Burger King

Wombwell Lane
Barnsley
S70 3NS

Plant Noise Impact Assessment

On behalf of

chapman ventilation

Project Reference: 92277 | Revision: 01 | Date: 3rd April 2024
Revised: 17th July 2024

T: 01252 519881
W: noisesolutions.co.uk
E: hello@noisesolutions.co.uk
Noise Solutions Ltd, Unit 5, Oriel Court, Omega Park, Alton, GU34 2YT Reg no. 3483481

Document Information

Project Name	:	**Burger King, Barnsley**
Project Reference	:	**92277**
Report Title	:	**Noise Impact Assessment**
Doc Reference	:	**92277/NIA/Rev1**
Date	:	**3rd April 2024**

	Name	Qualifications	Initials	Date
Prepared by:	Adam Meakins	AMIOA	ACM	3rd April 2024
Reviewed and approved by:	Nigel Chandler	BSc(Hons), MIOA	NAC	3rd April 2024
For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
1	17/7/2024	Include client comments	ACM	JS

Reg no. 3483481 Trading office Unit 5, Oriel Court, Omega Park, Alton, Hampshire, GU34 2YT

Contents

Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to provide a Noise Impact Assessment for new plant serving a proposed Burger King restaurant located along Wombwell Lane in Barnsley.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

1.3. The cumulative plant noise level has been predicted at the nearest noise-sensitive receptors and assessed against recognised standards.

1.4. A glossary of acoustic terminology is given in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

2.1. The Burger King restaurant is to be located within a new building along Wombwell Lane in Barnsley.

2.2. New ventilation, air conditioning (AC) and refrigeration plant will be located externally on the roof. Ventilation plant will comprise a supply AHU, a kitchen extract fan and a WC extract fan. Three air conditioning (AC) condensers and two catering condensing units will also be installed on the roof of the building.

2.3. All plant will run during the operational period 07:00 hours to 23:00 hours, with the exception of the catering condensing units which will run constantly.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is mainly commercial in nature. The nearest noise sensitive property (Receptor R1) will be the residential dwelling along Wombwell Lane 30m to the north of the nearest plant item.

3.2. **Appendix B** contains an aerial photograph showing the site and surrounding area, including the locations of the potential receptor identified above.

4.0 Existing noise climate

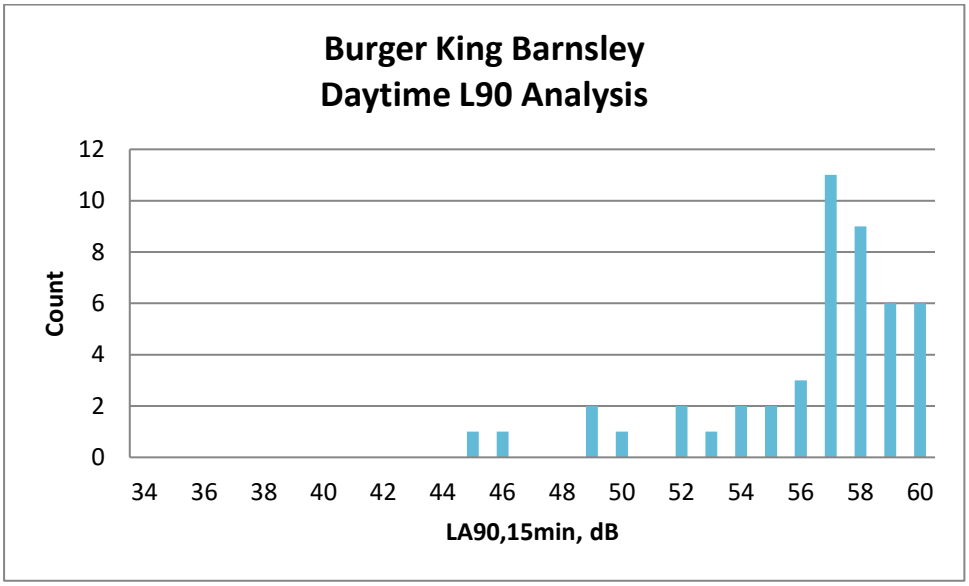
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix C**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime hours (07.00 – 23.00 hours)	56-65	68-93	60-67	45-60
Night-time hours (23.00 – 07.00 hours)	46-64	67-75	47-67	34-57

Figure 1 Histogram of daytime hours L_{A90} background sound pressure levels



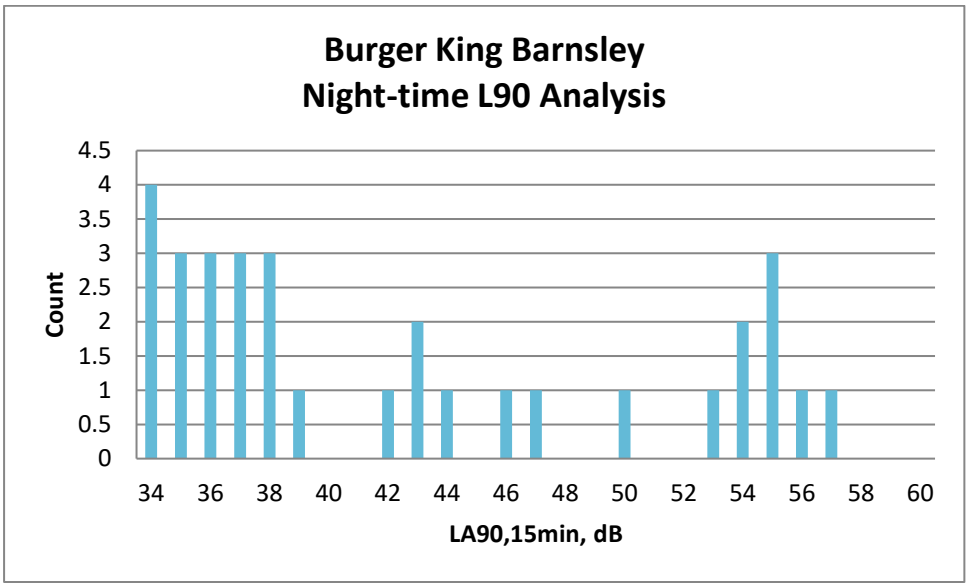
4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

Table 2 Statistical analysis of $L_{A90,15min}$ levels during daytime hours

dB, L_{A90} daytime period	
Mean	56
Mode	57
Median	57

4.4. From the histogram analysis, 49dB has been selected to be a robust representation of the background noise level during the daytime hours, at the survey location.

Figure 2 Histogram of night-time hours L_{A90} background sound pressure levels



4.5. Further statistical analysis has been carried out on the data and the mean and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time hours

dB, L_{A90} night-time period	
Mean	43
Mode	34
Median	39

4.6. Again, from the histogram analysis, 35dB has been chosen to be representative of the background sound level at the survey location, during the night-time hours.

4.7. The following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 49dB L_{A90} during the daytime hours; and
- 35dB L_{A90} during the night-time hours.

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. A new edition of the NPPF was published in December 2023 and came into effect immediately. The original National Planning Policy Framework (NPPF[1]) was published in March 2012, with subsequent revisions made periodically – this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The December 2023 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the December 2023 edition.

5.2. Paragraph 180 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land instability."*

5.3. The NPPF goes on to state in Paragraph 191:

"*planning policies and decisions 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 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 …

5.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE[2]).

5.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*

[1] National Planning Policy Framework, DCLG, March 2012
[2] Noise Policy Statement for England, DEFRA, March 2010

5.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed"*.

5.7. Paragraph 123 states that *"Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land".*

Barnsley Metropolitan Borough Council

5.8. Barnsley Metropolitan Borough Council's local plan was adopted in January 2019. The document requires noise from new developments to be assessed but does not refer to assessment methods or specific noise targets. A review of recent planning decisions for similar plant installations indicates that each case is judged individually and there are no "standard" noise requirements applied across the Borough.

5.9. It is therefore appropriate to assess noise from the proposed plant using the method described in BS 4142:2014+A1:2019.

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

5.10. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014+A1:2019 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

5.11. The procedure contained in BS 4142:2014+A1:2019 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.12. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.13. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

5.14. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*

5.15. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *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 sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

5.16. The standard does state that "*adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

5.17. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.18. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

5.19. BS 4142:2014+A1:2019 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Proposed criteria

5.20. In the absence of defined local authority requirements, it is considered appropriate that the rating noise level due to the new plant should not exceed the existing representative background sound level at the nearest residential windows. According to the method described in BS 4142:2014+A1:2019 this would result in, at worst, a "low impact":

Table 4 Plant noise emissions limits at the receptor boundary

Receptor	Period	Cumulative plant rating level, dB(A)
Residential	Daytime hours (07.00 – 23.00 hours)	49
	Night-time hours (23.00 – 07.00 hours)	35

6.0 External plant noise assessment

6.1. The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has taken into consideration distance attenuation and directivity corrections and the atmosphere-side attenuators shown in Table 5.

Table 5 Proposed atmospheric side attenuators to ventilation system

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
Supply (AHU1) – atmospheric	4	4	7	14	21	18	18	15
Kitchen Extract (EF1) – atmospheric	4	4	7	12	18	14	12	9
General Extract (EF2) – atmospheric	2	2	4	13	22	14	14	11

6.2. It should be noted that the proposed ventilation plant will operate during operational hours only and is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. To provide a robust assessment, a 3dB acoustic feature correction as described in BS 4142:2014+A1:2019 for the possible presence of "*...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...*".

6.3. Table 6 below, summarises the results of the assessment at the nearest receptor. All other receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in **Appendix E**. The predictions between 07.00 and 23.00 hours have been based on the proposed plant operating simultaneously at full capacity. The refrigeration plant only will operate between 23:00 and 07:00 hours.

Table 6 Assessment of predicted noise levels at nearest receptors

Receptor	Period	Predicted rating level at receptor, $L_{Ar,Tr}$ (dB)	Proposed design criterion (dB)	Difference (dB)
R1	Daytime hours (07.00 – 23.00 hours)	44	49	-5
	Night-time hours (10.00 – 23.00 hours)	31	35	-4

6.4. The above assessment demonstrates that noise from the proposed plant will result in noise levels below the proposed limits and should therefore be acceptable to the local authority.

Context and uncertainties

6.5. As BS 4142:2014+A1:2019 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
- It is to be appreciated that the BS 4142:2014+A1:2019 assessment relates to external noise levels only.

6.6. Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to provide a Noise Impact Assessment for new plant serving a proposed Burger King restaurant located along Wombwell Lane in Barnsley.

7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.

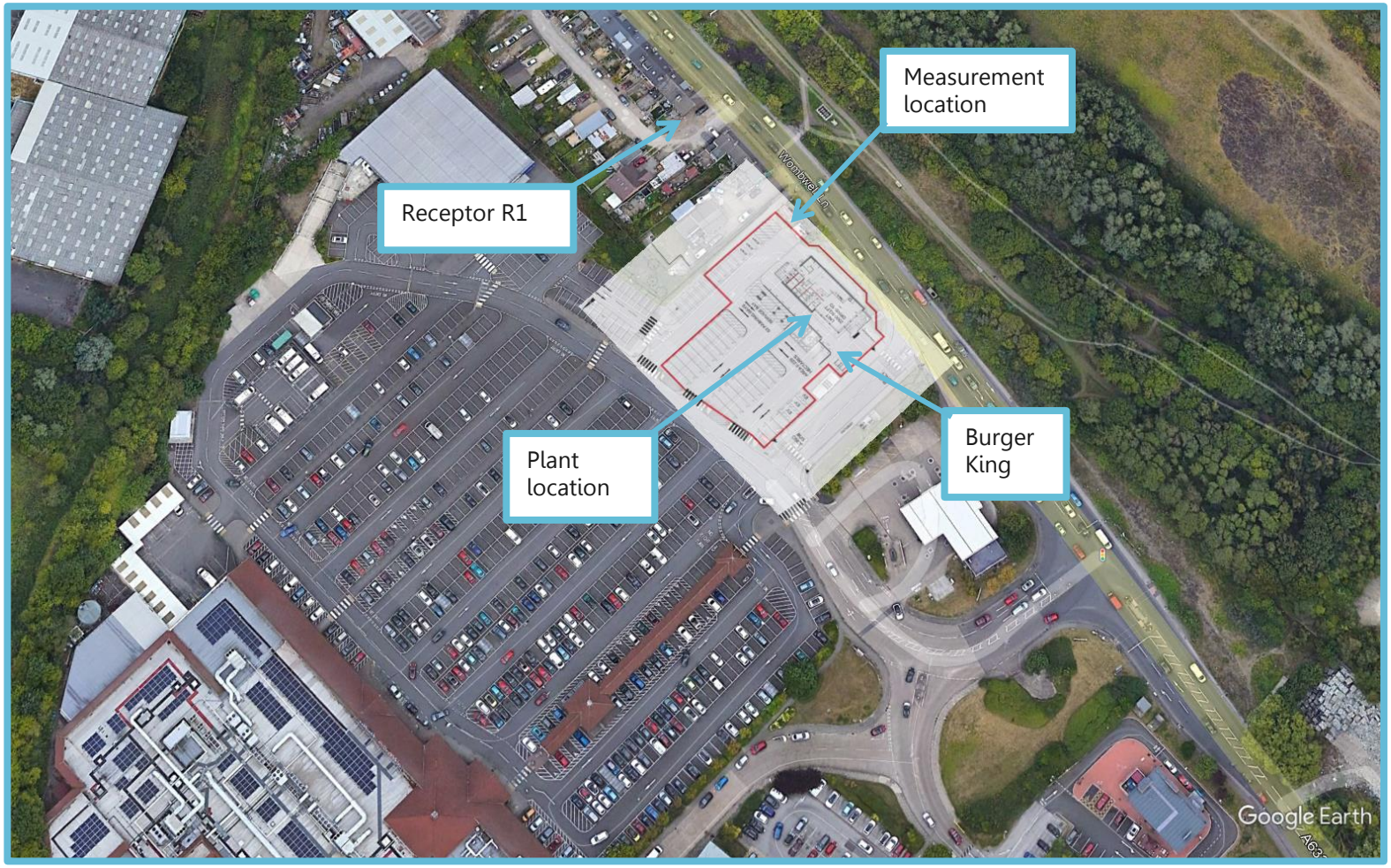
7.3. Cumulative plant noise emission levels for the proposed plant, including the attenuators specified in this report, have been predicted at the most affected noise sensitive receptors and assessed using the typical requirements of Barnsley Metropolitan Borough Council.

7.4. Therefore, noise from the proposals should not be a reason for refusal of planning permission.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial photograph of site showing areas of interest



Appendix C Environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken between 14.45 hours on Wednesday 27th March and 10.30 hours on Thursday 28th March 2024.

C.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive fifteen-minute sample periods for the duration of the survey.

Measurement position

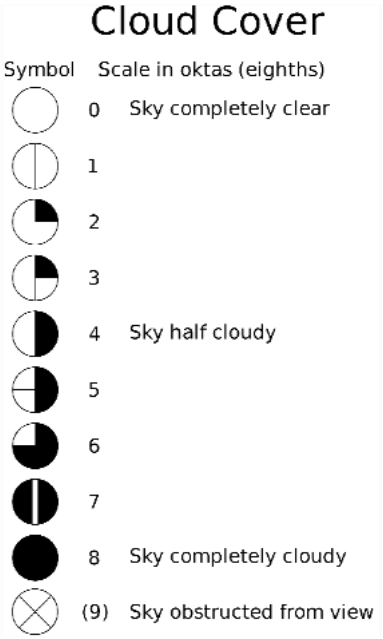
C.3 The sound level meter was positioned on a lamppost along Wombwell Lane, close to the nearest noise sensitive receptors. The approximate location of the microphone is indicated on the photograph in **Appendix B**. In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

Equipment

C.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

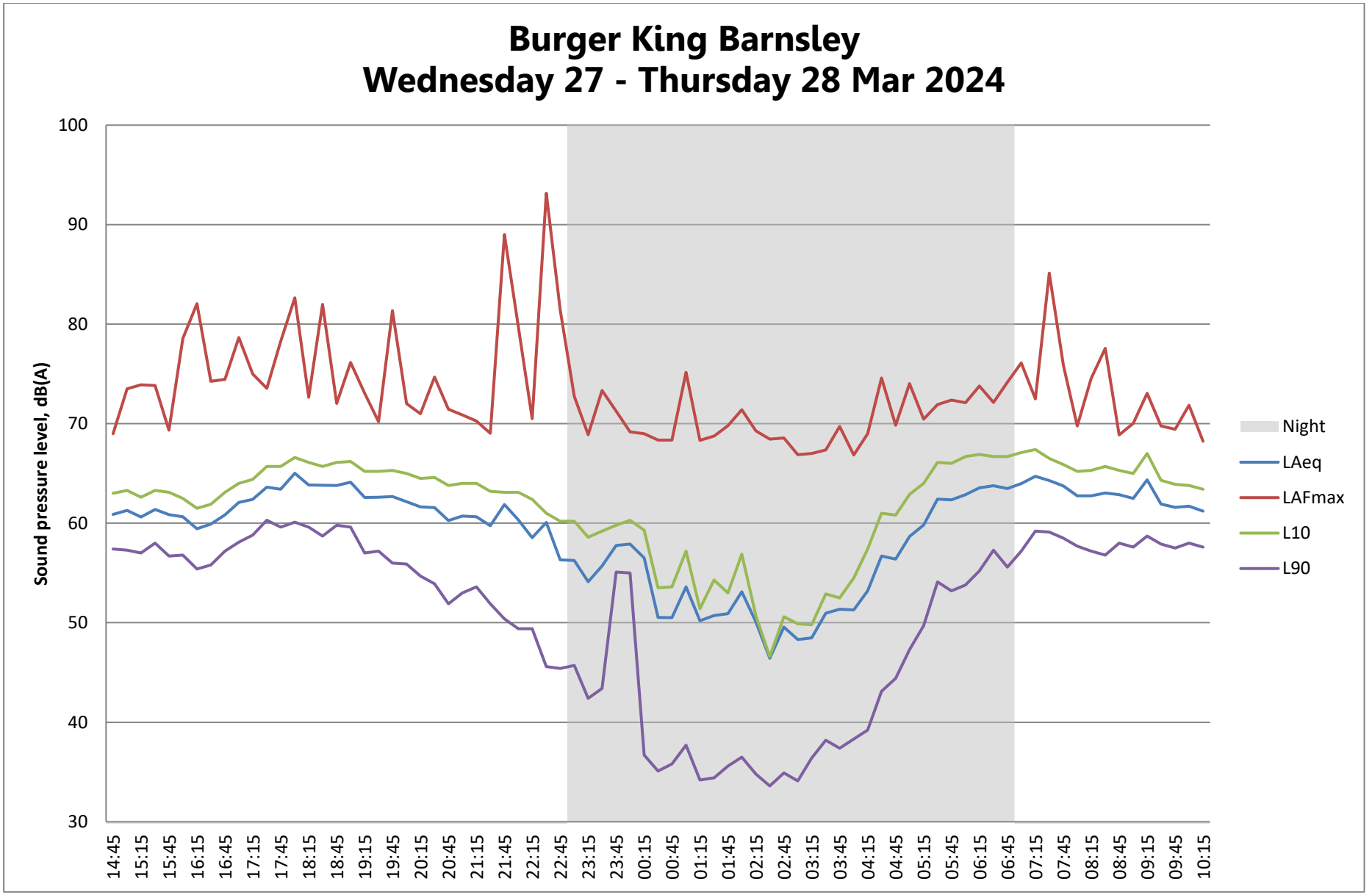
Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 97446	16/01/2023	1504305-1
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Svantek SV12L / 106487		
Calibrator	Svantek SV 30A / 10847	01/06/2023	1505421-1

C.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Time/Date**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	14.45 27/3/24 - 10.30 28/3/24	Temperature (°C)	10	7
		Precipitation:	Yes	Yes
		Cloud cover (oktas – see guide)	5	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	3	4
		Wind Direction	Southerly	South westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.6 The results of the survey are considered to be representative of the background sound pressure levels at the façade of the most affected noise sensitive receptor to the plant area during the quietest times at which the plant will operate. The noise climate at the measurement position during the installation and collection of the monitoring equipment was dominated by local road traffic. The results of the survey are presented in a time history graph overleaf.


Burger King Barnsley
Wednesday 27 - Thursday 28 Mar 2024
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
14:45
15:15
15:45
16:15
16:45
17:15
17:45
18:15
18:45
19:15
19:45
20:15
20:45
21:15
21:45
22:15
22:45
23:15
23:45
00:15
00:45
01:15
01:45
02:15
02:45
03:15
03:45
04:15
04:45
05:15
05:45
06:15
06:45
07:15
07:45
08:15
08:45
09:15
09:45
10:15
Night
LAeq
LAFmax
L10
L90

Appendix D Equipment Manufacturer's Noise Data

Reference	Make / Model	No. units	Notes	Sound levels, dB, at octave band frequencies (Hz)								
				63	125	250	500	1K	2K	4K	8K	L_{Aeq} (dB)
AHU1	Ruck/MPC500D4	1	Inlet L_w	74	86	79	74	75	74	70	64	80
			Case breakout L_w	73	76	62	57	61	52	49	40	88
EF1	Ruck/MPC560D4T140	1	Discharge L_w	81	92	86	84	83	80	75	69	71
			Case breakout L_w	78	83	74	74	71	62	57	51	65
EF2	Systemair/K250L	1	Discharge L_w	80	77	69	68	65	63	57	58	76
AC1-3	Toshiba/RAV1401ATPE	3	L_p at 1m									57 at 1 m
CC1-2	Typical	2	L_p at 10m									35 at 10 m

Appendix E Predicted Noise Levels Calculation

AHU1 vent

NSL Ref: **92277**
Project **BK Barnsley**

Compiled by:	ACM	03/04/2024

Plant Ref **AHU1**
Plant Description **Ruck/MPC500D4**

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	74	86	79	74	75	74	70	64	**80**
System losses		-6	-2	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-4	-4	-7	-14	-21	-18	-18	-15	
Sound power level leaving terminal		**64**	**80**	**72**	**60**	**54**	**56**	**52**	**49**	**68**

Receptor R1	V angle	H angle									
Directivity correction	0	135	900 x 600 (0,135)	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	33	m	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:		δ=	-33	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc												
Resultant at Receptor R1				L_p	**25**	**41**	**31**	**16**	**7**	**10**	**6**	**3**	**27**

AHU1 Case breakout

NSL Ref: **92277**
Project **BK Barnsley**

Plant Ref **Casing 1**
Plant Description **Ruck/MPC500D4**

Compiled by:	ACM	03/04/2024

			Sound level (dB) at octave band centre frequencies (Hz)								
			63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	Sound Power Level		73	76	62	57	61	52	49	40	**65**
Casing Lagging / Enclosure		I.L.	0	0	0	0	0	0	0	0	
Attenuated source noise level			**73**	**76**	**62**	**57**	**61**	**52**	**49**	**40**	**65**
Receptor R1											
Distance correction	33 m	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened: δ=	-33	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc											
Resultant at Receptor R1		**L_p**	**35**	**38**	**24**	**19**	**23**	**14**	**11**	**2**	**27**

EF1 vent

NSL Ref: **92277**
Project **BK Barnsley**

Compiled by:	ACM	03/04/2024

Plant Ref **EF1**
Plant Description **Ruck/MPC560D4T140**

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	81	92	86	84	83	80	75	69	**88**
System losses		-10	-6	-1	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-4	-4	-7	-12	-18	-14	-12	-9	
Sound power level leaving terminal		**67**	**82**	**78**	**72**	**65**	**66**	**63**	**60**	**75**

Receptor R1	V angle	H angle									
Directivity correction	90	0	500 x 500 (90,0)	0	0	0	0	-4	-7	-7	-7	
Distance correction	33	m	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:		δ= -33	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc												
Resultant at Receptor R1			L_p	**29**	**44**	**40**	**34**	**23**	**21**	**18**	**15**	**36**

EF1 Case breakout

NSL Ref: **92277**
Project **BK Barnsley**

Compiled by:	ACM	03/04/2024

Plant Ref **Casing 2**
Plant Description **Ruck/MPC560D4T140**

				Sound level (dB) at octave band centre frequencies (Hz)								
				63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	Sound Power Level			78	83	74	74	71	62	57	51	**76**
Casing Lagging / Enclosure			I.L.	0	0	0	0	0	0	0	0	
Attenuated source noise level				**78**	**83**	**74**	**74**	**71**	**62**	**57**	**51**	**76**
Receptor R1												
Distance correction	33	m	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:	δ=	-33	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc												
Resultant at Receptor R1			L_p	**40**	**45**	**36**	**36**	**33**	**24**	**19**	**13**	**38**

EF2 vent

NSL Ref: **92277**
Project **BK Barnsley**

Plant Ref **EF2**
Plant Description **Systemair/K250L**

Compiled by:	ACM	03/04/2024

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	80	77	69	68	65	63	57	58	**71**
System losses		-13	-9	-5	-1	0	-1	-2	-2	
Atmospheric side attenuator	I.L.	-2	-2	-4	-13	-22	-14	-14	-11	
Sound power level leaving terminal		**65**	**66**	**60**	**54**	**43**	**48**	**41**	**45**	**57**

Receptor R1	V angle	H angle									
Directivity correction	0	45	250 x 250 (0,45)	1	2	2	3	3	4	4	4	
Distance correction	33	m	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	Screened:		δ= -33	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface corrections etc												
Resultant at Receptor R1			**L_p**	**28**	**30**	**24**	**19**	**8**	**14**	**7**	**11**	**22**

Condensers R1

Unit	Make / Model	L_{pA}	at / m	m	dB	Directivity	Screening	Attenuation	Result
AC1	Toshiba/RAV1401ATPE	57	1	30	-30	0	0	0	27
AC2	Toshiba/RAV1401ATPE	57	1	30	-30	0	0	0	27
AC3	Toshiba/RAV1401ATPE	57	1	30	-30	0	0	0	27
CC1	Catering Condenser	35	10	30	-10	0	0	0	25
CC2	Catering Condenser	35	10	30	-10	0	0	0	25

Cumulative plant noise levels at Receptor

	R1 dB(A)
AHU1	27
EF1	36
EF2	22
AC1	27
AC2	27
AC3	27
CCU1	25
CCU2	25
AHU1 Case	27
EF1 Case	38
Combined plant L_p (Daytime) All plant running	**41**
Combined plant L_r (Daytime) including 3dB rating penalty	**44**
Combined plant L_p (Night-time) refrigeration plant running	**28**
Combined plant L_r (Night-time) including 3dB rating penalty	**31**

Appendix F Restaurant Layout