

Acoustic Associates Sussex Ltd

Discharge of condition Noise Assessment

Site: Babsham Farm, Babsham Lane, West Sussex, PO21 5EL
Client: The Church Commissioners for England

Report by: Martyn Chambers BA (Hons), PGDip: Acoustics, AMIOA

Date: 18/09/2020

Project: J2939

Issue 1



Acoustic Associates



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1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment to support a discharge of condition in regards to a change of use planning application (Application Ref: BE/89/19/PL). The application is to change an agricultural site to land to be used for the storage of building materials, equipment & plant and for the parking for fixed body vehicles, (classification B8). The site is located at Babsham Farm, Babsham Lane, West Sussex, PO21 5EL.

The site has gained conditional planning approval. Condition 3 of the decision notice relates to noise. Condition 3 can be seen below

“Within three months of the date of this permission an acoustic assessment shall be undertaken to determine the impact of noise arising from the development site and the results of the assessment and details of any mitigation measures submitted and approved in writing by the Local Planning Authority. Noise from commercial premises should be controlled, such that the noise rating level ($L_{Ar,Tr}$) emitted from the development does not exceed the background noise level ($L_{A90,T}$), by more than 3dB. All measurements shall be defined and derived in accordance with BS 4142:2014. The approved measures shall be implemented within three months of the date of approval of the details by the Local Planning Authority and thereafter be maintained in accordance with the approved details”

The purpose of the assessment was as follows:

- Measure and assess residual and background noise levels
- Assess noise levels created by commercial activities on the site and determine impact
- If necessary, provide mitigation measures to ensure that the impact of the new plant remains low.

Standards and guidance referenced for this assessment include:

- ISO9613 (Attenuation of sound during propagation outdoors) 1996
- National Planning Policy Framework (NPPF) 2019
- BS4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound
- BS5228-1-2009+A1-2014 - Code of practice for noise and vibration control on construction and open sites. Noise
- Sussex Planning Guidance - Noise 2015

A class one sound level meter has been used to measure representative background sound levels at the application site. The survey data was also used assess ambient noise levels at the location.

An assessment was conducted into the worst-case hour of the activities conducted on the site. This assessment has been conducted in accordance with methodology stated in BS4142:2014+A1:2019. The resulting calculations show that the predicted rating level is below the level stipulated by the planning condition. At the worse affected noise sensitive receptor (NSR), Lindisfarne, the predicted sound level would be 0.5dB(A) below the criterion, which is background sound level +3dB.

With the worst-case hour deemed to be below the level specified by condition of the decision notice, the report concludes that there is no reason that this condition cannot be discharged.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

The site is based off Babsham Lane near Bognor Regis. It was previously agricultural land but has been converted into a storage area for building materials, equipment & plant and for the parking for fixed body vehicles. Acoustic Associates Sussex have been informed by the client that the site is likely to be used for a maximum of 3 hours a day. These will approximately be:

- 07:00 -08:00
- 12:00-13:00
- 16:30-17:30

These times may vary, dependant on working schedule of the proprietors of the site, however this has been stated by the client to be a worst-case scenario. The site will only be used Monday to Friday and only within the day time period from 07:00 to at the latest 19:00 The main source of noise generated by the activities at the site will be the loading and unloading of vehicles, combined with their arrivals and departures. There are currently plans for any fixed plant to be running continuously at the site or for fork lifts to be used in the loading/unloading process. Most of the loading and unloading will be conducted by hand. However, Acoustic Associates Sussex have been informed a grab truck is used on a bi weekly basis. The application site is also proposing to upgrade the security at the site to install a 2m high security fence running around the perimeter.

The soundscape at site is currently dominated by fixed and mobile plant operating in the unit directly behind the application site. Traffic noise from the A259 is also clearly audible at the location. The nearest noise sensitive receptors (NSR's) are approximately 50m west of the site on Babsham lane. A site plan location map, and proposed site layout can be seen below in figure 1 and 2.

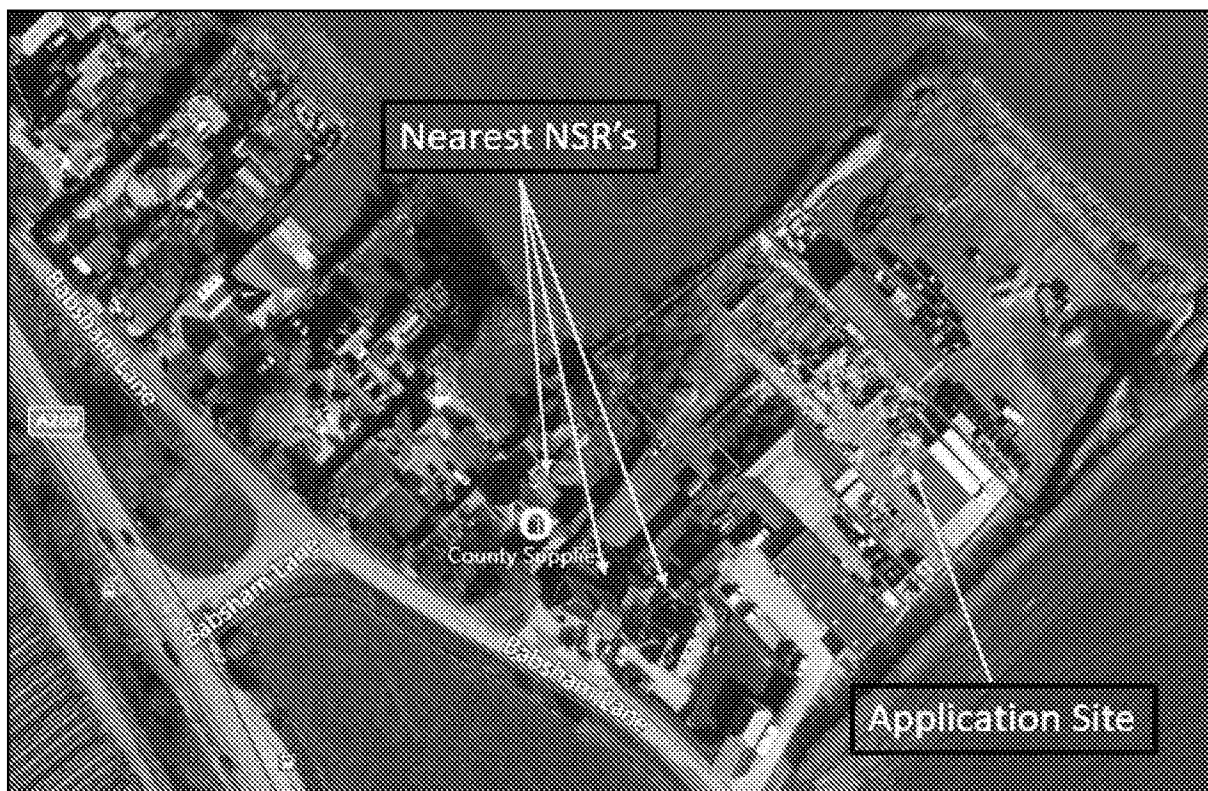


Figure 1: Site location plan

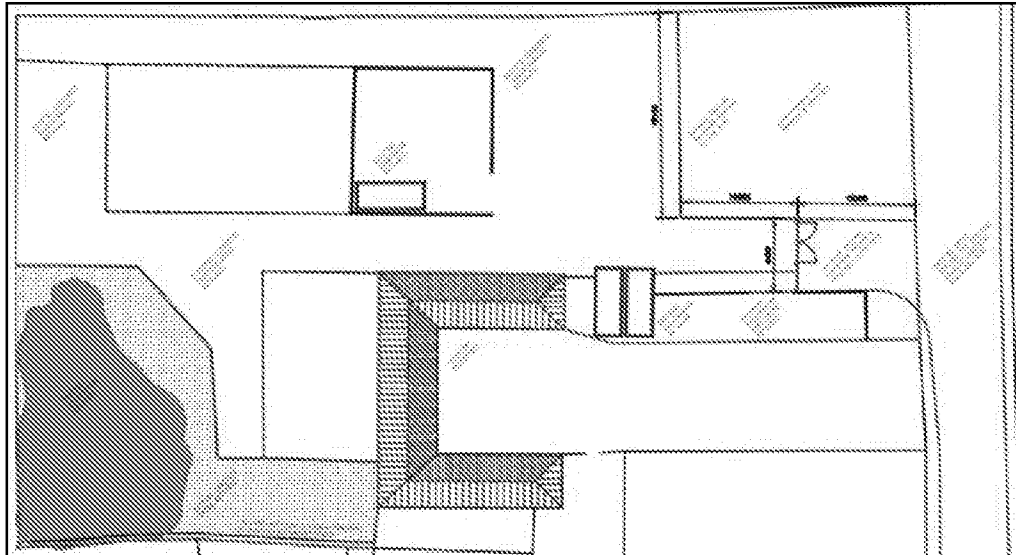


Figure 2: Proposed Site layout

3 Methodology and Approach

A sound survey was conducted at the site at a location near to the closest NSR to establish the current background level. The site is already being used by contractors to store goods and materials; therefore, aspects of the recorded data would not be representative of the residual sound level as they would be influenced by the noise created on the site. A diary was therefore kept by the client marking down the occasions during the survey period when the site was used by the present contractors, it is then possible to remove the hours when current site usage may have influenced the soundscape from the data set.

The hours that site was used for the delivery and collection of building goods, can then be compared against comparable hours when no one was on site to see if there is a rise in the sound level at the site.

It is also possible that the use of the site may increase going forward. The current report will use representative data to predict how an increase in the usage of the site would align with condition 3 of the planning notice.

Within the methodology of BS4142:2014+A1:2019, the practice of conducting on-time corrections is discussed. This practice takes into account that a noise source may not operate for the entire assessment period. However, to guard against the increase in the use of the site, the current report will consider a worst-case hour not the full 16-hour daytime assessment period stated in BS4142:2014+A1:2019. It stands to reason that if the sound pressure levels for one hour are in line with condition 3 of the decision notice then when corrected for a 16-hour period they would be further below the maximum sound level stated within the condition

The report will assess the loudest activity conducted on site which is the use of a Grab Truck to load or unload goods onto the site, as the sound levels from this equipment will be far higher than the use of manual handling techniques. The report will also take into account noise levels from arrivals and departures from the site.

4 Relevant Standards and Guidance

4.1 National Planning Policy Framework 2019

The National Planning Policy Framework (June 2019) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The following paragraphs are relevant within NPPF Section 15 (Conserving and enhancing the natural environment) states the following:

Paragraph 170(e) - preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 180-Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

Paragraph 182 - Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

4.2 BS4142: 2014+A1:2019: Methods for rating and assessing industrial and commercial sound

This document provides a means of assessing the impact of industrial or commercial sound upon nearby noise-sensitive receptors, including residential properties.

It does this by comparing the Rating Level of the noise from the industrial or commercial source with the pre-existent L_{90} background noise level affecting the same noise-sensitive premises. The Standard provides guidance that:

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

4.3 Planning Noise Advice Document: Sussex dated July 2015

Sussex Planning Noise Advice Document dated July 2015 in 2.2.1 states that “The rating level of the plant, when measured in accordance with BS4142:2014, should, where practicable, be no greater than the existing background levels when measured in accordance with BS4142:2014”.

4.4 Target Noise Level

From reviewing the above standards and guidance, this report concludes in order for noise levels from the fan system to be deemed acceptable, then after all corrections have been made in line with BS4142: 2014+A1:2019, then $L_{Ar,Tr}$ must not exceed 3dB(A) above background at the facade of the nearest resident. Upon demonstrating this, it would be deemed to be compliant with Condition 3 of the decision notice.

5 Noise Survey Baseline Conditions and Results

A noise survey was carried out from the 3rd September to the 8th of September 2020 in order to assess the soundscape of the site. The microphone placement was chosen so that it was close to nearest NSR, and was on top of a monopole which was approximately 3m in height in free field conditions.

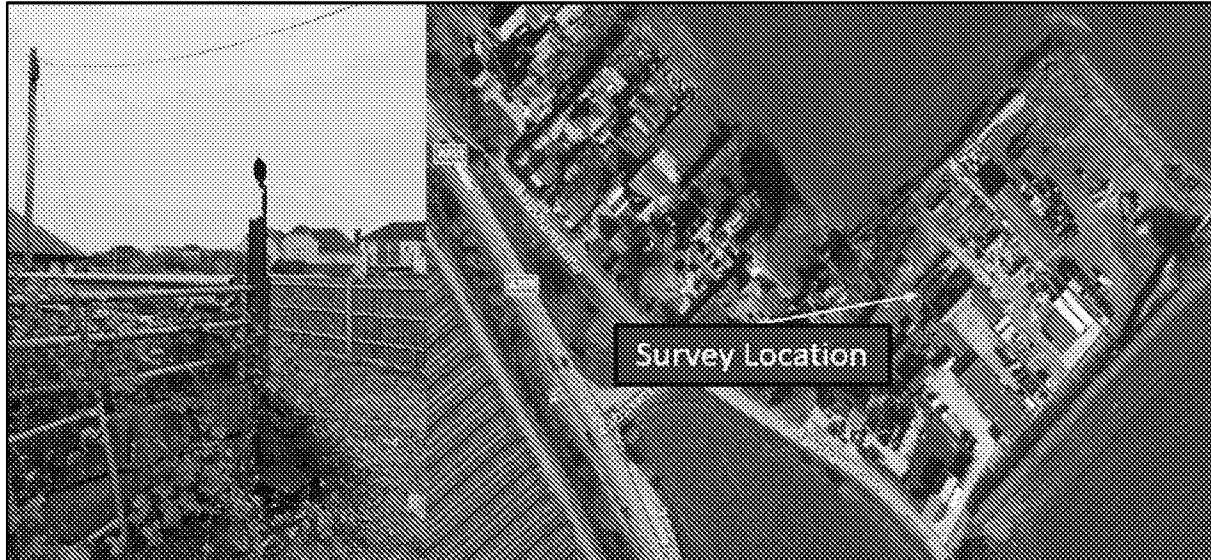


Figure 3: Survey Location

5.1 Baseline Conditions

- Survey carried out by:
 - Martyn Chambers BA (Hons) PGDip: Acoustics AMIOA
- Equipment used:
 - Castle Mirus GA117
 - Maplins Easy Weather Station

The Meter was calibrated before and after commencing the noise measurements (@94dB no drift).

5.2 Weather Conditions

Weather conditions were mostly dry and below 5ms in terms of wind speed. It has not been necessary to remove any measurements from the survey due to weather conditions.

The figure below shows the wind measurements during the survey period. The below red line is average wind speed and the red is gusts.

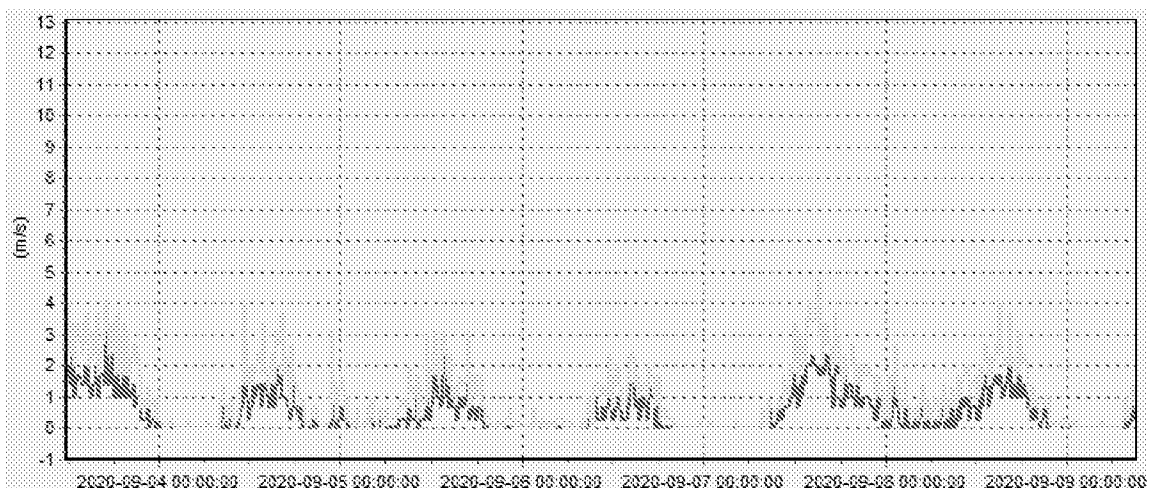


Figure 4: Wind Speed during survey period

5.3 Noise Survey Results

The survey data has been used to calculate the 16hr day time period sound levels. Table 1 below shows the entire day noise levels that were measured at the survey position, this includes times when the application site was in use.

Date (2020) September	Day	Time Period	Free field Level $L_{Aeq,16hr/8hr}$ dB(A)
3 rd	Friday	07:00-23:00hrs	50.9
4 th	Saturday	07:00-23:00hrs	51.3
5 th	Sunday	07:00-23:00hrs	48.9
6 th	Monday	07:00-23:00hrs	51.1
7 th	Tuesday	07:00-23:00hrs	49.7
8 th	Wednesday	07:00-23:00hrs	52.4
Average	All days	07:00-23:00hrs	50.7

Table 1: Survey Noise Levels

5.4 Representative Background Sound Levels

As mentioned previously in the report the site is already being used for the storage of building materials therefore the results shown in table 2 above contain both residual and ambient sound levels. The proprietors of the site kept a record as to when they used the site during the period of the sound survey, the details that were provided to Acoustic Associates regarding these times are as follows:

- Weekday Mornings: Between 07:00 and 08:00, generally only for 10minutes
- Midday on weekdays: Between 12:00 and 13:00, generally only for 15minutes
- Weekday Afternoons: Between 16:30 and 17:30, generally only for 15minutes

These time frames have been marked on the below graph show $L_{Aeq,1hr}$ of the survey data.

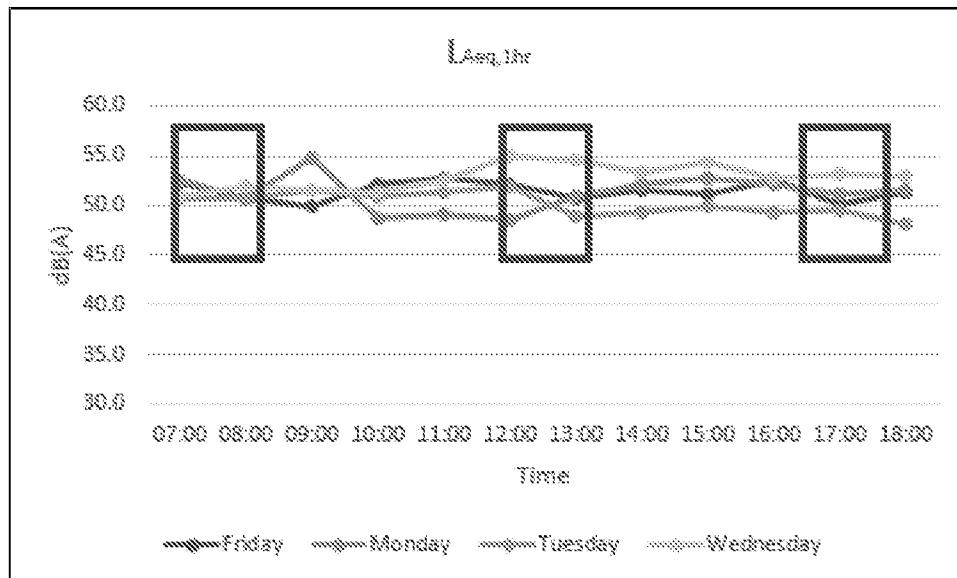


Figure 5: $L_{Aeq,1hr}$ marked with period used during sound survey

With so many noise sources influencing the acoustic environment at the site, the above graph does not show a specific trend as between when the site was being used compared to when it was not used. Therefore, two statistical analyses have been conducted, one showing the L_{A90} with the site in use, the other has the time periods marked in figure 5 removed from the data set.

A statistical analysis to establish the most commonly occurring value for the day and night time periods was conducted. This has been completed using that L_{A90} statistical value. L_{A90} is the A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. For the current report the statistical analysis will establish the background noise level that noise from the application site must not exceed by 3dB(A).

Figure 6 below shows the statistical analysis that includes data for when the site was in use by the present tenants. Figure 7 shows the statistical analysis for only hours when the site was not in use, i.e: only residual sound levels.

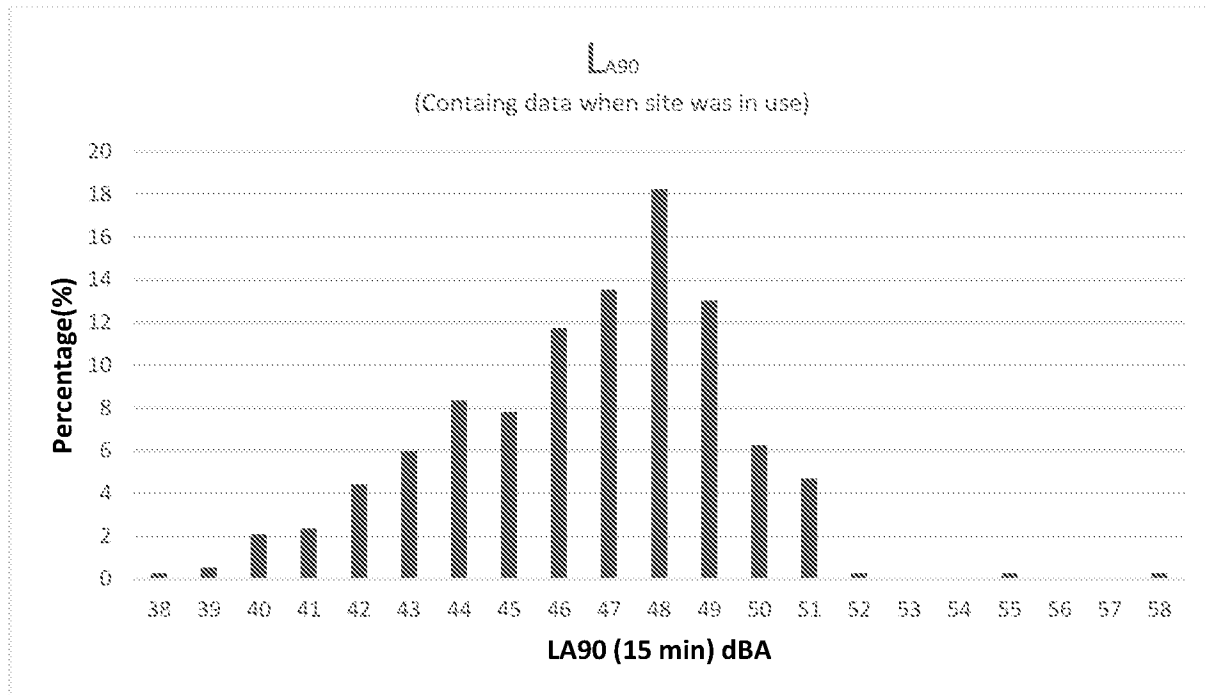


Figure 6: L_{A90} statistical analysis including data from when the site was in use

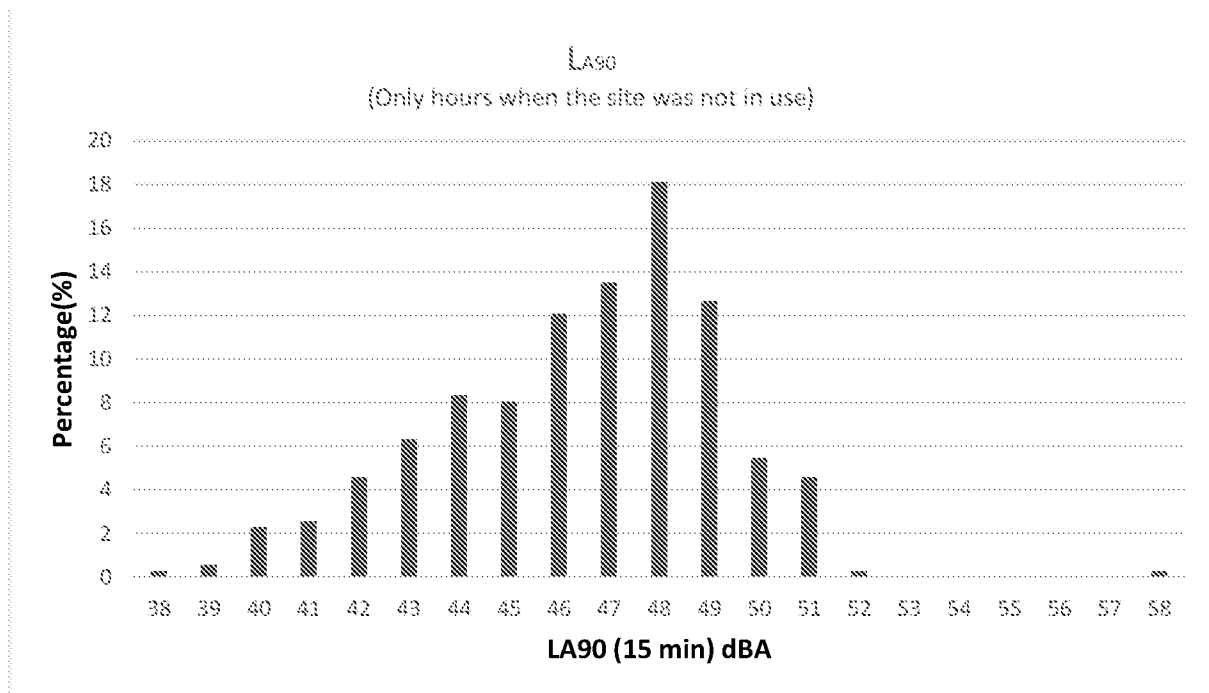


Figure 7: L_{A90} statistical analysis of only residual sound levels

To ensure a robust assessment, a time history of the $L_{A90, 15min}$ measurements during the periods has been plotted to demonstrate the fluctuations of sound over the full daytime period. The below figure 8 shows the $L_{A90, 15min}$ time history with the data included from when the site was in use. Figure 9, has the times when the site was in use removed for ease of contrast.

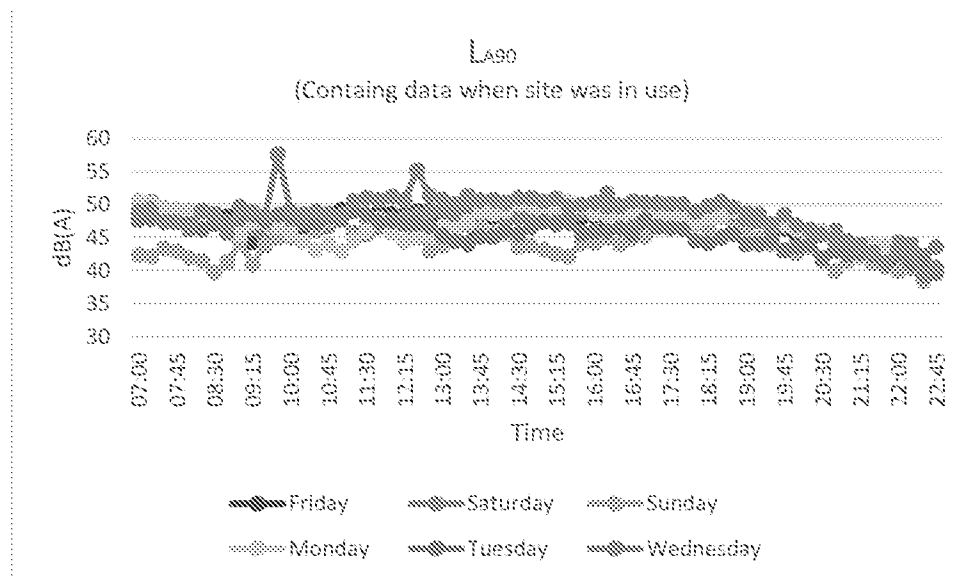


Figure 8: $L_{A90, 15min}$ time history including data from when the site was in use

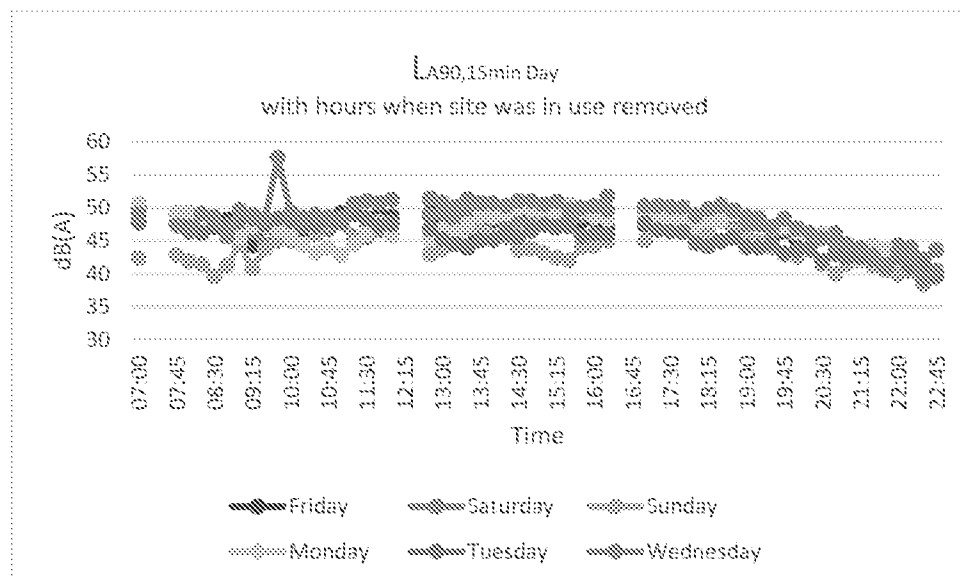


Figure 9: $L_{A90, 15min}$ time history with only residual sound levels

As can be seen from the graphs in figures 8 and 9 there is minimal variance between times when the site was in use compared to when it was not. The only obvious variance was a spike at 12:30 on the Wednesday the 8th, Acoustic Associates Sussex has not been able to ascertain if this was due to activity on the site, or if the peak was caused by another sound sources.

However, as there is an obvious dominant sound level at the site shown by the statistical analysis shown in both figure 6 and 7. These results would imply the dominant noise source at the site is coming from fixed plant running at a steady level, before being turned off in the evenings. This would also coincide with Acoustic Associates Sussex subjective assessment on site, where an undefined fixed plant equipment in the unit behind the application site dominates the soundscape.

5.5 Summary of Background Sound Levels at the site

The most frequently occurring residual sound levels (without site in use) for the daytime period is 48dB LA90, 15 minutes. Therefore, at the closest noise NSR the specific sound pressure level should not exceed 3dB(A) above this level, i.e. 51dB(A), in order for it to be compliant with condition 3 of the planning decision.

6 Grab Truck Measurements

Upon setting up of the sound survey a Grab Truck was used to collect excess materials from the existing container. Acoustic Associates was informed that at maximum this process would last 30mins. A LAeq,5min measurement was taken during the process at 5 meters from the rear of the Grab Truck. The measurement location can be seen below in-figure 10.

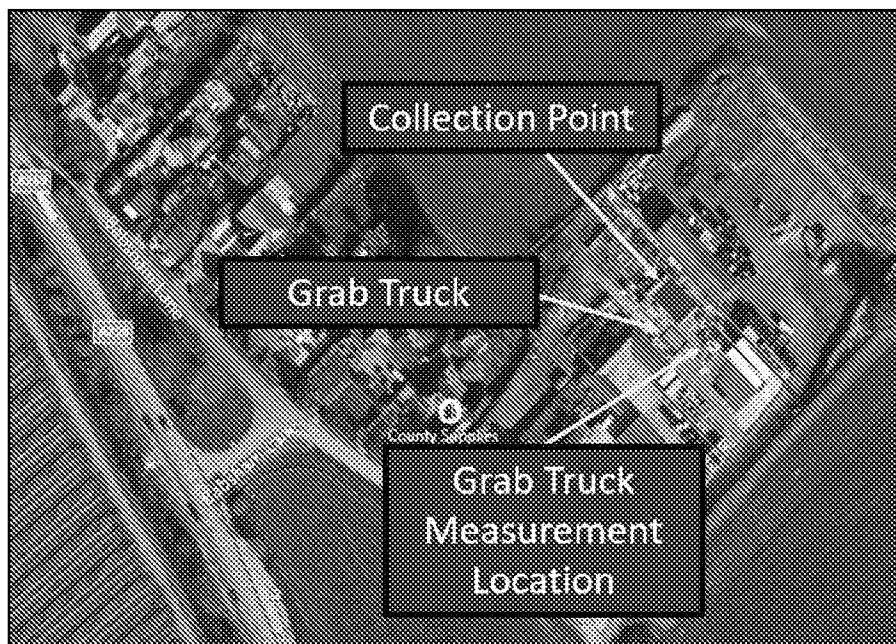


Figure 10: Grab Truck Measurement Location

Once the grab truck had completed its work a background measurement was conducted. This has been used to correct the measurement from the influence of the plant in the adjacent plot, by logarithmically subtracting the residual noise measurement from the ambient measurement taken with the grab truck in use, to leave the specific sound pressure levels for the grab truck. The unweighted frequency spectrum for the grab truck can be seen below in table 2.

63Hz	125Hz	250Hz	500Hz	1.0kHz	2.0kHz	4.0kHz	8.0kHz	16kHz	SUM dB(L)
76.4	71.0	71.8	68.2	68.4	66.4	61.5	52.5	45.3	79.6

Table 2: Unweighted Grab Truck specific noise level frequency spectrum

7 Vehicle Movements

It is proposed to provide parking for 8 fixed body vehicles on the application site, an assessment of the arrivals and departures and their effect on the NSR's needs to be included in a robust noise assessment.

Noise measurements were conducted onsite of the arrival and departure of two 3.5 tonne vehicles.

For the vehicle passes, the noise from the vehicle was measured in free-field conditions at the point shown in the below figure 11.

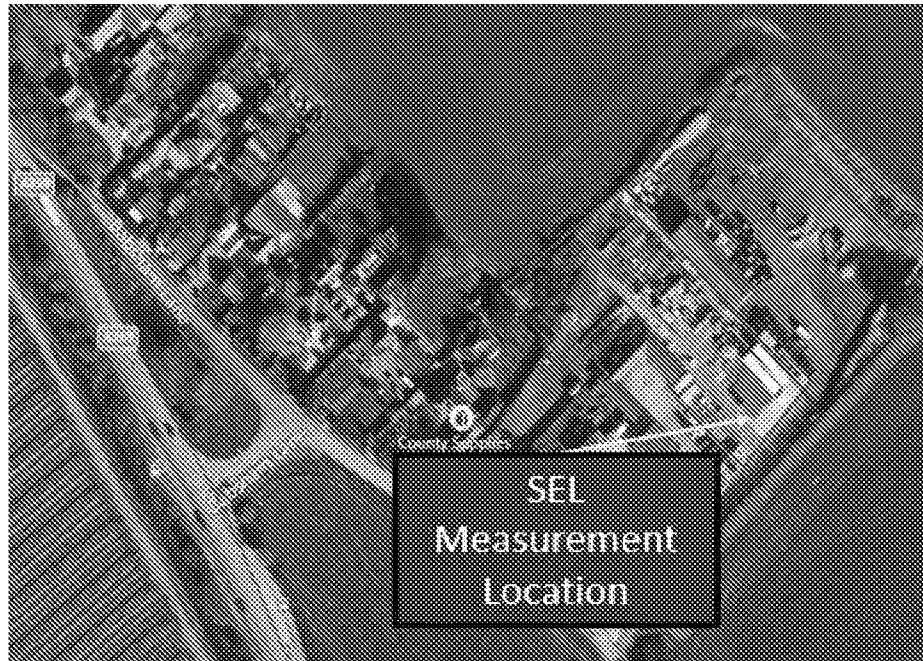


Figure 11: SEL measurement position

The arrival measurements commenced the moment the vehicle could be heard approaching the site and continued until the moment the vehicle was parked. Leaving the site, the measurement started when the engine was turned on, the vehicle manoeuvred and finished the moment it had left the site and was no longer audible. The measurements are shown below in table 3.

Measurement	SEL
Arrival	74.3
Departure	72.8
Logarithmic Average	73.8

Table 3: Vehicle Noise Measurements

The logarithmic average has been used in the subsequent calculations.

To help understand the following calculations the definitions (Taken from BS8233:2014 and CRN,1995 respectively) have been provided:

- $L_{Aeq,T}$ Is the value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound, that within a specified time interval, T, has the same mean-squared sound pressure as a sound that varies with time.
- Sound Exposure Level (SEL) the level at a reception point which, if maintained for a period of 1 second, would cause the same A-weighted sound energy to be received as it is actually received from a given noise event.

7.1 Vehicle Noise Level

The site will provide parking for up to 8 vehicles. As the current report is considering a worst-case hour, a realistic maximum is to anticipate that there would be 8 traffic movements within a single hour. Therefore, a realistic scenario of 4 arrivals and 4 departures within an hour has been calculated.

The measured SEL and the information regarding the number of vehicle movements can be used to predict the $L_{Aeq, 1\text{ hour}}$.

$$L_{Aeq, 1\text{ hour}} = SEL - 10\log T + 10\log N$$

- $N =$ no. of movements (8)
- $T =$ no. of seconds in period (3600 seconds in an hour)

The predicted worst-case hour traffic noise levels can be seen below:

$$L_{Aeq, 1\text{ hour}} = 73.8 - 10\log (3600) + 10\log (8) = 47.3 \text{ dB (A)}$$

As such a line source (to represent the vehicle tracks into and out of the site) calibrated to emit 47.8 dB(A) at the measurement location will be added to the computer model, shown in the later section, to represent traffic movement from the site.

8 Noise Modelling Software

In order to see how noise varies at different positions around the application site it is possible to produce a noise contour map. A computer noise model has been completed using the computer package IMMI. Drawings of the area have been used to complete the noise models and the topography of the location recreated. IMMI faithfully implements the propagation method of ISO-9613:1996; Acoustics – Attenuation of sound during propagation outdoors.

Section 6 discussed the measurements of a grab truck the loudest known noise source at the site. It is not possible from the measurements to distinguish the noise from the grab and drop of the collection process from the noise of the motor and mechanical element. Therefore, two area sources have been created within the IMMI noise model to represent the truck and container from where the grabbing took place. These areas have both been assigned the frequency spectrum shown in table 2 and adjusted until a reception point at the measurement location matched the measured level.

Following the calculations discussed in section 6, a line source calibrated to emit 47.3 dB(A) at the SEL measurement location was added to the model to represent traffic movements.

Reception points (RPs) for the nearest NSR's were added to the model. RPs were predicted for the day (Model says dB but levels are actually dBA values). The noise contour model can be seen below in figure 12 and the results shown in table 4.

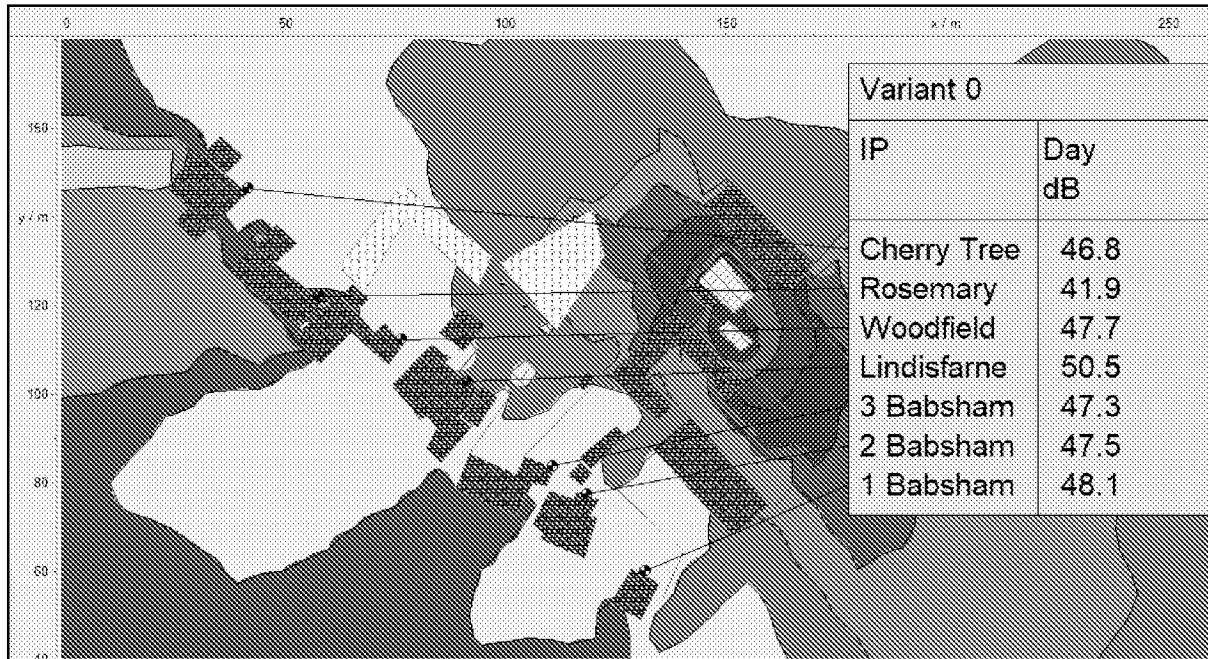


Figure 12: Worst-case house noise model

NSR	L _{Aeq} 1-hour
3 Babsham Lane	47.3
2 Babsham Lane	47.5
1 Babsham Lane	48.1
Woodfield	47.7
Lindisfarne	50.5
Rosemary	41.9
Cherry Tree	46.8

Table 4: Noise Model results

The result show that Lindisfarne is likely to be the worst affected NSR

9 Corrections to be Considered

9.1 Impulsivity and on-time corrections

The key feature of the collecting and moving of goods would be impulsivity. Therefore, a 3dB penalty will be added for this acoustic feature.

Acoustic Associates have been informed that the longest the grab truck takes to conduct its work is 30 minutes, therefore an on-time correction of -3dB has been applied as the plant is only ever used for half the worst-case hour assessment period.

10 Noise Levels and Character Corrections Summary

Table 5 below summarises the BS4142:2013:A1:2019 assessment made. It stands to reason if the noise level from the proposed site usage is within the standards for the closest NSR, then the noise levels at more distant locations will be further below the required level.

Results	Measurement Parameter		Relevant Clause
Specific sound level (corrected)	L _{Aeq} , 1 hour	50.5	7.3.4
Ontime correction	L _{Aeq} , 1 hour	- 3	7.3.14
Acoustic feature correction	Impulsivity	+ 3	9.2
Rating level		50.5	9.2
Background sound level Day + 3dB	L _{A90}	51	8
Excess of rating level over Background sound level Day + 3dB	Day	-0.5	11
Assessment indicates a:	Low to no impact depending on context		11
Uncertainty of the assessment	Discussed		10

Table 5: BS4142:2013:A1:2019 assessment summary

10.1.1 Results

Lindisfarne (Nearest Residential)

- Day-Time Period = **-0.5dB** below the criterion level set by the Noise Condition

This shows the sound level from the worst-case hour would be below the level stipulated in condition 3 of the planning decision notice, and therefore compliant with the condition.

11 Discussion and Uncertainty

The main uncertainty is the use of the site itself; the storage of building material is variable with numerous methods of loading and unloading goods and supplies. The regularity of visits to the site could also vary at points going forward. To guard against this uncertainty the current report has used sound levels from the loudest noise source proposed to be used for the movement of building materials, and compared these levels against a condensed time period. This methodology shows the sound levels at the site are acceptable even when they are at their highest, and that if the site was used more regularly in some periods it would still be below the levels stated within the condition.

It should also be noted that the site is currently used for the storage of building materials, and was during the current report's noise survey, however minimal variation was shown between the levels when the site was occupied compared to when it was not in use.

12 Conclusion

Acoustic Associates have been appointed to undertake an acoustic assessment to support a discharge of condition in regards to a change of use planning application (Application Ref: BE/89/19/PL). The application is to change an agricultural site to land to be used for the storage of building materials, equipment & plant and for the parking for fixed body vehicles, (classification B8). The site is located at Babsham Farm, Babsham Lane, West Sussex, PO21 5EL.

The site has gained conditional planning approval. Condition 3 of the decision notice relates to noise. Condition 3 can be seen below

“Within three months of the date of this permission an acoustic assessment shall be undertaken to determine the impact of noise arising from the development site and the results of the assessment and details of any mitigation measures submitted and approved in writing by the Local Planning Authority. Noise from commercial premises should be controlled, such that the noise rating level ($L_{Ar,T}$) emitted from the development does not exceed the background noise level ($L_{A90,T}$), by more than 3dB. All measurements shall be defined and derived in accordance with BS 4142:2014. The approved measures shall be implemented within three months of the date of approval of the details by the Local Planning Authority and thereafter be maintained in accordance with the approved details”

An assessment was conducted into the worst-case hour of the activities conducted on the site. This assessment has been conducted in accordance with methodology stated in BS4142:2014+A1:2019. The resulting calculations show that the predicted rating level is below the level stipulated by the planning condition. At the worst affected noise sensitive receptor (NSR), Lindisfarne, the predicted sound level would be 0.5dB(A) below the criterion, which is background sound level +3dB.

With the worst-case hour deemed to be below the level specified by condition 3 of the decision notice, the report concludes that there is no reason that this condition cannot be discharged.