END OF LIFE VEHICLE AUTHORISED TREATMENT FACILITY AND SCRAP METAL RECYCLING FACILITY

NOISE MANAGEMENT PLAN

Report Number 2135r7v2d0422

Site Location:
Pembrokeshire Metal Recycling
Carew pavilion
Carew Airfield
Tenby
SA70 8SX

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Description	Date	Author	Checked	Version
Bespoke Permit Application	November 2021	Geotechnology	PMR	1
Update following Schedule 5	April 2022	Geotechnology	PMR	2
Update following Schedule 5	July 2022	Geotechnology	PMR	3

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1 INTRODUCTION

1.1 Objectives of Plan

The aim of this Noise Management Plan (NMP) is to integrate the findings of a Noise Impact Assessment (NIA) undertaken for PMR into day-to-day operation of the site. This is to ensure that identified noise sources at the site are documented and measures are taken that ensure noise, as far as possible, that the site activity does not cause problems or annoyance to potentially sensitive receptors.

Horizontal Guidance Note H3 titled Noise Assessment and Control provides a noise management plan template that sets out some of the information expected by NRW to be in a management plan. This is based on that template (although now withdrawn) and also EA guidance titled Noise and vibration management: environmental permits which was updated in January 2022.

1.2 Management Committment

PMR recognise that the operation has the potential to be a source of noise and that it is the responsibility of management to control the potential impact. This will be done by implementation of a safe and well maintained operation, daily checks and developing good relationships with neighbours, waste regulators and local authority.

PMR is committed to ensuring that the waste activity and any subcontractors working at the site use noise control equipment that is designed, operated and maintained appropriately so it controls noise effectively at all times.

PMR also recognises that no NMP can cover every eventuality and so management will regularly review the effectiveness of the NMP.

1.3 Overview of Conditions

The site receives, sorts and dispatches various metals and ELV for depollution to primarily enable the recovery and recycling of metals. Most deliveries are brought to site by PMR vehicles that have collected metals from customer premises rather than the site being widely open to the public. The site operates between the hours of 08:00 and 17:00 Monday to Friday and 08:00 – 13:00 on Saturdays. The site is not operational on Bank Holidays.

Deliveries are received at the site via tipper trucks. Scrap metals are laid down externally and sorted through both manually and using a diesel powered 360 excavator with a grab attachment. During this process ferrous and non-ferrous metals are visually separated by operatives. Ferrous metals are stockpiled externally and non-ferrous metals placed in pallet boxes within the non-ferrous shed. Prior to depollution, ELV are placed into storage and handled using forklift. Oversize metals are sometimes received and require size reduction in the hot works area using an oxyacetylene torch and / or mechanical jaw cutters.

2 POTENTIAL NOISE SOURCES

2.1 On-site Noise Sources

A review of noise sources has been undertaken. This will be subject to ongoing review.

The operations comprise a series of steps and the use of machinery all of which have the potential to generate noise. These noise generating elements are summarised in Table 2-1 and also indicated on Figure 1.

Table 2-1 Main Noise Generating Elements

Activity	Location	Typical Operation
Tipper Trucks and Flatbed	External – deliver waste to receipt area	On-demand, occasional (upto 5 deliveries a day)
360 Excavator with Grab and Diesel-Powered Forklift	External – all areas of yard	On-demand, regular (used frequently each day to sort, separate and grade stock)
Oxyacetylene Cutter	External in Hot Works Area	On-demand, occasional (1 day a week)
Generator for Cutting Jaws	External in hot works area or adjacent ELV bay	On-demand, occasional (1 day a week)

2.2 Other noise sources

There are other noise sources within the area. These include:

- materials handling on adjacent site to northwest and southeast – both sites are used for storage
- Go-karting facility to north-west
- Farmyard activity and machinery related to activities to southeast
- Use of wider airfield for various activities throughout the year including regular markets and car boot sales with associated vehicular traffic from early in the morning, commercial activities, storage and materials handling, car parking for large events
- Recreational activities and public noise at caravan park to north e.g. music, children screaming / playing, vehicular movements and deliveries
- Noise associated with main road to north (A477)
- Noise of agricultural crops moving in ambient wind
- Noise associated with electrical transmission in overhead pylons to east

3 SITE CONTEXT

3.1 Location

The operation is located southeast of Sageston and Carew in rural Pembrokeshire at Grid Reference E205870, N202630. The site is located on the former Carew Airfield and is mainly surrounded by open countryside, as shown on the aerial imagery in Plates 3-1 and 3-2. The adjacent go-kart facility is also identified in Plate 3-2.

Plate 3-1 View south towards operation from Carew airfield entrance

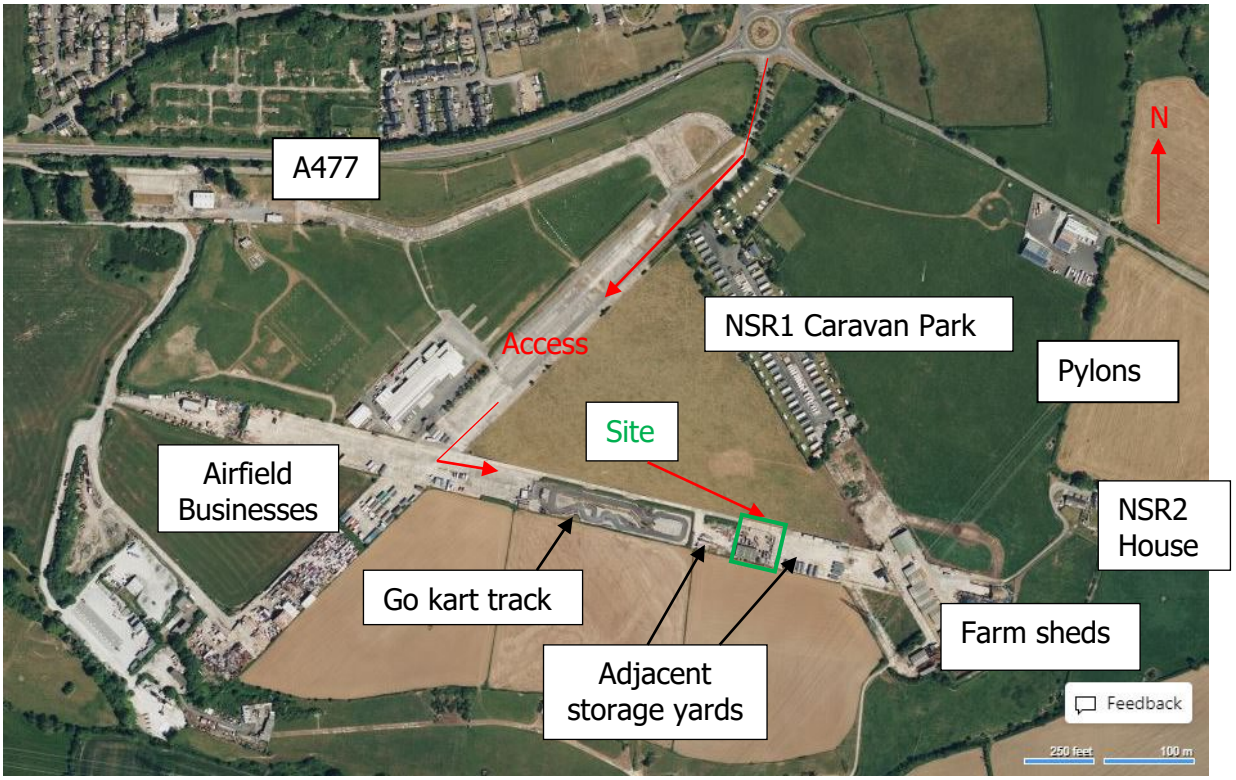

Plate 3-2 Identification of site in green, go-kart track and NSRs

(reader should note that NSR1 is ~90m north of site boundary at its closest point)

3.2 Planning Constraints and Enforcement

There are no specific planning conditions relating to noise at the site, enforcement actions have never been taken (either informal or formal) and the Local Planning Authority (LPA) has never had to undertake any noise monitoring.

3.3 Meteorology

Wind direction is predominantly dominated by southwesterly and westerly weather systems. However, easterly and northerly winds do occur, typically during the winter and spring. Rainfall totals approximately 1000mm per annum.

3.4 Noise Sensitive Receptors

As the site is located in a rural location there are very few permanent human or environmental noise sensitive receptors (NSRs) in proximity. There are no residential properties within 300m of the site and only one within 500m. There is also no school, hospital, nursing home or food preparation facility within 500m. Farm buildings used for animal husbandry are located 100m east but there is no associated residential property. Key features of the immediate surrounding area are identified on Plate 3-2.

The LPA has confirmed that the site is not in the proximity of any noise sensitive developments, that there are no areas zoned for noise sensitive developments and no noise initiatives in the area.

3.4.1 Human

PMR recognise that noise can lead to harmful effects that may come from stress reactions in the human body and that these may continue during sleep. These reactions can lead to:

- increased heart rate
- high blood pressure
- cardiovascular disease
- premature deaths
- cognitive impairment
- sleep disturbance
- hypertension
- annoyance

Two key human receptors are identified as NSR1 and NSR 2 on Plate 3-2.

- **NSR1.** Approximately 90m is a caravan site used by holidaymakers. This is designated as NSR1 on Plate 3-2. This has been the focus of the noise assessments as it is the closest.
- **NSR2.** This is 300m east of the site, beyond agricultural buildings used for animal welfare and husbandry. This residential property is also indicated on Plate 3-2.

Further details about the identified receptors are provided in Table 3-1.

Table 3-1 Sensitive Receptors

Receptor	Receptor Reference	Distance from noise sources on SITE	Description of ground between main site noise sources and receptor
Users of caravan park – static and mobile caravans providing short term accommodation	NSR1	~90m north at its closest point. Caravan park extends north towards A477 and entrance to Airfield	Beyond fenced site boundary and caravan park is open agricultural fields and then hedgerows and trees providing shelter and protection to the caravan park.
Residential property	NSR2	~300m East	Beyond fenced site boundary and residential property is storage yard, open agricultural fields and farm buildings / machinery used for animal husbandry.

3.4.2 Designated and Protected sites

There is ancient woodland ~1.3-1.4km to the north and south and also Special Areas of Conservation (SAC) to the northwest. The nearest feature is at Carew (~1.2km northwest) and is the Atlantic Salt Marshes. Other designated sites at Carew include Pembrokeshire Marine SAC, Pembrokeshire Bat SAC, Carew Castle SSSI and Milford Haven Waterway SSSI. These are considered to be beyond the radius of influence of the site.

4 NOISE ASSESSMENT OVERVIEW

As noise could possibly cause an impact, PMR has commissioned an independent noise impact assessment to assess the level of impact and what actions need to be taken, if any, to prevent or minimise noise pollution to acceptable levels.

The NIA has been undertaken by Inacoustic and is provided in Appendix 1. The assessment included:

- sound measurements at the closest noise-sensitive receptors (NSR1)
- 3-dimensional noise modelling
- detailed assessment of the potential noise impacts

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring.

The assessment indicates that the site can operate in an acoustically sympathetically but that control measures need to be implemented. These includes ensuring that material drop heights are reduced to a minimum, with the emphasis on placement rather than drop and ensuring that the closest receptors are screened from the activity as far as practicable. On this latter aspect, the assessment recommends the installation of a solid barrier around part of the site boundary to supplement the screening already provided by the stockpile of scrap metal and other objects.

5 NOISE CONTROL MEASURES

PMR acknowledges that it is its responsibility to avoid significant pollution and to demonstrate that appropriate measures to prevent, or where that is not practicable, to minimise noise impact are being effectively implemented, wherever feasible. In this context, the findings of the NIA have been integrated to this NMP and actions taken on the ground.

5.1 Normal Conditions

PMR recognises that preventing nuisance related to noise and vibration starts with good housekeeping, careful site management and layout and being a considerate neighbour. In this context, several preventative actions are to be integrated to the operation, as summarised in Table 5-1.

Table 5-1 Noise Control Measures

Activity	Location on site	Control Measures
Installation of perimeter hoarding	Around edge of site facing NSRs, as shown on Figure 1.	Erect solid barrier to supplement screening provided to off-site receptors at Caravan Park and ensure it is subject to preventative maintenance
External waste delivery and handling (manual and mechanical)	External areas	Banksman to be used to void use of reversing alarm Broadband reversing alarms to be used where feasible. Minimise drop heights – emphasis on placement and tipping onto stockpile where suitable and safe to do so Use manual separation where appropriate Minimise shouting and background music Vehicle routes to be kept clean and circular where feasible to avoid use reversing alarms Staff to avoid unnecessary revving of engines Implement routine housekeeping to keep site surface clear of metal fragments Switching off plant when not in use
Sorting, separating, size reducing and grading metals	External and internal areas	Use manual separation where appropriate Sort non-ferrous metals within shed Minimise use of noisy hand tools Minimise drop heights when separating metals into different containers Implement routine housekeeping to keep site surface clear of metal fragments

5.2 Abnormal Conditions

To ensure that abnormal conditions are identified, any change to on-site noise levels will be identified by site operatives and management. This will initially be done by subjective on-site assessment of noise levels based on experience and familiarity. As increased noise levels on-site could be indicative of failure of a control measure, the cause will be immediately investigated.

6 MONITORING AND COMPLAINTS

6.1 Complaints

PMR recognises that complaints are never a substitute for comprehensive monitoring and waste management practices but they do offer a valuable indicator of potential offsite problems related to the waste activity. For this reason, all complaints will be logged and documented in accordance with existing management systems.

6.1.1 Received Complaints

In the summer of 2021, PMR was informally approach by a representative of the Local Planning Authority in relation to a noise complaint received from the caravan site to the north. To reduce the likelihood of this re-occurring PMR discussed the erection of screening and this has been integrated to the site layout and NMP.

6.2 Monitoring

A Noise Level Assessment involving additional noise level monitoring and assessment may be necessary to assess and investigate complaints or changes in noise level identified at site.

6.3 Contingency Action Plans

Where observations, monitoring results or complaints indicate a potential noise problem, the contingency actions set out in Table 6-1 will be adopted.

Table 6-1 Contingency Action Plan

OBJECTIVE To initiate timely mitigation measures to prevent significant off-site noise problems	
Frequency of test	Following receipt of complaint related to noise or identification of significant rise in on-site noise levels

CONTINGENCY ACTION RESPONSES	**Response Time**
Step 1. Investigate Potential Sources Following detection of potential noise problem undertake detailed site inspection. If source of noise is obvious go to Step 2. If source cannot be identified go to Step 4.	Within 1 day or same day where feasible
Step 2. Remove noise source Review working practice and source of noise. Cease relevant operation and implement remedial actions where necessary. Go to Step 3.	Within 48 hrs of problem detection
Step 3. Continued Monitoring Repeat routine evaluation of site noise levels based on experience and familiarity once problem has been remedied. If problematic noise levels are still persistently detectable go to Step 4.	Within 1 week of problem initially being identified
Step 4. Further Investigation and Monitoring Ensure obvious noise problems have been remediated. Consider all available information including meteorological records, complaints history, other activities occurring at site / in surrounding area. Undertake detailed site inspections on-site and off-site for noise sources in accordance with H3 guidance. This will likely involve noise level assessment and monitoring at site and at receptor(s). Some operations may need to temporarily cease. **Outcome 1. Waste activity considered to be noise source.** Cease identified problematic activity and identify new mitigation measures. Go to Step 5. **Outcome 2. Waste activity not considered to be noise source.** Document investigations and return to normal operations.	Within 2 weeks of problem being identified
Step 5. Implement Mitigation Measures Review risks to off-site receptors. Implement relevant mitigation measures in consultation with NRW and noise advisors. This may involve temporarily ceasing operations.	Within 4 weeks of problem being identified

6.4 Receptor Notification

Following the identification of a significant noise problem, particularly following a noise complaint, PMR will liaise with the persons affected. This is to ensure that they are informed of the investigations being undertaken, relevant findings and mitigation measures.

7 PLAN REVIEW

PMR will review the effectiveness of this plan annually. This will be documented.

If NSRs are brought closer to the site by third parties, PMR will review this assessment and will also encourage the third party to understand the impact of their actions and how they could potentially assist.

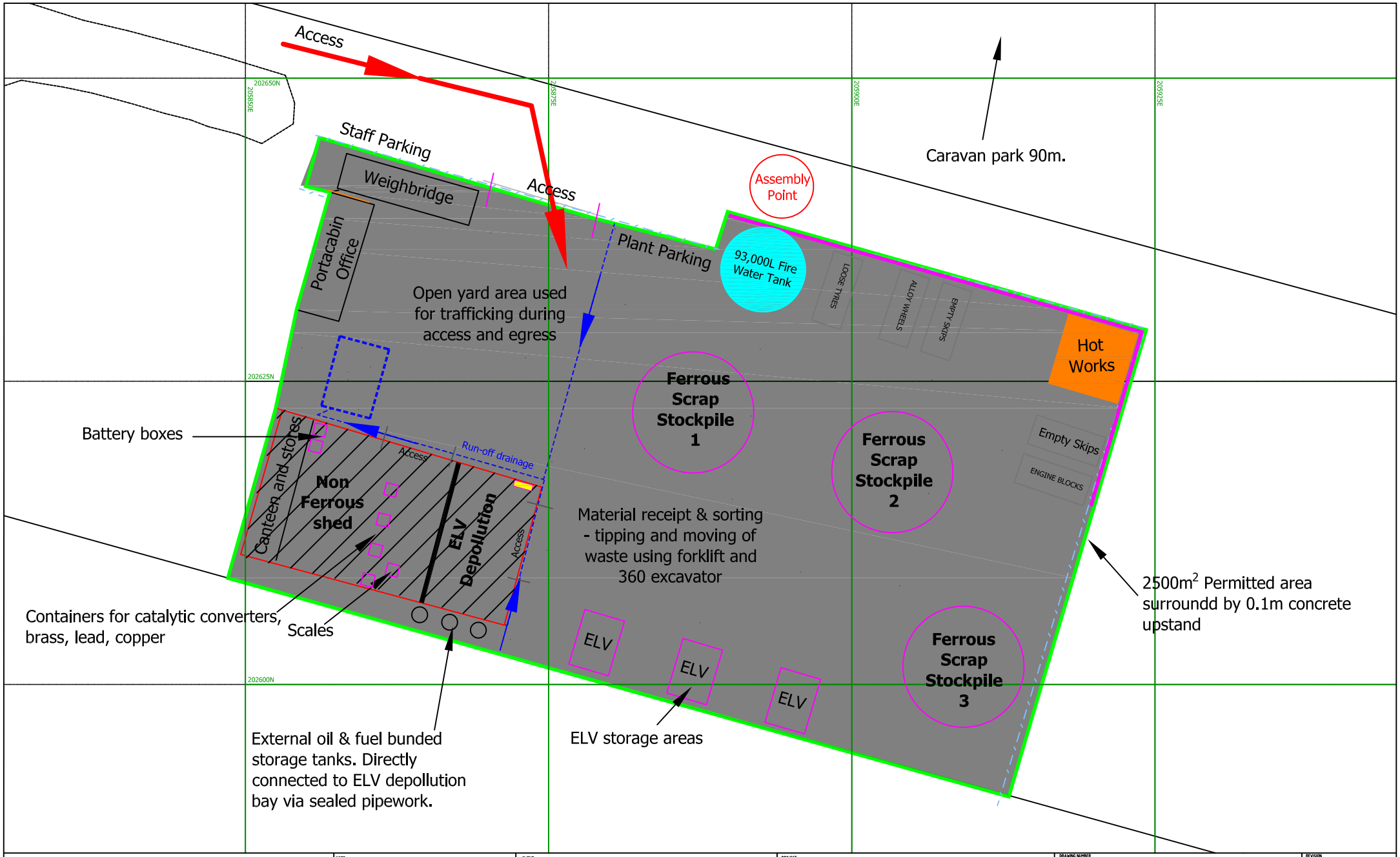

Figure Number 2135/1

Legend

Concrete
Building
Permit boundary
Solid hoarding
Electrical box

NOTE

CLIENT: Pembrokeshire Recycling Ltd

Rev	Date	Status/Ammendments

PROJECT: ELV ATF

TITLE: Noise Generating Activites

DRAWING NUMBER: 2135/1

REVISION: 0

SCALE: As Shown

DATE: 07/22

DRAWN: BR

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GEO TECHNOLOGY

END OF LIFE VEHICLE AUTHORISED TREATMENT FACILITY AND SCRAP METAL RECYCLING FACILITY

NOISE MANAGEMENT PLAN

APPENDIX 1
NOISE IMPACT ASSESSMENT

Report Number 2135r7v2d0422

Pembrokeshire Metal Recycling, Carew

Noise Assessment for NRW Permit

28th June 2022

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Version	Comments	Date	Authored By	Checked By	Project Number
1	Noise Impact Assessment for NRW	1st November 2021	Neil Morgan MSc MIOA	Antony Best BSc (Hons) MIOA	21-329
2	Response to NRW Comments	27th April 2022	Neil Morgan MSc MIOA	Antony Best BSc (Hons) MIOA	21-329
3	Response to further NRW Comments	28th June 2022	Neil Morgan MSc MIOA	Antony Best BSc (Hons) MIOA	21-329

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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to prepare a Noise Assessment for the Metal Recycling Operations at Pembrokeshire Metal Recycling, Carew Airfield, Carew, Tenby, SA70 8SX, for submission to Natural Resources Wales (NRW) as part of a Permit Application.

The site is currently operational, but intending to extend its operations to cover end-of-life vehicle breaking and processing.

This noise assessment is necessarily technical in nature; therefore a glossary of terms is included in Appendix A to assist the reader.

1.2. Scope and Objectives

The scope of the report is summarised as follows:

- Detailed sound measurements at the closest noise-sensitive receptors to the Site;
- A supplementary noise modelling exercise;
- A detailed assessment of the suitability of the Site, in accordance with the relevant policy; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the Noise and Vibration Management: Environmental Permits[1], and BS4142:2014+A1:2019[2].

[1] Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales and Northern Ireland Environment Agency, 2021. Noise and Vibration Management: Environmental Permits.
[2] British Standards Institution, 2019. BS4142:2014+A1:2019: Method for Rating and Assessing Industrial and Commercial Sound.

2. Assessment Framework

2.1. National Policy

2.1.1. Noise and Vibration Management: Environmental Permits

Environmental permits have conditions that require operators to control pollution; this includes controlling noise and vibration. The Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales and Northern Ireland Environment Agency have jointly released guidance to help holders and potential holders of permits apply for, vary, and comply with their permits. The guidance covers:

- how the respective environment agencies will assess noise from certain industrial processes;
- what the law says you must do to manage noise and vibration; and
- advice on how to manage noise – in particular, how to carry out a noise impact assessment and what operators should include in a noise management plan.

This guidance replaces these documents which have been withdrawn:

- Environment Agency Horizontal Guidance for Noise (H3) parts 1 and 2.

It involves determining the appropriate controls for industry to protect the environment through a single permitting process. To gain a Permit, Operators have to show that they have systematically developed proposals to apply the 'Best Available Techniques' (BAT) and meet certain other requirements, taking account of relevant local factors.

In terms of noise specifically, the use of BAT has to be considered and balanced within the wider context of other releases to different media (air, land and water) and taking issues such as usage of energy and raw materials into account. Noise cannot therefore be considered in isolation from other impacts on the environment.

The definition of pollution includes *"emissions which may be harmful to human health or the quality of the environment, cause offence to human senses or impair or interfere with amenities and other legitimate uses of the environment"*. BAT is therefore likely to be similar, in practice, to the requirements of the Statutory Nuisance legislation which requires the use of *"best practicable means"* to prevent or minimise noise nuisance. In the case of noise, *"offence to human senses"* may be judged by the likelihood of complaints. However, the lack of complaint should not necessarily imply the absence of a noise problem. In some cases it may be possible, and desirable, to reduce noise emissions still further at reasonable costs and this may therefore be BAT for noise emissions.

Consequently, the aim of BAT should be to ensure that there is no reasonable cause for annoyance to persons beyond the installation boundary.

In summary, the aim of BAT should be to achieve the following:

- Underpinning of good practice, a basic level of which the operator should employ for the control of noise including adequate maintenance of any parts of plant or equipment whose deterioration may give rise to increases in noise. For example, this would include bearings, air handling plant, the building fabric as well as specific noise attenuation measures associated with plant, equipment or machinery;
- Noise levels should not be loud enough to give reasonable cause for annoyance for persons in the vicinity, which is a more appropriate environmental standard than that of Statutory

Nuisance and is normally the aim of most planning or other conditions applied by Local Authorities; and
- Prevention of 'creeping background' (creeping ambient), which is the gradual increase in sound levels as industry expands and areas develop.

The indicative requirements apply to both new and existing activities but it is more difficult to justify departures from them in the case of new activities.

Indeed, because the requirements for noise are likely to be strongly influenced by the local environmental conditions, new installations are expected to meet BAT from the outset and to demonstrate that noise reduction or prevention has been built into the process design. For most existing plant, especially where there are no existing noise limits, the focus is on good practice (BAT) and the need to ensure that there is no reasonable cause for annoyance. In assessing any noise impact it is more normal to monitor existing levels and apply corrections and calculations, rather than rely on predictions.

The guidance refers to BS4142:2014+A1:2019 as the basis for the majority of noise impact assessments.

2.1.2. Planning Policy Wales

The Government's planning policies for Wales are contained in Planning Policy Wales (Edition 11, February 2021). The policy provides overarching requirements for developments to adequately control noise pollution, to provide appropriate soundscapes and to incorporate good acoustic design.

The policy is supplemented by the Noise and Soundscape Action Plan 2018-2023, which provides more detailed guidance on planning for a new development, but does not set out specific assessment methods or criteria. The guidance in this document has been used to inform a qualitative assessment of the effect the proposed development could have on the local soundscape.

2.1.3. Technical Advice Note (Wales) 11

This note provides advice on how the planning system in Wales can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.

2.2. Assessment Criteria

2.2.1. BS4142:2014+A1:2019

BS4142:2014+A1:2019 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014+A1:2019 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

BS4142:2014+A1:2019 states: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs"*. An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

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

The periods associated with day or night, for the purposes of the Standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

3. Site Description

3.1. Site and Surrounding Area

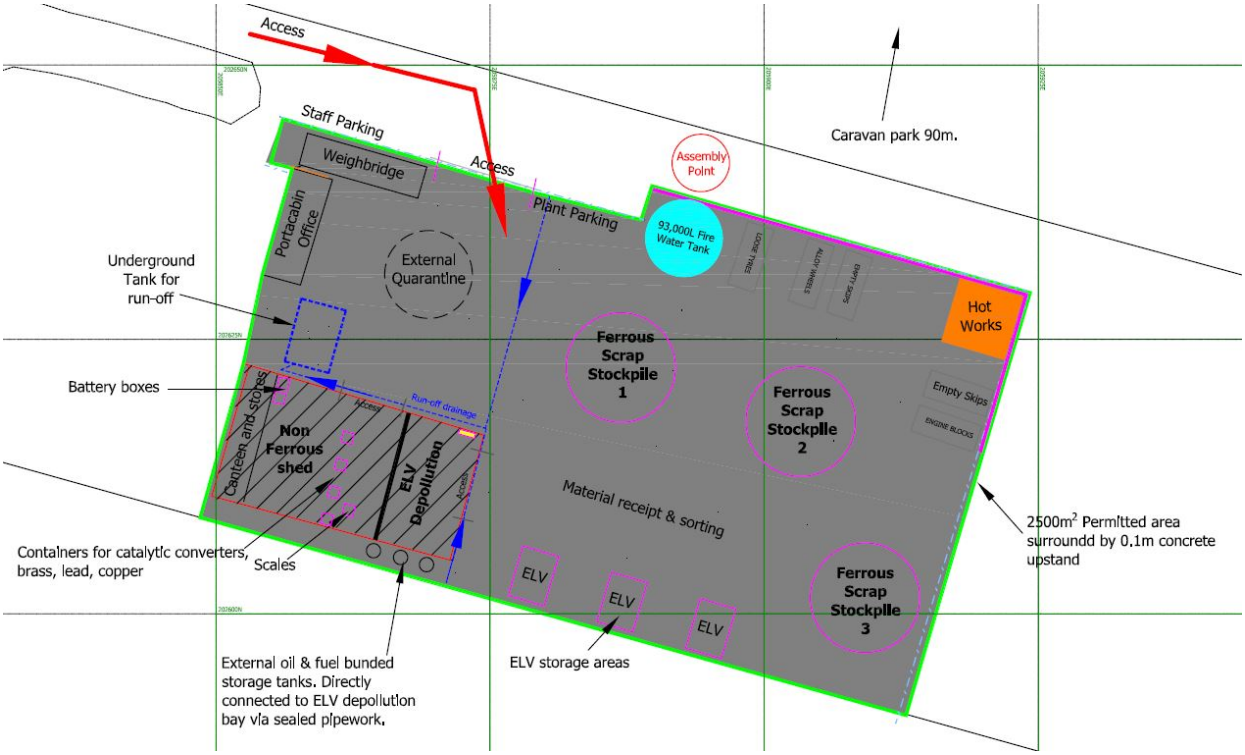
The site is situated towards the eastern end of Carew Airfield, Carew, Tenby, SA70 8SX. The sound environment across the area, including at the receptor locations was influenced by distant road traffic and activities associated with the wider commercial activities within the estate, including the adjacent go-kart track.

The location of the site, relative to key local features, including the closest noise sensitive receptors (NSRs) can be seen in Figure 1, with the layout of the site shown in Figure 2.

The caravan park (NSR1) is the closest to the site, the most potentially affected and has been the origin of a noise complaint against the Site, so is the focus of this assessment.

Figure 1: Location of Site and Surrounding Area

FIGURE 2: SITE LAYOUT



3.2. Operations Overview

The Pembrokeshire Metals Recycling (PMR) facility receives, sorts and dispatches various metals and metal parts that have reached the end of their operational lives, from various properties in the area.

The site operates between the hours of 08:00 and 17:00 Monday to Friday and 08:00 – 13:00 on Saturdays.

Metal is received at the site via tipper trucks, sorted through both manually and using a diesel-powered 360 excavator with a grab attachment, from where they are either heaped or brought via hand or forklift to the indoor bays for processing. The sorted metals are then stored at the site, ready for export.

Future operations are proposed to include the end-of-life processing of vehicles, which will include the breaking of vehicle bodies via the use of oxyacetylene and jaw cutters.

3.3. Noise Generating Elements

The operations currently comprise the receipt, sorting, aggregation, storage and export of scrap metals, comprising the noise-generating elements summarised in Table 1.

The operations are proposed to comprise the above, plus the dismantling of vehicles at the end of their operational lives. The noise generating elements of this proposed operation are also set out within Table 1.

TABLE 1: SUMMARY OF NOISE-GENERATING ELEMENTS

Description	Location	Operational Profile	Grid Coordinates	
			Easting	Northing
Current Equipment				
Diesel-Powered Forklift	External/Covered Area	High Frequency	205876	202613
Tipper Trucks	External	On Demand - Occasional	205889	202614
360 Excavator with Grab	External	On Demand - Regular	205897	202623
Flatbed	External	On Demand - Occasional	205859	202628
Proposed Equipment				
Oxyacetylene Cutter	External	On Demand - Occasional	205901	202603
Generator for Cutting Jaws	External	On Demand - Occasional	205897	202606

4. Measurement Methodology

4.1. General

The prevailing background noise conditions in the area have been determined by a partially attended environmental noise survey conducted during both daytime and night-time periods between Thursday 21st and Friday 22nd of October 2021.

Attended periods spanned 12:45 to 16:15 on Thursday 21st and 09:30 to 11:45 on Friday 22nd, during which all typical current site activities were observed to occur.

A spot measurement exercise was also undertaken at the site on Thursday 21st October 2021, in order to quantify the source noise emission levels of the various noise-generating site activities.

4.2. Measurement Details

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445[3].

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672[4]. A full inventory of this equipment is shown in Table 2 below.

Table 2: Inventory of Sound Measurement Equipment

Position	Make, Model & Description	Serial Number	Calibration Certificate Number	Calibration Expiry Date
MP1	Rion NL-31 Sound Level Meter	00110040	1107106	14/12/2022
	Rion NH-21 Preamplifier	00142	1107106	14/12/2022
	Rion UC-53A Microphone	306449	1107106	14/12/2022
Spots	Rion NL-52 Sound Level Meter	965159	1110825	30/03/2023
	Rion NH-25 Preamplifier	65386	1110825	30/03/2023
	Rion UC-59 Microphone	10288	1110825	30/03/2023
All	Cirrus CR:515 Acoustic Calibrator	82501	1110254	12/03/2022

Measurement equipment used during the survey was field calibrated at the start and end of the measurement period, with the following results:

- MP1: Before: 94.0 dB After: 94.0 dB (@1kHz)
- Spots: Before: 93.9 dB After: 94.0 dB (@1kHz)

The weather conditions during the survey were conducive to noise measurement; it being dry, with low wind speeds. It was noted that a gentle breeze was blowing from the north, to north-west, which occasionally changed to the south-west. The wind speeds were locally observed to not be sufficiently strong to unduly influence the noise measurement results.

[3] British Standard 7445: 2003: *Description and measurement of environmental noise*. BSI.
[4] British Standard 61672: 2013: *Electroacoustics. Sound level meters*. Part 1 *Specifications*. BSI.

The microphones were fitted with protective windshields for the measurements, with the static position described in Table 3, with an aerial photograph indicating its location shown in Figure 3.

TABLE 3: MEASUREMENT POSITION DESCRIPTION

Measurement Position	Description
MP1	A partially attended daytime and night-time measurement of sound under free-field conditions, at a height of 1.5 metres above local ground level at the boundary of Hazelbrook Caravan Park, within the Carew Airfield complex and representing the closest noise-sensitive receptor to the Permit Application Site. The sound environment was sustained by distant road traffic noise, wind-induced vegetation movement, distant agricultural activity along with occasional, barely audible contributions associated with commercial activities, plant and machinery within the PMR site and the neighbouring go-karting track. It should be noted that local traffic conditions were noted to be reduced in intensity during both the pre and post operational periods, compared to much of the core daytime, thus potentially reducing the residual sound level.

FIGURE 3: MEASUREMENT POSITION

4.3. Summary Results

The summarised results of the environmental noise measurements are presented in Table 4, with a graphical full-time history, plus full, tabulated output presented under Appendix B.

TABLE 4: SUMMARY OF NOISE MEASUREMENT RESULTS

Measurement Position	Period	Noise Level, dB		
		$L_{Aeq,T}$	L_{A90}	L_{AFmax}
MP1	Operational Daytime – 08:00-17:00 (Go-kart free periods)	50.2	45.6	67.5
	Operational Daytime – 08:00-17:00 (Go-kart affected periods)	50.2	46.2	67.2
	Shoulder/Residual Periods (07:00-08:00 and 17:00-18:00)	48.0	43.5 (*44)	61.4
(**) *denotes typical value, derived from modal distribution analysis of 5-minute results*				
Hourly Results				
MP1	21/10/21 13:00-14:00	49.8	46.7	67.2
	21/10/21 14:00-15:00	48.9	45.3	63.3
	21/10/21 15:00-16:00	49.9	45.1	74.3
	21/10/21 16:00-17:00	51.9	45.1	69.0
	22/10/21 08:00-09:00	50.5	46.1	70.9
	22/10/21 09:00-10:00	49.8	45.1	72.2
	22/10/21 10:00-11:00	50.1	46.3	67.2

Source Description	Distance to Source (m)	Noise Level, dB	
		$L_{Aeq,T}$	L_{AFmax}
360 Grab Idling	1	69.2	71.8
360 Grab Operating	3	82.9	97.3
Forklift Idling	1	73.0	74.1
Forklift Operating	2	75.4	83.4
Tipper Idling	1	69.4	83.4
Tipper Unloading	2	74.9 – 88.3	88.9 - 101.4
*Adjacent Go-Kart Track	25	54.6	63.7
**denotes activity associated with adjacent site, but presented for context*			

5. Operational Noise Assessment – Current

5.1. Assessment Parameters

5.1.1. Specific Sound Level Summary

The specific sound level of the current operations has been obtained via subtraction of the mean residual sound level measured during the hour immediately preceding and following the cessation of daily operations (07:00-08:00 and 17:00-18:00) on 21st and 22nd October from the ambient sound level measured during the operational period (08:00-17:00) of the PMR operations on 21st and 22nd October 2021.

The same computation has been carried out for the highest measured hourly statistic, recorded between 16:00 and 17:00 on 21st October.

This computation is summarised in Table 5.

Table 5: Derivation of Specific Sound Level

Ambient Sound Level (Operational Period) $L_{Aeq,T}$ - dB	Residual Sound Level (Non-Operational Period – Logarithmic Mean of Shoulder Periods) $L_{Aeq,T}$ - dB	Specific Sound Level $L_{Aeq,T}$ - dB
Whole Period		
50.2	48.0	**46.2**
Peak Period		
51.9	48.0	**49.6**

5.1.2. Background Sound Level Summary

The background sound level has been obtained from the modal distribution analysis of $L_{A90,15\text{-minute}}$ values from between 07:00-08:00 and 17:00-18:00 on 21st and 22nd October 2021.

This computation is summarised in Table 6.

Table 6: Derivation of Background Sound Level

Modal $L_{A90,5min}$ - dB	Mean $L_{A90,T}$ - dB	Adopted Background Sound Level $L_{A90,T}$ - dB
44	44	**44**

5.2. Assessment

5.2.1. Rating Penalty Principle

Section 9 of BS4142:2014+A1:2019 describes how the rating sound level should be derived from the specific sound level, by determining a rating penalty. BS4142:2014+A1:2019 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

The subjective method has been adopted to derive the rating sound level from the specific sound level, which is discussed in Section 9.2 of BS4142:2014+A1:2019, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014+A1:2019 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

Tonality

A rating penalty of +2 dB is applicable for a tone which is *"just perceptible"*, +4 dB where a tone is *"clearly perceptible"*, and +6 dB where a tone is *"highly perceptible"*.

Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is *"just perceptible"*, +6 dB where it is *"clearly perceptible"*, and +9 dB where it is *"highly perceptible"*.

Other Sound Characteristics

BS4142:2014+A1:2019 states that where *"the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."*

Intermittency

BS4142:2014+A1:2019 states that when the *"specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference*

time interval which contains the greatest total amount of on time … if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."

5.2.2. Rating Penalty Assessment

Considering the content of Section 5.2.1, an assessment of the various sound sources associated with the Proposed Development, in terms of whether any rating penalties are applicable, and has been detailed in Table 7 below.

TABLE 7: RATING PENALTY ASSESSMENT

Source	Tonality	Impulsivity	Intermittency	Other Sound Characteristics	Discussion
Scrap Handling Operations	0 dB	+3 dB	0 dB	0 dB	Despite scrap handling activities typically giving rise to impulsive and tonal characteristics at source, due to the sonorous nature of the material, such off-site characteristics weren't noted to be clearly audible at the receptor position, due to the nature of on-site material handling, the type of scrap being received and the residual sound environment. Some impulsivity attributed to the tipping of scrap material from delivery vehicles, was noted to be barely, but infrequently audible.

Consequently, a +3 dB acoustic feature correction has been applied with the assessment.

5.2.3. Uncertainty in Calculations

BS4142:2014+A1:2019 requires that the level of uncertainty in the measured data and associated calculations is considered in the assessment. The Standard recommends that steps should be taken to reduce the level of uncertainty.

Measurement Uncertainty

BS4142:2014+A1:2019 states that measurement uncertainty depends on a number of factors, including the following, which are applicable to the Proposed Development:

a) the complexity of the sound source and the level of variability in sound emission from the source;
b) the complexity and level of variability of the residual acoustic environment;
…
d) the location(s) selected for taking the measurements;
…
g) the measurement time intervals;
h) the range of times when the measurements have been taken;
i) the range of suitable weather conditions during which measurements have been taken;

...

k) the level of rounding of each measurement recorded; and

l) the instrumentation used.

Each of the measurement uncertainty factors outlined above have been considered and discussed in Table 8 below.

TABLE 8: MEASUREMENT UNCERTAINTY FACTORS

Measurement Uncertainty Factor Reference	Level of Uncertainty	Discussion
a)	0 dB	The measurement period spanned a sufficiently robust period to cover the potential variability of the source and enabled the derivation of both typical and peak specific noise levels.
b)	0 dB	Residual acoustic environment is relatively constant, hence no correction for a complex residual acoustic environment. Reductions in observed local road traffic activity during the residual periods were however noted, resulting in a worst-case comparison with the measured ambient sound level.
d)	0 dB	Measuring at a location representative of the closest affected receptors to the site has enabled the determination of robust background sound levels.
g)	0 dB	Measurement time intervals were set in accordance with BS4142:2014+A1:2019, hence no further correction needs to be made.
h)	0 dB	Measurements were undertaken over a continuous 24-hour period.
i)	±1 dB	No periods of significant wind or precipitation were noted; however, the presence of a gentle breeze blowing from the receptor to the source introduced a small potential for uncertainty.
k)	0 dB	Measured values were rounded to 0.1 dB, therefore rounding would not have had a significant impact on the overall typical background sound levels.
l)	0 dB	The acoustic measurement equipment accorded with Type 1 specification of British Standard 61672.

In summary, a ±1 dB uncertainty budget has been considered in the assessment, to account for measurement uncertainty.

5.2.4. Rating Sound Level

Incorporating the rating penalties detailed in Section 5.2.2 with the derived specific sound level, as detailed in Table 9, the rating sound level has been derived and have been detailed in Table 9 below.

TABLE 9: RATING SOUND LEVELS – CURRENT OPERATIONS

NSR	Specific Sound Level (dB)	Rating Sound Level (dB)
Whole Period		
1	46	49
Peak Period		
1	50	53

5.2.5. BS4142:2014+A1:2019 Assessment – Current Operations

The rating sound level, as calculated from the derived specific sound level, has been assessed in accordance with BS4142:2014+A1:2019, at the closest NSR.

The resultant assessment summary, during the daytime period, can be seen in Table 10 below.

TABLE 10: DAYTIME BS4142:2014+A1:2019 ASSESSMENT SUMMARY

NSR	Rating Sound Level (dB)	Daytime Background Sound Level (dB)	Excess of Rating over Daytime Background Sound Level (dB)
Whole Period			
1	49	44	+5
Peak Period			
1	53	44	+9

It can be seen that the operation of the site in its current form gives rise to a potentially *'adverse impact'*, rising to a potentially *'significant adverse impact'* during peak operating conditions at the closest receptor to the site during the daytime period, dependent upon the context.

6. Operational Noise Assessment – Cumulative/Future

6.1. Noise Modelling

6.1.1. General

The addition of the future activities associated with vehicle breaking has been considered alongside the assessment of existing operations set out in Section 5. A hybrid approach has been used, which incorporates the observed measurements of the existing activity, coupled to a model-based, predictive assessment of future activity to determine cumulative effects; this being an entirely acceptable and typical approach used by practicing, professional acoustic consultants for such scenarios.

6.1.2. Noise Source Data

The following additional sources of noise associated with the Site have been identified and are considered in this assessment:

- Oxyacetylene Cutter; and
- Mechanical Cutting Jaws (Generator).

6.1.3. Source Data

The sound source data used in the assessment, associated with the various activities/items can be seen below in Table 11.

Table 11: Sound Source Data

Item	Quantity	Sound Pressure Level – dB(A)	Distance from Source	% On-Time	Resultant Sound Power Level – dB(A)
Oxy Cutter	1	76.0	5m	25	92.0
Generator	1	65.0	7m	25	84.0

6.1.4. Calculation Process

Calculations were carried out using Cadna/A, which undertakes its calculations in accordance with guidance given in ISO9613-1:1993 and ISO9613-2:1996.

6.1.5. Sound Data Assumptions

Given that the land between Proposed Development and nearest receptors is mixed, the ground factor of the hard ground (former runway areas) has been set to hard/reflective (0.0), while the

intervening fields have been set to soft/absorptive (1.0) in the calculation software. That calculation process also considers two orders of reflection.

On the basis of information presented above and provided by the Applicant, it has been assumed that all processes will occur simultaneously, representing a worst-case scenario.

6.1.6. Specific Sound Level Summary – Proposed Activities

The predicted specific sound level of the additional future activities at the measurement position, described as MP1 on Figure 3, is set out in Table 12.

TABLE 12: PREDICTED SPECIFIC SOUND LEVEL SUMMARY

NSR	Specific Sound Level (dB)
MP1 – Caravan Park	38.9

6.2. Cumulative Assessment

6.2.1. Rating Penalty Assessment

The rating penalty described in Table 7 is considered to remain relevant for the cumulative scenario.

6.2.2. Rating Level - Cumulative

The cumulative rating levels considered in the assessment are set out in Table 13.

TABLE 13: CUMULATIVE RATING LEVEL SUMMARY

Scenario	Predicted Specific Sound Level – dB(A)	Measured Specific Sound Level – dB(A)	Cumulative Specific Sound Level – dB(A)	Cumulative Rating Level - dB(A)
Typical	38.9	46.2	46.9	50
Worst Case/Peak		49.6	50.0	53

6.2.3. Uncertainty

Calculation Uncertainty

BS4142:2014+A1:2019 states that calculation uncertainty depends on a number of factors, including the following, which are applicable to the Proposed Development:

"
...
b) uncertainty in the operation or sound emission characteristics of the specific sound source and any assumed sound power levels;
c) uncertainty in the calculation method;

d) simplifying the real situation to "fit" the model (user influence on modelling); and
e) error in the calculation process."

Each of the calculation uncertainty factors outlined above have been considered and discussed in Table 14.

TABLE 14: CALCULATION UNCERTAINTY FACTORS

Calculation Uncertainty Factor Reference	Level of Uncertainty	Discussion
b)	±1 dB	Sound source levels are based on robust archive data.
c)	0 dB	Calculations were undertaken in accordance with ISO 9613-2, which is considered a *"validated method"* by BS4142:2014+A1:2019.
d)	0 dB	The real situation has not been simplified for the purposes of this assessment.
e)	±1 dB	ISO 9613-2 indicates that there is a ±3 dB accuracy to the prediction method, therefore, an uncertainty factor of ±1 dB is considered appropriate and proportional, given the separation distances involved.

In summary, an uncertainty budget of ±2 dB has been considered in the assessment, to account for calculation uncertainty.

The overall uncertainty is considered to be small enough that it would not affect the conclusions of the assessment, relative to the overall levels.

6.2.4. Cumulative BS4142:2014+A1:2019 Assessment

The cumulative rating sound levels, as calculated from the predicted specific sound levels, have been assessed in accordance with BS4142:2014+A1:2019, at the closest NSR, being the closest point of the caravan park to the north-east of the site.

The cumulative BS4142:2014+A1:2019 assessment of proposed and existing activities can be seen in Table 15

TABLE 15: CUMULATIVE NOISE ASSESSMENT

Scenario	Sound Level – dB		
	Rating Level: L_{ArTr}	Background Sound Level: $L_{A90,T}$	Excess of L_{ArTr} above $L_{A90,T}$
Typical	50	44	+6
Worst Case/Peak	53		+9

Table 15 identifies that the proposed operation of the waste recycling facility would give rise to a potentially *"adverse to significant adverse impact"* at the closest noise-sensitive receptor to the site, in the context of BS4142:2014+A1:2019 assessment criteria.

7. MITIGATION

7.1. Best Available Technology

7.1.1. Existing Operations

Scrap handling at the site is currently conducted in an acoustically sympathetic manner, with the majority of received waste comprising mixed, fragmented material, with very little by way of highly sonorous material types, such as girders or dense material being received.

Where possible, material drop heights are reduced to a minimum, with the emphasis on placement rather than drop. The potential does, however, exist for more significant impulsive events to occur during material deliveries, where tipper vehicles do result in some droppage. Where possible, such material deposition occurs onto existing stockpiles, to minimise drop heights and ensure that instances where metals are dropped onto concrete/hard surfaces are minimised. It is, however, this event that gives rise to the majority of off-site audibility.

External stockpiles within the site are, as far as practicable, maintained along the northern and eastern boundaries, such that they act as an acoustic screen for on-site activities, with most of the motorised activity occurring at a lower elevation than the top of the stockpiles.

Regular on-site sweeping activity occurs to remove metal particles and remnants from the working areas, such that the risk of tyre punctures and requirement to mechanically scrape the concrete hardstanding area are minimised.

The above measures are considered to represent a good demonstration of BAT.

7.1.2. Further Mitigation

In terms of further improvements; efforts should be made to further ensure, where practicable that material drop heights are minimised during deliveries and, where the risk of tyre damage is not introduced, continue to ensure that material deliveries occur onto existing stockpiles.

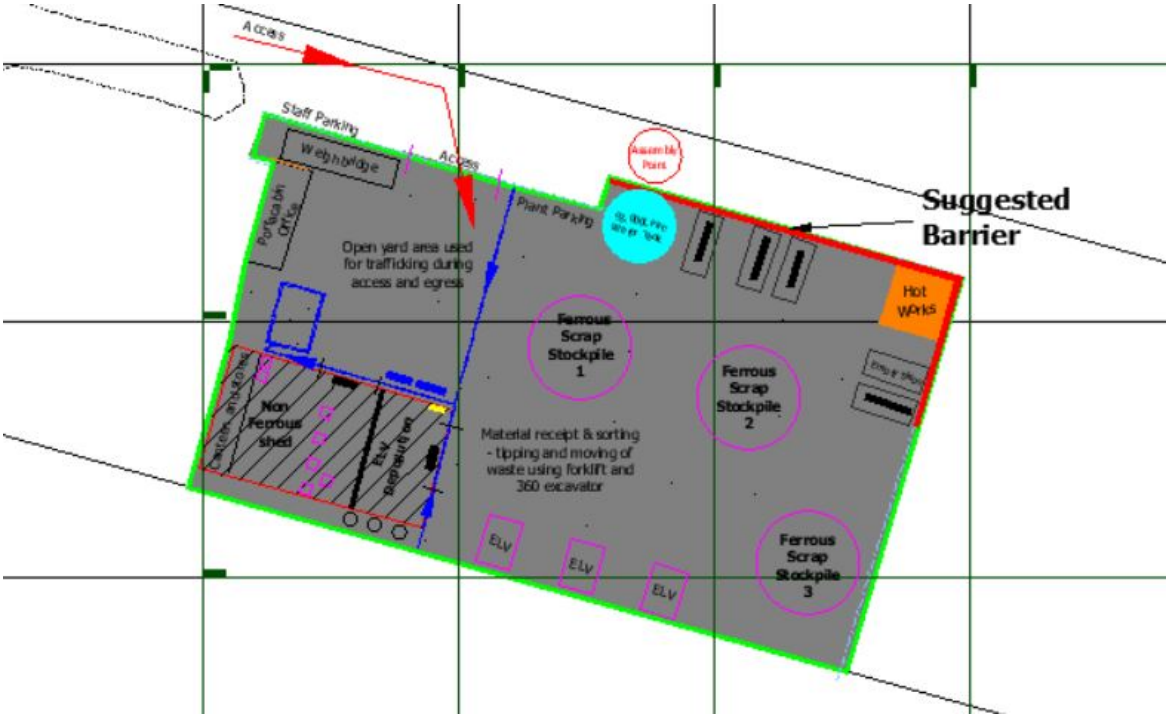
Furthermore, efforts will continue to be made to maintain a stockpile around the site boundary, such that the site is effectively self-screened from nearby receptors.

In addition to the above, it is strongly recommended that the existing palisade fence is upgraded to a solid barrier, extending to 2.4 metres in height, as per the extent marked in red on Figure 4. Such a barrier could be composed of plywood hoarding (circa 22mm thick) attached to the existing fence (subject to the wind loading capabilities of the existing structure).

Such a measure would be considered to be particularly effective, given the topography of the area and path difference that would be achieved as a result of the falling gradient, towards the caravan park. Consequently, acoustic reductions in the order of -5 dB would be expected, that would reduce the level of future cumulative noise impact to within the *'low to adverse impact'* range of BS4142.

Such a combination of measures would be considered to represent a good demonstration of BAT.

FIGURE 4: SUGGESTED BARRIER EXTENT



8. CONCLUSION

inacoustic has been commissioned to prepare a Noise Assessment for the Metal Recycling Operations at Pembrokeshire Metal Recycling, Carew Airfield, Carew, Tenby, SA70 8SX, for submission to Natural Resources Wales (NRW) as part of a Permit Application.

When operated in the manner described in this report, the Site can be brought forward in compliance with the requirements of the Noise and Vibration Management: Environmental Permits, demonstrating BAT where possible, as outlined in Section 6.

In light of the above, it is considered that this report provides sufficient information to the grant the Application for a Permit for the Site.

9. APPENDICES

9.1. Appendix A – Definition of Terms

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
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 log10 (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.
A-weighting, dB(A)	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.
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.
$L_{eq,T}$	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 during the 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.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% 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.
$L_{10,T}$	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.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE 16: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source.

A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

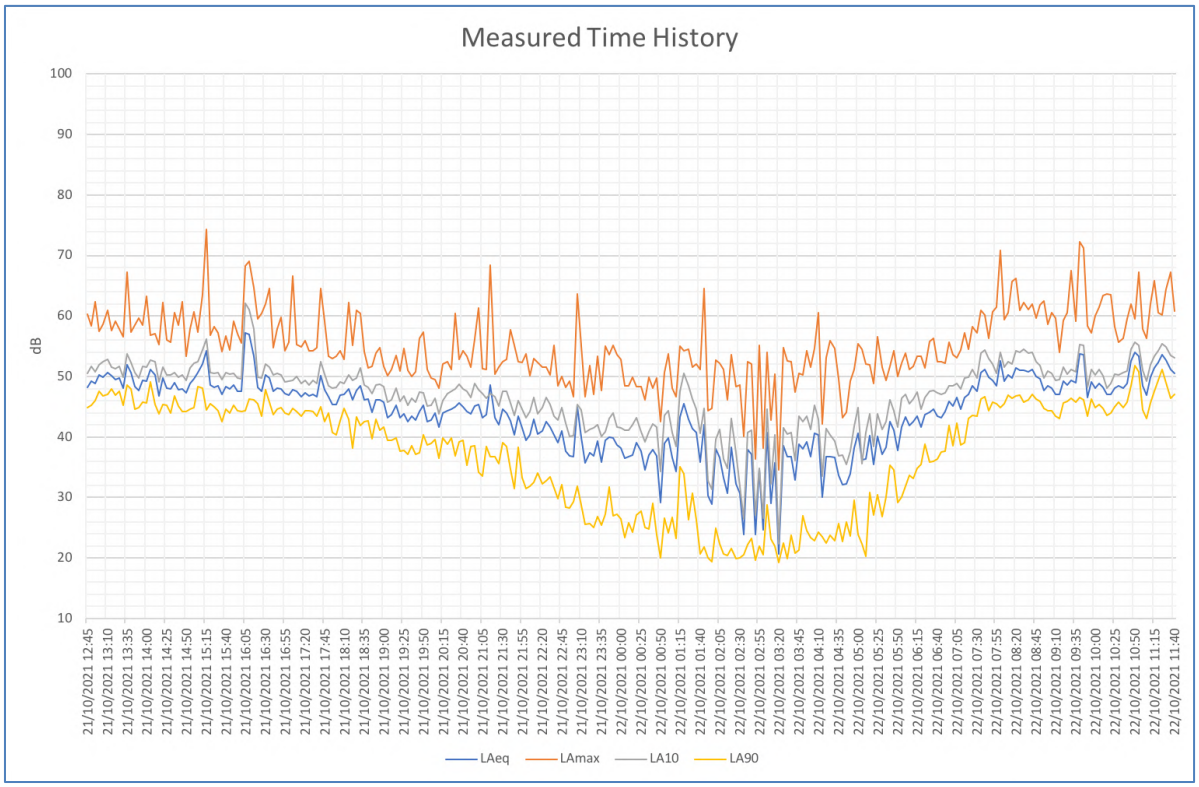
For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

9.2. Appendix B – Full Measurement Results



Period Description	Period	Noise Level, dB		
		$L_{Aeq,T}$	L_{A90}	L_{AFmax}
Site Operational	21/10/2021 12:45	48.2	44.8	60.3
Site Operational	21/10/2021 12:50	49.2	45.3	58.4
Site Operational	21/10/2021 12:55	48.8	46.0	62.3
Site Operational	21/10/2021 13:00	50.2	47.5	57.5
Site Operational	21/10/2021 13:05	49.9	46.8	58.6
Site Operational	21/10/2021 13:10	50.7	47.0	61.0
Site Operational	21/10/2021 13:15	50.1	48.0	57.6
Site Operational	21/10/2021 13:20	49.5	46.9	59.1
Site Operational	21/10/2021 13:25	49.8	47.6	57.9
Site Operational	21/10/2021 13:30	48.1	45.2	56.6
Site Operational	21/10/2021 13:35	51.9	48.6	67.2
Site Operational	21/10/2021 13:40	50.6	47.9	57.4
Site Operational	21/10/2021 13:45	48.3	44.6	58.5
Site Operational	21/10/2021 13:50	47.7	44.9	59.7
Site Operational	21/10/2021 13:55	49.3	45.8	58.5
Site Operational	21/10/2021 14:00	49.2	45.6	63.3

Site Operational	21/10/2021 14:05	51.2	49.1	56.8
Site Operational	21/10/2021 14:10	50.2	45.4	57.1
Site Operational	21/10/2021 14:15	46.8	43.8	55.3
Site Operational	21/10/2021 14:20	49.7	45.4	62.2
Site Operational	21/10/2021 14:25	48.1	45.3	56.1
Site Operational	21/10/2021 14:30	48.0	44.0	55.7
Site Operational	21/10/2021 14:35	49.0	46.8	60.5
Site Operational	21/10/2021 14:40	47.8	45.1	58.5
Site Operational	21/10/2021 14:45	48.0	44.2	62.4
Site Operational	21/10/2021 14:50	47.3	44.2	53.3
Site Operational	21/10/2021 14:55	48.9	44.6	57.8
Site Operational	21/10/2021 15:00	49.6	44.8	60.7
Site Operational	21/10/2021 15:05	50.7	48.3	57.4
Site Operational	21/10/2021 15:10	52.1	48.1	63.5
Site Operational	21/10/2021 15:15	54.3	44.5	74.3
Site Operational	21/10/2021 15:20	48.6	45.5	56.8
Site Operational	21/10/2021 15:25	48.2	45.0	58.3
Site Operational	21/10/2021 15:30	48.4	44.4	57.2
Site Operational	21/10/2021 15:35	47.1	42.6	54.1
Site Operational	21/10/2021 15:40	48.3	44.6	56.7
Site Operational	21/10/2021 15:45	48.0	43.9	54.4
Site Operational	21/10/2021 15:50	48.6	45.2	59.2
Site Operational	21/10/2021 15:55	47.6	44.4	57.1
Site Operational	21/10/2021 16:00	47.6	44.2	55.5
Site Operational	21/10/2021 16:05	57.2	44.4	68.3
Site Operational	21/10/2021 16:10	56.9	46.3	69.0
Site Operational	21/10/2021 16:15	53.4	46.1	64.7
Site Operational	21/10/2021 16:20	48.2	45.5	59.5
Site Operational	21/10/2021 16:25	47.5	43.5	60.4
Site Operational	21/10/2021 16:30	50.3	47.8	62.0
Site Operational	21/10/2021 16:35	49.7	45.8	64.6
Site Operational	21/10/2021 16:40	47.6	43.7	54.8
Site Operational	21/10/2021 16:45	48.1	44.6	57.8
Site Operational	21/10/2021 16:50	48.0	44.8	59.8
Site Operational	21/10/2021 16:55	47.2	44.0	54.3
Site Closed	21/10/2021 17:00	46.9	43.7	55.7

Site Closed	21/10/2021 17:05	47.8	44.7	66.6
Site Closed	21/10/2021 17:10	47.6	44.2	55.3
Site Closed	21/10/2021 17:15	46.6	43.5	54.9
Site Closed	21/10/2021 17:20	47.3	44.3	55.9
Site Closed	21/10/2021 17:25	46.8	44.3	54.2
Site Closed	21/10/2021 17:30	47.1	44.2	54.3
Site Closed	21/10/2021 17:35	46.7	43.4	54.7
Site Closed	21/10/2021 17:40	50.1	45.0	64.6
Site Closed	21/10/2021 17:45	47.8	42.5	59.1
Site Closed	21/10/2021 17:50	46.6	44.0	53.4
Site Closed	21/10/2021 17:55	45.4	40.7	52.9
Site Closed	21/10/2021 18:00	45.4	40.3	53.4
Site Closed	21/10/2021 18:05	46.9	42.7	54.3
Site Closed	21/10/2021 18:10	47.0	44.7	52.8
Site Closed	21/10/2021 18:15	48.0	42.9	62.2
Site Closed	21/10/2021 18:20	46.1	38.1	55.2
Site Closed	21/10/2021 18:25	47.7	43.3	61.0
Site Closed	21/10/2021 18:30	48.4	41.9	60.4
Site Closed	21/10/2021 18:35	46.1	42.5	54.1
Site Closed	21/10/2021 18:40	46.3	42.7	51.4
Site Closed	21/10/2021 18:45	44.1	39.7	51.7
Site Closed	21/10/2021 18:50	46.2	42.9	53.9
Site Closed	21/10/2021 18:55	46.1	41.1	54.8
Site Closed	21/10/2021 19:00	45.7	41.6	51.7
Site Closed	21/10/2021 19:05	43.2	39.4	50.1
Site Closed	21/10/2021 19:10	43.7	39.5	51.2
Site Closed	21/10/2021 19:15	45.3	39.8	53.5
Site Closed	21/10/2021 19:20	43.2	37.7	50.9
Site Closed	21/10/2021 19:25	43.8	37.8	54.6
Site Closed	21/10/2021 19:30	42.5	37.1	51.0
Site Closed	21/10/2021 19:35	43.5	38.6	50.0
Site Closed	21/10/2021 19:40	42.8	37.1	50.8
Site Closed	21/10/2021 19:45	44.2	37.4	56.3
Site Closed	21/10/2021 19:50	45.3	40.4	57.3
Site Closed	21/10/2021 19:55	42.5	38.7	51.1
Site Closed	21/10/2021 20:00	42.8	38.9	49.8

Site Closed	21/10/2021 20:05	44.0	39.6	49.5
Site Closed	21/10/2021 20:10	41.6	36.5	48.1
Site Closed	21/10/2021 20:15	43.9	39.9	52.1
Site Closed	21/10/2021 20:20	44.4	38.8	52.4
Site Closed	21/10/2021 20:25	44.6	39.8	51.2
Site Closed	21/10/2021 20:30	45.0	36.9	60.4
Site Closed	21/10/2021 20:35	45.6	39.2	52.8
Site Closed	21/10/2021 20:40	45.0	39.4	54.2
Site Closed	21/10/2021 20:45	44.2	35.3	53.4
Site Closed	21/10/2021 20:50	43.8	38.4	51.5
Site Closed	21/10/2021 20:55	45.1	38.5	56.2
Site Closed	21/10/2021 21:00	45.4	34.2	61.3
Site Closed	21/10/2021 21:05	43.2	33.5	51.3
Site Closed	21/10/2021 21:10	43.7	38.4	51.2
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Site Closed	21/10/2021 21:20	43.2	36.7	50.4
Site Closed	21/10/2021 21:25	42.0	35.6	51.6
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Site Closed	21/10/2021 21:35	44.0	38.4	52.8
Site Closed	21/10/2021 21:40	42.7	34.7	57.7
Site Closed	21/10/2021 21:45	40.4	31.5	55.2
Site Closed	21/10/2021 21:50	43.4	38.3	52.4
Site Closed	21/10/2021 21:55	41.5	33.3	52.3
Site Closed	21/10/2021 22:00	39.4	31.5	53.7
Site Closed	21/10/2021 22:05	40.4	31.8	50.1
Site Closed	21/10/2021 22:10	42.9	32.5	53.0
Site Closed	21/10/2021 22:15	40.5	34.1	52.3
Site Closed	21/10/2021 22:20	41.0	32.3	51.5
Site Closed	21/10/2021 22:25	42.5	32.7	51.6
Site Closed	21/10/2021 22:30	41.7	33.4	50.3
Site Closed	21/10/2021 22:35	40.3	31.6	55.2
Site Closed	21/10/2021 22:40	39.1	29.8	48.5
Site Closed	21/10/2021 22:45	41.0	32.1	50.0
Site Closed	21/10/2021 22:50	37.7	28.4	48.2
Site Closed	21/10/2021 22:55	36.9	28.2	49.2
Site Closed	21/10/2021 23:00	36.7	29.3	46.7

Site Closed	21/10/2021 23:05	45.0	31.9	63.6
Site Closed	21/10/2021 23:10	40.0	28.8	55.1
Site Closed	21/10/2021 23:15	35.7	25.6	46.7
Site Closed	21/10/2021 23:20	37.4	25.7	51.8
Site Closed	21/10/2021 23:25	36.9	25.1	47.1
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Site Closed	22/10/2021 00:40	37.9	29.0	48.1
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Site Closed	22/10/2021 00:50	29.1	20.0	42.5
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Site Closed	22/10/2021 01:05	36.6	26.7	48.1
Site Closed	22/10/2021 01:10	34.3	23.3	46.6
Site Closed	22/10/2021 01:15	43.3	35.1	55.0
Site Closed	22/10/2021 01:20	45.5	33.9	54.3
Site Closed	22/10/2021 01:25	42.9	26.3	54.5
Site Closed	22/10/2021 01:30	41.4	30.7	51.5
Site Closed	22/10/2021 01:35	40.8	26.3	52.0
Site Closed	22/10/2021 01:40	35.8	20.6	51.1
Site Closed	22/10/2021 01:45	42.0	21.8	64.6
Site Closed	22/10/2021 01:50	30.3	20.0	44.4
Site Closed	22/10/2021 01:55	28.9	19.4	44.7
Site Closed	22/10/2021 02:00	38.0	24.9	52.7

Site Closed	22/10/2021 02:05	36.6	22.3	52.2
Site Closed	22/10/2021 02:10	33.3	20.7	51.2
Site Closed	22/10/2021 02:15	30.7	20.4	46.2
Site Closed	22/10/2021 02:20	38.3	21.6	53.6
Site Closed	22/10/2021 02:25	32.3	19.9	48.3
Site Closed	22/10/2021 02:30	30.7	20.0	48.6
Site Closed	22/10/2021 02:35	23.9	20.5	40.1
Site Closed	22/10/2021 02:40	37.9	22.2	52.5
Site Closed	22/10/2021 02:45	37.1	23.3	52.0
Site Closed	22/10/2021 02:50	23.9	19.6	36.3
Site Closed	22/10/2021 02:55	34.7	22.0	55.2
Site Closed	22/10/2021 03:00	24.6	20.5	38.1
Site Closed	22/10/2021 03:05	40.7	28.8	54.0
Site Closed	22/10/2021 03:10	29.0	23.1	42.8
Site Closed	22/10/2021 03:15	35.7	22.0	50.4
Site Closed	22/10/2021 03:20	20.7	19.2	34.5
Site Closed	22/10/2021 03:25	38.5	22.5	54.8
Site Closed	22/10/2021 03:30	36.7	19.9	52.6
Site Closed	22/10/2021 03:35	36.7	23.7	52.4
Site Closed	22/10/2021 03:40	32.9	20.8	47.4
Site Closed	22/10/2021 03:45	38.8	21.3	50.5
Site Closed	22/10/2021 03:50	38.0	27.0	50.3
Site Closed	22/10/2021 03:55	39.2	24.5	54.3
Site Closed	22/10/2021 04:00	36.8	23.4	51.6
Site Closed	22/10/2021 04:05	40.6	22.9	54.6
Site Closed	22/10/2021 04:10	40.3	24.3	60.5
Site Closed	22/10/2021 04:15	30.0	23.5	42.2
Site Closed	22/10/2021 04:20	36.8	22.5	53.1
Site Closed	22/10/2021 04:25	36.7	23.7	55.9
Site Closed	22/10/2021 04:30	36.6	22.9	54.6
Site Closed	22/10/2021 04:35	33.6	25.7	49.6
Site Closed	22/10/2021 04:40	32.1	22.7	43.2
Site Closed	22/10/2021 04:45	32.2	26.0	44.1
Site Closed	22/10/2021 04:50	33.9	23.6	49.2
Site Closed	22/10/2021 04:55	38.1	29.6	51.1
Site Closed	22/10/2021 05:00	40.6	23.9	55.4

Site Closed	22/10/2021 05:05	36.2	22.4	54.5
Site Closed	22/10/2021 05:10	36.3	20.3	52.1
Site Closed	22/10/2021 05:15	40.2	30.8	51.9
Site Closed	22/10/2021 05:20	35.5	27.1	48.9
Site Closed	22/10/2021 05:25	40.1	30.5	56.6
Site Closed	22/10/2021 05:30	37.1	26.8	51.6
Site Closed	22/10/2021 05:35	38.3	30.0	49.3
Site Closed	22/10/2021 05:40	42.5	35.3	51.7
Site Closed	22/10/2021 05:45	41.1	34.5	54.2
Site Closed	22/10/2021 05:50	37.8	29.1	50.0
Site Closed	22/10/2021 05:55	41.7	30.1	52.2
Site Closed	22/10/2021 06:00	43.3	31.9	53.9
Site Closed	22/10/2021 06:05	41.9	33.7	51.1
Site Closed	22/10/2021 06:10	42.6	33.2	51.7
Site Closed	22/10/2021 06:15	43.5	34.8	53.4
Site Closed	22/10/2021 06:20	41.6	35.4	53.4
Site Closed	22/10/2021 06:25	43.7	38.8	51.4
Site Closed	22/10/2021 06:30	44.1	35.8	55.8
Site Closed	22/10/2021 06:35	44.6	36.0	56.3
Site Closed	22/10/2021 06:40	43.4	36.4	52.5
Site Closed	22/10/2021 06:45	43.2	37.5	52.5
Site Closed	22/10/2021 06:50	44.2	37.7	52.2
Site Closed	22/10/2021 06:55	45.9	41.9	55.6
Site Closed	22/10/2021 07:00	45.1	38.6	53.6
Site Closed	22/10/2021 07:05	46.5	42.3	53.1
Site Closed	22/10/2021 07:10	44.6	38.7	54.4
Site Closed	22/10/2021 07:15	46.5	39.1	57.2
Site Closed	22/10/2021 07:20	47.0	43.1	54.5
Site Closed	22/10/2021 07:25	48.4	43.6	58.2
Site Closed	22/10/2021 07:30	47.5	43.4	57.2
Site Closed	22/10/2021 07:35	50.7	46.3	60.9
Site Closed	22/10/2021 07:40	51.2	46.6	60.2
Site Closed	22/10/2021 07:45	49.9	44.4	56.3
Site Closed	22/10/2021 07:50	49.4	45.7	60.7
Site Closed	22/10/2021 07:55	48.5	45.5	61.4
Site Operational	22/10/2021 08:00	52.6	44.9	70.9

Site Operational	22/10/2021 08:05	49.2	45.5	59.4
Site Operational	22/10/2021 08:10	50.2	46.9	60.6
Site Operational	22/10/2021 08:15	49.7	46.4	65.7
Site Operational	22/10/2021 08:20	51.4	46.8	66.2
Site Operational	22/10/2021 08:25	51.0	46.9	60.9
Site Operational	22/10/2021 08:30	51.0	45.7	62.2
Site Operational	22/10/2021 08:35	50.8	46.2	61.1
Site Operational	22/10/2021 08:40	51.1	47.1	62.0
Site Operational	22/10/2021 08:45	50.0	46.3	59.7
Site Operational	22/10/2021 08:50	49.6	45.9	61.9
Site Operational	22/10/2021 08:55	47.7	44.7	62.5
Site Operational	22/10/2021 09:00	48.4	44.3	58.6
Site Operational	22/10/2021 09:05	48.1	44.4	60.6
Site Operational	22/10/2021 09:10	47.0	43.5	59.6
Site Operational	22/10/2021 09:15	47.1	43.1	54.0
Site Operational	22/10/2021 09:20	49.2	45.6	59.3
Site Operational	22/10/2021 09:25	48.6	45.9	60.6
Site Operational	22/10/2021 09:30	49.3	46.4	67.5
Site Operational	22/10/2021 09:35	49.0	45.7	59.1
Site Operational	22/10/2021 09:40	53.7	46.5	72.2
Site Operational	22/10/2021 09:45	53.6	46.2	71.2
Site Operational	22/10/2021 09:50	46.5	43.4	58.4
Site Operational	22/10/2021 09:55	49.1	46.3	57.2
Site Operational	22/10/2021 10:00	48.1	44.9	60.0
Site Operational	22/10/2021 10:05	48.8	45.4	61.4
Site Operational	22/10/2021 10:10	48.2	44.7	63.4
Site Operational	22/10/2021 10:15	47.1	43.6	63.6
Site Operational	22/10/2021 10:20	47.0	43.9	63.5
Site Operational	22/10/2021 10:25	48.1	45.0	58.2
Site Operational	22/10/2021 10:30	48.4	45.8	55.7
Site Operational	22/10/2021 10:35	48.1	44.8	56.3
Site Operational	22/10/2021 10:40	48.9	45.8	59.5
Site Operational	22/10/2021 10:45	52.6	48.5	62.0
Site Operational	22/10/2021 10:50	54.0	51.8	59.5
Site Operational	22/10/2021 10:55	53.4	50.8	67.2
Site Operational	22/10/2021 11:00	48.5	44.5	57.8

Site Operational	22/10/2021 11:05	46.9	43.1	56.3
Site Operational	22/10/2021 11:10	49.9	45.6	62.0
Site Operational	22/10/2021 11:15	51.4	47.6	65.8
Site Operational	22/10/2021 11:20	52.3	49.3	60.5
Site Operational	22/10/2021 11:25	53.6	51.2	60.2
Site Operational	22/10/2021 11:30	52.7	49.0	64.4
Site Operational	22/10/2021 11:35	51.2	46.4	67.2
Site Operational	22/10/2021 11:40	50.5	47.0	60.8

9.3. Appendix C – Qualifications etc

The company is directed and led by Antony Best BSc (Hons) MIOA and Neil Morgan MSc MIOA, who have a combined experience of over 30 years in the acoustic industry; covering a range of project types and assessment scenarios, including numerous submissions to the Environment Agency.

Neil Morgan MSc MIOA produced this report, and it was reviewed by Antony Best BSc (Hons) MIOA. The on-site noise measurement works were undertaken by Archie Byard BSc (Hons), under the full remote supervision and guidance of Neil Morgan.

Professional Qualifications for Neil Morgan

- MSc in Applied Acoustics from the University of Derby
- Institute of Acoustics Post Graduate Diploma in Acoustics and Noise Control, Institute of Acoustics, University of the West of England
- BSc (Hons) in Surveying for Resource Development from the University of Glamorgan
- Corporate Member of the Institute of Acoustics (MIOA)

Professional Experience for Neil Morgan

- 2017 to Present inacoustic (Director)
- 2013 to 2017 MLM Acoustics (Technical Director)
- 2009 to 2013 Innovate Acoustics (Associate Director)
- 2007 to 2009 SLR Consulting (Senior Consultant)
- 2006 to 2007 Grontmij (Senior Engineer)
- 1996 to 2006 Capita Symonds (Various Positions)

Professional Qualifications for Antony Best

- BSc (Hons) in Acoustics from the University of Salford
- Corporate Member of the Institute of Acoustics

Professional Experience for Antony Best

- 2015 to Present inacoustic (Director)
- 2013 to 2015 MLM Acoustics (Principal Acoustic Consultant)
- 2010 to 2013 Eddie Jewell Acoustics (Director)
- 2008 to 2009 Sandy Brown Associates LLP (Acoustic Technician)

Professional Qualifications for Archie Byard

- BSc (Hons) in Audio Technology (1st class) from the University of the West of England

Professional Experience for Archie Byard

- 2021 to Present inacoustic (Acoustic Consultant)
- 2019 to 2020 Mach Acoustics (Gap Year – Acoustic Technician)

9.4. Appendix D – Calibration Certificates

CERTIFICATE OF CALIBRATION

ISSUED BY: **CALIBRATION MAINTENANCE & REPAIR LTD**

DATE OF ISSUE: 14 December 2020 CERTIFICATE NUMBER: **1107106**

BS EN ISO 9001:2015 APPROVED BY **LR**

CERT No 10045223

11 Frensham Road
Norwich
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NR3 2BT

Tel: +44 1603 279557

Page 1 of 3
Approved Signatory
Electronically Authorised Document
☐ P K CLARK
☐ R J WADE
☐ M A FROST
☒ M S PARDOE
☐ J FRYER

Customer	**INACOUSTIC**
Order No	**CAL20-FINAL**
Equipment Description	**SOUND LEVEL METER**
Manufacturer	**RION CO LTD**
Model	**NL-31**
Serial No	**00110040**
Ident No	**320/00354**
Date Of Calibration	**14 DECEMBER 2020**

INSTRUMENT CONDITION

Adjustments Made	**YES**
Repairs Made	**NO**

ENVIRONMENT

The instrument was placed in the laboratory environment for a minimum period of 4 hours and was operated prior to calibration.

Measurements were made in ambient conditions of 22ºC ± 3ºC and 45% ± 15% RH.

PROCEDURE

Measurements were performed in accordance with the in house laboratory procedure 5970
All equipment used has been calibrated/verified against measurement standards or reference equipment traceable to International or National Measurement Standards as specified in our control procedure WI64
The results attached to this certificate refer to measurements made at the time of test and not to the instrument's ability to maintain calibration.
The attached results are a true record of the levels required to return the instrument to the original stated manufacturer's specification and accuracy where known.

CERTIFICATE OF CALIBRATION

ISSUED BY: **CALIBRATION MAINTENANCE & REPAIR LTD**

DATE OF ISSUE: 30 March 2021 CERTIFICATE NUMBER: **1110825**

BS EN ISO 9001:2015 APPROVED BY **LR**

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Approved Signatory

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☐ R J WADE ☐ M FOY
☐ M A FROST
☒ M S PARDOE

Customer	**INACOUSTIC**
Order No	**CAL21-52-5**
Equipment Description	**SOUND LEVEL METER**
Manufacturer	**RION CO LTD**
Model	**NL-52**
Serial No	**00965159**
Ident No	**NL52 (5)**
Date Of Calibration	**30 MARCH 2021**

INSTRUMENT CONDITION

Adjustments Made	**YES**
Repairs Made	**NO**

ENVIRONMENT

The instrument was placed in the laboratory environment for a minimum period of 4 hours and was operated prior to calibration.

Measurements were made in ambient conditions of 22ºC ± 3ºC and 45% ± 15% RH.

PROCEDURE

Measurements were performed in accordance with the in house laboratory procedure 4642
All equipment used has been calibrated/verified against measurement standards or reference equipment traceable to International or National Measurement Standards as specified in our control procedure WI64
The results attached to this certificate refer to measurements made at the time of test and not to the instrument's ability to maintain calibration.
The attached results are a true record of the levels required to return the instrument to the original stated manufacturer's specification and accuracy where known.

CERTIFICATE OF CALIBRATION

ISSUED BY: **CALIBRATION MAINTENANCE & REPAIR LTD**

DATE OF ISSUE: 12 March 2021 CERTIFICATE NUMBER: **1110254**

BS EN ISO 9001:2015 APPROVED BY **LR**

CERT No 10045223

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Tel: +44 1603 279557

Approved Signatory

Electronically Authorised Document

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☐ R J WADE ☐ M FOY
☐ M A FROST
☒ M S PARDOE

Customer	**INACOUSTIC**
Order No	**CAL21-CR515-82501**
Equipment Description	**ACOUSTIC CALIBRATOR**
Manufacturer	**CIRRUS RESEARCH PLC**
Model	**CR:515**
Serial No	**82501**
Ident No	**NOT KNOWN**
Date Of Calibration	**12 MARCH 2021**

INSTRUMENT CONDITION

Adjustments Made	**NO**
Repairs Made	**NO**

ENVIRONMENT

The instrument was placed in the laboratory environment for a minimum period of 4 hours and was operated prior to calibration.

Measurements were made in ambient conditions of 22ºC ± 3ºC and 45% ± 15% RH.

PROCEDURE

Measurements were performed in accordance with the in house laboratory procedure 2124
All equipment used has been calibrated/verified against measurement standards or reference equipment traceable to International or National Measurement Standards as specified in our control procedure WI64
The results attached to this certificate refer to measurements made at the time of test and not to the instrument's ability to maintain calibration.
The attached results are a true record of the levels required to return the instrument to the original stated manufacturer's specification and accuracy where known.

9.5. Appendix E – Measurement Position Photograph

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