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ACOUSTIC REPORT

for

PROPOSED EXTENSION TO EXISTING HATCHERY,

at

PD HOOK (HATCHERIES) LTD,
GUNNESS HATCHERY,
STATION ROAD,
SCUNTHORPE,
DN15 8SU

Date of visits:	28th April - 4th May 2022
Date of report:	14th July 2022
Prepared for:	Acorus Rural Property Services Ltd
Prepared by	David Garritt, BEng, MIOA

Members of the Association of Noise Consultants (ANC) & Institute of Acoustics (IOA)
Originally established in 1981. Company number 4688174.

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1.0 Introduction

PD Hook operate an existing hatchery at Station Road, Gunness, Scunthorpe. A planning application is being submitted for an extension to the premises that includes four areas that adjoin the existing building and two new small buildings.

As part of this application, the Local Planning Authority have requested an acoustic survey is submitted to predict sound from the new extension as received at the nearest dwellings. The applicants have commissioned this survey in response to this request.

1.1 Summary Conclusions

The context of the site is that it lies in a mainly mixed area with some well established dwellings and several similarly well established industrial premises. The details of the nearest receptors are given in the table below.

Dwelling	Grid Ref	Distance to Site Centre	Elevation
Dwelling to North (Wharfedale Close)	SE 84339 10901	115 m	5 m
Dwelling to South (Burringham Road)	SE 84213 10634	185 m	5 m
Dwelling to West (Above Ironstone Wharf)	SE 84219 10843	125 m	6 m

Long duration, unattended background sound measurements were taken outdoors on land in the garden of the managers bungalow located at the Hatchery site entrance. This position is likely to be subject to similar environmental background sound as the nearest dwellings and enjoys a sheltered location from immediately adjacent road traffic sound.

The typical background sound levels were measured as:

Weekday daytime 07.00 – 19.00	49 dB $LA_{90,15min}$
Weekend daytime 07,00 – 19.00	48 dB $LA_{90,15min}$
Evening 19.00 – 23.00	43 dB $LA_{90,15min}$
Night Time 23.00 – 07.00	38 dB $LA_{90,15min}$

The reasonable worst case specific sound levels from sources associated with the hatchery extension are:

Specific Sound Level, dB LA_{eq}

Dwelling	Specific Level at Receptor, dB $LA_{eq,t}$
Dwelling to North	34.4
Dwelling to South	28.1
Dwelling to West	33.4

After applying corrections or penalties to take account of the character of sound as received at the nearest dwellings, the BS 4142 Rating Levels are:

BS 4142 Rating Level, dB

Dwelling	Rating Level, Day & Evening dB	Rating Level, Night dB
Dwelling to North	34	36
Dwelling to South	28	28
Dwelling to West	33	34

The comparisons between the Rating Levels and the measured background levels are shown below. Negative values (also shown in red) indicate where Rating Levels are below typical background sound levels.

Dwelling	Weekday	Weekend	Evening	Night
Dwelling to North	-15	-14	-9	-2
Dwelling to South	-21	-20	-15	-10
Dwelling to West	-16	-15	-10	-4

The Rating Level is predicted at or below the existing background sound level at all times.

The context of the area means that some sound from industrial sources may be anticipated at the nearest dwellings and some small exceedances of Rating Level above background may be deemed acceptable.

The predictions show that it is expected that the Rating Level will remain below the typical background sound level at all dwellings at all times. This assumes that the model and operating mode any new main building fans will not significantly exceed a sound power level of 75 dBA and that the duct section will be square. If any preferred new fans will have sound power level at or above 80 dBA or details differ from those given in this report, then it is recommended that further detailed calculations are undertaken by us once precise details and locations are known.

It is concluded that the proposed extension should cause low impact at all dwellings at all times and so noise impact from the proposals should be in compliance with the aims of the National Planning Policy Framework.

2.0 Standards and Guidance Documents

Central Government policy sets the overarching objectives for all development. The most appropriate quantitative document for the assessment of noise impact from this site is BS 4142 : 2014 'Methods for rating and assessing industrial and commercial sound.' These policies and documents are outlined in the next subsections of this report.

2.1 Central Government Policies

The government's planning policies are described in the National Planning Policy Framework (NPPF) which includes consideration of potential adverse impacts of noise caused by new development. The NPPF makes reference to the Noise Policy Statement for England (NPSE) which includes an Explanatory Note describing three incremental categories of noise impact:

- No Observed Effect Level (NOEL) being the situation below which no effect caused by noise can be detected,
- Lowest Observable Adverse Effect Level (LOAEL) being the situation above which adverse effects caused by noise can be detected,
- Significant Observed Adverse Effect Level (SOAEL) being the level above which significant adverse effects caused by noise occur.

Stated objectives of the NPSE are:

1. Avoid significant adverse impacts, usually interpreted as calling for sound levels above SOAEL to be avoided.
2. Mitigate and minimise adverse impacts, usually interpreted as calling for noise mitigation to be used within the bounds of practicality for situations between LOAEL and SOAEL.
3. Where possible contribute to the improvement of health and quality of life, usually interpreted as calling for noise reductions to be made where possible for situations between NOEL and LOAEL.

Although introducing these subjective concepts for the assessment of impact, the NPPF and NPSE documents do not provide quantitative values against which the suitability of a site for development can be assessed in terms of sound levels.

2.2 **Methods of BS 4142: 2014**

The noise rating method of BS 4142 is to measure or predict the outdoor sound levels at noise-sensitive premises during the emission of noise from the industrial or commercial premises under investigation and measure the background sound level typical of that location in the absence of the industrial or commercial noise. A correction factor is applied if appropriate to the measured levels for some acoustic features that affect acceptability, described as tonal, impulsive or other characteristic features which are distinctive against the residual acoustic environment. The corrected measured level, the Rating Level, is compared with the background.

- If the Rating Level exceeds the background by around +10 dB or more then this is an indication of a significant adverse impact, depending on the context.

- A difference of around +5 dB is an indication of an adverse impact, depending on the context.

- The lower the Rating Level is relative to the background, the less likely it is that the industrial / commercial source will have an adverse impact.

- Where the Rating Level does not exceed the background, this is an indication of the industrial / commercial source having a low impact, depending on the context.

Situations where a noise impact assessment may need to be modified due to the context include those where:

- The residual sound levels in the absence of the industrial / commercial source are particularly high or low.

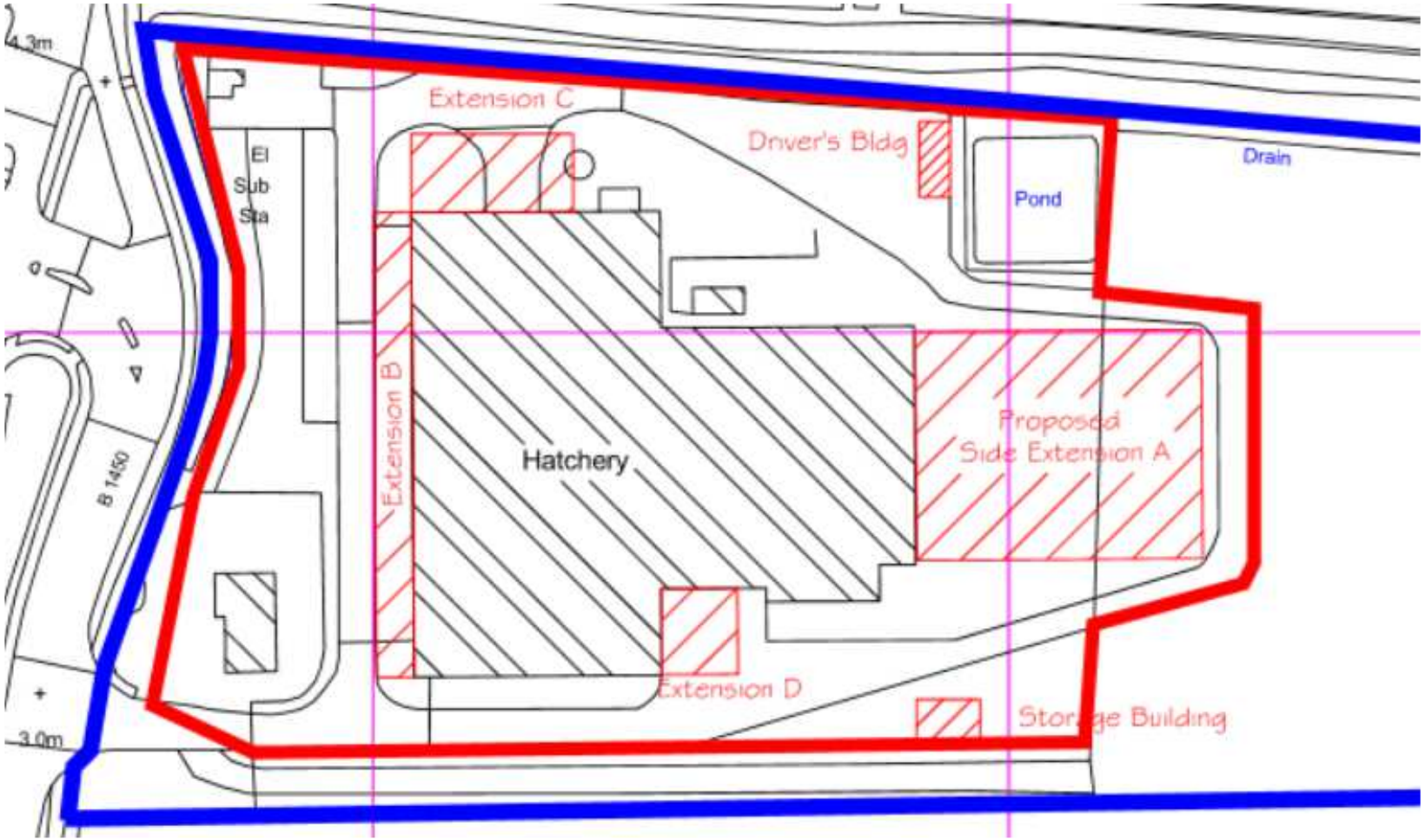
- The character of the residual sound has acoustic features comparable to those of the industrial / commercial sound.

- The sensitivity of the receptor is significant, and whether residential properties incorporate design measures that secure good internal or outdoor acoustic conditions.

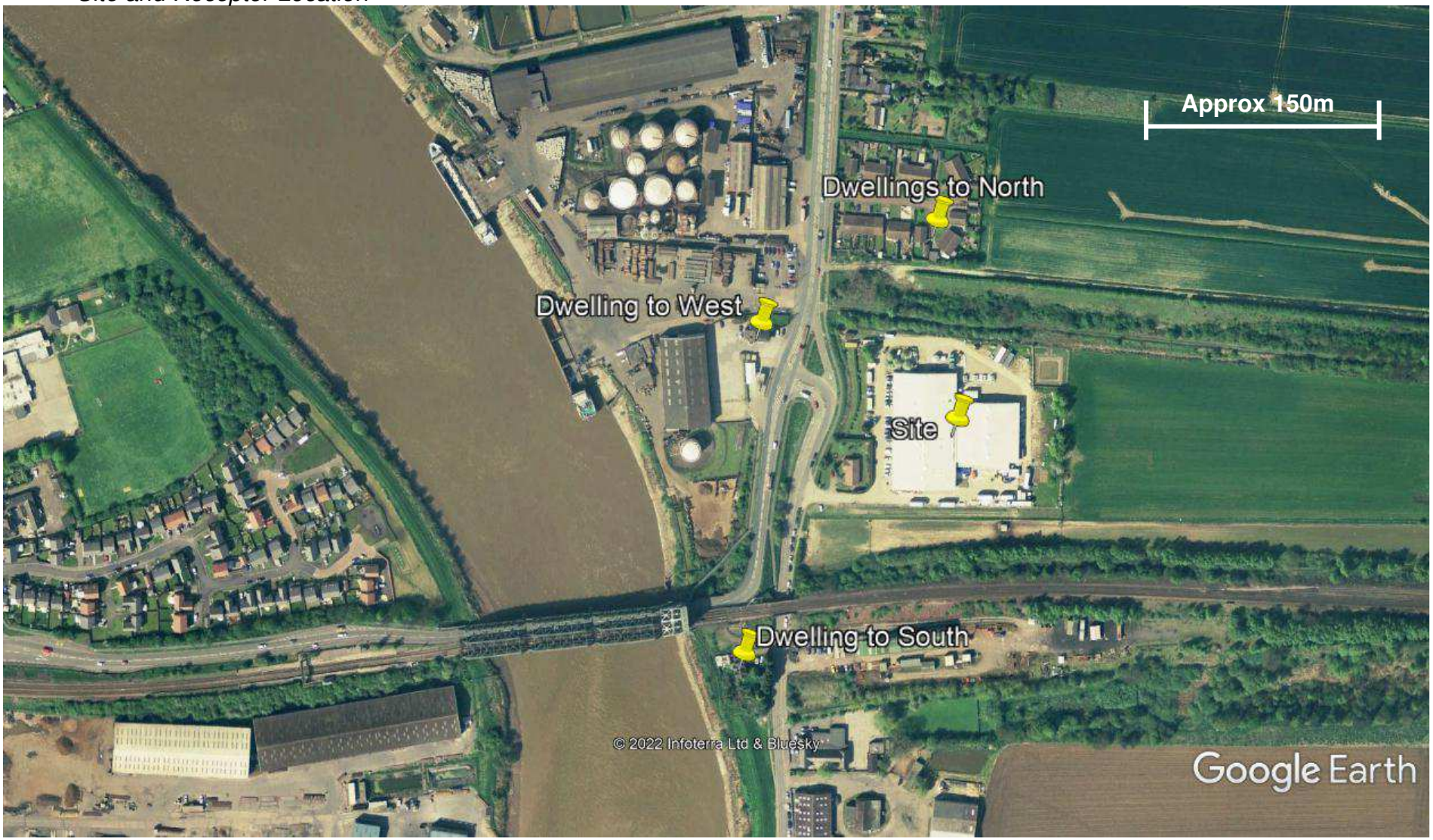
Section 12 of BS 4142 lists information that is to be reported in an assessment. This report follows the same order as the standard.

3.0 **Site Details**

Plan of Proposed New Extension



Site and Receptor Location



4.0 BS 4142 Assessment

Section 12 of BS 4142 lists the information that should be reported in an assessment. For ease of reference and completeness of information, this section of the report follows the same order as BS 4142 section 12.

(a) Qualifications and Experience

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

David Garritt has been a member of the Institute of Acoustics since 2005 and holds an honours degree in Electronic and Computer Systems Engineering.

David teaches acoustics at post graduate level on a part time basis for the Institute of Acoustics and sits on the ANC Communications and PR Committee. David has extensive experience in the preparation of surveys involving industrial sound sources directly comparable to the subject of this report.

(b) Sources Being Assessed

The sources associated with the proposed extension are described in this section, including details of measurements taken on the existing site or other previous sites to provide source data for the assessment.

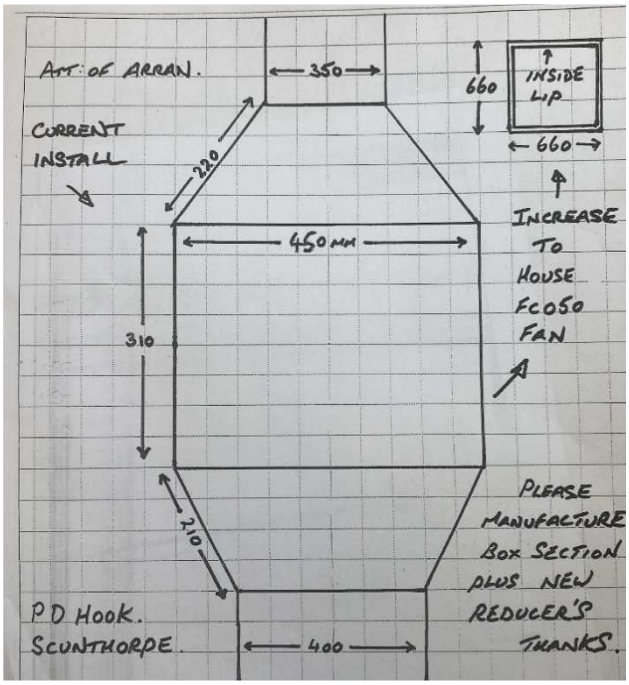
Main Building Fans

There are six main fans currently installed within the building that ventilate to the roof ridge. It is likely that the proposed extension will either require upgrade of the existing fans or the addition of six new fans. The fans are all internal to the building with square section ductwork leading to terminations at roof ridge level. A diagram of the previously installed fans is shown to illustrate the principle. Calculations of fan sound have been undertake using these dimensions and details.

For the purpose of assessment, contributions from six additional / new fans has been included in the predictions to provide the reasonable worst case scenario.

The fans used are likely to be Ziehl – Abegg FC0 series FC035 or FC050 axial models. The supplied datasheets give a wide range of sound power levels (SWL) depending on exact model and duty.

The majority of fan models and duties show sound power levels in the range 55 – 75 dBA SWL. There are also a smaller number of instances of sound power levels of up to 80 dBA SWL and two instances that show sound power levels up to 85 dBA SWL. The predictions in this report are undertaken based on fan sound power levels of 75 dBA and likely locations to provide the reasonable worst case within the majority of fan and duty specifications.



The predictions contained later in this report suggest that fan sound power levels of up to 80 dBA would be entirely acceptable. In the first instance it would be prudent to avoid the configurations where the sound power level is listed as being above 80 dBA. If the operation / design team wishes to use a fan configuration with sound power levels above 80 dBA, it is recommended that further calculations are undertaken by us with full details of the proposals to accurately predict the noise impact.

Extension A

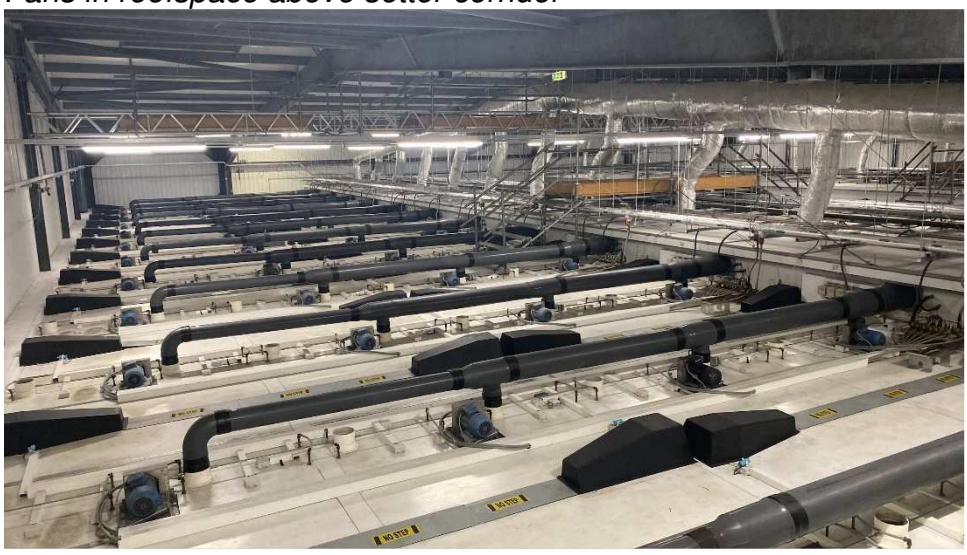
The largest of the building extensions is Extension A, which is to be a setter corridor. The corridors contain several small rooms / enclosures where the process of egg hatching is undertaken and replicates the natural egg setting process.

There is a series of approximately 160no 1.5kw 90 cage 400v motor units in the roof space above the setter corridors.

The motor units in the extension will be the same in type and layout as at the existing facility. Source data was obtained by directly measuring sound levels in the setter corridor and in the roofspace containing the motor units (which was easily accessible), taken as roaming measurements around the spaces.

Setter Corridor

Fans in roofspace above setter corridor



<u>Extension B</u>

Extension B is a long narrow extension to the existing building to provide office and canteen facilities. To provide a reasonably worst case assessment, the predictions are based on measurements taken by us at the Fancie Canteen and Bakery in Sheffield on 14th March 2014.

Roaming measurements were taken around the interior of the eating area of this commercial premises as part of a previous consultancy exercise. Tables were occupied by diners and the premises was generally busy. Use of these measurements is thought to represent the reasonable worst case

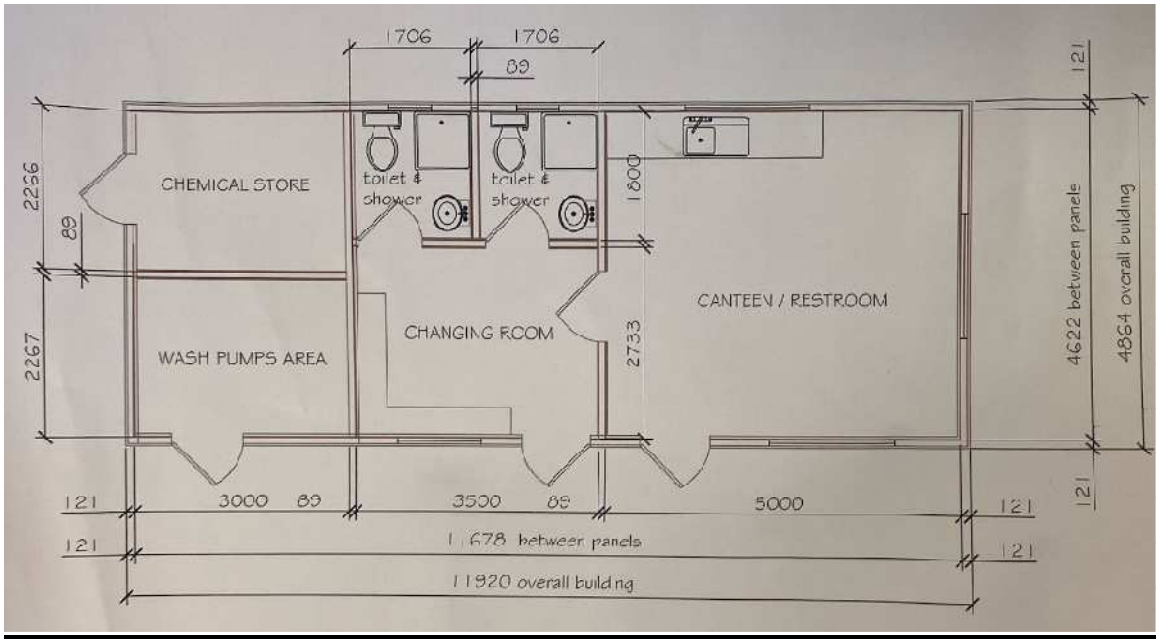
internal sound level of the canteen, which is likely to be the part of Extension B with the highest sound level.

Extension C & D

A new 'Egg Room' will be provided in Extension C to the north of the existing building and a new Basket Room will be provided to the south. Sound level measurements were taken in the areas of the existing premises that most accurately replicate the use of these new areas.

Drivers Building

A new Drivers Building will be provided to the north east of the site, a plan of which is shown below. The sound output from this building is likely to be relatively low, but to provide some quantitative assessment the source sound levels detailed above for canteen areas is used and is likely to represent the worst case scenario for this building.



Overall Source Sound Levels

The source sound levels used in this assessment are shown in the table overleaf

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000		dBA
Inside Setting Corridor (Ext A)	75.9	67.3	67.1	67.9	69.1	67.2	64.4	51.2	55.0		**71.5**
Roof Void of Setting Corridor (Ext A)	58.3	58.0	61.0	61.1	77.8	77.3	77.1	62.7	66.7		**81.9**
Office & Canteen (Ext B)		67.0	69.0	70.0	76.0	74.0	70.0	66.0	57.0		**78.1**
Egg Room (Ext C)	77.7	70.6	73.0	68.7	67.2	63.2	64.1	55.6	51.0		**70.0**
Basket Room (Ext D)	63.7	62.3	63.0	64.6	60.3	58.8	62.0	66.5	49.9		**69.8**
Drivers Building		67.0	69.0	70.0	76.0	74.0	70.0	66.0	57.0		**78.1**
Main Building Fans* (Sound Power)		94.2	82.1	76.6	71.2	67.0	65.2	60.0			**75.0**

**spectra for main building fans obtained by applying typical spectral corrections to the overall dBA sound power level quoted by the manufacturers*

2. The site may operate 24 hours per day, 7 days per week. It has been assumed that the noise output from the new buildings is caused by all elements of the source spectra continuously and simultaneously at all times of day and night to provide the reasonable worst case scenario.

3. It is assumed that all sources operate continuously for the full assessment period of one hour during the daytime and 15 minutes at night.

4. All machinery and procedures / operations were measured at their normal full operating duty.

5. The constructions and dimensions of the building extensions are:

   Drivers Building, 11.9m x 4.9m, polyester coated profile steel
   Extension A, 45.0m x 36.0m, composite panels
   Extension B, 73.1m x 5.9m, composite panels
   Extension C, 12.5m x 13.5m, single skin profile steel
   Extension D, 29.1m x 12.3m, composite panels

   The sound reduction indices of the building materials are taken from data held on file for the single skin profile steel and test data published by Tata Steel for typical composite cladding systems. The sound reduction indices are:

Sound reduction indices, dB

Construction / Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000
Composite Cladding System	13	13	18	19	24	24	28	45	48
Single Skin Profile Steel	7	11	15	18	23	22	24	30	36

(c) **Subjective Impressions**

Source sound levels were taken at distances or indoor areas where the sources under test were dominant.

Subjective impressions of the existing noise climate at the site were that it was dominated by road traffic with some sporadic audibility of other indistinct mixed sources including some contributions from various industrial premises. The overall effect was of a mixed soundscape with no immediately dominant sources other than road traffic, as may be expected for the type of area.

(d) **Existing Context**

The context of the site is that it lies in a mainly mixed area with some well established dwellings and several similarly well established industrial premises.

Given the nature of the area and existing soundscape, it may be anticipated that some contributions from the hatchery may be audible at the nearest dwellings, though there was none noted during our visits to site.

The context of the area means that a small exceedance of Rating Level above background may be acceptable, but the sensitivity of residents to newly introduced, dominant or sustained industrial sound should not be overlooked.

(e) **Measurement Locations**

The details of the nearest receptors are given in the table below.

Dwelling	Grid Ref	Distance to Site Centre	Elevation
Dwelling to North (Wharfedale Close)	SE 84339 10901	115 m	5 m
Dwelling to South (Burringham Road)	SE 84213 10634	185 m	5 m
Dwelling to West (Above Ironstone Wharf)	SE 84219 10843	125 m	6 m

The grid reference of the site centre is SE 84345 10783 and the elevation is 5m. Distances between each receptor and individual parts of the extension are given in the appendices of this report.

Many sound sources are located within the building at ground level. The motors for the setting corridor are located in the roofspace above the corridor. The main building fans are also located within the roofspace, but

the main sources are the terminations on the roof.

Barrier effect for sources where frequency spectra are available is calculated using the theory of Maekawa. There are no accurate cross section drawings available, so a nominal path difference of 0.1m is used in the Maekawa calculations, which is likely to be conservative.

For barrier effect of HGV movements where spectral data is not available, section D.3.2.2.1 of BS 5228 states that *'In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation. Subtract the attenuation from the value of LAeq calculated at the point of interest.'*

At the dwelling to the north, acoustic line of sight is assumed from all sources except Extension D at the opposite side of the existing building and HGVs that will generally operate to the south of the building.

At the dwelling to the south, barrier effect of all sources is provided by existing structures on site or the railway embankment that forms a bridge over Burringham Road.

For sources received at the dwelling to the west, the existing building or other structures provide barrier effect for extension A and D, also to most HGV movements. It is assumed that the roof of extension A (that houses the hatchery corridor motors) has line of sight to the dwelling to provide the reasonable worst case scenario.

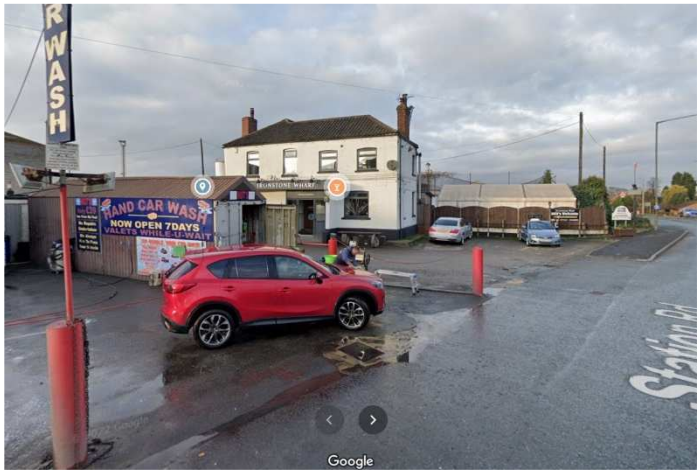
The majority of the surrounding land to dwellings is hard and reasonably flat, with some areas of grass / soft land a difference in elevation of approximately 0-1m. The correct formula for distance decay from a point source where the intervening ground between sources and receptor is hard is *Decay = 20 x log (Distance Ratio) dB.*

A Google Earth image showing the site and receptors is given in section 2 of this report, and street view screenshots of the dwellings are shown overleaf.

Dwelling to North

Dwelling to South

Dwelling to West (above Ironstone)



Site Managers Dwelling

Background Measurements

Long duration, unattended background sound measurements were taken outdoors on land in the garden of the managers bungalow located at the Hatchery site entrance. This position is likely to be subject to similar environmental background sound as the nearest dwellings and enjoys a sheltered location from immediately adjacent road traffic sound. This is similar to the situation at dwellings to the north and south. The dwelling to the west is likely to be more exposed to road traffic sound where background sound levels are likely to be higher (less onerous).

Shorter duration attended background sound level measurements were taken on public land immediately adjacent to the nearest dwellings for comparison and to provide additional data points. Background sound levels are described in section m) to follow the same order as section 12 of BS 4142: 2014.

(f) Instrumentation

Equipment Description	Type number	Manufacturer	Date of expiration of Calibration	Calibration Certificate Number
Sound Level Meter	2260 s/n 2409281	Bruel & Kjaer	07.10.2022	147227
Preamplifier	ZC 0026	Bruel & Kjaer	07.10.2022	147227
Sound Level Meter	XL2 TA s/n A2A-10019-EO	NTi Audio	25.08.2022	145408
Microphone	MK 224 s/n 210762A	Cirrus Research	20.08.2022	145404
Microphone	MK:224 s/n 212421D	Cirrus Research Plc	06.10.2022	147221
Calibrator	4231 s/n 2564324	Bruel & Kjaer	02.03.2023	A2013

(g) Operational Tests

1. The reference level of the calibrator is 94 dB SPL at 1000 Hz.

2. The meter readings with the calibrator before measurements was 94.0 dB SPL before and after the unattended monitoring measurements.

(h) Weather Conditions

The weather conditions during the outdoor sound survey are shown in the table below and were entirely suitable for the outdoor sound measurements.

Date	Wind Speed (ms)	Temperature (deg C)	Cloud cover (%)
28/04/2022	1-3	6-10	50-100
29/04/2022	0-3	5-12	50-100
30/04/2022	1-3	5-18	25-100
01/05/2022	1-4	9-14	50-100
02/05/2022	2-3	9-16	25-75
03/05/2022	1-3	8-12	25-75
04/05/2022	2-4	9-15	50-100

(i) Date and Time of Measurements

Background sound levels were monitored by unattended measurements from 17.00 on Thursday 28th April to 15.45 on Wednesday 4th May 2022. Source sound levels inside the existing facility were measured from approximately 16.10 on Wednesday 4th May 2022.

(j) **Measurement Time Intervals**

Background sound levels were measured over continuous 15 minute intervals in accordance with BS 4142: 2014. Measurements of specific source plant and operations were taken over time periods that allowed the measured results to settle to a constant value.

(k) **Reference Time Interval**

The reference time interval is 1 hour during the daytime and 15 minutes at night in accordance with 3.8 of BS 4142. The process is relatively constant and so there is no difference between 15 minute and 1 hour time average sound levels.

(l) **Specific Sound Levels**

The specific sound levels from the proposed new concrete batching plant as received at the nearest dwellings are shown in the table below as time averaged LA_{eq} quantities as required.

Specific Sound Level, dB LA_{eq}

Dwelling	Specific Level at Receptor, dB $LA_{eq,t}$
Dwelling to North	34.4
Dwelling to South	28.1
Dwelling to West	33.4

The methods of determining the specific sound levels of the sources are in accordance with section F.2.1 of BS 5228-1 which describes methods of quantifying the sound levels of sources on a site. Three alternative means of obtaining the necessary data on source sound levels are described in BS 5228 as:

(a) Carry out sound measurements on similar plant items operating in the same mode as those proposed at the application site.

(b) Use data on typical sound levels of various plant items as provided in Annexes C and D of BS 5288-1.

(c) Use data on the maximum permitted sound levels of plant items under EC Directive 2000/14/EC[11].

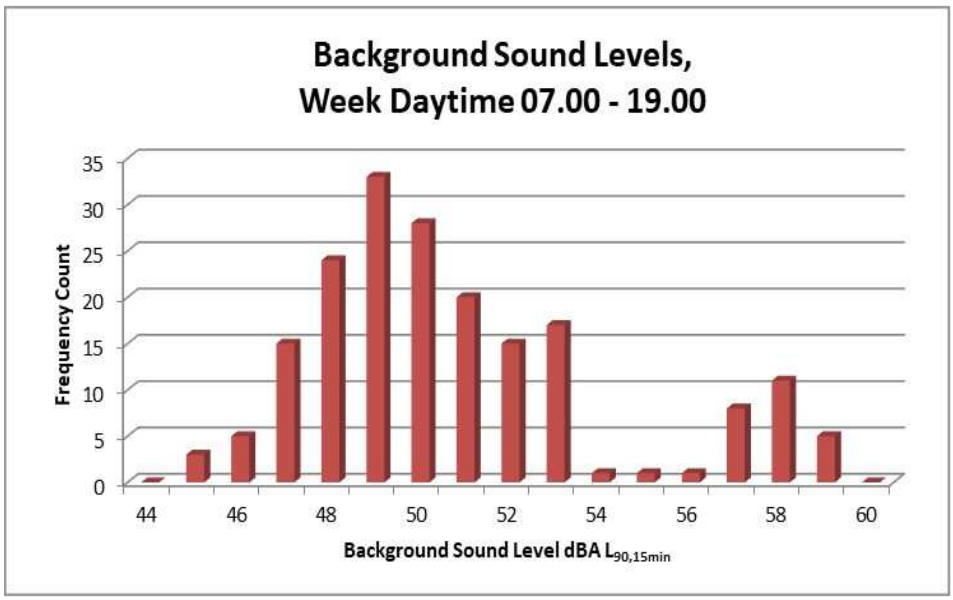
Section F.2.1 advises that "The method given in item (a) is likely to provide the most accurate prediction". Method a) has been used since appropriate

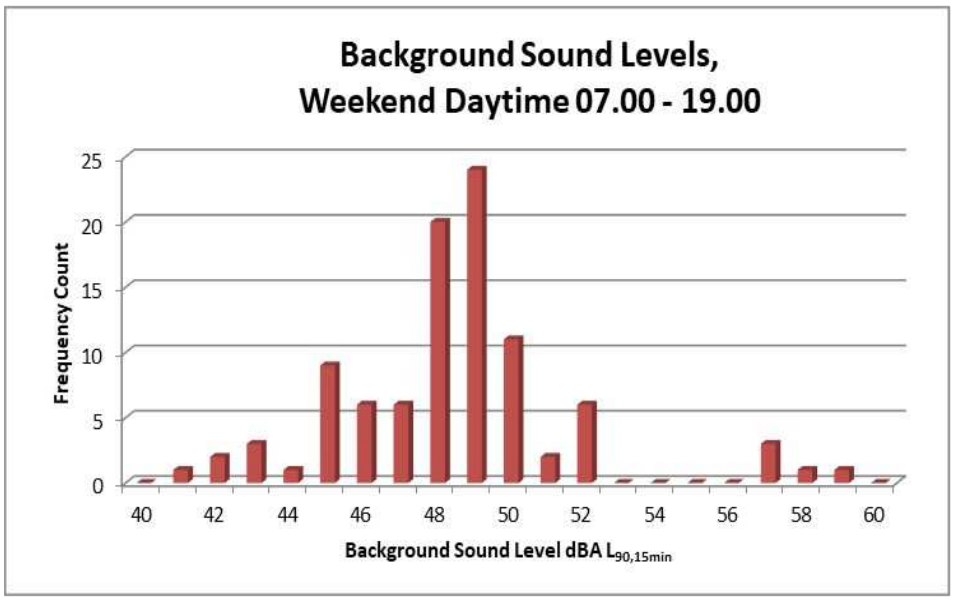
similar existing sources could be directly measured, minimising uncertainty in the assessment of source levels.

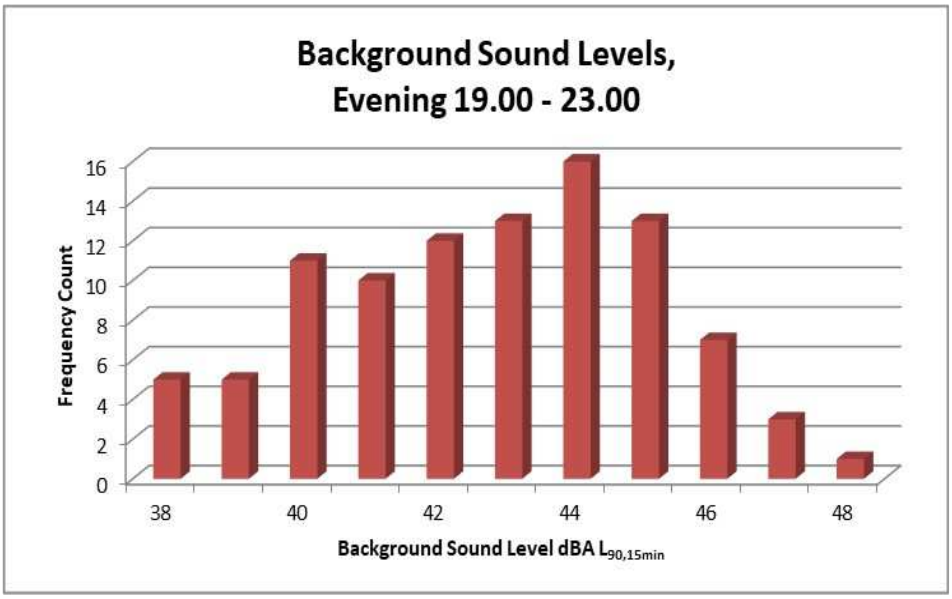
(m) Background Sound Level

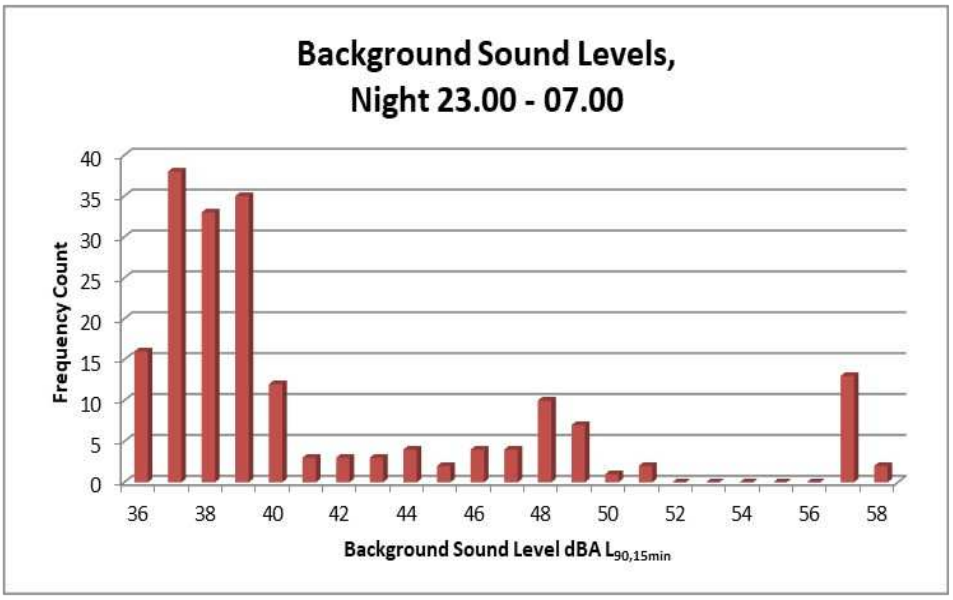
Long duration unattended measurements of background sound were taken at site using a Type I calibrated sound level meter. A graphical summary of the measured sound levels that are used in the assessment is shown below and overleaf for different time and day periods.

Full measurement data is included in the appendices of this report.









Our subjective impressions on site were that this location was not unduly affected by sound from the existing hatchery. This appears to be borne out in the measured levels, which follow a distribution that may be expected from dominant environmental sound, with the exception of a small number of significantly higher sound levels that are excluded from the assessment of background sound. These higher sound levels may have been caused by activity at the hatchery site or sound at the occupied managers dwelling.

It is concluded that the typical background sound levels are:

Weekday daytime 07.00 – 19.00	49 dB $LA_{90,15min}$
Weekend daytime 07,00 – 19.00	48 dB $LA_{90,15min}$
Evening 19.00 – 23.00	43 dB $LA_{90,15min}$
Night Time 23.00 – 07.00	38 dB $LA_{90,15min}$

Short duration attended sound levels measured outside the dwellings to the north and south show measurements similar to or slightly above (ie. less onerous for the assessment) than those measured during the unattended survey. It can be concluded that the results of the long term unattended survey are suitable for use in the BS 4142 assessment. Full results are given in the appendices of this report.

(n) Rating Levels

The sound sources at the proposed extension are generally not impulsive or intermittent, especially given the low level of predicted audibility.

Third octave analysis of source measurements shows the presence of some tones. Generally these will not be perceptible at the nearest dwellings due to the low predicted audibility. The possibility remains that some tonal elements may be just perceptible when background sound levels fall at night, so the following corrections / penalties are applied at night only:

- Dwelling to the north +2 dB to setting corridor roof void (motor) transmitted through the gable end and through the roof. The possibility of a barely perceptible tone from the roof fans has also been allowed for by applying a +2 dB correction.

- Dwelling to the west, + 2 dB for sound transmitted through the roof of the setting corridor.

It remains fairly unlikely that any tones will be significantly perceptible, but these corrections allow for the reasonable worst case scenario.

The BS 4142 Rating Levels with the site in its current condition are:

BS 4142 Rating Level, dB

Dwelling	Rating Level, Day & Evening dB	Rating Level, Night dB
Dwelling to North	34	36
Dwelling to South	28	28
Dwelling to West	33	34

(o) Background Comparisons

The noise impact predicted by the methods of BS 4142 is ascertained by comparing the Rating Level to background as described earlier in this report.

The comparisons between the Rating Levels and the measured background levels are shown below. Negative values (also shown in red) indicate where Rating Levels are below typical background sound levels.

Dwelling	Weekday	Weekend	Evening	Night
Dwelling to North	-15	-14	-9	-2
Dwelling to South	-21	-20	-15	-10
Dwelling to West	-16	-15	-10	-4

The initial conclusion of the BS 4142 assessment without taking context into account is that Low Impact is predicted at all dwellings at all times.

(p) BS 4142 Conclusions

The Rating Level is predicted at or below the existing background sound level at all times.

The context of the area means that some sound from industrial sources may be anticipated at the nearest dwellings some small exceedances of Rating Level above background may be deemed acceptable.

The predictions show that it is expected that the Rating Level will remain below the typical background sound level at all dwellings at all times. This assumes that the model and operating mode any new main building fans will not significantly exceed a sound power level of 75 dBA and that the duct section will be square. If any preferred new fans will have sound power level at or above 80 dBA or details differ from those given in this report, then it is recommended that further detailed calculations are undertaken by us once precise details and locations are known.

It is concluded that the proposed extension should cause low impact at all dwellings at all times.

(q) Uncertainty

It is a requirement of BS 4142: 2014 that the level of uncertainty in data and calculations should be considered. These uncertainties and how they have been minimised are considered in this section.

Sound data for the sources has been taken from measurements taken by us directly at the existing hatchery. Manufacturers datasheets have been used for the assessment of potential new main building fans. All assumptions have been made on a reasonable worst-case basis.

The procedures used for the calculation of specific sound levels at the nearest noise-sensitive receptors are based on basic, fundamental principles of acoustics. Sound decay with distance from the sources has been calculated using the principles and methods recommended in BS 5228 and by the methods of Rathe. The addition and subtraction of sound levels was done logarithmically on an energy basis, which is the correct method for decibel calculations. It is anticipated that this method would be considered by other suitably qualified acousticians to be relevant, correct and appropriate for this survey and is a method examined by the Institute of Acoustics on their post graduate diploma course.

All sound level measurements were taken with a calibrated type 1 sound level meter, which represents the most accurate type of SLM available. Sound levels were measured to the nearest 0.1 dB, time periods were measured and recorded to the nearest second. No rounding was done in any calculations, the only rounding being done on final results, in compliance with BS 4142 : 2014. The sound level meter was calibrated before and after each survey period and no drift was apparent.

Background sound data was obtained using long duration unattended measurements and the results analysed to ensure applicable and representative data is used in the assessment of noise impact.

It is concluded that the uncertainty in this survey has been minimised as far as possible and is believed to be below the level at which it would have an impact on the assessment conclusions contained in this report.

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APPENDIX 1 – OUTDOOR SOUND LEVEL MEASUREMENTS

Results of attended monitoring

Date	Time	LAeq	LAFmax	LAFmin	LAF10%	LAF90%
[YYYY-MM-DD]	[hh:mm:ss]	[dB]	[dB]	[dB]	[dB]	[dB]
Dwelling to North						
28/04/2022	16:28	55.3	67.6	46.4	59.8	50.0
04/05/2022	17:15	56.9	68.6	45.7	60.4	50.8
04/05/2022	17:30	55.8	66.9	49.2	61.0	51.4
04/05/2022	17:45	55.5	63.8	48.2	60.1	50.6
Dwelling to South						
28/04/2022	15:22	57.2	72.4	46.8	61.3	49.3
28/04/2022	15:37	58.3	69.8	46.2	60.9	49.5
28/04/2022	15:52	58.0	70.1	48.0	61.8	50.8
28/04/2022	16:07	58.5	73.6	48.6	61.5	50.3

Results of unattended monitoring

Date	Time	LAeq	LAFmax	LAFmin	LAF10%	LAF90%
[YYYY-MM-DD]	[hh:mm:ss]	[dB]	[dB]	[dB]	[dB]	[dB]
28/04/2022	17:00:00	55.6	71.7	45.1	59	49.8
28/04/2022	17:15:00	53.3	67	46.3	55.4	49.7
28/04/2022	17:30:00	56.2	72.1	45.1	57.9	49.5
28/04/2022	17:45:00	52	59.7	44	54.6	47.7
28/04/2022	18:00:00	56.6	69.5	44	58.3	48.8
28/04/2022	18:15:00	52.7	65.4	43.9	55.2	48
28/04/2022	18:30:00	50.8	59	43.2	53.7	45.8
28/04/2022	18:45:00	53.3	68.9	42.8	55	46.7
28/04/2022	19:00:00	52.9	69.4	40.7	54.4	44.7
28/04/2022	19:15:00	51.3	69.4	40.8	54	43.8
28/04/2022	19:30:00	52.2	67.2	41.2	55.8	45
28/04/2022	19:45:00	51.1	70.1	40	53.3	44.9
28/04/2022	20:00:00	51	65.8	41.2	53.4	44.8
28/04/2022	20:15:00	51	65.2	41.2	53.9	43.7
28/04/2022	20:30:00	48.9	59.7	39.7	52.1	42.9
28/04/2022	20:45:00	51.4	64.9	38.6	53.8	42.4
28/04/2022	21:00:00	53.3	78.2	37.8	54.6	41.4
28/04/2022	21:15:00	50	61.7	39.7	53.6	42.4
28/04/2022	21:30:00	50.7	65.6	39.2	53.9	42.1
28/04/2022	21:45:00	47.6	59.9	38.3	51.2	40.8
28/04/2022	22:00:00	52.8	69	37.6	54.4	40.1
28/04/2022	22:15:00	50.9	69.7	37	52.4	39.7

28/04/2022	22:30:00	50.8	66.8	37.8	52.2	39.4
28/04/2022	22:45:00	49.1	64.5	36.7	51.3	39
28/04/2022	23:00:00	47.9	63.1	36.5	49.7	38.3
28/04/2022	23:15:00	51.9	70.6	36.9	52.5	38.6
28/04/2022	23:30:00	45.2	61.3	36.6	48.2	38.4
28/04/2022	23:45:00	48.2	64.8	37.1	50.9	38.8
29/04/2022	00:00:00	49.1	67.8	37	50.7	38.5
29/04/2022	00:15:00	42.5	56.4	36.8	46.1	37.9
29/04/2022	00:30:00	47.8	63.2	36.4	47.6	37.7
29/04/2022	00:45:00	43.2	59.8	36.5	44.5	37.6
29/04/2022	01:00:00	49.5	65.8	36.3	51.2	37.7
29/04/2022	01:15:00	42.5	63.2	36	44.5	37.1
29/04/2022	01:30:00	50.7	65.4	35.9	53.9	37.3
29/04/2022	01:45:00	43.8	61.1	36	45.6	37.2
29/04/2022	02:00:00	42.2	58.3	35.8	44.6	37.1
29/04/2022	02:15:00	49.7	67.8	36.2	46.9	37.6
29/04/2022	02:30:00	51.8	71.3	36.8	49.5	38
29/04/2022	02:45:00	55	73	36.7	54	38.4
29/04/2022	03:00:00	44.6	62.3	36.4	47.1	38.1
29/04/2022	03:15:00	49.5	67.6	36.4	48.5	38.4
29/04/2022	03:30:00	51.1	68	36.2	48.2	38
29/04/2022	03:45:00	43.2	56.5	36.4	45.8	38.1
29/04/2022	04:00:00	43.3	60.8	36.7	43.9	38.7
29/04/2022	04:15:00	45.2	60.2	37.4	48	39.3
29/04/2022	04:30:00	53.2	71.3	37.3	56.8	39.6
29/04/2022	04:45:00	54.1	70.3	39.7	55.8	43.8
29/04/2022	05:00:00	54.7	73.1	44.2	55.3	47.7
29/04/2022	05:15:00	53.3	66.4	46.5	58.1	48
29/04/2022	05:30:00	59.4	71.2	55.9	60.5	57.7
29/04/2022	05:45:00	59	69.2	55.3	60.3	57.1
29/04/2022	06:00:00	58.4	67.3	55.3	59.7	56.9
29/04/2022	06:15:00	60	74.5	55.6	60.8	57.3
29/04/2022	06:30:00	58.9	71.1	55.1	60.4	56.9
29/04/2022	06:45:00	60.4	74.7	55	61.3	57
29/04/2022	07:00:00	59.5	70.3	55.5	60.6	57.2
29/04/2022	07:15:00	59.6	70.8	56	60.8	57.4
29/04/2022	07:30:00	59.8	73.5	55.5	60.8	57.9
29/04/2022	07:45:00	60.2	71.1	56.5	61.7	58.3
29/04/2022	08:00:00	60.2	71.6	56.7	61.1	58.4
29/04/2022	08:15:00	59.4	68.9	56.8	60.4	58.1
29/04/2022	08:30:00	60.7	74.1	56.9	61.4	58.6
29/04/2022	08:45:00	60.2	67.9	57.5	61.1	59
29/04/2022	09:00:00	59.9	71.1	56.6	60.9	58.3
29/04/2022	09:15:00	59.8	71.3	57.3	60.6	58.5
29/04/2022	09:30:00	60.5	72.5	55.2	61.4	58.8

29/04/2022	09:45:00	60.3	73.5	57.6	61.1	59.1
29/04/2022	10:00:00	59.4	69.5	56.6	60.2	58
29/04/2022	10:15:00	59	69.3	53.9	60.1	56.5
29/04/2022	10:30:00	59.5	70.1	53.4	60.7	56
29/04/2022	10:45:00	59.3	70.3	46.9	61.1	51.1
29/04/2022	11:00:00	54.8	64.1	47.3	57.2	50.8
29/04/2022	11:15:00	55.9	73.2	46.8	57.3	51.5
29/04/2022	11:30:00	54.4	69.3	45.2	56.6	48.8
29/04/2022	11:45:00	54.1	71.9	45.2	56.1	49.1
29/04/2022	12:00:00	54.2	71.2	45.1	56.7	48.6
29/04/2022	12:15:00	58.7	73.7	49.5	61.7	52.9
29/04/2022	12:30:00	56.1	66.2	49.9	58.7	52.6
29/04/2022	12:45:00	55.7	64	49.1	57.9	52.4
29/04/2022	13:00:00	55.7	72	49.1	57.1	51.5
29/04/2022	13:15:00	55.2	73.3	47.6	56.9	51
29/04/2022	13:30:00	54.3	70	44	57.1	48.1
29/04/2022	13:45:00	53.9	65	44.7	57.1	48.8
29/04/2022	14:00:00	53.5	71.3	42.9	55.9	47.4
29/04/2022	14:15:00	52.5	66.1	42.7	55	47.5
29/04/2022	14:30:00	58	81.9	43.4	56.2	47.4
29/04/2022	14:45:00	53.6	72	44	55.1	47.6
29/04/2022	15:00:00	54.9	72.6	45	57.6	48.6
29/04/2022	15:15:00	53.2	61.8	46.1	54.7	50.1
29/04/2022	15:30:00	54.6	72	45.4	57.4	49.8
29/04/2022	15:45:00	54	69.7	43.7	56.3	49.3
29/04/2022	16:00:00	56.3	75.2	47.1	58.7	51.2
29/04/2022	16:15:00	54.6	68.7	44.6	57.2	49.8
29/04/2022	16:30:00	54.9	70.7	45	57.1	49.2
29/04/2022	16:45:00	53.4	67.2	43.3	55.7	47.7
29/04/2022	17:00:00	54.3	71.6	43.5	57.2	49
29/04/2022	17:15:00	54.6	69.2	46.1	56.8	49.4
29/04/2022	17:30:00	52.5	69.3	41.4	54.7	47.7
29/04/2022	17:45:00	54.8	74.4	42.2	56.3	48
29/04/2022	18:00:00	52.3	66.6	42	54.4	47.2
29/04/2022	18:15:00	55.1	69.4	42.5	56.2	47.7
29/04/2022	18:30:00	53.3	71.7	42.9	54.8	46.6
29/04/2022	18:45:00	51.3	69.6	40.8	53.8	46
29/04/2022	19:00:00	52.1	68.3	41.5	54.8	46
29/04/2022	19:15:00	53.2	68.1	40.6	55.5	45.6
29/04/2022	19:30:00	53.8	75.5	41.9	55.6	45.1
29/04/2022	19:45:00	50.4	63.3	39.5	53.2	44.4
29/04/2022	20:00:00	50.8	64.1	39	53.7	45.2
29/04/2022	20:15:00	52.7	68.2	39.7	55.8	44.7
29/04/2022	20:30:00	50.6	69.9	40.7	53.6	44.2
29/04/2022	20:45:00	54.4	68.3	41.5	55.1	46.2

29/04/2022	21:00:00	51.2	69.3	40.4	53.5	44.9
29/04/2022	21:15:00	49.6	59	38.9	53.2	42.9
29/04/2022	21:30:00	55.1	70.1	39.7	56.3	43
29/04/2022	21:45:00	51.2	71.4	41.1	53.8	44.6
29/04/2022	22:00:00	49.2	60.8	39.5	52.5	43.6
29/04/2022	22:15:00	49.2	64.8	38.1	52.1	41.4
29/04/2022	22:30:00	47.4	64.5	37.9	50.6	40.1
29/04/2022	22:45:00	47.6	63.7	37.8	50.7	40.4
29/04/2022	23:00:00	53.3	71.6	37.9	53.6	41.2
29/04/2022	23:15:00	48.4	71.7	37.9	51.1	40.2
29/04/2022	23:30:00	45.2	59.3	36.9	48.6	38.9
29/04/2022	23:45:00	53.4	70.1	37.2	53.6	38.9
30/04/2022	00:00:00	44.6	56.8	36.7	47.7	39.4
30/04/2022	00:15:00	44.7	58.4	36.8	48.1	38.7
30/04/2022	00:30:00	44.9	57.7	36.9	47.9	39.2
30/04/2022	00:45:00	46.8	62.1	37.1	48.5	39
30/04/2022	01:00:00	47.8	64.4	37.8	48.2	39.5
30/04/2022	01:15:00	48.9	66	37.2	48.4	39
30/04/2022	01:30:00	50.2	68.4	37	49	38.9
30/04/2022	01:45:00	50.4	65.8	37.5	48.4	39.2
30/04/2022	02:00:00	43.1	58	37.5	45.1	39
30/04/2022	02:15:00	42.5	58.5	37.9	44	39.3
30/04/2022	02:30:00	43.1	56.1	37.6	45	39.3
30/04/2022	02:45:00	47.9	66.5	37.7	50.1	39.1
30/04/2022	03:00:00	53	72.5	37.4	54	39.1
30/04/2022	03:15:00	44.5	61.2	37	46.6	39.3
30/04/2022	03:30:00	41.7	61.7	36.9	43.6	38.4
30/04/2022	03:45:00	49.9	66.7	37.1	50.1	39
30/04/2022	04:00:00	52	68.9	37.3	46.8	39.1
30/04/2022	04:15:00	41.6	57.1	37.8	43.5	39.1
30/04/2022	04:30:00	51.8	70.8	38.6	51.7	43.7
30/04/2022	04:45:00	50.1	65.6	43.1	52.5	45.4
30/04/2022	05:00:00	51.7	66.9	42.8	53.5	46.3
30/04/2022	05:15:00	50.5	61.6	46.9	52.3	48.3
30/04/2022	05:30:00	53.1	68.8	46.1	54.4	48
30/04/2022	05:45:00	50.6	61.8	46.1	53.1	47.6
30/04/2022	06:00:00	49.8	62.1	45.3	52	46.8
30/04/2022	06:15:00	50.6	63.1	45.4	53.5	47
30/04/2022	06:30:00	50.7	60.4	45.1	53.6	46.7
30/04/2022	06:45:00	50.6	62.8	45.7	53.1	47.1
30/04/2022	07:00:00	52.1	66.5	45.8	54.1	47.8
30/04/2022	07:15:00	53.8	69.1	45.5	54.5	47.8
30/04/2022	07:30:00	51.5	61.7	45.9	54.1	47.7
30/04/2022	07:45:00	54.2	69.2	45.6	55	47.5
30/04/2022	08:00:00	59.4	76.1	44.8	63.7	47.4

30/04/2022	08:15:00	57.4	76.4	46.5	60.2	49.2
30/04/2022	08:30:00	58.6	66.8	55.9	59.6	57.3
30/04/2022	08:45:00	60.4	78.7	55.5	62.7	56.9
30/04/2022	09:00:00	58.7	72.4	55.4	59.7	57.2
30/04/2022	09:15:00	60.3	76.4	56.1	61	58.1
30/04/2022	09:30:00	60.6	75.5	56.2	61.5	58.5
30/04/2022	09:45:00	57.6	66.7	48.2	60.9	51.6
30/04/2022	10:00:00	55.1	81.3	47.8	56.3	50.5
30/04/2022	10:15:00	54	69.1	47.1	55.7	50.4
30/04/2022	10:30:00	57.4	80.5	49.2	58	51.9
30/04/2022	10:45:00	53.8	70.5	48.8	55.3	51.5
30/04/2022	11:00:00	55.6	72.4	48.4	57.8	52
30/04/2022	11:15:00	56.6	73.4	49.2	59.3	52.4
30/04/2022	11:30:00	54.3	62.2	49.7	56	52
30/04/2022	11:45:00	53.7	66.3	48	55.7	50.1
30/04/2022	12:00:00	56.5	79.4	46.9	58.4	50.8
30/04/2022	12:15:00	55.3	76.9	45.7	56.5	49.5
30/04/2022	12:30:00	54.5	69.1	45.1	57.6	49.3
30/04/2022	12:45:00	53.1	69	45.9	55.5	49.2
30/04/2022	13:00:00	56.2	78.2	45.7	55	49.5
30/04/2022	13:15:00	54.7	67.1	45.4	57.3	49
30/04/2022	13:30:00	54.3	71.1	45.2	56	49.8
30/04/2022	13:45:00	52.3	66.5	43.7	54.6	48.2
30/04/2022	14:00:00	53.6	69.3	44.6	54.4	48.1
30/04/2022	14:15:00	54.5	69	43	57	49
30/04/2022	14:30:00	54.2	71.2	43.5	56.5	48.1
30/04/2022	14:45:00	54.4	66.1	43.5	56.9	49.4
30/04/2022	15:00:00	54.4	67.6	45.3	56.2	49.8
30/04/2022	15:15:00	54.4	71.4	44.9	56.2	49.2
30/04/2022	15:30:00	57.2	78.3	45.9	56.6	49.8
30/04/2022	15:45:00	56.1	78.1	42.9	55.6	48.8
30/04/2022	16:00:00	56	75.3	44.3	58.9	48.9
30/04/2022	16:15:00	57.6	73.4	44.3	57.9	50.2
30/04/2022	16:30:00	55.4	79.3	43.2	56.9	48.9
30/04/2022	16:45:00	53.3	68.9	43.6	55.7	48.5
30/04/2022	17:00:00	54.3	71.2	43.7	56.3	49.1
30/04/2022	17:15:00	54.3	72.3	46.8	55.9	49.6
30/04/2022	17:30:00	53.4	66.8	44.2	55.8	49.1
30/04/2022	17:45:00	54.4	68.9	46.1	56.6	49.6
30/04/2022	18:00:00	53.3	67.7	43	55.4	47.9
30/04/2022	18:15:00	53.6	66.5	43.6	56.2	48.6
30/04/2022	18:30:00	53.5	71.8	43.3	56.2	48.4
30/04/2022	18:45:00	54.6	73.7	43.1	56.3	48.2
30/04/2022	19:00:00	53.7	69.4	42.8	56.2	48.3
30/04/2022	19:15:00	52.9	71.1	39.9	55.4	45.8

30/04/2022	19:30:00	52.9	69.2	40.8	55.6	46.7
30/04/2022	19:45:00	53.2	65.2	40.9	56.3	47.3
30/04/2022	20:00:00	53.1	63.4	40.3	56.3	46.3
30/04/2022	20:15:00	56.9	87.3	39.1	54.6	44.4
30/04/2022	20:30:00	51.1	67.2	37.5	54.5	41.9
30/04/2022	20:45:00	50.6	66.8	37	54.1	42.5
30/04/2022	21:00:00	51.5	62.2	40.3	54.8	45.4
30/04/2022	21:15:00	51.1	61.6	40.1	54.6	44
30/04/2022	21:30:00	49.9	64.8	36	53.4	42.1
30/04/2022	21:45:00	51.8	67.4	37.6	54.9	43.2
30/04/2022	22:00:00	50	63	37.8	54	41.2
30/04/2022	22:15:00	48.7	60.8	37.5	52.3	41.1
30/04/2022	22:30:00	50	75.1	36.3	52.7	41.2
30/04/2022	22:45:00	48.3	60.7	35.9	52	40.1
30/04/2022	23:00:00	49.6	71.2	36.2	53.1	39.4
30/04/2022	23:15:00	46.9	62.9	34.9	50.1	37.2
30/04/2022	23:30:00	45.2	63	34.8	48.7	36.5
30/04/2022	23:45:00	46.4	62.5	35.2	49.9	37.2
01/05/2022	00:00:00	45.7	62.8	34.9	49.2	36.5
01/05/2022	00:15:00	43.6	56.9	34.8	47.1	36.4
01/05/2022	00:30:00	45.1	60.5	34.7	48.5	36.6
01/05/2022	00:45:00	43.1	57.4	34.6	46.6	36.5
01/05/2022	01:00:00	42.9	59.6	35.5	45.7	36.9
01/05/2022	01:15:00	41.4	55.7	35.2	43.7	36.4
01/05/2022	01:30:00	44.5	64.1	35.4	46.6	36.4
01/05/2022	01:45:00	41.7	61.8	35.2	43.4	36.3
01/05/2022	02:00:00	41.1	58.2	34.9	44	36.2
01/05/2022	02:15:00	41.5	57.4	34.8	44.4	36.1
01/05/2022	02:30:00	40.3	55.8	34.9	43.1	36.2
01/05/2022	02:45:00	40.3	57.2	34.9	41.6	36.3
01/05/2022	03:00:00	41	61	34.8	43.6	36.2
01/05/2022	03:15:00	39	55.5	34.6	41.1	36
01/05/2022	03:30:00	41.7	61.2	34.9	44.3	36.1
01/05/2022	03:45:00	41.5	57.8	34.5	43.9	36.1
01/05/2022	04:00:00	40.7	58.5	34.4	43.3	36
01/05/2022	04:15:00	44.7	58.9	34.7	48.1	36.9
01/05/2022	04:30:00	47.2	65.6	35.8	50.6	39
01/05/2022	04:45:00	44.9	55.2	36.6	47.7	39.8
01/05/2022	05:00:00	46.2	69.6	36.1	48.7	40.1
01/05/2022	05:15:00	51.3	66.3	36.9	54.7	41.5
01/05/2022	05:30:00	51	66.2	37.5	53.4	41.2
01/05/2022	05:45:00	47.4	63.6	37	50.1	39.9
01/05/2022	06:00:00	47	59.5	36.5	50.1	40.2
01/05/2022	06:15:00	47.3	59.9	35.5	50.6	39.4
01/05/2022	06:30:00	51.2	75.7	36.7	51.1	40.2

01/05/2022	06:45:00	49.6	62.3	38.7	52.9	43
01/05/2022	07:00:00	49.1	62.8	38.5	52.3	42.2
01/05/2022	07:15:00	48.1	67.5	36.7	51.5	41.4
01/05/2022	07:30:00	49.9	66.7	40.4	52.9	44.8
01/05/2022	07:45:00	50.5	63.6	36.1	53.9	42.6
01/05/2022	08:00:00	49.3	60.7	37.5	53	41.8
01/05/2022	08:15:00	49.4	60.5	38.3	52.5	42.8
01/05/2022	08:30:00	49.9	66.2	40.9	52.7	44.5
01/05/2022	08:45:00	51.6	64.8	38.2	54.9	44.5
01/05/2022	09:00:00	53.2	71.7	42.7	56	47.1
01/05/2022	09:15:00	51.3	65.3	40.5	54	45.3
01/05/2022	09:30:00	53.3	69.6	41.3	55.7	46.9
01/05/2022	09:45:00	52.7	70.4	41.8	55.2	47.5
01/05/2022	10:00:00	53.1	65.8	45.3	55.5	49
01/05/2022	10:15:00	54.2	68.1	45	57	49
01/05/2022	10:30:00	53.4	67.4	43.9	55.7	49
01/05/2022	10:45:00	52.3	61.8	43.3	54.9	48.1
01/05/2022	11:00:00	53.5	70.6	45.6	55.5	49.4
01/05/2022	11:15:00	54.2	71.7	41.7	55.9	48.8
01/05/2022	11:30:00	52.6	62.9	42.4	54.7	48.9
01/05/2022	11:45:00	52.7	59.8	45.8	54.9	49.2
01/05/2022	12:00:00	54	67.9	43.5	55.7	48.3
01/05/2022	12:15:00	53.3	70.5	46.6	55.5	49.6
01/05/2022	12:30:00	54.6	75.8	43.3	56.1	49.4
01/05/2022	12:45:00	52.9	64.8	45.3	55.1	48.9
01/05/2022	13:00:00	52.4	64.1	43.8	54.8	47.6
01/05/2022	13:15:00	52.4	70.2	43.5	54.6	47.9
01/05/2022	13:30:00	53.6	66.8	44.8	55.9	48.8
01/05/2022	13:45:00	52.5	68.5	44.1	54.7	48.3
01/05/2022	14:00:00	52.7	66.9	41	55	47.1
01/05/2022	14:15:00	51.8	62	43	54.4	47.6
01/05/2022	14:30:00	50.8	62.1	38.3	53.2	45.6
01/05/2022	14:45:00	51.9	60.6	43.4	54.6	47.5
01/05/2022	15:00:00	52.7	69.9	42.3	54.7	48.4
01/05/2022	15:15:00	50.8	65.9	41.2	53.2	46.4
01/05/2022	15:30:00	51.3	70.2	42.2	53.4	46.7
01/05/2022	15:45:00	51.9	65.7	43	54.1	47.5
01/05/2022	16:00:00	51.3	61.8	43.1	53.9	46.8
01/05/2022	16:15:00	51.3	67.1	40.1	53	45.5
01/05/2022	16:30:00	51.2	65.7	40	53.4	45.2
01/05/2022	16:45:00	52.7	68	39.2	54.2	45.3
01/05/2022	17:00:00	51.6	62.4	38.6	54.2	45.6
01/05/2022	17:15:00	51	62.5	39.9	53.7	45.1
01/05/2022	17:30:00	53.7	75.8	38.8	54.3	45.5
01/05/2022	17:45:00	50.3	57.9	41.1	53.2	45

01/05/2022	18:00:00	50.7	60.2	41.4	53.7	45.3
01/05/2022	18:15:00	51.8	67.4	41.9	54	45.7
01/05/2022	18:30:00	52.4	68.6	38.1	55.1	43
01/05/2022	18:45:00	52.4	73.5	38.1	53.8	44.2
01/05/2022	19:00:00	52.5	72.1	38.9	54.1	44.6
01/05/2022	19:15:00	50.5	69	36.9	53.9	42.3
01/05/2022	19:30:00	50.6	67.3	40	53.4	44
01/05/2022	19:45:00	49.4	61.9	36.2	52.8	41.9
01/05/2022	20:00:00	50.4	66.5	37.3	53.4	43.8
01/05/2022	20:15:00	49.2	61.3	37.2	52.5	42.6
01/05/2022	20:30:00	48	60.3	37	51.1	41.6
01/05/2022	20:45:00	48.4	59.1	37	51.9	42
01/05/2022	21:00:00	47.6	60	36.5	50.9	39.8
01/05/2022	21:15:00	54.6	72.2	36.9	53.4	40.7
01/05/2022	21:30:00	47.6	67.9	36.5	50.7	38.7
01/05/2022	21:45:00	47.1	62.8	36.3	50.6	38.2
01/05/2022	22:00:00	45.6	61	36.4	49.1	38.1
01/05/2022	22:15:00	45.6	64.3	35.9	48.9	38.1
01/05/2022	22:30:00	49.6	70.2	36.2	50.3	38.1
01/05/2022	22:45:00	44.7	58.2	36.2	47.9	38.4
01/05/2022	23:00:00	44.1	60.4	36	46.8	37.4
01/05/2022	23:15:00	43.6	59	35.5	46.5	37.4
01/05/2022	23:30:00	50.1	67.6	36.1	49.7	37.5
01/05/2022	23:45:00	43.8	58.2	36.1	46.9	37.5
02/05/2022	00:00:00	50.1	66.6	35.9	48.9	37.2
02/05/2022	00:15:00	40.6	54.1	35.5	42.7	36.9
02/05/2022	00:30:00	42.5	58	35.6	45.1	36.8
02/05/2022	00:45:00	45.1	58.9	35.6	47.9	37
02/05/2022	01:00:00	39.4	56.6	35.5	40.4	36.7
02/05/2022	01:15:00	40.5	56.7	35.5	42.5	36.7
02/05/2022	01:30:00	41.5	55.1	35.5	43.8	37.1
02/05/2022	01:45:00	39.7	55.6	35.3	40.8	36.5
02/05/2022	02:00:00	40.2	59.7	35.1	40.9	36.4
02/05/2022	02:15:00	42.8	59	35.6	43.4	36.9
02/05/2022	02:30:00	41.8	63.9	35.4	42.9	36.8
02/05/2022	02:45:00	41.1	56.7	35.3	43.8	36.5
02/05/2022	03:00:00	39.5	55.9	35.5	40.3	36.6
02/05/2022	03:15:00	40.7	55.8	35.2	43.4	36.4
02/05/2022	03:30:00	47.7	62.1	35.2	48.2	36.5
02/05/2022	03:45:00	41.7	56.4	35.5	44.6	37
02/05/2022	04:00:00	42.3	59.2	35.9	44.7	37.5
02/05/2022	04:15:00	43.1	57.9	36.1	45.6	37.9
02/05/2022	04:30:00	50	66.1	36.4	53.3	40
02/05/2022	04:45:00	49.4	69.8	38.9	50.2	41.9
02/05/2022	05:00:00	48.2	55.8	40.1	50	43.5

02/05/2022	05:15:00	59.1	72	46.4	60.4	48.8
02/05/2022	05:30:00	58.5	69.3	55.5	59.3	57.4
02/05/2022	05:45:00	59.2	69.3	56.3	60.5	57.5
02/05/2022	06:00:00	58.3	69	55.6	59.1	57.1
02/05/2022	06:15:00	58.9	73.7	55.7	59.2	57.1
02/05/2022	06:30:00	58	67.3	55.4	58.9	56.8
02/05/2022	06:45:00	58.1	69.9	55.3	59.1	56.8
02/05/2022	07:00:00	58.7	72.4	55.3	59.7	56.8
02/05/2022	07:15:00	59.3	70	56	59.8	57.7
02/05/2022	07:30:00	59.8	72.9	56.2	61.3	57.3
02/05/2022	07:45:00	58.7	70.2	46.7	59.8	56.8
02/05/2022	08:00:00	52.4	78.1	47.2	53.7	48.5
02/05/2022	08:15:00	52.2	62.7	46.3	54.7	48.7
02/05/2022	08:30:00	52.6	62.9	47.1	55.2	49
02/05/2022	08:45:00	52.5	63.8	47.4	54.9	49.4
02/05/2022	09:00:00	56.6	79.7	47.4	57.7	49.3
02/05/2022	09:15:00	53.3	66.4	42.4	56.2	48
02/05/2022	09:30:00	52.5	71.1	43.9	55.1	47.2
02/05/2022	09:45:00	51.9	71.8	40.5	54.3	46.7
02/05/2022	10:00:00	54.6	71.9	44.2	55.2	47.5
02/05/2022	10:15:00	55.4	69.2	45.6	56.9	49.2
02/05/2022	10:30:00	53.5	71.7	44.2	55.8	48.4
02/05/2022	10:45:00	57	73.4	44.3	59.4	49.4
02/05/2022	11:00:00	53.1	66.4	43.7	55.8	48.1
02/05/2022	11:15:00	53.6	67.5	44.3	55.4	48.7
02/05/2022	11:30:00	54.7	68.2	44.4	57.5	48.9
02/05/2022	11:45:00	53	71.4	41.5	55.5	48.7
02/05/2022	12:00:00	57.9	80.9	45.2	56.6	49
02/05/2022	12:15:00	56	71.8	44.9	58	49.5
02/05/2022	12:30:00	56.8	76.8	46.1	57.2	49.7
02/05/2022	12:45:00	54.5	65.9	45.3	57.1	49.6
02/05/2022	13:00:00	55.5	71.9	46.5	57.5	50.4
02/05/2022	13:15:00	54.3	70.3	44.6	56.5	49.6
02/05/2022	13:30:00	54.3	63.3	44.5	56.7	49.8
02/05/2022	13:45:00	56.1	70	42.3	58.8	51.1
02/05/2022	14:00:00	54.8	70.6	44.7	56.9	50.1
02/05/2022	14:15:00	55.1	69.8	44.8	57	49.8
02/05/2022	14:30:00	55.5	71	44.3	57.6	50
02/05/2022	14:45:00	53.8	60.4	45.3	56.1	49.8
02/05/2022	15:00:00	55.6	72.1	43.1	57.7	49.7
02/05/2022	15:15:00	57	72.3	43.2	59.2	51.4
02/05/2022	15:30:00	55.7	71.2	46.3	57	50.5
02/05/2022	15:45:00	55.4	70.9	45.1	56.9	49.7
02/05/2022	16:00:00	54.6	65.6	42.3	56.8	48.7
02/05/2022	16:15:00	52.5	61.4	42.3	55.4	46.7

02/05/2022	16:30:00	51.3	63.3	39.4	54.2	45.8
02/05/2022	16:45:00	51.3	61	38.6	54.1	45.1
02/05/2022	17:00:00	52.1	64.9	39.9	55	45.6
02/05/2022	17:15:00	53.7	67.7	39.5	56.1	45.3
02/05/2022	17:30:00	54.3	65.1	41.7	57.1	48.5
02/05/2022	17:45:00	56.2	67.8	42.1	58.1	47.7
02/05/2022	18:00:00	53.3	69.9	42.1	56.1	46.9
02/05/2022	18:15:00	54.3	77.3	40.7	56.1	46.6
02/05/2022	18:30:00	53.1	66.9	43.4	56	47.7
02/05/2022	18:45:00	52.7	67.5	40.7	55.5	45.3
02/05/2022	19:00:00	52.4	70.7	41.8	55.3	46.5
02/05/2022	19:15:00	55.6	71.3	41	58	45.8
02/05/2022	19:30:00	51.1	69.3	40.8	54	44.6
02/05/2022	19:45:00	50.9	62.6	40.5	54.2	44.2
02/05/2022	20:00:00	49.9	62.1	39.3	53.3	42.9
02/05/2022	20:15:00	50.1	64.6	39	53.4	42.6
02/05/2022	20:30:00	52.3	70.5	39.1	54.3	44
02/05/2022	20:45:00	51.7	73.8	39.1	54.6	42.4
02/05/2022	21:00:00	50.3	62.7	38.1	53.4	42.4
02/05/2022	21:15:00	50.5	66.4	39	53.9	42.6
02/05/2022	21:30:00	47.8	61.9	37.1	51.2	39.5
02/05/2022	21:45:00	50.2	62.5	39.5	53.8	43.4
02/05/2022	22:00:00	49.8	62.7	36.7	53.4	39.8
02/05/2022	22:15:00	56.1	69.1	38	58.5	41.2
02/05/2022	22:30:00	47.7	64	36.9	50.5	39
02/05/2022	22:45:00	52.5	73.2	36.9	52.7	38.6
02/05/2022	23:00:00	45.1	60.9	36.5	48.5	38.2
02/05/2022	23:15:00	52	70.8	36.5	50.3	38.7
02/05/2022	23:30:00	53.6	69.3	36.2	54.5	37.6
02/05/2022	23:45:00	43.7	57.8	36.5	47.3	37.8
03/05/2022	00:00:00	46.4	61	35.9	50.2	38.4
03/05/2022	00:15:00	45.2	60.3	35.8	48.4	37.8
03/05/2022	00:30:00	43	59.2	36.4	45.5	37.8
03/05/2022	00:45:00	40.3	54.8	35.7	41.9	37.2
03/05/2022	01:00:00	42.2	62	35.5	42.6	36.8
03/05/2022	01:15:00	40.8	57.1	35.2	42	36.5
03/05/2022	01:30:00	42.9	61.6	35.3	45.4	36.7
03/05/2022	01:45:00	42	60.2	35.2	44.6	36.5
03/05/2022	02:00:00	44.9	65.7	35	46.5	36.3
03/05/2022	02:15:00	44.1	62	34.9	47	36.5
03/05/2022	02:30:00	42.9	60.7	34.8	45.2	36.5
03/05/2022	02:45:00	40.9	60.4	35.2	40.7	36.6
03/05/2022	03:00:00	44.1	61.3	35.6	45.6	37
03/05/2022	03:15:00	40.2	59.4	35.6	41.3	37
03/05/2022	03:30:00	45.6	60.3	36.1	49.4	37.7

03/05/2022	03:45:00	44.3	59.3	35.4	47.4	37.5
03/05/2022	04:00:00	44.5	59	35.8	47.9	37.7
03/05/2022	04:15:00	48.5	59.8	37	51.8	40.4
03/05/2022	04:30:00	48.9	59.5	38.6	51.6	44.2
03/05/2022	04:45:00	53.3	77.3	42.8	55.3	46.2
03/05/2022	05:00:00	51.4	71.5	43.4	53.7	47.7
03/05/2022	05:15:00	53	70.8	47	55.3	48.7
03/05/2022	05:30:00	55	70.4	46.2	57.3	49.5
03/05/2022	05:45:00	56.7	73.6	46.3	58.8	48.8
03/05/2022	06:00:00	54	67	45.6	57.5	48.7
03/05/2022	06:15:00	59.3	70.4	56.1	60.4	57.3
03/05/2022	06:30:00	59	72.3	55.6	60.3	57.2
03/05/2022	06:45:00	59.5	72.3	54.7	60.8	57.1
03/05/2022	07:00:00	59.2	72.3	55.6	60.9	57.1
03/05/2022	07:15:00	60	71.3	56.1	61.7	57.6
03/05/2022	07:30:00	59.5	71.3	55.7	60.4	57.3
03/05/2022	07:45:00	60	70.7	56.6	61.4	58.1
03/05/2022	08:00:00	60.4	74.3	56.7	61.1	58.4
03/05/2022	08:15:00	60.7	70.3	55.8	61.1	58.4
03/05/2022	08:30:00	56	68	48.2	59.2	51.5
03/05/2022	08:45:00	53.5	65.3	47.8	55.4	50.7
03/05/2022	09:00:00	55.6	70.1	48	57.1	50.3
03/05/2022	09:15:00	57.4	75	48.3	59.7	52.3
03/05/2022	09:30:00	55.3	71	48.8	57.3	51.3
03/05/2022	09:45:00	56.3	73.8	46.9	57.3	49.6
03/05/2022	10:00:00	53.7	71.7	43.4	55.8	47.7
03/05/2022	10:15:00	52.6	71.6	43.5	55.3	47.7
03/05/2022	10:30:00	53.8	66.9	42.4	57	46.3
03/05/2022	10:45:00	56.4	73.5	43.8	58.8	52.1
03/05/2022	11:00:00	56	72.7	50	57.7	53.2
03/05/2022	11:15:00	56.5	71.4	49.9	58	53
03/05/2022	11:30:00	55.6	68.2	50.1	57.4	52.7
03/05/2022	11:45:00	55.5	72.5	50.2	56.7	52.3
03/05/2022	12:00:00	55.5	71.7	46.3	57.8	51.5
03/05/2022	12:15:00	53.6	72	45.5	56.2	48.6
03/05/2022	12:30:00	54.9	70.4	45.2	57.6	49.4
03/05/2022	12:45:00	53.9	69.4	44.8	55.8	48.2
03/05/2022	13:00:00	54.6	69.9	43.9	56.7	48.5
03/05/2022	13:15:00	54.8	71.9	42.9	56.1	47.8
03/05/2022	13:30:00	58.5	80.5	40.6	58.2	47.4
03/05/2022	13:45:00	55.9	72.3	44.9	57.2	48.1
03/05/2022	14:00:00	54.4	71.3	40.9	55.8	47.2
03/05/2022	14:15:00	50.9	65	43.4	53.2	46.9
03/05/2022	14:30:00	54.5	71.7	42.7	56	48
03/05/2022	14:45:00	52.6	72.2	43.8	55.1	48

03/05/2022	15:00:00	56.6	70.4	42.2	55.7	48
03/05/2022	15:15:00	52.8	71	42.6	54.7	48.5
03/05/2022	15:30:00	52.7	62.1	45.7	54.7	49.2
03/05/2022	15:45:00	52.6	66.8	44.9	54.1	48.7
03/05/2022	16:00:00	54.4	74.4	48.2	56	50.8
03/05/2022	16:15:00	53.5	68.6	45.2	55.4	49.6
03/05/2022	16:30:00	53.2	72.1	45.9	55.1	49
03/05/2022	16:45:00	53.3	62.7	47.5	55.2	50.1
03/05/2022	17:00:00	54.9	72.2	45.8	56.9	50.8
03/05/2022	17:15:00	56.1	72.8	42.9	57	50.1
03/05/2022	17:30:00	55.1	68.5	42.9	56.2	49.6
03/05/2022	17:45:00	55.8	71	44.6	57.4	48.9
03/05/2022	18:00:00	52.7	67.7	43.3	55	47.8
03/05/2022	18:15:00	55.6	67	43.4	56.8	49
03/05/2022	18:30:00	52.1	62.9	41.2	54.7	47.3
03/05/2022	18:45:00	52.8	67.5	43.3	54.6	47.1
03/05/2022	19:00:00	52.5	67.9	40.8	54.4	45.6
03/05/2022	19:15:00	53.1	70	39.7	54.2	44.1
03/05/2022	19:30:00	52.4	67.4	39.5	55.5	44.2
03/05/2022	19:45:00	49.7	59.6	38.6	53.1	44.2
03/05/2022	20:00:00	54.8	72.3	41	55.5	44.6
03/05/2022	20:15:00	52.9	77.4	39.4	53.6	44.2
03/05/2022	20:30:00	48.9	60	38.8	52	42.5
03/05/2022	20:45:00	51.5	74.4	38.5	52.4	41.7
03/05/2022	21:00:00	54.3	72.5	39.1	55.4	42.8
03/05/2022	21:15:00	52.9	65.2	40.1	56.3	43.6
03/05/2022	21:30:00	52.2	69.8	38.8	54.3	42.8
03/05/2022	21:45:00	46.8	62.1	39	49.6	41.2
03/05/2022	22:00:00	50.3	70.3	37.7	50.4	39.5
03/05/2022	22:15:00	46.7	63.4	37.6	49.9	40.6
03/05/2022	22:30:00	49.8	66.3	37.7	51.9	39.7
03/05/2022	22:45:00	46	57.3	37.3	49.4	39.7
03/05/2022	23:00:00	45.5	58.2	37.5	49	39.4
03/05/2022	23:15:00	43.9	55.9	37.1	47	38.8
03/05/2022	23:30:00	45.8	65.6	37.2	47.3	38.4
03/05/2022	23:45:00	47.1	70	37	48.1	38.5
04/05/2022	00:00:00	41.6	55.6	36.8	43.2	38.5
04/05/2022	00:15:00	41.9	57	36.8	44	38.5
04/05/2022	00:30:00	43.4	58.5	37.3	46.1	38.6
04/05/2022	00:45:00	41.6	55.7	37.5	42.9	38.9
04/05/2022	01:00:00	42.1	60.6	37.4	43.7	38.7
04/05/2022	01:15:00	51.2	75.9	36.7	43	38.2
04/05/2022	01:30:00	42.7	59.4	36.7	45.3	38.3
04/05/2022	01:45:00	41	56.6	36.7	42.4	38.4
04/05/2022	02:00:00	40.6	55.5	36.6	41.8	38.4

04/05/2022	02:15:00	44.7	61	36.4	45	38
04/05/2022	02:30:00	45.7	57.3	37.1	49	39.5
04/05/2022	02:45:00	46	56.3	38.2	49	40.1
04/05/2022	03:00:00	47.2	62.1	42.3	48.5	44.8
04/05/2022	03:15:00	48.5	61.4	42.9	50.1	45.8
04/05/2022	03:30:00	50.7	64.1	46.8	52.4	48.4
04/05/2022	03:45:00	55.1	70.8	41.2	58.9	43.2
04/05/2022	04:00:00	46.6	64.7	37.4	49.9	41.1
04/05/2022	04:15:00	47.4	69.1	38.4	49.8	42.2
04/05/2022	04:30:00	47.1	57.1	39.3	49.8	42.5
04/05/2022	04:45:00	53	71.8	43.8	55.1	46.4
04/05/2022	05:00:00	53	76.7	44.3	53.4	47.7
04/05/2022	05:15:00	51.1	63.2	47.4	53	48.6
04/05/2022	05:30:00	53.9	70.8	46.7	55.2	48.7
04/05/2022	05:45:00	53.1	67.7	45.8	55.6	48.1
04/05/2022	06:00:00	52.1	67.1	46	54.2	48.3
04/05/2022	06:15:00	56.1	72.1	46	57.2	48.9
04/05/2022	06:30:00	55	65.6	48.8	57.3	50.9
04/05/2022	06:45:00	58.4	70.5	48.2	63.8	51
04/05/2022	07:00:00	55	69	49	56.9	51.1
04/05/2022	07:15:00	55.7	65.3	50.1	57.3	52.2
04/05/2022	07:30:00	57	72.4	50.7	57.8	52.7
04/05/2022	07:45:00	58.8	72.1	49.7	58.2	52.8
04/05/2022	08:00:00	56.4	68.8	50.5	57.9	53.3
04/05/2022	08:15:00	58.2	71.5	49.8	61.1	53.4
04/05/2022	08:30:00	55.5	68.3	49.2	56.7	51.9
04/05/2022	08:45:00	54.8	64.5	49.1	56.4	52.5
04/05/2022	09:00:00	55.4	69.3	47.4	57.4	51
04/05/2022	09:15:00	56.5	74.2	48.7	57.3	50.9
04/05/2022	09:30:00	57.6	70.8	49.4	60.1	52.6
04/05/2022	09:45:00	57.6	72.5	50.4	59.2	52.7
04/05/2022	10:00:00	55.2	68.1	46.9	56.9	51.1
04/05/2022	10:15:00	55	71	46.8	57.1	50.4
04/05/2022	10:30:00	54.9	70.9	46.5	56.4	50.3
04/05/2022	10:45:00	55.7	74.5	46.4	57.4	49.7
04/05/2022	11:00:00	55.1	68	46.9	57.6	51.1
04/05/2022	11:15:00	55.5	71.2	47.7	56.7	50.5
04/05/2022	11:30:00	54.3	68.9	47.6	56.6	50.7
04/05/2022	11:45:00	54.9	69.4	46.6	56.7	50.4
04/05/2022	12:00:00	56.5	72.6	47.3	58.6	52.2
04/05/2022	12:15:00	58	72.1	50.3	59.7	52.9
04/05/2022	12:30:00	55.2	67.4	47	57.5	51.1
04/05/2022	12:45:00	55	66.2	48.5	57.2	51.6
04/05/2022	13:00:00	57.2	72.1	50.7	59.7	53.6
04/05/2022	13:15:00	56.2	68.7	48.6	58.3	52.7

04/05/2022	13:30:00	56.9	73.6	49.4	59.4	52.4
04/05/2022	13:45:00	55.5	69.7	47.1	57.7	51.5
04/05/2022	14:00:00	63.5	75.6	47.6	67.3	54.9
04/05/2022	14:15:00	57.1	64.4	48.4	59.5	53
04/05/2022	14:30:00	59.3	81.1	47.8	59.1	51.4
04/05/2022	14:45:00	53.7	73.9	43.3	55.8	49.4
04/05/2022	15:00:00	58.2	71	48.7	59	53.1
04/05/2022	15:15:00	56.5	70.6	47.2	57.2	51.7
04/05/2022	15:30:00	56.5	72.1	50.2	58.3	53

APPENDIX 2 – SOUND LEVEL CALCULATIONS AND PREDICTIONS

Source Sound Levels

Sound Pressure Levels, Roaming	dB Linear L_{eq} spectra										dB $LA_{eq,t}$
	31.5	63	125	250	500	1000	2000	4000	8000		dBA
Inside Setting Corridor (Ext A)	75.9	67.3	67.1	67.9	69.1	67.2	64.4	51.2	55.0		**71.5**
Roof Void of Setting Corridor, Roaming (Ext A)	58.3	58.0	61.0	61.1	77.8	77.3	77.1	62.7	66.7		**81.9**
Office & Canteen (Ext B)		67.0	69.0	70.0	76.0	74.0	70.0	66.0	57.0		**78.1**
Separate Sources	77.7	70.6	73.0	68.7	67.2	63.2	64.1	55.6	51.0		**70.0**
Basket Room (Ext D)	63.7	62.3	63.0	64.6	60.3	58.8	62.0	66.5	49.9		**69.8**
Drivers Building		67.0	69.0	70.0	76.0	74.0	70.0	66.0	57.0		**78.1**
Roof Transmission from Ext A	58.3	58.0	61.0	61.1	77.8	77.3	77.1	62.7	66.7		**81.9**

Distance Decay

The majority of the surrounding land to dwellings is hard and reasonably flat, with some areas of grass / soft land a difference in elevation of approximately 0-1m. The correct formula for distance decay from a point source where the intervening ground between sources and receptor is hard is *Decay = 20 x log (Distance Ratio) dB.*

Item	Receptor (North)	Decay (North)	Receptor (South)	Decay (South)	Receptor (West)	Decay (West)
Inside Setting Corridor (Ext A)	110	29.3	210	34.9	170	33.0
Roof Void of Setting Corridor, Roaming (Ext A)	110	29.3	210	34.9	170	33.0
Office & Canteen (Ext B)	80	35.3	150	29.7	80	24.3
Egg Room (Ext C)	60	28.8	210	39.6	80	31.3
Basket Room (Ext D)	130	31.6	175	34.2	145	32.5
Drivers Building	75	31.7	250	42.1	160	38.3
Roof Transmission from Ext A	130	20.1	240	25.5	200	23.9

Barrier Effect

For sources that benefit from barrier effect, the following attenuation spectrum is used:

Frequency	31.5	63	125	250	500	1000	2000	4000	8000
Attenuation (dB)	5.35	5.69	6.30	7.36	9.04	11.34	14.09	17.04	20.00

Refraction

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000
Refraction from Ext A Roof Transmission	2	3	4	4	5	5	6	6	6

Main Building Fan Calculation

Calculations are shown for fan sound reaching the nearest dwellings:

A Weighted Source Spectra										
Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**		**dBA**
SWL fan										**75.0**
Axial Fan Correction	-7	-9	-7	-7	-8	-11	-16			
A Weights	26.2	16.1	8.6	3.2	0	1.2	1			
dB Linear SWL	94.2	82.1	76.6	71.2	67.0	65.2	60.0			
dBA SWL	68.0	66.0	68.0	68.0	67.0	64.0	59.0			**74.9**

Duct Attenuation / m

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
350mm square duct	0.6	0.5	0.4	0.3	0.25	0.22	0.22	0.22

Duct Length

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
350mm square duct	3	3	3	3	3	3	3	3

Duct Attenuation

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
350mm square duct	1.8	1.5	1.2	0.9	0.75	0.66	0.66	0.66

Termination

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
350mm square duct	12	7	4	1	0	0	0	0

SPL at Termination									
Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Reflections / Directivity	3	3	3	3	3	3	3	0	**11.5**
SPL at 1m	72.4	65.6	63.4	61.3	58.3	56.5	51.3	0.0	**74.1**
A weighted	46.2	49.5	54.8	58.1	58.3	55.3	50.3	0.0	**63.4**

Fan Sound at Dwelling to North

Distance Decay

Fan 1

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**2**	**3**	**3**	**4**	**4**	**5**	**5**	
Decay	39.08485	39.08485	39.08485	39.08485	39.08485	39.08485	39.08485	
SPL at Dwelling	31.3	23.5	21.3	18.2	15.2	12.5	7.3	
A weighted	5.1	7.4	12.7	15.0	15.2	11.3	6.3	**20.4**

Fan 2

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**2**	**3**	**3**	**4**	**4**	**5**	**5**	
Decay	40	40	40	40	40	40	40	
SPL at Dwelling	30.4	22.6	20.4	17.3	14.3	11.5	6.3	
A weighted	4.2	6.5	11.8	14.1	14.3	10.3	5.3	**19.5**

Fan 3

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**3**	**3**	**4**	**5**	**5**	**6**	**6**	
Decay	40.82785	40.82785	40.82785	40.82785	40.82785	40.82785	40.82785	
SPL at Dwelling	28.6	21.8	18.6	15.5	12.4	9.7	4.5	
A weighted	2.4	5.7	10.0	12.3	12.4	8.5	3.5	**17.7**

Fan 4

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**3**	**3**	**4**	**5**	**5**	**6**	**6**	
Decay	41.58362	41.58362	41.58362	41.58362	41.58362	41.58362	41.58362	
SPL at Dwelling	27.8	21.0	17.8	14.7	11.7	9.0	3.8	
A weighted	1.6	4.9	9.2	11.5	11.7	7.8	2.8	**17.0**

Fan 5

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**3**	**3**	**4**	**5**	**5**	**6**	**6**	
Decay	42.27887	42.27887	42.27887	42.27887	42.27887	42.27887	42.27887	
SPL at Dwelling	27.1	20.3	17.1	14.0	11.0	8.3	3.1	
A weighted	0.9	4.2	8.5	10.8	11.0	7.1	2.1	**16.3**

Fan 6

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Refraction & Barrier Effects	**3**	**3**	**4**	**5**	**5**	**6**	**6**	
Decay	42.92256	42.92256	42.92256	42.92256	42.92256	42.92256	42.92256	
SPL at Dwelling	26.5	19.7	16.5	13.4	10.3	7.6	2.4	
A weighted	0.3	3.6	7.9	10.2	10.3	6.4	1.4	**15.6**

Total Fans

Item / Frequency (Hz)	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
SPL at Dwelling	36.8	29.5	26.8	23.7	20.6	17.9	12.7	
A weighted	10.6	13.4	18.2	20.5	20.6	16.7	11.7	**25.9**

Fan sound received at other (less onerous) dwellings is calculated using the same process with different quantities. The results are omitted here for conciseness, but are available upon request.

HGV Change in Sound Level

Dwelling to North

Description	Current	Proposed	Increase
LWA	102	102	102
Q (no. movements per hour)	2	3	1
V, kmh	16	16	16
d (distance)	150	150	150
a (angle of view)	70	70	70
Shielding	10	10	10
Overall SPL, dB $LA_{eq,1hour}$	24.1	25.9	21.1

Dwelling to South

Description	Current	Proposed	Increase
LWA	102	102	102
Q (no. movements per hour)	2	3	1
V, kmh	16	16	16
d (distance)	130	130	130
a (angle of view)	40	40	40
Shielding	10	10	10
Overall SPL, dB $LA_{eq,1hour}$	22.3	24.1	19.3

Dwelling to West

Description	Current	Proposed	Increase
LWA	102	102	102
Q (no. movements per hour)	2	3	1
V, kmh	16	16	16
d (distance)	120	120	120
a (angle of view)	45	45	45
Shielding	10	10	10
Overall SPL, dB $LA_{eq,1hour}$	23.2	24.9	20.1

Specific Sound Levels

Specific Sound Level, dB LA_{eq}

Item	Dwelling to North	Dwelling to South	Dwelling to West
Inside Setting Corridor (Ext A)	18.2	3.2	5.0
Roof Void of Setting Corridor, Roaming (Ext A)	27.1	10.5	23.4
Office & Canteen (Ext B)	18.1	13.6	29.1
Egg Room (Ext C)	20.0	0.6	17.5
Basket Room (Ext D)	0.9	0	0.0
Drivers Building	23.6	2.8	17.1
Roof Fans	25.0	21.5	25.9
Roof Transmission from Ext A	31.1	25.7	27.3
HGVs on site	21.1	19.3	20.2

Specific Sound Level, dB LA_{eq}

Dwelling	Specific Level at Receptor, dB $LA_{eq,t}$
Dwelling to North	34.4
Dwelling to South	28.1
Dwelling to West	33.4

Background Sound Levels

The typical background sound levels are:

Weekday daytime 07.00 – 19.00	49 dB $LA_{90,15min}$
Weekend daytime 07,00 – 19.00	48 dB $LA_{90,15min}$
Evening 19.00 – 23.00	43 dB $LA_{90,15min}$
Night Time 23.00 – 07.00	38 dB $LA_{90,15min}$

Rating Levels

BS 4142 Rating Level, dB

Dwelling	Rating Level, Day & Evening dB	Rating Level, Night dB
Dwelling to North	34	36
Dwelling to South	28	28
Dwelling to West	33	34

Background Sound Level Comparison

Dwelling	Weekday	Weekend	Evening	Night
Dwelling to North	-15	-14	-9	-2
Dwelling to South	-21	-20	-15	-10
Dwelling to West	-16	-15	-10	-4

Tone Calculations

Inside Setting Corridor (Ext A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Source Level	63.4	62	63.8	61.6	62.4	59.9	63.9	63	63.9	62.3	61.9	61	67.2	63.6	58.8	63.5	61.6	59.4	56.5	47.3	46.2	45.6	50.1	51.2	49.1
Diff to band lower		1.4	1.8	2.2	0.8	2.5	4.0	0.9	0.9	1.6	0.4	0.9	6.2	3.6	4.8	4.7	1.9	2.2	2.9	9.2	1.1	0.6	4.5	1.1	
Diff to band higher		1.8	2.2	0.8	2.5	4.0	0.9	0.9	1.6	0.4	0.9	6.2	3.6	4.8	4.7	1.9	2.2	2.9	9.2	1.1	0.6	4.5	1.1	2.1	
Tone?		No	No	No	No	No	No	No	No	No	No	Yes	yes	No	No	No	No	No	Yes	yes	No	No	No	No	

Roof Void of Setting Corridor, Roaming (Ext A)	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000

Source Level	47.4	52.7	52.7	54.2	54.6	51.9	59.1	55.4	55	57.9	59.8	65.7	77.4	71.4	66.8	75.5	73.8	72.7	69.1	60	58	53.8	57.8	65.9	51.3
Diff to band lower		5.3	0.0	1.5	0.4	2.7	7.2	3.7	0.4	2.9	1.9	5.9	11.7	6.0	4.6	8.7	1.7	1.1	3.6	9.1	2.0	4.2	4.0	8.1	
Diff to band higher		0.0	1.5	0.4	2.7	7.2	3.7	0.4	2.9	1.9	5.9	11.7	6.0	4.6	8.7	1.7	1.1	3.6	9.1	2.0	4.2	4.0	8.1	14.6	
Tone?		No	No	No	No	No	No	No	No	No	Yes	yes	yes	yes	Yes	yes	No	No	Yes	yes	No	No	Yes	yes	

Office & Canteen (Ext B)	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**	**6300**	**8000**	**10000**
Source Level	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diff to band lower		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Diff to band higher		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tone?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	

Egg Room (Ext C)	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**	**6300**	**8000**	**10000**
Source Level	66.7	66.7	67.2	62	62.4	70.9	67.8	66.4	62.8	60.4	61.1	58.9	65	55.5	54.7	61.6	56	56.2	62.5	52.7	51.4	46.1	46.2	48.1	43.1
Diff to band lower		0.0	0.5	5.2	0.4	8.5	3.1	1.4	3.6	2.4	0.7	2.2	6.1	9.5	0.8	6.9	5.6	0.2	6.3	9.8	1.3	5.3	0.1	1.9	
Diff to band higher		0.5	5.2	0.4	8.5	3.1	1.4	3.6	2.4	0.7	2.2	6.1	9.5	0.8	6.9	5.6	0.2	6.3	9.8	1.3	5.3	0.1	1.9	5.0	
Tone?		No	No	No	No	yes	No	No	No	No	No	Yes	yes	yes	Yes	yes	yes	Yes	yes	yes	Yes	yes	No	Yes	

Basket Room (Ext D)	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**	**6300**	**8000**	**10000**
Source Level	57.3	55.2	59.2	57.2	58.5	58.8	57.4	61.6	60.6	54.7	55.8	55.6	55	54.5	53.8	53.8	53.7	54.5	60.3	65	60.6	52.1	47.6	44	41.5
Diff to band lower		2.1	4.0	2.0	1.3	0.3	1.4	4.2	1.0	5.9	1.1	0.2	0.6	0.5	0.7	0.0	0.1	0.8	5.8	4.7	4.4	8.5	4.5	3.6	
Diff to band higher		4.0	2.0	1.3	0.3	1.4	4.2	1.0	5.9	1.1	0.2	0.6	0.5	0.7	0.0	0.1	0.8	5.8	4.7	4.4	8.5	4.5	3.6	2.5	
Tone?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	yes	No	Yes	yes	No	No	
