The Co-operative
Southwater Village
Horsham
RH13 9LA

Plant Noise Survey

On behalf of

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1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Healy's to undertake a plant noise commissioning survey for new plant at the Cooperative store in Southwater Village in Horsham.

1.2. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Site layout

2.1. The Cooperative store occupies a property on Lintot Square in Southwater. A new external gas cooler and pack have been installed to replace the existing plant in an enclosure on the north-west corner of the site.

3.0 Nearest noise sensitive receptors

3.1. The residential receptors nearest to the gas cooler are flats (Receptor R1) above the Co-op to the north-west.

3.2. A site plan showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in **Appendix B**.

4.0 Existing noise climate

4.1. The existing noise climate is detailed in the NSL report "Plant Noise impact Assessment" reference 91950/NIA dated 19th February 2024.

5.0 Plant noise design criteria

Horsham District Council

5.1. The plant installation has been approved by Horsham District Council with the Decision Notice to Planning Application reference DC/24/0799. Condition 3 States:

***Post-Operation Condition**: Within 3 months of the first use of the plant hereby permitted, a noise impact assessment shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall demonstrate that plant noise levels for daytime operation do not exceed levels of 36dB for daytime noise and 36dB for night-time noise. The assessment shall be undertaken in accordance with BS 4142: 2014 (or subsequent superseding equivalent) and current best practice and shall include full spectrum analysis to confirm that there is no tonality or other acoustically distinctive features present in the noise. Any additional measures required to mitigate noise shall be detailed and implemented, as necessary. The details as approved shall thereafter be permanently retained.*

Reason: As this matter is fundamental in the interests of residential amenities by ensuring an acceptable noise level for the neighbours of the development in accordance with Policy 33 of the Horsham District Planning Framework (2015).

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

5.2. BS 4142:2014 +A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014[1] includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

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

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

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

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

[1] For brevity, references to BS 4142 and BS 4142:2014 should be read as BS 4142:2014 + A1:2019

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

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

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

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

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

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

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

6.0 Site Visit 11th March 2025

6.1. A survey was undertaken during the evening of 11th March 2025 in order to conduct on/off plant noise testing.

6.2. The gas cooler is fixed to run at the design duty. Measurements were undertaken with the unit running and with the unit switched off.

6.3. Measurements were taken over short 30 second intervals to reduce transient noise included in the measurements.

Gas cooler assessment

6.4. Measurements were undertaken to establish the sound level emissions from the gas cooler.

6.5. The measurements were undertaken at 1m from the plant to ensure clear measurements.

6.6. The initial measurements are shown in Table 6 below:

Table 1 External plant sound pressure level survey results

Plant item	Sound pressure levels (dB)		
	Plant on	Plant off	Specific level
1m from gas cooler	44	34	44

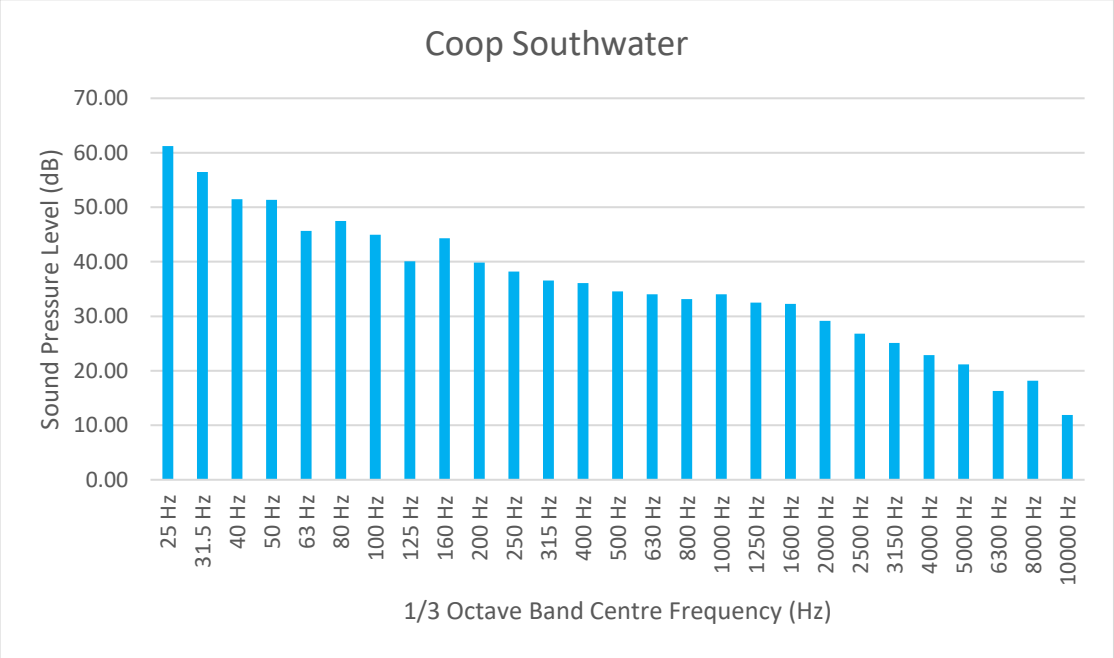
6.7. The nearest residential window is approximately 3m from the gas cooler. Table 2 shows the measured plant noise corrected for distance and compared with the criterion from Condition 3.

Table 2 Plant noise levels outside nearest residential windows

Receptor	Period	Specific sound level, L_{Aeq} (dB)	Emissions criteria (dB)	Difference (dBA)
R1	Daytime	35	36	-1
	Night-time	35	36	-1

6.8. Condition 3 also requires a tonal analysis of the plant noise. Figure 1 below shows the 1/3 octave band spectrum for the refrigeration plant specific sound levels measured at 1m from the gas cooler. The spectrum shows there are no tonal components to the plant noise emissions.

Figure 1 1/3 octave band spectrum for the refrigeration plant



7.0 Discussion of results

7.1. The Local Authority noise level criteria is demonstrated to be met during both the daytime and the night-time. In addition, the 1/3 octave band spectrum shows that there is no tonality present according to BS4142:2014+A1:2019 Annex C *"Objective method for assessing the audibility of tones in sound: One-third octave method".*

7.2. Condition 3 also requires that any additional mitigation be implemented. The photograph in **Appendix D** shows the gas cooler as installed with absorptive acoustic lining around the plant enclosure.

8.0 Conclusions

8.1. Noise Solutions Ltd (NSL) has been commissioned by Healy's to undertake a plant noise commissioning survey for new plant at the Cooperative store in Southwater Village in Horsham.

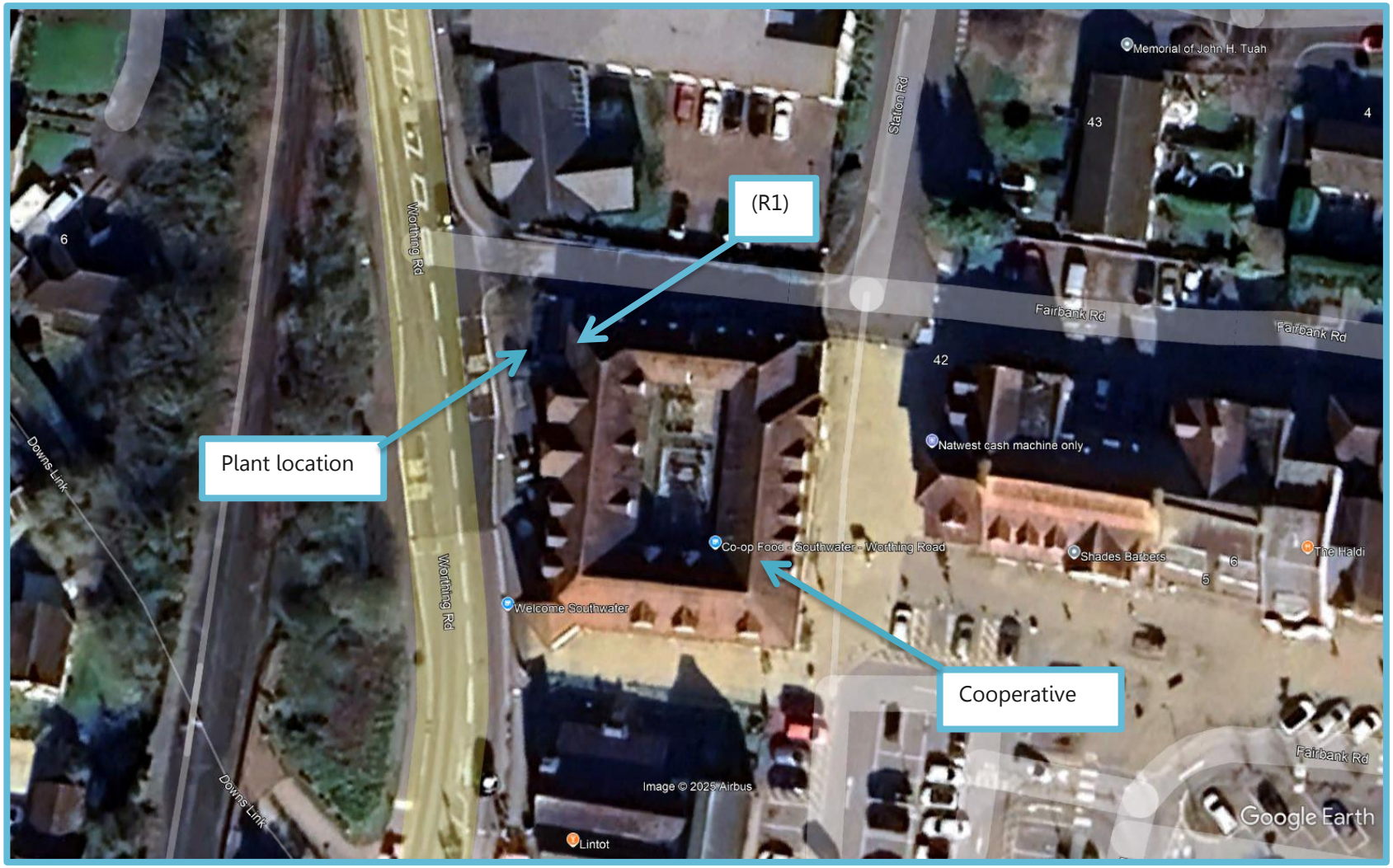
8.2. The noise from the gas cooler is too low to measure at the nearby receptors. This shows the gas cooler meets the Local Authority requirements during the daytime and is likely to meet the requirements during the night-time.

8.3. Planning application reference DC/24/0799 Condition 3 should be discharged.

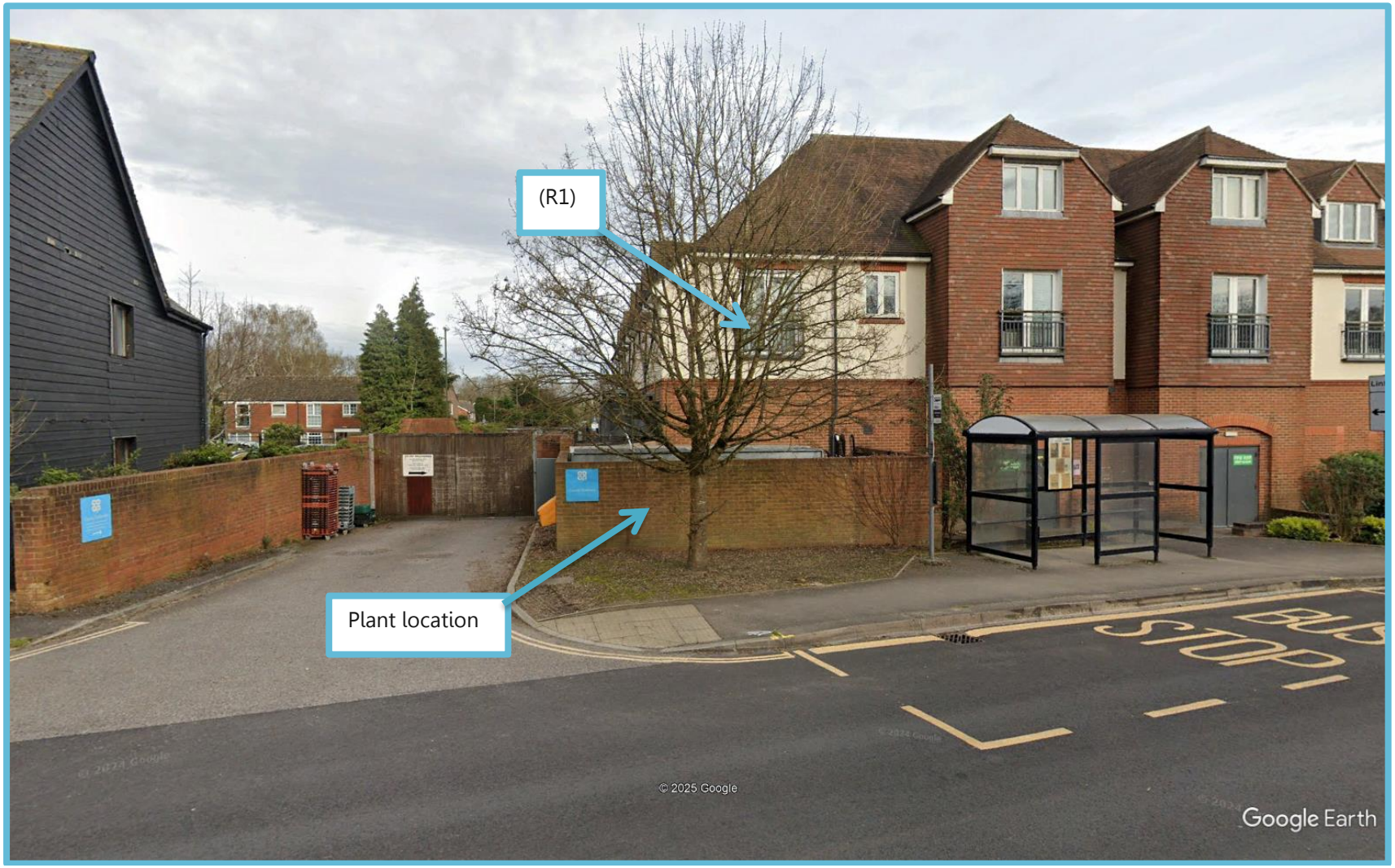
Appendix A Acoustic terminology

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

Appendix B Aerial photograph site showing areas of interest



Photograph 1 Courtesy of Google Earth


(R1)
Plant location
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Google Earth

Appendix C Environmental sound survey

Details of sound surveys

C.1 Measurements of the plant sound levels were undertaken between 18.00 hours and 20.00 hours on Tuesday 11th March 2025.

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

Equipment

C.3 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Plant noise survey

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

Appendix D Photograph of the Gas Cooler as installed

