EDL Acoustics

Noise Impact Assessment

Client:	Ready Case Ltd
Project:	Waste Extract System Ready Case Ltd Stephens Way Warminster Business Park Warminster BA12 8PE
Our Reference:	13390/NIA
Date of Report:	25 May 2023
Prepared by:	Laurence Evans MIOA MCIEH

Executive Summary

Following complaint of noise disturbance to Wilshire Council, EDL Acoustics Ltd has been appointed by Ready Case Ltd to undertake an assessment into the noise impacts associated with the operation of a newly installed waste extract system at their business premises at Warminster Business Park, Stephens Way, Warminster BA12 8PE.

To facilitate this assessment, a baseline environmental noise survey was conducted to establish and quantify existing noise levels at locations representative of nearby noise sensitive properties to the Site, which are potentially at risk of exposure to noise from the plant.

Based on the results of the baseline noise survey (Section 4) and in accordance with Wiltshire Council's plant noise policy (Section 3.1), appropriate maximum plant noise emission limits have been set in controlling plant -5 dB below the representative background noise level ($L_{A90,T}$) and are set out in Section 5.1.

Based upon detailed measurement of source sound emissions from the waste extract system (Section 4.4) and using the acoustic software package Cadna-A, operational plant noise levels have been determined at the nearest noise sensitive properties to the Site. To account for characteristics likely to affect perception and response to the source sound at receiver locations, appropriate acoustic feature corrections has been applied to the model predictions to define the BS 4142 Rating Level at NSRs, which were then assessed against the plant noise requirements of Wilshire Council. Assessment results show that cumulative plant noise emissions fail to comply Wiltshire Council's plant noise standard at the closest NSRs and that noise mitigation measures are warranted in arriving at an acceptable outcome.

To meet the plant noise requirements of Wiltshire Council, a number of different noise control measures have been determined. Measures are detailed in Section 6 and are focused on controlling noise at source.

Through adoption of the recommended noise control measures (or similar) there can be a high level of confidence that noise from the waste extract system will be satisfactorily controlled to within the plant noise requirements of Wilshire Council as not to prejudice the existing noise climate and amenity of local people living in the area.

1.0 Introduction

Following complaint of noise disturbance to Wilshire Council, EDL Acoustics Ltd has been appointed by Ready Case Ltd to undertake an assessment into the noise impacts associated with the operation of a newly installed waste extract system at their business premises at Warminster Business Park, Stephens Way, Warminster BA12 8PE (hereafter 'the Site').

As part of this assessment the following works have been carried out:

- comprehensive baseline environmental noise survey over the course of a weekday and weekend period to establish and quantify the existing noise climate at the nearest affected residential properties to the Site;
- measurement of the level and frequency content of plant noise emissions at source when all plant is operating at its design duty in order for the assessment to utilise representative noise levels;
- preparation of a 3-dimensional noise model of the Site using the acoustic software package Cadna-A to predict and illustrate plant noise levels experienced at the closest noise sensitive receptors;
- evaluation of the significance of plant noise impacts with reference to the assessment and rating methodology described in BS 4142:2014+A1:2019[1]; and
- recommendations for the control of noise to meet the plant noise requirements of Wilshire Council, where necessary.

A glossary of the acoustic terminology used in this report is presented in **Appendix A**.

[1] British Standards Institution (BSI) (2014); British Standard (BS) 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*', BSI.

2.0 The Site, Site Setting and Waste Extract System

2.1 Site Description

The Site lies within Warminster Business Park situated approximately 0.75 km to the north of Warminster, off Bath Road (the B3414). The Site is located in the south-east corner of Warminster Business Park with Farleigh Masonry immediately to its north, Travis Perkins to its west and Dunster House and Howdens to its south-west. To the south of the Site lies open space and woodland. To the east there is a drainage pond and woodland with residential properties beyond at Broadwood Close, Chalfield Close and Arn View at a distance of approximately 95 metres from the Site boundary.

2.2 Noise Climate in Summary

The noise climate of the area is dominated by bird song, leaves rustling, intermittent local road traffic and human activities. Noise from occasional train and aircraft movements in the area is also evident and contributes to the local noise climate to a degree.

2.3 Waste Extract System

A waste extract system has been installed externally to the north of the main production building for the capture and removal of paper and corrugated cardboard trim from waste-generating areas of the production process.

Two ducted systems have been installed, one duty and one standby, with the systems configured so they cannot be run at the same time. The fans (45 kW) keep the trim waste constantly moving throughout the duct system by creating the correct volume, pressure and conveying velocity to enable rapid removal of material right at source. Extracted waste material is compacted and subsequently taken away for recycling.

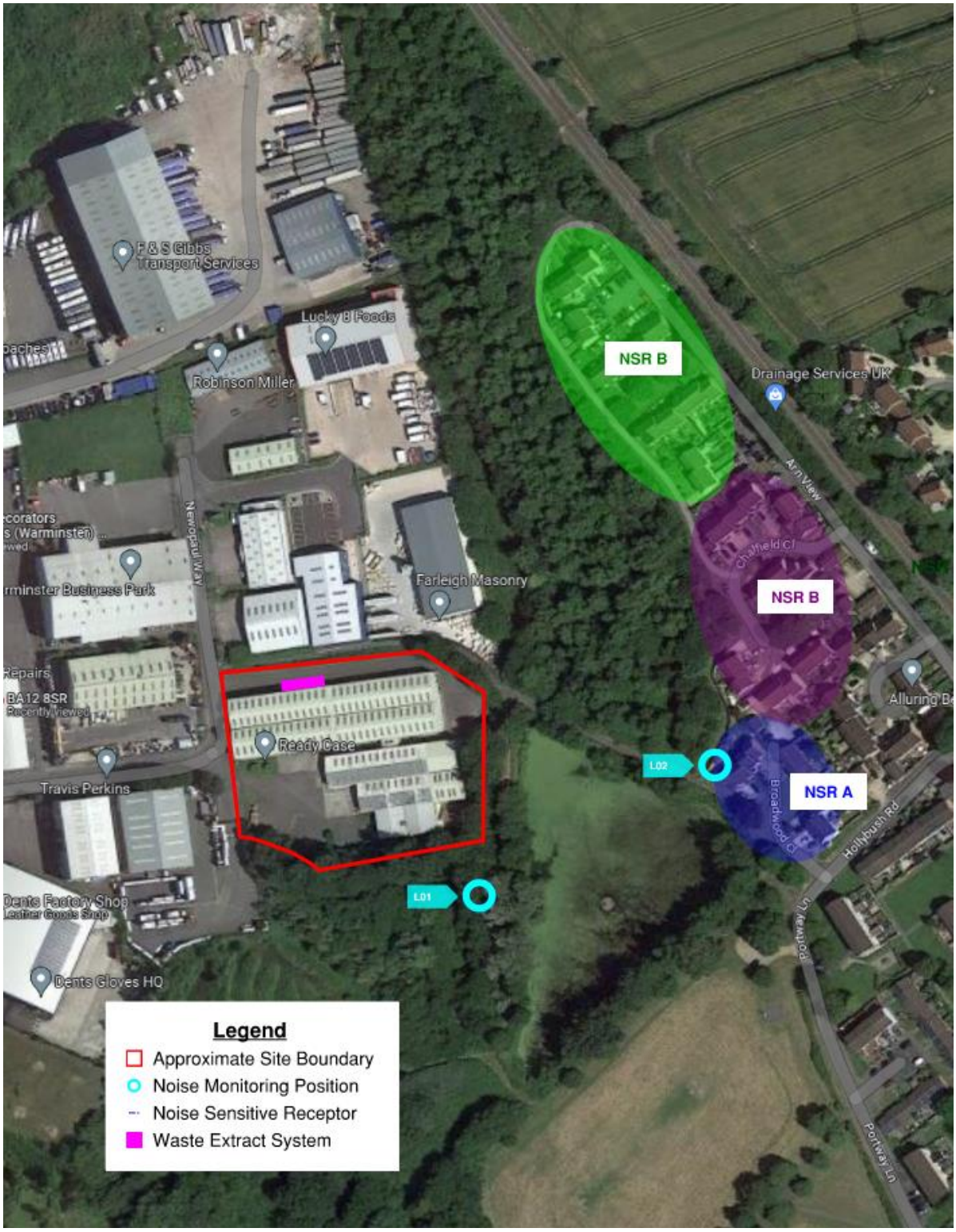
Operational hours for the waste extract system are 24 hours 7 days a week during busy production periods (e.g., in the run up to Christmas). During more standard production times the hours of operation are typically 06:00 to 22:00 Monday to Friday and 06:00 to 18:00 on Saturdays, with it unusual to work on Sundays and very unusual to need to work on bank holidays. To inform the noise impact assessment we have assumed the waste extract system operates 24/7 to identify the greatest environmental impact that might reasonably be expected.

2.4 Noise Sensitive Receptors

The nearest residential buildings are approximately 175 m to the east of the waste extract system. Noise sensitive receptors (NSRs) are situated on Broadwood Close (NSR A), Chalfield Close (NSR B) and Arn View (NSR C). If noise is controlled to an acceptable level at these properties, then it will be suitably controlled at all other NSRs further away.

A Site location plan is provided as **Figure 1**, showing the location of the Site, the approximate location of the waste extract system, the nearest NSRs and the baseline noise measurement positions.

Figure 1: Location Plan of the Waste Extract System, Receptor and Noise Survey Positions



3.0 Noise Criteria

3.1 Wiltshire Council's Plant Noise Standard

Wilshire Council have been consulted regarding the noise standard they typically apply to plant, advising that they require noise from new fixed building services plant to be controlled to a level at least 5 dB below the background sound level when assessed in accordance with BS 4142:2014+A1:2019 at a position 1 m outside the windows of any NSR (i.e. Plant $L_{Ar,Tr}$ = $L_{A90,T}$ – 5 dB).

Design to such a criterion would result in plant noise contributing less than 1.4 dB to the noise climate of the area and which, subjectively, is likely to be imperceptible as not to materially affect the noise climate and amenity of local people living and working in the area.

Wilshire Council's plant noise standard is considered reasonable in that it should ensure the acoustic acceptability of the waste extract system, which is to run during the more noise sensitive evening (19:00 to 23:00) and night-time (23:00 and 07:00) hours periods.

In setting appropriate plant noise emission limits, regard has been given to the results of the baseline noise survey as presented in Section 4.

3.2 British Standard BS 4142

It is common industry practice for plant noise levels to be assessed in accordance with BS 4142:2014+A1:2019 '*Method for rating and assessing industrial and commercial sound*'.

This British Standard guidance document describes methods for rating and assessing sound of an industrial and/or commercial nature for the purposes of: (a) investigating complaints, (b) assessing sound from proposed, new, modified or additional sources of sound of an industrial/commercial nature, and (c) assessing sound at proposed new residential premises.

In summary, the procedure compares the measured (or predicted) sound level from the source (known as the specific sound level (notated $L_{Aeq,T}$) immediately outside of the dwellings with the background sound level (notated $L_{A90,T}$) that exists in the absence of the source in question. If the sound is tonal, impulsive, intermittent, or otherwise distinctive in character at the assessment location then a character correction of between 0 dB and +9 dB is added to the specific sound level (correcting for the influence from any residual sound) to obtain the rating level (notated $L_{Ar,Tr}$).

After making any relevant corrections the background sound level is subtracted from the rating level and an initial estimate of the potential impact of the sound source in question is made with consideration to the following:

- 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 or more is likely to be an indication of an adverse impact, depending on the context; and
- 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.

In addition to the margin by which the rating level of the specific sound source exceeds the background sound level, the standard places emphasis upon an appreciation of the "context" in which the sound occurs in arriving at any decision. Pertinent factors may include the nature of the neighbourhood, the absolute level of sound and background sound level, the character and level of sound, the sensitivity of the receptor and whether the residential premises incorporate design measures that ensure good internal acoustic conditions such as façade treatment, ventilation and acoustic screening.

4.0 Noise Surveys

4.1 Baseline Environmental Noise Survey

In support of this study, a comprehensive baseline environmental noise survey was undertaken to establish and quantify the existing noise climate at the nearest residential properties most at risk of exposure to noise from the waste extract system.

The noise survey was carried out over a five-day period from 19th April to 24th April 2023, over the course of a weekday and weekend period, thereby covering the operational hours of the waste extract system.

Noise measurements during the weekday were taken at a fixed location off a footpath to the south of the Site, marked L01 on Figure 1. The monitoring location was in free-field conditions, with the microphone positioned 2.0 m above ground level. This measurement location was selected to ensure that noise from the operational waste extract system had no measurable influence on the background noise levels measured.

Noise measurements during the weekend were taken at the curtilage of 1 Broadwood Close when the waste extract system was off, marked L02 on Figure 1. The monitoring location was again in free-field conditions, with the microphone positioned 2.0 m above ground level.

Noise measurements were made with a calibrated precision grade (Class 1) frequency (one-third-octave band) sound level meter in order to provide a detailed description of the prevailing environmental noise characteristics. The sound level meter was set-up to record over consecutive 5-minute periods the L_{eq}, L_{90}, L_{10}, L_{max} and L_1 noise indices in the A-weighting network over 125 ms fast response time constant intervals for the duration of the survey. The indices are described in Appendix A of this report, but roughly translated they describe in turn the average, background, road traffic, maximum and maximum noise level that discounts one-off events.

Details of the instrumentation used for the noise measurements are provided in **Table 4.1**, with equipment calibration certificates are available on request.

Table 4.1: Survey Equipment Details

Equipment Description	Manufacturer & Model Type	Serial No.	Last Calibrated
Sound Level Meter	Norsonic Nor140	1407754	07/09/22
Pre-amplifier	Norsonic Nor1209	23091	
Microphone	Norsonic Nor1225	413171	
Accuracy:			
The sound level meter was calibrated at the start and end of each measurement survey using a precision (Class 1) calibrator (Nor1255; Serial No.: 125525668) that had itself been calibrated by a United Kingdom Accreditation Service (UKAS) laboratory within the previous twelve months. No significant change (+/- 0.1 dB) in the calibration level (114 dB at 1000 Hz) was observed.			

Weather conditions, whilst not actively measured during the survey period, were monitored remotely throughout. Overall, weather conditions were conducive to the measurement of noise. Conditions were largely dry with temperatures around 4-11 ºC and light wind speeds (<5 ms^{-1}) prevailing.

4.2 Results

A summary of the measured daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) noise levels for the survey period are presented in **Table 4.2**, with the full results displayed graphically in time-history format in **Figure 2** and **Figure 3**.

Table 4.2: Summary of Baseline Noise Monitoring Results

Weekday / Weekend	Period	Ambient Sound Level $L_{Aeq,T}$ dB	Background Sound Level $L_{A90,T}$ dB	
		Ave[1]	Ave[2]	10th%ile[3]
Weekday (L01)	Day	51	44	42
	Evening	49	40	35
	Night	47	35	30
Weekend (L02)	Day	48	43	40
	Evening	45	40	38
	Night	46	38	34
Combined	Day	49	43	40
	Evening	47	39	35
	Night	47	37	31

Notes: [1] Logarithmic average over the day/evening/night survey periods; [2] Arithmetic average over the day/evening/night survey periods; [3] The 10th percentile value is given for each survey period; this is considered representative of the typical lowest background sound levels experienced. All figures rounded to nearest integer.

Figure 2: Measured Weekday Noise Level Time History at Position L01 (free-field, uncorrected)

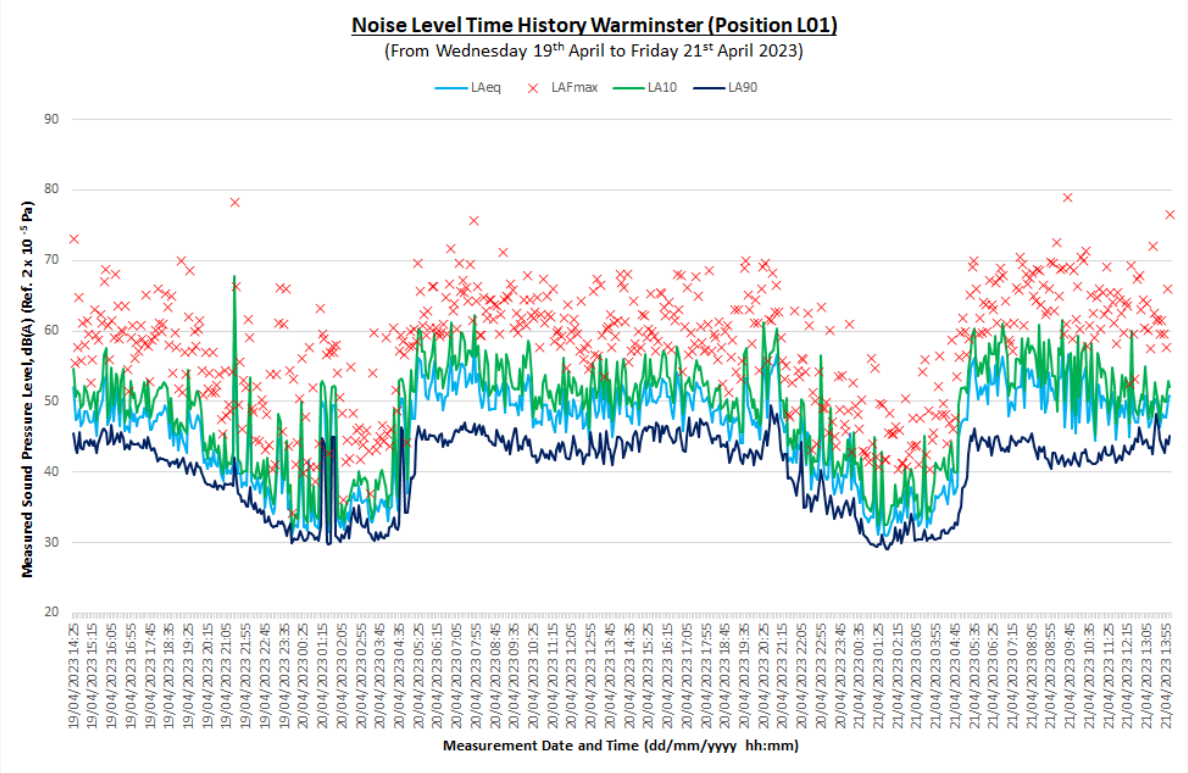
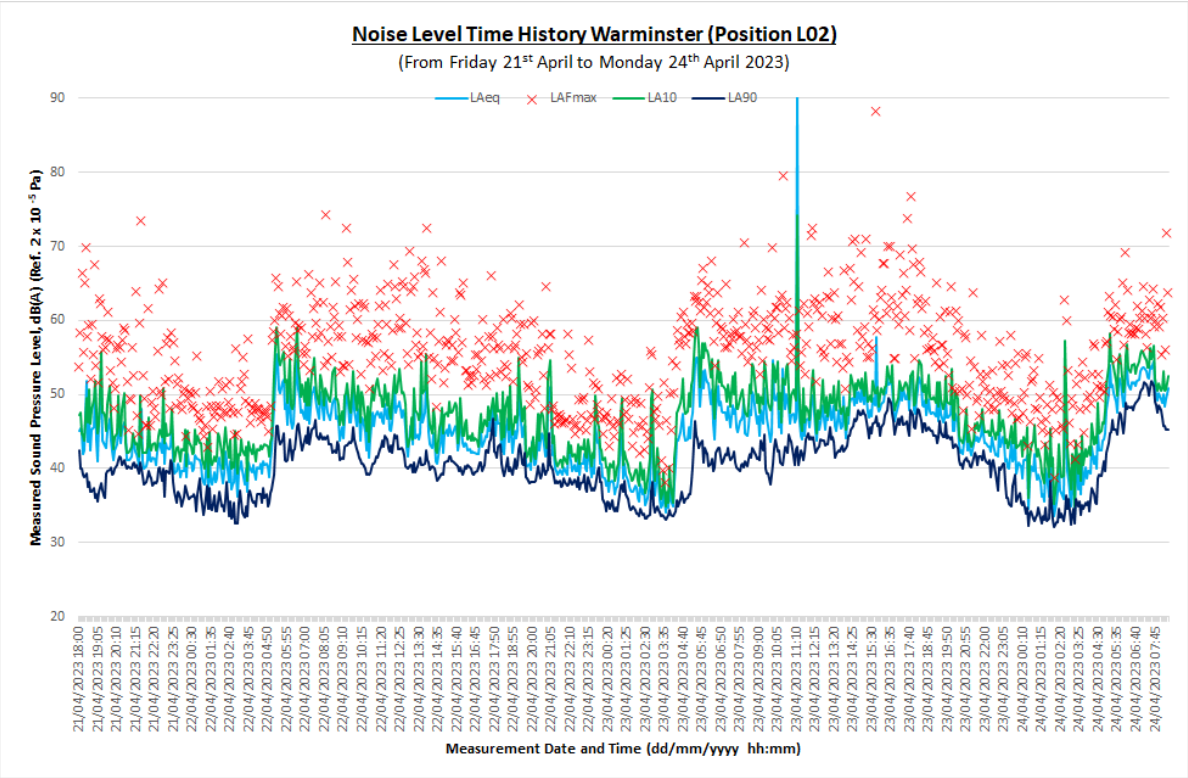


Figure 3: Measured Weekend Noise Level Time History at Position L02 (free-field, uncorrected)

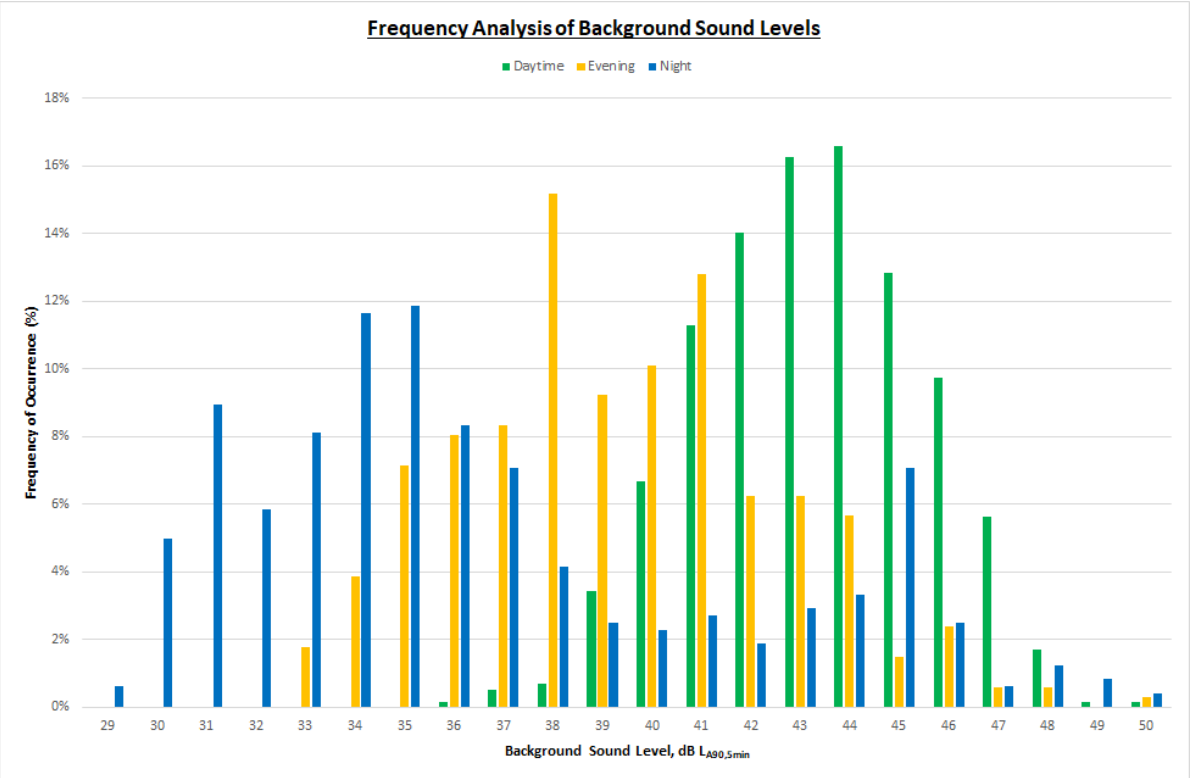


4.3 Background Sound Level

There is no "single" background sound level as this is a fluctuating, time-varying parameter. It is important that the background sound level used in assessment is reliable and suitably represents both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain the lowest measured background sound level, but rather to quantify what is typical during particular time periods when the waste extract system may operate.

In determining an appropriate background sound level to use in assessment statistical analysis has been undertaken to determine the most frequently occurring background sound level over the daytime, evening and night-time periods of interest. For the distribution of the data as presented in **Figure 4**, an $L_{A90,5min}$ of 43 dB during the day, 38 dB during the evening and 34 dB during the night is considered to be characteristic and has been used in assessment. In each instance the background sound level is at or below the modal value for each data set.

Figure 4: Background Sound Level Occurrence Analysis



4.4 Plant Noise Survey

In order for the assessment to utilise representative noise levels, detailed measurement of source noise emissions were taken of the waste extract system. A summary of the measured noise levels utilised in our assessment are presented in **Table 4.3**. Noise levels have been normalised to a reference distance of 3.0 m to permit evaluation of the relative noise contribution of the different noise sources comprising the system.

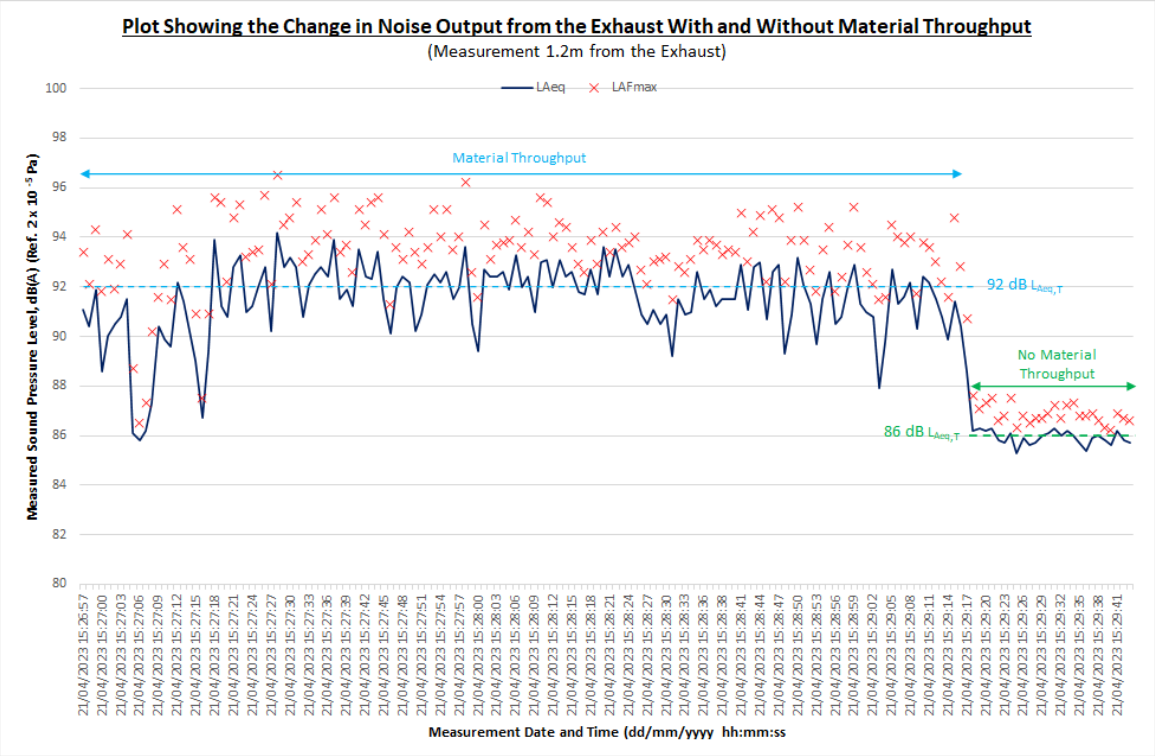
Table 4.3: Measured Specific Sound Level from the Waste Extract System (Normalised to 3.0 m)

File #	Plant Item	LAeq,T	LAFmax	dB,Leq,Linear at Octave Band Centre Frequency (Hz)									dBA	Lw
				31.5	63	125	250	500	1k	2k	4k	8k		
177	Exhaust (Material Throughput)	84	89	78	85	91	81	74	74	76	78	76	84	104
177	Exhaust (No Material Throughput)	78	80	77	84	90	81	69	64	64	66	65	78	98
178	Rear of Main Elevated Hopper	69	71	74	87	78	70	65	61	58	57	53	69	90
179	Diverter Casing Breakout Noise (Material Throughput)	68	73	57	74	72	65	64	61	60	60	55	68	89
180	Diverter Casing Breakout Noise (No Material Throughput)	66	69	55	72	72	65	63	60	57	53	49	66	87
182	Duct Breakout Noise (Material Throughput)	75	79	59	68	74	68	69	67	69	69	63	75	96
182	Duct Breakout Noise (No Material Throughput)	68	73	58	69	74	66	67	61	59	56	49	68	89

From review of Table 4.3, it is clear that noise from the exhaust is the dominate acoustic source, with wider elements of the system comparable in level. As may reasonably be expected, the noise level from the waste extract system increases when there's material throughput - around 6 decibels, as highlighted in **Figure 5**.

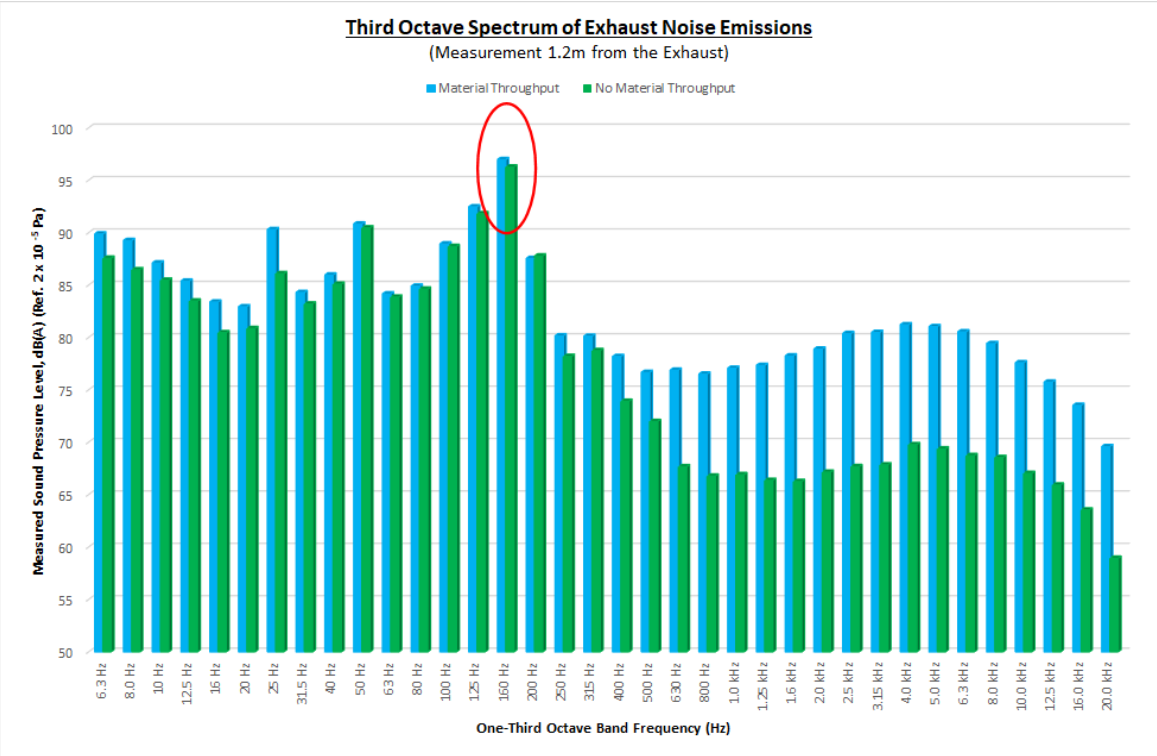
Based upon detailed measurement of source sound emissions from the waste extract system (Section 4.4) and using the acoustic software package Cadna-A, operational plant noise levels have been determined at the nearest noise sensitive properties to the Site. To account for characteristics likely to affect perception and response to the source sound at receiver locations, appropriate acoustic feature corrections has been applied to the model predictions to define the BS 4142 Rating Level at NSRs, which were then assessed against the plant noise requirements of Wilshire Council. Assessment results show that cumulative plant noise emissions exceed Wiltshire Council's plant noise standard at the closest NSRs.

Figure 5: Plot Showing the Change in Noise Output With and Without Material Throughput



Third-octave analysis also shows a strong concentration of energy at 160 Hz as presented in **Figure 6**, which can increase the significance of noise impact over that expected from just the magnitude (loudness) of the sound.

Figure 6: Third Octave Spectral Analysis of Exhaust Noise Emissions



5.0 Noise Impact Assessment

This section of the report assesses noise impact against Wiltshire Council's plant noise standard and draws conclusions.

5.1 Operational Plant Noise Emission Limits

Based on the results of the baseline noise survey (Section 4) and the noise requirements of Wilshire Council (Section 3.1), suitable noise emission limits to which the waste extract system should adhere have been set and are presented in **Table 5.1**.

Table 5.1: Plant Noise Limit at Nearest Noise Sensitive Receptors

Location	Period	Representative Background Sound Level, dB $L_{A90,T}$	Plant Noise Emission Limit, dB $L_{Ar,Tr}$
All NSRs	Daytime (07:00 – 19:00)	43	≤38
	Evening (19:00 – 23:00)	38	≤33
	Night-time (23:00 – 07:00)	34	≤29

The noise limits apply to the total contribution of noise from all parts of the waste extract system running under full duty during any particular period. The limits are to be met 1.0 m outside the nearest habitable window of NSRs.

It is important that the waste extract system is designed to provide a steady, broadband noise that does not attract attention. If plant noise is determined to contain any distinguishable acoustic features at the assessment location (e.g., tones, impulses, intermittency etc.), then appropriate scaled acoustic feature corrections should be applied in accordance with BS 4142:2014.

5.2 Noise Modelling

To accurately predict noise from the waste extract system at the closest NSRs a three-dimensional noise model of the Site was prepared using the acoustic software package Cadna-A, which predicts noise in accordance with BS EN ISO 9613-2:1996 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'[2].

The model is based on the source noise measurements detailed in Section 4.4 when there was material throughput to identify the greatest environmental impact that might reasonably be expected. The model takes into account various factors including: geometrical spreading, local topography; ground absorption; screening and meteorological effects in undertaking the calculations. The calculations were based on the following:

- The different noise sources comprising the waste extract system were inputted at their respective heights as measured on site.
- The ground between the Site and the nearest NSRs is considered to be 'soft', with a ground absorption of 0.6 assumed. Roads and car parks are considered to be 'hard' surfaces, where a ground absorption of 0.1 has been assumed.
- The topography of the study area is considered flat for the purposes of the noise modelling.
- The sound reduction provided by the boundary fences around the curtilage of NSRs is not considered in the modelling as it is not possible to establish the exact performance, if any, afforded by boundary constructions.

[2] International Standardization Organization (ISO) (1996); ISO 9613- 2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation', ISO.

5.3 Noise Impact Assessment Results

The resultant noise contour plot is shown in **Figure 7**, whilst a summary of predicted noise levels at the nearest NSRs are presented in **Table 5.2** and compared against Wilshire Council's plant noise standard.

Figure 7: Noise Contour Plot of Predicted Unmitigated Noise Levels at the Closest NSRs, dB $L_{Aeq,Tr}$

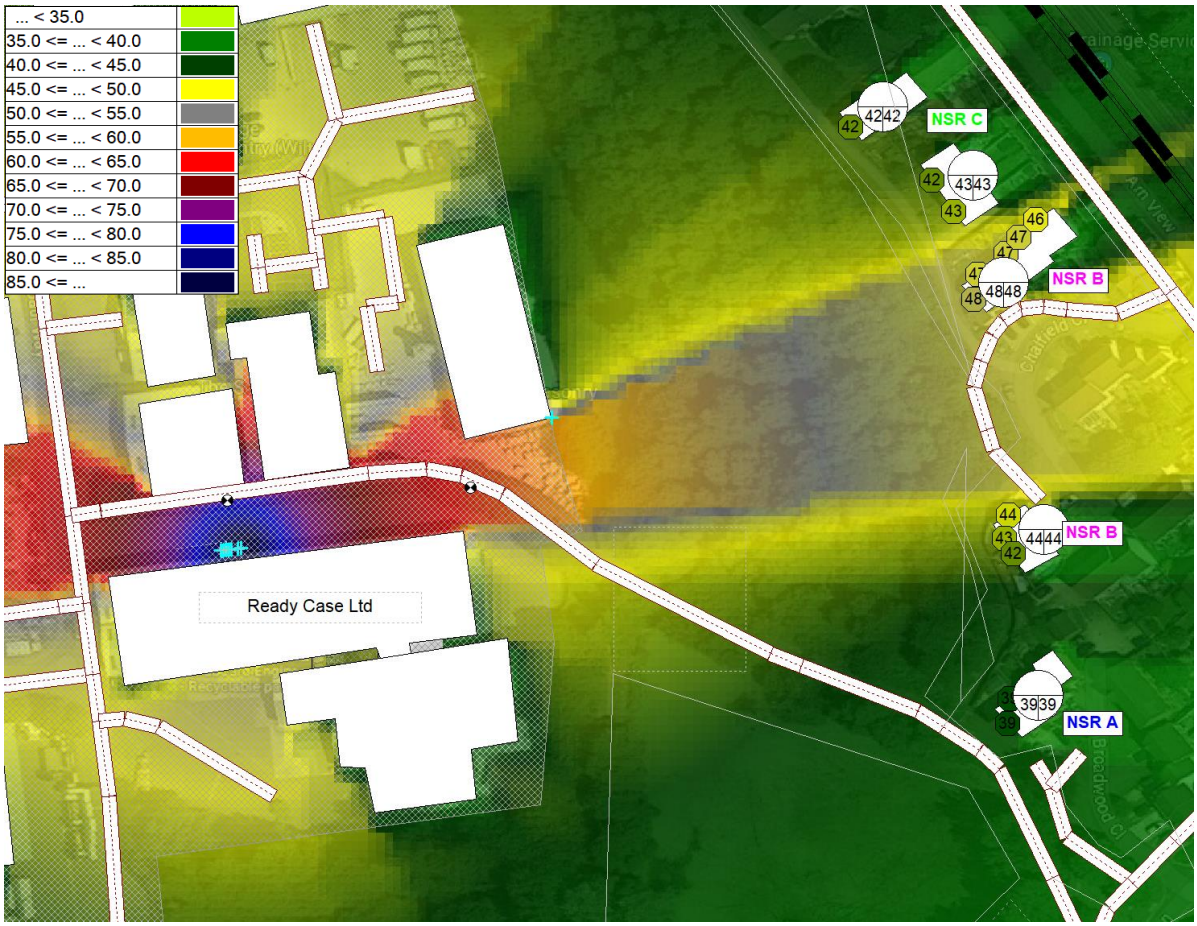


Table 5.2: Summary of Predicted Unmitigated Noise Levels at the Closest NSRs

Assessment	NSR A / NSR B / NSR C		
	Day	Evening	Night
Specific Sound Level (SSL), ($L_{Aeq,Tr}$)	39 / 48 / 43	39 / 48 / 43	39 / 48 / 43
Acoustic Feature Correction [1]	3	3	3
Rating Level (RL), ($L_{Ar,Tr}$)	42 / 51 / 46	42 / 51 / 46	42 / 51 / 46
Background Sound Level (BSL), ($L_{A90,T}$)	43	38	34
Plant Noise Limit ($L_{Ar,Tr} = L_{A90,T} – 5$ dB)	38	33	29
Difference, dB	+4 / +13 / +8	+9 / +18 / +13	+13 / +22 / +17
Compliant with noise requirements of Wiltshire Council?	No	No	No
Excess of rating over background sound level	A difference of around +5 dB or more is likely to be an indication of an adverse impact, depending on the context. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.		

Notes:

1) A low frequency tone (160 Hz) from the exhaust and rat-a-tat sound from the rapid succession of waste trim knocking on the sides of the ducting are distinguishable against the residual acoustic environment at the closest NSRs.

From review of Table 5.2, it can be seen that a Rating Level of between 42 dB and 51 dB is predicted at the closest NSRs to the Site. Noise emissions from the waste extract system are between +4 dB and +22 dB above the plant noise emission limits detailed in Table 5.1 and fail to comply with Wilshire Council's plant noise standard.

Based on assessment results there is an objective basis for concluding that noise mitigation measures are warranted in controlling noise from the waste extract system, which are considered in the following section.

6.0 Mitigation Recommendations

To meet the plant noise requirements of Wilshire Council, a number of different noise control principles will need to be employed. Recommended measures are focused on controlling noise at source and from the dominant sources in order to most practically and cost-effectively achieve the desired result. The mitigation measures include:

Hardware

- Review of the fan selection. Because noise is critical, the size and speed of fan should be one producing the lowest sound output for a given duty. The fan should operate as near as possible to its maximum efficiency point to coincide with the region of maximum aerodynamic efficiency and minimum noise level.
- Inclusion of an attenuator on the outlet of each exhaust, achieving the reported minimum insertion losses as detailed in **Table 6.1**.

Table 6.1: Minimum Required Dynamic Insertion Loss

Acoustic Hardware	Minimum Dynamic Insertion Loss, dB at each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Exhaust Attenuator[1]	-16	-31	-23	-17	-17	-26	-32	-35

Notes: [1] The attenuator should have a cross sectional area to keep the air velocity <4.0 m/s with a pressure drop <50 Pa unless the manufacturer recommends otherwise. An air volume of 6.3 m^3/s as verified by Impact Air Systems should be designed to. The attenuator selection must be adjusted to suit any changes in final fan selection, system design and/or on-site system installation requirements.

- Application of 1no layer of 5 kg/m^2 damping sheet and 1no 10 kg/m^2 mass lagging layer with 50 mm thick glass fibre spacer (minimum 25 kg/m^3 density) protected in a layer of PIB waterproofing membrane around the serving ductwork, diverter, hopper, and attenuator of each system.

Management Measures

- Operation of the west orientated waste extract system during the more noise-sensitive weekend, evening and night-time periods, where practical.
- Maintenance of plant in accordance with manufacturer's recommendations.
- Programmed review of noise controls to ensure their continuing effectiveness.

With these measures in place, the resultant cumulative plant noise level as set out in **Table 6.2** and illustrated in **Figure 8** are predicted at the closest NSRs.

Table 6.2: Summary of Predicted Mitigated Noise Levels at the Closest NSRs

Assessment	NSR A / NSR B / NSR C		
	Day	Evening	Night
Specific Sound Level (SSL), ($L_{Aeq,Tr}$)	19 / 27 / 23	19 / 27 / 23	19 / 27 / 23
Acoustic Feature Correction [1]	0	0	0
Rating Level (RL), ($L_{Ar,Tr}$)	19 / 27 / 23	19 / 27 / 23	19 / 27 / 23
Background Sound Level (BSL), ($L_{A90,T}$)	43	38	34
Plant Noise Limit ($L_{Ar,Tr} = L_{A90,T} - 5$ dB)	38	33	29
Difference, dB	-19 / -11/ -15	-14 / -6 / -10	-10 / -2 / -6
Compliant with noise requirements of Wiltshire Council?	Yes	Yes	Yes
Excess of rating over background sound level	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.		

Figure 8: Noise Contour Plot of Predicted Mitigated Noise Levels at the Closest NSRs, dB $L_{Aeq,Tr}$



Assessment indicates that through incorporation of the recommended noise control measures (or similar) that noise from the waste extract system will be controlled to within the noise requirements of Wilshire Council.

7.0 Conclusion

Following complaint of noise disturbance to Wilshire Council, EDL Acoustics Ltd has been appointed by Ready Case Ltd to undertake an assessment into the noise impacts associated with the operation of a newly installed waste extract system at their business premises at Warminster Business Park, Stephens Way, Warminster BA12 8PE.

To facilitate this assessment, a baseline environmental noise survey was conducted to establish and quantify existing noise levels at locations representative of nearby noise sensitive properties to the Site, which are potentially at risk of exposure to noise from the plant.

Based on the results of the baseline noise survey (Section 4) and in accordance with Wilshire Council's plant noise policy (Section 3.1), appropriate maximum plant noise emission limits have been set in controlling plant -5 dB below the representative background noise level ($L_{A90,T}$) and are set out in Section 5.1.

Based upon detailed measurement of source sound emissions from the waste extract system (Section 4.4) and using the acoustic software package Cadna-A, operational plant noise levels have been determined at the nearest noise sensitive properties to the Site. To account for characteristics likely to affect perception and response to the source sound at receiver locations, appropriate acoustic feature corrections has been applied to the model predictions to define the BS 4142 Rating Level at NSRs, which were then assessed against the plant noise requirements of Wilshire Council. Assessment results show that cumulative plant noise emissions fail to comply Wiltshire Council's plant noise standard at the closest NSRs and that noise mitigation measures are warranted in arriving at an acceptable outcome.

To meet the plant noise requirements of Wiltshire Council, a number of different noise control measures have been determined. Measures are detailed in Section 6 and are focused on controlling noise at source.

Through adoption of the recommended noise control measures (or similar) there can be a high level of confidence that noise from the waste extract system will be satisfactorily controlled to within the plant noise requirements of Wilshire Council as not to prejudice the existing noise climate and amenity of local people living in the area.

Appendix A: Glossary of Acoustic Terms

The acoustic terms, indices and parameters used in this report are defined below.

Term	Description
Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Broadband	Containing the full range of frequencies.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels.
Free Field	Free field noise levels are measured or predicted such that there is no contribution made up of reflections from sound reflecting objects (e.g., buildings),usually taken to mean at least 3.5m away.
dB(A): **A-weighted decibels**	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3 dB).
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L_{eq}	A noise level index called the equivalent continuous noise level over a specified period of time, 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 under investigation. It is in effect the energy average level over the specified measurement period (T) and is the most widely used indicator for environmental noise.
L_{AN}	If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The LAN indices are used for this purpose. The term refers to the A-weighted level (in decibels) exceeded for n% of the time specified.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. It gives an indication of the upper levels of fluctuating noise. The L_{10} can be considered to be the "average maximum" noise level and is commonly used to describe road traffic noise.
L_{90}	The level of noise 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

Term	Description
	used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.
L_1	The level exceeded for 1% of the time and as such gives an indication of the maximum noise level that discounts one-off atypical events.
L_{max}	The maximum noise level over a specified period of time, T, and unless described otherwise, it is measured using the 'fast' sound level meter response. The L_{AFmax} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{Aeq} noise level but will still affect the noise environment.
Rating Noise Level ($L_{Ar,Tr}$)	The equivalent continuous A-weighted sound pressure level during a specified time interval, plus specified adjustments for tonal, impulsiveness, intermittent or where other readily distinctive characteristics are present in the specific sound.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 400% times the loudness of a sound of 65 dB.
Noise	Sound which a listener does not wish to hear.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Specific Noise Level	The monitored/calculated noise level as a result of a sound source excluding the impacts of any extraneous sound sources.