

Aldi store
Watling Street
Hinckley

Plant and Delivery
Noise Impact Assessment

On behalf of



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Contents

1.0	Introduction	1
2.0	Site layout and development proposals	1
3.0	Nearest noise sensitive receptors	1
4.0	Policy context	2
	National Planning Policy Framework	2
	Planning Practice Guidance – Noise.....	4
5.0	Acoustic standards and guidance	7
	BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.	7
	World Health Organisation, Guidelines for Community Noise, 1999 (WHO)	7
	World Health Organisation (WHO) 2009.....	8
	BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound	9
	Hinkley and Bosworth Borough Council.....	10
6.0	Existing noise climate	10
	Environmental sound levels	10
	Summary.....	12
7.0	Assessment of delivery noise	12
	Sound pressure levels of activities associated with store deliveries	12
	Delivery noise impact assessment.....	13
	BS 4142:2014 delivery noise assessment.....	14
	BS 8233:2014 and WHO delivery noise assessment	16
	<i>L_{Aeq} assessment</i>	16
	<i>L_{Amax} assessment</i>	17
8.0	Plant noise assessment	17
	Plant noise impact assessment.....	17
9.0	Discussion of results	18
	Deliveries	18
	External plant noise.....	18
10.0	Conclusions	18

Appendices

Appendix A	Acoustic terminology
Appendix B	Aerial photograph of site and plan showing delivery route
Appendix C	Delivery noise impact calculations
Appendix D	Environmental sound survey
Appendix E	Plant noise data
Appendix F	Plant noise calculations

1.0 Introduction

- 1.1. It is proposed to extend the existing Aldi store at Watling Street, Hinckley. Noise Solutions Ltd (NSL) has been commissioned by Aldi Stores Limited to undertake a noise impact assessment in relation to external plant and deliveries at the extended store.
- 1.2. An environmental noise survey was undertaken to establish prevailing noise levels affecting the development site. Noise emissions from proposed plant have been predicted at the most affected noise sensitive receptors and assessed in accordance with the typical requirements of the local authority. Noise emissions from delivery activities have been predicted at the nearest noise sensitive receptors and assessed in accordance with National Policy.
- 1.3. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at <http://www.acoustic-glossary.co.uk>.

2.0 Site layout and development proposals

- 2.1. The existing Aldi store is to be extended, predominantly within the confines of the existing site.
- 2.2. The existing delivery area is at the north of the building. The Aldi delivery vehicles enter through the car park and reverse up to a roller shutter door, providing level access from the trailer bed. This negates the requirement for tail-lift operation and wheeling trolleys across rough external ground finishes which is a scenario that often occurs at other food stores. Trolleys are only manoeuvred internally, either inside the trailer or within the store, on flat level surfaces. Up to four deliveries by articulated lorries are expected in any 24-hour period. Deliveries may potentially be made at any time of the day or night and are currently unrestricted.
- 2.3. External plant will be located in a plant area at the north of the building. The refrigeration plant will operate at all times. The heating plant will operate only when the store is open. Plant noise levels are given in **Appendix E**.

3.0 Nearest noise sensitive receptors

- 3.1. The food store site lies to the north east of the A5 Watling Street with fields to the north and west. A petrol filling station and a bungalow (Bonheur) are to the south east.
- 3.2. Bonheur (Receptor R1) is the nearest noise sensitive residential property and is approximately 35m from the closest part of the delivery route and approximately 50m from the delivery bay.

The existing timber acoustic fence along the site boundary between the store car park and the house is to be replaced by a new 2m high timber acoustic fence.

- 3.3. The proposed plant area is around 70m from the receptor.
- 3.4. **Appendix B** contains an aerial photograph showing the site and surrounding area.

4.0 Policy context

National Planning Policy Framework

- 4.1. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF¹) was published in March 2012, with revisions in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.
- 4.2. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*
- 4.3. The NPPF goes on to state in Paragraph 185:
- "planning policies and decisions should ...*
- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;*
 - b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...*
- 4.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE²).
- 4.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*

¹ National Planning Policy Framework, DCLG, March 2012

² Noise Policy Statement for England, DEFRA, March 2010

- 4.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed"*.
- 4.7. Paragraph 119 states that *"Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land"*

Noise Policy Statement for England

- 4.8. The Noise Policy Statement for England (NPSE³), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are: *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
- *avoid significant adverse effects on health and quality of life;*
 - *mitigate and minimise adverse effects on health and quality of life; and*
 - *where possible, contribute to the improvement of health and quality of life."*
- 4.9. The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and quality of life occur.
- 4.10. The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the NPSE). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case: *"...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."*

³ Noise Policy Statement for England, Defra, March 2010

- 4.11. Importantly, the NPSE goes on to state that: *“This does not mean that such adverse effects cannot occur.”*
- 4.12. The NPSE does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that: *“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*
- 4.13. It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

Planning Practice Guidance – Noise

- 4.14. An updated Planning Practice Guidance (PPG⁴) for noise was published on 22 July 2019 and provides additional guidance and elaboration on the NPPF. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 4.15. This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is ‘very disruptive’ and should be ‘prevented’ (as opposed to SOAEL, which represents a situation where noise is ‘disruptive’, and should be ‘avoided’).
- 4.16. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2>, 22 July 2019

- 4.17. The LOAEL is described in PPG⁵ as the level above which *"noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard"*.
- 4.18. PPG identifies the SOAEL as the level above which *"noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present."*
- 4.19. In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG⁶ acknowledges that *"...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."*
- 4.20. The relevant guidance in the PPG in relation to the adverse effect levels is summarized below:

Table 1 Table of effects (Planning Policy Guidance)

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not Intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required

⁵ Paragraph: 005 Reference ID: 30-005-20190722

⁶ Paragraph: 006 Reference ID: 30-006-20190722

Response	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level			
Present and Intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very Disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

4.21. The Planning Practice Guidance⁷ states the following in relation to mitigation measures:

"For noise sensitive developments, mitigation measures can include avoiding noisy locations in the first place; designing the development to reduce the impact of noise from adjoining activities or the local environment; incorporating noise barriers; and optimising the sound insulation provided by the building envelope."

⁷ Paragraph: 010 Reference ID: 30-010-20190722

4.22. In addition, the Guide notes that it may also be relevant to consider⁸:

"... whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations".

5.0 Acoustic standards and guidance

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.

5.1. This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999⁹). These guideline noise levels are shown in Table 2, below:

Table 2 BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
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 $L_{Aeq,8h}$

5.2. BS 8233:2014 advises that: *"regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."*

World Health Organisation, Guidelines for Community Noise, 1999 (WHO)

5.3. The World Health Organisation (WHO) Guidelines for Community Noise (1999) recommends suitable internal and external noise levels based on dose response research. The levels recommended in this guidance could be correlated to the LOAEL. Relevant guidance from this document is presented below.

- **Sleep Disturbance (Night-time internal LOAEL):** If negative effects on sleep are to be avoided, the equivalent sound pressure level should not exceed 30dBA indoors for continuous noise.

⁸ Paragraph: 006 Reference ID: 30-006-20190722

⁹ World Health Organisation Guidelines for Community Noise, 1999

- Interference with Communication (Daytime internal LOAEL): Noise tends to interfere with auditory communication, in which speech is a most important signal. However, it is also vital to be able to hear alarming and informative signals such as door bells, telephone signals, alarm clocks, fire alarms etc., as well as sounds and signals involved in occupational tasks. The effects of noise on speech discrimination have been studied extensively and deal with this problem in lexical terms (mostly words but also sentences). For communication distances beyond a few metres, speech interference starts at sound pressure levels below 50 dB for octave bands centred on the main speech frequencies at 500, 1 000 and 2 000 Hz. It is usually possible to express the relationship between noise levels and speech intelligibility in a single diagram, based on the following assumptions and empirical observations, and for speaker-to-listener distance of about 1 metre:
 - a) Speech in relaxed conversation is 100% intelligible in background noise levels of about 35dBA, and can be understood fairly well in background levels of 45dBA.
 - b) Speech with more vocal effort can be understood when the background sound pressure level is about 65dBA.

World Health Organisation (WHO) 2009

- 5.4. The introduction of the Directive on Environmental Noise, obliges Member States to assess and manage noise levels. With the support of the European Commission, the WHO Regional Office for Europe has developed night noise guidelines for Europe to help Member States develop legislation to control noise exposure.
- 5.5. The guidelines are based on scientific evidence on the effects of noise and the thresholds above which these effects appear to harm human health.
- 5.6. There is limited evidence that night noise is related to hypertension, heart attacks, depression, changes in hormone levels, fatigue and accidents.
- 5.7. The WHO report summarises the threshold levels of night noise above which a negative effect starts to occur or above which the impact becomes dependent on the level of exposure. For example, the threshold level for waking in the night and/or too early in the morning was 42 dB.
- 5.8. It also establishes that there are differences in the intensity and frequency of noise depending on the source, which lead to different impacts. Road traffic is characterised by low levels of noise per event, but as there are a high number of events, on average it has a greater effect on awakenings than air traffic, which has high levels of noise per event but fewer events.
- 5.9. Integrating these findings, the report proposed a guideline target limit of outdoor night noise of 40 dB (annual average defined as 'L_{night}' in the Environmental Noise Directive). There is not

sufficient evidence that the biological effects observed below this level are harmful to health but adverse effects are observed above 40dB.

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

- 5.10. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014+A1:2019 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"* and *"sound from the loading and unloading of goods and materials at industrial and/or commercial premises"*.
- 5.11. The procedure contained in BS 4142:2014 +A1:2019 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one-hour period for the daytime and a 15-minute period for the night-time. Daytime is defined in the standard as 07.00 to 23.00 hours, and night-time as 23.00 to 07.00 hours.
- 5.12. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.
- 5.13. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*
- 5.14. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*
- 5.15. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- *Typically, the greater this difference, the greater the magnitude of the impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
 - *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.*

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

- 5.16. The standard does state that *"adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- 5.17. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*
- 5.18. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:
- "An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*
- 5.19. BS 4142:2014+A1:2019 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Hinkley and Bosworth Borough Council

- 5.20. As part of a previous application, Hinckley and Bosworth Borough Council were contacted in order to ascertain their requirements for plant noise. It was confirmed¹⁰ that a BS 4142:2014 plant rating level, at the nearest noise-sensitive receptor, no higher than the existing representative background sound level would be acceptable.

6.0 Existing noise climate

Environmental sound levels

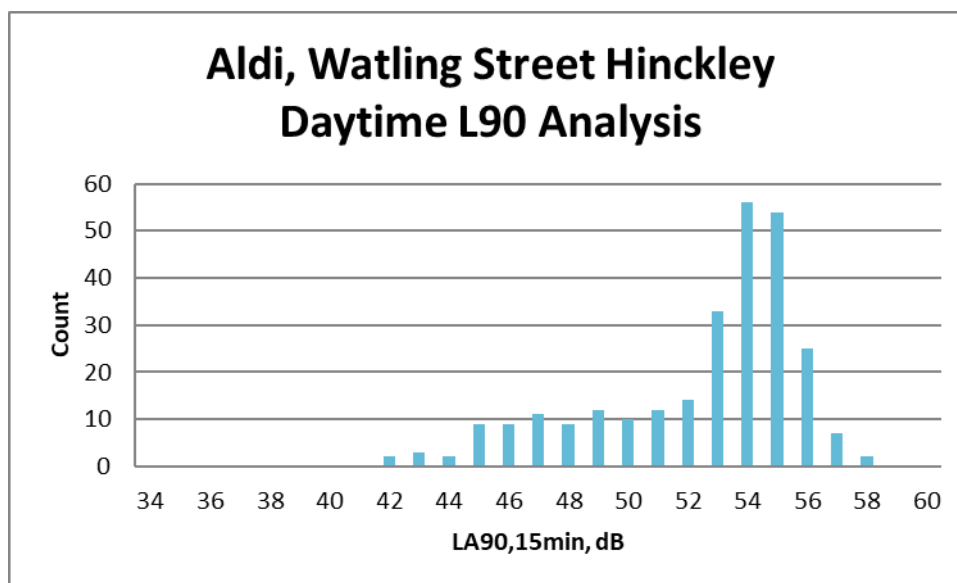
- 6.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearby noise sensitive receptors during the quietest times at which activity will occur.
- 6.2. The results of the environmental sound survey are summarised in Table 3. The full set of measurement results and details of the survey methodology are presented in [Appendix D](#).

¹⁰ Email, Giles Rawdon, Environmental Health Officer (Pollution), Hinckley & Bosworth Borough Council, 9 Jul 2018

Table 3 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Aeq} (15mins)	L _{Amax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 – 23.00 hours)	53-74	65-93	57-72	42-58
Night-time (23.00 – 07.00 hours)	49-64	64-87	53-65	35-55

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



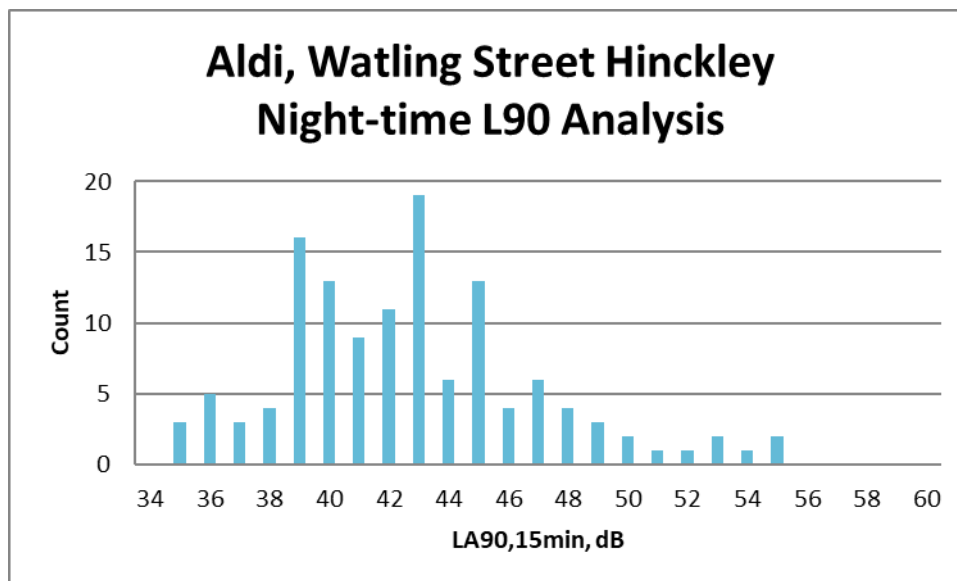
- 6.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 4 below.

Table 4 Statistical analysis of L_{A90,15min} levels during the daytime period

dB, L _{A90} daytime period	
Mean	52
Mode	54
Median	54

- 6.4. From the histogram analysis and the time history, 52dB has been selected to be a robust representation of the L_{A90} background sound pressure level during the daytime period, excluding elevated noise levels during periods where the car park is in use.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



- 6.5. Further statistical analysis has been carried out on the data and the mean and median values are shown in Table 5 below.

Table 5 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} daytime period	
Mean	43
Mode	43
Median	42

- 6.6. From the time history, 39 dB has been chosen to be representative of the L_{A90} background sound pressure level during the night-time period.

Summary

- 6.7. Therefore, the following background noise levels are considered to be representative:

- 52dB L_{A90} during the daytime period (07.00 – 23.00);
- 39dB L_{A90} during the night-time period (23.00 – 07.00).

7.0 Assessment of delivery noise

Sound pressure levels of activities associated with store deliveries

- 7.1. The sound pressure levels associated with refrigerated lorry deliveries were established by measurement of a delivery at a similar Aldi store already in operation. The measurements included all aspects of the delivery including, but not limited to, the arrival, unloading, movement of cages and the departure of the lorry. The sound pressure levels were normalised to a distance

of 10m from the delivery area and have been converted to Sound Exposure Levels (SEL) for ease of comparison/calculation. Typical L_{Amax} levels were also established.

- 7.2. Table 6 details typical source noise levels, used within the assessment, with the data presented in terms of SEL and maximum individual noise event levels (L_{AFmax}).

Table 6 Reference noise data for delivery activities (at 10m)

Noise Source	SEL, dB(A)	L_{AFmax} , dB(A)
Lorry arrival	69	61
Lorry reversing & manoeuvring into loading bay	65	58
Door open/close	60	68
Cage and pallet movement	51	59
Engine starts and lorry departs	74	71

Delivery noise impact assessment

- 7.3. The information contained in Table 6 was used to 'build-up' a source noise level based on the number of activity events over the required assessment period using the following equation:

7.4.
$$L_{Aeq,T} = SEL + 10 \cdot \log\left(\frac{1}{T}\right) + 10 \cdot \log(N) \quad (\text{Equation 1})$$

Where:

SEL is the L_{Aeq} over a one second period, and represents the noise energy from an event (e.g. cage movement) compressed into one second;

T is the reference time period in seconds; and

N is the number of movements in the time period, T.

- 7.5. The loading area is located approximately 130m from the nearest existing house with an unobstructed view (Receptor R2). The closest approach of the lorry while manoeuvring is approximately 46m from Receptor R2. Approximate distances used in the calculations are shown in Table 7 below.

Table 7 Distances to façades of nearest houses

Item	Distance to R1
Lorry arrives and turns	30
Lorry reverses and manoeuvres into loading bay	35
Door open / close	52
Cage/pallet movement (internally, central location within trailer assumed)	56
Engine starts and lorry departs	52
Closest part of route through store car park	30

- 7.6. It is understood that reversing warning signals are disabled when headlights are switched on, so there are no audible warnings at night; vehicles are fitted with "traditional" beepers (rather than white noise or voice alarms). To ensure a robust assessment, a typical daytime delivery (and all that entails) was used as the basis for reference data for both daytime and night-time assessments.
- 7.7. Table 8 presents the calculated cumulative L_{Aeq} and 'maximum' L_{Amax} noise levels at the receptor. Full calculations are included within [Appendix C](#).

Table 8 Predicted delivery noise levels

Receptor	Period	Predicted noise levels at upper window of most affected residential dwelling	
		$L_{Aeq,T}$, dB	Range of L_{Amax} (dB)
R1 façade	Daytime	23	39-52
	Night-time	26	39-52

BS 4142:2014 delivery noise assessment

- 7.8. Table 9 and Table 10 present the assessment of the likely impact during the daytime and night-time periods in accordance with the BS 4142:2014 methodology at receptor R1. As noted in Section 6 the representative background sound levels are considered to be 52dB L_{A90} for deliveries during the daytime and 39dB L_{A90} for deliveries during the night-time.

Table 9 R1 Assessment of predicted external delivery noise levels using BS 4142:2014 during the daytime.

Results		Relevant Clauses of BS4142:2014	Commentary
Background Sound level	$L_{A90} = 52\text{dB}$	8.1, 8.2	Representative typical background sound level determined from a range of measurements
Assessment made during the daytime, so the reference interval is one hour		7.2	
Specific Sound Level	$L_{Aeq,T} = 23\text{dB}$	7.3.6	Calculations presented in Appendix C
Acoustic Feature Correction	6dB	9.2	Impulsivity (bangs and clatters) could be perceptible
Rating Level	$(23+6)\text{ dB} = 29\text{dB}$		
Excess of Rating Level over background sound level	$(29-52)\text{ dB} = -23\text{dB}$		
Assessment of impact: No impact		11	Site is near a busy main road.

Table 10 R1 Assessment of predicted external delivery noise levels using BS 4142:2014 during the night-time

Results		Relevant Clauses of BS4142:2014	Commentary
Background Sound level	$L_{A90} = 39\text{dB}$	8.1, 8.2	Representative typical background sound level determined from a range of measurements
Assessment made during the night-time, so the reference interval is 15 minutes		7.2	
Specific Sound Level	$L_{Aeq,T} = 26\text{dB}$	7.3.6	Calculations presented in Appendix C
Acoustic Feature Correction	6dB	9.2	Impulsivity (bangs and clatters) could be perceptible
Rating Level	$(26+6)\text{ dB} = 32\text{dB}$		
Excess of Rating Level over background sound level	$(32-39)\text{ dB} = -7\text{dB}$		
Assessment of impact: No impact		11	Site is near a busy main road.

- 7.9. As the standard advises, the estimated impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into

consideration when determining the potential impact that may be experienced:

- The assessments are undertaken at a single residential window. The impact on all other residential windows will be lower due to distance losses and noise screening provided by the building structure.
- The number of expected deliveries by large articulated lorries is low (typically four per 24 hour period).

7.10. Where possible uncertainty in this assessment has been minimised by taking the following steps:

- The measurement of the background sound levels was undertaken over a period including the quietest times of the day and night.
- The sound level meter and calibrator used have a traceable laboratory calibration and were field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby residential dwellings and not at a position where higher noise levels are present.

BS 8233:2014 and WHO delivery noise assessment

7.11. A BS 4142:2014 assessment considers only external noise levels at the location of sensitive receptors and does not consider the attenuation offered by the building envelope. The resulting internal sound levels are also used to inform the context and resulting likely noise impact.

L_{Aeq} assessment

- 7.12. The sound attenuation offered by a building will be governed by its weakest element, acoustically speaking. This is invariably the glazing and any natural ventilation provision.
- 7.13. Assuming four store deliveries by articulated lorries all occur between 07.00 and 23.00 hours daily, the equivalent $L_{Aeq,16hr}$ level externally at the most affected residential window (Receptor R1) would be around 17dB. The existing environmental sound level affecting the area was measured as 60dB $L_{Aeq,16hr}$.
- 7.14. Similarly, if two of the daily deliveries were to occur during the night-time period, the equivalent $L_{Aeq,8hr}$ level externally would be 17dB. The existing sound level in the area was measured to be 57dB $L_{Aeq,8hr}$. As such, the delivery activity would have no impact on the daytime or night-time

average noise levels.

- 7.15. Assuming a situation where bedroom windows were partially open for ventilation, and assuming a corresponding 13dB attenuation (as referenced in the Building Regulations Part O), an internal night-time level of below 10dB $L_{Aeq,8hr}$ from delivery activity would result.

L_{Amax} assessment

- 7.16. The predicted L_{Amax} levels resulting from delivery activities at the nearest residential windows are lower than the measured daytime and night-time levels during the course of the environmental noise survey. Therefore, the anticipated L_{Amax} levels resulting from delivery activities would be of negligible significance. It is noted that BS 8233:2014 gives no specific daytime guidance on the impact of L_{Amax} levels, which are predominantly associated with sleep disturbance.
- 7.17. Within bedrooms with open windows, at worst L_{Amax} noise levels due to deliveries during the night-time are expected to be no higher than 39 dB, below the 42 dB threshold described in WHO 2009 guidance "for waking in the night and/or too early in the morning" and significantly below the guidance of 55dB L_{Amax} within Part "O" of the Building Regulations. Again, it is noted that that prevailing internal L_{Amax} levels at night in the absence of delivery activity are already above this level.

8.0 Plant noise assessment

- 8.1. It is proposed for plant noise to be no worse than "low impact" when assessed in accordance with BS 4142:2014.
- 8.2. The cumulative rating level for the proposed plant at the nearest residential windows should not therefore exceed the limits shown in the table below:

Table 11 Proposed plant sound emissions level limits at residences

Period	Cumulative plant rating sound limit, dB(A)
Daytime (07.00 – 23.00 hours)	52
Night-time (23.00 – 07.00 hours)	39

Plant noise impact assessment

- 8.3. The cumulative plant sound level at the most affected noise sensitive receptors has been predicted. The assessment has taken into consideration distance attenuation and directivity corrections. Screening effects have been considered where appropriate, including the boundary fence between the store and the bungalow to the east.

- 8.4. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3dB feature correction has been applied to the noise level predictions as advised in BS 4142:2014+A1:2019.
- 8.5. Table 12 summarises the results of the assessment at the most affected residential properties. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in [Appendix F](#).

Table 12 Assessment of predicted noise levels at nearest receptor

Receptor	Period	Predicted rating level at receptor, $L_{A,T,r}$ (dB)	Proposed design criterion (dB)	Difference (dB)
R1 – Bungalow to east	Daytime (07.00 – 23.00 hours)	28	52	-24
	Night-time (23:00 – 07:00 hours)	23	39	-16

- 8.6. The above assessment demonstrates that the proposed plant will comply with suitable Standards and accepted Guidance.

9.0 Discussion of results

Deliveries

- 9.1. The results of the assessment have demonstrated that the noise impact associated with deliveries to the store, during both daytime and night-time periods, will be below the level at which a 'low impact' is expected, when assessed in accordance with BS 4142:2014+A1:2019. Deliveries should continue to not be restricted.

External plant noise

- 9.2. As indicated in Section 8, the typical plant complies with suitable Standards and accepted Guidance. Therefore, plant noise should not be a reason for refusal of planning permission.

10.0 Conclusions

- 10.1. Noise Solutions Limited has been commissioned by Aldi Stores Limited to undertake an assessment of the noise impact from the external plant and delivery operations for the extended Aldi store at Watling Street, Hinckley.

- 10.2. In support of these assessment works, a baseline noise survey was undertaken to determine the prevailing environmental noise levels at the nearest noise sensitive receptors to the store during representative periods. This survey covered a weekend period, typically expected to be quieter than weekdays, and therefore represents a robust assessment.
- 10.3. Reference noise measurements of delivery activity at a similar operating Aldi store were used in the assessment.
- 10.4. The results of the survey were used to undertake an assessment of the likely noise impact from deliveries at the store. For the purposes of the assessment, the methodology used in BS 4142:2014+A1:2019 was utilised. Further assessments were undertaken taking into consideration guidance from the World Health Organisation and BS 8233:2014.
- 10.5. The results of the assessments were analysed and reviewed in line with the aims and advice contained within the National Policy Statement for England, the National Planning Policy Framework and the Planning Practice Guidance.
- 10.6. The assessment has concluded that deliveries during the daytime have a low noise impact, assessed using the method in BS 4142:2014+A1:2019. While night-time deliveries have a potential for an adverse noise impact assessed using the method in BS 4142:2014+A1:2019, the site is near a busy main road and the existing average noise levels would not increase. Maximum levels are also below both the prevailing internal L_{Amax} levels and the threshold described in WHO guidance for sleep disturbance.
- 10.7. Noise from deliveries during both daytime and night-time periods, including weekdays, weekends and bank holidays, is therefore considered to be within acceptable limits and no restrictions should be imposed on delivery operations.
- 10.8. Sound from the proposed external plant will comply with suitable Standards and accepted Guidance and should therefore be acceptable to the local authority.
- 10.9. Based on the findings of this assessment, sound emissions from external plant and delivery activities should not be a reason for refusal of planning permission.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10}(s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

Appendix B Aerial photograph of site and plan showing delivery route



Activity	Measured noise levels		Correction for no. of occurrences		Distance correction		Screening correction (dB)	Resultant SEL at receptor (dB)	Resultant L _{Amax} at receptor (dB)
	SEL @ 10m	L _{Amax} @10m	No. of occurrences	Correction (dB)	Distance (m)	Correction (dB)			
Lorry arrives and turns all forwards	69	61	1	0	30	-10	-5	54	46
Lorry reverses and manoeuvres into loading bay	65	58	1	0	35	-11	-5	49	42
Door open close	60	68	2	3	52	-14	-5	44	49
Cage/pallet movement	51	59	10	10	56	-15	-5	41	39
Engine starts and lorry leaves	74	71	1	0	52	-14	-5	55	52
							Cumulative SEL	58	
							L _{Aeq,1hr}	23	
							Range of L _{Amax}		39-52

R1 façade – Night-time

Activity	Measured noise levels		Correction for no. of occurrences		Distance correction		Screening correction (dB)	Resultant SEL at receptor (dB)	Resultant L _{Amax} at receptor (dB)
	SEL @ 10m	L _{Amax} @10m	No. of occurrences	Correction (dB)	Distance (m)	Correction (dB)			
Lorry arrives and turns all forwards	69	61	1	0	30	-10	-5	54	46
Lorry reverses and manoeuvres into loading bay	65	58	1	0	35	-11	-5	49	42
Door open close	60	68	1	0	52	-14	-5	41	49
Cage/pallet movement	51	59	5	7	56	-15	-5	38	39
Engine starts and lorry leaves	74	71	0	n/a	52	-14	-5		
Cumulative SEL								55	
L _{Aeq,1hr}								26	
Range of L _{Amax}									39-52

*NB it is not possible to undertake a full delivery operation in a 15-minute assessment period.

Appendix D Environmental sound survey

Details of environmental sound survey

- D.1 Measurements of the existing background sound levels were undertaken between 09.30 hours on Friday 28th April and 13.00 hours on Tuesday 2nd May 2023.
- D.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

- D.3 The representative measurement position was located on a lamp-post within the existing store car park (location indicated on the site plan in [Appendix B](#)). In accordance with BS 7445-2:1991 '*Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*', the measurements were undertaken under free-field conditions. This location is approximately representative of the levels of road traffic noise at the closest noise sensitive receptors.

Equipment

- D.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 97446	16/01/2023	1504305-1
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Svantek SV12L / 106487		
Calibrator	Svantek SV 30A / 10847	06/06/2022	1500577-1

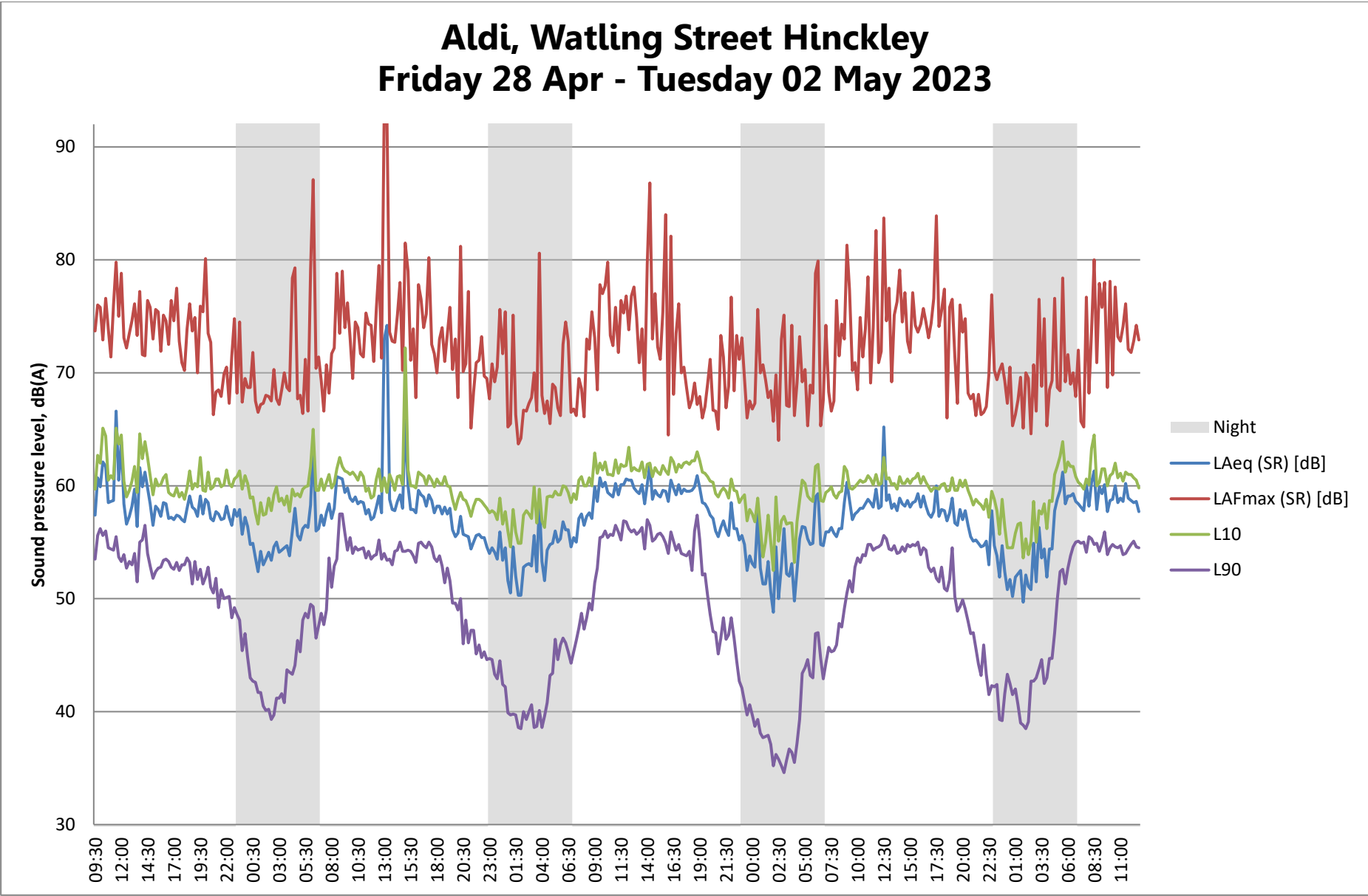
Weather conditions

- D.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	09.30 28/4/23 - 13.00 2/5/23	Temperature (°C)	15	14
Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Precipitation:	No	No
		Cloud cover (oktas - see guide)	8	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	3	<1
		Wind Direction	NW	NE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- D.6 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate and deliveries will be made. The noise climate during the setup and collection of the monitoring equipment was dominated by local and distant road traffic. The results of the survey are presented in a time history graph overleaf.



Appendix E Plant noise data

Manufacturers' plant noise data

Plant	Make/model	Operating period	Quantity	Source sound pressure level	
				dBA	at (m)
Heating units 1 - 4	Vaillant R290 VWL125	Day only	4	59	1
Refrigeration pack		Day and night	1	38	10
Refrigeration gas cooler		Day and night	1	35	10
LT Condensing Unit		Day and night	1	36	10
MT Condensing unit		Day and night	1	33	10

Receptor R1 façade Bungalow to east)

Plant	Source sound pressure level		Distance (m)	Correction (dB)	Directivity (dB)	Screening (dB)	BS4142 Feature (dB)	Rating level at receptor
	dBA	at (m)						
Pack	38	10	70	-17	0	-5	3	19
Cooler	35	10	70	-17	0	-5	3	16
LT unit	36	10	70	-17	0	-5	3	17
MT unit	33	10	70	-17	0	-5	3	14
ASHP1	59	1	70	-37	0	-5	3	20
ASHP2	59	1	70	-37	0	-5	3	20
AHSP3	59	1	70	-37	0	-5	3	20
ASHP4	59	1	70	-37	0	-5	3	20
Rating level (daytime – all plant running)								28
Rating level (night – heating plant off)								23