

J O S T E C

BUILDING REGULATIONS COMPLIANCE SERVICES



REPORT TITLE: BS4142 ASSESSMENT OF ADDITION OF A SPRAY BOOTH TO TILEHURST HAND
CAR WASH, NORCOT ROAD, READING

REPORT REFERENCE: 23069

ISSUED TO: THE KEEN PARTNERSHIP
THE COURTYARD
EDINBURGH ROAD
READING
RG30 2UA

ISSUED BY: JAMES FLITTON

DATE: 12 June 2023

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1.0 Introduction

- 1.0.1 This report has been commissioned to determine the noise impact of the recently installed spray booth at the Tilehurst hand car wash & valeting centre, Norcot Road, Reading, RG30 6BU.
- 1.0.2 The assessment has been conducted in line with the BS4142:2014.

2.0 Site Details

- 2.0.1 The site is located at the rear of the existing Hand Carwash, adjacent to the welding tool repair garage off of Lemart Close.
- 2.0.2 The extraction system for the spray both is located on the roof to the rear of the building.
- 2.0.3 The closest Noise Sensitive Receptors (NSRs) are located along Norcot Road and the rear gardens and properties backing onto the site from Recreation Road to the South-West.
- 2.0.5 The extraction system was measured at source while both on and off to obtain the specific noise level. Background measurements were taken from the rear of a property on Norcot Road (as the closest NSR) over a 24hr period.

2.1 Location of Monitors

2.1.1 The noise location was chosen based on the proximity to the closest NSR.

Figure 1



Figure 2



2.1.2 Measurements were made in 15 minute periods, on 1 second averaging, to allow for the removal of anomalies and increased accuracy. The data was averaged into L_{Aeq1hr} daytime and $L_{Aeq15min}$ night-time with data also recorded for L_{Amax} in both day and night periods for the BS4142:2014 assessment.

2.1.3 The monitoring was conducted using 1 x Type 1 NTi XL2 sound level with batteries and outdoor microphone protection.

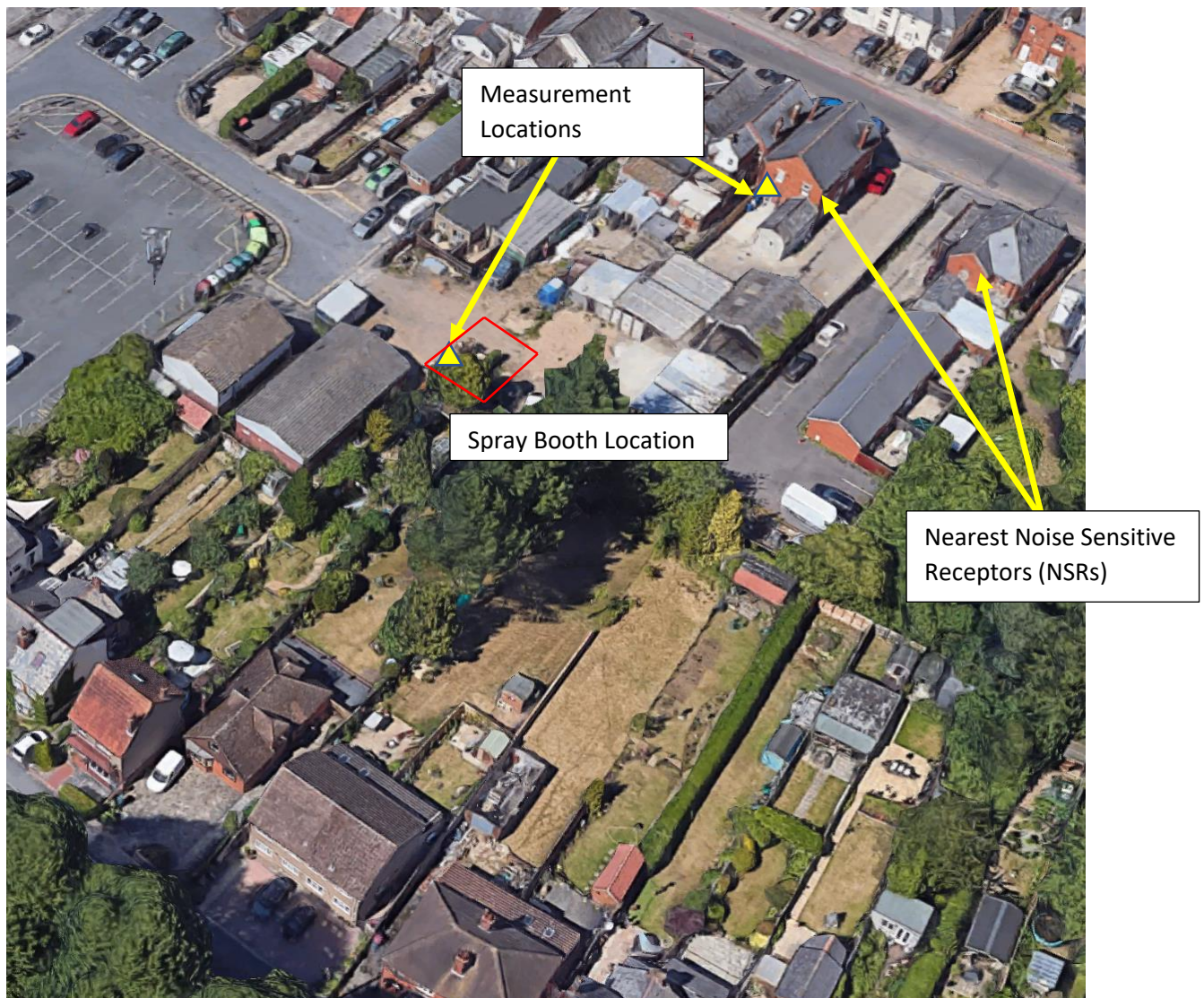
2.1.4 All measurements were taken after a field calibration was undertaken to ensure accuracy and repeatability of measurements.

2.1.5 Further data such as wind speed, wind direction, rainfall intensity, temperature and cloud cover were all recorded at the beginning and end of the assessment at the monitoring location.

2.1.6 Any anomalies (such as noise by the engineer during setup and collection of the kit) were removed from the survey for a true reflection of the ambient levels in the vicinity. This was done by recording audio throughout the survey at each location and listening back through the files during the analysis process to confirm what was recorded manually during the survey.

2.2 Plan Views of Site with Designated Work Areas

Figure 3



Key



= Monitoring Position for Noise Assessment

3.0 Legislation

3.0.1 The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 174 of the NPPF states the following:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

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...."

Paragraph 185 goes on to mention:

"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;"

3.0.2 The NPPF reinforces the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life;

- and where possible, contribute to the improvement of health and quality of life.”

3.0.3 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

3.1 Local Authority Criteria

3.1.1 The Reading Local Plan 2019 makes references to the impact of noise generating sources. EN17: Noise Generating Equipment states:

“Where noise generating equipment is proposed, the noise source specific⁶¹ level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor. ”

3.1.2 Section 4.2.90 also goes on to state; “Exposure to high levels of noise can have a significant effect on human health. This policy deals with noise issues in general, whilst policy EN17 deals particularly with noise-generating equipment. It is worth noting that there is a Professional Practice Guide on Planning and Noise available which provides guidance on design of residential developments to take account of noise, and taking account of this from the early design stage will help to reduce noise effects on future residents.”

3.1.3 The Local Plan document also references the ProPG: Planning and Noise document from May2017 produced by the IOA, ANC and CIEH. The guidance states that;

- *“The cumulative impacts of more than one source of noise should be considered; and*
- *In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring.”*

3.2 BS4142:2014 +A1 (2019)

- 3.2.1 The Local plan also makes reference to the measurement procedure used for BS4142:2014 as the best method.
- 3.2.2 Noise effects on residential properties due to the current operational hours and extended hours have been assessed according to the guidance in BS 4142:2014. This standard primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential sensitive receptors.
- 3.2.3 The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
- 3.2.4 According to BS 4142:2014, the background sound levels adopted for the assessment should be representative of the periods being assessed. The standard recommends that the background sound level should be collected from continuous measurements of normally not less than 15-minute intervals. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. It is particularly difficult to determine what is 'representative' of the night-time period because it can be subject to a wide variation in background sound levels between the shoulder night periods.
- 3.2.5 The method chosen for this section of the report is to use the data collected at the nearest NSR for the day and night periods to provide the ambient and background noise levels. The mode $L_{Aeq,1hr(Day)}$ and $L_{Aeq,1.5min(Night)}$ value will then be used for each time period over the course of the measurement as the most appropriate way of creating a representative value.
- 3.2.6 The specific sound levels have been determined separately in terms of the $L_{Aeq,1hr}$ during the daytime $L_{Aeq,1.5min}$ during the night-time. Daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours, so these periods have been adopted for this assessment.

- 3.2.7 At each of the most likely sensitive receptor locations, the rating level has been determined from the predicted specific sound level. Where it has considered it to be appropriate, a rating penalty has been applied for tonality, impulsivity and/or intermittent specific sounds as described in the commentary to paragraph 9.2 of BS4142:2014. This has been applied with consideration for the main sound sources from site that contribute to the level of specific sound at the receptor location.
- 3.2.8 As per the requirements of the standard, an initial estimate of the impact of the specific sound has been obtained by subtracting the measured background sound level from the rating level of the specific sound. Table 2 provides the initial evaluation of impact following this method.

Table 1

Magnitude	Difference Between rating Level and Background Level	Comments
High	+10dB	Significant Adverse impact Likely
Medium	+5 to +10dB	Adverse impact Likely
Low	0 to +5 dB	Adverse impact unlikely
Negligible	Less than 0dB	Adverse impact unlikely
No Change	-10 dB	No adverse impact

- 3.1.9 Following the initial evaluation of impact, the context of the sound has also been considered, which is a key requirement of the Standard. In evaluation of the context, the following factors have been considered:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

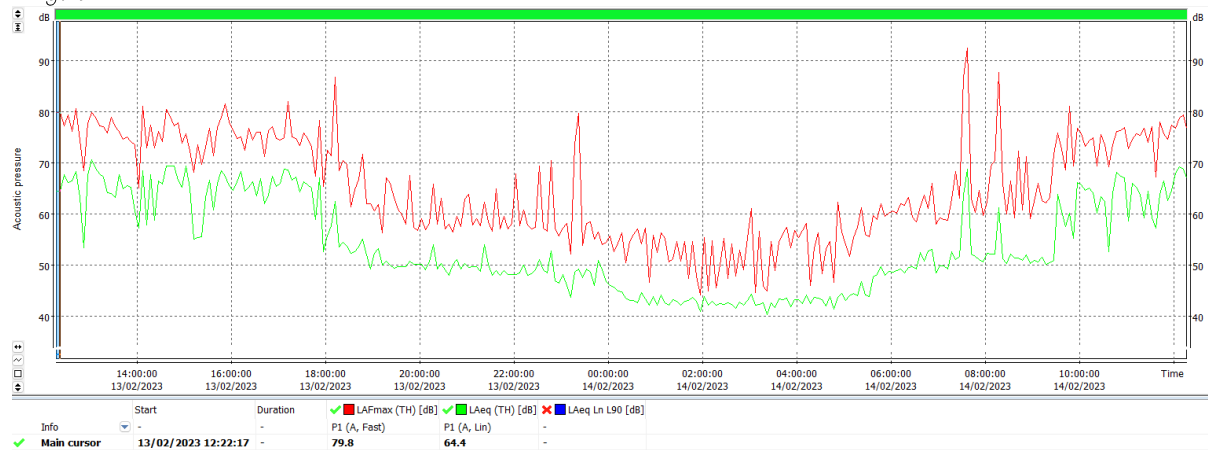
4.0 Results

4.1 – Background Noise

Table 2

Location	Start Date/Time	L _{Amax}	L _{Aeq1hr} (Mode)	L _{Aeq15min} (Mode)	L _{A90}
20 Norcot Road					
Day (0700-2300)		86.8dBA	59.5dBA		49.8dBA
Night (2300-0700)		79.8dBA		42.8dBA	39.9dBA

Figure 2



Comments

Large amounts of traffic and high background noise during the day

*based on Appendix C

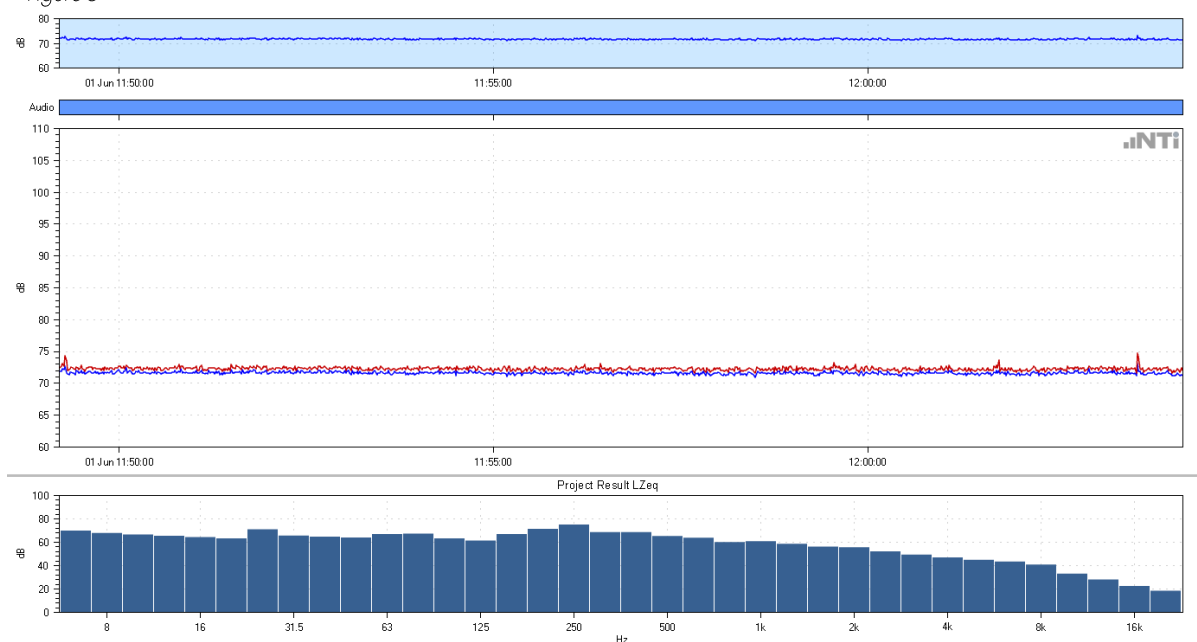
Cloud Cover	Temperature (Celcius)	Presence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
3	7.5 (1hr mode)	No	2.6	NE

4.2 – Extraction system assessment (Extraction on)

Table 3

Location	Start Date/Time	L _{Amax}	L _{Aeq 1.5min}	L _{A90}
Spray booth roof	11.49am	74.7dBA	71.6dBA	71.3dBA

Figure 5



Comments

Large amounts of traffic and high background noise

*based on Appendix C

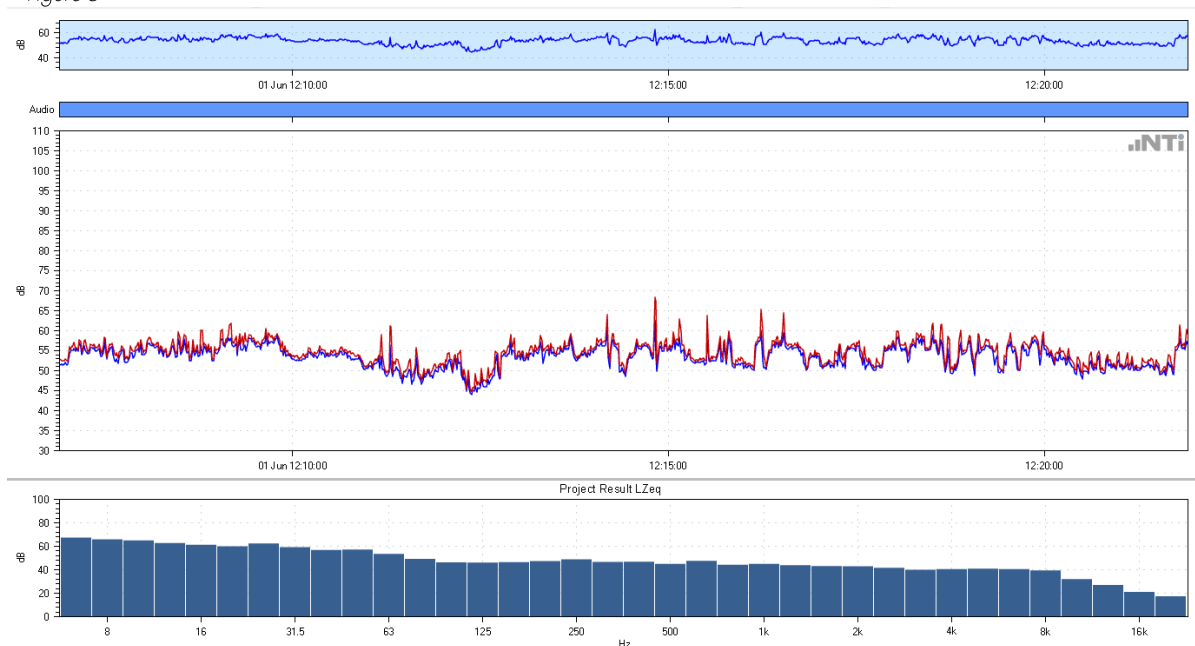
Cloud Cover	Temperature (Celcius)	Presence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
2	14	No	0.4	E

4.3 – Extraction system assessment (Extraction off)

Table 4

Location	Start Date/Time	L _{Amax}	L _{Aeq 1.5min}	L _{A90}
Spray booth roof	12.06pm	68.3dBA	54.1dBA	49.7dBA

Figure 6



Comments

Large amounts of traffic and high background noise

*based on Appendix C

Cloud Cover	Temperature (Celcius)	Presence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
2	14	No	0.6	E

5.0 Analysis of Results

5.1 Calculated Results

- 5.1.1 The specific noise level for the extraction system can be taken from looking at the ambient noise level with and without the presence of the noise. This provides a level that can then be used in the CadnaA noise modelling software to look at the impact on the residents in the area.
- 5.1.2 Based on the subtraction of the L_{Aeq} values for the system being on and off the specific noise level (at source) can be given as 71.5dBA. This can then be used to calculate the rating level at the NSR façade points in the area, and then compared to the background noise level.
- 5.1.3 Figure 5 below shows the calculated value for the nearest NSR. Appendix D shows the full calculation spec to include barrier attenuation, ground attenuation and reflections.

Figure 7

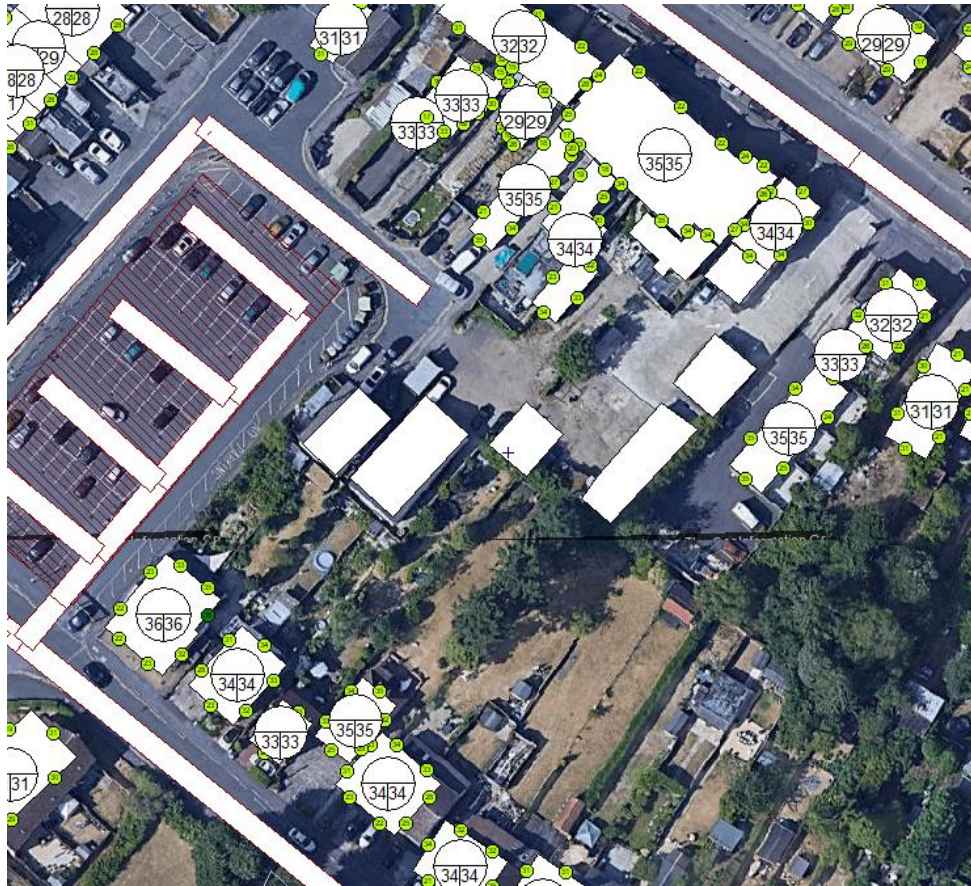
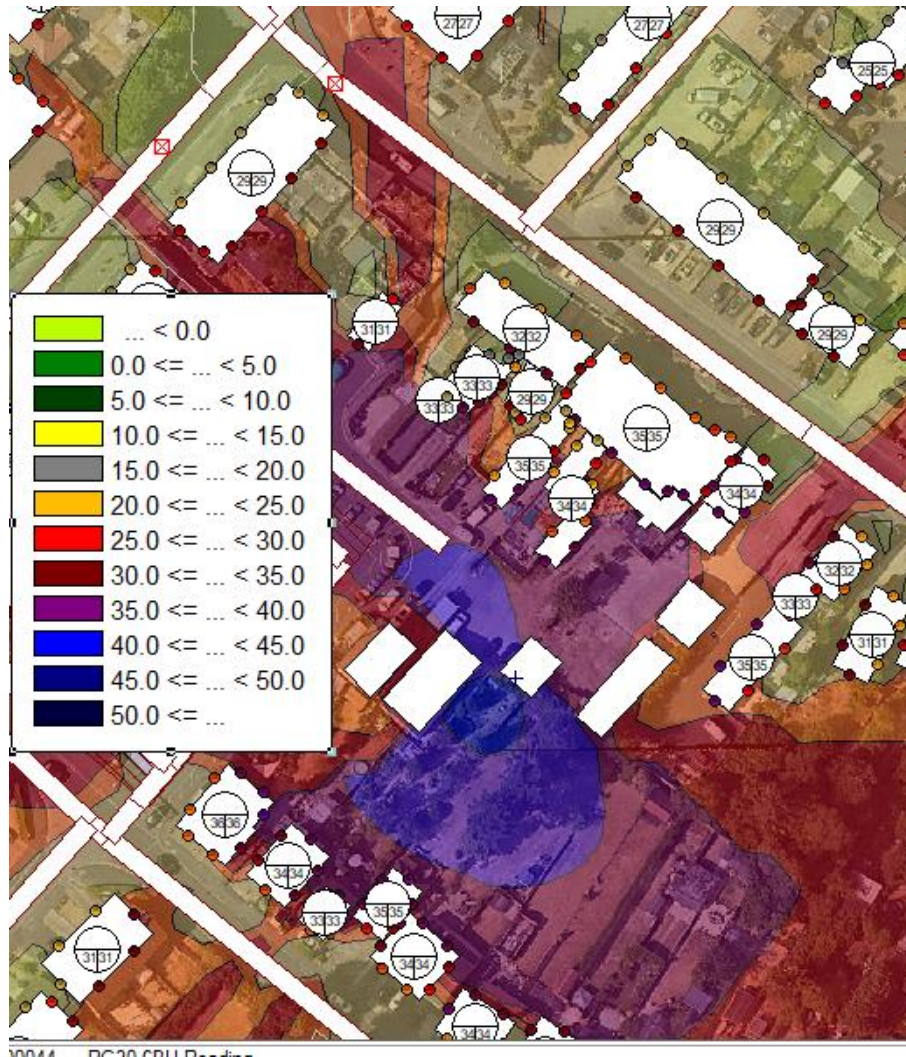


Figure 8



5.1.4 With the calculated specific noise level being at a maximum of 35dBA at the closest NSR window, and 34dB at the next; 35dBA has been used in the calculations in table 4 to assess the noise impact of the units.

Table 5

Measurement Type	Parameter	Result	Comment
Day			
Ambient sound	L _{Aeq}	58dBA	Measured at NSR- Source present
Residual sound level	L _{Aeq1hr}		
Background sound level	L _{A901hr}	48dBA	Measured at NSR- Source present
Specific Sound Level	L _{Aeq1hr}	35dBA	Modelled
Acoustic Feature Correction	dBA	+3	No Tonal noise but distinctive
Rating Level	dBA	38dBA	
Difference of Background vs Rating level	dBA	-10dB	
Likelihood of complaints			No Adverse impact

6.0 Conclusion and Further Comments

6.1 Discussion of Levels

- 6.1.1 The specific noise level of the extraction system is below the required levels, in accordance with BS4142:2014, for there to be the likelihood of adverse impact on the nearest NSR.
- 6.1.2 There are no plans to run the spray booth past 5-6pm so night values have not been considered in this report.
- 6.1.3 Although there is no mathematical need to on the basis of this report, the client may look to include a silencer to further reduce levels from the extraction system.

7.0 Credentials

Name	Title	Credentials
James Flitton BSc AMIOA	Acoustic Consultant	CSCS Professionally Qualified person
		Associate Member Institute of Acoustics
		Affiliate Member of IDE
		Affiliate Member of IOR
Signed		

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 s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. 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 $20\mu\text{Pa}$. 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_A	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 exceeded for 90% of the time over the period T. Generally used to describe background noise level.

Appendix B – Survey Instrumentation



Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

This model of sound level meter submitted for periodic testing successfully completed the applicable pattern-evaluation tests given in IEC 61672-2. The pattern approval certificate is available at www.nti-audio.com/XL2.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2-TA	S/N	A2A-22077-F0
Firmware	V4.71		
Microphone Model	M2230		
Preamplifier	MA220	S/N	11392
Microphone Capsule	MC230A	S/N	A24696
Performance class	Class 1		
Customer Inventory Nr.			

Customer

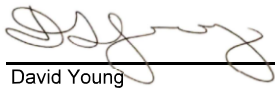
Crimson Remote Services Ltd
7 Hicks Grove
Thoresby Vale
Edwinstowe
Nottinghamshire

Date 07 February 2023

Certificate UK-23-018

Results PASSED
(for detailed report see next pages)

Operator


David Young

NTi Audio UK Ltd • Office 33C Julians Road • Stevenage
Hertfordshire, SG1 3ES, UK • uk@nti-audio.com



Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **Class 1 Sound Calibrator CAL200**
- Serial Number: **19829**

-
- Date of Calibration: **30 November 2022**
 - Certificate Number: **44895-19829-CAL200**
 - Results: **PASSED**
(for detailed report see next page)

Tested by: **D.Young**

Signature:

A handwritten signature in blue ink, appearing to be "D. Young", written over a horizontal line.

Appendix C – Weather Conditions Chart Used

(Blank version)

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Error! Reference source not found.		Temperature:		
Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Precipitation:		
		Cloud cover (oktas - see guide)		
		Presence of fog/snow/ice		
		Presence of damp roads/wet ground		
		Wind Speed (m/s)		
		Wind Direction		
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)		

Appendix D – CadnaA Calculation Sheet

Receiver
Name: Norcot Road
ID:
X: 30636499.2m
Y: 5702834.2m
Z: 4.00m

Point Source, ISO 9613, Name: "", ID: ""																				
Nr.	X	Y	Z	Ref.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahaus	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB(A))
1	30636465.05	5702807.36	9.10	0	DEN	500	82.3	0.0	0.0	0.0	0.0	43.8	0.1	0.0	0.0	0.0	6.0	0.0	0.0	32.4

Receiver
Name: Recreation Road
ID:
X: 30636431.4m
Y: 5702779.4m
Z: 4.00m

Point Source, ISO 9613, Name: "", ID: ""																				
Nr.	X	Y	Z	Ref.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahaus	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB(A))
2	30636465.05	5702807.36	9.10	0	DEN	500	82.3	0.0	0.0	0.0	0.0	43.9	0.1	0.0	0.0	0.0	4.8	0.0	0.0	33.6