Equivalent absorption area of receiving room	-	21.6	14.6	11.9	6.6	10.4	-

Terms that are not frequency dependent		
Sf	Facade area (including window)	18 m ²
Sr	Roof area (exposed side)	0 m ²
Swi	Window area	2 m ²
Sew	Sf - Swi	16 m ²
S	Sf + Srr	18 m ²
Ao	Reference absorption area given in BS EN ISO 10140-2	10 m ²



APPENDIX E – INTERNAL NOISE LEVEL CALCULATION FOR ROAD TRAFFIC NOISE

E6 INTERNAL NOISE LEVEL CALCULATION – WINDMILL BRAE

EQUIVALENT ABSORPTION AREA OF RECEIVING ROOM CALCULATION

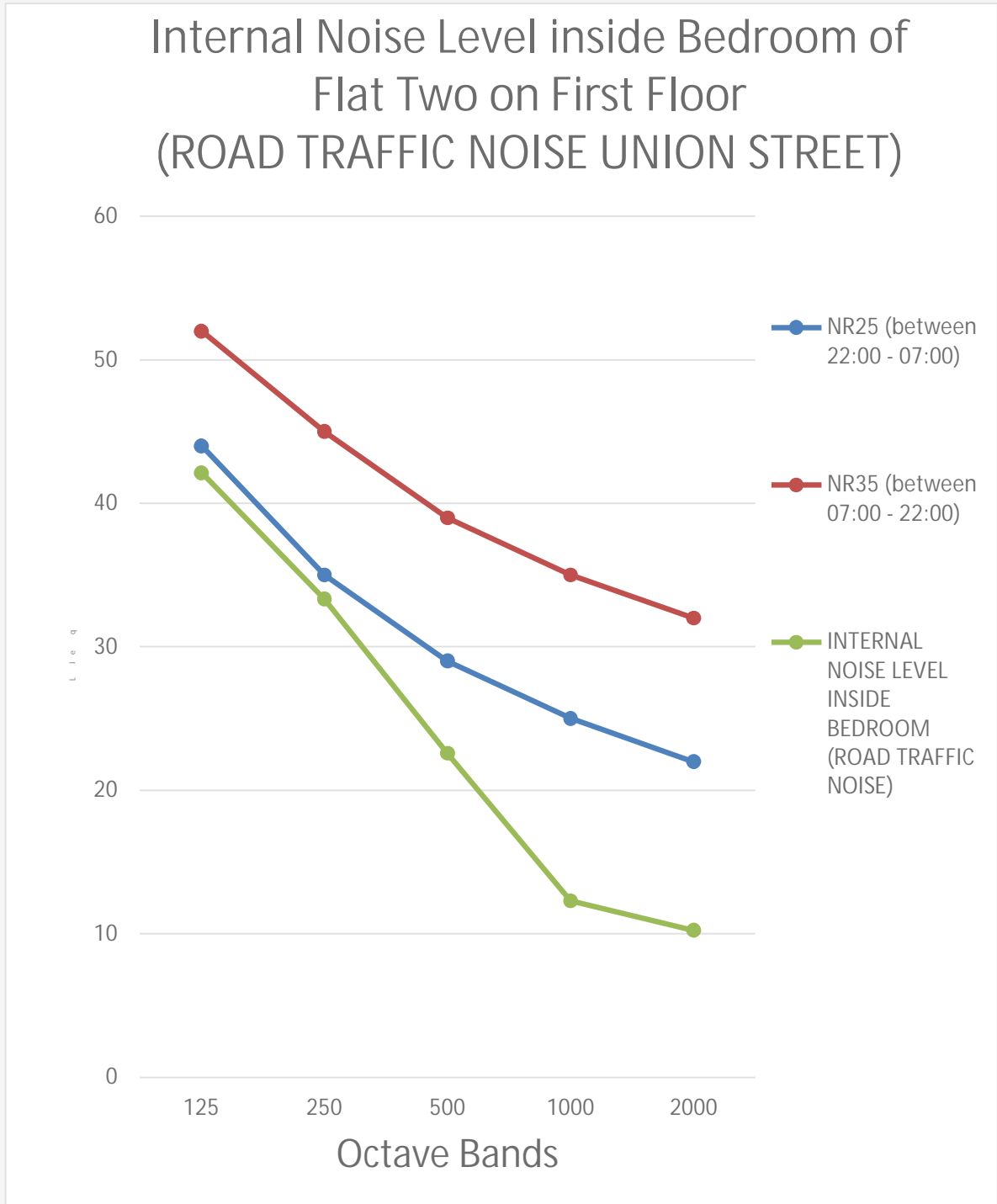
Absorbent		Absorption					
Item	Area	125		250Hz		500Hz	
		Absorption coefficient	Absorption	Absorption coefficient	Absorption	Absorption coefficient	Absorption
Plastered walls/ceiling	68.6	0.3	20.58	0.2	13.72	0.15	10.29
Flooring (composite carpeting)	15.3	0.05	0.765	0.05	0.765	0.1	1.53
Windows	2	0.15	0.3	0.07	0.14	0.04	0.08
A			21.645		14.625		11.9

Item	Area	1000Hz		2000Hz		Absorption coefficients are taken from Woods Practical Guide to Noise Control
		Absorption coefficient	Absorption	Absorption coefficient	Absorption	
Plastered walls/ceiling	68.6	0.05	3.43	0.05	3.43	
Flooring (composite carpeting)	15.3	0.2	3.06	0.45	6.885	
Windows	2	0.03	0.06	0.02	0.04	
A			6.55		10.355	

APPENDIX F – INTERNAL NOISE LEVEL GRAPH (ROAD TRAFFIC NOISE)

1 of 2

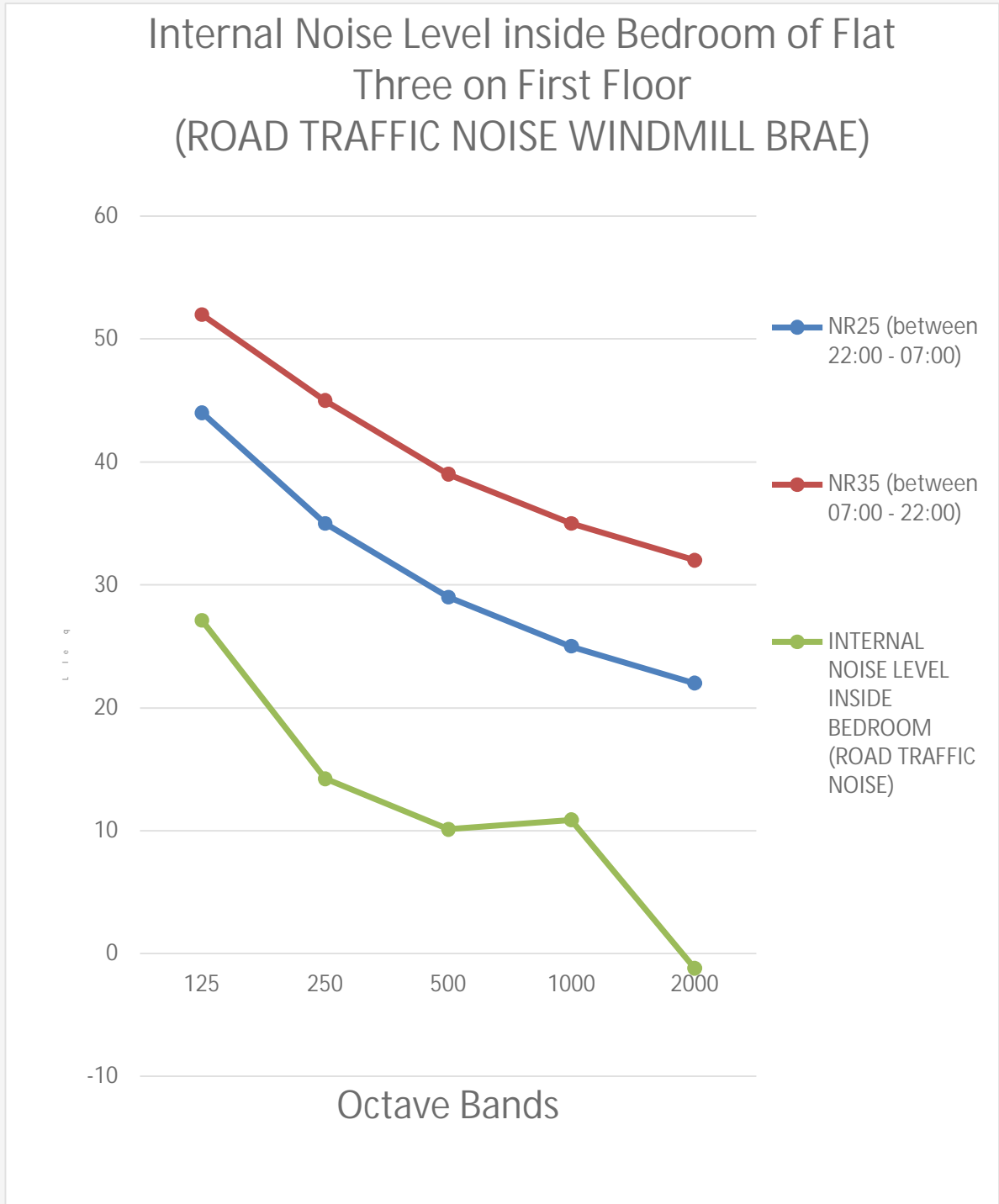
F1 INTERNAL NOISE LEVEL GRAPH (ROAD TRAFFIC NOISE UNION STREET)



APPENDIX F – INTERNAL NOISE LEVEL GRAPH (ROAD TRAFFIC NOISE)

2 of 2

F2 INTERNAL NOISE LEVEL GRAPH (ROAD TRAFFIC NOISE WINDMILL BRAE)



APPENDIX G – SURVEY DETAILS

1 of 2

G1 SURVEY DETAILS

1 Location

181 Union Street, Aberdeen, AB11 6BB

2 Survey Date and Times

DATE: 23.07.20

TIME START: 13:20

TIME STOP: 14:34

DATE: 24.07.20

TIME START: 20:30

TIME STOP: 20:46

3 Personnel Present

Tanya Grosle

4 Instrumentation

Instrument	Serial No	Date of next calibration
Bruel & Kjaer Type 2260B sound level Meter	2001719	06 – Feb – 2022
Bruel & Kjaer Type 4189 microphone	2021293	06 – Feb – 2022
Bruel & Kjaer ZC 0026 preamplifier	2001719	06 – Feb – 2022
Bruel & Kjaer Type 4231 calibrator	2094490	06 – Feb – 2021

APPENDIX G – SURVEY DETAILS

2 of 2

G2 SURVEY DETAILS











5 Procedure

At locations 1 to 5, the sound level meter was placed at the assessment location at a distance of 1.3 metres above the floor level. At location 6, the sound level meter was located outside the window at a distance of one metre. The sound level meter was calibrated before, and the drift was checked at the start and end of the survey periods.

6 Weather conditions


The weather during the survey period on the 23 July 2020 was dry and cloudy with no wind. The cloud cover during the entire measurement period was eight oktas and the temperature was 12°C during the survey period.

The weather during the survey period on the 24 July 2020 was dry and cloudy with no wind. The cloud cover during the entire measurement period was six oktas and the temperature was 10°C during the survey period.

Symbol	Scale in oktas (eighths)
	0 Sky completely clear
	1
	2
	3
	4 Sky half cloudy
	5
	6
	7
	8 Sky completely cloudy
	(9) Sky obstructed from view

APPENDIX H – CALIBRATION CERTIFICATES


H1 CALIBRATION CERTIFICATES

CERTIFICATE OF CALIBRATION																					
ISSUED BY	Gracey & Associates		BSI CERTIFICATE	FS 25913																	
DATE OF ISSUE	06 February 2020	CERTIFICATE NUMBER	2020-0374																		
DATE OF CALIBRATION	06 February 2020	PAGE 1 OF 1																			
CALIBRATION INTERVAL	24 months	Gracey & Associates Barn Court Shelton Road Upper Dean PE28 0NQ Tel: 01234 708835 Fax: 01234 252332 www.gracey.com																			
TEST ENGINEER	APPROVING SIGNATORY																				
Equipment	B&K 2260 B, s/n: 2001719																				
Description	Investigator, Bruel & Kjaer UK Limited																				
Customer	Grosle Environmental Services 88 Hamilton Place, Aberdeen, AB15 5BA																				
Standards	Conditions																				
BS EN 60651 Class 1	Atmospheric Pressure 102.4 kPa																				
BS EN 60804 Class 1	Temperature 20.8 °C																				
	Relative Humidity 33.0%																				
Calibration Reference Sources <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Equipment</th> <th style="text-align: left;">S/N</th> <th style="text-align: left;">Last Cal</th> <th style="text-align: left;">Equipment</th> <th style="text-align: left;">S/N</th> <th style="text-align: left;">Last Cal</th> </tr> </thead> <tbody> <tr> <td>Druck DPI 141</td> <td>479</td> <td>29-Oct-15</td> <td>HP 34401</td> <td>3146A29376</td> <td>21-Jan-19</td> </tr> <tr> <td>Vaisala HMP23</td> <td>S2430007</td> <td>04-Nov-15</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Equipment	S/N	Last Cal	Equipment	S/N	Last Cal	Druck DPI 141	479	29-Oct-15	HP 34401	3146A29376	21-Jan-19	Vaisala HMP23	S2430007	04-Nov-15			
Equipment	S/N	Last Cal	Equipment	S/N	Last Cal																
Druck DPI 141	479	29-Oct-15	HP 34401	3146A29376	21-Jan-19																
Vaisala HMP23	S2430007	04-Nov-15																			
Notes We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%. Copyright of this certificate is owned by Gracey & Associates and may not be reproduced other than in full except with their prior written approval.																					
Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972 Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.																					

APPENDIX H – CALIBRATION CERTIFICATES

H2 CALIBRATION CERTIFICATES

CERTIFICATE OF CALIBRATION



ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913
DATE OF ISSUE	06 February 2020	CERTIFICATE NUMBER	2020-0375
DATE OF CALIBRATION	05 February 2020		
CALIBRATION INTERVAL	24 months		PAGE 1 OF 2

TEST ENGINEER	APPROVED BY	

Gracey & Associates
 Barn Court Shelton Road
 Upper Dean PE28 0NQ
 Tel: 01234 708835
 Fax: 01234 252332
 www.gracey.com

Equipment	B&K 4189, s/n: 2021293
Description	Microphone - 1/2" FF 0V, Bruel & Kjaer UK Limited
Customer	Grosle Environmental Services 88 Hamilton Place, Aberdeen, AB15 5BA

Standards	Conditions
BS EN 61094	Atmospheric Pressure 102.9kPa
	Temperature 21.3°C
	Relative Humidity 35.1%


Calibration Data	
Sensitivity	-25.70 dB

Calibration Reference Sources

Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
B&K 4134 L	1935995	13-Aug-19	Druck DPI 141	479	29-Oct-15
HP 34401	3146A29376	21-Jan-19	Nor 1253	22456	13-Aug-19
Stanford DS36	33213	02-Nov-15	Vaisala HMP23	S2430007	04-Nov-15

Notes
 We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%.
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APPENDIX H – CALIBRATION CERTIFICATES

H3 CALIBRATION CERTIFICATES

CERTIFICATE OF CONFORMANCE					
ISSUED BY	Gracey & Associates	BSI CERTIFICATE	FS 25913		
DATE OF ISSUE	06 February 2020	CERTIFICATE NUMBER	2020-0376		
DATE OF CALIBRATION	06 February 2020	PAGE 1 OF 1			
CALIBRATION INTERVAL	24 months				
TEST ENGINEER 		APPROVED BY 			
Gracey & Associates Barn Court Shelton Road Upper Dean PE28 0NQ Tel: 01234 708835 Fax: 01234 252332 www.gracey.com					
Equipment	B&K ZC 0026, s/n: 2001719				
Description	Preamplifier - 2260, Bruel & Kjaer UK Limited				
Customer	Grosle Environmental Services 88 Hamilton Place, Aberdeen, AB15 5BA				
Standards	Conditions				
Manufacturer's Original Specifications	Atmospheric Pressure 102.4 kPa				
	Temperature 20.8 °C				
	Relative Humidity 33.0%				
Calibration Reference Sources					
Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
Druck DPI 141	479	29-Oct-15	HP 34401	3146A29376	21-Jan-19
Vaisala HMP23	S2430007	04-Nov-15			
Notes We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%. Copyright of this certificate is owned by Gracey & Associates and may not be reproduced other than in full except with their prior written approval.					
Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972 Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.					

APPENDIX H – CALIBRATION CERTIFICATES

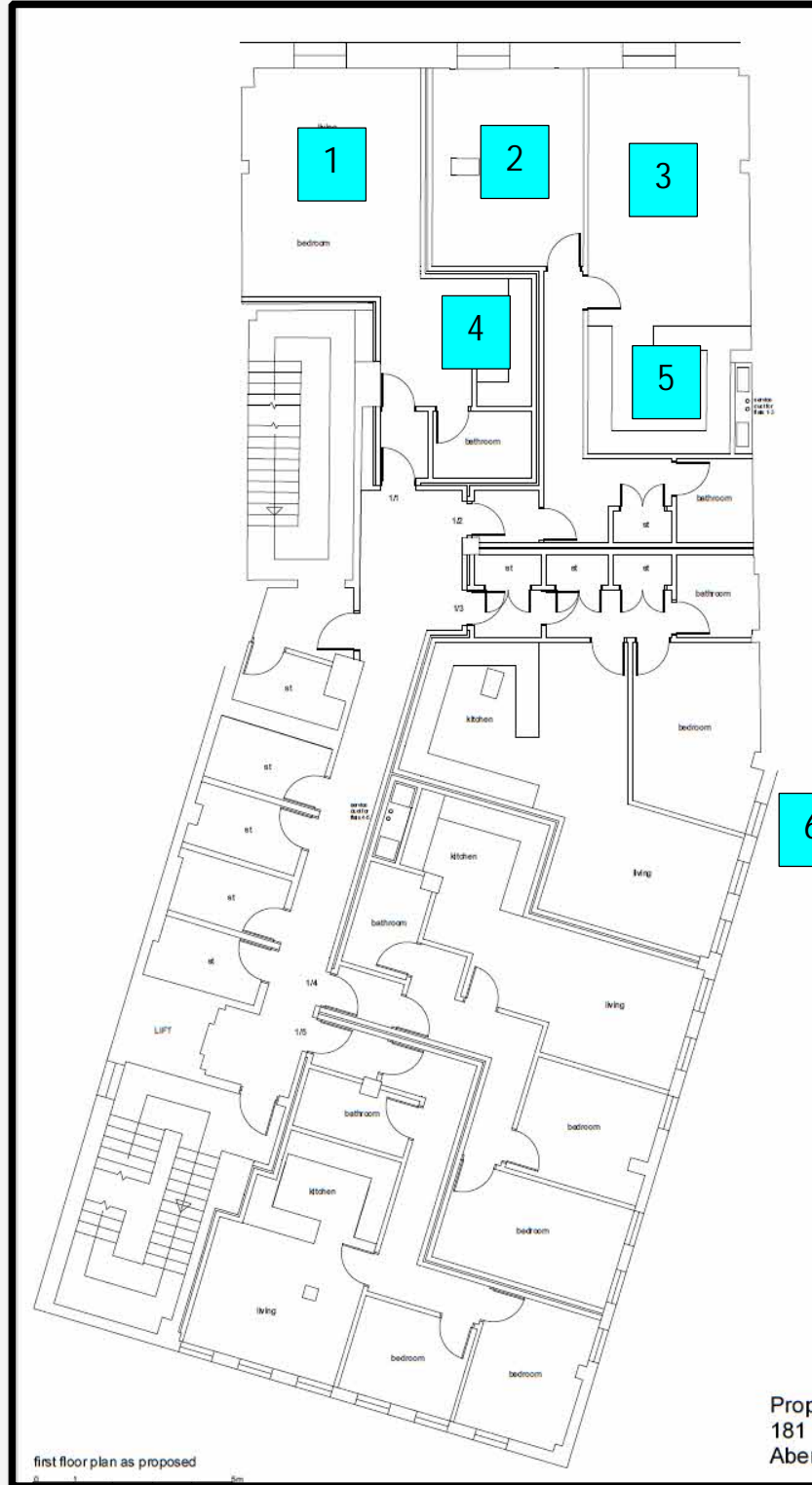
H4 CALIBRATION CERTIFICATES

CERTIFICATE OF CALIBRATION					
ISSUED BY	Gracey & Associates		BSI CERTIFICATE FS 25913		
DATE OF ISSUE	06 February 2020	CERTIFICATE NUMBER 2020-0377			
DATE OF CALIBRATION	06 February 2020				
CALIBRATION INTERVAL	12 months	PAGE 1 OF 2			
TEST ENGINEER: [REDACTED] APPROVED BY: [REDACTED]		Gracey & Associates Barn Court Shelton Road Upper Dean PE28 ONQ Tel: 01234 708835 Fax: 01234 252332 www.gracey.com			
Equipment	B&K 4231, s/n: 2094490				
Description	Calibrator - Acoustic - Class 1, Bruel & Kjaer UK Limited				
Customer	Grosle Environmental Services 88 Hamilton Place, Aberdeen, AB15 5BA				
Standards	BS EN 60942 Class 1	Conditions			
		Atmospheric Pressure 102.4 kPa			
		Temperature 20.8 °C			
		Relative Humidity 33.0 %			
Calibration Data					
Output Level	94.03 dB				
Frequency	999.84 Hz				
Calibration Reference Sources					
Equipment	S/N	Last Cal	Equipment	S/N	Last Cal
B&K 4134 L	1935995	13-Aug-19	Druck DPI 141	479	29-Oct-15
HP 34401	3146A29376	21-Jan-19	Nor 1253	22456	13-Aug-19
Stanford DS36	33213	02-Nov-15	Vaisala HMP23	S2430007	04-Nov-15
Notes					
We certify that the above product was duly tested and found to be within the specification at the points measured (except where indicated). Measurements are traceable to reference sources calibrated to National Standards. Where no national or international standards exist, traceability is to standards maintained by the manufacturer. Our Quality Management System has been assessed to comply with BS EN ISO 9001:2015 - BSI Certificate number FS 25913. Tests were carried out in environmental conditions controlled to the extent appropriate to the instrument's specification. All relevant test certificates are available for inspection. The uncertainties are for a confidence probability of not less than 95%. Copyright of this certificate is owned by Gracey & Associates and may not be reproduced other than in full except with their prior written approval.					
Gracey & Associates is the trading name of W T Gracey Ltd. Registered in Upper Dean England No 1176412. Est. 1972 Hire and calibration of noise and vibration instruments under a BSI ISO 9001 quality management system, Cert No. FS 25913.					

APPENDIX I – MEASUREMENT LOCATIONS AND PHOTOGRAPHS

1 of 4

11 MEASUREMENT LOCATIONS AND PHOTOGRAPHS



APPENDIX I – MEASUREMENT LOCATIONS AND PHOTOGRAPHS

2 of 4

12 MEASUREMENT LOCATIONS AND PHOTOGRAPHS

Location 1 – Flat One – Livingroom – internal – First Floor



Location 2 – Flat Two – Bedroom – internal – First Floor



APPENDIX I – MEASUREMENT LOCATIONS AND PHOTOGRAPHS

3 of 4

13 MEASUREMENT LOCATIONS AND PHOTOGRAPHS

Location 3 – Flat Two – Livingroom – internal – First Floor



Location 4 – Flat One – Kitchen – internal – First Floor



APPENDIX I – MEASUREMENT LOCATIONS AND PHOTOGRAPHS

4 of 4

I4 MEASUREMENT LOCATIONS AND PHOTOGRAPHS

Location 5 – Flat Two – Kitchen – internal – First Floor



Location 6 – Flat Three – Bedroom – external – First Floor



APPENDIX J – SURVEY RESULTS

1 of 2

J1 SURVEY RESULTS

SURVEY REPORT

PERSONNEL PRESENT: Tanya Grosle

ADDRESS: 181 Union Street, Aberdeen, AB11 6BB

DATE: 23.07.20 TIME START: 13:20 TIME STOP: 14:34

DATE: 24.07.20 TIME START: 20:30 TIME STOP: 20:46

REASON FOR MONITORING: Noise Impact Assessment relating to the conversion to residential flats

Location	Number and Duration	Time	L _{Aeq}	L _{AF90}	L _{AF10}	L _{AFMAX}	
Measurement 23.07.20							
Sound level meter calibrated at 13:20							
-	1 (00 mins, 06 secs)	13:22	94.0	-	-	-	Calibration drift check
Location 1	2 (10 mins, 00 secs)	13:24	39.4	33.0	42.4	53.8	Location 1 – Flat One – Livingroom – internal – First Floor Measurement taken in the middle of the room with window closed. Dominant noise source was road traffic. Intermittent noise sources were seagulls and pedestrian crossing. No noise from Coral Bookmakers.
Location 2	3 (10 mins, 00 secs)	13:38	34.6	28.4	36.6	56.2	Location 2 – Flat Two – Bedroom – internal – First Floor Measurement taken in the middle of the room with window closed. Dominant noise source was road traffic. Intermittent noise sources were seagulls and pedestrian crossing. No noise from Coral Bookmakers.
Location 3	4 (10 mins, 00 secs)	13:50	37.6	28.6	38.2	62.5	Location 3 – Flat Two – Livingroom – internal – First Floor Measurement taken in the middle of the room with window closed. Dominant noise source was road traffic. Intermittent noise sources were seagulls and pedestrian crossing. No noise from Coral Bookmakers.
Location 4	5 (10 mins, 00 secs)	14:02	37.2	31.2	39.8	53.0	Location 4 – Flat One – Kitchen – internal – First Floor Measurement taken in the middle of the proposed room. Dominant noise source was road traffic. Intermittent noise sources were seagulls and pedestrian crossing. No noise from Coral Bookmakers.
Location 5	6 (10 mins, 00 secs)	14:13	43.3	26.6	36.6	67.5	Location 5 – Flat Two – Kitchen – internal – First Floor Measurement taken in the middle of the proposed room with doors closed. Dominant noise source was distant road traffic. Intermittent noise sources were seagulls and pedestrian crossing. No noise from Coral Bookmakers.

APPENDIX J – SURVEY RESULTS

2 of 2

J2 SURVEY RESULTS

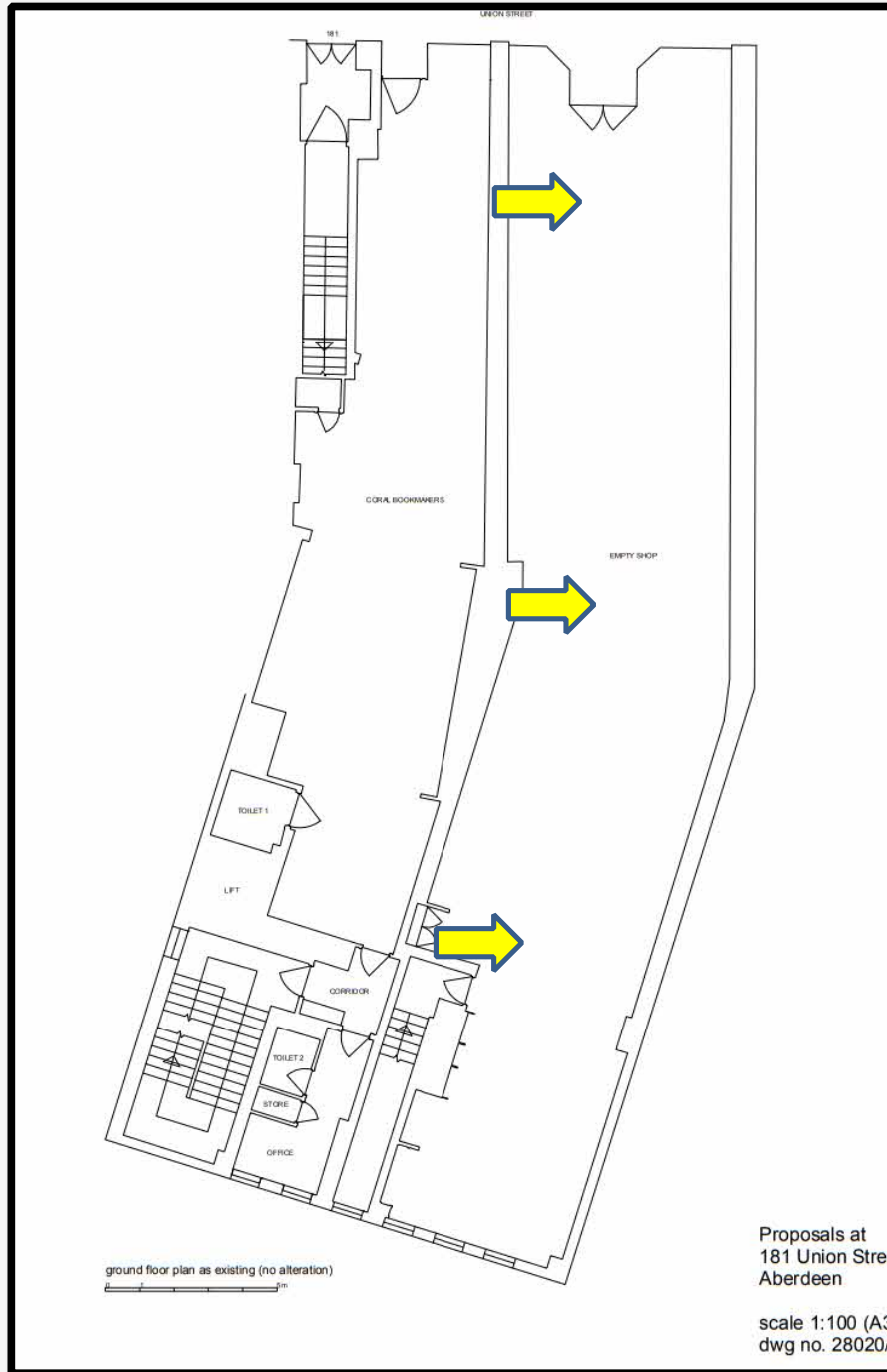
SURVEY REPORT

Location	Number and Duration	Time	L _{Aeq}	L _{AF90}	L _{AF10}	L _{AFMAX}	
Location 6	7 (10 mins, 00 secs)	14:24	59.3	50.8	62.6	77.9	Location 6 – Flat Three – Bedroom – external – First Floor Measurement taken at a distance of one metre from the window façade. Dominant noise source was road traffic. Intermittent noise sources were seagulls and faint mechanical plant.
-	8 (00 mins, 08 secs)	14:34	94.0	-	-	-	Calibration drift check
Measurement 24.07.20							
-	9 (00 mins, 07 secs)	20:30	94.0	-	-	-	Calibration drift check
Location 6	10 (10 mins, 00 secs)	20:35	54.9	47.3	58.2	68.3	Location 6 – Flat Three – Bedroom – external – First Floor Measurement taken at a distance of one metre from the window façade. Dominant noise source was road traffic. Intermittent noise sources were seagulls and faint mechanical plant.
-	11 (00 mins, 06 secs)	20:46	94.0	-	-	-	Calibration drift check

APPENDIX K – SEPARATING FLOOR

K1 SEPARATING FLOOR

The plan below highlights the existing ground floor plan, showing Coral Bookmakers and adjacent empty retail unit. The arrows highlight the location for the examination of the separating floor construction.



APPENDIX K – SEPARATING FLOOR

2 of 4

K2 SEPARATING FLOOR

Front of adjacent empty retail unit



Concrete slab separating floor at the front of adjacent empty retail unit



APPENDIX K – SEPARATING FLOOR

3 of 4

K3 SEPARATING FLOOR

Middle of adjacent empty retail unit



Concrete slab separating floor in the middle of adjacent empty retail unit



APPENDIX K – SEPARATING FLOOR

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K4 SEPARATING FLOOR

Rear of adjacent empty retail unit



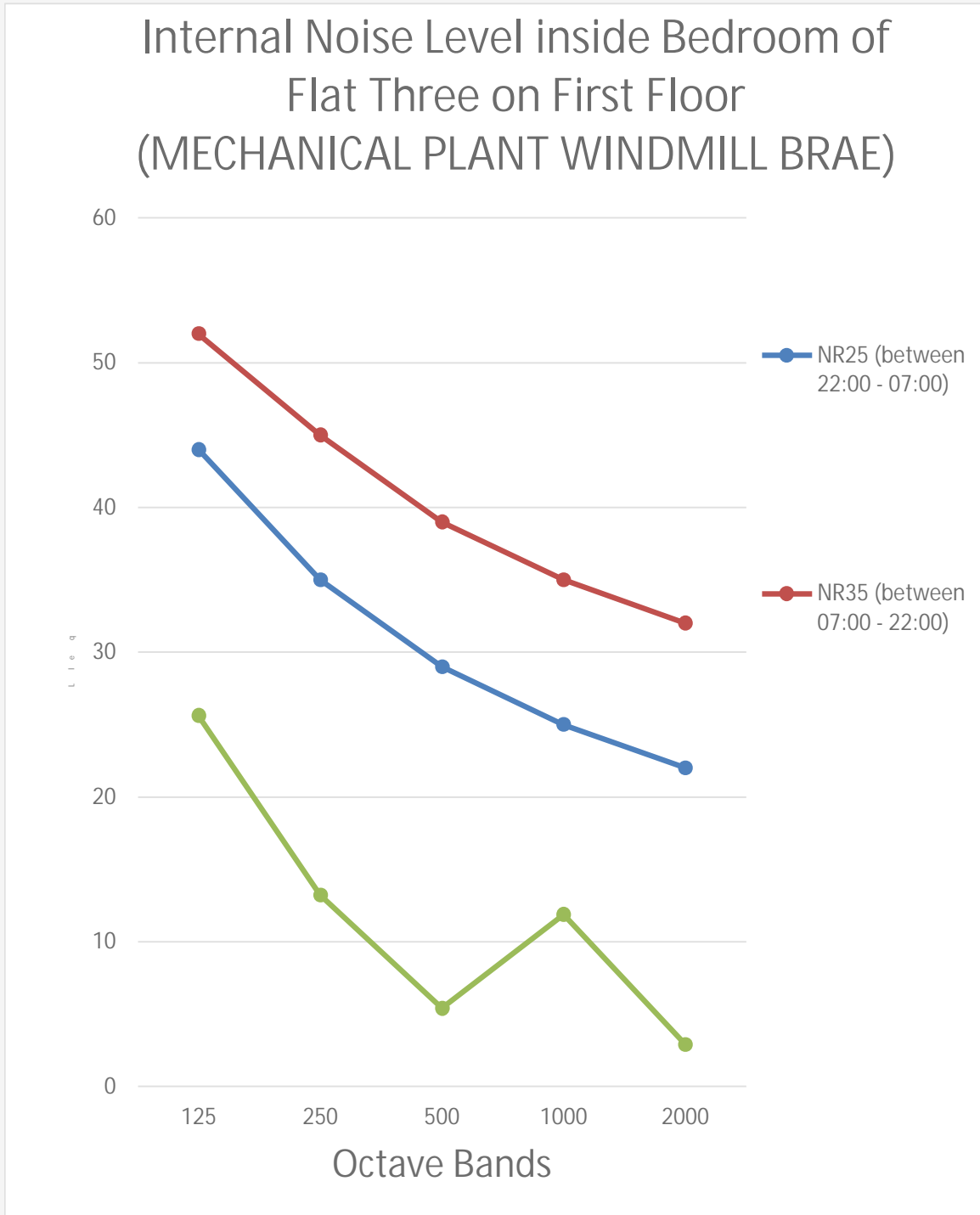
Concrete slab separating floor at the rear of adjacent empty retail unit



APPENDIX L – INTERNAL NOISE LEVEL GRAPH (MECHANICAL WINDMILL BRAE)

1 of 1

L1 INTERNAL NOISE LEVEL GRAPH (MECHANICAL WINDMILL BRAE)



APPENDIX M – INTERNAL NOISE LEVEL GRAPH (MUSIC AND CROWD NOISE WINDMILL BRAE)

1 of 1

M1 INTERNAL NOISE LEVEL GRAPH (MUSIC AND CROWD NOISE WINDMILL BRAE)

