Ardagh Metals Wrexham

Noise Assessment

2026

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Quality Management

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1 Introduction

Project Background

Element Environmental were commissioned to undertake a noise assessment for the Ardagh Metals Wrexham site. The assessment will assess any impact from the increases operations within the facility on nearby residential properties.

Approach to noise assessment

The existing levels of noise have been quantified through a noise measurement survey to establish the site noise levels and the noise levels at the closest receptor location surrounding the site. The operational processes noise emission levels were obtained from measurements taken around the works. This data was subsequently used to predict operational noise levels at the façade location of the nearest dwellings using CadnaA environmental noise modelling software. The façade noise level of the facility has been increased by 3dB to provide a worst case scenario due to the additional equipment being installed. The results of the assessment based on measured and predicted values have been compared to relevant national guidance. If required, indications of the typical mitigation measures which may be required to achieve an acceptable internal noise climate will be provided.

Site description

The site is located in a mixed industrial area with some residential property's close to the works boundary . The work is approximately 90m from the closest residential dwelling on Coed Abden road.

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2 Assessment criteria

The following relevant guidance documents were considered whilst undertaking this assessment.

Guidance documents

The following relevant guidance documents were considered whilst undertaking this assessment.

Planning Policy Wales, describes the planning development policies of the Welsh Assembly Government. Chapter 13 of the policy "*Minimising and Managing Environmental Risks and Pollution"* sets out the policy objectives with regard to noise from new development; this is summarised in paragraph 13.15.1 of the document:

> *"Noise can be a material planning consideration, for example in proposals to use or develop land near an existing source of noise or where a proposed new development is likely to generate noise. Local planning authorities should make a careful assessment of likely noise levels and have regard to any relevant Noise Action Plan before determining such planning applications and in some circumstances it will be necessary for a technical noise assessment to be provided by the developer."*

The introduction of **Technical Advice Note (Wales) 11: 1997 'Noise' (TAN11)** states:

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

TAN11 provides the following information:

- it indicates how noise issues should be handled in development plans and development control;
- outlines ways of mitigating the adverse impact of noise;
- provides specific guidance on noisy and noise-sensitive development;
- introduces the use of noise exposure categories; and
- guidance on the use of planning conditions relating to noise.

The TAN11 guidance introduces the concept of Noise Exposure Categories (NEC), which has been derived to assist local planning authorities in their consideration of planning applications for residential development near transport-related noise sources. The NEC procedure is only applicable for the introduction of a new residential development into an area with an existing noise source. Annex 1 of TAN11 provides guidance on various types of noise sources, which includes road traffic, aircraft and railways.

For reference, the recommended NEC for new dwellings near existing sources is provided in Table 1. Note that these noise categories are based upon measurements taken in an open site (i.e. without any proposed noise attenuating features in place).

The level at the boundary of NEC A and NEC B is based on guidance provided by the World Health Organisation (WHO) health criteria from 1999, which states that *"general daytime outdoor noise levels of less than 55 dB(A) L_{eq} are desirable to present any significant community annoyance"*.

The night time noise level at the boundary of NEC A and NEC B is also based upon the WHO health criteria, stating *"based on limited data available, a level of less than 35 dB(A) L_{eq} is recommended to*

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preserve the restorative process of sleep". A level of 30 dB(A) is also recommended in BS8233 for bedrooms.

Table 1 provides an interpretation of the TAN11 NEC categories in terms of granting planning permission.

Table 1: TAN11 NEC categories

NEC category	Description	Noise range $L_{Aeq,T}$ dB
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.	<55 dB(A) daytime (16hr) <45 dB(A) night-time (8hr) Road, rail and mixed sources
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.	55-63 dB(A) daytime (16hr) 45-57 dB(A) night-time (8hr) Road and mixed sources
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.	63-72 dB(A) daytime (16hr) 57-66 dB(A) night-time (8hr) Road and mixed sources
D	Planning permission should normally be refused.	>72 dB(A) daytime (16hr) >66 dB(A) night-time (8hr) Road and mixed sources

In applying these noise exposure categories, TAN11 states:

"where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3 dB(A) above the recommended levels. In other cases, a reduction of up to 3 dB(A) may be justified."

British Standard 4142:2014+A1:2019

This British Standard describes a method for rating and assessing sound levels of an industrial and/or commercial nature, and the effects the sound may have on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

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The sound from the industrial/commercial source is rated by taking into account the sound level of the source, known as the specific sound level, and its characteristics, such as tonal, impulsive or intermittency of the source, and applying an appropriate correction to give the rating level of the sound source.

Tonality

For sound ranging from not tonal to prominently tonal a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be conceded to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 3 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be conceded 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.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

To gain an initial estimate of the potential impacts of the sound source, its rating level is compared to the background sound level (L_{A90}), and the level by which it exceeds the background sound level indicates the following potential impacts:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

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c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) 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.

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.
In terms of establishing the rating level, corrections for the noise character has to be taken into consideration.

British Standard 8233:2014

BS 8233:2014 provides guidance on internal ambient levels that should be achieved within different spaces, of dwellings for day and night-time. These largely agree with the noise levels recommended by the WHO below. An extract from BS 8233 is provided in **Table 2**.

Table 2: BS 8233:2014 – Indoor ambient noise levels for dwellings

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

In terms of levels in areas used for external amenity space BS 8233:2014 states the following:

'...it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited'

World Health Organisation 'Noise Guidelines' 2018

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Sections of the Guideline Values table presented in the 1999 WHO document *Guidelines for Community Noise*[1] which are referenced in this 2018[2] publication as still being valid are indicated as:

50-55 dB $L_{Aeq,(16\ Hour)}$ in outdoor living environments during day and evening periods;

35 dB $L_{Aeq,\ (16\ Hour)}$ in indoor living areas during day and evening periods;

30 dB $L_{Aeq,\ (8\ Hour)}$ in bedrooms during the night time period;

60 dB $L_{AFMax\ (8\ Hour)}$ outside bedrooms during the night time period; and

45 dB $L_{AFMax\ (8\ Hour)}$ in bedrooms during the night time period

[1] Berglund *et al*. (1999) - *Guidelines for Community Noise*. Geneva, World Health Organisation (WHO)

[2] WHO (2018) - *Noise Guidelines for the European Region*, World Health Organisation (WHO)

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3 Noise survey

Survey details

Noise measurements were collected on the 31st March and 1st April 2026 using the equipment listed in **Table 3** at the position shown in **Figure 1**.

Table 3: Noise survey equipment

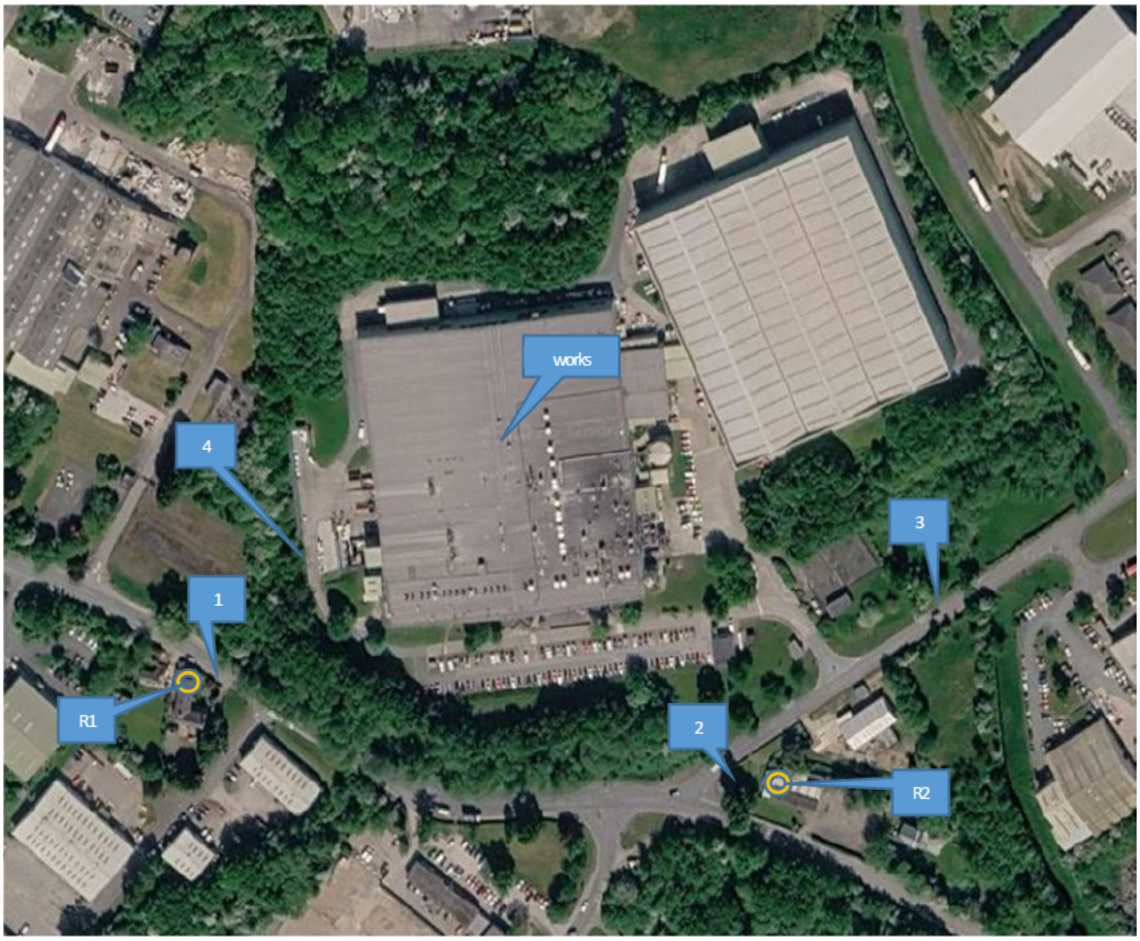
Item	Manufacturer	Model	Serial Number	Cal due Date
Sound Level Meter	Brüel and Kjær	2270	3027566	June 2026
Sound Level Meter	Brüel and Kjær	2250	2507239	June 2026
Calibrator	Brüel and Kjær	4231	2588767	June 2027

All the sound measurement equipment was within calibration and the calibration of the sound level meters was checked before and after the survey period, with no significant change in sensitivity observed. Noise source, site boundary and receptor measurements were taken. The source measurements were used to model the impact of the works on the closest receptor positions. Measurements were taken at the boundary of the works adjacent to the closest receptor so adjustments could be made in the model to best represent the noise from the works only.

Weather conditions during the survey were recorded and found to be dry, cool, with occasional light variable winds 0-1m/s and were considered as suitable to undertake reliable measurements.

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Measurement positions – Figure 1: Noise monitoring and receptor positions



Receptor locations assessed in the Cadna noise model

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Figure 2: Background Noise monitoring position



Description of noise climate

Road traffic and general industrial noise were audible and generally dominant, the facility operations were also just audible at receptor locations. Local vehicle movements were the dominant noise source during the measurements. Background position low level industrial noise.

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4 Noise Measurements

Measurement was taken at the boundary of the works where any potential increase in noise levels would be seen from the proposed changes to the works.
Noise levels measured without influence from vehicle movements on the works was 53.2dBL_{Aeq} at the boundary of the works gives a good indication on existing noise levels from the works. A low level low frequency from the works was noted but not the dominant noise in the area. The adjacent factory was the dominant source with a broadband noise emanating from the façade, air vents and roof area of the factory. The low frequency noise evident has the potential to be audible at the closest receptors a low tonal penalty will be applied in the BS4142 assessment.

Table 4: Noise survey boundary measurement position

Position	Description	L_{Aeq} (dB) Day	L_{A90}(dB) Day	L_{Aeq} (dB) Night	L_{A90}(dB) Night
1	Closest residential receptor - Coed Aben Rd.	65.9	50.0	54.6	48.4
2	Residential receptor – Bridge Rd Junction	74.0	57.0	55.6	55.1
3	Site boundary	69.2	53.7	58.0	51.9

Table 5: Noise measurement position on works

Position	Description	L_{Aeq} (dB)Total measurement period	L_{A90} (dB)Total measurement period	L_{Aeq}(dB)Periods with No site traffic	L_{A90}(dB)Periods with No site traffic
4	On site measurement	60.5	52.6	53.2	52.5

The data from the noise measurements can be found in **Appendix B**

5 Noise Modelling

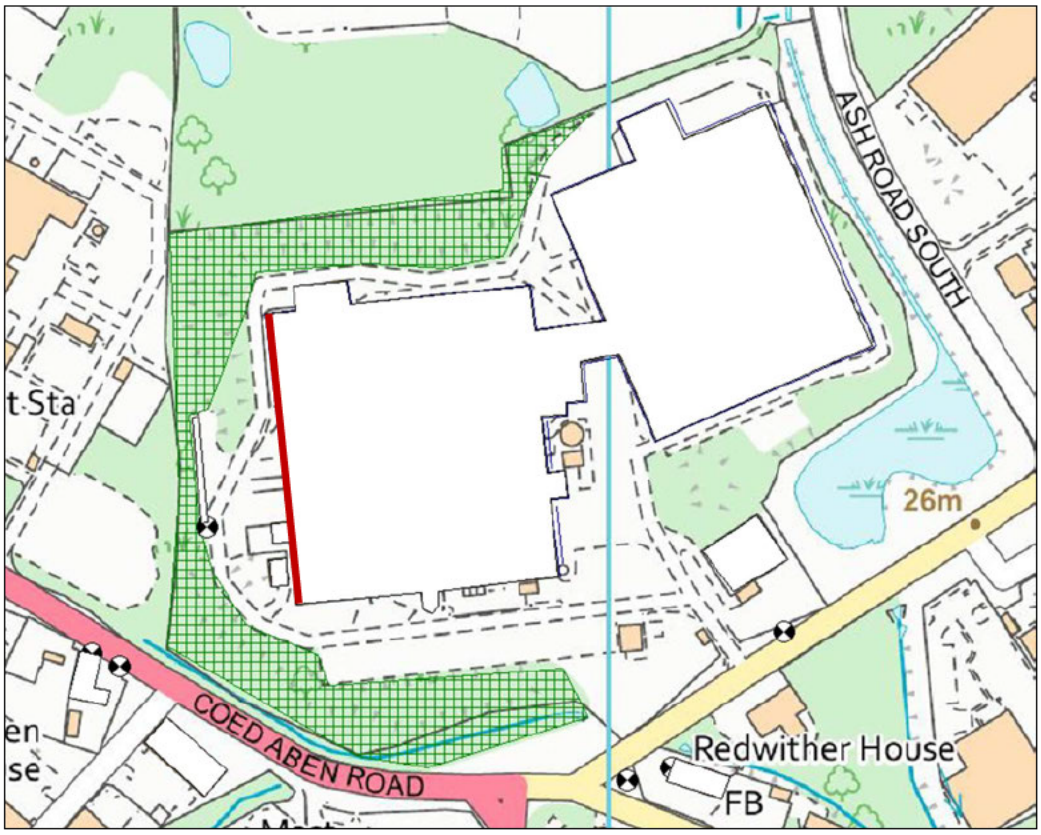
Noise modelling based on the site measurements was undertaken using Datakustik's CadnaA noise propagation software which implements most common national and international acoustic calculation methods as described in International Standard (ISO) 9613. The output of this modelling assessment allows the impact of the site noise to be assessed without the influence of any external noise influences. The impact of the site noise levels affecting the closest receptor facades can also be assessed. The works noise output has been adjusted to be in line with the measured values taken during the site measurement visit.

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A 3D noise model was constructed using the noise measurements taken during the assessment to determine the impact on the noise levels affecting the different façades of nearest residential dwellings.

All major buildings on the works and receptor locations have been included. Any other industrial buildings that could affect the propagation from the works have also been included. Estimation of building heights has been used where no data was available. Obstructions including fences, walls, foliage have been included in the model.

Figure 3: **Façade area with increased internal noise level**



Red line shows area where internal noise levels have been increased by 3dB to represent the additional noise contribution.

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Figure 4: **CadnaA noise contour plot**



Table 6: Predicted noise levels at receptor positions and with additional 3dB factory noise level

Receptor locations	Existing noise Levels at ground floor facades (L_{Ar} dB)	Existing noise Levels at Upper floor facades (L_{Ar} dB)	+3dB factory levels at receptor ground floor facades (L_{Ar} dB)	+3dB factory levels at receptor Upper floor facades (L_{Ar} dB)
R1	48.3	50.2	48.5	50.2
R2	52.6	53.2	52.6	53.2

Model receiver positions heights were 1.5m for ground floor facades and 4m for upper facade

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6 BS4142:2014+A1:2019 Assessment

The assessment incorporates guidance provided in BS 4142:2014+A1:2019, *"Methods for rating and assessing industrial and commercial sound"*. Using the *subjective method* guidance provided in Section 9.2 of BS 4142:2014+A1:2019, the operational noise can be assessed as being tonal and distinctive against the residual sound environment. As tonal noise sources are audible at receptors a rating penalty of +2 dB should be applied to the L_{Ar} level at the assessment location. These corrections are deemed appropriate due to the tonal character of sources from the works being audible above general background levels, at the receptor measurement locations. No significant Intermittency or impulse noise was observed and no corrections are required.

BS 4142:2014+A1:2019 states that the difference between the rating noise level and the background noise level is an indication of the likelihood of the noise from the proposed operational change having an adverse impact on the occupants of the closest residential properties. The assessment in **Table 7 .** is based on the predicted noise levels from the facility and assessments are compared against the background L_{A90} noise level and is considered representative of the current noise environment.

BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature in terms of adverse impact on a noise sensitive receptor. According to BS 4142:2014+A1:2019:

> *"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. Where the rating level does not exceed the background sound level, this is an indication of the specific source having a low impact, depending on the context"*

Table 7: BS 4142:2014+A1:2019 assessment for upper windows

Receptor location	Background Measured L_{A90} (dB) (L_{A90} dB)	Predicted operational receptor level (L_{Ar} dB)	Penalty (tonal) (dBA)	Calculated rating level (dBA)	BS4142 assessment rating level (dBA)
R1	45	50	+2	52	+7
R2	45	53	+2	55	+10

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Using the criteria in BS 4142:2014+A1:2019 for assessing adverse impact **Table 7** indicates that the calculated rating levels at location R1 fall above the +5dB level considered to be the level of *"adverse impact"*, with receptor R2, at +10dB "**is likely to be an indication of a significant adverse impact**"

BS 8233:2014 indicates that 15 dB of attenuation would be expected through a window partially open for ventilation (Annex G.1 of BS 8233:2014). An external rating level **of 50dBA** for receptor R1 would therefore result in internal levels of approximately **35dBA, and 53dBA for R2 would result in 38dBA** which is above the 30dB the criteria stipulated in BS 8233:2014 for good sleeping conditions in bedrooms during the night time (**Table 2**).

TAN 11

In relation to the operational noise predictions, TAN11 requires the daytime and night time noise exposures to be evaluated (mixed sources category) to be below 55 dB LAeq16hr for day noise levels and 45dB LAeq 8hr night levels have to be considered for residential planning.

Table 8: TAN11 assessment

Position	Predicted levels with additional 3dB façade level L_{Aeq}(dB)	TAN11 Category Day	TAN11 Category Night
R1	50	A	B
R2	53	A	B

Table 8 demonstrates that the receptor locations will fall within TAN11 category A during the day and B during night periods. Category B meaning noise should be taken into account when determining residential planning applications and category A meaning noise may need not be considered as a determining factor in granting residential planning permission. No existing developments would be affected in the vicinity of the works.

External noise climate *Outdoor recreation areas – private and communal garden areas*

The propagated noise at ground level associated with the site operation within the front private garden of receptor R1 would be 1dB below the limit of 50 dB L_{Aeq} as recommended by the WHO and BS 8233 for external amenity spaces and receptor R2 would be 3dB above the recommended 50 dB L_{Aeq} . Levels for from gardens were predicted to be well below 50dB from the facility.

Uncertainty

Where possible, uncertainty in this assessment has been minimised and measurement have been taken during calm ground level conditions. The works is located in an area where there will be significant off site variability in noise levels due to the close proximity of major roads and other industrial units. Wind direction and general air movement can significantly influence the measured noise levels at the closest receptor locations. To remove the significant uncertainty in assessing the

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relative impact on the closest receptor positions from offsite measurements the dominant noise sources were assessed on the works and modelled using CadnaA noise modelling software. All measurements have been taken during calm weather to reduce the measurement uncertainty.

Uncertainty in the calculated impact has been reduced by the use of source measurement and predictive calculation in accordance with ISO 9613-2:1996.

7 Summary

A noise impact assessment has been undertaken for the Ardagh Metals facility in Wrexham to ascertain the noise impact on nearby residential receptors due to increased factory capacity.

The noise impact from the Ardagh facility on the closest receptor positions around the works have been assessed using the output of the model predictions. These predictions are based on the site source measurements taken on the works during full operation. The predicted levels were assessed against the Tan 11 guidance and BS4142 criteria using the night background levels measured on industrial estate where no noise from the facility was audible. Background noise levels have been used that are representative of the general noise levels the receptors would be exposed to if the facility was not operational. Using modelling to predict noise levels to assess any impact from the increased capacity at the facility is considered the most representative way of assessing the noise impact from the works on receptors. The assessment considers the contribution from the increases capacity to contribute a 3dB increase in the internal noise levels which represents a worst case scenario. The assessment has considered the impact on the two closest receptors. Using predicted noise levels from source measurements taken enable the relative impact from the works to be assessed. The measured night background data is considered representative of the existing situation, and the most appropriate data to assess the likelihood of complaint.

The outcome of the assessment using the predicted levels demonstrates the calculated rating levels for night time periods are considered to be over the level of *"adverse impact"*, at receptor R1 location. with receptor R2, at +10dB "is likely to be an indication of a significant adverse impact". Although the assessment shows an adverse impact the change in noise levels from the additional capacity has little impact on the existing noise environment.

The receptor locations will fall within TAN11 category A during the day and B during night periods. Category B meaning noise should be taken into account when determining residential planning applications and category A meaning noise may need not be considered as a determining factor in granting residential planning permission. No existing developments would be affected in the vicinity of the works.

BS 8233:2014 indicates that 15 dB of attenuation would be expected through a window partially open for ventilation (Annex G.1 of BS 8233:2014). An external rating level of 50 and 53 dB(A) form the works at receptors would therefore result in internal levels of approximately 35 - 37dB(A), which is above the 30dB the criteria stipulated in BS 8233:2014 for good sleeping conditions in bedrooms during the night time.

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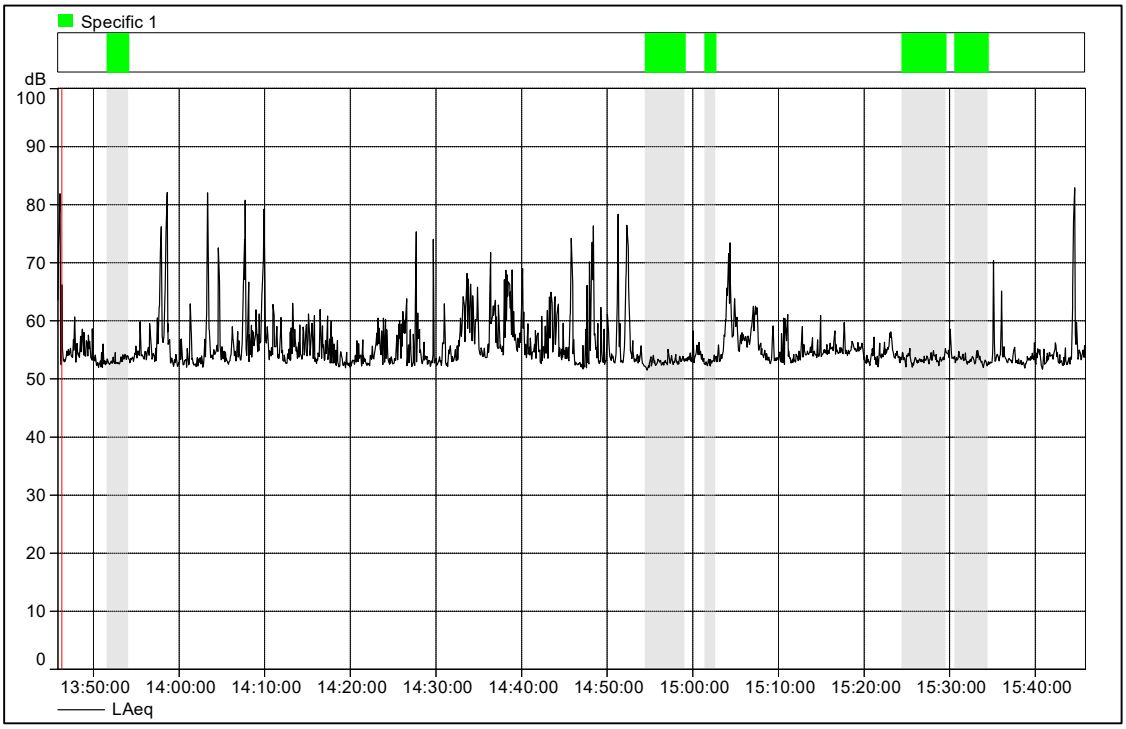
The propagated noise at ground level associated with the site operation within the front private garden of receptor R1 would be 1dB below the limit of 50 dB L_{Aeq} as recommended by the WHO and BS 8233 for external amenity spaces and receptor R2 would be 3dB above the recommended 50 dB L_{Aeq} . from the facility.

The predicted noise level from the increased internal noise levels within the factory at the at the closest receptors has minimal impact on the existing noise levels a change in less than 1dB will not be perceived.

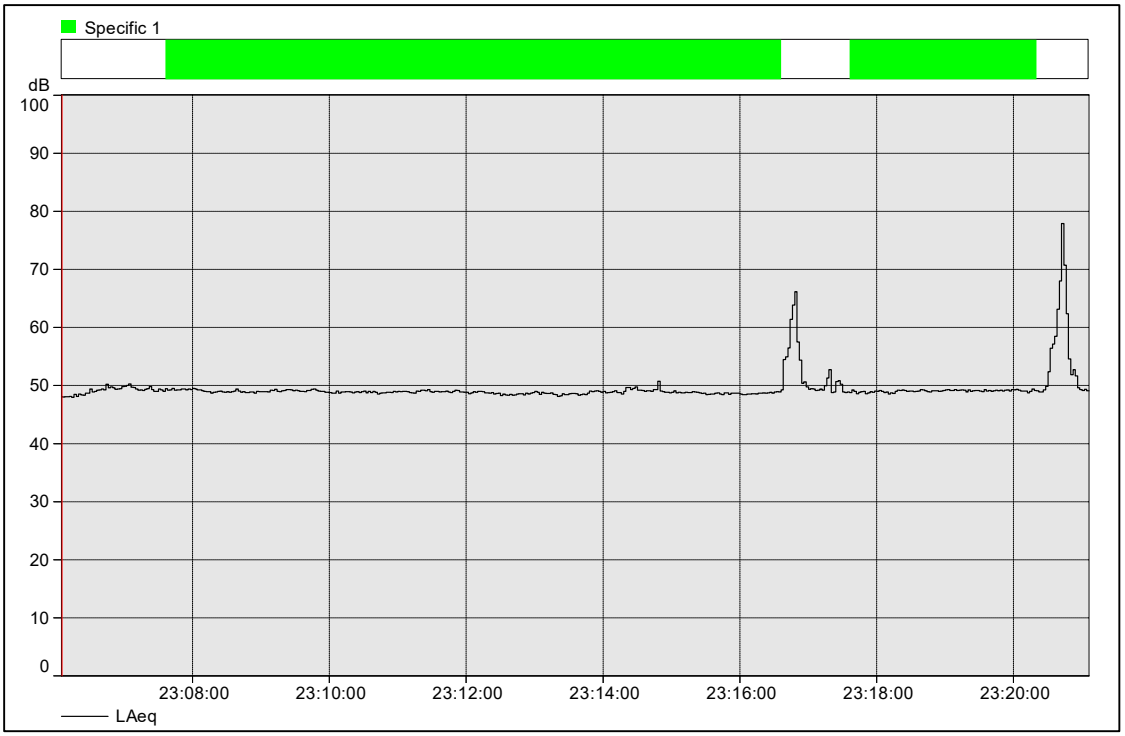
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Appendix A – Noise measurements

Location 4 - Onsite works boundary

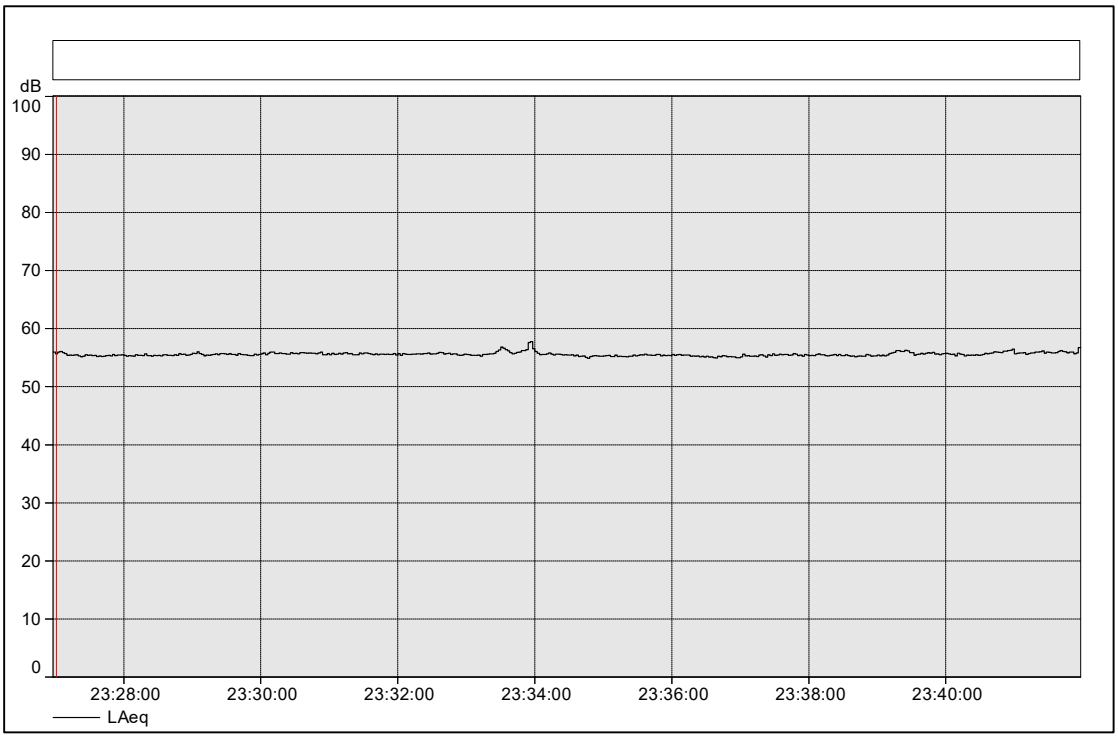


Location 1 night

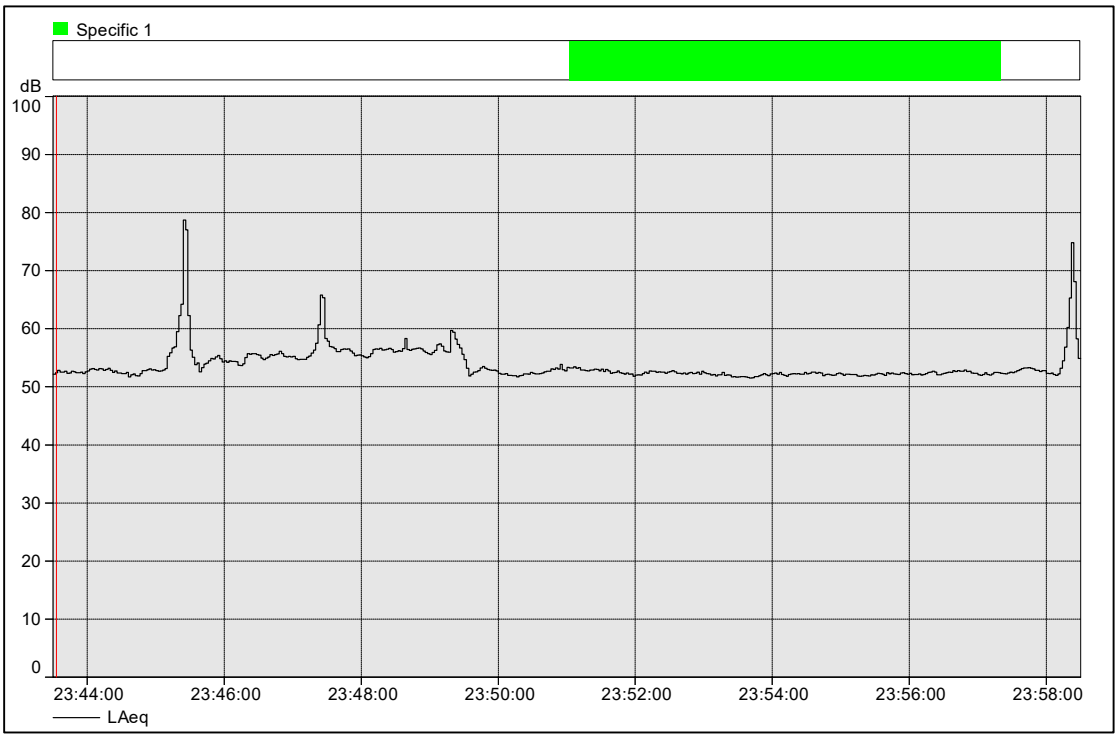


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Location 2 night

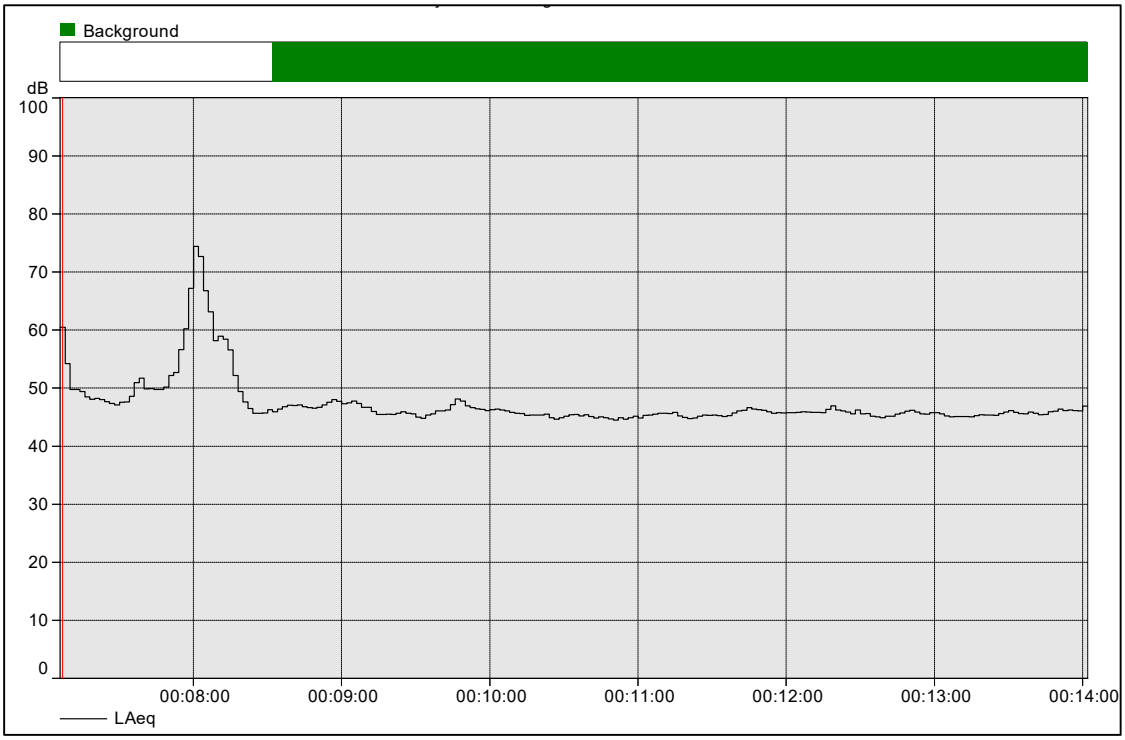


Location 3 Night

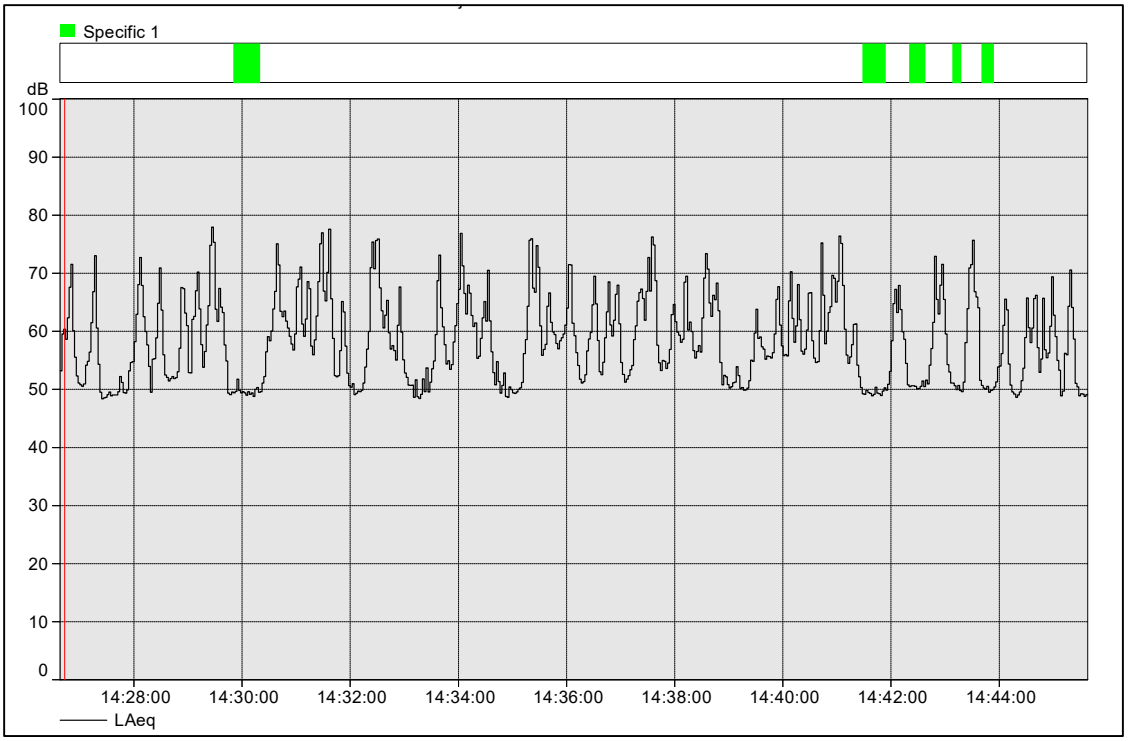


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Background night

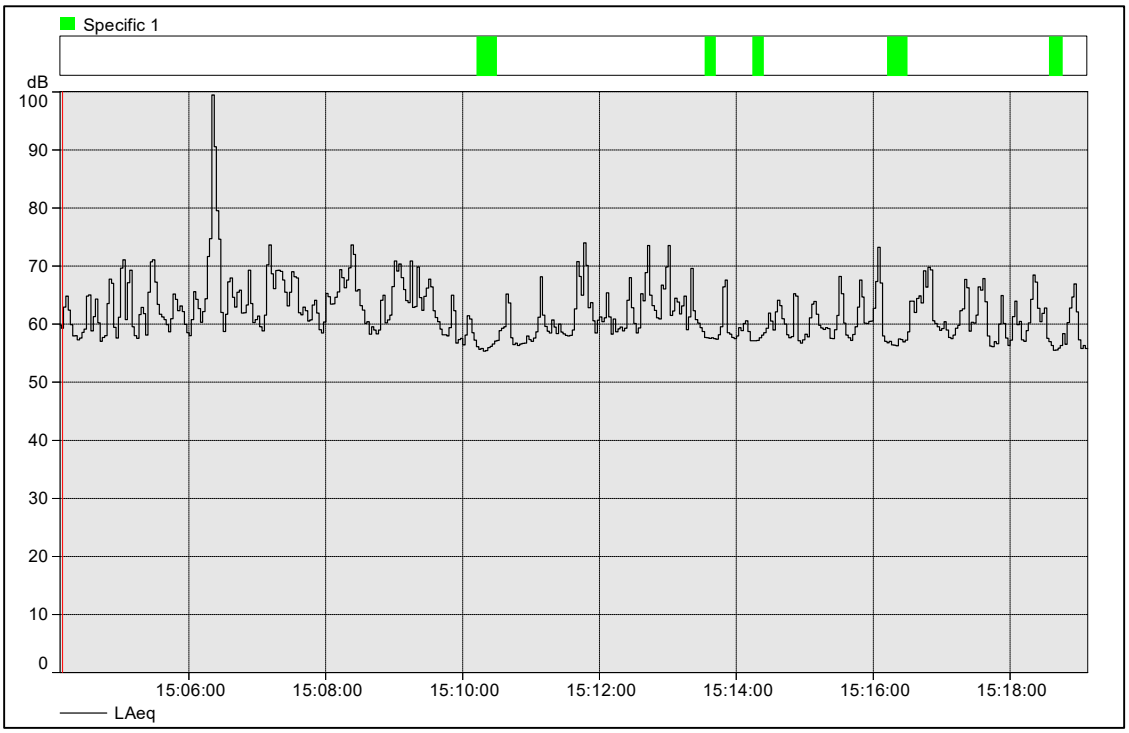


Location 1 Day

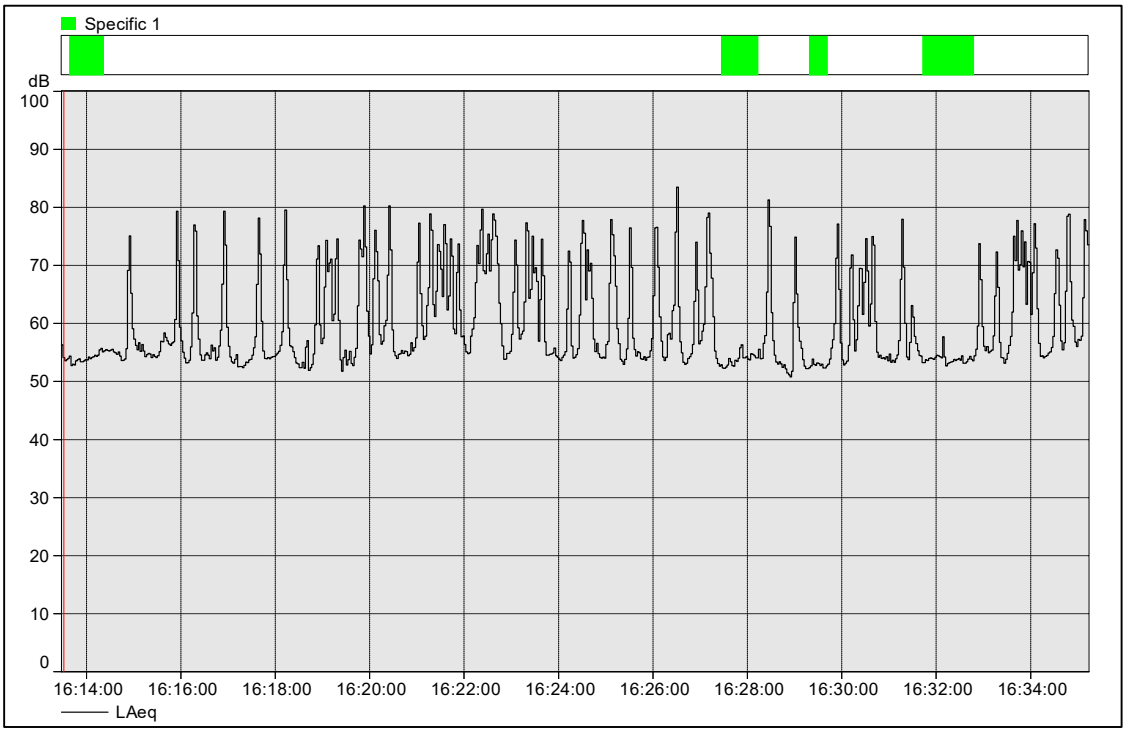


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Location 2 Day



Location 3 Day



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