



Acoustic Survey and Assessment for Proposed Extraction System to serve a Car Respraying Booth at 2 Vale Road, Northfleet, Gravesend, Kent, DA11 9RE.

Prepared for:

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1. Introduction

- 1.1. Martin Environmental Solutions has been commissioned to undertake an acoustic survey and assessment to support a planning application for the erection of an extraction flue to serve a new car spray booth installed at 2 Vale Road, Gravesend, Kent, DA11 9RE.

Site Location and Context

- 1.2. The development site is situated to the west of Vale Road and to the north of a larger industrial area, currently empty and to be used for storage. Existing industrial buildings are located to the immediate south, including a tyre repair centre adjacent. Residential properties are located on the far side of the Vale Road ~45m from the extraction point and to the immediate north of the site, with garden amenity areas adjacent to the extraction point.
- 1.3. An aerial photograph is enclosed in Figure 1, together with a proposed layout drawing in Figure 2.
- 1.4. The report has been produced to clarify the potential impact on the proposed development and to identify mitigation measures if required to ensure the development is appropriate in terms of noise impact.



2. Policy and Guidance

- 2.1. The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals, or schools, with other activities that generate high levels of noise. However, the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).
- 2.2. The Government's publication of the National Planning Policy Framework (NPPF), updated in December 2024, states that planning policies and decisions should prevent new and existing development from contributing to or being put at unacceptable risk from, of being adversely affected by unacceptable levels of noise pollution, paragraph 187.
- 2.3. The document goes further in paragraph 198 by stating planning policies and decisions should ensure that new development is appropriate for its location ... in doing so they should *"mitigate and reduce to a minimum potential adverse impacts from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life"*. The NPPF makes direct reference to the Government published Noise Policy Statement for England (NPSE).
- 2.4. The NPSE sets out the long-term vision of the government's policy on noise, which is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*
- 2.5. Its guiding principles include "Using Sound Science Responsibly – Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values."
- 2.6. The NPSE's long-term vision is supported by three aims:
- 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 improvements of health and quality of life.

2.7. The NPSE provides further guidance on “significant adverse effects” and adverse effects” and introduces the following terms, which have been used within toxicological studies for years.

NOEL – No Observed Effect Level; this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

LOAEL – Lowest Observed Adverse Effect Level; this is the level of noise exposure above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level; This is the level of noise exposure above which significant adverse effects on health and quality of life occur.

2.8. The use of the words Observed is important, a change in behaviour, e.g. closing windows, turning up TV’s or physical change, e.g. being woken up must be observed, and not simply being able to hear a sound.

2.9. The NPSE recognises that it is not possible to have single objective noise-based measures which define the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

2.10. The Planning Practice Guidance on Noise, July 2019 (PPG – N) provides further guidance on the consideration of noise as part of the planning process and highlights that plan-making and decision making need to take account of the acoustic environment and consider;

- Whether or not a significant adverse effect is occurring or likely to occur
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether a good standard of amenity can be achieved.

The guidance used the same concepts of adverse effect level, used within the NPSE.

2.11. The PPG -N document provides the following noise exposure hierarchy;

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING EFFECT LEVEL	ACTION
Not Noticeable	No effect.	No observed effect	No specific measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable adverse effect	Prevent

2.12. One therefore needs to determine what level represents SOAEL in a given situation, so that it can be avoided and mitigated against. While the NPSE and PPG-N identify that no single level of sound can be provided which determines an adverse impact from noise many Local Authorities have identified sound level criteria in accordance with the World Health Organisation's recommended levels, mirrored in BS8233:2014.



- 2.13. The World Health Organisation (WHO) “Guidelines for the prevention of Community Noise Annoyance” provides guidance on internal and external sound levels that are likely to result in community annoyance. These are mirrored within BS8233:2014. ‘Guidance on sound insulation and noise reduction for buildings – Code of Practice’
- 2.14. The WHO recommended noise levels are based on sound scientific research principles on when observed effects are reached as required by the NPPF.
- 2.15. The WHO guidance identifies that for outdoor amenity areas (gardens) sound levels should not exceed 55dB(A) $L_{Aeq,16hr}$ in order to avoid ‘Serious Community Annoyance’ or 50dB(A) $L_{Aeq,16hr}$ to avoid ‘Moderate Community Annoyance’ during the day. For internal levels the WHO set 35dB(A) $L_{Aeq,16hr}$ during the day to prevent Moderate Annoyance and 30 dB(A) $L_{Aeq,8hr}$ in bedrooms at night to prevent sleep disturbance.
- 2.16. The WHO guidance also recommends that maximum sound levels at night should not regularly exceed 45dB(A) within bedrooms to prevent sleep disturbance. Regularly is considered to be more than 10 times during any 8-hour night-time period.
- 2.17. The hours of 07:00 – 23:00 representing day-time and 23:00 -07:00 night-time periods.
- 2.18. BS 8233:2014 also specifies desirable noise levels to be achieved inside dwellings. The daytime period suggests internal noise levels of 35dB $L_{Aeq,16hr}$ for resting in living rooms and bedrooms while for night-time a level of 30dB $L_{Aeq,8hr}$ is recommended. Slightly higher levels are recommended for dining room areas at 40dB $L_{Aeq,16hr}$. The criteria for external areas mirrors that within the WHO guidance.
- 2.19. The WHO/BS8233 guidelines therefore suggest sound levels above 55dB(A) externally would result in a significant adverse impact (SOAEL), between 50-55dB(A) as a moderate annoyance or LOAEL and therefore below 50dB(A) as NOEL.
- 2.20. Internally the guidance recommended levels of 35dB(A) during the daytime to avoid moderate annoyance and 30dB(A) at night-time to prevent sleep disturbance (LOAEL). Thus, levels below these would equate to NOEL.



2.21. Based on the 15dB reduction for an open window sited within both the WHO and BS8233 guidance documents and the sited external and internal recommended sound levels, LOAEL would be observed between 35-40dB $L_{Aeq,16hr}$ day and 30-35dB $L_{Aeq,8hr}$ night. While SOAEL levels would be above these values.

2.22. Councils typically use the 35dB day/30dB night as internal criteria when assessing the impact on and from developments as part of the planning process, along with the night-time maximum 45dB L_{Amax} level within bedrooms.

BS4142:2014+A1:2019

2.23. Another commonly used standard is British Standard 4142:2014+A1:2019 'Method for rating industrial and commercial sound' compares the sound predicted by the source in question against the background, L_{A90} sound levels. This standard aims at addressing the impact from industrial and commercial activities, taking into account the subjective nature of sound and potential short term activities.

2.24. The methodology requires the "residual sound", the ambient sound level when the specific sound source is suppressed or absent, expressed as an $L_{Aeq,t}$ measurement, to be then subtracted from the "ambient sound level", the overall sound level present including the specific source sound, measured as L_{Aeq} measurement, this results in a value for the specific or "problem" sound.

2.25. If the "specific" sound is tonal, such as whine or hum, or if it is impulsive such as bangs or clatters or if it is intermittent or irregular enough to attract attention a correction is added to the "specific level" to produce a "rating level". The "rating level" is then compared to the measured "background" L_{A90} sound level.

2.26. If the "rating level" exceeds the "background" by around 10dB(A) or more this "indicates a significant adverse impact". A difference of around 5dB(A) 'indicates an adverse impact. The lower the commercial noise level is, the lower the likely impact.





ProPG : Planning & Noise : 2017

- 2.27. The primary goal of this guidance is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise.
- 2.28. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise).
- 2.29. The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is “not dominant”.
- 2.30. This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging. The two sequential stages of the overall approach are:
- Stage 1 – an initial noise risk assessment of the proposed development site; and
 - Stage 2 – a systematic consideration of four key elements.
- 2.31. The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:
- Element 1 – demonstrating a “Good Acoustic Design Process”;
 - Element 2 – observing internal “Noise Level Guidelines”;
 - Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
 - Element 4 – consideration of “Other Relevant Issues”.
- The ProPG considers suitable guidance on internal noise levels found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”.
- 2.32. Based on the above guidance and given the development being considered the following criterion have been identified:



Location	07:00 to 23:00	23:00 to 07:00
External Garden Amenity Areas	50dB LAeq,16hr	-
Living rooms (e.g. Lounges)	35dB LAeq,16hr	-
Bedrooms	35dB LAeq,16hr	30dB LAeq,8hr
Dining rooms	40dB LAeq,16hr	-
Night-time LAMax	-	45dB LAMax
BS4142:2014 Rating Level		
External Garden Amenity Areas	Rating level < background LA90	
Living rooms	35dB LAeq,16hr	-
Bedrooms	35dB LAeq,16hr	30dB LAeq,8hr



3. The Assessment

The development

- 3.1 The proposed development consists of the retrospective erection of an extraction system to serve a car respraying booth/ the system is located towards the rear of the building.
- 3.2 The business will operate between 9:00-17:00, Monday to Friday and 9:00-13:00 on Saturdays. However, the spray booth will not operate for the full duration of the opening hours, only being used as required for the business.
- 3.3 The extraction flue is also to be raised to $\geq 1\text{m}$ above the eaves of the building with a vertical discharge point to aid dispersion and sound emission directivity.
- 3.4 Figure 2 below provides an overview of the proposed development.

Existing Situation.

- 3.5 In order to obtain representative background sound levels for the area on site monitoring was undertaken over the 1st July 2026 to obtain representative sound background sound levels for the area with the site non-operational. At the end of this period the spray booth extraction system was run for an hour to obtain current sound emissions levels for the site.
- 3.6 A Cirrus Optimus Green sound level meter was utilised for the monitoring. The meter was placed at a height of $\sim 1.5\text{m}$ next to the extraction system between the building and the neighbouring properties garden fence.
- 3.7 The meter was field-calibrated at the start and end of the monitoring period with no significant variation and full laboratory calibration certificates are available on request.
- 3.8 The weather during the monitoring was warm, dry with little wind $< 5\text{m/s}$.
- 3.9 The full results are shown in Appendix A, average sound levels for the day were $45.7 L_{Aeq}$, and $36.3 L_{A90}$. When the extraction system was switched on the sound



level increased to 70.1dB(A). the rest of the industrial estate was not in use at the time of the monitoring.

Potential Impact

- 3.10 The difference between the background sound level and that of the extraction system is significant and the resulting sound levels within the garden area would be above the recommended 50dB(A). Further mitigation measures are therefore required to ensure the sound levels from the extraction system are acceptable and will result in no significant adverse impact on the surrounding properties.
- 3.11 Research has identified a suitable silencer which when fitted to the both the inlet and outlet of the extraction system will reduce the sound level at the monitoring point to 33.9dB(A). See Appendix B for details and Calculations.
- 3.12 Thus, the inclusion of the silencers – Elta R02-3-1800 rectangular silencers will ensure the resulting sound level is both below the prevailing background L_{A90} sound level and the recommended 50dB(A) within the garden amenity area.
- 3.13 The property façade is located further away and given a 15dB attenuation¹ for an open window the internal sound levels will be below the recommended day and night-time levels.
- 3.14 No significant adverse impact will therefore be experienced following the inclusion of the silencers and as such a No Observed Effect Level will be experienced.
- 3.15 The silencers are to be installed internally and should be fitted on anti-vibration mounts with flexible connectors at either end to prevent vibration running through the extraction system.

¹ BS8233: 2014; Guidance on sound insulation and noise reduction for buildings



BS4142:2014+A1:2019

- 3.16 Council's typically request a BS4142:2014+A1:2019 assessment be undertaken for development which incorporates external plant being installed such as this one.
- 3.17 Such an assessment has been conducted and is detailed below.
- 3.18 The system will when used be on continuously and each cycle will last over an hour. The assessment requires a standard reference period of 1hr and also the unit will be on continuously over the assessment period. A review of the monitoring data has identified a slight tone at 200Hz, a correction of +4dB is to be applied. The below assessment represents the impact post installation of the silencers.

	Day	
Measured Ambient sound level	-	Mitigated extraction system not present
Residual Sound level	$L_{Aeq} = 45.7\text{dB}$	From second monitoring point
Background Sound Level	$L_{A90} = 36.3\text{dB}$	Background taken from second monitoring point.
Reference period	60 minutes	Normal ref period,
Specific sound Level	$L_{Aeq} = 33.9\text{dB}$	Calculated
Acoustic feature	+2	+4 tonal correction
Rating level	35.9dB	
Background sound level	$L_{A90} = 36.3\text{dB}$	
Excess of Rating level over background level	$(35.9-36.3) \text{ dB} = -0.4\text{dB}$ indicates no significant adverse impact	
Uncertainty		The rest of the industrial site was not in operation at the time of the monitoring. This is likely to increase background sound levels at the receptor location. The nearest receptor point the rear garden amenity area is located further away from the monitoring point, thus the specific sound level above, calculated on the



		monitoring position is likely to be less by at least 6dB.
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3.19 The assessment; when considering the above mitigation measures will not result in any adverse impact on the future residents.



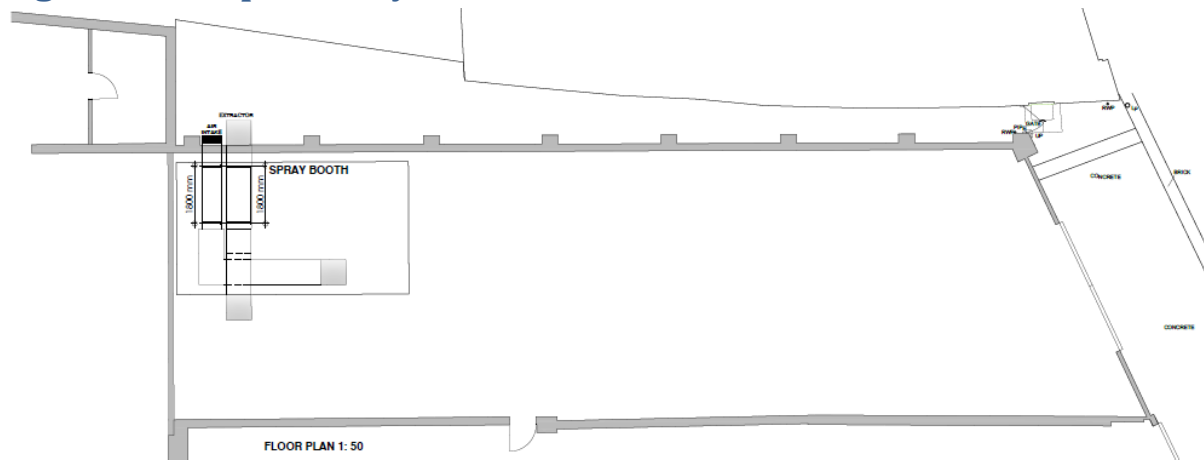
4. Conclusion

- 4.1. On-site monitoring has identified the extraction system will result in an adverse impact on neighbouring properties and as such mitigation measures have been identified to reduce the sound emission levels from the system.
- 4.2. These measures consist of the installation of an Elta R02-3-1800 silencer to both the inlet and outlet of the extraction system.
- 4.3. The inclusion of the above mitigation measures will result in sound levels below the prevailing background sound level and the recommended external level of 50dB(A), thus less than the internal recommended sound level of 35dB(A). therefore, a No Observed Effect Level (NOEL) on the neighbouring residents in line with the Noise Policy Statement for England. Thus, the development will achieve the aims of the NPSE by avoiding any significant adverse or adverse impacts on health or quality of life.
- 4.4. In terms of the PPG-N the development achieves the aims of ensuring no significant adverse or adverse effect will occur at the nearby residential properties.
- 4.5. As such the development will meet the objectives of the National Planning Policy Framework in ensuring that no significant adverse impact is experienced by the neighbouring residents. The development is therefore considered to be acceptable in terms of noise.

Figure 1 – Aerial Photograph



Figure 2 – Proposed Layout Plan





Appendix A – Full Monitoring Results

Background - Extraction Off		
Time	L _{Aeq} (dB)	L _{A90} (dB)
01/07/2026 16:00	53.2	36.2
01/07/2026 15:00	42.2	35.8
01/07/2026 14:00	39.8	35.9
01/07/2026 13:00	41.0	36.0
01/07/2026 12:00	42.9	37.4
01/07/2026 11:00	42.3	35.6
01/07/2026 10:00	44.6	36.9
01/07/2026 09:00	39.0	35.8
01/07/2026 08:00	41.0	36.6
Extraction on		
01/07/2026 17:00	70.1	69.6



Appendix B – Silencer Details and Calculations

	63	125	250	500	1	2	4	Lp
Extract	63.3	63.3	74.8	63.2	64.3	63	57.1	70.1
silencer R02-3-1800	10	20	35	49	50	50	50	
	53.3	43.3	39.8	14.2	14.3	13	7.1	
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	
Resulting Sound level	27.1	27.2	31.2	11	14.3	14.2	8.1	33.9

R02

Rectangular Silencers

ELTA

Acoustic Performance (dB) - Centre Band Frequency

Product Code	Length (mm)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
R02 - 3 - 600	600	6	9	13	26	31	32	24	20
R02 - 3 - 900	900	7	12	18	33	42	42	37	28
R02 - 3 - 1200	1200	8	16	26	42	60	60	46	34
R02 - 3 - 1500	1500	9	18	30	47	60	60	60	40
R02 - 3 - 1800	1800	10	20	36	49	60	60	60	62
R02 - 3 - 2100	2100	12	23	40	60	60	60	60	49
R02 - 3 - 2400	2400	13	26	40	60	60	60	60	60

Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions will be assessed using the relevant certified insertion loss data together with relevant dynamic corrections.



Appendix C – Acoustic Terminology

Descriptor	Explanation
dB (decibel)	The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2×10^{-5} Pascals) and the threshold of pain is around 120 dB.
dB(A) – A-weighting	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
$L_{Aeq,T}$	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_{Amax}	A noise level index defined as the maximum noise level. 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_{A10} and L_{90}	A noise level index. The noise level exceeded for percentage of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
$R + R_w$	The weighted (w) sound reduction index (R), a single figure rating of the laboratory airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz. The higher the value, the greater the sound insulation, and the more onerous the requirement.
D_{nTw}	Weighted standardized level difference. Single-number quantity that characterizes the airborne sound insulation between rooms. Specified in Building Regulations and measured on site.
C or C_{Tr}	These are spectrum adaptation terms for taking into account the effect of different sound spectra. C and C_{Tr} are corrections for pink noise and traffic noise respectively and are added to single figure quantities, e.g. $R_w + C_{Tr}$



Reverberation Time	The time required for the steady sound pressure level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off.
Free-field	Far from the presence of sound reflecting objects (except the ground),
Fast/slow time weighting	An averaging time used in sound level meters. Defined in BS 5969.
D _{n,e,w}	A weighted normalised sound level difference as measured in laboratory conditions for small building components like ventilators. The higher the figure the greater the level of attenuation is achieved.
SEL	Single Event Level – A 1 second figure which contains the same energy as the whole event.
Frequency	the pitch of a sound in Hz or kHz.
Octave Bands or 1/3 Octave Bands	Whilst single figure values are useful, often spectral data is required for analysis and/or acoustic specification. To represent the frequency content, sound level or acoustic properties are presented in specific frequency bands, also known as octave bands. The frequencies of octave bands have been internationally standardised. For example, the 500 Hz octave band (500 Hz being the centre frequency) has a range from 354 Hz to 707 Hz. Where finer spectral detail is required, 1/3-octave band data can be used. Each octave band is divided into three 1/3-octave bands.
Sound Pressure Level, L _p	a measure of the sound pressure at a point, in decibels.
Sound Power Level, L _w	sound power level. It is a measure of the total sound energy radiated by a sound source and is used to calculate sound levels at a distant location. The LWA is the A-weighted sound power level.



Appendix D - Report Author Details

This report has been produced by Neil Martin, BSc (Hons), PGDip, CEnvH MCIEH, MIOA.

Neil is the principal acoustic consultant at Martin Environmental Solutions Ltd, a consultancy company specialising in Environmental Health disciplines including environmental noise assessment and control. He holds a Bachelor's degree in Environmental Health and Diploma in Acoustics. He is a Chartered Member of the Chartered Institute of Environmental Health and a Full member of the Institute of Acoustics.

Neil has over 20 years' experience working within a Local Authority Environmental Health setting, principally in the Environmental Protection and Public Health areas and has been working as an acoustic consultant since 2011.

Since its formation, Martin Environmental Solutions has advised and assisted many groups including residents, developers and local authorities about the problems of noise and vibration in the environment and the possible solutions. Neil also acts as an expert witness in the area of acoustics.