ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Thermotraffic Ltd.
Ash Road South, Wrexham Industrial Estate, Wrexham, LL13 9UG

Reference: 12178/OP

Client

TSL

Document Control

Version:	Revision Description:	Date:	Author:	Reviewed by:	Approved by:
1.0	First Issue	18/09/2026	Ollie Platts, MIOA	Blake Lucas, MIOA	Blake Lucas, MIOA

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

TSL Projects Limited appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment for the proposed installation of eight blast freezers at Thermotraffic Ltd, Ash Road South, Wrexham Industrial Estate, Wrexham, LL13 9UG. The assessment considers the potential operational noise associated with the new freezers at the nearest noise-sensitive receptors (NSRs).

The nearest identified NSRs are residential properties on Bryn Lane and Oak Road, situated more than 800m from the proposed blast freezers. These receptors have been used as the primary assessment locations because they represent the closest dwellings at which operational noise from the proposed plant could affect residential amenity.

An attended baseline noise survey was undertaken at locations representative of the nearest NSRs to establish the prevailing daytime and night-time acoustic environment. Near-field measurements were also undertaken on existing blast freezers operating at the Thermotraffic site to quantify a representative source level for the freezers in question. The measured data has then been used to model freezer noise, and the resulting predictions have been compared with the representative background sound levels at the NSRs.

The noise impact assessment has been undertaken with reference to the relevant Welsh planning and acoustic guidance, primarily Planning Policy Wales (PPW), Technical Advice Note 11: Noise (TAN 11) and British Standard 4142:2014+A1:2019 (BS 4142).

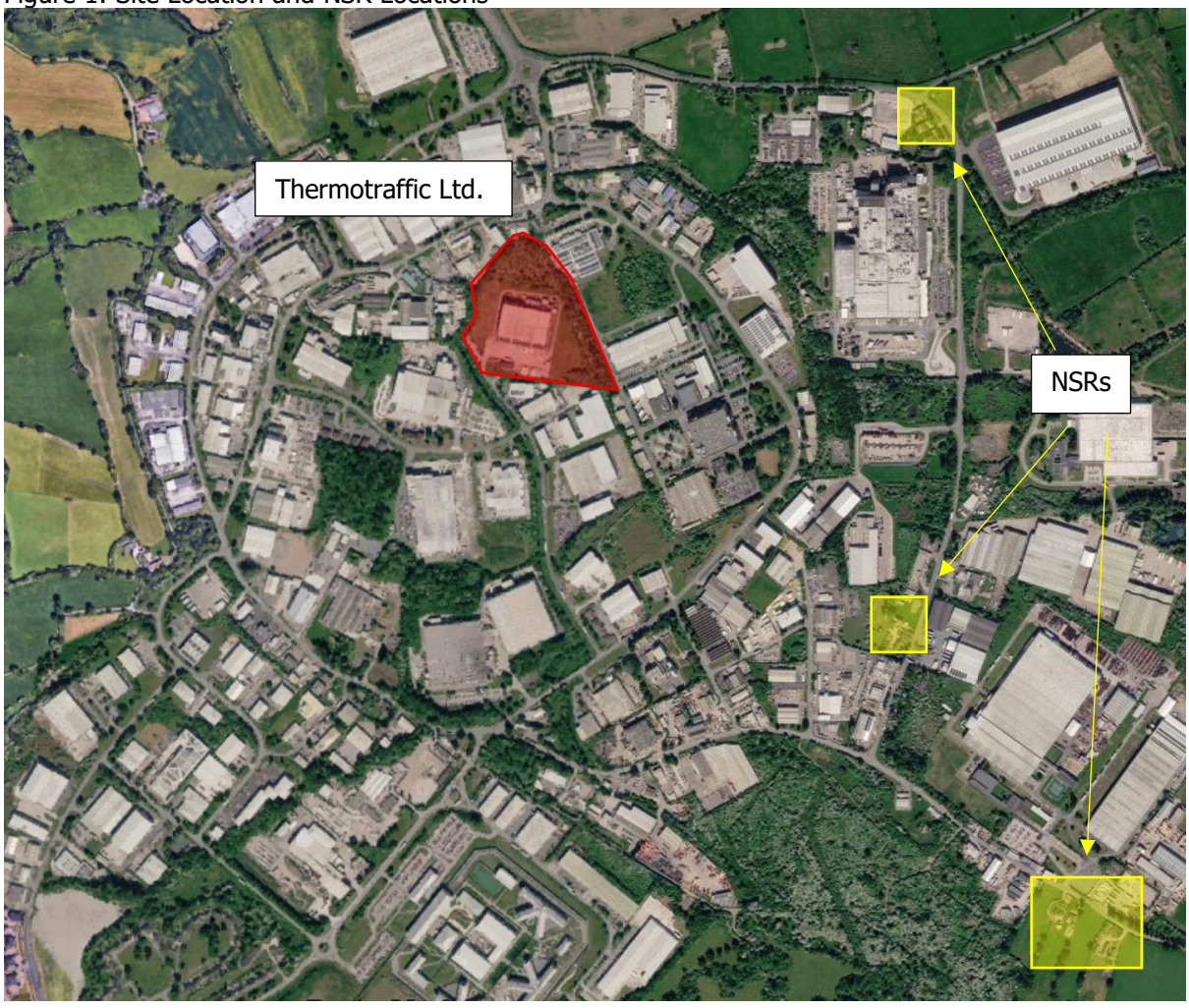
2. Site and Location

The site is located on Ash Road South, Wrexham Industrial Estate, Wrexham, LL13 9UG. Wrexham Industrial Estate comprises a mixture of large manufacturing facilities, warehouses, distribution units, offices and smaller industrial/workshop premises. The surrounding area to the industrial estate is largely rural and agricultural, a number of residential properties are located in the wider vicinity of the site. The nearest identifiable NSRs to the proposed blast freezers are located over 800m away on Bryn Lane and on Oak Road.

The noise climate in the area consists of a combination of industrial and commercial activity with associated road traffic mainly comprising of HGV vehicle movements at the various distribution centres around the estate. Many of the businesses on the estate operate continuously throughout the day and night.

The following figure shows the site location and location of the nearest known NSRs.

Figure 1: Site Location and NSR Locations



3. Planning and Noise

3.1. Planning Policy Wales (PPW)

Planning Policy Wales (PPW) Edition 12 dated February 2024 sets out the land use planning policies of the Welsh Government. Section 1 states:

1.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs1, MTANs2 and policy clarification letters comprise national planning policy.

The most relevant statements for noise affecting a residential use are provided in Section 6.7 and summarised below:

"6.7.1 Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible."

6.7.4 The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.6 In proposing new development, planning authorities and developers must, therefore:

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- *not create areas of poor air quality or inappropriate soundscape; and*
- *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

6.7.7 To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer."

6.7.8 Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- *traffic management and road safety;*
- *ensuring progress towards a shift to low or zero emissions means of road transport, such as electrical charging points;*
- *supporting low or zero emissions public transport;*
- *providing active travel infrastructure; and*
- *incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors.*

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

6.7.19 The health imperative of good air quality and appropriate soundscapes in contributing to the overall character and quality of places and the health and well-being of people and wildlife should be fully recognised. It will not be appropriate to locate sensitive uses, such as hospitals, schools, care homes and housing adjacent to busy roads or other transport routes, where there are no connectivity benefits to be gained and where health and amenity impacts associated with increased exposure of people to pollution will be unacceptable. Whilst some uses may be appropriate with

the aid of good design air quality and soundscape considerations can be overriding factors, especially for sensitive uses, if they cannot be adequately mitigated and impacts minimised.

6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.

6.7.21 Regard should be paid to current air quality and noise levels and the quality of the existing soundscape and account taken of any relevant local air quality action plan, noise action plan and/ or local or regional air quality strategy as part of development strategies and proposals in development plans and before determining planning applications.

6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken.

PPW does not provide any quantifiable criteria and directs you to the Technical Advice Notes (TAN 11).

3.2. Technical Advice Note (Wales) - Noise

Planning Policy Wales (PPW) Edition 11 dated February 2021 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes. The relevant planning criteria for proposed residential development is in Technical Advice Note (Wales) 11 entitled "Noise" which was published in October 1997. The introduction 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.

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

For noise from industrial and commercial developments, such as plant noise, TAN 11 states:

"B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987."

4. Assessment Criteria

For industrial and commercial noise, the most relevant guidance is provided within British Standard 4142:2014+A1:2019. The methods described in the British Standard use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premise used for residential purposes.

4.1. **BS4142, Initial Assessment**

The initial estimate principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'. The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Clause 9 entitled 'Rating Level' states:

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

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Clause 11 of the Standard, entitled 'Assessment of the Impacts', it states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9), and consider the following.

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

It should be noted that the numerical outcome only represents the initial estimate of impact, as stated in the first paragraph of Clause 11, and that contextual matters should be considered before determining what the potential impact is.

4.2. **BS4142, Context**

In all instances the context needs to be considered when determining the overall impact. In terms of context BS 4142:2014+A1:2019 states: *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.*

1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

   NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
   i) façade insulation treatment;
   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
   iii) acoustic screening."

In terms of good internal acoustic conditions, the most relevant criteria and methodology is provided in BS8233:2014. This is in accordance with a March 2020 Technical published by the ANC Working Group, which provided comments and guidance to clear any ambiguity in BS4142:2014+A1:2019.

5. Baseline Noise Survey

A baseline noise survey was undertaken between 12:19hrs and 14:20hrs on Friday 11th September 2026 as well as between 23:00hrs and 00:45hrs on Monday 14th / Tuesday 15th September 2026. The baseline noise survey was undertaken at measurement locations representative of the nearest NSRs.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 1: Equipment Used and Calibration Dates

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL3	A3A-02236-F0	06/01/2026	UK-26-001
Pre-Amp, NTI, MA230	2369	06/01/2026	UK-26-001
Microphone, NTI, MC230A	A32951	06/01/2026	UK-26-001
Calibrator, Cirrus Research, CR:515	84377	24/02/2026	07648/1

The measuring systems were checked for calibration before and after the tests and had no significant drift.

5.2. Weather Conditions

The weather during both the daytime and night-time surveys was dry. The temperatures ranged from 15-21 degrees Celsius. Wind speed typically ranged from 3-5 m/s.

The weather conditions are not expected to have adversely affected the measured noise data.

5.3. Monitoring Procedure

An attended noise survey was undertaken between 12:19hrs and 14:20hrs on Friday 11th September as well as between 23:00hrs and 00:45hrs on Monday 14th / Tuesday 15th September 2026. The purpose of these measurements was to determine the background sound level in locations representative of the nearest NSRs to the proposed blast freezers.

The noise climate observed during the measurement procedure comprises of general industrial/commercial noise as well as road traffic consisting of mostly HGV movements associated with the industrial estate.

The measurements were undertaken in the locations shown in the figure below using a microphone mounted on a tripod at a height of 1.5m.

The monitoring locations are given in the figure below:

Figure 2: Monitoring locations



5.4. Measured Baseline Noise Levels

The summary of measured data for the baseline noise survey consists of the equivalent sound level ($L_{Aeq,T}$), background sound level ($L_{A90,T}$) and the maximum sound level (L_{AFmax}) in dB. These results are displayed in the tables below.

5.4.1. Monitoring Location 1

Table 2: Measured Equivalent, Background and Maximum Noise Levels at ML1

Assessment Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB	L_{AFmax}
Daytime (12:19-12:34 & 13:27-13:42)	56	46	73
Night-time (23:00-23:15 & 23:54-00:09)	35	34	70

We have determined a typical representative background sound level of 46 dB L_{A90} during the day and 34 dB L_{A90} at night at ML1.

5.4.2. Monitoring Location 2

Table 3: Measured Equivalent, Background and Maximum Noise Levels at ML2

Assessment Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB	L_{AFmax}
Daytime (12:38-12:53 & 13:45-14:00)	71	48	90
Night-time (23:17-23:32 & 00:13-00:28)	40	38	69

We have determined a typical representative background sound level of 48 dB L_{A90} during the day and 38 dB L_{A90} at night at ML2.

5.4.3. Monitoring Location 3

Table 4: Measured Equivalent, Background and Maximum Noise Levels at ML3

Assessment Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB	L_{AFmax}
Daytime (12:59-13:14 & 14:04-14:19)	68	46	83
Night-time (23:35-23:50 & 00:30-00:45)	46	45	76

We have determined a typical representative background sound level of 46 dB L_{A90} during the day and 45 dB L_{A90} at night at ML3.

6. Operational Noise Survey

Noise measurements of the existing blast freezers were undertaken onsite between 11:01hrs and 11:25hrs on Friday 11th September 2026. The purpose of these measurements was to quantify the noise levels produced by a typical blast freezer for use within the noise model. The monitoring equipment and weather conditions are the same as contained within Sections 5.1 and 5.2.

6.1. Monitoring Procedure

There were 10no. blast freezers onsite, five of these blast freezers were of a newer model than the other five. Measurements were undertaken on nine of the blast freezers, four on the newer models and five on the older models.

Near-field noise measurements were undertaken for each operating blast freezer at distances of 1m and 5m. The measurements were undertaken using a microphone mounted on a tripod at a height of 1.5m. A typical measurement arrangement has been included in the figure below.

Figure 3: Near Field Measurement of New Blast Freezer



6.2. Measured Noise Levels

We have been advised that the blast freezers to be included in the new development are of similar make and model to the newer model measured onsite and included in Figure 3.

The below table provides the average measured octave band sound pressure level for the four newer blast freezers that were measured onsite at a distance of 1m.

Table 5: Measured Octave Band Sound Pressure Level of New Blast Freezer @ 1m

Plant	Centre Frequency Octave Band Sound Pressure Level @ 1m (dB)								dBA
	63	125	250	500	1k	2k	4k	8k	
Average Blast Freezer (New)	79	78	72	69	66	61	62	51	72

A sound power level for the blast freezers has been calculated using the measured noise levels above as per ISO 3744, this level has been used within the noise model.

7. Noise Predictions

7.1. Location of Blast Freezers

The blast freezers are to be housed on the east elevation of Thermotraffic Ltd.

Figure 4: Thermotraffic Blast Freezers - Elevations and 3D Visuals

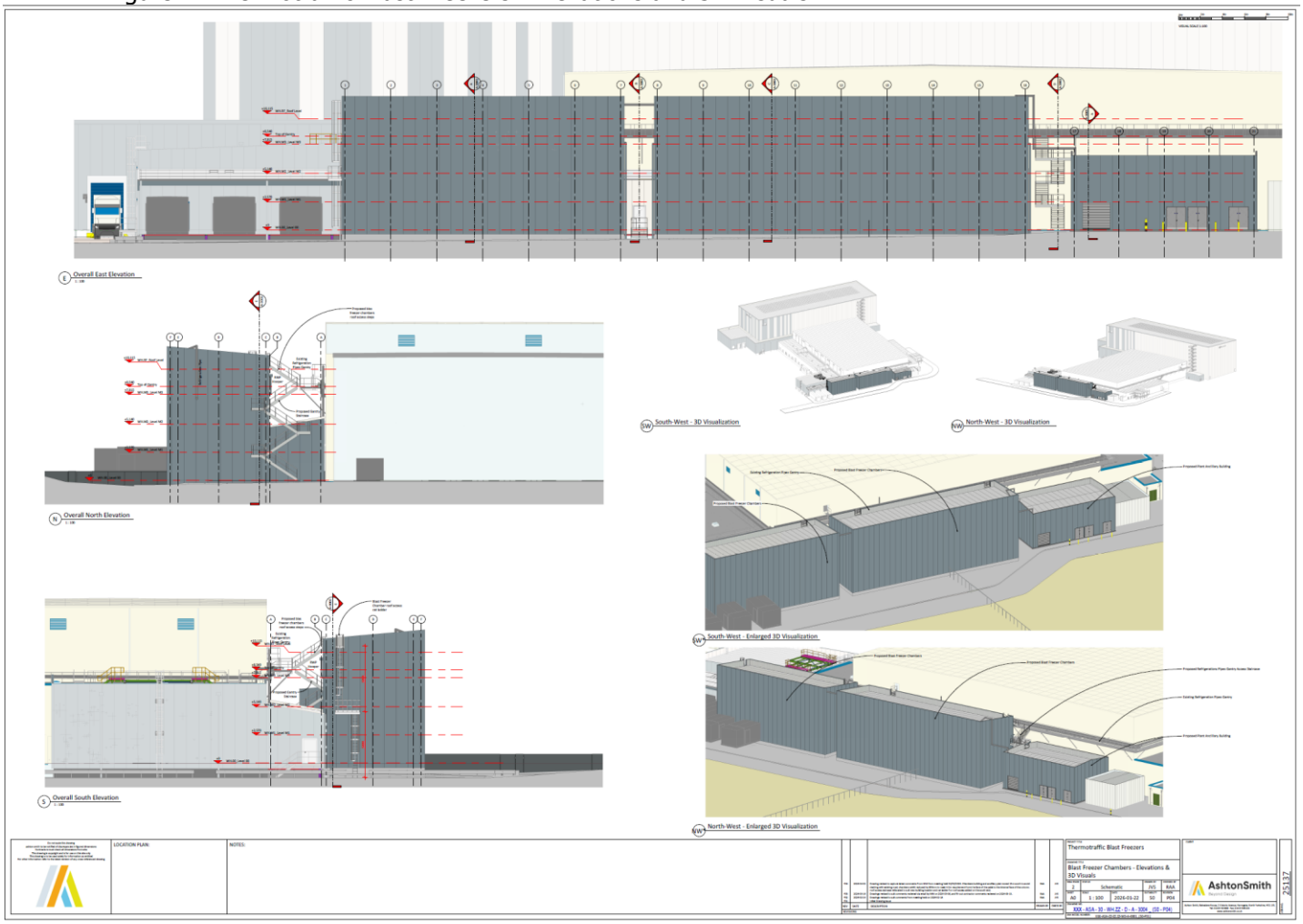
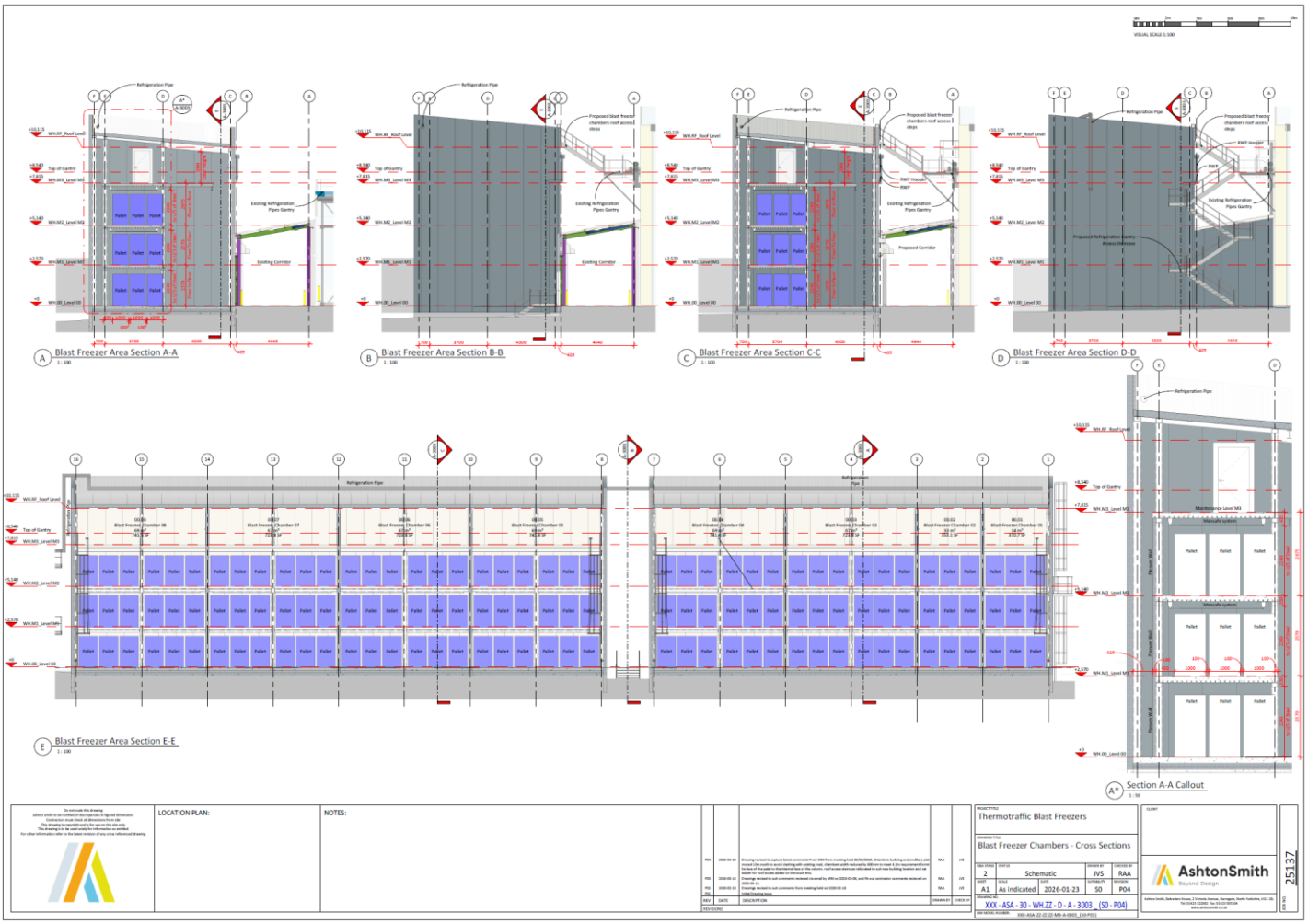


Figure 5: Thermotraffic Blast Freezers - Cross Sections



7.2. Noise Modelling

The noise emissions of the new blast freezers have been modelled in the proprietary noise modelling software Cadna:A by DataKustik. The modelling software calculates sound levels based on the inputted sound emission values, source and receiver locations, and primarily distance, barrier and ground attenuation. Calculations are undertaken using the General Method of Calculation from ISO 9613-2.

7.2.1. Noise Modelling Parameters

The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- Building positioning and heights are based on data sourced from OpenStreetMap, site plans provided and google maps data.
- The order of reflections is 3, and all buildings are considered reflective.
- The ground surrounding the site has been considered hard and reflective (G = 0.0).
- The topography of the site has been inputted using LiDAR data 2022.
- The predictions are based on the measured operational noise levels set out in Section 6.2 above.
- The predictions are based on all 8no. new blast freezers operating continuously throughout both the day and night.
- The predicted noise map levels are at 4.5m to assess worst-case noise i.e. Bedrooms during the night.
- Building evaluations indicate the maximum noise level at each façade, text boxes have been included in the noise map to show noise levels whilst including overall site context.
- The predicted building evaluation levels are free-field.

7.2.2. **Noise Modelling Results**

The noise map below shows the cumulative absolute worst-case noise emission from the proposed site for the day and night.

Figure 6: Predicted Specific Sound Level of Blast Freezers $L_{Aeq,T}$ (4.5m Height)



8. Noise Assessment

A noise impact assessment has been undertaken in accordance with BS4141:2014+A2019.

8.1.1. Background Sound Level

From the measured noise data, we have determined the representative background sound levels for both the day and night to be the following for each measurement location:

Table 6: Measured Background Sound Levels

Assessment Location	Background Sound Level $L_{A90,T}$ dB	
	Day	Night
ML1 – Oak Road	46	34
ML2 – Bryn Lane	48	38
ML3 – Bryn Lane	46	45

8.1.2. Specific Sound Level

The predicted sound level from the blast freezers at each measurement location is included in the Table below. This is the level with no character corrections applied.

Table 7: Predicted Specific Sound Levels

Assessment Location	Specific Sound Level $L_{Aeq,T}$ dB
ML1 – Oak Road	29
ML2 – Bryn Lane	37
ML3 – Bryn Lane	37

8.1.3. Character Corrections

Character corrections should be added to the "specific sound level" if the "specific sound level" exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location. Based on our site visit the character corrections to be applied are as follows:

- *Tonality* – Noise from the blast freezers is not tonal, we also do not anticipate noise to be easily distinguishable at the NSR.
- *Impulsivity* – Blast freezer noise is not normally impulsive; this would also not be clearly perceptible at the NSR.
- *Intermittency* – We have assumed all plant is running continuously within our noise model.
- *Other Sound Characteristics* – We do not believe a character correction is necessary for other sound characteristics.

8.1.4. Assessment of Impact

Therefore, the British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 8: BS 4142:2014 Initial Assessment of Impact

Parameter	ML1 – Oak Road		ML2 – Bryn Lane		ML3 – Bryn Lane	
	Day	Night	Day	Night	Day	Night
Background Sound Level, $L_{A90,T}$ dB	46	34	48	38	46	45
Specific Sound Level, $L_{Aeq,T}$ dB	29		37		37	
Character correction	0		0		0	
Rating Level, $L_{Ar,T}$ dB	29		37		37	
Difference	**-17**	**-5**	**-11**	**-1**	**-9**	**-8**

Predicted rating levels at the worst affected NSRs to the plant show differences between -9 and -17dB during the day and differences between -1 and -8dB at night resulting in no significant noise impacts as per BS4142:2014.

It should be noted that the numerical outcome above only represents the initial estimate of impact, as stated in the first paragraph of Clause 11, and that contextual matters should be considered before determining what the impact will be.

8.2. Context

British Standard 4142:2014 states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

8.2.1. Absolute Levels

1) Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse."

With regard to 'absolute levels', the most relevant guidance is British Standard 8233:2014. Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings. The guideline states that internal noise levels should not exceed 30dB $L_{Aeq,8hr}$ at night and 35dB $L_{Aeq,16\ hr}$ during the day.

The internal level is approximately 15 dB quieter than the external free-field level (as stated by the WHO) allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows:

Table 9: Comparison with BS 8233:2014 at NSRs

Assessment Location	Time	Predicted External Level dB(A)	Open Window Correction dB(A)	Predicted Internal Level dB(A)	Within Criteria?
ML1 – Oak Road	Day	29	-15	14	Yes
	Night				Yes
ML2 – Bryn Lane	Day	37		22	Yes
	Night				Yes
ML3 – Bryn Lane	Day	37		22	Yes
	Night				Yes

As can be seen from the table above, the rating sound level is below the British Standard 8233:2014 criteria for daytime and night-time rooms at each assessment location. Therefore, we would consider the blast freezer noise to be suitably controlled to the dwellings in the vicinity when absolute levels are considered.

8.2.2. Residual Levels

British Standard 4142:2014 also states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following".

> *1) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it."*

Table 10: Comparison of Rating Level and Residual Sound Level at NSRs

Parameter	ML1 – Oak Road		ML2 – Bryn Lane		ML3 – Bryn Lane	
	Day	**Night**	**Day**	**Night**	**Day**	**Night**
Residual Sound Level, $L_{A90,T}$ dB	56	35	71	40	68	46
Specific Sound Level, $L_{Aeq,T}$ dB	29		37		37	
Character correction	0		0		0	
Rating Level, $L_{Ar,T}$ dB	29		37		37	
Difference	**-27**	**-6**	**-34**	**-3**	**-31**	**-9**

As can be seen from the table the rating level falls at least 27dB below the residual sound level during the day and at least 3dB below at night.

As such, we would consider that the noise will not be clearly perceptible against the residual noise climate during the day and night.

8.3. Summary of British Standard 4142:2014 Assessment

As can be seen above plant noise will be acceptable and of no impact when assessed to British Standard 4142:2014+A1:2019 and would therefore satisfy the contents of Planning Policy Wales (PPW) and Technical Advice Note 11 (TAN11).

9. Summary and Conclusions

TSL Projects Ltd. appointed Acoustic Consultants Limited to undertake a noise impact assessment in relation to 8no. proposed new blast freezers to be installed at Thermotraffic Ltd. who are located on Ash Road South, Wrexham, LL13 9UG.

This report provides a noise impact assessment of the proposed blast freezers at the nearest noise sensitive receivers (NSRs) which are located over 800m away from the site on Bryn Lane and Oak Road.

Near-field noise measurements of existing on-site blast freezers have been undertaken. This noise impact assessment is based on the results of both a baseline noise survey undertaken at the nearest NSRs as well as the measurements undertaken onsite.

The noise impact assessment has been undertaken in accordance with the guidance in Planning Policy Wales (PPW), Technical Advice Note 11 (TAN11) and British Standard 4142:2014+A1:2019 (BS4142).

The predicted rating level from the blast freezers will be at least 9dB below the background sound level during the day at least 1dB below the background sound level at night at the nearest NSRs. When this level is compared to the representative background sound level, and contextual matters are considered, the blast freezer noise results in no significant noise impact when assessed to BS4142:2014 and thus would satisfy the contents of Planning Policy Wales (PPW) and Technical Advice Note 11 (TAN11).

10. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$– A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 µPa); and
$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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