

The Co-operative
Ash Bank Road
Werrington
ST9 0JR

**Planning Noise
Assessment Report**

On behalf of

TSA Riley

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Contents

1.0	Introduction	1
2.0	Details of development proposals.....	1
	Proposed store and car park	1
	Proposed deliveries.....	1
	Proposed plant.....	2
3.0	Nearest noise-sensitive receptors.....	2
4.0	Noise policy	2
	Noise Policy Statement for England	2
	National Planning Policy Framework	3
	Planning Practice Guidance – Noise.....	5
	Staffordshire Moorlands District Council.....	7
5.0	Acoustic Standards and Guidance.....	8
	BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.....	8
	BS 4142:2014+A1:2019 Methods for Rating and Measuring Industrial and Commercial Sound..	9
6.0	Existing noise climate	11
7.0	Plant noise design criteria.....	16
8.0	Retail store delivery noise assessment.....	16
	Sound pressure levels of activities associated with store deliveries	16
	Predicted impact	17
	BS 8233:2014 and WHO delivery noise assessment	17
	BS 4142:2014 delivery noise assessment.....	18
	Recommended Delivery Noise Mitigation	20
9.0	Plant noise impact assessment.....	20
10.0	Noise impact of car park.....	21
	Opening hours	21
	Predicted impact of noise from car park	22
11.0	Discussion of results	24
	Deliveries	24
	Plant noise.....	25
	Noise from customers using car park	25
12.0	Summary	25

Appendices

Appendix A	Acoustic terminology
Appendix B	Photograph and images of site showing areas of interest
Appendix C	Site layouts
Appendix D	Environmental sound survey
Appendix E	Delivery noise impact calculations
Appendix F	Plant noise calculations
Appendix G	Car park activity noise assessment

Executive summary

Noise Solutions Limited has been commissioned to assess the impact of deliveries, plant noise and customer movement from a proposed Co-operative convenience store adjacent to Ash Bank Road, Werrington. This report is provided in support of a revised application following a prior refusal, of which noise was not grounds for refusal of planning permission.

The assessment of noise from deliveries shows the resulting internal noise levels will remain within acceptable levels of NOAEL and LOAEL. Short-term impacts are mitigated by a suitable service management plan and all best practical means. Deliveries will not be made early in the morning or late into the evening, and no more than two main warehouse deliveries will be made in any day.

The assessment of noise from the proposed plant, with close boarded timber fencing, shows that the cumulative rating levels at the nearest residential premises will comply with the local council's typical requirements.

The assessment of noise from use of the customer car park shows that the internal noise levels within the nearest residential premises will be below the level at which lowest adverse effects may be observed.

Based on the findings of this assessment, noise should not be grounds for refusal of planning permission for the proposed development.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned to undertake assessments of delivery, plant noise and customer movements at a proposed Co-operative convenience store adjacent to Ash Bank Road, Werrington.
- 1.2. This report presents the results of an environmental noise survey, the applicable policies and guidance, and a noise impact assessment to support a planning application.
- 1.3. To assist with the understanding of this report a brief glossary of acoustic terms can be found in **Appendix A**. A more in-depth glossary of acoustic terms can be assessed at the following web address <http://www.acoustic-glossary.co.uk/>.

2.0 Details of development proposals

Proposed store and car park

- 2.1. The proposed Co-operative store is to occupy a standalone single storey building.
- 2.2. Seventeen car parking spaces, including one space for Blue Badge holders, and one parent and child space, will be located at the front of the premises, at the northeast of the site.
- 2.3. Plans of the development are shown in **Appendix B** and **Appendix C**.

Proposed deliveries

- 2.4. For stores of this type, main warehouse deliveries are typically made by a vehicle no larger than a 12m HGV. Each delivery will take no longer than one hour to complete, the deliveries would not be within the same hour, and no overlap would occur. Ambient, fresh and frozen deliveries would occur in total once or twice per day, between 07.00 and 20.00 hours from Monday to Saturday, and between 10.00 and 20.00 hours on Sundays.
- 2.5. Smaller deliveries will be made via third party suppliers (sandwiches, bread, newspapers, etc.); however, the vehicles and loads associated with these deliveries are not anticipated to result in any significant noise impact, since they are smaller vehicles and metal roll cages are not used.
- 2.6. The proposed loading bay is at the front of the store on the southeast corner. Vehicles will enter the car park forwards from Ash Bank Road and reverse to the back of house entrance door, towards the southeast of the building. This will minimise the distance over which trolleys and cages will need to be moved between the rear of the vehicle and the warehouse door. Goods will be unloaded into the BOH by trolleys. The delivery vehicles will leave the car park in forward gear onto Ash Bank Road.

Proposed plant

- 2.7. The proposed plant is to comprise of refrigeration plant and air-conditioning (AC) plant. The plant area will be located in a service yard at the rear of the store to the south. Close boarded timber fencing is proposed around the plant area, with the exception of the northeast boundary which is bounded by palisade fencing.
- 2.8. The proposed refrigeration plant will potentially operate 24 hours a day, although it should be noted that these units operate as required to meet demand and that store demands for cooling are generally reduced at night. AC plant will only operate during store opening hours.
- 2.9. The proposed plant layout is shown in [Appendix C](#). Manufacturer's plant noise data is given in [Appendix F](#).

3.0 Nearest noise-sensitive receptors

- 3.1. The area surrounding the site is mainly residential in nature. The nearest noise-sensitive receptor to the deliveries will be the houses on Spindlestone Close (Receptor R1), approximately 20 metres northeast of the loading bay, and on Salters Close (Receptor R2), approximately 16 metres east of the loading bay.
- 3.2. The nearest noise-sensitive receptor to the plant area will be the house on Salters Lane (Receptor R3), approximately 10 metres west of the plant area. The next closest noise-sensitive receptor to the plant area will be the house on Salters Close (Receptor R4), approximately 15 metres southeast of the plant area.
- 3.3. The nearest noise-sensitive receptors to the car park will be receptors R1 and R2.
- 3.4. [Appendix B](#) contains an aerial photograph showing the site and surrounding area.

4.0 Noise policy

Noise Policy Statement for England

- 4.1. The Noise Policy Statement for England (NPSE¹), 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;*

¹ Noise Policy Statement for England, Defra, March 2010

- *mitigate and minimise adverse effects on health and quality of life; and*
 - *where possible, contribute to the improvement of health and quality of life."*
- 4.2. 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.
- 4.3. 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."*
- 4.4. Importantly, the NPSE goes on to state that: *"This does not mean that such adverse effects cannot occur."*
- 4.5. 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."*
- 4.6. 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.

National Planning Policy Framework

- 4.7. A new edition of the NPPF was published in December 2024 and came into effect immediately, with corrections published in February 2025. The original National Planning Policy Framework (NPPF²) was published in March 2012, with subsequent revisions made periodically - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The December 2024/February 2025 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the December 2024/ February 2025 edition.
- 4.8. Paragraph 187 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing new and existing*

² National Planning Policy Framework, DCLG, March 2012

development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."

4.9. The NPPF goes on to state in Paragraph 198:

"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 ...*

4.10. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE³).

4.11. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission be determined in accordance with the development plan unless material considerations indicate otherwise."*

4.12. 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."*

4.13. Paragraph 124 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".*

³ Noise Policy Statement for England, DEFRA, March 2010

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

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

- 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 PPG Noise effects table

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
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

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

Response	Examples of Outcomes	Increasing Effect Level	Action
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."

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".

Staffordshire Moorlands District Council

4.23. Staffordshire Moorlands District Council's policy for the assessment of noise from fixed plant installations has been advised as follows:

"The machinery, plant or equipment including installed or operated in connection with the carrying out of this permission shall be so enclosed and/or attenuated that the noise generated

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

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

by the operation of the machinery shall not increase the background noise levels during day time expressed as LA90 [1hour] (day time 07:00-23:00 hours) and/or (b) LA90 [15 mins] during night time (night time 23:00-07:00 hours) at any adjoining noise sensitive locations or premises in separate occupation above that prevailing when the machinery is not operating. Noise measurements for the purpose of this condition shall be pursuant to BS 4142:2014. The details and location of any plant or machinery to be installed under this permission should be submitted to and approved of in writing by the Local Planning Authority."

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 (1999). These guideline noise levels are shown in Table 2, below:

Table 2 BS 8233:2014 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."* While the current edition of the standard gives no specific guidance on internal night-time L_{Amax} sound levels, the previous edition¹⁰ recommended that:

For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax} .

- 5.3. The standard also provides advice in relation to design criteria for external noise. It states that:

"for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However,

⁹ World Health Organisation Guidelines for Community Noise, 1999

¹⁰ BS 8233:1999 Sound insulation and noise reduction for buildings – Code of practice

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.

...

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

BS 4142:2014+A1:2019 Methods for Rating and Measuring Industrial and Commercial Sound

- 5.4. BS 4142:2014+A1:2019¹¹ describes a method for rating and assessing sound of an industrial or commercial nature, which includes:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 5.5. Therefore, for the first time in the UK, noise associated with store deliveries (i.e. sound from loading and unloading of goods) has a recognised and approved assessment methodology as this type of noise was not included in the scope of previous versions of BS 4142.

¹¹ For the purposes of brevity, references in this report to "BS 4142:2014" or "BS 4142" should be read as BS 4142:2014 + A1:2019

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- 5.6. The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.
- 5.7. The procedure contained in BS 4142 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.
- 5.8. 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.
- 5.9. 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."
- 5.10. 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."
- 5.11. The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that: "A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."
- 5.12. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- 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.*
 - 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."

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."

- 5.13. 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."

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

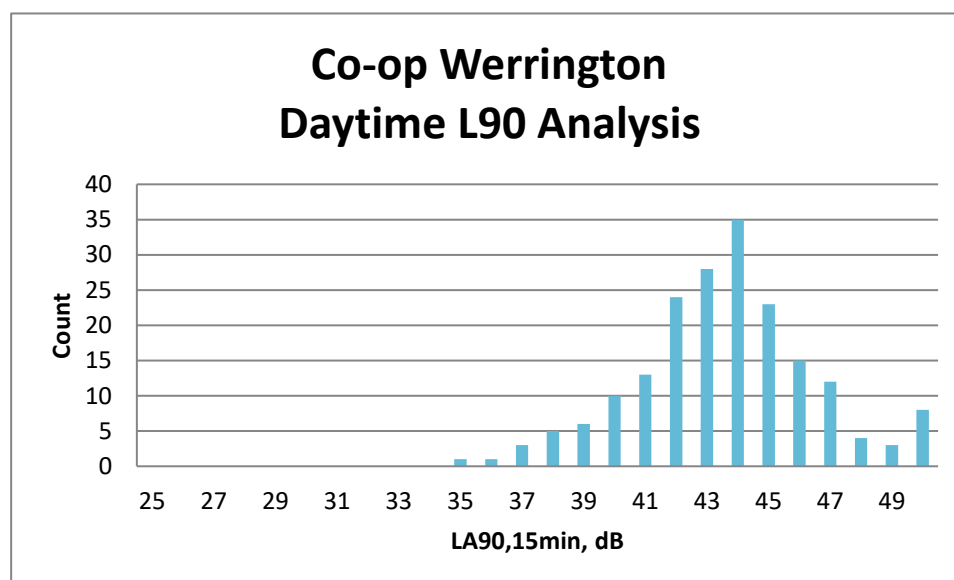
6.0 Existing noise climate

- 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 nearest noise sensitive receptors.
- 6.2. The results of the environmental sound survey are summarised in Table 3 below. The full set of measurement results and details of the survey methodology are presented in [Appendix D](#).

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)	43-69	59-93	46-68	35-50
Delivery hours (07.00 – 20.00 hours)	49-69	65-93	52-68	39-49
Night-time (23.00 – 07.00 hours)	32-53	52-75	31-56	25-45

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



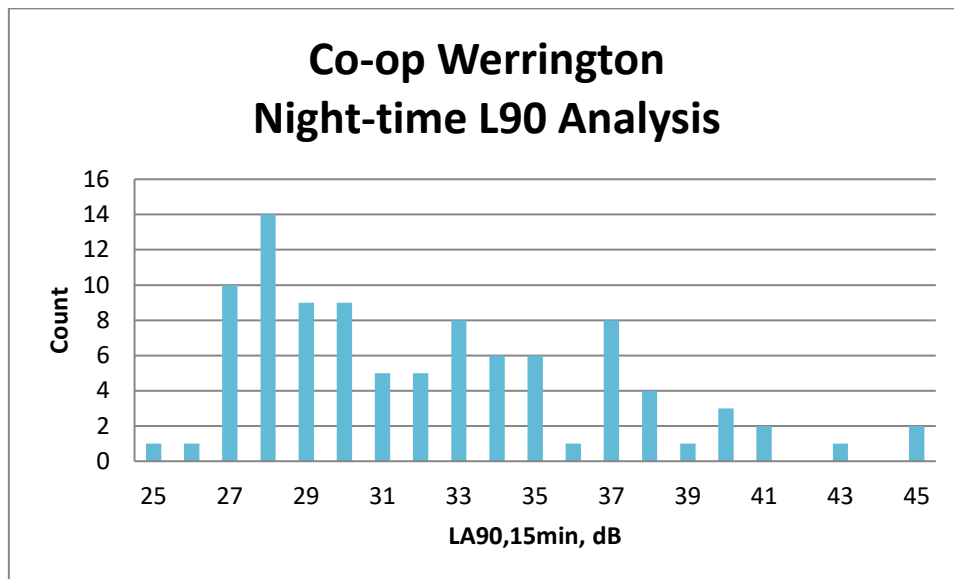
- 6.3. Additional statistical analysis has been undertaken. As shown in Table 4, the mean, median, and modal values have been calculated:

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

dB, L _{A90} daytime period	
Mean	44
Median	44
Mode	44

- 6.4. From reviewing the above histogram, 42dB has been selected to be robustly representative of the background sound level in this area.

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



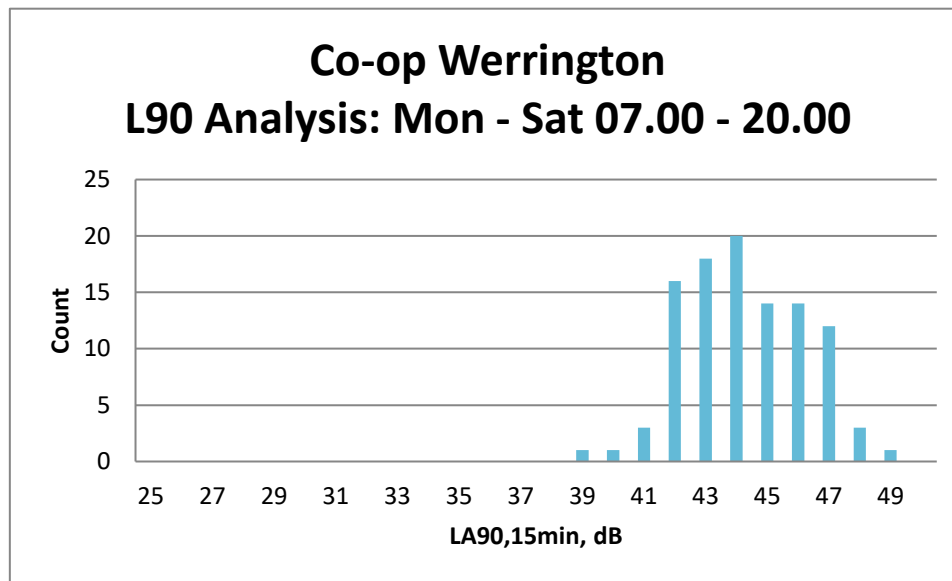
- 6.5. Additional statistical analysis has been undertaken. As shown in Table 5, the mean, median, and modal values have been calculated:

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

dB, L_{A90} night-time period	
Mean	32
Median	31
Mode	28

- 6.6. From reviewing the above histogram, 27dB has been selected to be representative of the night-time background sound level in this area.
- 6.7. Additionally, background sound levels during the proposed delivery hours have been analysed to determine representative values.

Figure 3 Histogram of L_{A90} background sound pressure levels during proposed Mon – Sat delivery hours



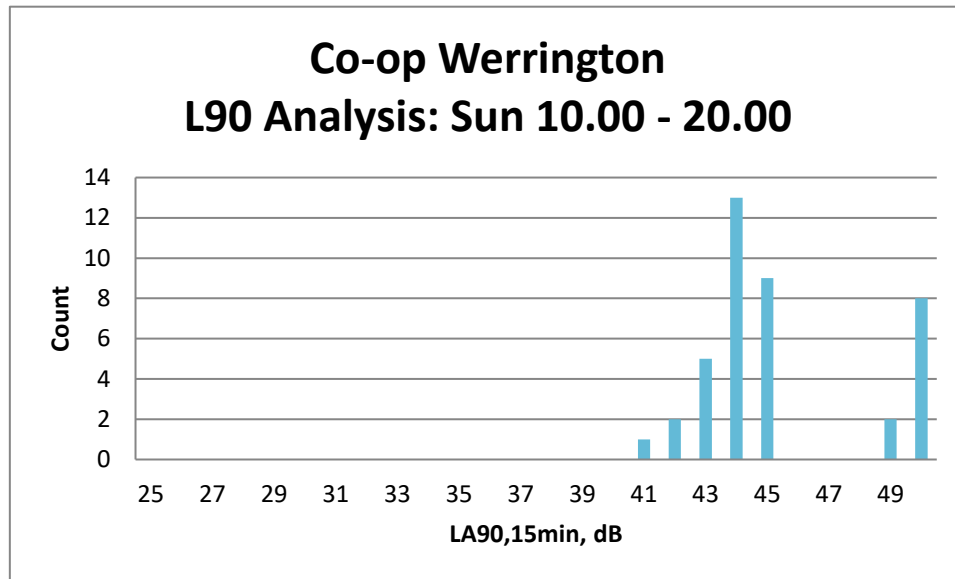
- 6.8. Additional statistical analysis has been undertaken. As shown in Table 6, the mean, median, and modal values have been calculated:

Table 6 Statistical analysis of $L_{A90,15min}$ levels during the Mon – Sat delivery hours

dB, L_{A90} Mon – Sat 07.00 – 20.00 hours	
Mean	44
Median	44
Mode	44

- 6.9. From reviewing the above histogram, 42dB has been selected to be representative of the background sound level in this area during this period.

Figure 4 Histogram of L_{A90} background sound pressure levels during proposed Sunday delivery hours



- 6.10. Additional statistical analysis has been undertaken. As shown in Table 7, the mean, median, and modal values have been calculated:

Table 7 Statistical analysis of $L_{A90,15min}$ levels during the Sunday delivery hours

dB, L_{A90} Sun 10.00 – 20.00 hours	
Mean	45
Median	44
Mode	44

- 6.11. From reviewing the above histogram, 44dB has been selected to be representative of the background sound level in this area during this period.
- 6.12. Therefore, the following values are considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:
- 42dB L_{A90} during the daytime period;
 - 27dB L_{A90} during the night-time period;
 - 42dB L_{A90} between 07.00 and 20.00 hours Monday to Saturday;
 - 44dB L_{A90} between 10.00 and 20.00 hours on Sunday.

7.0 Plant noise design criteria

- 7.1. In accordance with Staffordshire Moorlands District Council requirements, it is proposed that during the daytime the noise level of the plant should be 10dB below the existing background noise level at the nearest residential receptor.
- 7.2. In view of the low background sound levels at night, and in accordance with the recommendations in BS 4142:2014 in such circumstances, it is proposed that at night the plant noise level at the nearest residential window is no higher than 30dBA. At worst this will result in internal noise levels of around 15-20dBA when windows are open, a level lower than that resulting from domestic refrigerators etc. within the dwellings.
- 7.3. The noise level resulting from the proposed plant, at the nearest residential receptors, should therefore not exceed the limits shown in the table below:

Table 8 Proposed plant noise emissions level limits at noise sensitive residential receptors

Period	Cumulative plant noise level, dB(A)
Daytime (07.00 – 23.00 hours)	32
Night-time (23.00 – 07.00 hours)	30

8.0 Retail store delivery noise assessment

Sound pressure levels of activities associated with store deliveries

- 8.1. The sound pressure levels associated with refrigerated lorry deliveries were established by measurement of a delivery at a similar convenience store 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.
- 8.2. It should be noted that the example delivery represented a standard operation; the refrigeration unit was switched off as standard. The Service Management Plan for the store also confirms that refrigeration units will be switched off and that all Co-op delivery vehicles are fitted with white noise reversing alarms.
- 8.3. Table 9 below 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 9 Reference noise data for delivery activities (at 10m)

Noise Source	SEL, dB(A)	L _{AFmax} , dB(A)
Lorry arrives and manoeuvres	68	62
Lorry manoeuvring-first movement (no reversing alarms)	75	66
Unloading cages on to lift	71	74
Unloading pallets on to lift	75	73
Lift up	73	65
Lift down	71	71
Unloading cages into BoH	78	75
Lorry departure	75	68

Predicted impact

- 8.4. The information contained in Table 9 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:

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

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.

- 8.5. The delivery noise level at each of the nearest residential windows has been predicted. Full calculations are shown in [Appendix E](#) and are summarised in Table 10.

Table 10 Predicted delivery noise levels

Receptor	Predicted noise levels at window of most affected residential dwelling	
	L _{Aeq,T} , dB	Range of L _{Afmax} (dB)
R1	45	54 - 64
R2	48	49 - 67

BS 8233:2014 and WHO delivery noise assessment

- 8.6. As no deliveries are proposed at night (23.00 to 07.00 hours), only the daytime internal noise criterion of an L_{Aeq,16hr} not exceeding 35dBA applies. BS 8233:2014 notes that a window left partially open for ventilation has a sound insulation of around 15dB. Therefore, the limiting external noise level at the receptor window would be 50dBA to meet the guidelines from BS 8233:2014 and WHO.

- 8.7. With two deliveries per day, internal noise levels of around 24dB $L_{Aeq,16 \text{ hours}}$ would be expected within the worst-affected room to the delivery area. The internal daytime noise levels are comfortably below 35dBA and will result in adverse effect levels between NOAEL and LOAEL, which is in line with the guidance given in NPSE and PPG.

BS 4142:2014 delivery noise assessment

- 8.8. Table 11 below presents the initial assessment of the likely impact during the daytime period in accordance with the BS 4142:2014 methodology at receptor R2, where noise levels are predicted to be highest.

Table 11 Assessment of predicted external delivery noise levels at Receptor R2 using BS 4142:2014 during the daytime period

Results	Mon-Sat 07.00 – 20.00	Sun 10.00 – 20.00	Relevant Clauses of BS 4142:2014	Commentary
Background Sound level	$L_{A90} = 42\text{dB}$	$L_{A90} = 44\text{dB}$	8.1, 8.2	Representative typical background sound level during permitted delivery period, determined from a range of measurements
Assessment made during the daytime, so the reference interval is one hour			7.2	
Specific Sound Level	$L_{Aeq,T} = 48\text{dB}$		7.3.6	Calculations presented in Appendix E
Acoustic Feature Correction	5dB		9.2	See Appendix E
Rating Level	$(48+5) \text{ dB} = 53\text{dB}$			
Excess of Rating Level over background sound level	$(53 - 42) \text{ dB} = +11\text{dB}$	$(53 - 44) \text{ dB} = +9\text{dB}$		
Context	Site is on a road with local traffic, producing short periods of high noise levels.			
Assessment of impact:	Possible significant adverse impact depending on the context			

- 8.9. The assessment indicates that, for deliveries made within the typical delivery periods as noted, the rating level is 9 – 11dB above the representative background sound level and there is therefore the possibility of a short-term significant adverse noise impact. However, the predicted impact is dependent on context and proposed mitigation measures.

- 8.10. The site is next to a main road with local traffic, producing short periods of high noise levels. This is evident from the daytime delivery hours average $L_{Aeq T}$ of 56dB. As such, noise resulting from deliveries will remain below the existing traffic noise levels at the nearest receptors.
- 8.11. It is to be appreciated that the BS 4142 assessment relates to external noise levels only. To assess internal noise levels, it would be necessary to take into account the sound attenuation provided by windows and ventilation provisions at nearby dwellings and to assess internal noise levels according to guidelines in BS 8233 and WHO.
- 8.12. As shown from the BS 8233 assessment above, the resulting noise levels from deliveries will result in between NOAEL and LOAEL. In this context, NPSE advises: *"...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."*
- 8.13. The following must, therefore, also be taken into consideration when determining the potential daytime impact that may be experienced:
- Deliveries will not occur in the early morning or late evening, and there are only up to nine main depot deliveries in a week. Main warehouse deliveries would be made during the daytime period between 07.00 and 20.00 hours.
 - The assessment is undertaken at a single residential window. The impact on all other residential windows will be lower due to distance/screening losses.
 - The assessment has assumed the worst-case scenario in terms of the levels of noise produced. Providing that the trollies are well maintained, it is likely that the noise from the deliveries will be quieter than the levels predicted above.
 - A robust +5dB penalty has been added to the rating level.
 - The distance over which trolleys and cages will be moved is minimised by the proximity of the lorry delivery area to the back of house door. The duration of each movement will therefore be reduced to the shortest practical period.
 - The number of expected deliveries by large lorries is low (i.e. typically one in the morning, one in the afternoon each day).
 - Delivery activities are only proposed during the daytime with no activity proposed in the late evening.
 - A service management plan is proposed to mitigate delivery noise.

Recommended Delivery Noise Mitigation

- 8.14. The Co-op's Service Management Plan for the store contains the following elements with regard to minimising the noise impact of delivery operations.
- Noise levels to be kept to a minimum
 - Vehicle radios to be turned off
 - Refrigeration units to be switched off when stationary
 - Mechanical noise generation from vehicles manoeuvring into unloading positions to be kept to a minimum
 - Drivers will:
 - Engage gears with a minimum of noise
 - Keep engine revs to a minimum and switch off engine when stationary
 - Apply brakes gently
 - Close doors with minimal noise
- 8.15. Local store management will undertake a minimum of weekly checks to ensure that this plan is adhered to, with regional management undertaking additional unannounced checks.
- 8.16. With the above mitigation measures, adverse effect levels from delivery noise will remain acceptable within NOEL and LOEL.

9.0 Plant noise impact assessment

- 9.1. The cumulative plant noise level at the most affected noise sensitive receptor has been predicted based on manufacturer's noise data for the proposed equipment. The assessment has taken into consideration distance attenuation and directivity.
- 9.2. The predictions are inclusive of screening attenuation from 1.8m tall close boarded timber fence installed on the southwest and southeast boundaries of the plant area. The fence must be close boarded and imperforate with no gaps in or under the screen. The fence will have a minimum density of 15kg/m².
- 9.3. Table 12 summarises the results of the assessment at the most affected properties. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in [Appendix F](#).

Table 12 Assessment of predicted sound pressure levels at the nearest noise sensitive receptors

Receptor	Period	Predicted sound pressure level at receptor, L_{Aeq} (dB)	Criterion (dB)	Difference
R3	Daytime (07.00 - 23.00 hours)	32	32	+0
	Night-time (23.00 - 07.00 hours)	17	30	-13
R4	Daytime (07.00 - 23.00 hours)	26	32	-6
	Night-time (23.00 - 07.00 hours)	16	30	-14

- 9.4. The assessment shows that with the proposed fence in place, the cumulative plant noise levels will comply with the proposed criteria.

10.0 Noise impact of car park

Opening hours

- 10.1. The main source of operational noise associated with a convenience store of the type proposed is the arrival and departure of customers, and particularly car movements to and from the car park.
- 10.2. BS 4142:2014 'Methods for Rating and Measuring Industrial and Commercial Sound' is explicit in its scope that noise from people should not be assessed using its methodology. Guidance in BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' confirms that for sporadic sources it may not be appropriate to set specific noise limits and that bespoke limits may be set instead. Therefore, for the purposes of this assessment and in line with guidance in BS 8233:2014, an internal level of 35dB L_{Aeq} is proposed as a *Lowest Observed Adverse Effect Level*, with a *Significant Observed Adverse Effect Level* of 50dB¹² L_{Aeq} . BS 8233:2014 indicates that a reduction of approximately 15 dBA between the external and internal noise levels results when a window is open for ventilation.
- 10.3. The noise from the car park will comprise the noise produced from vehicles entering and departing the car park, engines starting, car doors closing etc. The patrons of the store may also converse with each other or on the phone whilst they walk back and forth from their vehicles. Other patrons who may not drive may also be present.

¹² HS2 noise impact assessment which has been approved by the secretary of state implies a 15dB difference between the LOAEL and SOAEL for transportation noise.

- 10.4. For the purposes of the assessment, it is necessary to estimate the likely number of car park movements in the busiest hour of the day, with each movement consisting of the arrival of car, its occupants walking from the car to the store and back, and the car departing. To give a robust assessment it is assumed that all customers will talk during their journeys.
- 10.5. For calculation purposes the car park is divided into seven “zones”, as shown in [Appendix C](#). These are:
- Zone A – Blue Badge and Parent and Child Spaces adjacent to store entrance (two spaces)
 - Zone B – two spaces for customers adjacent to store entrance
 - Zone C – one space for customers near store entrance
 - Zone D – six spaces for customers on northeast site boundary
 - Zone E – five spaces for customers on northeast site boundary
 - Zone F – one space for customers on northeast site boundary
- 10.6. Predicted vehicle movements within the car park over a typical weekday has been provided¹³. It is assumed that during the peak hour there will be a total of 36 separate sets of car movements to the store. Outside the peak times the number of visits is likely to be substantially lower.
- 10.7. Table 13 below details typical source noise level used in this assessment with the data presented in terms of SEL.

Table 13 Reference noise data for assessment

Activity	Measurement Data				
	L _{Aeq,T}	Distance (m)	Time (s)	SEL (dB)	SEL normalised to 10m (dB)
Car movement	58	3	15	70	60
A person talking	60	1	15	72	52

Predicted impact of noise from car park

- 10.8. The information in Table 13 was used to calculate a source noise level based on the number of activity events over the assessment period.

¹³ Gross Trip Generation Calcs, Exigo Project Solutions, received 6 November 2025

- 10.9. The noise level associated with each part of a visit is calculated by considering each visit in stages:
- Car arrives through car park access from Ash Bank Road and drives to parking space
 - Customers walk to the store, and return
 - Car starts, manoeuvres and leaves car park onto Ash Bank Road
- 10.10. With regard to the likely usage of the car parking spaces, it is assumed that the spaces closest to the store entrance (Zones A to C in [Appendix C](#)) are used more frequently than the other spaces, with the following predicted rates:
- Zone A – three arrivals and departures to each space (total six vehicles)
 - Zone B – four arrivals and departures to each space (total eight vehicles)
 - Zone C – four arrivals and departures to each space (total four vehicles)
 - Zone D – two arrivals and departures to each space (total twelve vehicles)
 - Zone E – one arrival and departure to each space (total five vehicles)
 - Zone F – one arrival and departure to each space (total one vehicle)
- 10.11. As the predicted vehicle movements in 10.6 is inclusive of cycles and motorcycles, the total number of cars in each parking space is likely to be lower and the assessment remains robust. It is assumed that during the peak hour a further 20 customers arrive on foot.
- 10.12. The calculations are included in [Appendix G](#) and summarised in Table 14. As described in BS 8233:2014, the typical noise reduction provided by an open window is around 15 dBA, and this has been used to predict the resulting highest internal noise levels at the receptor.

Table 14 Predicted car park sound levels at receptor

Receptor	L _{Aeq,1hr}	
	External Noise Level, dB	Internal Noise Level (open window), dB
R1	37	22
R2	35	20

- 10.13. Using the method described above, the predicted car park noise level, during the noisiest hour, is below the *Lowest Observed Adverse Effect Level* inside the nearest existing residential receptors, even with windows open.
- 10.14. During less-busy periods, the noise level will be lower than the levels predicted in Table 14.

11.0 Discussion of results

- 11.1. Where possible uncertainty in the above assessments has been minimised by taking the following steps:
- The measurement of the background sound levels was taken over a 72-hour weekend period.
 - The meter and calibrator used have a traceable laboratory calibration and was field calibrated before and after the measurements.
 - Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
 - Care was taken to ensure that the measurement positions were representative of the noise climate outside the nearby residential dwellings and not in positions where higher noise levels were present.

Deliveries

- 11.2. The BS 8233:2014 assessment for the internal noise level demonstrates that during the proposed delivery window internal noise is below the LOAEL and is therefore acceptable in planning terms.
- 11.3. The BS 4142 assessment indicates that noise from deliveries may be of potential significant adverse impact *depending on the context*. It should be noted that noise resulting from deliveries are predicted to be lower than existing traffic noise levels.
- 11.4. Main warehouse deliveries occur no more than twice in any day and not in the early morning or late evening.
- 11.5. Following guidance from the NPSE to "*mitigate and minimise adverse effects on health and quality of life*", the impact of noise from deliveries is to be minimised by application of a service management plan.

Plant noise

- 11.6. The plant noise impact assessment shows that the cumulative noise emissions from the proposed plant will comply with the proposed limits at the nearest residential premises.

Noise from customers using car park

- 11.7. A noise impact assessment of car park noise shows that, even during the busiest periods, the resulting noise level inside the nearest noise-sensitive receptors is below the LOAEL and is therefore acceptable.

12.0 Summary

- 12.1. Noise Solutions Ltd (NSL) has been commissioned to undertake assessments of delivery, plant noise and customer movements at a proposed Co-op store in Werrington.
- 12.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors.
- 12.3. 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 8233:2014 was utilised with guidance from the World Health Organisation and NPSE. Further assessments were undertaken with BS 4142:2014. Reference noise measurements of delivery activity at a similar operating convenience store were used in the assessment.
- 12.4. Noise from deliveries will remain acceptable within NOAEL and LOAEL at the nearest receptor. All best practical means have been considered to minimise the short-term impact of deliveries including the restriction of delivery hours to ensure no deliveries will occur during the late evening or night, and the inclusion of a suitable service management plan. The conclusion also takes into account that the HGV deliveries will be limited to one or two per day and will be of short duration.
- 12.5. With the close boarded timber fence in place, the cumulative noise emissions from the proposed plant serving the store will result in no worse than a "low impact" when assessed using the methodology in BS 4142:2014 + A1:2019.
- 12.6. An assessment of the noise impact of customer visits shows that noise from the car park is below the *Lowest Observed Adverse Effect* level inside the nearest noise-sensitive receptors, even during the busiest one-hour periods and with the receptor windows open.
- 12.7. Based on the findings of this assessment, noise should not be grounds for refusal of planning permission for the proposed development.

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 that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Photograph and images of site showing areas of interest



Photograph 1 Courtesy of Google Earth

Appendix C Site layouts

Proposed site layout with car park zones



Appendix D Environmental sound survey

Details of environmental sound surveys

- D.1 Measurements of the existing environmental sound levels were undertaken between 10.15 hours on Friday 7th November and 10.00 hours on Monday 10th November 2025.
- 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 fifteen-minute sample periods for the duration of the survey.

Measurement position

- D.3 The representative measurement position was located on a lamppost on Salters Close, representative of the nearest noise-sensitive property (location indicated on the site plan in [Appendix B](#)). In accordance with BS 7445-2:21991 '*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.

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	16/01/2025	1511004-1
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Microtech MK255 / 20194		
Calibrator	Svantek SV 30A / 10847	13/06/2025	1512563-1

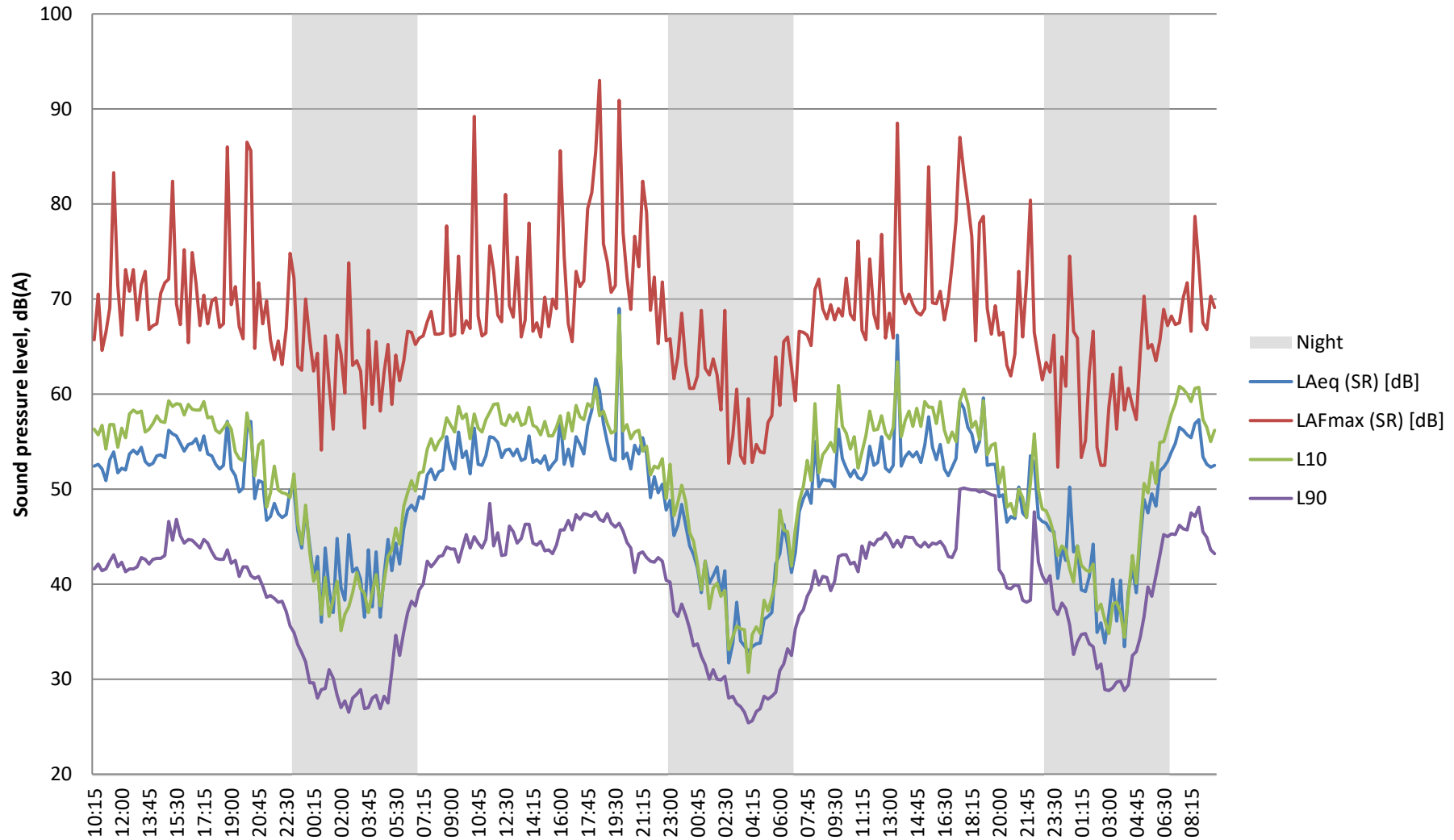
- D.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the installation and removal of the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

Weather Conditions				
Measurement Location	Time/Date	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	10.15 7/11/25 - 10.00 10/11/25	Temperature (°C)	11	11
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	3
		Presence of fog/snow/ice	Fog	No
		Presence of damp roads/wet ground	No	Yes
		Wind Speed (m/s)	0.6	0.1
		Wind Direction	SE	SE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- D.6 The results of the survey are considered to be representative of the background sound pressure levels at the façades of the most affected noise sensitive receptors to the plant area and service yard. During installation and removal of the meter, the noise climate at the measurement position was dominated by distant road traffic, with occasional noise from birds.
- D.7 The results of the survey are presented in a time history graph overleaf.

Co-op Werrington Friday 07 - Monday 10 Nov 2025



Appendix E Delivery noise impact calculations

Receptor R1

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)	BS4142 feature corr'n	SEL + feature
	SEL @ 10m	L _{Amax} @ 10m	No.	Corr'n (dB)	Distance (m)	Corr'n (dB)					
Lorry arrival	68	62	1	0	26	-8	0	60	54	0	60
Lorry manoeuvring-first movement (no reversing alarms)	75	66	1	0	26	-8	0	67	58	3*	70
Unloading cages on to lift	71	74	10	10	35	-11	0	70	63	6**	76
Unloading pallets on to lift	75	73	10	10	35	-11	0	74	62	6**	80
Lift up	73	65	10	10	35	-11	0	72	54	3*	75
Lift down	71	71	10	10	35	-11	0	70	60	3*	73
Unloading cages into BoH	78	75	10	10	35	-11	0	77	64	6**	83
Lorry departure	75	68	1	0	27	-9	0	66	59	0	66
Combined								81			86
Overall feature correction											+5
L_{Aeq} (1hour)								45			
Range of L_{Amax}									54 - 64		

*+3dB correction for intermittency

**+6dB for clearly perceptible impulsivity

Receptor R2

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)	BS4142 feature corr'n	SEL + feature
	SEL @ 10m	L _{Amax} @ 10m	No.	Corr'n (dB)	Distance (m)	Corr'n (dB)					
Lorry arrival	68	62	1	0	44	-13	0	55	49	0	55
Lorry manoeuvring-first movement (no reversing alarms)	75	66	1	0	38	-12	0	63	54	3*	66
Unloading cages on to lift	71	74	10	10	25	-8	0	73	66	6**	79
Unloading pallets on to lift	75	73	10	10	25	-8	0	77	65	6**	83
Lift up	73	65	10	10	25	-8	0	75	57	3*	78
Lift down	71	71	10	10	25	-8	0	73	63	3*	76
Unloading cages into BoH	78	75	10	10	25	-8	0	80	67	6**	86
Lorry departure	75	68	1	0	30	-10	0	65	58	0	65
Combined								84			89
Overall feature correction											+5
L_{Aeq} (1hour)								48			
Range of L_{Amax}									49 – 67		

*+3dB correction for intermittency

**+6dB for clearly perceptible impulsivity

Appendix F Plant noise calculations

Manufacturer's noise data

Plant	Make / Model	No. of units	Sound Pressure Level
Refrigeration Pack	Space Engineering ST – 3A Pack	1	20dBA @ 10m
Gas Cooler	Kelvion GF-SA103F5H-063M038	1	22dBA @ 10m
AC1-3	Mitsubishi PUZ-ZM125YKA w/Deflector	3	54dBA @ 1m

Plant	Plant noise level at source		Distance to receptor		Directivity	Acoustic Screening	Resultant at receptor dB(A)
	Noise level, dB(A)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration Pack	20	10	14	-3	3	-5	15
Gas Cooler	22	10	11	-1	3	-11	13
AC1	54	1	13	-22	3	-7	28
AC2	54	1	14	-23	3	-7	27
AC3	54	1	16	-24	3	-7	26
Combined sound pressure level, dB L _{Aeq}							32

Plant	Plant noise level at source		Distance to receptor		Directivity	Acoustic Screening	Resultant at receptor dB(A)
	Noise level, dB(A)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration Pack	20	10	14	-3	3	-5	15
Gas Cooler	22	10	11	-1	3	-8	13
Combined sound pressure level, dB L _{Aeq}							17

Receptor R4 daytime

Plant	Plant noise level at source		Distance to receptor		Directivity	Acoustic Screening	Resultant at receptor dB(A)
	Noise level, dB(A)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration Pack	20	10	16	-4	3	-5	14
Gas Cooler	22	10	17	-5	3	-9	11
AC1	54	1	21	-26	3	-10	21
AC2	54	1	20	-26	3	-10	21
AC3	54	1	19	-26	3	-10	21
Combined sound pressure level, dB L _{Aeq}							26

Receptor R4 night-time

Plant	Plant noise level at source		Distance to receptor		Directivity	Acoustic Screening	Resultant at receptor dB(A)
	Noise level, dB(A)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	
Refrigeration Pack	20	10	16	-4	3	-5	14
Gas Cooler	22	10	17	-5	3	-9	11
Combined sound pressure level, dB L _{Aeq}							16

Appendix G Car park activity noise assessment

Receptor R1

Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq, 1hr} @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R1, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
Access to car park											
Car Pass by	58	3	15	70	60	76	43	36	-11	0	32
Pedestrians on foot											
People talking	60	1	15	72	52	20	29	44	-13	0	16
ZONE A (Spaces 1 to 2)											
Car Pass by	58	3	15	70	60	12*	35	40	-12	0	23
People talking	60	1	15	72	52	12	27	40	-12	0	15
ZONE B (Spaces 3 to 4)											
Car Pass by	58	3	15	70	60	16	36	36	-11	0	25
People talking	60	1	15	72	52	16	28	36	-11	0	17
ZONE C (Spaces 5)											
Car Pass by	58	3	15	70	60	8	33	41	-12	0	21
People talking	60	1	15	72	52	8	25	41	-12	0	13
ZONE D (Spaces 6 to 11)											
Car Pass by	58	3	15	70	60	24	38	20	-6	0	32
People talking	60	1	15	72	52	24	30	20	-6	0	24

Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq, 1hr} @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R1, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
ZONE E (Spaces 12 to 16)											
Car Pass by	58	3	15	70	60	10	34	20	-6	0	28
People talking	60	1	15	72	52	10	26	20	-6	0	20
ZONE F (Spaces 17)											
Car Pass by	58	3	15	70	60	2	27	31	-10	0	17
People talking	60	1	15	72	52	2	19	31	-10	0	9
*2no. spaces, each used 3 times, with each car entering and exiting the car park. 2x3x2=12 movements.									Total dB L _{Aeq,1hr}		37

Receptor R2

Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq, 1hr} @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R2, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
Access to car park											
Car Pass by	58	3	15	70	60	76	43	41	-12	0	31
Pedestrians on foot											
People talking	60	1	15	72	52	20	29	45	-13	0	16
ZONE A (Spaces 1 to 2)											
Car Pass by	58	3	15	70	60	12*	35	41	-12	0	23
People talking	60	1	15	72	52	12	27	41	-12	0	15

Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq, 1hr} @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R2, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
ZONE B (Spaces 3 to 4)											
Car Pass by	58	3	15	70	60	16	36	33	-10	0	26
People talking	60	1	15	72	52	16	28	33	-10	0	18
ZONE C (Spaces 5)											
Car Pass by	58	3	15	70	60	8	33	47	-13	0	20
People talking	60	1	15	72	52	8	25	47	-13	0	12
ZONE D (Spaces 6 to 11)											
Car Pass by	58	3	15	70	60	24	38	33	-10	0	28
People talking	60	1	15	72	52	24	30	33	-10	0	20
ZONE E (Spaces 12 to 16)											
Car Pass by	58	3	15	70	60	10	34	44	-13	0	21
People talking	60	1	15	72	52	10	26	44	-13	0	13
ZONE F (Spaces 17)											
Car Pass by	58	3	15	70	60	2	27	49	-14	0	13
People talking	60	1	15	72	52	2	19	49	-14	0	5
*2no. spaces, each used 3 times, with each car entering and exiting the car park. 2x3x2=16 movements.									Total dB L _{Aeq,1hr}		35

*2no. spaces, each used 3 times, with each car entering and exiting the car park. 2x3x2=16 movements.