tnei

A specialist energy consultancy

Noise Impact Assessment

Steelphalt Plant, Rover Way, Cardiff

Client Company

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COMMERCIAL IN CONFIDENCE

HARSCO

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1 Introduction

TNEI have been commissioned by Harsco to undertake an environmental Noise Impact Assessment (NIA) in order to support a proposed extension of operating hours of the Steelphalt site located within the Celsa site, off Rover Way, Cardiff. At present the site operates during daytime hours only (06:00 to 17:00) seven days per week; it is proposed that the site will operate 24 hours per day, seven days per week.

It is not possible to determine operational noise levels from Steelphalt at the nearest Noise Sensitive Receptors (NSRs) through measurement alone, as the noise environment in the area is heavily influenced from multiple noise sources, including other industrial operations and significant levels of road traffic. Therefore, a noise measurement survey was undertaken onsite to determine the noise levels of specific plant within the Steelphalt site, which could then inform a noise propagation model to determine levels at the nearest receptors.

Measured noise levels at the nearest NSRs that are referred to in this report have been taken from a previous assessment of the site, discussed further below.

1.1 Nomenclature

Please note the following terms and definitions, which are used throughout this report:

- Emission refers to the sound level emitted from a sound source, expressed as either a sound power level or a sound pressure level;
- Immission refers to the sound pressure level received at a specific location from a sound source(s);
- SPL indicates the sound pressure level in decibels (dB);
- NML refers to any location where baseline sound levels have been measured (Noise Monitoring Location); and,
- NSRs are all identified receptors which are sensitive to noise (Noise Sensitive Receptors).

Unless otherwise stated, all noise levels refer to free field levels i.e. noise levels without influence from any nearby reflective surfaces.

In the interest of clarity, a Glossary of Terms is provided as Appendix A.

All Figures can be found in Appendix C.

All grid coordinates refer to the Ordnance Survey grid using Eastings and Northings.

1.2 Noise Related Permit Conditions

Noise levels from processes occurring within the Celsa site must comply with the requirements of Environmental Permit EPR/TP3639BH (the Permit), which covers the Steelphalt site as of variation V009 (May 2020).

The Permit contains two ongoing noise related conditions. Conditions 3.4.1 and 3.4.2 state:

- *"Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of Natural Resources Wales, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration."*
- *"The operator shall:*

a. *if notified by Natural Resources Wales that the activities are giving rise to pollution outside the site due to noise and vibration, submit to Natural Resources Wales for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration;*

b. *implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by Natural Resources Wales."*

There are no immediate actions required to satisfy these conditions, however, the Permit Variation has additional requirements that are to be met through an *'Improvement Programme'*.

1.2.1 Improvement Programme Requirements

Table S1.3 of the Permit sets out the Improvement Programme and Reference IC8 of that programme sets out the noise requirements. The relevant extract of Table S1.3 is detailed below in Table 1-1:

Table 1-1: IC8 of Permit Table S1.3 Improvement Programme Requirements

Reference	Requirement	Date
IC8	Following completion of the asphalt plant and integrated scrap metal recycling centre, the Operator shall undertake noise monitoring at the nearest sensitive receptors. This shall include: • A full noise monitoring survey and assessment meeting the BS4142:2014 standard including details of local conditions e.g. meteorological conditions (wind direction). • 1/3rd octave and narrow band (FFT) measurements to identify any tonal elements or low frequency noise. • Reference to the World Health Organisation guidelines for community noise. • Reference to Noise Action Plan for Wales 2018-2023. Upon completion of the work, a written report shall be submitted to Natural Resources Wales. If rating levels likely to cause complaints or disturbance at sensitive receptors are detected as a result of the installation operation, the report shall include an assessment of the most suitable abatement techniques, an estimate of the cost and a proposed timetable for their installation.	Within 6 months of issue of variation V009, or as otherwise agreed in writing by Natural Resources Wales

The above requirements were addressed in a report produced in 2021 by TNEI (Ref 14381-001-R0).

1.3 Previous Noise Assessments

TNEI has previously undertaken a number of noise assessments for the Steelphalt site, including:

1.3.1 Report 13331-001-R2 (July 2019)

A report was produced in July 2019 to summarise a NIA for the (then proposed) Asphalt Plant (the Steelphalt site). The report compared predictions from a noise model of the site to measured daytime ambient noise levels at nearby Noise Sensitive Receptors (NSRs).

Attended noise measurements were undertaken at three Noise Monitoring Locations (NMLs) near to the site over two days during May 2019. The survey took place during daytime periods only.

Predicted noise levels were based on measurements undertaken at a Steelphalt site in Rotherham, which uses similar equipment to the Cardiff site. These measurements were supplemented by sound power level (SWL) data taken from Annex C of BS5228:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Noise*'.

During consultation with an Environmental Health Officer (EHO) at Cardiff Council, it was agreed that if noise immission levels were predicted to be more than 10 dB below the existing ambient noise levels then no further assessment would be necessary. If however, noise levels were above or within 10 dB of the existing levels then a BS 4142 'context based' assessment would be required.

The assessment determined that noise immission levels would likely be more than 10 dB below the existing noise levels at all receptor locations and for all proposed working periods, and as such that the site would not have an adverse impact on the local area.

1.3.2 Report 14381-001 (August 2021)

Following construction of the Steelphalt site and to meet the requires detailed in Section 1.2.1, a NIA was undertaken specifically in relation to the operation of the Steelphalt site i.e. not considering any other elements of the wider Celsa site.

An unattended noise monitoring survey took place from the 30th April to the 4th May 2021 at three nearby NMLs, along with two proxy measurement locations located outside the sphere of influence of the Celsa site.

A number of problems were encountered during the measurement survey, including vandalism and theft of equipment and atypical conditions at the proxy locations. These issues meant that background sound levels could not be obtained and a full BS 4142 assessment could not be undertaken, however, an assessment of operational noise was undertaken against WHO guideline levels for daytime and night-time periods.

The assessment identified an intermittent noise source at two of the three measurement locations, which could not be directly attributed to the Celsa site. Where the intermittent noise source was not present, measured sound levels at all locations were below the WHO guideline levels during night-time. During daytime, sound levels at one location were below the WHO guideline levels, and at two locations exceeded the WHO levels, but due to the local soundscape being heavily influenced by road traffic, this could not be attributed to operations from the Celsa site.

2 Steelphalt Site Summary

2.1 Description of Operations

The Steelphalt site is located within the wider Celsa site, to the south of Rover Way, Cardiff. The site operations include the production of asphalt using materials delivered to site, including by-products from operations based elsewhere within the Celsa site (in particular, steel slag from the nearby Melt Shop).

Aggregates are delivered to the Steelphalt site via HGV, which are weighed at an on-site weigh bridge upon entry. Aggregates are stored at the south-east side of the site, however additional materials such as liquid bitumen and fibre additives are stored in silos located to the north of the site.

The aggregates are loaded into to a series of hoppers, which feed into a conveyor system during operation; the conveyor transports the material into a rotary dryer, which combined with a gas fuelled burner heats and dries the material ready for mixing. Dust created during this process is extracted and filtered, and cleaned air is released into the atmosphere via an exhaust fan and stack.

From the rotary drier, the aggregates are transported to the top of the mixer unit via a material elevator. The aggregates are then combined within the mixer unit, along with liquid bitumen and fibre additives which act as binding agents. Recycled material, left over from previous asphalt production, is included in this process, however this bypasses the rotary dryer.

Once the mixing process is complete, the finished product is released from the bottom of the mixer into a conveyor-mounted hopper. The product is then moved to a pair of raised hoppers that dispense into open-topped HGVs and is taken off site. If any additional material is left over at the end of a batch, this is transported to the aggregate storage area for recycling.

Other operations on site include the movement of vehicles transporting materials round the site, as well as maintenance operations such as the cleaning of HGV load beds and, where required, the removal of excess ground water on site via a mobile pump unit.

2.2 Operational Times

At present, operations within the Steelphalt site are limited to 06:00 to 17:00, seven days a week. In practice, operational times are dependant on demand and available materials; operations therefore frequently cease earlier than 17:00.

2.3 Study Area

Noise Sensitive Receptors (NSRs) are properties that are sensitive to noise and, therefore, require protection from nearby noise sources.

The Study Area has been defined through the identification of the closest NSRs to the development. Specifically, the study area considers the closest NSRs only, on the assumption that if noise levels are within acceptable levels at the closest receptors, then it is reasonable to assume they will also be acceptable at more distant locations.

Three groups of residential NSRs have been identified.These are:

- NSR Group 1 - Residential properties to North of Celsa site on Willows Avenue
- NSR Group 2 - Residential properties located within the traveller site to the east on Rover Way
- NSR Group 3 - Residential properties to North/North East on Greenbay Road/Hind Close.

These are the same NSRs considered in previous assessments, and no new NSRs have been identified.

Figure 1 included in Appendix C details the closest identified NSRs, which are all residential receptors.

3 Assessment Methodology

3.1 Legislation and Policy Context

3.1.1 Noise and Soundscape Action Plan 2018–2023

The Welsh Government, in 2018, published the Noise and Soundscape Action Plan 2018–2023 (NSAP), which outlines the Welsh public sector's strategic policy direction in relation to noise and soundscape management.

With regards to industrial noise the NSAP explains how noise from major industrial sources is regulated by Natural Resources Wales (NRW) through the Environmental Permitting Regulations 2016 (EPR). Paragraph 8.2.5 states;

"Under EPR, noise is regulated through the use of standard noise conditions and each site's environmental management plan, rather than through the use of specific limits. This provides greater flexibility for adaptation to a changing soundscape."

In June 2023, the Draft Noise and Soundscape Plan for Wales 2023-2028 was published, which states in relation to controlling noise from businesses:

"Depending on the type of business, noise may also be controlled by means of planning conditions, entertainment licences and/or environmental permits."

The consultation period for this draft document ended in October 2023, and until superseded, the NSAP 2018-2023 remains relevant.

3.1.2 Guidance for Permitting – Horizontal Guidance

Overarching noise guidance for IPPC permit applications (i.e. not sector specific) was formerly contained in the Natural Resources Wales (NRW) Horizontal Guidance Notes H3 Parts 1 and 2. This has since been superseded, with NRW following the Environment Agency (EA) documents *'Noise and vibration management: environmental permits'* and requiring compliance with *'BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound'* (BS 4142) for industrial noise impact assessments. NRW recommends the guidance contained within the EA document *'Method implementation document (MID) for BS 4142'* should also be followed when undertaking a BS 4142 assessment.

3.1.3 Guidance for Permitting – Noise and Vibration Management: Environmental Permits

Noise and Vibration Management: Environmental Permits (NVMEP) describes how the various UK environmental agencies (including NRW) will assess noise from industrial processes, includes information on management of noise and vibration in terms of the law, and provides 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. It replaces the Environment Agency Horizontal Guidance for Noise (H3) parts 1 and 2.

NVMEP provides information on how the level of noise impact relates to BS 4142 descriptors, in relation to unacceptable levels of audible and detectable noise. Specifically, where noise at a receptor is considered an unacceptable level of audibility or detectability, this is equivalent to the BS 4142 descriptor 'significant adverse impact'; where noise at a receptor is considered barely audible or detectable, this is equivalent to the BS 4142 descriptor 'low impact or no impact'.

NVMEP discusses the use of 'appropriate measures to prevent or, where that is not practicable, minimise noise'.

3.2 Assessment Methods

A number of standards and guidelines are available for the assessment of environmental noise from industrial developments, however, assessments are typically based on a comparison of likely noise levels against either 'context' based limits or a set of fixed limits.

Context based limits are set relative to the existing noise environment and may also consider the characteristics of the noise source(s), whilst fixed limits are usually set regardless of the existing noise environment or type of noise source(s).

3.2.1 'Context' Based Assessments

BS 4142:2014+A1:2019 *'Methods for Rating and Assessing Industrial and Commercial Sound'* is commonly used to assess the potential impacts of new sound sources on nearby residential receptors.

The BS 4142 form of assessment is based on the predicted or measured levels of an assessed sound source compared to the measured background sound levels without the specific sound source present and uses, *"outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident".*

Specifically, the assessment is made by subtracting the measured background sound level from a calculated or measured 'Rating Level'.

BS4142 uses the following definitions:

Ambient Sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far. Described using the metric, $L_{Aeq\ (t)}$.

Specific Sound Level: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, *Tr*. Described using the metric $L_{Aeq\ (t)}$. Also referred to in this report as the *Immission Level*.

Residual Sound Level: Equivalent continuous A-weighted sound pressure level of the residual sound without the specific sound source(s) present at the assessment location over a given time interval, *T*. Described using the metric $L_{Aeq\ (t)}$.

Background Sound Level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T*, measured using time weighting *F* and quoted to the nearest whole number of decibels. Described using the metric $L_{A90\ (t)}$.

Rating Level: The Specific Sound Level adjusted for the characteristics of the sound. The Rating Level is calculated by adding a penalty or penalties (if required) to the Specific Sound Level when the sound source contains audible characteristics such as tonal, impulsive or intermittent components. Described using the metric, $L_{Aeq\ (t)}$.

3.2.2 Guidance for the implementation of BS 4142

The Environment Agency document *'Method Implementation Document (MID) for BS 4142'* provides guidance and requirements for the implementation of BS 4142. The MID provides information on qualitative assessment methods and identifies a number of factors that can affect the context in which sound occurs and the sensitivity of an area.

The MID provides a number of issues to consider when making decisions about context and sensitivity, including the existing acoustic environment at receptors, the presence of industry and whether new sounds are in keeping with the character of the existing soundscape.

3.2.3 Fixed Guideline Levels (BS 8233:2014)

BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' presents guideline noise levels for daytime and night-time periods for a number of different building types; for residential developments these are based on guidelines issued by the WHO. Specifically, the Standard states; *"it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4."* Table 4 is reproduced here as Table 3.1.

Table 3.1: Indoor Ambient Noise Levels for Dwellings (*BS 8233:2014 Table 4*)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16\ hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\ hour}$	30 dB $L_{Aeq,8\ hour}$

BS 8223 suggests that an allowance of 15 dBA for the attenuation of a partially open window is reasonable in order to convert between internal and external sound levels and limits. Therefore, an assessment of external noise levels can assume an external noise level limit of 15 dB above those values detailed within Table 3-1 i.e. to achieve an internal night-time level of 30 dB $L_{Aeq(8hour)}$ with windows open, the external sound level must not exceed 45 dB $L_{Aeq(8hour)}$.

3.3 Assessment Criteria

The 2019 NIA considered an assessment criteria agreed during consultation with Cardiff Council that where noise immission levels were predicted to be more than 10 dB below the existing ambient noise levels then no further assessment would be necessary. If however, noise levels were above or within 10dB of the existing levels then a BS 4142 'context based' assessment would be required.

Considering all of the above, the assessment is made as follows:

- The predicted levels are compared to the existing ambient sound levels. Where the noise immission levels from the proposed developments are at least 10 dB below the existing ambient sound levels then no further assessment is necessary, as no noise level increase will occur. If, however, noise levels are above the ambient sound levels or within 10 dB, further assessment will be required (as defined in the following bullet points);
- A quantitative assessment is made against the fixed noise guideline levels defined in BS 8233:2014 and the WHO guideline levels, where possible; and
- A qualitative assessment is undertaken in accordance with BS 4142:2014, taking into consideration the context of the development and the outcome of the quantitative assessment.

3.4 Calculation Methods

In order to predict the noise immission levels attributable to the proposed developments a noise propagation model is constructed using the propriety noise modelling software CadnaA. Within the software, complex models can be produced in order to simulate the propagation of noise according to a range of international calculation standards.

For this assessment, noise propagation is calculated in accordance with ISO9613 '*Acoustics – Attenuation of sound during propagation outdoors'* using the following input parameters:

- Temperature is assumed to be 10°C and relative humidity as 70%;
- A ground attenuation factor of 0.5 (mixed ground) is used; and
- Receiver heights are set to 4 m (to represent a first floor bedroom) and 1.5 m for the single story dwellings within the traveller site.

The noise propagation model is intended to give a good approximation of the specific sound level and the contribution of each individual sound source; however, it is expected that measured levels are unlikely to be matched exactly with modelled values and the following limitations in the model should be considered:

- In accordance with ISO 9613, all assessment locations are modelled as downwind of all sound sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. These conditions are favourable to the propagation of sound;
- Table 5 of ISO 9613 estimates overall accuracy for broadband noise predictions of ± 3dB, with average source to receiver heights <5m, at distances of up to 1000m;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation may have been accounted for; and
- The model assumes all sound sources are operating continuously and simultaneously, estimating a worst-case source noise level.

4 Noise Measurement Survey

A noise measurement survey was undertaken at the Steelphalt site on 9th and 10th of November 2023. During the survey, a series of sound level measurements were undertaken of all identified noise producing items of plant.

The noise monitoring equipment consisted of two Cirrus Optimus Green integrating sound level meters (SLMs) fitted with standard wind shields. All noise monitoring equipment (calibrator, SLM and microphone) used for the study are categorised as Class 1, as specified in IEC 61672-1 *'Electroacoustics. Sound level meters. Specifications'* (IEC, 2002). The equipment was calibrated on site at the beginning and end of each measurement period with no significant deviations noted. Appendix B contains the equipment and laboratory calibration details.

All measurements were made with the sound level meter (SLM) and microphone mounted on a tripod approximately 1.5 meters above the ground. Where possible, measurements were undertaken in close proximity to the plant (typically 1 m distance), however in some instances measurements they were taken at greater distances when access to the item of plant was either not possible or potentially dangerous. Measurement duration varied depending on the source, however in most instances measurements were one minute in length unless a longer measurement time was required (e.g. if the sound level obviously changed over time).

Detail of the measured data is provided in Appendix B, and a list of each item of plant along with a brief description is presented in in Table 4.1 below.

Table 4.1 Measured Items of Plant

Name	Description
Input Hopper Conveyor	Conveyor transporting aggregate material from input hoppers to dryer feed conveyor
Dryer Input Conveyor	Conveyor belt feeding aggregate into rotary dryer
Burner	Gas fuelled burner used to heat material within the rotary drier
Rotary Dryer	Large rotary drum used to heat aggregate material prior to mixing
Dryer Elevator	Elevator for transporting heated aggregate to top of mixer stack
Exhaust Fan	Fan used to extract dust from rotary dryer through filtration system and expel exhaust gas via stack
Fibre Blower	Motorised blower used to add fibre additives to mixing process
Bitumen Pump	Pump used to add liquid bitumen to mixing process
Mixer Stack	Large multi-level enclosed stack housing mixing plant
Output Hopper Motor	Motor powering output hopper conveyor bucket
Hot Water Pump	Pump to power hot water hose used to wash out lorry beds
CAT972M	Articulated loader used for moving aggregate material around site

Name	Description
Renault HGV	Transport trucks used to transport aggregate to site and asphalt from site
Water Tanker Pump	Vacuum tank trailer used for removing excess surface water from site
Water Tanker Tractor	Tractor used to move water tanker pump trailer

In addition to the measurements of operational plant, a number of measurements were taken of ambient noise levels across the site, in order to validate the noise prediction model against measured levels (see Section 5.1). These are summarised in Table 4.2 below.

Table 4.2 Ambient Measurements

Description	Easting	Northing	Measured Sound Pressure Level (dB, L_{Aeq})
Measurement taken at north west edge of site	321434	176269	72
Measurement taken at north east edge of site	321481	176281	78
Measurement taken within site, approximately 5 m west of bitumen silos	321444	176259	80

All measurements were undertaken during normal site operations between 09:00 to 14:00 on 09/11/2023 and 07:00 to 10:00 on 10/11/2023. Weather conditions on both days included scattered showers with some heavy rainfall; no measurements were undertaken during rainfall or periods of strong winds, however some standing water was present on the lower areas of the site from heavy rainfall in the days preceding the site visit.

5 Operational Noise Impacts

5.1 Modelling of Individual Sources

The noise model considers all of the individual sound sources detailed within Table 4.1.

The measured SPL data for each noise source is provided in Appendix B. Table 5.1 details the calculated SWL used in the noise model for each source. The conversion from SPL to SWL is undertaken automatically within the CadnaA software and is based on the measurement distance and the proximity of the source to any reflective surfaces during the measurement period.

Small noise producing items of plant (e.g. pumps, compressors) have been modelled as 'point sources'. Conveyor belts have been modelled as line sources, with the derived SWL level applied to each 1 m section.

For larger items of plant, and/or items of plant contained within enclosures, measurements were taken of more than one side or façade and an average level derived for use in the noise model. Where a specific noise source was located on a particular façade (e.g. a motor located on one side of the mixer stack), this has been modelled separately from the remaining facades. Large items of plant have been reproduced within the noise model by modelling these items of plant within CadnaA as 'buildings' with different SWL levels applied to each side, as required.

A number of items of mobile plant were in operation around the site, such as HGVs and an CAT 972M loader. These items of plant have been modelled as stationary, located within typical working areas observed during the site visit.

Table 5.1: Octave Band Sound Power Levels for Steelphalt Site Plant, dBZ

Name	Calculated Sound Power Level									
	63	125	250	500	1000	2000	4000	8000	dBA	dBZ
Burner (Side)	112	108	105	106	99	97	91	84	106	115
Burner (End)	105	111	109	103	100	98	91	83	106	114
Dryer Elevator	91	90	89	89	88	85	80	73	92	97
Dryer Input Conveyor	86	82	81	80	79	77	74	66	84	90
Exhaust Fan	103	94	93	92	90	85	80	76	94	104
Fibre Blower	91	88	96	90	90	89	88	84	96	100
Hot Water Pump	88	82	85	90	92	91	93	82	98	99
Bitumen Pump	87	84	87	87	87	80	76	71	90	94
Input Hopper Conveyor	97	88	86	89	88	85	79	79	92	99
Mixer Stack – Level 1 – Side A	90	86	84	83	81	78	74	66	86	93

Name	Calculated Sound Power Level									
	63	125	250	500	1000	2000	4000	8000	dBA	dBZ
Mixer Stack – Level 1 – Side B	84	80	80	79	80	74	70	64	83	88
Mixer Stack – Level 2	95	92	88	86	85	83	84	83	91	98
Mixer Stack – Level 3	86	84	81	80	82	85	83	80	90	92
Mixer Stack – Level 4 – Side A	91	90	89	89	82	82	80	74	90	97
Mixer Stack – Level 4 – Side B	101	92	92	87	87	88	85	81	94	102
Mixer Stack – Level 0 (Ground Level)	98	101	103	104	101	98	93	88	106	109
Output Hopper Motor	86	81	83	88	84	80	83	79	90	93
Rotary Dryer (End)	92	88	87	86	82	78	74	66	87	95
Rotary Dryer (Side)	93	91	91	90	89	87	87	84	95	99
CAT972M Loader	89	83	83	80	80	74	66	56	84	91
HGV	86	80	82	86	84	82	74	66	89	92
Water Tanker Pump	106	95	100	96	85	87	85	78	97	107
Water Tanker Tractor	95	89	89	87	86	84	78	68	91	98

During the survey, it was not possible to measure the sound level from the exhaust stack due to the lack of access (the stack stands at 22 m high). While on site, the surveyors did not observe any noticeable sound from the stack tip, however this may be attributed to the dominance of other sound sources at ground level. A sound power level for the exhaust stack output has therefore been derived by the following method.

A sound power level spectrum for the exhaust fan (centrifugal with backwards facing blades) was taken from the Fläkt Woods Practical Guide to Noise Control (Flakt Woods, 2005). The spectra was adjusted to incorporate typical attenuation levels that would occur from the total stack height/ducting length, as well as end reflections.

During the survey, ambient sound level measurements were taken at points around the Steelphalt site during typical operation (see Table 4.2). These measurements were taken to allow the noise prediction model to be compared against measured levels, validating the accuracy of the predictions; where predicted levels match measured ambient levels on site, it can be assumed that predicted levels at the NSRs are accurate.

Predicted noise levels at the ambient measurement locations were found to be slightly below (approximately 1 - 2 dB) the measured ambient sound levels. The sound power level of the exhaust stack outlet was then set using the derived spectra so that the predicted levels matched (or slightly exceeded) the measured levels at all ambient measurement locations. The assumed sound power level for the exhaust stack outlet is summarised in Table 5.2 below.

Table 5.2 Exhaust Stack Tip Sound Power Level

Name	Calculated Sound Power Level (Octave Bands (dBZ), Broadband A Weighted, Broadband Z Weighted)									
	63	125	250	500	1000	2000	4000	8000	A	Z
Fan Spectra	-4	-6	-9	-11	-13	-16	-19	-22	-	-
Attenuation due to duct length, based on 20 m length (Figure 5.4, Fläkt Woods)	0	-0.4	-0.7	-1	-1.4	-1.5	-1.5	-1.5	-	-
Attenuation due to end reflections, based on 1.5 m diameter (Figure 5.7, Fläkt Woods)	-3.5	-1	0	0	0	0	0	0	-	-
Final exhaust stack outlet sound power level spectrum	105	105	102	100	98	95	92	89	**103**	**110**

5.2 Calculated Noise Immission Levels

The broadband noise immission levels have been calculated assuming all plant is operating continuously and concurrently and at maximum capacity.

The predictions have been made for a total of four Noise Assessment Locations (NALs), detailed in

Table 5.3. These NALs are the same as those considered within the July 2019 report (reference 13331-001-R2), and are representative of the nearest NSRs to the Steelphalt Site.

In addition, Figure 2 (Appendix C) presents an isopleth noise contour plot for a height of 4 m overlaid on digital mapping data.

Table 5.3: Noise immission Levels, dB $LAeq_{(t)}$

Noise Assessment Location (NAL)				Predicted Noise Level, dB $L_{Aeq(t)}$
NAL ID	NAL Descriptor	Easting	Northing	
NAL01	Willows Avenue	321084	176566	43
NAL02	Traveller Site	321844	176768	38
NAL03	Greenbay Road	321192	176885	30
NAL04	Hind Close	321554	177005	43

6 Noise Impact Assessment

6.1 Measured Ambient Noise Levels

As part of the previous NIA summarised in the 2021 report (reference 14381-001-R0), night-time (23:00 – 07:00) ambient sound levels were measured at three locations proximate to the Steelphalt site, summarised in Table 6.1.

Table 6.1: Measured Ambient Night-time Sound Levels

NML ID	Easting	Northing	Representative of NSR Group / NAL	Ambient Sound Level, Night-time, dB $L_{Aeq(t)}$
NML01 – Willows Avenue	321092	176572	NSR Group 1 / NAL01	60
NML02- Rover Way Traveller Site	321769	176701	NSR Group 2 / NAL02	70
NML03 – Runway Road	321288	177052	NSR Group 3 / NAL03 & NAL04	48

These levels are considered representative of the noise environment at the NALs identified above.

NAL01 and NAL02 are at the approximate locations of NML01 and NML02, respectively. NML03 is located approximately equidistant from NAL03 and NAL04, which represent the closest points of NSR Group 3 to the Steelphalt site.

6.2 Noise Impacts on Noise Sensitive Receptors

In line with the assessment criteria set out in Section 3.3, Table 6.2 compares the predicted noise levels with the lowest measured ambient sound levels measured during night-time as part of the 2021 NIA.

Table 6.2: Comparison of Predicted Versus Existing Ambient Sound Levels

NAL ID	Ambient Sound Level, Night-time, dB $L_{Aeq(t)}$	Predicted Noise Level, dB $L_{Aeq(t)}$	Margin Above/Below (+/-) Existing Levels, dB
NAL01	60	43	-17
NAL02	70	38	-32
NAL03	48	30	-18
NAL04	48	43	-5

It can be seen that for NAL01, NAL02 and NAL03, the predicted levels are more than 10 dB below the existing ambient sound levels and no further assessment is required.

At NAL04, predicted noise levels are 5 dB below the measured ambient sound level.

As discussed in Section 1.3.2, the background noise survey undertaken as part of the 2021 NIA concluded that insufficient data was available to undertake a BS 4142 assessment.

A further stage of assessment against the WHO guideline levels has, however, been undertaken, comparing predicted noise levels at each NAL to the external noise limit (referenced in Section 3.2.3) of 45 dB $L_{Aeq(8hour)}$, based on an internal limit of 30 dB plus a 15 dB allowance for the attenuation provided by a partially open window. This is presented in Table 6.3.

Table 6.3: Comparison of Predicted Noise Level to BS 8233 External Noise Level Limit

NAL ID	Predicted Noise Level, dB $L_{Aeq(t)}$	External Noise Level Limit, dB $L_{Aeq(t)}$	Margin Above/Below (+/-) Existing Levels, dB
NAL01	43	45	-2
NAL02	38	45	-7
NAL03	30	45	-15
NAL04	43	45	-2

Assessment against the WHO guideline levels show that predicted noise levels at all NALs are below the external guideline level of 45 dB $L_{Aeq(8hour)}$, indicating that an internal night-time level of 30 dB, with windows open, would be achieved.

BS 4142 Qualitative Assessment

The EA guidance document *Noise and Vibration Management: Environmental Permits* (NVM) provides information on how the level of noise impact relates to BS 4142 descriptors, which may enable a qualitative BS 4142 assessment to be undertaken where a quantitative assessment cannot be.

An important consideration when determining the level of impact is the overall change in noise level and whist no longer considered current guidance, the Horizontal Guidance for Noise (H3) part 2 document states:

"It is commonly accepted that for the average person a change of 1 dB is just perceptible under controlled conditions. A change of 3 dB is noticeable, 6 dB obvious and a change of 10 dB is significant and corresponds approximately to halving or doubling the loudness of a sound."

Considering that the predicted sound level at NML04 is 43 dB, and the ambient sound level is 48 dB, the increase in sound level from the operation of the Steelphalt plant would be 1 dB, which may be considered 'just perceptible' or less than the level considered to be 'noticeable'.

With regards to BS 4142, the NVMEP provides information on how the level of noise impact relates to audibility and detectability of noise; where noise at a receptor is considered barely audible or detectable, this is equivalent to the BS 4142 descriptor 'low impact or no impact'. Given that the increase in noise will be only just perceptible under worst-case conditions, it is determined that operation of the Steelphalt site during night-time hours would constitute a 'low impact or no impact' in line with BS 4142.

It is noted that there are a number of noise control measures currently in place at the Steelphalt site, such as many of the main noise-producing elements of plant (such as the mixer stack and dust

extraction system) being fully enclosed within sealed containers. As such, it is considered that operation of the Steelphalt site are undertaken in accordance with Best Available Techniques (BAT).

7 Summary

TNEI were commissioned by Harsco to undertake a noise survey and assessment for submission to NRW. The purpose of the assessment is to support a proposed extension of operating hours of the Steelphalt site located within the Celsa site, off Rover Way, Cardiff. At present, the site operates during daytime hours only (06:00 to 17:00) seven days per week; it is proposed that the site will operate 24 hours per day, seven days per week.

TNEI had previously undertaken Noise Impact Assessments that considered the Steelphalt site in 2019 (to support the planning application) and 2021 (to satisfy the noise related requirements of Environmental Permit EPR/TP3639BH V009).

The permit includes both noise related conditions and an Improvement Programme with noise related requirements. There were no immediate actions required to satisfy the ongoing permit conditions, however the 2021 assessment was undertaken to satisfy the Improvement Programme. The requirements included a noise monitoring survey, BS4142 assessment, tonal analysis, and reference to both WHO guideline noise levels and the Noise Action Plan for Wales 2018-2023.

In order to determine the likely level of impact of the Steelphalt site operating during the night, calculations have been undertaken using a noise prediction model. The noise model has been informed by a site survey, undertaken on the 9th and 10th of November 2023, during which measurements were taken of all identified items of noise producing plant located within the Steelphalt site.

A noise survey was undertaken in 2021 with the aim to determine background noise levels at the nearest NSRs to the Steelphalt site. Difficulties encountered during the survey, primarily equipment vandalization, meant that background noise levels could not be determined. As a result, a full BS 4142 assessment could not be undertaken, and assessment was instead made that considered measured ambient noise levels at the NSRs and with reference to WHO guideline levels.

In the absence of background noise level data for the NSRs, a full BS 4142 assessment could not be undertaken as part of this assessment. Instead, predicted noise levels at the NSRs were compared to measured ambient noise levels.

In 2019, it was agreed during consultation with Cardiff Council that if noise immission levels were predicted to be more than 10 dB below the existing ambient noise levels then no further assessment would be necessary. At NAL01, NAL02 and NAL03, predicted noise levels from the Steelphalt site are more than 10 dB below measured ambient sound levels, and as such it is considered that noise resulting from night-time operation of the Steelphalt site will not result in an adverse impact at the locations and no further assessment is required.

Predicted noise levels at NAL04 were 5 dB below the measured ambient sound levels, and as such further assessment was undertaken. When considering an external noise limit based on BS 8233 guideline levels for night time, predicted noise levels were found to be below the recommendations by a margin of 2 dB.

In addition, the likely change in the level of sound due to night-time operation of the Steelphalt site has been considered. Based on the assumption that all items of plant are operating at full capacity at all times, the increase in sound level at NAL04 will be 1 dB over existing ambient levels. As noted in Horizontal Guidance for Noise (H3) part 2, a change of 1 dB is typically considered ‘just perceptible’

and a change of 3 dB is considered 'noticeable'. A change in level of 1 dB is therefore considered to be below the level that would result in an 'adverse impact' in line with BS 4142.

Accordingly, it is considered that the extension of operational hours of the Steelphalt site to include night-time operation will not have an adverse noise impact on the local area.

Appendix A – Glossary of Terms

Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Sound Level: the sound level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night-time periods. The LA90 indices (see below) are typically used to represent the background sound level.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in sound level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate sound in the same way as the ear, and to counter this weakness the sound measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). The dB(A) weighting is internationally accepted and has been found to correspond well with people's subjective reaction to sound levels and noise. Some typical subjective changes in sound levels are:

- a change of 3dB(A) is just perceptible;
- a change of 5dB(A) is clearly perceptible; and
- a change of 10dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Emission: the sound energy emitted by a sound source (e.g. a wind turbine).

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound waves with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard ground), 0.5 (mixed ground) and 1 (soft ground).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

Immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Isopleth: a line on a map connecting points of equal value, for example air pressure, noise level etc.

Noise: unwanted sound.

Lw: is the 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.

Leq: is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The LAeq, T is the A-weighted equivalent continuous sound level over a given time period (T).

L90: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The LA90,10min is the A-weighted background sound level over a ten-minute measurement sample.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of ≤20 Hz). This noise is subjectively more annoying than broadband noise.

Appendix B – Calibration Certificates & Survey Data

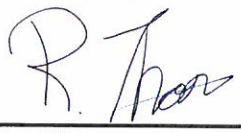
CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201438**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:



Outdoor Kit Calibration Information

Instrument information

Manufacturer:	Cirrus Research plc
Model:	CK:675
Preamp Model	MK:172
Microphone Serial Number	2015
Primary Calibration Certificate Number	201435

Summary

Date of calibration: 26 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
This information is in addition to the primary calibration certificate for the sound level meter. The calibration certificate number is shown above and should be used in conjunction with this additional information.

The sound level meter detailed above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the standards to which the instrument has been designed.

All calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

The microphone capsule was calibrated using an electrostatic calibration system to produce the frequency response and a reference acoustic source for the final sensitivity testing.

In addition to the calibration of the complete sound level meter in its standard configuration, (instrument, MV:200 series preamplifier and microphone capsule), the sound level meter and microphone capsule were tested with the MK:172 preamplifier in place of the MV:200 series.

The sound level meter, G078524 , has been tested with Outdoor Microphone/Preamplifier Type MK:172 Serial Number 2015 and conforms to the requirements of the standards stated in the instrument user manual.

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Cirrus Research plc
dedicated to noise measurement

Service Report

Instrument Manufacturer: Cirrus Research Plc
Job Reference Number: 86656
Instrument Type: CR:171B
Serial Number: G078524

Customer Name: TNEI Services Ltd
Customer Address: 7th Floor
West One
UK
NE1 3PA

Issue	Action	Result	Engineer
RHS button not working.	New keypad fitted.	Recal OK.	Rebecca Thomas

Engineer: R. Thom

Date: 26 October 2023

We hope that you are satisfied with the service you have received from Cirrus Research plc.
If you have any concerns, would like further information or have any feedback do not hesitate to contact us.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: support@cirrusresearch.com

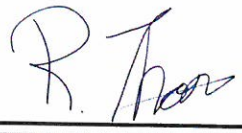
CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201435**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:



Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G078524	
Class:	1	
Firmware version:	3.2.3254	

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201436**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Third-octave-band filter : IEC 61260:1995

Instrument information

Manufacturer:	Cirrus Research plc
Model:	CR:171B
Serial number:	G078524
Class:	1
Firmware version:	3.2.3254

Notes:

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61260:1995.

The filter submitted for testing successfully completed the Relative Attenuation test of IEC 61260 for the environmental conditions under which the test was performed.

Notes

It provides traceability of measurement to the SI system of units and/or to units of measurement realised at a recognised national metrology institute. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201437**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Octave-band filter : IEC 61260:1995

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G078524	
Class:	1	
Firmware version:	3.2.3254	

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61260:1995.

The filter submitted for testing successfully completed the Relative Attenuation test of IEC 61260 for the environmental conditions under which the test was performed.

Notes

It provides traceability of measurement to the SI system of units and/or to units of measurement realised at a recognised national metrology institute. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **11 October 2023** CERTIFICATE NUMBER **201439**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 212180B

Calibration procedure

Date of calibration: 11 October 2023

Open circuit: 48.9 mV/Pa

Sensitivity at 1 kHz: -26.2 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 99.94 kPa

Temperature: 23.4 °C

Humidity: 54.7 %

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201440**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:515

Serial number: 78218

Class: 1

Notes:

Test summary

Date of calibration: 25 October 2023

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed by Laboratoire National d'Essais (LNE), PhysikalischTechnische Bundesanstalt (PTB) and APPLUS (APPLUS).

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Cirrus Research plc
dedicated to noise measurement

Service Report

Instrument Manufacturer: Cirrus Research plc
Job Reference Number: 86656
Instrument Type: CK:675
Serial Number: 84009

Customer Name: TNEI Services Ltd
Customer Address: 7th Floor
West One
UK
NE1 3PA

Issue	Action	Result	Engineer
Internal preamp cable wires broken from bulkhead.	Rewired.	Tested OK.	Rebecca Thomas
MK: 172 showing no readings.	New 0171A fitted.	Tested OK.	Rebecca Thomas

Engineer: R. Thom

Date: 26 October 2023

We hope that you are satisfied with the service you have received from Cirrus Research plc.
If you have any concerns, would like further information or have any feedback do not hesitate to contact us.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: support@cirrusresearch.com

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201431**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Outdoor Kit Calibration Information

Instrument information

Manufacturer:	Cirrus Research plc
Model:	CK:675
Preamp Model	MK:172
Microphone Serial Number	2026
Primary Calibration Certificate Number	201431

Summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
This information is in addition to the primary calibration certificate for the sound level meter. The calibration certificate number is shown above and should be used in conjunction with this additional information.

The sound level meter detailed above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the standards to which the instrument has been designed.

All calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

The microphone capsule was calibrated using an electrostatic calibration system to produce the frequency response and a reference acoustic source for the final sensitivity testing.

In addition to the calibration of the complete sound level meter in its standard configuration, (instrument, MV:200 series preamplifier and microphone capsule), the sound level meter and microphone capsule were tested with the MK:172 preamplifier in place of the MV:200 series.

The sound level meter, G078532 , has been tested with Outdoor Microphone/Preamplifier Type MK:172 Serial Number 2026 and conforms to the requirements of the standards stated in the instrument user manual.

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201431**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G078532	
Class:	1	
Firmware version:	3.2.3254	

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

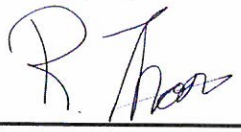
CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201432**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:



Octave-band filter : IEC 61260:1995

Instrument information

Manufacturer:	Cirrus Research plc
Model:	CR:171B
Serial number:	G078532
Class:	1
Firmware version:	3.2.3254

Notes:

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61260:1995.

The filter submitted for testing successfully completed the Relative Attenuation test of IEC 61260 for the environmental conditions under which the test was performed.

Notes

It provides traceability of measurement to the SI system of units and/or to units of measurement realised at a recognised national metrology institute. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

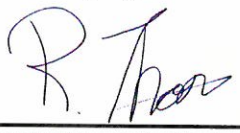
CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201430**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:



Third-octave-band filter : IEC 61260:1995

Instrument information

Manufacturer:	Cirrus Research plc
Model:	CR:171B
Serial number:	G078532
Class:	1
Firmware version:	3.2.3254

Notes:

Test summary

Date of calibration: 25 October 2023

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61260:1995.

The filter submitted for testing successfully completed the Relative Attenuation test of IEC 61260 for the environmental conditions under which the test was performed.

Notes

It provides traceability of measurement to the SI system of units and/or to units of measurement realised at a recognised national metrology institute. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **11 October 2023** CERTIFICATE NUMBER **201433**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 211155D

Calibration procedure

Date of calibration: 11 October 2023

Open circuit: 43.9 mV/Pa

Sensitivity at 1 kHz: -27.2 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 99.94 kPa

Temperature: 23.4 °C

Humidity: 54.7 %

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **26 October 2023** CERTIFICATE NUMBER **201434**

Cirrus Research
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
R.Thomas
Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:515

Serial number: 78219

Class: 1

Notes:

Test summary

Date of calibration: 25 October 2023

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed by Laboratoire National d'Essais (LNE), PhysikalischTechnische Bundesanstalt (PTB) and APPLUS (APPLUS).

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Cirrus Research plc

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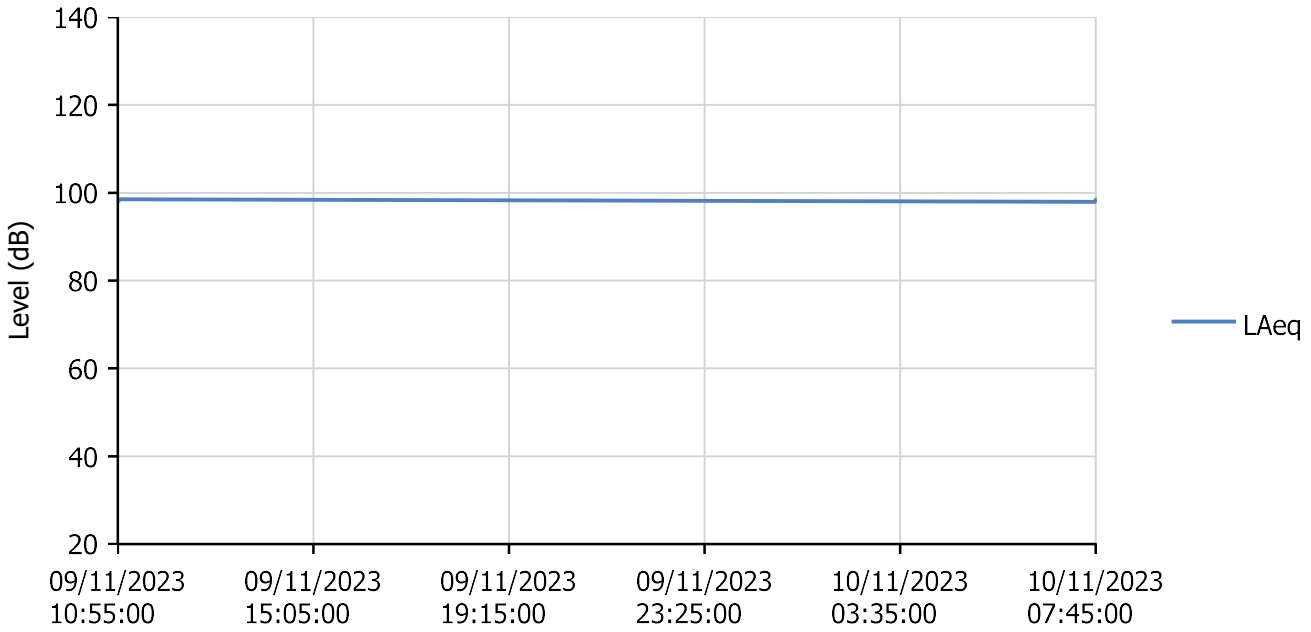
Measurement List Report

Name Burner (Side) @ 1m
Start Time 09/11/2023 10:55:00
End Time 10/11/2023 07:46:00

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	10/11/2023 10:05:32	Offset	0.14 dB



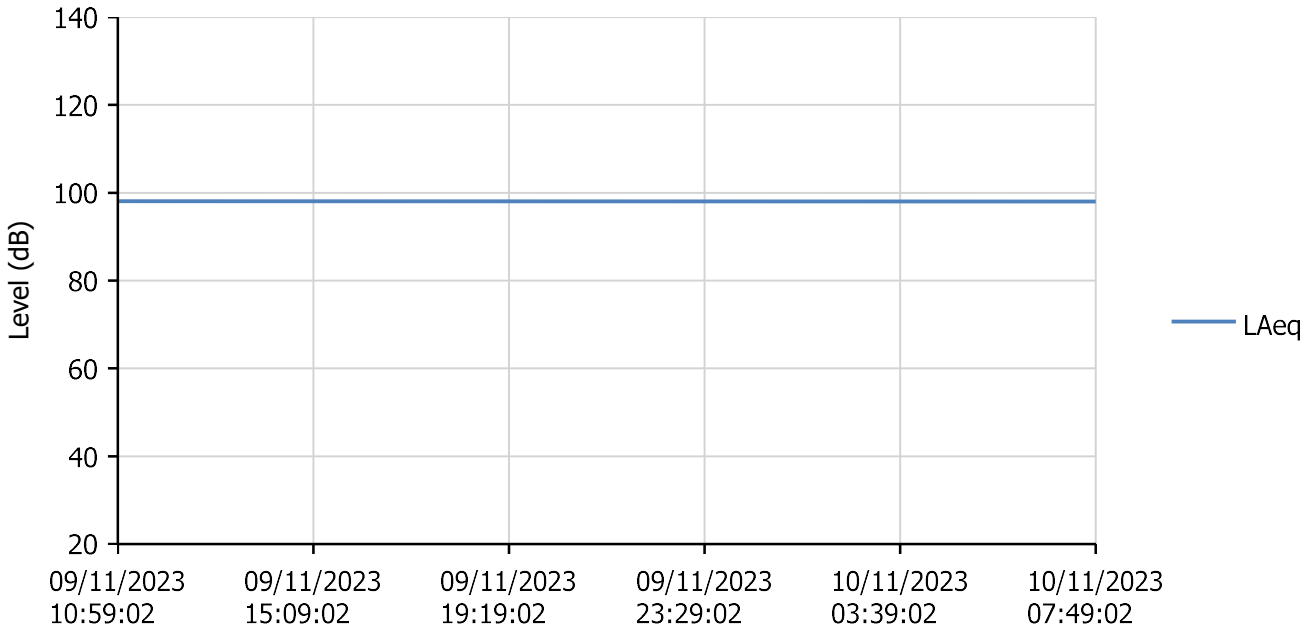
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 10:55:00	09/11/2023 10:56:00	00:01:00	98.1
09/11/2023 10:56:59	09/11/2023 10:57:59	00:01:00	98.5
10/11/2023 07:43:40	10/11/2023 07:44:40	00:01:00	97.9
10/11/2023 07:45:00	10/11/2023 07:46:00	00:01:00	98.5

ReportId

Measurement List Report

Name Burner (End) @ 1m
Start Time 09/11/2023 10:59:02
End Time 10/11/2023 07:49:40

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	10/11/2023 09:07:18	Offset	-0.20 dB



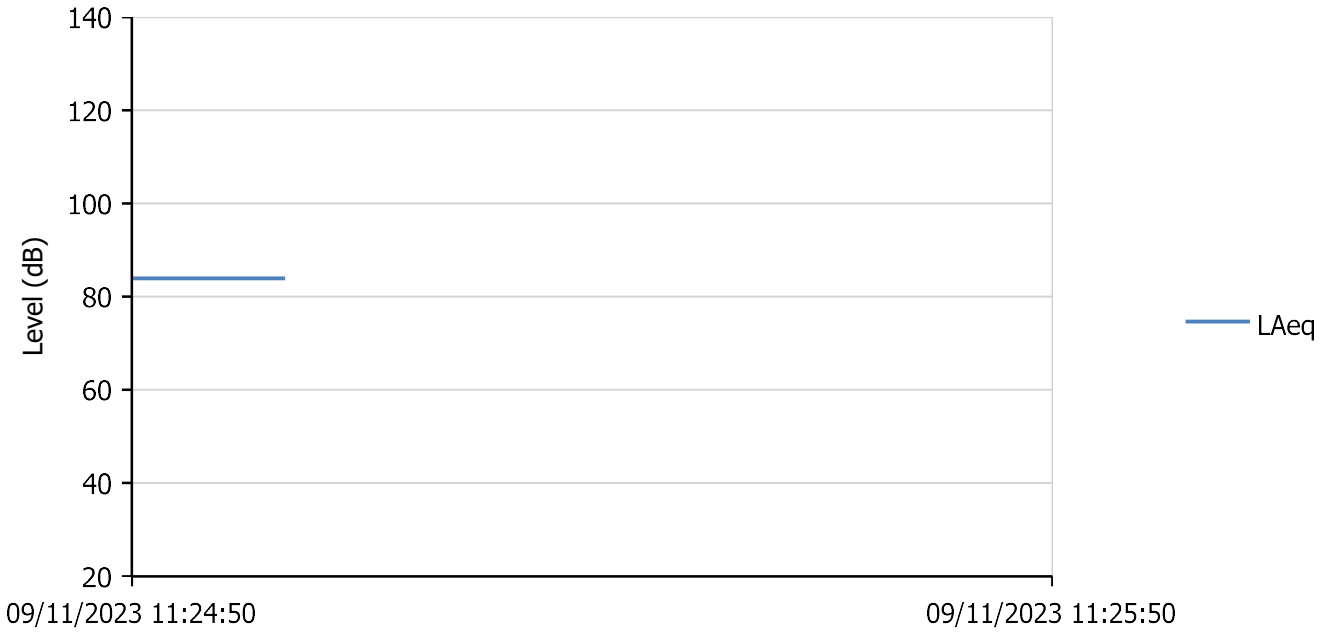
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 10:59:02	09/11/2023 11:00:02	00:01:00	98.1
10/11/2023 07:48:40	10/11/2023 07:49:40	00:01:00	98.0

ReportId

Measurement List Report

Name Dryer Elevator @ 1m
Start Time 09/11/2023 11:24:50
End Time 09/11/2023 11:25:50

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	09/11/2023 13:03:58	Offset	-0.48 dB



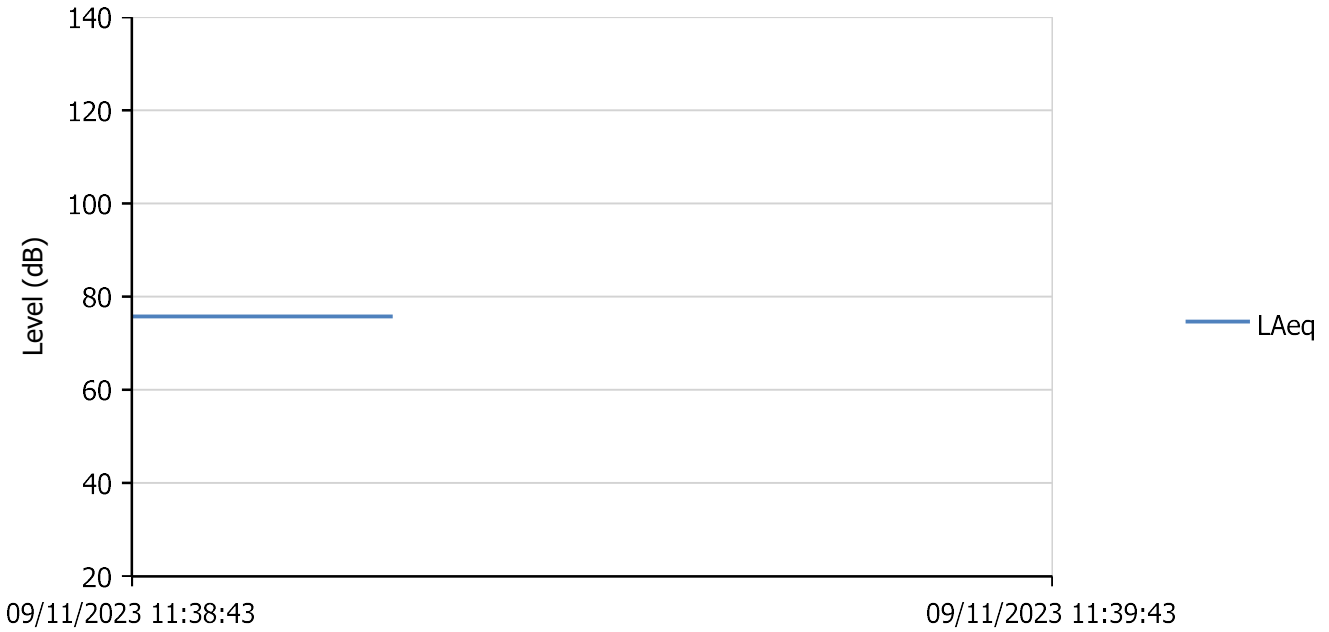
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 11:24:50	09/11/2023 11:25:50	00:01:00	83.9

ReportId

Measurement List Report

Name Dryer Input Conveyor @ 1m
Start Time 09/11/2023 11:38:43
End Time 09/11/2023 11:39:43

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	09/11/2023 13:03:58	Offset	-0.48 dB



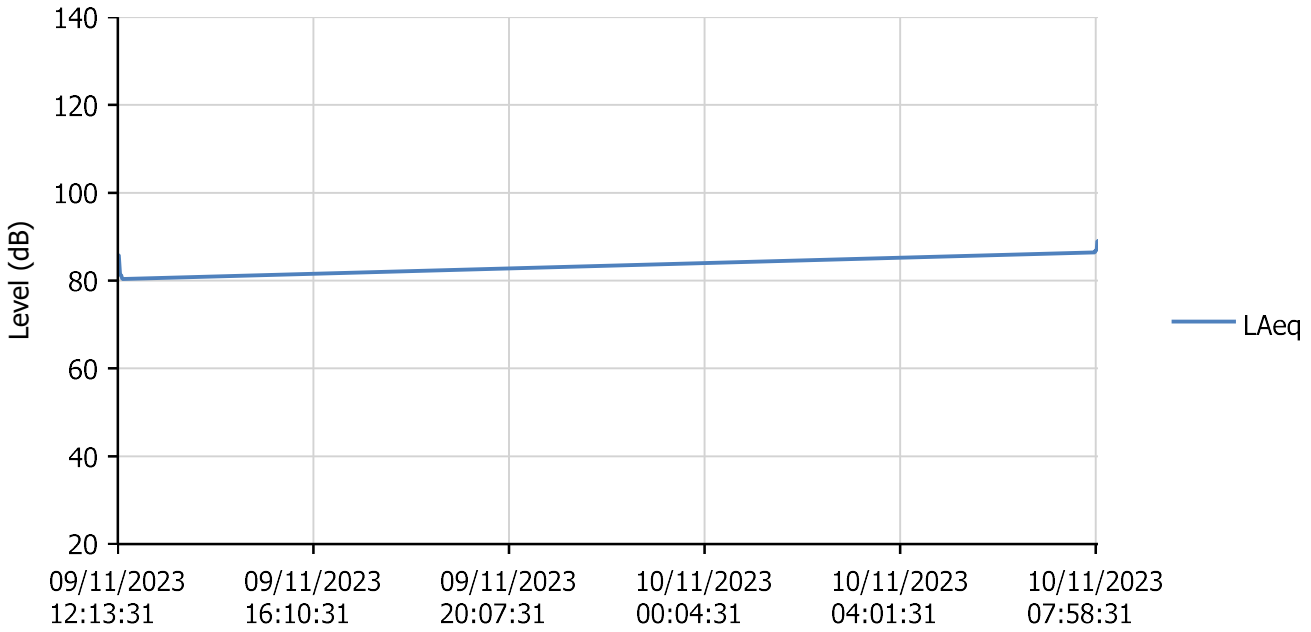
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 11:38:43	09/11/2023 11:39:43	00:01:00	75.8

ReportId

Measurement List Report

Name Exhaust Fan @ 1m
Start Time 09/11/2023 12:13:31
End Time 10/11/2023 08:01:09

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	10/11/2023 09:07:18	Offset	-0.20 dB



Start Time	End Time	Duration	LAeq (dB)
09/11/2023 12:13:31	09/11/2023 12:14:31	00:01:00	85.8
09/11/2023 12:16:19	09/11/2023 12:17:19	00:01:00	81.3
09/11/2023 12:18:52	09/11/2023 12:19:52	00:01:00	80.3
10/11/2023 07:56:06	10/11/2023 07:57:06	00:01:00	86.5
10/11/2023 07:58:21	10/11/2023 07:59:21	00:01:00	86.9

ReportId

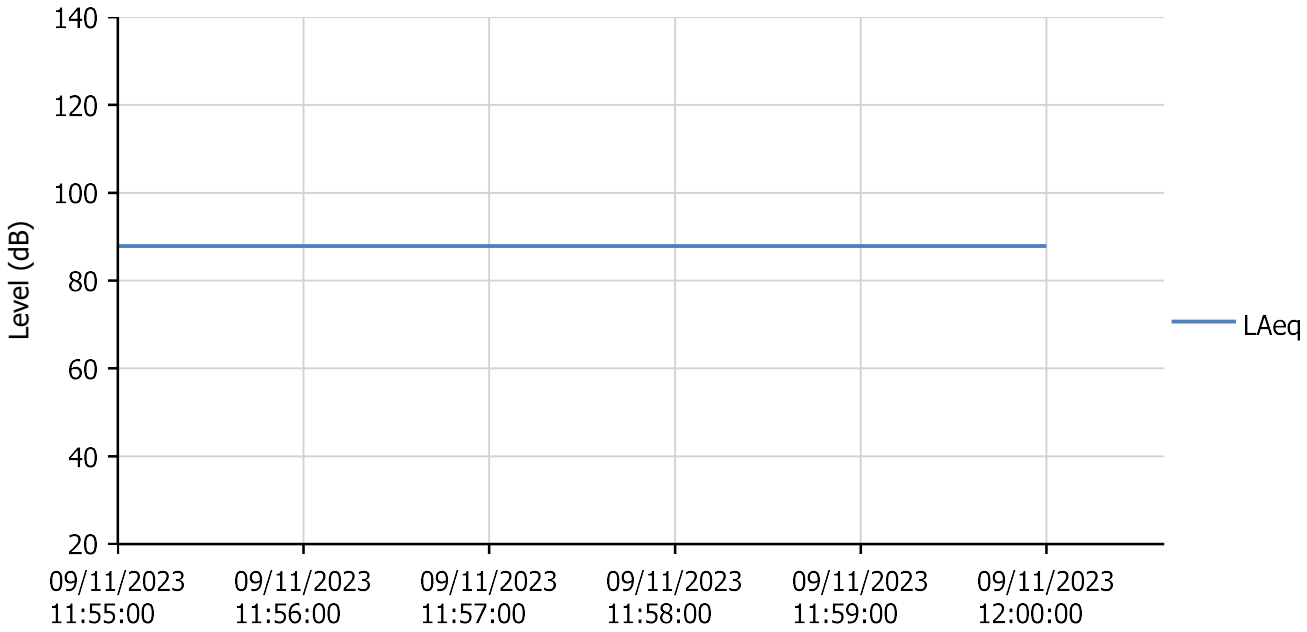
10/11/2023 08:00:09	10/11/2023 08:01:09	00:01:00	89.1

ReportId

Measurement List Report

Name Fibre Blower @ 1m
Start Time 09/11/2023 11:55:00
End Time 09/11/2023 12:00:38

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	09/11/2023 13:03:58	Offset	-0.48 dB



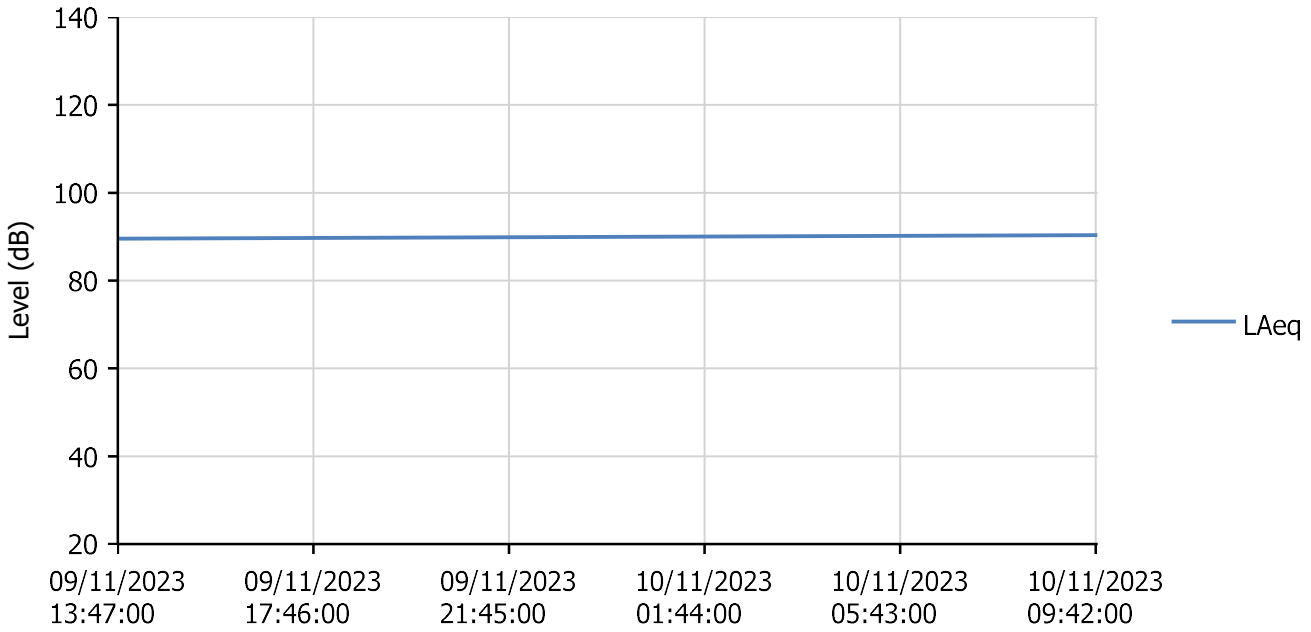
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 11:55:00	09/11/2023 11:56:00	00:01:00	87.8
09/11/2023 11:59:38	09/11/2023 12:00:38	00:01:00	87.9

ReportId

Measurement List Report

Name Hot Water Pump @ 1m
Start Time 09/11/2023 13:47:00
End Time 10/11/2023 09:44:18

Calibration Before	09/11/2023 13:03:58	Offset	-0.48 dB
Calibration After	10/11/2023 10:05:11	Offset	-0.15 dB



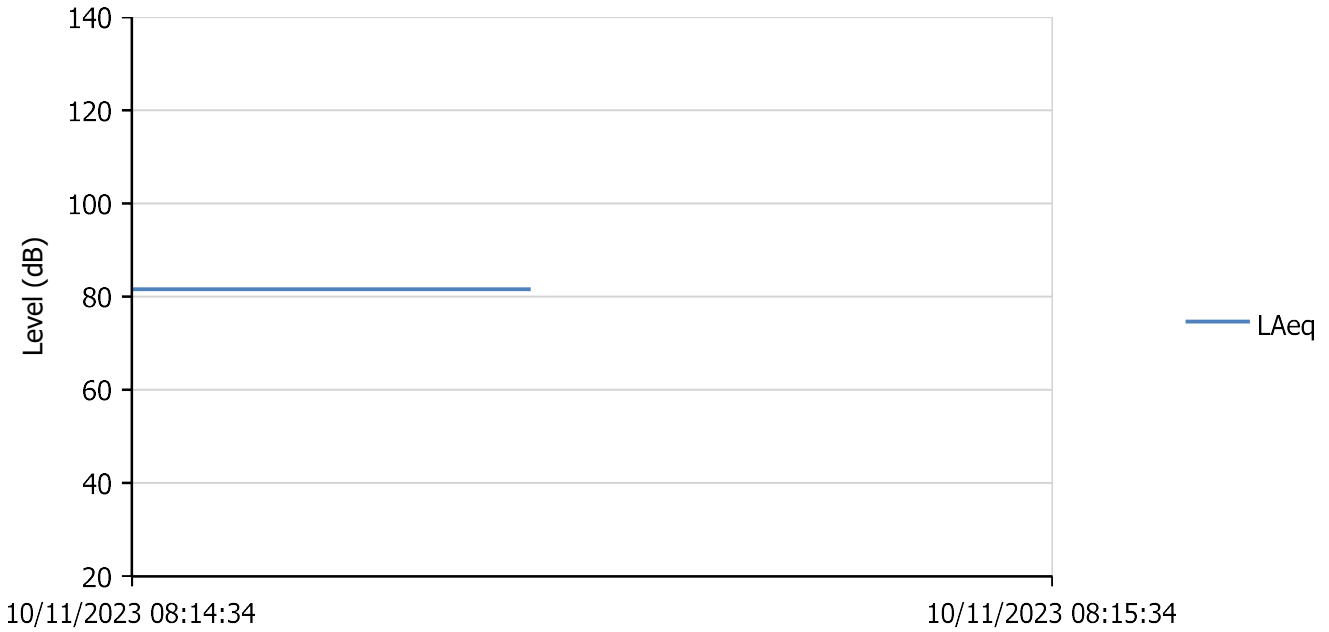
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 13:47:00	09/11/2023 13:48:00	00:01:00	89.5
10/11/2023 09:43:18	10/11/2023 09:44:18	00:01:00	90.3

ReportId

Measurement List Report

Name Bitumen Pump @ 1m
Start Time 10/11/2023 08:14:34
End Time 10/11/2023 08:15:34

Calibration Before	10/11/2023 07:42:31	Offset	-0.73 dB
Calibration After	10/11/2023 09:07:18	Offset	-0.20 dB



Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:14:34	10/11/2023 08:15:34	00:01:00	81.6

ReportId

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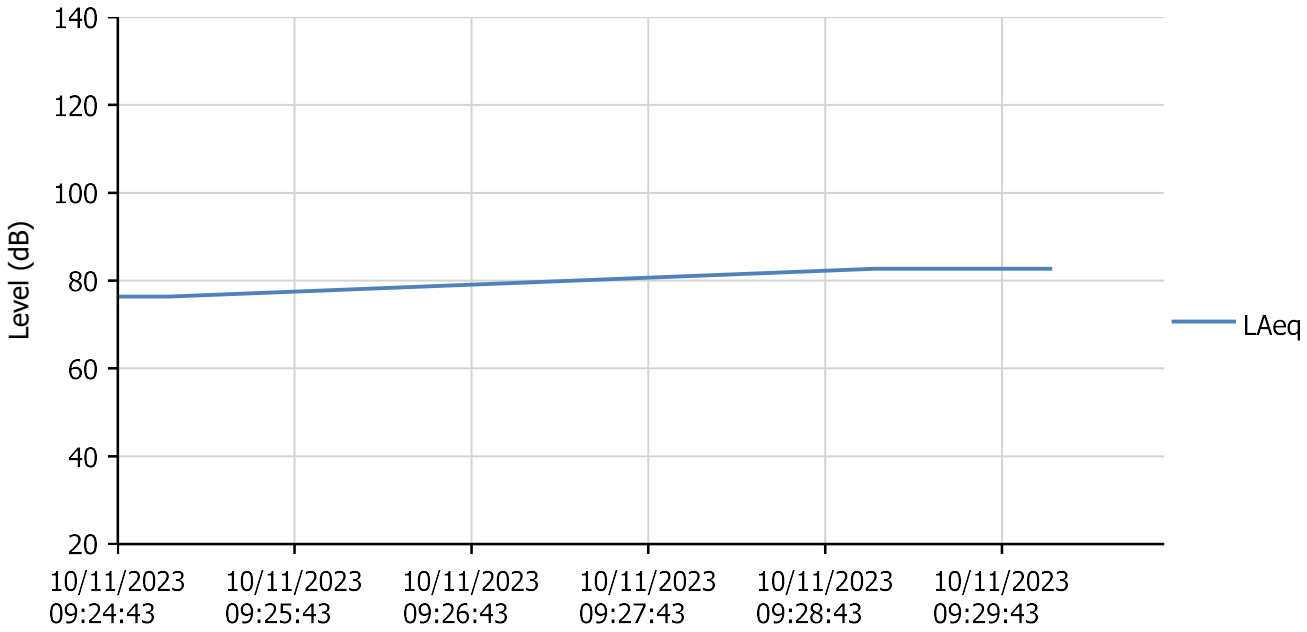
Measurement List Report

Name Input Hopper Conveyor @ 1.5m
Start Time 10/11/2023 09:24:43
End Time 10/11/2023 09:30:38

Calibration Before	10/11/2023 07:42:59	Offset	0.34 dB
Calibration After	10/11/2023 10:05:11	Offset	-0.15 dB



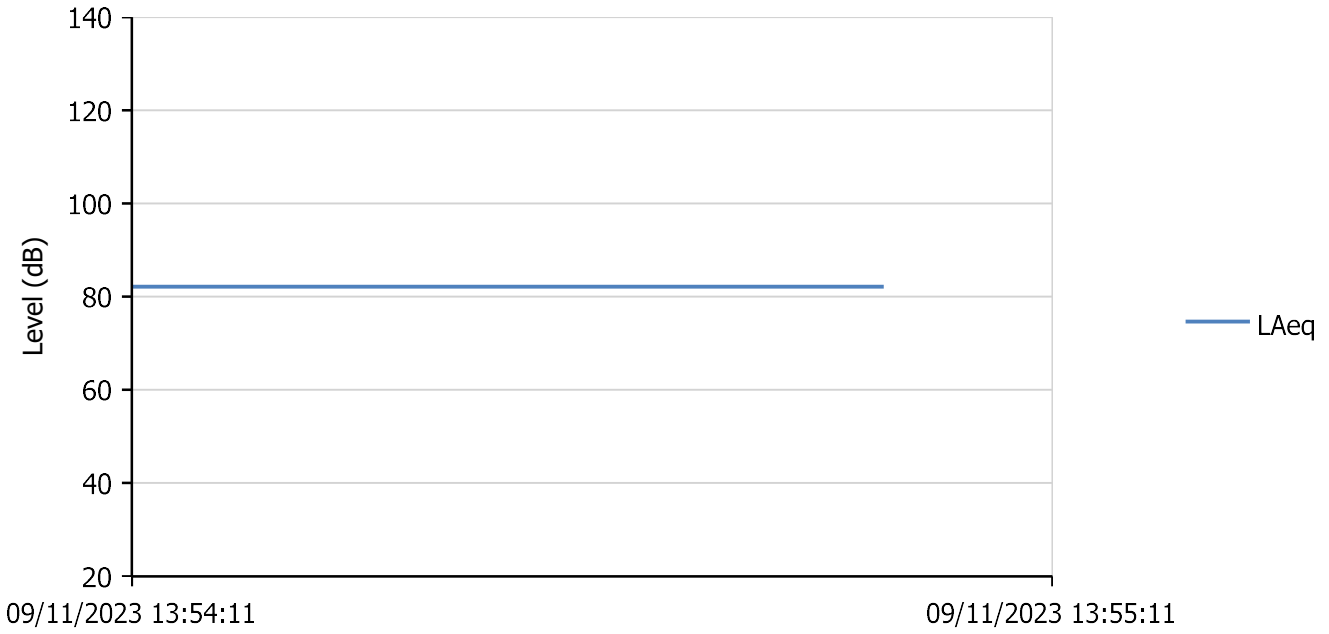
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 09:24:43	10/11/2023 09:25:43	00:01:00	76.3
10/11/2023 09:29:38	10/11/2023 09:30:38	00:01:00	82.7

ReportId

Measurement List Report

Name Mixer Stack - Level 1 - Side A @ 0.5m
Start Time 09/11/2023 13:54:11
End Time 09/11/2023 13:55:11

Calibration Before	09/11/2023 13:03:58	Offset	-0.48 dB
Calibration After	09/11/2023 14:12:59	Offset	-0.38 dB



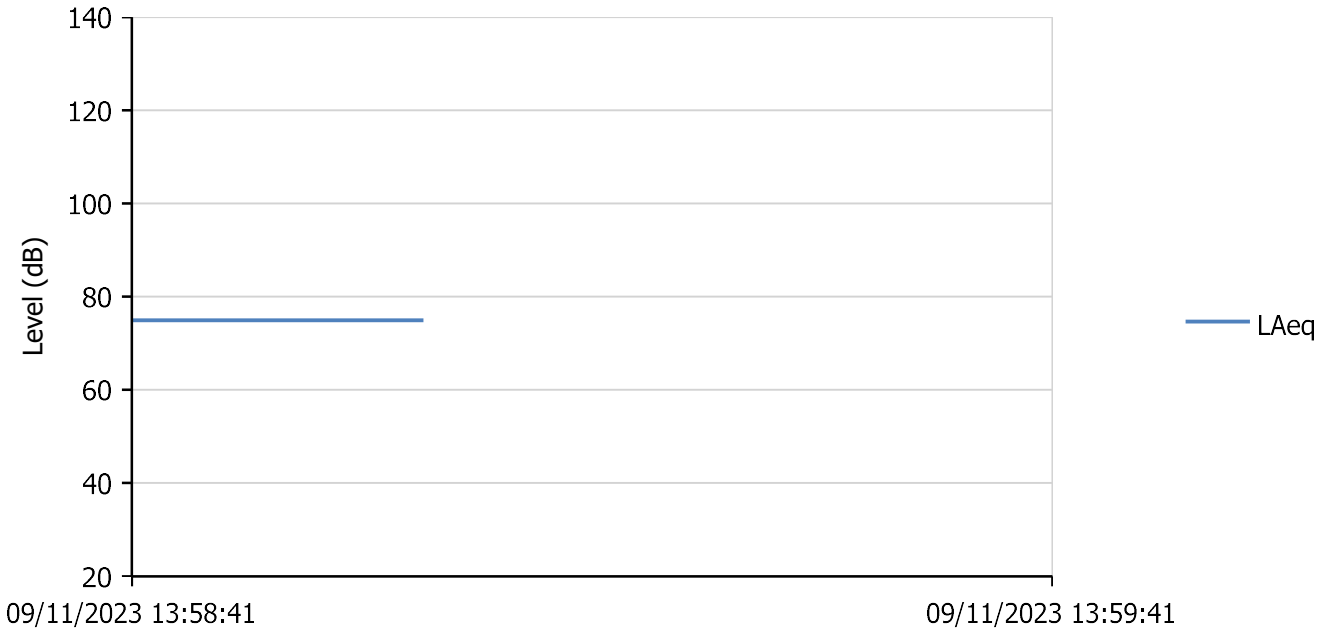
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 13:54:11	09/11/2023 13:55:11	00:01:00	82.2

ReportId

Measurement List Report

Name Mixer Stack - Level 1 - Side B @ 1m
Start Time 09/11/2023 13:58:41
End Time 09/11/2023 13:59:41

Calibration Before	09/11/2023 13:03:58	Offset	-0.48 dB
Calibration After	09/11/2023 14:12:59	Offset	-0.38 dB



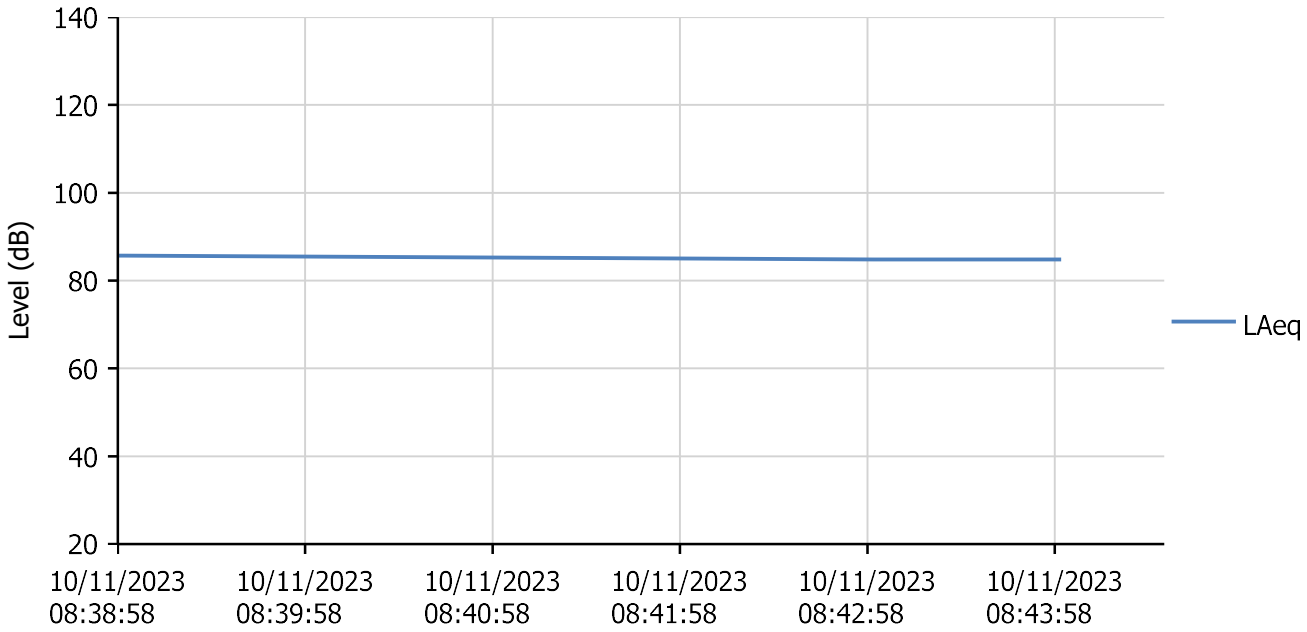
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 13:58:41	09/11/2023 13:59:41	00:01:00	74.9

ReportId

Measurement List Report

Name Mixer Stack - Level 2 @ 0.8m
Start Time 10/11/2023 08:38:58
End Time 10/11/2023 08:44:33

Calibration Before	10/11/2023 07:42:59	Offset	0.34 dB
Calibration After	10/11/2023 10:05:32	Offset	0.14 dB



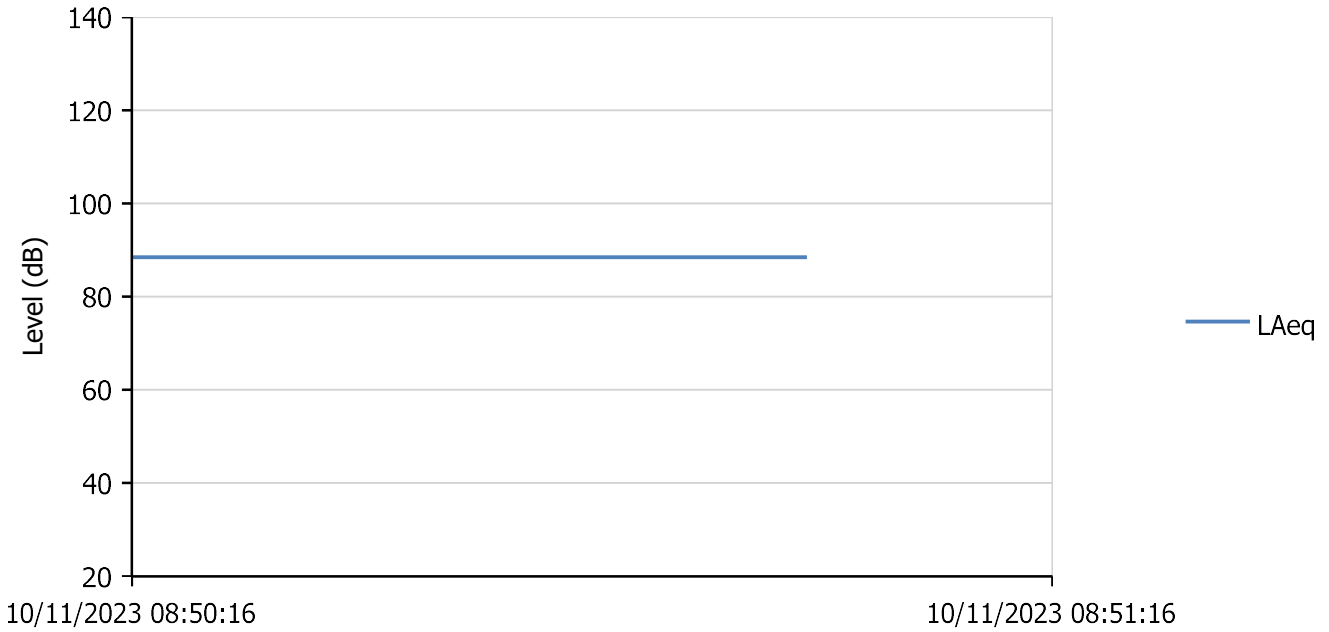
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:38:58	10/11/2023 08:39:58	00:01:00	85.7
10/11/2023 08:43:33	10/11/2023 08:44:33	00:01:00	84.8

ReportId

Measurement List Report

Name Mixer Stack - Level 3 @ 0.45m
Start Time 10/11/2023 08:50:16
End Time 10/11/2023 08:51:16

Calibration Before	10/11/2023 07:42:59	Offset	0.34 dB
Calibration After	10/11/2023 10:05:32	Offset	0.14 dB



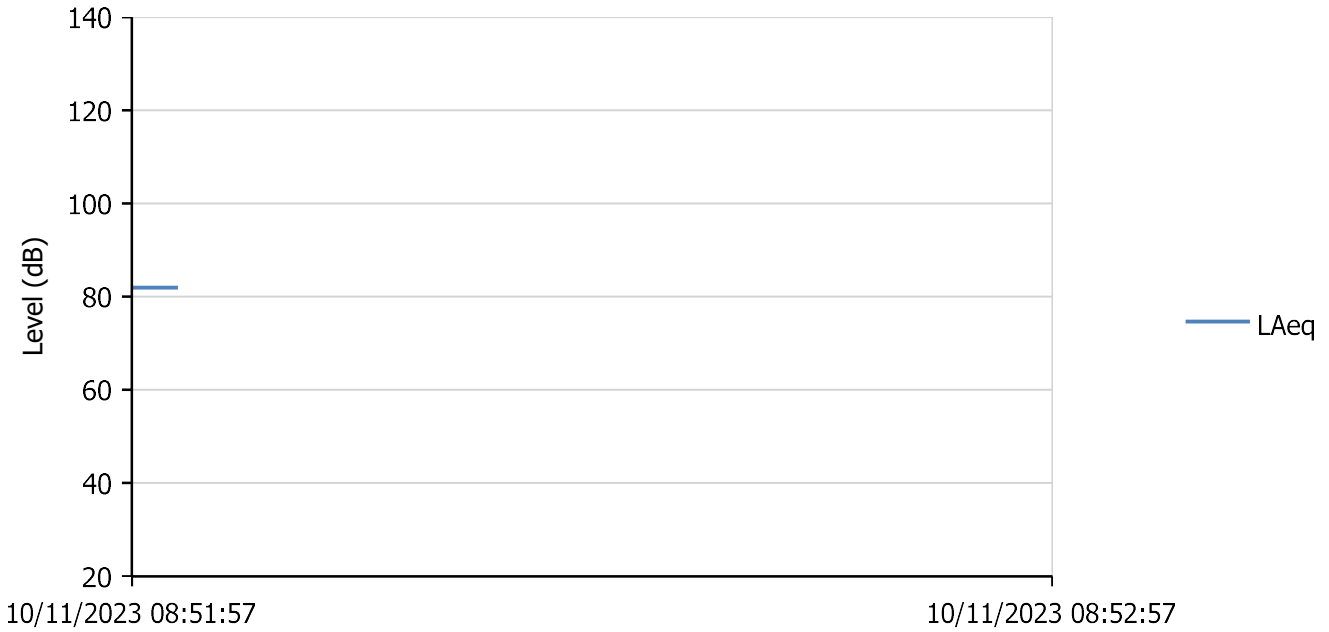
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:50:16	10/11/2023 08:51:16	00:01:00	88.5

ReportId

Measurement List Report

Name Mixer Stack - Level 4 - Side A @ 1.5m
Start Time 10/11/2023 08:51:57
End Time 10/11/2023 08:52:57

Calibration Before	10/11/2023 07:42:31	Offset	-0.73 dB
Calibration After	10/11/2023 09:07:18	Offset	-0.20 dB



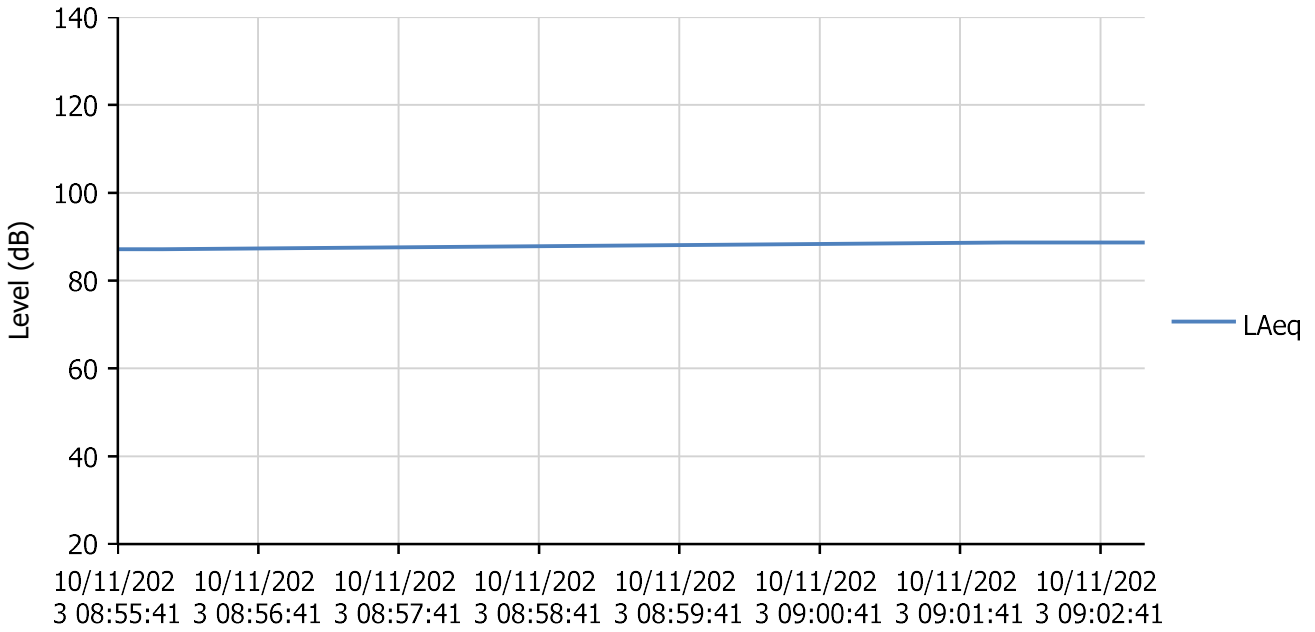
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:51:57	10/11/2023 08:52:57	00:01:00	81.9

ReportId

Measurement List Report

Name Mixer Stack - Level 4 - Side B @ 0.5m
Start Time 10/11/2023 08:55:41
End Time 10/11/2023 09:03:00

Calibration Before	10/11/2023 07:42:59	Offset	0.34 dB
Calibration After	10/11/2023 10:05:32	Offset	0.14 dB



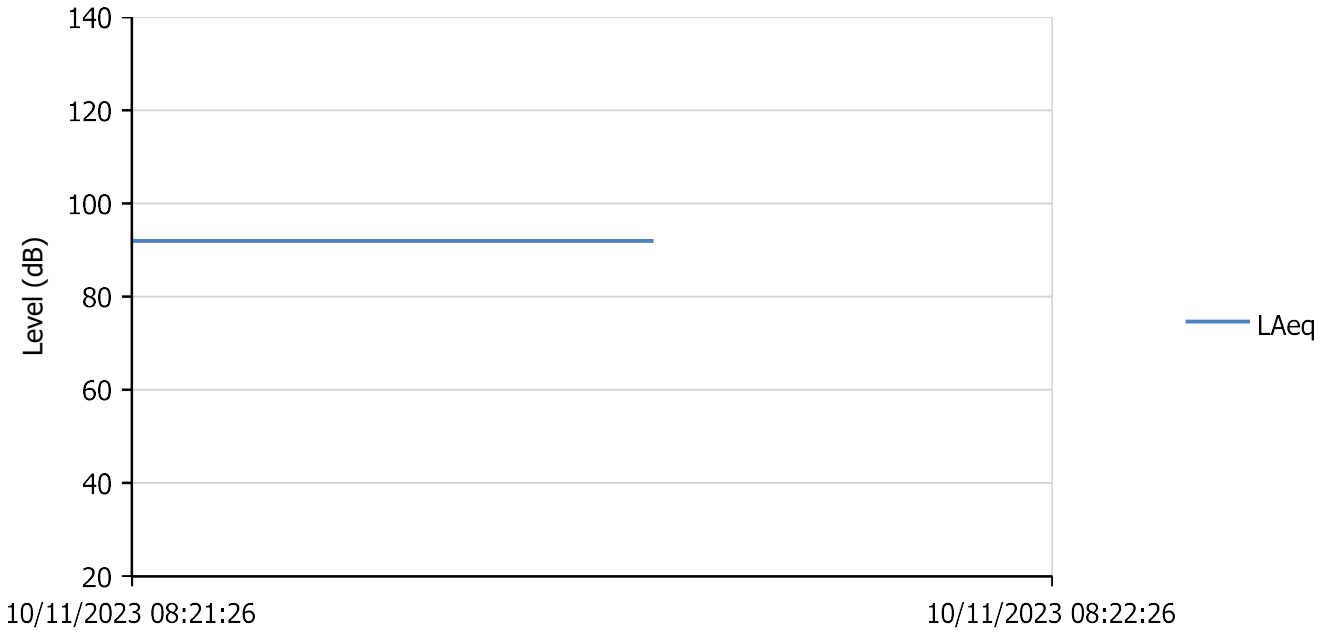
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:55:41	10/11/2023 08:56:41	00:01:00	87.2
10/11/2023 09:02:00	10/11/2023 09:03:00	00:01:00	88.7

ReportId

Measurement List Report

Name Mixer Stack - Level 0 (Ground Level) @ 2m
Start Time 10/11/2023 08:21:26
End Time 10/11/2023 08:22:26

Calibration Before	10/11/2023 07:42:31	Offset	-0.73 dB
Calibration After	10/11/2023 09:07:18	Offset	-0.20 dB



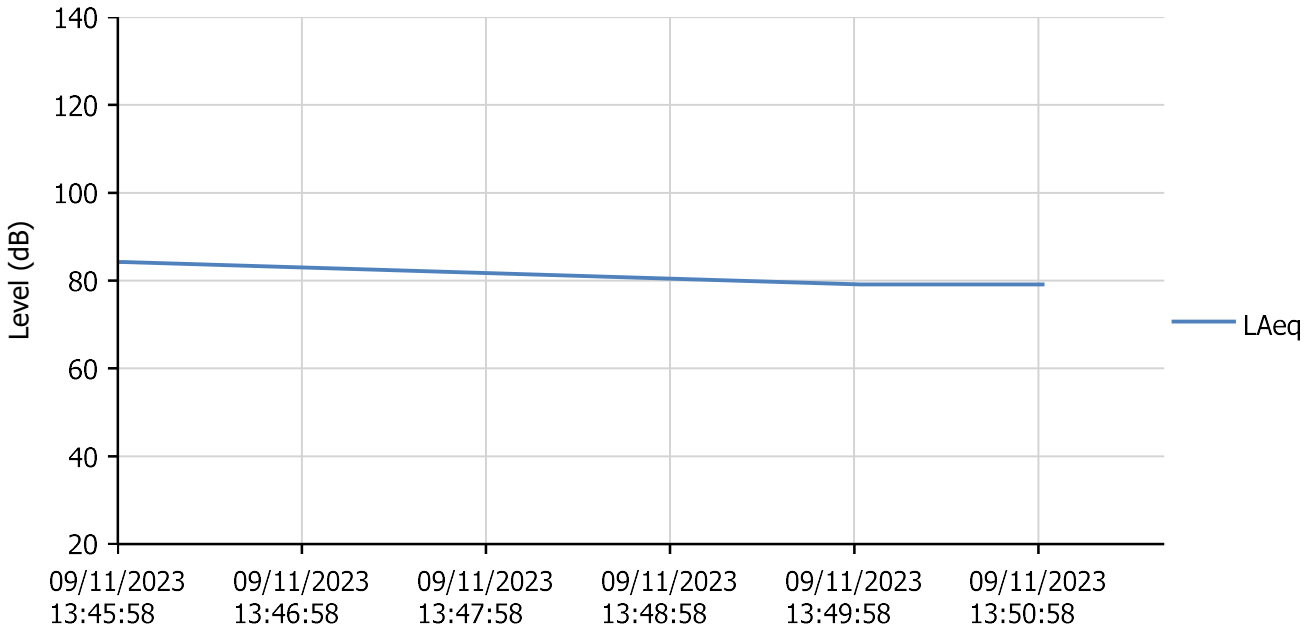
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 08:21:26	10/11/2023 08:22:26	00:01:00	92.0

ReportId

Measurement List Report

Name Output Hopper @ 1m
Start Time 09/11/2023 13:45:58
End Time 09/11/2023 13:51:39

Calibration Before	09/11/2023 13:01:45	Offset	-0.12 dB
Calibration After	09/11/2023 14:15:45	Offset	-0.15 dB



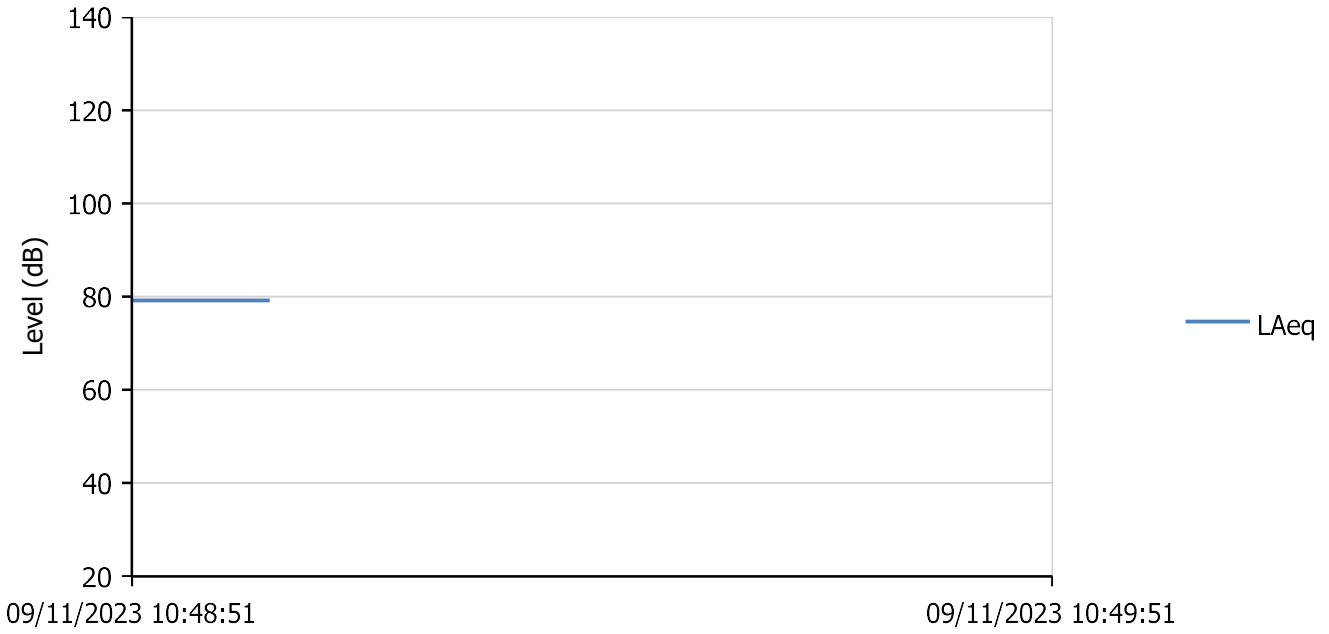
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 13:45:58	09/11/2023 13:46:58	00:01:00	84.2
09/11/2023 13:50:39	09/11/2023 13:51:39	00:01:00	79.2

ReportId

Measurement List Report

Name Rotary Dryer (End) @ 1m
Start Time 09/11/2023 10:48:51
End Time 09/11/2023 10:49:51

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	09/11/2023 13:03:58	Offset	-0.48 dB



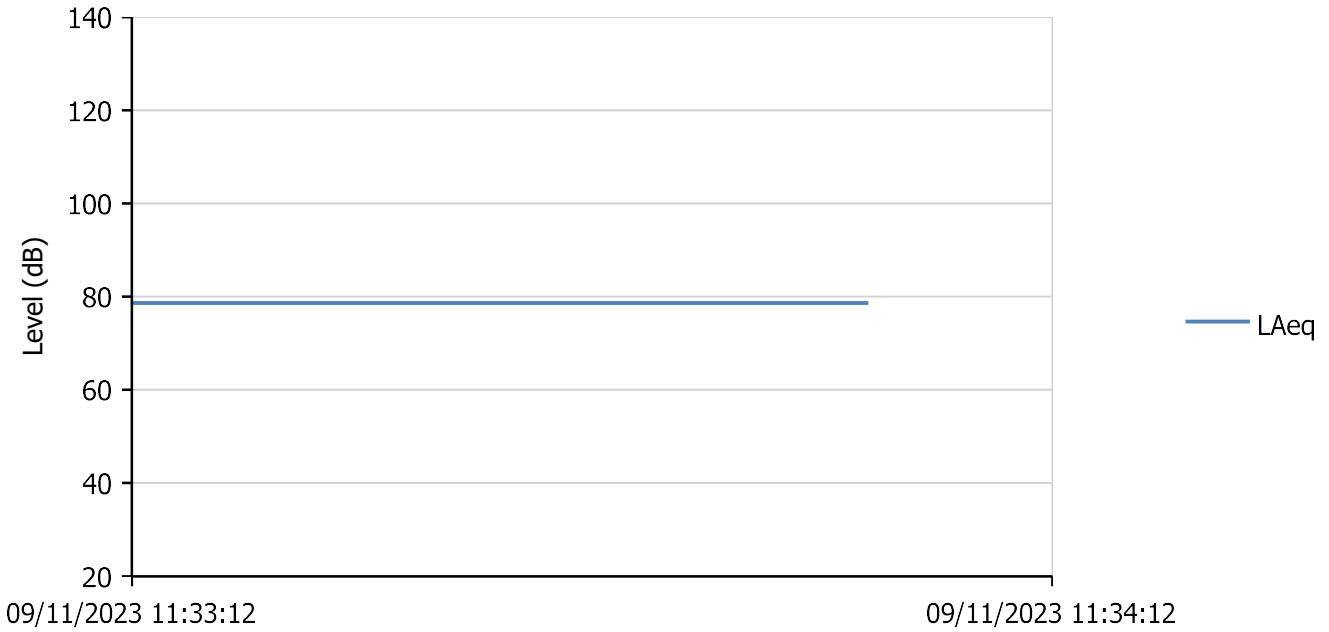
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 10:48:51	09/11/2023 10:49:51	00:01:00	79.2

ReportId

Measurement List Report

Name Rotary Dryer (Side) @ 2.5m
Start Time 09/11/2023 11:33:12
End Time 09/11/2023 11:34:12

Calibration Before	09/11/2023 10:44:36	Offset	-0.31 dB
Calibration After	09/11/2023 13:03:58	Offset	-0.48 dB



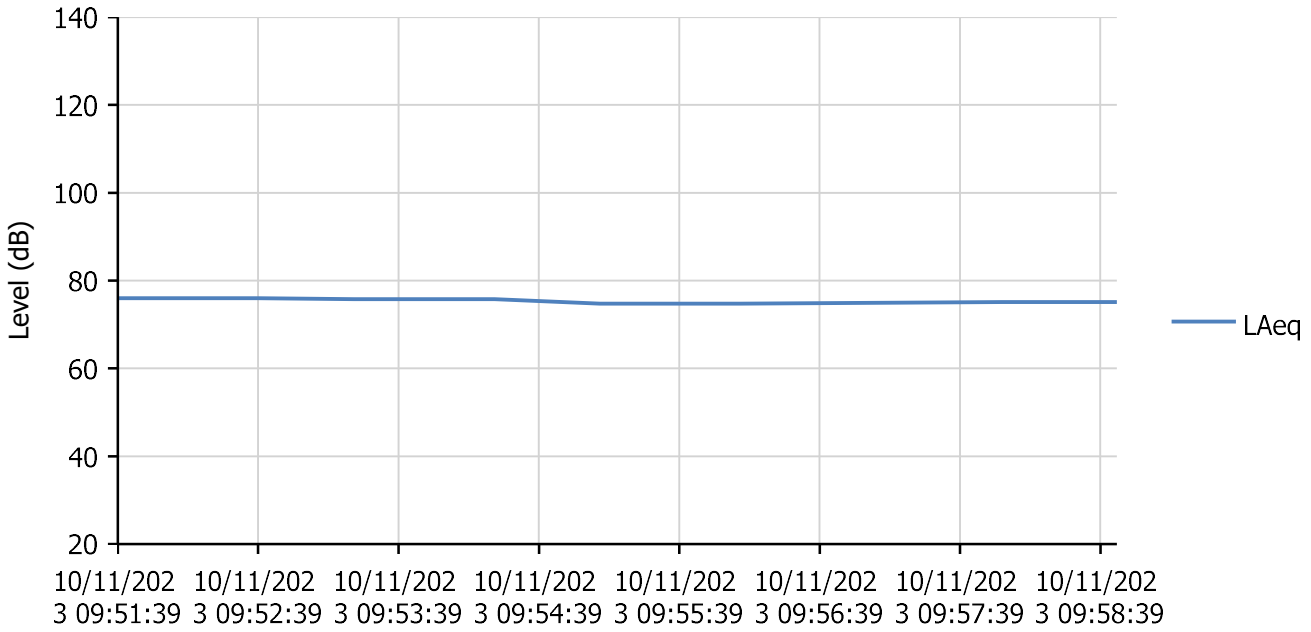
Start Time	End Time	Duration	LAeq (dB)
09/11/2023 11:33:12	09/11/2023 11:34:12	00:01:00	78.7

ReportId

Measurement List Report

Name CAT972M Loader @ 1m
Start Time 10/11/2023 09:51:39
End Time 10/11/2023 09:58:46

Calibration Before	10/11/2023 09:07:18	Offset	-0.20 dB
Calibration After	10/11/2023 10:05:11	Offset	-0.15 dB



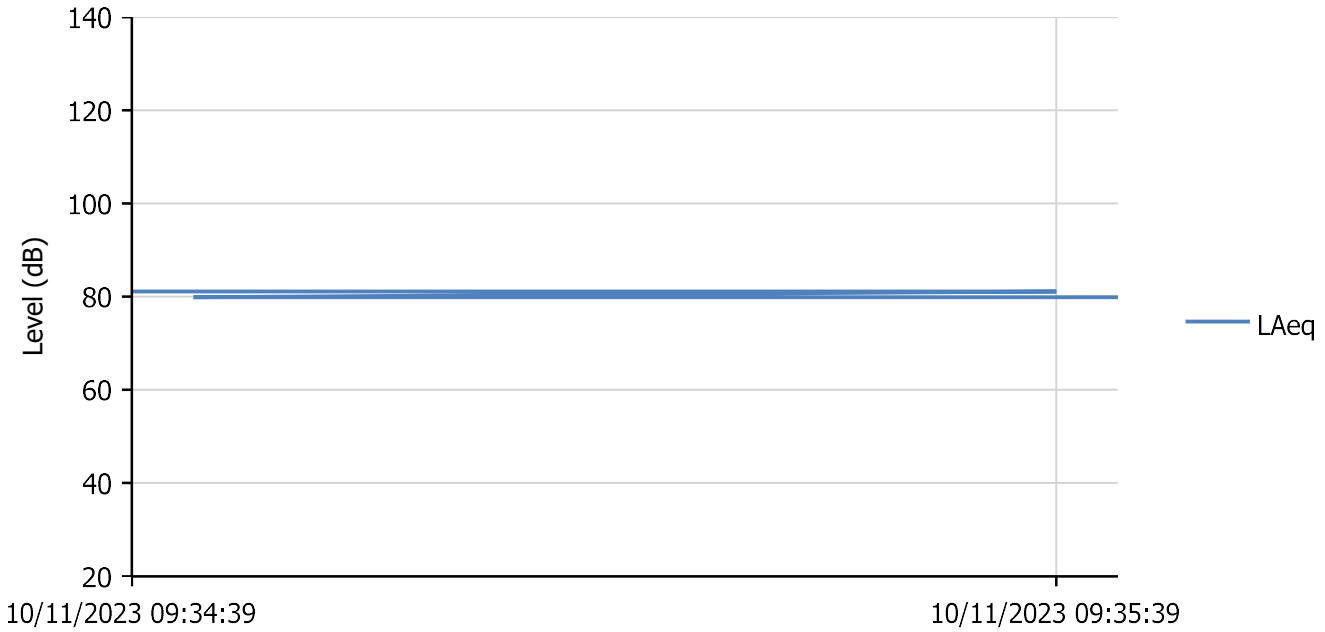
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 09:51:39	10/11/2023 09:52:39	00:01:00	76.0
10/11/2023 09:53:20	10/11/2023 09:54:20	00:01:00	75.8
10/11/2023 09:55:05	10/11/2023 09:56:05	00:01:00	74.8
10/11/2023 09:57:57	10/11/2023 09:58:46	00:00:49	75.1

ReportId

Measurement List Report

Name HGV @ 1m
Start Time 10/11/2023 09:34:39
End Time 10/11/2023 09:35:43

Calibration Before	10/11/2023 09:07:18	Offset	-0.20 dB
Calibration After	10/11/2023 10:05:32	Offset	0.14 dB



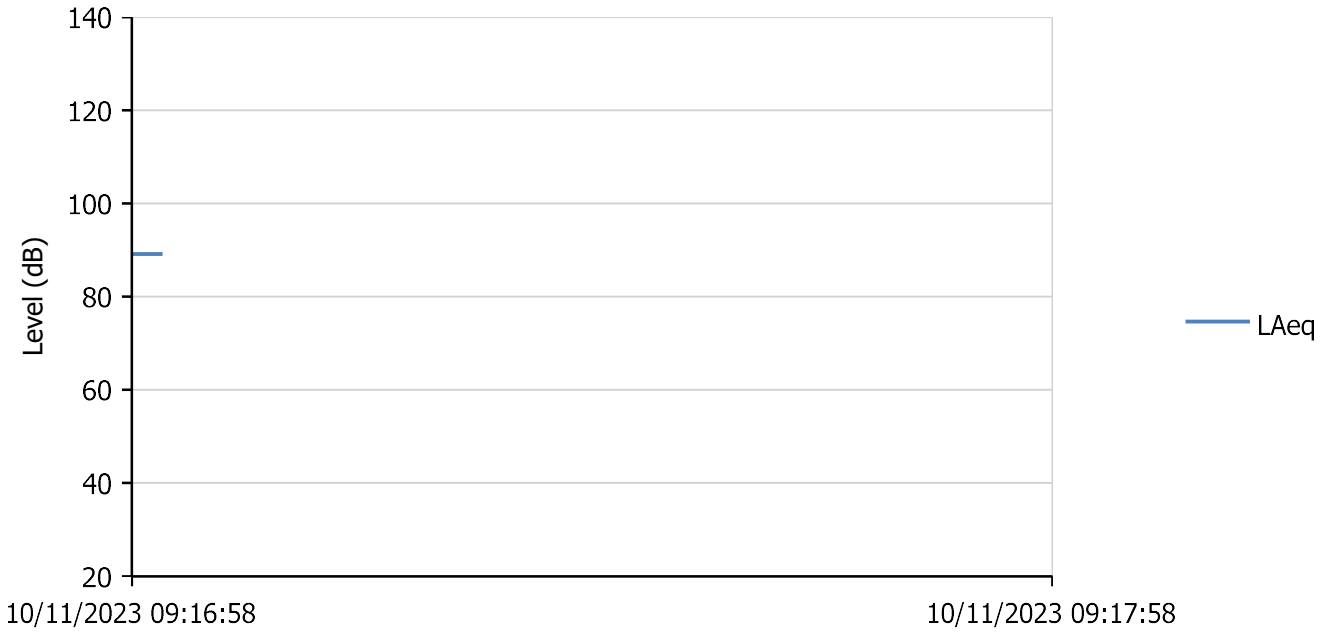
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 09:34:39	10/11/2023 09:35:39	00:01:00	81.1
10/11/2023 09:34:43	10/11/2023 09:35:43	00:01:00	79.9

ReportId

Measurement List Report

Name Water Tanker Pump @ 1m
Start Time 10/11/2023 09:16:58
End Time 10/11/2023 09:17:58

Calibration Before	10/11/2023 09:07:18	Offset	-0.20 dB
Calibration After	10/11/2023 10:05:11	Offset	-0.15 dB



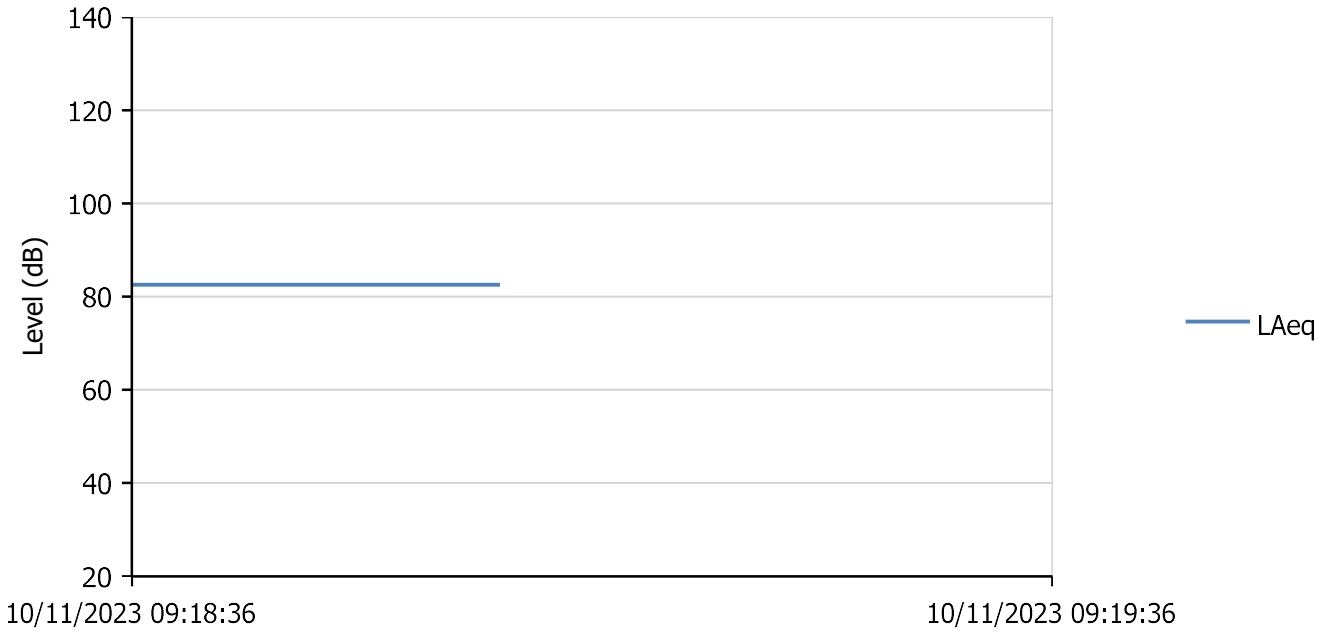
Start Time	End Time	Duration	LAeq (dB)
10/11/2023 09:16:58	10/11/2023 09:17:58	00:01:00	89.2

ReportId

Measurement List Report

Name Water Tanker Tractor @ 1m
Start Time 10/11/2023 09:18:36
End Time 10/11/2023 09:19:36

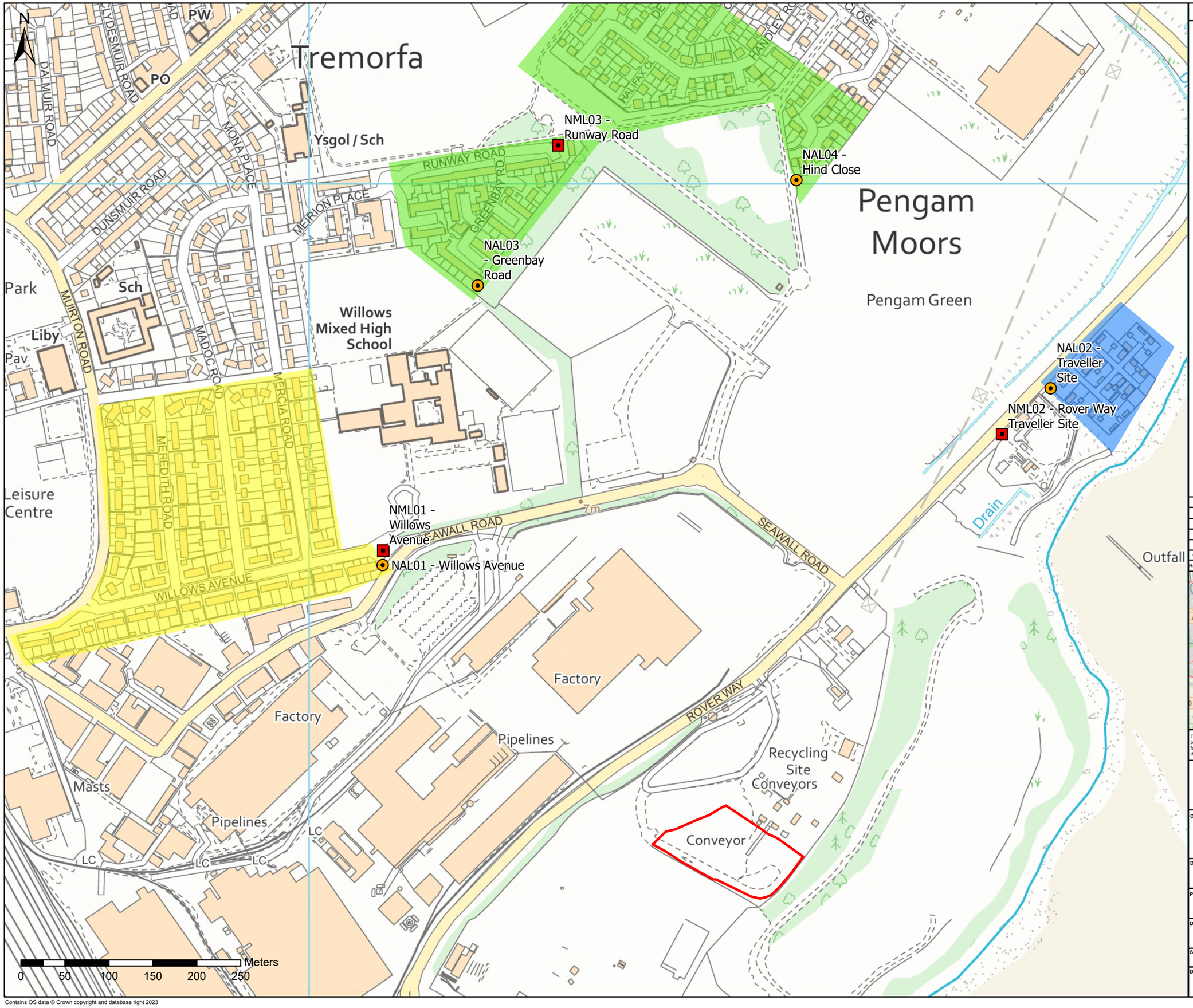
Calibration Before	10/11/2023 09:07:18	Offset	-0.20 dB
Calibration After	10/11/2023 10:05:11	Offset	-0.15 dB



Start Time	End Time	Duration	LAeq (dB)
10/11/2023 09:18:36	10/11/2023 09:19:36	00:01:00	82.6

ReportId

Appendix C – Figures



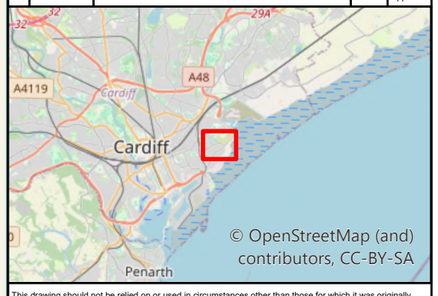
LEGEND

- Site Boundary
- Noise Assessment Locations (NALs)
- 2021 Noise Monitoring Locations (NMLs)

Nearest Noise Sensitive Receptors (NSRs)

- NSRs represented by NML01
- NSRs represented by NML02
- NSRs represented by NML03

Rev.	Date	Amendment Details	Drawn	Approved
0	12/01/2024	FIRST ISSUE	MT	JS



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Client
HARSCO

Drawing Status:
FOR INFORMATION

Project Title:
STEELPHALT NIA

Drawing Title:
FIGURE 1 - NOISE SENSITIVE RECEPTORS

Scale:	Original Size:	Spatial Reference:
1:4,000	A3	British National Grid

Drawing Number:
16195-002

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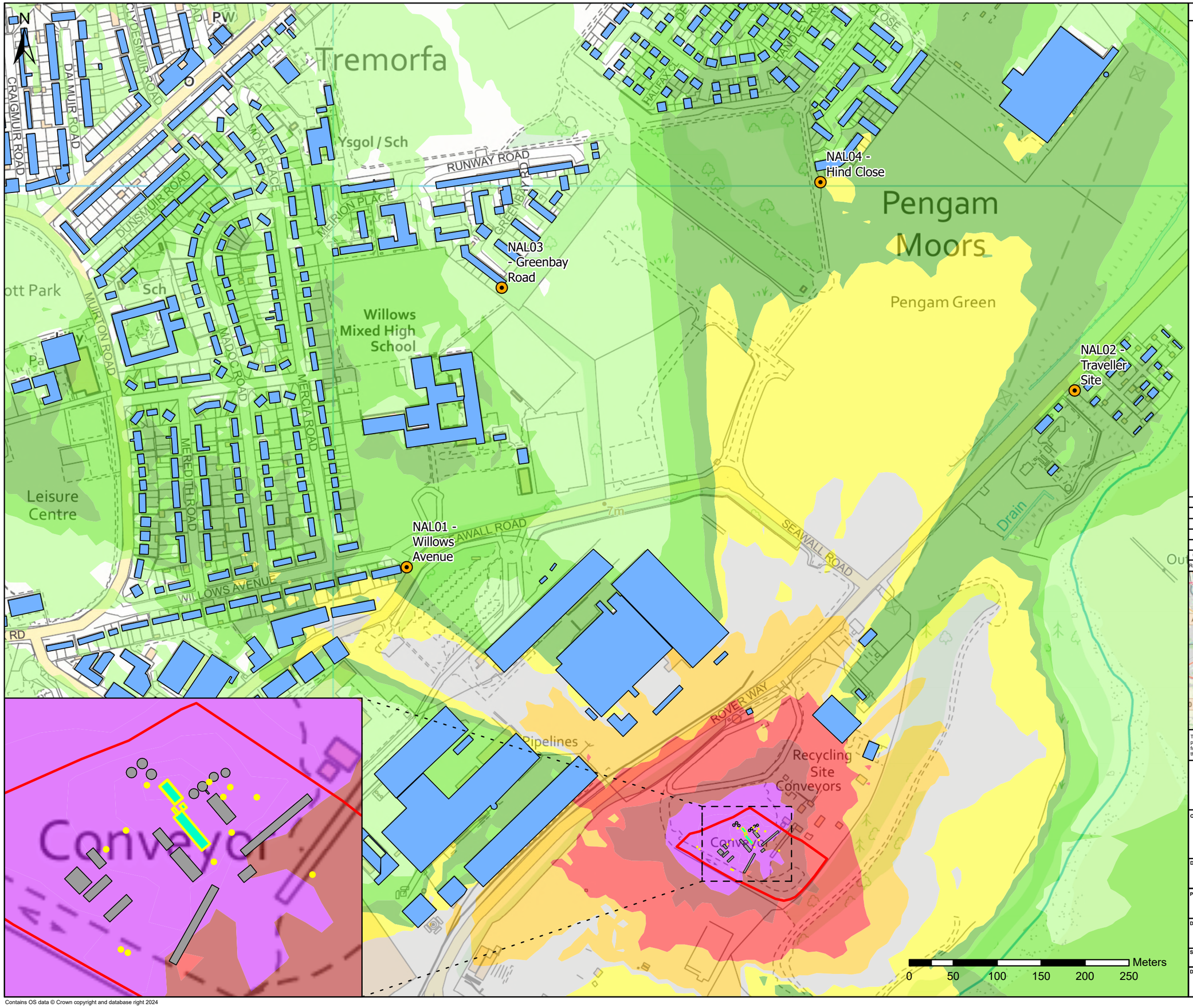


LEGEND

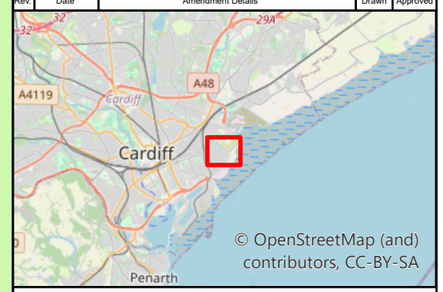
- Site Boundary
- Noise Assessment Locations (NALs)
- Noise Sources (Point Sources)
- Noise Sources (Vertical Area Sources)
- Noise Sources (Area Sources)
- Modelled Buildings (On-site)
- Modelled Buildings (Off-site)

Predicted Noise Level (dBA)

- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- >70

Noise contours modelled in accordance with ISO 9613 Part 2:1996 at a height of 4 m and displayed on a 10 m by 10 m grid.
All noise sources assumed to be operating concurrently.
All levels shown as dB LAeq(t).

Rev.	Date	Amendment Details	Drawn	Approved
0	12/01/2024	FIRST ISSUE	MT	JS



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Client: HARSCO

Drawing Status: FOR INFORMATION

Project Title: STEELPHALT NIA

Drawing Title: FIGURE 2 - NOISE CONTOUR PLOT

Scale:	Original Size:	Spatial Reference:
1:4,000	A3	British National Grid

Drawing Number: 16195-003

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