INFINITY ACOUSTICS

NOISE IMPACT ASSESSMENT

The Cocked Hat,

Ferry Road,

Scunthorpe,

DN15 8LQ

INFINITY ACOUSTICS

Project Description:

Noise Assessment of a Mixed Use Development – Ground Floor Retail and 1st Floor Residential Dwellings

Project Reference Number:

A340WS

Amendment Register

Version Number	Date of Version	Amendment
001	29.10.2025	Original Version
002	02.12.2025	Revised Plans & Assessment
003	03.12.2025	Revised Mitigation Section

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1. Introduction

1.1 Infinity Acoustics Ltd has been appointed to undertake a noise assessment of the proposed development located at The Cocked Hat, Ferry Road, Scunthorpe, DN15 8LQ. The client proposes to develop the disused public house into a mixed-use development with ground-floor retail and 1st floor residential dwellings.

1.2 As part of the development process, the client will be submitting a full planning application for the development to the Local Planning Authority (LPA), North Lincolnshire Council.

1.3 The aim of the noise survey and assessment below is to provide the relevant information to assist the client and the local planning authority in approving the application. The noise levels at the site will be measured and assessed according to the relevant standards and local planning policy. A sound insulation scheme will be provided where necessary to ensure the amenity of all surrounding residents can be protected from commercial noise from the site, and the amenity of the residents in the proposed dwellings on the 1st floor can also be protected.

1.4 The following noise assessment report will be undertaken in line with the National Planning Policy Framework 2024 and Noise Policy Statement for England 2010, as well as the following legislation, policy and guidance.

1.5 ***BS8233:2014* - Guidance on Sound Insulation and Noise Reduction In Buildings**

The general noise criteria used in the assessment will be obtained from BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'. The criteria in BS8233 are largely based on the World Health Organisation Guidelines on Community Noise. The BS8233 criteria are outlined below:

- Living Room/Bedroom - 35 dB $L_{Aeq,16hour}$ (Day)
- Dining Room – 40 dB $L_{Aeq,16hour}$ (Day)
- Bedroom – 30 dB $L_{Aeq,8hour}$ (Night)

1.6 L_{Afmax} levels will also be assessed based on the criteria defined by the World Health Organisation. The WHO state within the 'Guidelines on Community Noise' that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB L_{Afmax}. The frequency of L_{Afmax} events should also be considered. It is understood that for an L_{Afmax} noise event to adversely impact sleep, the criteria would need to be exceeded more than ten times during a nighttime period.

1.7 ***BS4142:2014+A1:2019 – Methods for Rating and Assessing Industrial and Commercial Sound***

BS4142 is a British Standard that provides guidance and a standardised methodology for assessing industrial and commercial noise sources. BS4142 outlines methods for defining specific sound levels from a given development and/or noise source. Rating penalties are then applied to account for the acoustic characteristics of the noise source. Rating penalties can be applied for the following:

- Tonality
- Impulsivity
- Intermittency

Using the subjective method, the penalties vary in magnitude depending on how perceptible the acoustic characteristic is to the human ear. The rating noise level is then compared to the underlying L_{A90} background sound level of the area

without the source under assessment operating to assess the likely noise impact. The level by which the rating noise level exceeds the background L_{A90} defines the potential for noise impact. The table below outlines the relevant criteria bandings described in BS4142.

Description	Impact Rating
Rating noise levels +10 dB above the background	Significant adverse impact, depending on the context.
Rating noise levels +5 dB above the background	Adverse impact, depending on the context.
Where the rating level does not exceed the background	Low impact, dependent on Context

Table 1.0 – BS4142 Criteria

This methodology will be used to assess the commercial noise impact of the site on the nearby residents and sensitive receptors directly above the proposed ground-floor retail. With regards to continually running and operating noise sources such as that produced by external mechanical plant, it is expected that to ensure residential amenity can be protected, then mechanical plant rating level noise emissions should fall equal to or below the background sound levels when assessed in accordance with BS4142. When assessed in accordance with the NPPF and NPSE this would equate ‘No Observed Effect Level’.

2. Site & Surroundings

2.1 The site is located approximately 1.6km north east of Scunthorpe Town centre. The area surrounding the site is primarily residential with interspersed commercial and entertainment/leisure facilities. In general, the area surrounding the site could be described as suburban.

2.2 The site is located on Ferry Road, which facilitates moderate levels of through traffic. To the east of the site is Foxhills Road, which facilitates moderate to low levels of road traffic. During the site visit road noise was noted as the dominant noise within the surrounding acoustic environment.

2.3 Located in the vicinity of the site are the following commercial establishments: Good Coffee, which operates on Tuesday 09:00–14:30 and Thursday 09:30–14:30.Foxhills Club, which operates Monday–Thursday 15:30–22:00, Friday 15:00–22:00, Saturday 13:00–01:00, and Sunday 13:00–22:00. There is also the Oaisis Community Centre which operates between 09:30 – 16:30 and the Park Library which operates between 10:00 – 19:00. In general, commercial noise from the surrounding commercial units was not audible above the road noise during the site visits.

2.4 It should be noted that the adjacent Foxhills Club operates until 01:00 on the weekends and as such, even though noise from this location was not audible during the site visits it may become more audible in the evening and nighttime periods as the road traffic noise in the area drops.

2.5 The site itself is a disused public house and hotel that is currently in a severe state of disrepair. During the site visit, it was noted that the facades were constructed of masonry, and the roof was a timber frame roof with standard roofing tiles. The glazed areas of the site were severely damaged, and nearly all windows were smashed. Given this, it is assumed that the existing glazing at the site would be replaced by new glazing systems.

2.6 The development itself comprises of two ground-floor retail units, one of which is to be utilised as a convenience store with a sales area and back-of-house areas, defined as Unit A. The second Unit, Unit B, is to be sublet as a retail unit. However, the exact end user is unknown.

2.7 The exact mechanical plant specification for the units is not yet defined; however, based on previous projects of a similar nature and information provided by the client, it is assumed that, considering a worst-case scenario, there will be two Daikin RZAG140NV1 units with a sound power of 71 dB L_{wA} for Unit B, which will operate in the daytime only. For Unit A, based on the information provided by the client, there will be no.4 Daikin RZAG140NV1 AC units operating in the day only with a sound power level of 71 dB L_{wA}.

2.8 Based on information obtained in previous projects and provided by the client, there will also be ventilation units and louvred sections of wall to facilitate the ventilation for the cold room, which will be operated in both the day and nighttime periods and general ventilation for the ground floor stores in the form of HAVC and Air Handling Units. However, the location of the louvred terminus and the make and model of the ventilation plant for the commercial units is yet unknown.

2.9 The closest dwellings to the proposed commercial development on the ground floor are the proposed dwellings directly above and the residential dwellings located on Foxhills Road to the north. These locations will be considered the noise-sensitive receptors (NSRs) in the subsequent assessment. The figure below indicates the development, the surrounding area and noise survey measurement locations.

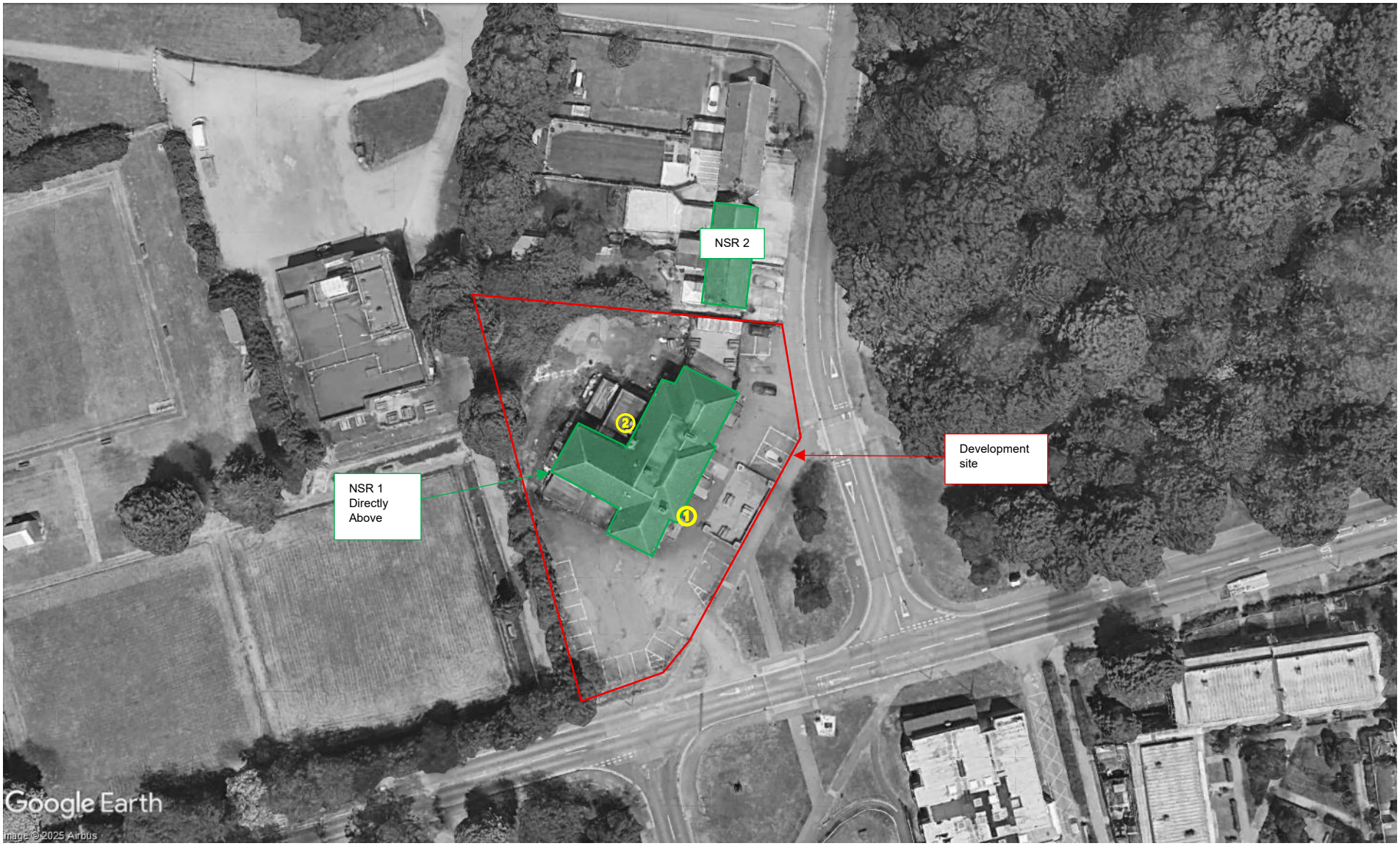

Figure 1.0 – Development Site & Surroundings

3. Survey

3.1 A noise survey of the site was undertaken between Friday 17th October 2025 and Monday 20th October 2025.

3.2 The following equipment was used to undertake the noise survey. All equipment used was field calibrated at 1kHz with a tolerance of less than 0.2 dB drift before and after the measurement. Calibration certificates for the equipment can be provided upon request.

- SVAN 971A Class 1 Sound Level Meter – SN – 113352
- SVAN 971A Class 1 Sound Level Meter – SN – 139441
- SVAN SV33B Class 1 Calibrator – SN – 122241

3.3 The long-term noise meter and associated microphone at Measurement Location 1 (ML1) were located on the first floor levels protruding from a 1st floor window along the front façade of the building. The microphone was located approximately 1m from the façade of the building.

The long-term noise meter and associated microphone at Measurement Location 2 (ML2) were located on the flat roof to the rear of the development site. The Noise meter was located approximately 1.5m from the surface of the roof and 1m from the façade of the building.

Given the proximity of the microphones to the facades of the building, appropriate facade corrections will be applied to establish free field noise levels incident on the development.

3.4 The weather during the setup of the equipment is outlined below:

- 11.7 Degrees Celsius
- NW wind with speeds of less than 1m/s
- Moderate cloud coverage and no precipitation

During the collection of the equipment, the weather was

- 12.7 Degrees Celsius
- SE wind with speeds of 2.2m/s
- Moderate cloud cover and no precipitation

3.5 Generally, the weather across the majority of the survey complied with the requirements of BS 7445-2. A full weather summary for the duration of the survey is outlined in the table below and has been taken from the nearest functioning weather station.

Weather Data	
Description	**Data**
Temp (C)	10.1 - 17.0
Rainfall (mm)	0.0
Wind Speed (m/s)	0.0 – 5.1
Prevailing Wind	SE
Relative Mean Humidity (%)	78.1

Table 2.0 – Weather Data

3.6 The results of the ambient noise survey are presented in the tables below and will be used in the subsequent Noise Assessment.

16 & 8 Hour Results ML1 – Front Facade				
Period and Date	**Time Period**	**L_{Aeq} (dB)**	**L_{Afmax} (dB)**	**$L_{A90,t}$ (dB)**
Day – 17/10/2025	11:15 – 23:00	55.0	82.0	48.0
Night – 17/10/2025	23:00 – 07:00	46.0	74.0	34.0
Day – 18/10/2025	07:00 – 23:00	55.0	91.0	47.0
Night – 18/10/2025	23:00 – 07:00	45.0	75.0	38.0
Day – 19/10/2025	07:00 – 23:00	54.0	85.0	47.0
Night – 19/10/2025	23:00 – 07:00	47.0	72.0	36.0
Day – 20/10/2025	07:00 – 10:15	59.0	86.0	51.0
ML1 L_{Afmax} Analysis				
Time Period		**10th Highest $L_{Afmax,1min}$**		
Night		65.0		
ML1 Highest 1 Hour Periods				
Time Period		**$L_{Aeq,1hour}$ (dB)**		
Day		62.0		
Night		51.0		

Table 3.0 – Noise Survey Global Data ML1 – Front Facade

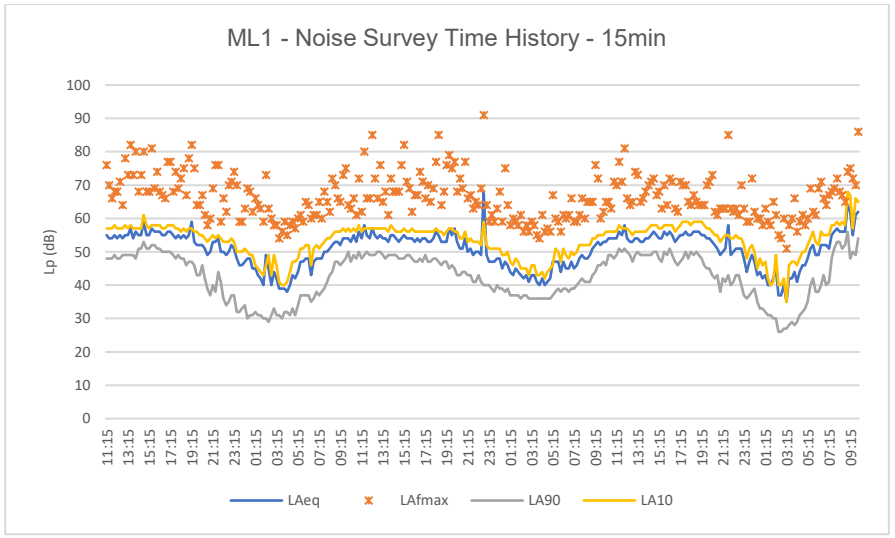

Figure 2.0 – ML1 – Noise Survey Time History – Front Facade

3.7 The measured noise levels at the front façade of the development are considered to be moderate to low and typical of a suburban environment. When considering an open window at the residential flats on the first floor, the internal noise criteria outlined in BS8233 would be exceeded when considering the 16-hour and 8-hour noise levels. In general, the noise incident on the front façade was considered to be steady state traffic noise following typical diurnal patterns.

16 & 8 Hour Results ML2 – Rear Facade				
Period and Date	**Time Period**	**$L_{Aeq\ (dB)}$**	**$L_{Afmax\ (dB)}$**	**$L_{A90,t\ (dB)}$**
Day – 17/10/2025	11:45 – 23:00	42.0	73.0	36.0
Night – 17/10/2025	23:00 – 07:00	36.0	73.0	27.0
Day – 18/10/2025	07:00 – 23:00	43.0	73.0	36.0
Night – 18/10/2025	23:00 – 07:00	37.0	65.0	31.0
Day – 19/10/2025	07:00 – 23:00	43.0	66.0	39.0
Night – 19/10/2025	23:00 – 07:00	36.0	62.0	32.0
Day – 20/10/2025	07:00 – 09:30	43.0	62.0	39.0
ML2 L_{Afmax} Analysis				
Time Period		**10th Highest $L_{Afmax,1min}$**		
Night		60.0		
ML2 Highest 1 Hour Periods				
Time Period		**$L_{Aeq,1hour\ (dB)}$**		
Day		48.0		
Night		41.0		

Table 4.0 – Noise Survey Global Data ML2 – Rear Facade

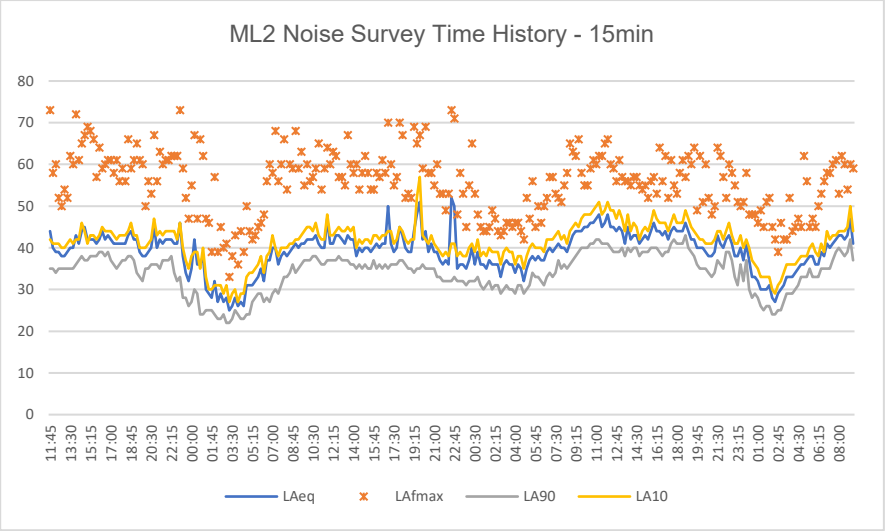

Figure 3.0 – ML2 – Noise Survey Time History – Rear Facade

3.8 The survey results at the rear façade ML2 indicate that noise levels in this area of the development are low, and when considering the 16-hour and 8-hour values in the internal noise criteria could be achieved within the proposed dwellings with an open window. A review of the time history indicates noise level in this area fluctuates somewhat throughout the day and evening periods. This could be due to activity and the nearby Foxhills Club in the late evening. Given the results of the assessment, the residential noise break-in in the area to the rear of the site will be undertaken using the loudest measured 1-hour periods instead of the typical $L_{Aeq,16hour}$ and $L_{Aeq,8hour}$

3.9 The proposed ground floor commercial section of the development and associated external AC units will operate during the day between 07:00 – 23:00. However, there is also potential for the Monoblock cold room ventilation plant to operate 24 hours a day during the nighttime. Given this, the table below presents the background sound levels that will be used in the assessment for each period. To reduce the potential for adverse impact from deliveries at the site, it is advised that deliveries be limited to the time periods between 09:00 – 17:00.

Typical Background Sound Levels – ML2 Rear Facade	
Time Period	**Typical $L_{A90,15min}$**
Day 07:00 – 23:00	35.0
Day Delivery Period 09:00 – 17:00	37.0
Night 23:00 – 07:00	26.0

Table 5.0 – Background Sound Levels

4. Commercial Units - Recommendations and Noise Control Measures

4.1 The following section of the report outlines specific noise control measures that need to be employed to ensure the noise from the ground-floor commercial units can be effectively managed and controlled to ensure the amenity of nearby residents can be protected, and any potential noise impact is minimised.

4.2 The proposed no.4 Daikin RZAG140NV1 AC units associated with Unit A should be positioned in acoustic enclosures providing a minimum of 23 dB attenuation.

4.3 The proposed no.2 Daikin RZAG140NV1 AC units associated with Unit B should be located as outlined in the figure below. The units should also be positioned in an acoustic enclosure providing a minimum 22 dBA attenuation.

Figure 4.0 – Unit B Plant Location

4.4 All external AC units as outlined above should not operate in the nighttime period between 23:00 – 07:00. Should operation in the nighttime be required, then further noise assessment would be required.

4.5 Should the proposed AC unit specification used in the assessment be different or change in any way, further noise assessment would be required.

4.6 Any other mechanical plant yet to be specified, such as ventilation units and louvred vents to the external environment, should not exceed the plant limit levels outlined in the table below. All mechanical plant limit levels have been devised to ensure the cumulative rating noise levels from all plant do not exceed the background sound level at any NSR are inclusive of any applicable rating penalties in accordance with BS4142.

Rating Limit Level Additional Plant	
Location	**Rating Limit Level $L_{Ar,Tr}$ (dB)**
Any Residential Door/Window	25.0

Table 6.0 – Additional Plant – Noise Limit Level

4.7 Deliveries should only occur at the site between the hours of 09:00 – 17:00.

4.8 The following scheme of noise barriers should be implemented to ensure delivery noise impact is as low as possible. The barriers should be a minimum 2.5m & 3m in height and have a minimum surface mass of 10kg/m^3 with no gaps or holes.

Figure 5.0 – Noise Barriers

4.9 Any residential windows associated with the proposed dwelling above the commercial elements of the site that are exposed to delivery noise should be fixed closed. All glazing units should be specified utilising the BS4142 Rating noise level or higher and provide a minimum 39 dB R_{w+ctr} sound reduction. The figure below indicates the residential windows that should be fixed closed.

Figure 6.0 – Fixed Closed Windows

4.10 Any residential dwellings with fixed closed windows overlooking the delivery area should be provided with an alternative means of ventilation in the form of a full MVHR system. The system should be designed to ensure sufficient ventilation and prevention from overheating, assuming windows are fixed closed.

4.11 To reduce the potential for delivery noise, an effective delivery noise management plan should be implemented. A brief management plan is outlined below.

- All deliveries should occur in the daytime between 09:00 – 17:00
- All deliveries should be staggered and arranged so that no two deliveries occur within on the same 1-hour period. Where possible, deliveries should be limited to one per day, with no deliveries on Sundays
- All goods vehicles should be switched off when not in use; no vehicle idling should be allowed.
- Where possible, all goods should be hand-carried from delivery HGVs into the establishment, reducing the need for noisy cages, wheels or pallet trucks or the dragging/rolling of goods.
- Rubberised thresholds should be installed on the rear door area to reduce noise produced by goods being wheeled through the rear doors.
- A dedicated noise officer should be appointed, and could be a manager or supervisor responsible for managing goods deliveries. The noise officer should oversee all deliveries of goods to the ground floor section of the development with the aim of reducing noise from deliveries as much a practically possible.
- The noise officer should be responsible for communication with the residents in the area, and a specific phone number for noise complaints should be provided to the nearby residents.
- An Incident Management System (IMS) should be set up and used to log and store details of any noise complaints.
- Should a noise complaint arise, the noise officer will investigate this complaint with immediate effect. The details of the complaint, time and source or noise and any remedial measures implemented will be logged in the IMS System.
- Should the complaint be deemed valid and the source of excessive delivery noise be identified as part of the investigation, delivery and loading works should stop until remedial measures and or processes can be put in place to ensure the source of noise has been significantly reduced or eradicated for the delivery process.
- The IMS should be stored in a secure location and made available to the local authority environmental protection team if required.

5. Computer Noise Model Results

5.1 In order to calculate the specific sound levels from the commercial mechanical plant and deliveries at the Noise Sensitive Receptors, a computer sound model has been generated using DGMR Noise Prediction Software. This software undertakes calculations using the methods outlined in ISO 9613-2 Attenuation of Sound During Propagation Outdoors.

5.2 The following assumptions have been made within the computer sound model:

- The ground in the area has been considered primarily hard.
- The topography of the site and surrounding land has been taken from Google Earth and information gained on-site.
- The elevations and building height for the proposed development have been obtained from the associated plans and information gained on-site.
- The AC units have been input into the model as point sources 1m from the ground.
- The HGV moving around the site has been input into the model as a line source/moving point source 0.5m from the ground.
- Loading and unloading in the delivery bay has been input into the model as an area source set at 0.5m from the ground.
- The sound power input levels of each noise source used in the model can be found in Appendix D.

5.3 The results of the computer noise model can be found in the table below. The table below presents the noise levels at the most exposed window associated with the Noise Sensitive Receptor, considering the noise control measures in Section 4.0 have been implemented. Full noise contours can be found in Appendix D.

Location	Specific Noise Levels $L_{Aeq,1hour}$ Plant Noise Day (dBA)	$L_{Aeq,1hour}$ Delivery Noise Day (dBA)
NSR 1	30.0	61.0
NSR 2	19.0	40.0

Table 7.0 – Calculated Specific Noise Levels

5.4 As can be seen in the table above, providing the recommendations are implemented, the noise from the mechanical plant is low. The noise from deliveries is considered high relative to the background sound level; however best practicable means of reducing delivery noise impact have been advised. When considering the specific delivery noise levels and an open window at nearby NSR 2, it is concluded that the internal criteria outlined in the W.H.O Guidelines on Community Noise and BS8233 would be achieved internally.

6. BS4142 Noise Assessment

6.1 The following section of the report assesses the noise from the development by undertaking a BS4142 Assessment.

6.2 In order to establish the rating noise level for the assessment, the following rating penalties have been applied been applied in accordance with BS4142.

Mechanical Plant
+2 dB Potential Tonality
+3 dB Intermittent Operation

Delivery Noise
+6 dB Impulsivity Loading/Unloading
+4 dB Tonality Rear Lift / Reversing Alarms
+3 dB Intermittent Activity

6.3 The plant noise BS4142 Assessment is outlined in the tables below and has been undertaken assuming the noise control measures outlined in Section 4.0 of the report have been implemented. The nighttime plant assessment has been undertaken assuming the plant limit level outlined in Section 4.0 of the report has been implemented, as the location of the cold room ventilation louvres has not yet been established.

BS4142 Assessment Plant Noise Day		
Description	**NSR 1 (dB)**	**NSR 2 (dB)**
Specific Noise Level at NSR	30.0	19.0
Rating Noise Level +5 dB	35.0	24.0
Background L_{A90}	35.0	35.0
Level Above Background	0.0	-11.0

Table 8.0 – BS4142 Assessment – Mechanical Plant Day

BS4142 Assessment Plant Noise Night		
Description	**NSR 1 (dB)**	**NSR 2 (dB)**
Rating Noise Limit Level	25.0	25.0
Background L_{A90}	26.0	26.0
Level Above Background	-1.0	-1.0

Table 9.0 – BS4142 Assessment – Mechanical Plant Night

6.4 As can be seen in the assessment above, provided the mechanical plant recommendations in Section 4.0 of the report are implemented, 'Low impact, depending on context', is expected at the surrounding NSRs when assessed in accordance with BS4142. When assessed in accordance with the NPPF and NPSE this would equate to 'No Observed Effect Level'.

6.5 The table below outlines the BS4142 assessment of delivery noise on the surrounding NSRs.

BS4142 Assessment Delivery Noise		
Description	**NSR 1 (dB)**	**NSR 2 (dB)**
Specific Noise Level at NSR	61.0	40.0
Rating Noise Level +13 dB	74.0	53.0
Background L_{A90}	37.0	37.0
Level Above Background	+37.0	+16.0

Table 10.0 – BS4142 Assessment – Delivery Period

6.6 The delivery noise assessment indicates that during a delivery, there is potential for significant adverse impact to occur at both the residential dwellings above the site and the existing dwellings in the area. However, BS4142 stipulates that the context of any assessment should also be fully considered when assessing the likely impact. As can be seen in Section 4.0 of the report, significant noise control measures have been outlined to reduce the noise impact from deliveries as much as practically possible, including limitations on delivery times, significant noise barriers, a detailed noise management plan, façade treatment and ventilation. Should these be implemented, it is assumed that delivery noise can be effectively managed, and the actual impact would be lower than stated in the assessment. It should also be noted that delivery to the site will not be constant and may only occur once per day, and likely last less than 1 hour. As such, the potential for noise impact from deliveries is likely to be lower than stated in the numerical assessment when considering the context of the assessment.

6.7 To further protect the residents situated directly above the delivery area, the glazing and sound insulation scheme to the rear of the site will be specified utilising the delivery noise rating noise levels from the BS4142 assessment.

7. BS8233 Assessment Results and Requirements

7.1 The table below indicates the required sound reduction in each façade zone to ensure the BS8233 Internal noise criteria can be achieved. Full noise break-in calculations can be found in Appendix D.1. On facades exposed to significant delivery noise, the rating noise level from the delivery noise BS4142 assessment has been used in the analysis to ensure the amenity of future residents of the 1st floor dwellings can be protected.

Required Sound Reduction	
Façade Zone	**Required Sound Reduction**
Front and South Facades	24 dB R_{w+ctr}
Rear Facades	39 dB R_{w+ctr}

Table 11.0 – Required Sound Reduction

7.2 In order to assess the need for an alternative ventilation strategy, an open window assessment has been undertaken and is presented in Appendix D.2. On facades exposed to significant delivery noise, the rating noise level from the delivery noise assessment has been used in the assessment. The open window assessment indicates that generally appropriate internal noise criteria cannot be achieved with an open window, and as such, an alternative ventilation strategy is required.

The AVO Guide assessment indicated that in the daytime period, there would be a 'Medium' risk of an overheating condition occurring due to residents keeping their windows closed to avoid significant noise ingress at the front and south facades and a 'High Risk' at the rear due to delivery noise. At night, this risk level drops to 'Low'. Given this, and the presence of commercial noise and activity in the units below, an alternative means of ventilation should be provided.

7.3 In order to ensure the future residents of the site can be protected from significant commercial noise breaking through the adjoining walls and floors of the development a noise breakthrough assessment has been undertaken and is presented in Appendix D.3. The assessment incites that provided the separating walls and floors provide a minimum sound attenuation of 55 dB $D_{nt,w+ctr}$ appropriate sound levels can be achieve in the residential dwellings directly above.

8. Sound Insulation Scheme and Recommendations – Residential Dwellings

8.1 The following section of the report details the sound insulation scheme required to ensure internal and external noise criteria can be achieved and that future residents are protected from noise ingress from the external environment. Prior approval of the sound insulation scheme should be sought from the local authority before any of the works outlined below are implemented.

8.2 Facades & Roof

The façade build-up obtained during the site visit is assumed to be a minimum of 210mm of masonry brick. This is deemed to provide sufficient sound reduction. When modelled in INSUL 10.0, typical wall constructions such as this are found to provide a minimum of 50 dB R_w.

The plans indicate the roof space will be utilised as a voided loft and a such no further sound insulation would be required in these areas provided a minimum 400mm thermal insulation is installed.

8.3 Glazing

To ensure the amenity of the future residents can be protected, the minimum sound reduction defined in the section below should be achieved by all glazing. The following glazing units are sufficient to achieve said performance and could be installed along each facade zone for both bedrooms and living rooms.

Glazing Sound Reduction Front and South Facades
6mm Glass / 6-16mm Air Cavity / 4mm Glass 32 dB R_w / 28 dB R_{w+ctr}
Glazing Sound Reduction Rear Facades
10mm Glass / 20mm Argon Cavity / 8.8mm Optiphon Glass 46 dB R_w / 40 dB $R_{w + Ctr}$

Table 12.0 – Proposed Glazing Sound Reduction

The glazing in the table above has been taken from the Pilkington database; however, any other glazing capable of achieving the minimum required sound reduction is outlined in the table above and would be sufficient and thus could be installed.

8.4 Ventilation

An open window assessment has been undertaken, and it has been found that the internal noise criteria would be exceeded across the site when considering an open window. During the daytime, there would be a 'Medium' risk of an overheating condition occurring due to residents keeping windows closed to avoid noise ingress.

Given this, and the potential for commercial noise from the ground floor, an alternative ventilation system should be employed across the site. System 4, outlined in the Building Regulations Part F and the AVO guide, should be installed. System 4 outlines the use of a full Mechanical Ventilation Heat Recovery System or MVHR, as indicated in the figure below. MVHR is a centralised system ducted to supply outlets in living rooms and bedrooms as well as to extract in wet rooms. It is assumed that, in locations where windows remain openable, the residents can still use open windows for purge ventilation and rapid dispersion of moisture and odour. However, an overheating assessment is required to inform the design of the MVHR system. The proposed

ventilation system should be designed to be sufficient to prevent overheating and provide sufficient ventilation, assuming windows are closed.

Figure 7.0 – Proposed Ventilation System

Internal mechanical ventilation, such as extract systems, produce self-generated noise which needs to be fully considered. The following criteria should be met by any mechanical ventilation systems employed at the site. The criteria below have been defined by the ANC in consultation on the Future Home Standards 2019 and the AVO Guide 2020.

Whole-dwelling ventilation system noise should not exceed:

- 26 dB $L_{Aeq,t}$ in Bedrooms
- 30 dB $L_{Aeq,t}$ in Living rooms

This would apply to Mechanical Extract Ventilation (MEV) and Mechanical Ventilation with Heat Recovery (MVHR) systems.

The extract ventilation system noise should not exceed:

- 26 dB $L_{Aeq,t}$ in Bedrooms
- 35 dB $L_{Aeq,t}$ in Living rooms
- 45 dB $L_{Aeq,t}$ in Kitchens and Bathrooms

8.5 Separating Wall Construction

The separating walls between the ground floor commercial and 1st floor residential stairwells should provide a minimum 55 dB $D_{nt,w+ctr}$ sound reduction. The plans indicate that the existing walls in these areas are a minimum of 100mm masonry. Therefore, this will be the basis of the design. This should be verified prior to the installation of any construction details. The following wall detail is deemed sufficient; however, any other detail could be installed provided the minimum requirement is achieved.

- Existing 100mm masonry wall
- 50mm Air cavity
- Minimum 50mm Steel C stud with 50mm insulation with a min density of 10kg/m^3.
- 2 layers of 15mm Soundbloc Plasterboard, min mass 12.6kg/m^2 per board

Expected Performance: 56 dB $D_{nt,w+ctr}$

8.6 Separating Floor Construction

The separating floor between the ground floor commercial and 1st floor residential should provide a minimum 55 dB $D_{nt,w+ctr}$ sound reduction. Based on the existing floor buildup identified on site, the following floor detail is deemed sufficient; however, any other detail could be installed, provided the minimum requirement is achieved.

- 18mm Cement Particle Board (Min Density 1275kg/m^3)
- Existing Floorboards sealed to an air-tight condition

- Existing Timber Joists 150mm
- 150mm Slab Insulation Within Timber Joists (Min Density 45kg/m^3
- 30mm Resilient Bar Affixed to the Underside of the Joists
- No.2 Layer of 15mm Soundbloc F Plasterboard Min mass 13.2kg/m^3
- Suspended Light Steel Grid with a Minimum Drop of 350mm
- 50mm Slab Insulation Within Ceiling Void (Min Density 45kg/m^3)
- Generic Mineral Fibre Ceiling Tile (Min Mass 3kg/m^2)

Expected Performance: 57 dB $D_{nt,w+ctr}$

The above wall and floor details have been specified based on the acoustic performance required. However, separating walls and floors between use classes will also be required to achieve the minimum required fire resistance outlined in Part B of the Building Regulations. Prior to the installation of any wall and floor details, the required fire performance and proposed construction details should be reviewed by a suitably qualified person to ensure compliance.

9. Conclusion

9.1 In conclusion, a noise survey has been undertaken at The Cocked Hat, Ferry Road, Scunthorpe, DN15 8LQ. The noise levels obtained during the survey have allowed a noise assessment to be undertaken in order to calculate the requirements for a sound insulation scheme to ensure the amenity of future residents can be protected.

9.2 The mechanical plant BS4142 Assessment indicates that, provided the recommendations outlined in Section 4.0 of the report are implemented, the impact from any proposed mechanical plant is expected to be 'Low' when assessed in accordance with BS4142.

9.3 The delivery noise impact assessment indicated that the background sound levels of the area would be exceeded significantly during delivery periods to the ground-floor retail unit. However best practicable means of reducing the noise impact from deliveries has been advised, including façade treatment, ventilation, strategic noise barriers, limitations on delivery periods and a delivery noise management plan. Should these be implemented, it is expected that delivery noise could be effectivity managed. BS4142 stipulates that context should be considered when assessing the potential for impact. Given the proposed mitigation and noise control measures and the fact that deliveries may only occur once a day for a short period of time, the actual impact of deliveries is likely lower than stated in the numerical BS4142 assessment.

9.4 As a result of the noise assessment, a sound insulation scheme and further mitigation measures have been defined in Section 8.0 to ensure all the criteria outlined in BS8233:2014 can be achieved and the amenity of the residents within the proposed 1st floor dwellings can be protected. Provided the sound insulation scheme and recommendations are installed and retained thereafter, the amenity of future residents can be fully protected, and all criteria should be achieved. Prior to the commencement of any works or implementation of the sound insulation works, the above assessment should be fully approved by the local authority.

APPENDIX A – List of Terms and Glossary

The following section of the report outlines a glossary of terms used in the assessment to assist the reader in understanding the assessment above, which is, by necessity, technical in nature.

Decibel DB - The decibel, often denoted as dB, is the logarithmic unit used to describe the magnitude of sound or noise levels. The typical range of sound pressure levels is from 0 dB, defined as the threshold of hearing, to 120 dB, defined as the threshold of pain.

Frequency Hz – As well as the decibel sound and noise, it is also measured and defined in frequency. Frequency or Hertz (Hz) is an expression of the number of cycles a sound wave will complete per second. Larger frequencies may be expressed in kilohertz (kHz). The typical range of human hearing is from 20 Hz to 20,000Hz; however, with age, the audible frequency range decreases in most humans.

A - Weighting – The A-weighting is the most commonly used weighting curve taken from IEC 61672:2003 and is applied to sound pressure level measurements. The A-weighting is applied to measured sound levels to account for the loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies.

LAeq - The A-weighted 'equivalent continuous noise level', which is an average of the total sound energy measured over any given time period. L_{Aeq} is the level of a continuous noise that has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. The A-weighting represents a curve that is applied to the measured noise levels to represent the way the human auditory system perceives sound.

LAfmax - The maximum A-weighted noise level that was recorded during the monitoring period using a fast time weighting. This acoustic parameter represents more transient sound levels within the acoustic environment, which may only occur for a few seconds or minutes.

LA10 - This is the A-weighted noise level exceeded for 10% of a given time period. This parameter is typically used to measure and predict road traffic noise.

LA90 - This is the A-weighted noise level exceeded for 90% of any given time period. Generally, this acoustic parameter represents the underlying background sound level in a given area and doesn't generally include transient or short-term noise events that may occur within the surroundings.

Sound Pressure – Sound pressure is the difference between the instantaneous pressure at a point in the presence of a sound wave and the static pressure of the medium. Sound pressure fluctuates due to refractions and compressions of air molecules.

Sound Reduction Index – The sound reduction index, denoted by the parameter 'R', is the laboratory-measured sound reduction given material or construction. R is measured in 1/3 octave band frequencies. The R_w sound insulation parameter stands for the weighted standardised sound reduction index and is a single-figure global rating of the sound insulation of a given material or construction.

APPENDIX B – Site Plans

Figure 8.0 – Site Plans

APPENDIX C – Internal Layout

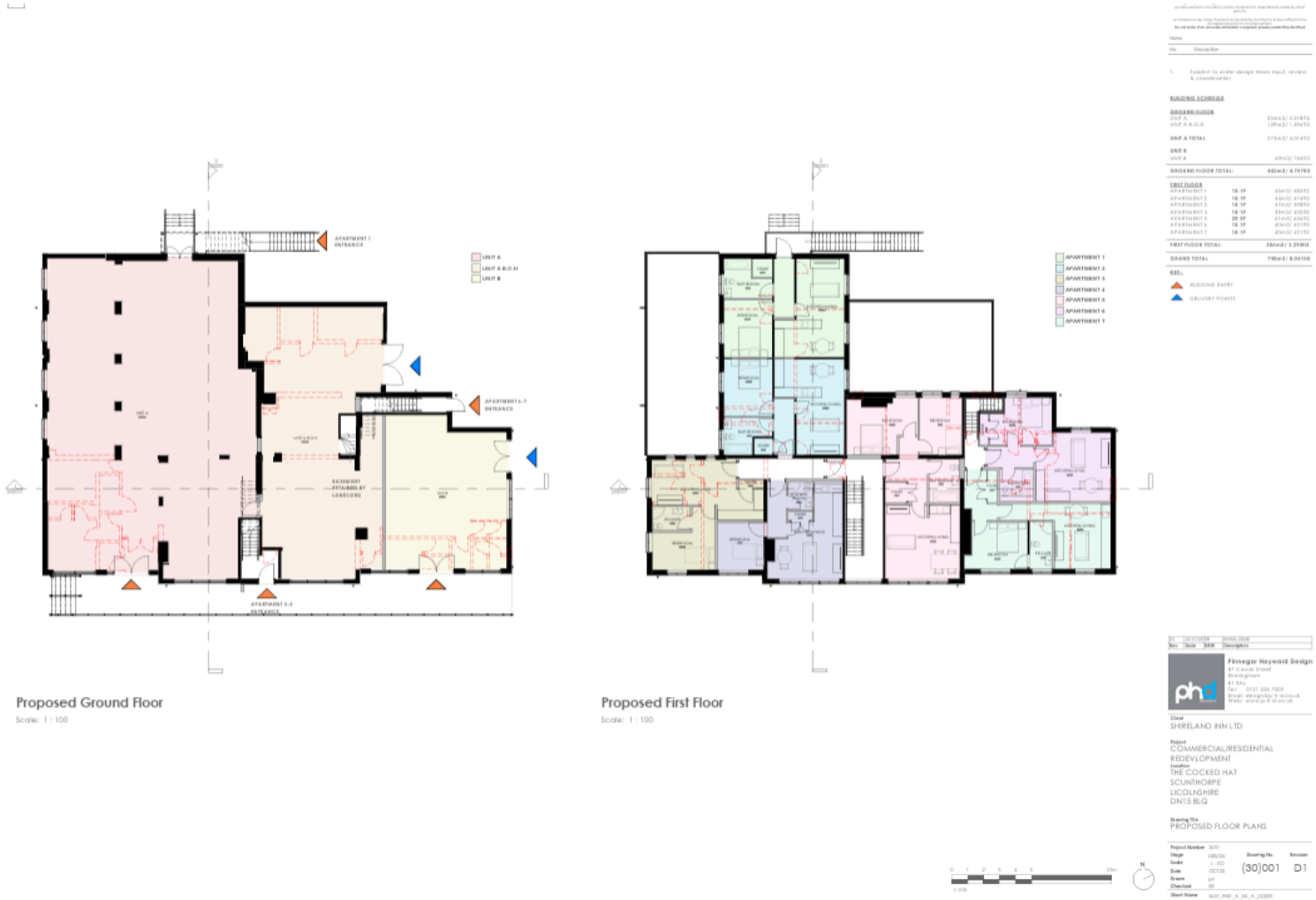

Figure 9.0 – Internal Layout

APPENDIX D – Calculations & Noise Contours

D.1 – BS8233 Noise Break-In Assessment

The tables below compare the noise level expected at each of the defined facade zones to the criteria outlined in BS8233:2014 in order to calculate the required sound reduction index of the proposed dwellings.

Location/Time Period	Façade Zone	Façade Noise Level (dBA)	BS8233 Criteria (dBA)	Required Sound Reduction (dB)
Bedroom / Living Room Day	Front Façade	59.0	35 dB $L_{Aeq,16hour}$	24.0 R_{w+ctr}
Bedroom Night		47.0	30 dB $L_{Aeq,8hour}$	17.0 R_{w+ctr}
Bedroom Night		65.0	45 dB L_{Afmax}	20.0 R_{w}
Bedroom / Living Room Day	Rear Façade	74.0*	35 dB $L_{Aeq,1hour}$	39.0 R_{w+ctr}
Bedroom Night		41.0**	30 dB $L_{Aeq,1hour}$	11.0 R_{w+ctr}
Bedroom Night		60.0	45 dB L_{Afmax}	15.0 R_{w}

Table 13.0 – BS8233 Façade Break-In Assessment

**BS4142 Delivery Rating Noise Level*

***Highest Measured 1 hour*

D.2 – BS8233 Open Window Assessment

The assessment below has been undertaken assuming a 13 dB attenuation from an open window to establish the internal noise levels. The AVO Guide indicates that at levels approximately 5 dB above the criteria, there would be a low risk of overheating. Document O of the Building Regulations also stipulates internal levels of 40 dB $L_{Aeq,8hours}$ or below and L_{Amax} levels not regularly exceeding 55 dB are sufficient when using open windows for the prevention of overheating.

BS8233 Open Window Assessment						
Location / Time Period	**Façade Zone**	**External Noise Level (dBA)**	**Internal Noise Level (dBA)**	**BS8233 Criteria (dBA)**	**Exceedance (dBA)**	**AVO Guide Risk Level**
Bedroom / Living Room Day	Front	59.0	46.0	35 dB $L_{Aeq,16hour}$	+11.0	Medium
Bedroom Night		47.0	34.0	30 dB $L_{Aeq,8hour}$	+4.0	Low
Bedroom Night		65.0	52.0	45 dB $L_{Afmax,8hour}$	+7.0	Low
Bedroom / Living Room Day	Rear	74.0*	61.0	35 dB $L_{Aeq,16hour}$	+26.0	High
Bedroom Night		41.0**	28.0	30 dB $L_{Aeq,8hour}$	-2.0	Negligible
Bedroom Night		60.0	47.0	45 dB $L_{Afmax,8hour}$	+2.0	Low

Table 14.0 – Open Window Assessment

**BS4142 Delivery Rating Noise Level*

***Highest Measured 1 hour*

D.3 – Noise Breakthrough Calculations

The following table presents the noise breakthrough calculation that has been undertaken to establish the required sound reduction of the floor/walls between the ground floor commercial and 1st floor residential sections of the development.

In order to provide a robust and conservative assessment, it is assumed that noise levels within the retail unit will not exceed 80 dB, which falls in line with the Control of Noise at Work Regulations 2005, and that appropriate internal criteria for the dwelling above would be 25 dBA. This falls in line with the BS8233 / World Health Organisation noise criteria for bedrooms during the nighttime, with a 5 dB penalty applied. This approach is understood to be robust as it is understood that the ground floor retail will operate in the daytime only.

Noise Breakthrough Assessment		
Description	**Wall Noise Level (dBA)**	**Floor Noise Level (dBA)**
Internal Noise Level in Retail	80.0	80.0
Adapted Internal Bedroom Criteria Night	25.0	25.0
Sound Reduction Required to Achieve Criteria ($D_{nt,w+ctr}$)	55.0	55.0

Table 15.0 – Noise Breakthrough Assessment

D.4 – Noise Model Contours

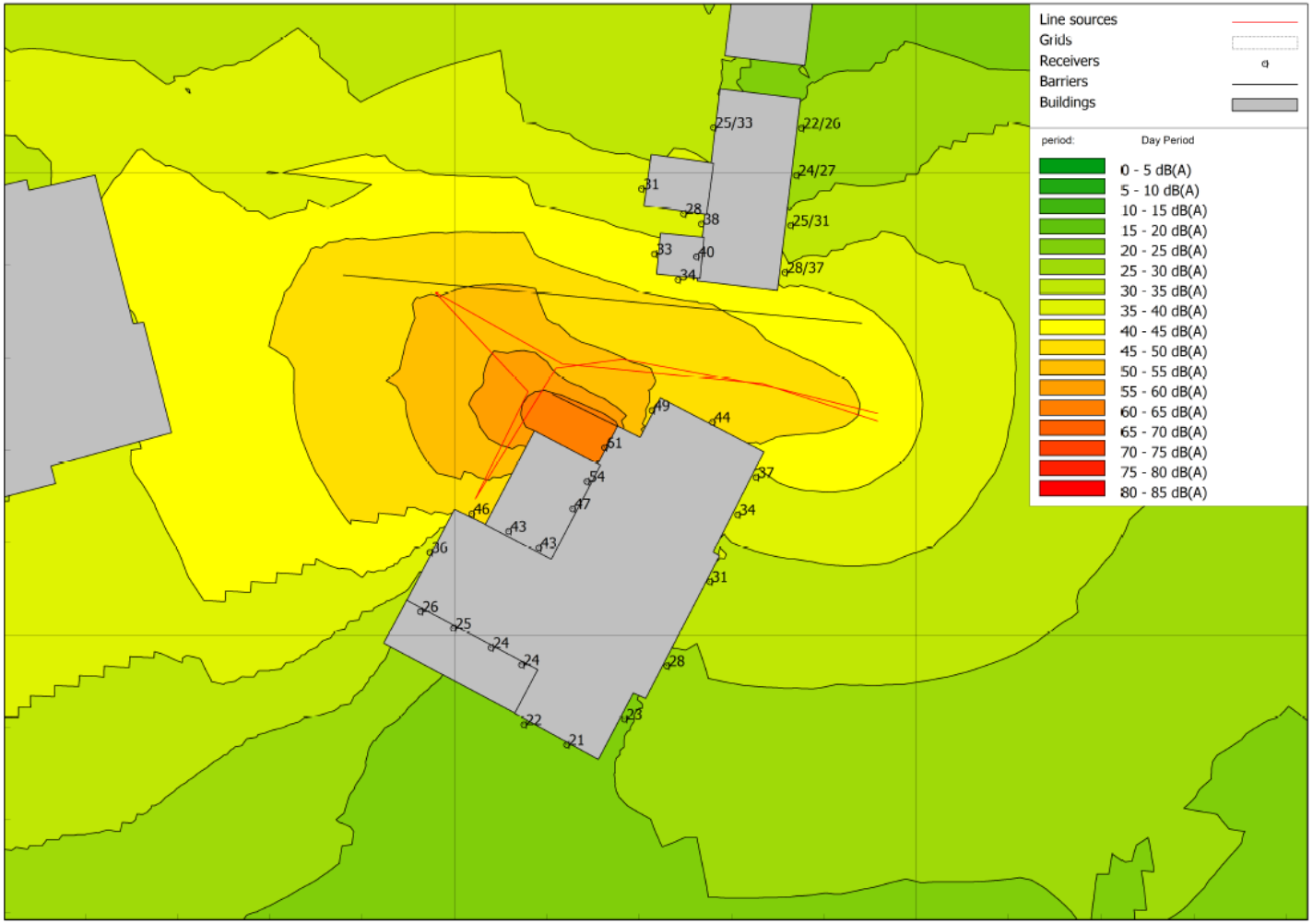

Figure 10.0 – Delivery Noise Contours $L_{Aeq,1hour}$ – 1.5m Contour Hight

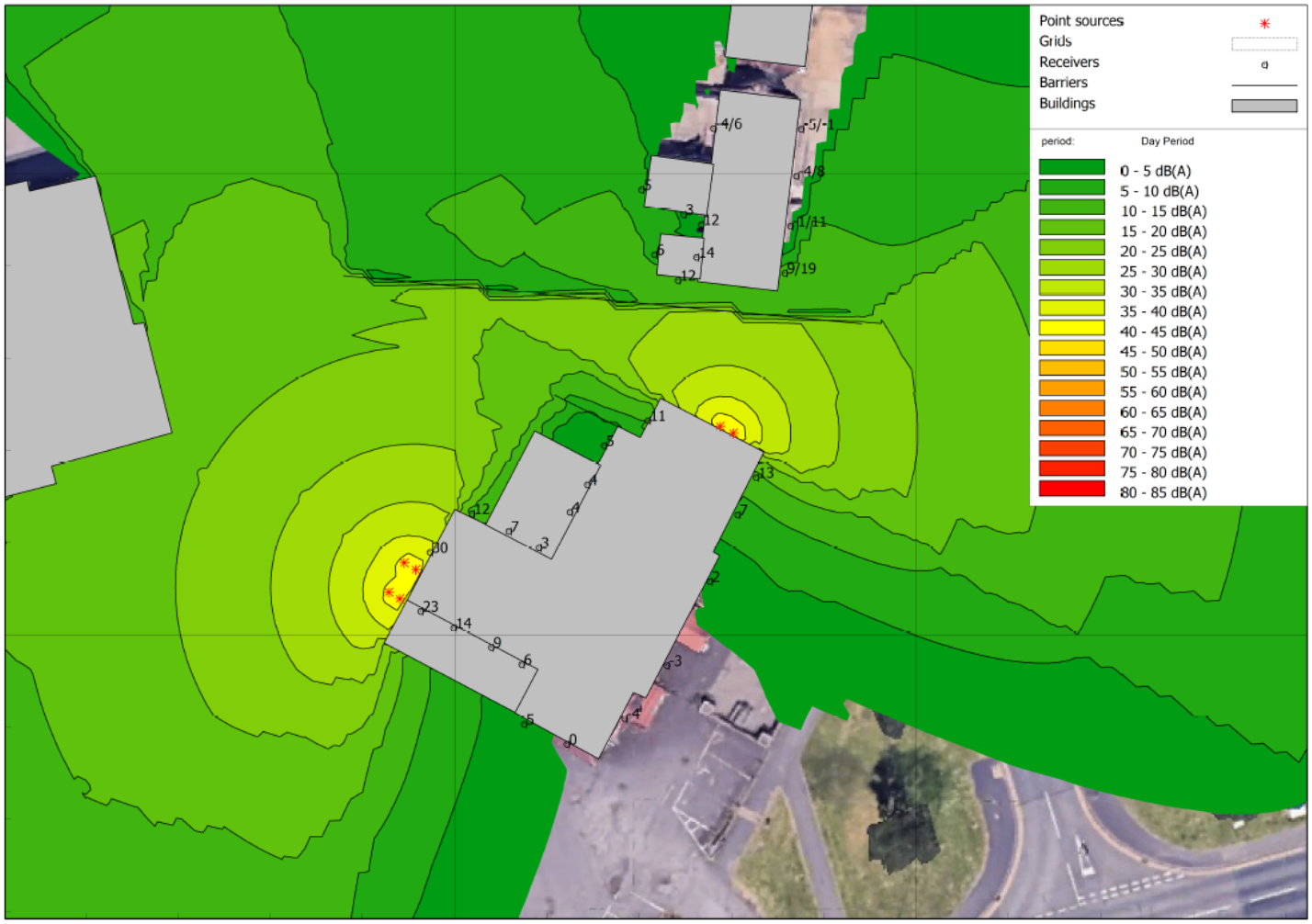

Figure 11.0 – Delivery Noise Contours $L_{Aeq,1hour}$ – 1.5m Contour Hight

D.5 – Noise Model Inputs

The specific delivery loading/unloading noise input noise levels have been calculated by the delivery noise SEL data. The input sound power level has been calculated for the SEL levels of individual operations using the following equation:

$$L_{Aeq,t} = SEL + 10log(1/T) + 10log(N)$$

Where: T = Assessment reference period and N = The number of operations

Activity	SEL @10m (dB)	No. of Occurrences	$L_{Aeq1hour}$ at 10m (dB)	$L_{Aeq,1hour}$ at 1m (dB)	Cumulative $L_{Aeq1,\ hour}$ at 1m (dB)	L_{wA} (dB)
Unloading Cages onto lift	71.0	10.0	45.0	65.0	74.0	82.0
Lift up	73.0	10.0	47.0	67.0		
Lift Down	71.0	10.0	45.0	65.0		
Stock Moved to Store	78.0	10.0	52.0	72.0		

Table 16.0 – Delivery Loading Noise Level Inputs

Description	Lp at 3m	L_{wA}	Distance in and out (m)	On-Time Per Hour (mins)	Time Corrected L_{wA} (dB)
HGV Manoeuvring	69.0	87.0	105	3	74.0

Table 17.0 – HGV Noise Level Inputs

Mechanical Plant Noise Model inputs can be seen in the table below:

Description	Make & Model	L_{wA} per unit	No. of units	Enclosure Attenuation (dBA)	L_{wA} Sound Power (dBA)
AC Units	Mitsubishi PUZ-ZM140YKA	71.0	2	-22.0	49.0
AC Units	Mitsubishi PUZ-ZM140YKA	71.0	4	-23.0	48.0

Table 18.0 – Plant Noise Level Inputs

Specifications Table for RZAG-NV1

					RZAG71N7V1B	RZAG71N2V1B	RZAG100N7V1B	RZAG100N2V1B	RZAG125N7V1B	RZAG125N2V1B	RZAG140N7V1B	RZAG140N2V1B
Dimensions	Unit		Height	mm	870	870	870	870	870	870	870	870
			Width	mm	1100	1100	1100	1100	1100	1100	1100	1100
			Depth	mm	460	460	460	460	460	460	460	460
Weight	Unit			kg	81	81	85	85	95	95	95	95
Compressor	Type				Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor	Hermetically sealed swing compressor
Operation range	Cooling	Ambient	Min.	°CDB	-20	-20	-20	-20	-20	-20	-20	-20
			Max.	°CDB	52	52	52	52	52	52	52	52
	Heating	Ambient	Min.	°CWB	-20	-20	-20	-20	-20	-20	-20	-20
			Max.	°CWB	18	18	18	18	18	18	18	18
Sound power level	Cooling			dBA	64	64	66	66	69	69	70	70
	Heating			dBA					68 (1)	68 (1)	71 (1)	71 (1)
Sound pressure level	Cooling		Nom.	dBA	46	46	47	47	49	49	50	50
	Heating		Nom.	dBA	48	48	50	50	52	52	52	52

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