The Co-operative

Liverpool Road North
Maghull
L31 2HP

Planning Noise Assessment Report

On behalf of

Central England Co-operative

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Executive summary

Noise Solutions Limited has been commissioned to assess the impact of deliveries, plant noise and customer movement from the proposed Co-operative convenience store at Liverpool Road North, Maghull.

The assessment of noise from deliveries shows there may be short-term, adverse impacts, although it must be noted that deliveries are unlikely 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. All best practical means have been considered to minimise the impact of deliveries including the inclusion of a suitable noise management plan.

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.

Noise from plant serving the store has been predicted and found to comply with suitable criteria when assessed at the most affected noise sensitive receptors.

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 store on the site of the former Maghull Methodist Church on Liverpool Road North, Maghull.

1.2. This report presents the results of an environmental noise survey, the applicable polices 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

2.1. The proposed Co-operative store is to occupy a standalone building on the site currently occupied by the Maghull Methodist Church. The existing buildings on the site will be removed and replaced by a new single-storey unit.

2.2. Twenty-seven car parking spaces, including two dedicated to disabled use, will be located at the front of the premises, toward the north and east of the site.

2.3. Deliveries to the store will be made to a dedicated service area at the rear (east) of the building, with vehicles arriving in forward gear and reversing up to the loading bay door, then leaving in forward gear via the main access onto Liverpool Road North.

2.4. Plans of the development are shown in **Appendix B**.

Proposed deliveries

2.5. For stores of this type, main warehouse deliveries are typically made by vehicles no bigger than 10.35m rigid lorries. 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 deliveries would typically be made three times a week, between 07.00 and 23.00 hours, with fresh and frozen deliveries made six times a week (usually between 07.00 and 13.00 hours). It must be noted, however, that deliveries between 07.30 – 09.30 hours and 15.30 – 18.00 hours will generally be avoided.

2.6. Smaller deliveries will be made via third party suppliers (bread, sandwiches, 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.

2.7. Vehicles will enter the car park forwards from Liverpool Road N and reverse to the back of house entrance door, towards the east 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. The delivery vehicles will leave the car park in forward gear onto Liverpool Road N.

Proposed plant

2.8. External plant serving the store will be located in a dedicated compound at the south east of the building. Plant will comprise three air conditioning (AC) units, a DA compressor pack, a chiller condenser and a freezer condenser.

2.9. The AC units will be housed within dedicated acoustic enclosures, while the refrigeration plant items will also be installed within acoustic housings.

2.10. The AC units will operate only when the store is open. Refrigeration plant will operate at a reduced duty at night when cooling demands are lower.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is predominately residential, with the rear of residential properties on Clent Avenue (Receptors R1 and R2) being the nearest noise-sensitive premises to the proposed plant and delivery areas. Receptor R2 will also be closest to the car parking spaces.

3.2. Receptor R3, on Liverpool Road North to the south of the site, will be closest to the customer and delivery vehicle access. Receptor R4, to the north, may also have line of sight of the car park.

3.3. **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 (NPSE[1]), 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*

[1] Noise Policy Statement for England, Defra, March 2010

- *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 NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF[2]) 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.

4.8. 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."*

[2] National Planning Policy Framework, DCLG, March 2012

4.9. 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 ...

4.10. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE[3]).

4.11. 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."*

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 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"*.

Planning Practice Guidance – Noise

4.14. An updated Planning Practice Guidance (PPG[4]) 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

[3] Noise Policy Statement for England, DEFRA, March 2010
[4] Planning Practice Guidance – Noise, https://www.gov.uk/guidance/noise--2, 22 July 2019

- 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 PPG[5] 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 PPG[6] 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

[5] Paragraph: 005 Reference ID: 30-005-20190722
[6] Paragraph: 006 Reference ID: 30-006-20190722

Response	Examples of Outcomes	Increasing Effect Level	Action
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
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 Guidance[7] 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 consider[8]:

> *"... 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 (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 edition[10] 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,*

[8] Paragraph: 006 Reference ID: 30-006-20190722
[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+A1:2019[11] 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

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

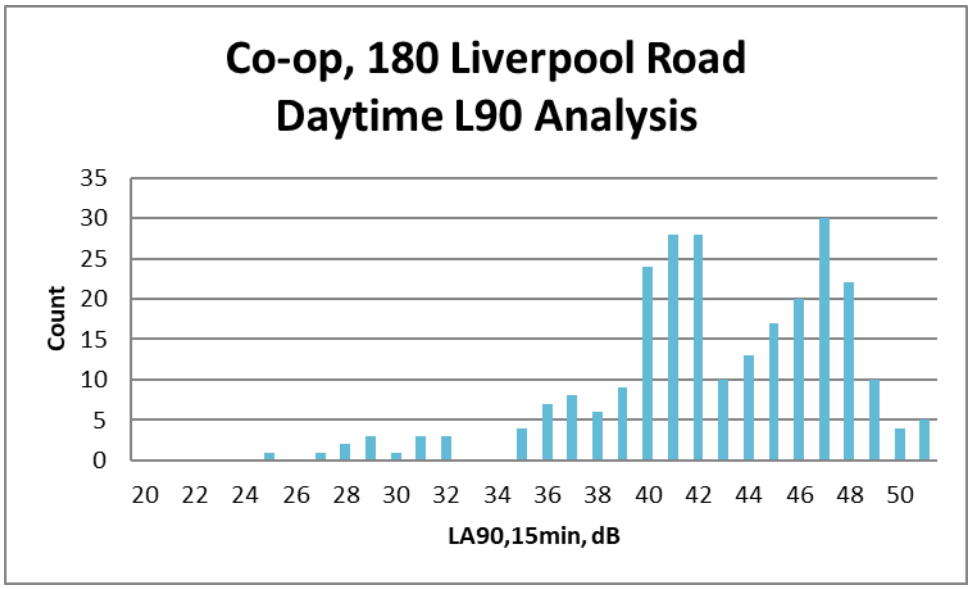
6.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors.

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 C**.

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)	34-61	57-88	34-63	25-51
Night-time (23.00 – 07.00 hours)	26-62	39-82	28-64	22-47

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



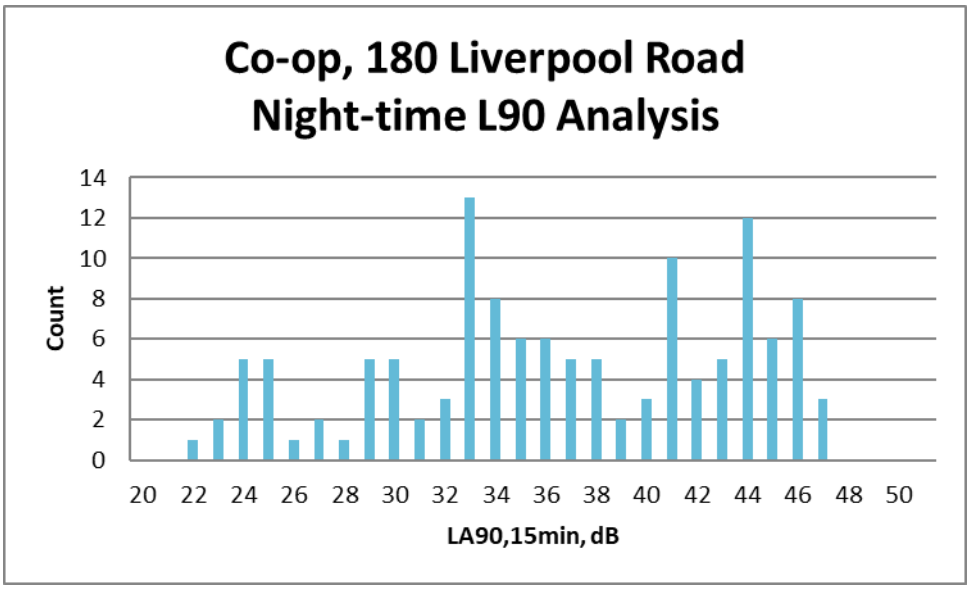
6.3. Additional statistical analysis has been undertaken. As shown in Table 4, the mean, median, and modal values have been calculated:

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

dB, L_{A90} daytime period	
Mean	43
Mode	47
Median	43

6.4. From reviewing the above histogram, 40dB has been selected to be 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	36
Mode	33
Median	36

6.6. From reviewing the above histogram, 29dB has been selected to be representative of the night-time background sound level in this area.

6.7. Therefore, the following values are considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 40dB L_{A90} during the daytime period;
- 29dB L_{A90} during the night-time period; and

6.8. It can be seen from the time history in **Appendix C** that the above values are a conservative assessment of the representative background noise climate for both daytime and night-time periods.

7.0 Plant noise design criteria

Sefton Council

7.1. The Sefton Local Plan published in April 2017 contains the following:

EQ4 POLLUTION AND HAZARDS

1. *Development proposals should demonstrate that environmental risks have been evaluated and appropriate measures have been taken to minimise the risks of adverse impacts which include amenity, damage to health and wellbeing, property and the natural environment (including internationally important nature sites) from:*

    a. *Pollution of the land, water (including surface water and groundwater) and the air,*

    b. *Hazardous substances,*

    c. *Noise/vibration, dust, odour or artificial light pollution.*

2. *Development will be permitted where it can be demonstrated that:*

    a. *Appropriate measures are incorporated into proposals to avoid pollution to air, water and soil,*

    b. *There would be no unacceptable risk to the users of the site, occupiers of neighbouring land or the environment from the presence of hazardous substances. Proposals for sensitive uses close to existing sources of pollution must demonstrate that there will be no detrimental impact on the amenity of existing or future occupiers,*

    c. *The impact of noise/vibration and lighting will not be significant or can be reduced to an acceptable level.*

3. *Development must lead to no deterioration of, and where practicable improve, water quality, and must protect and enhance Sefton's waterbodies and water environment.*

4. *The cumulative effects of pollution will be taken into account in terms of the impact of a number of developments in an area. The effects of a combination of various types of pollution will also be considered.*

7.2. In the absence of specific noise criteria it is proposed to reference BS 4142:2014 + A1:2019, with plant noise being of no worse than "Low Impact" when assessed in accordance with the guidance within BS 4142:2014. This is typically achieved when the rating level of new plant at

the most affected noise sensitive property is equal to or below the existing background sound level.

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 6 Proposed plant noise emissions level limits at noise sensitive residential receptors

Period	Cumulative plant noise level, dB(A)
Daytime (07.00 – 23.00 hours)	40
Night-time (23.00 – 07.00 hours)	29

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.

8.3. Table 7 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 7 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	69	75
Lorry departure	75	68

Predicted impact

8.4. The information contained in Table 7 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:

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

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.

8.5. The delivery noise level at each of the nearest residential windows has been predicted. Full calculations are shown in **Appendix D** and are summarised in Table 8.

Table 8 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	50	52-69

BS 4142:2014 delivery noise assessment

8.6. Table 9 below presents the initial assessment of the likely impact at the nearest houses during the proposed delivery periods, in accordance with the BS 4142:2014 methodology:

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

Results	Mon-Sun 07.00 – 23.00	Relevant Clauses of BS 4142:2014	Commentary
Background Sound level	L_{A90} = 40dB	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	$L_{Aeq,T}$ = 50dB	7.3.6	Calculations presented in Appendix D
Acoustic Feature Correction	5dB	9.2	See calculation
Rating Level	(50+5) dB = 55dB		
Excess of Rating Level over background sound	(55-40) dB = +15dB		

level			
Context	Site is on a road with local traffic, producing short periods of high noise levels.		
Assessment of impact:	Possible significant adverse impact		

8.7. The assessment indicates that, for deliveries made within the typical delivery periods as noted, the rating level is 15dB above the representative background sound level and there is therefore the possibility of an adverse noise impact.

8.8. Furthermore, deliveries do not occur in the early morning or late evening, and there are only up to nine main depot deliveries in a week. The majority of the deliveries would be made between 07.00 and 13.00 hours.

8.9. The following must, therefore, also be taken into consideration when determining the potential daytime impact that may be experienced:

- 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.
- 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.

BS 8233:2014 and WHO delivery noise assessment

8.10. 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 and the resulting internal noise level.

L_{Aeq} assessment

8.11. 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. With windows open for ventilation, and assuming a 15dB attenuation (as referenced in WHO) with two deliveries per day, internal noise levels of around 26dB $L_{Aeq,16\ hours}$ would be expected within the nearest residential room to the delivery area.

Delivery Noise Mitigation

8.12. Co-op proposes to implement a delivery Noise Management Plan at the site, along with a Code of Delivery Practice. This will ensure the noise impact of delivery activity on neighbours is reduced as much as possible.

8.13. A copy of the Plan is attached at **Appendix H**.

8.14. It should be noted that delivery operations will take place in a secure yard (also hosting the external plant) and, as such, ground floor windows of the receptors will benefit from acoustic screening and the above analysis therefore is likely to over-estimate noise levels from deliveries. As screening effects will be less at upper storey windows of the receptors however, to ensure a robust assessment screening effects have been excluded in the calculations.

9.0 Plant noise impact assessment

9.1. Cumulative plant noise levels from the proposed refrigeration and AC plant have been predicted. Calculations include corrections for the distance between the plant items and the receptor along with any reflections and screening where appropriate.

9.2. The plant is not expected to exhibit any tonal or impulsive characteristics provided it is well maintained,, and is also not expected to contain any significant low frequency tones. To be robust, however, a +3dB feature correction as advised in BS 4142:2014+A1:2019 has been applied for the plant for the possible presence of "...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...".

9.3. Resulting noise levels at the most affected receptor are shown in Table 10.

Table 10 Summary of plant noise levels at receptor

Receptor	Period	Rating level at receptor, dBA	Criterion, dBA	Excess, dB
R1	Daytime (07.00 – 23.00 hours)	38	40	-2
	Night-time (23.00 – 07.00 hours)	29	29	0

9.4. Full calculations are shown in **Appendix F**.

Context and uncertainties

9.5. As BS 4142:2014 advises, the 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 assessment is undertaken at the nearest residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
- It is to be appreciated that the BS 4142:2014 assessment relates to external noise levels only.

9.6. Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The meter and calibrator used have a traceable laboratory calibration and the meter 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.

10.0 Noise impact of car park

Opening hours

10.1. Noise from vehicles in car parks, and noise from customers, falls outside the scope of BS 4142:2014 + A1:2019. Guidance in BS 8233:2014 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 summarised in Table 2 of this report, a level of 35dB $L_{Aeq,\ 1hr}$ inside the nearest noise-sensitive dwellings is proposed as

a *Lowest Observed Adverse Effect Level*, with a *Significant Observed Adverse Effect Level* of 50dB[12] L_{Aeq}.

10.2. 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. It is unlikely that all the car park spaces will be used in the later hours. Therefore, for the purposes of the assessment, a set of reasonably worst-case assumptions will have to be made in relation to the number of vehicles which may use the car park in any one-hour period (particularly outside the peak opening hours).

10.3. Table 11 below details typical source noise level used in this assessment with the data presented in terms of SEL.

Table 11 Reference noise data for assessment

Activity	Measurement Data			
	$L_{Aeq,T}$	Dist (m)	Time (s)	SEL (dB)
Car movement	58	3	15	70
A person talking	60	1	15	72

Predicted impact of opening hours

10.4. The information in Table 11 was used to calculate a source noise level based on the number of activity events over the assessment period.

10.5. A total of 27 car park spaces are proposed, including two dedicated for disabled parking. An estimate of the typical number of movements to each space in a peak hour has been made and used to calculate the resultant external noise level at the receptors. As a robust assessment, it has been assumed that every parking space will be used by three vehicles in a nominal peak hour.

10.6. The calculations are included in **Appendix E** and summarised in Table 12. 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.

[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.

Table 12 Predicted car park sound levels at receptor

Receptor	$L_{Aeq,1hr}$	
	External Noise Level, dB	Internal Noise Level, dB
R1	37	22
R2	43	28
R3	45	30
R4	38	23

10.7. 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.

10.8. During less-busy periods, the noise level will be lower than the levels predicted in Table 12.

10.9. Maximum (L_{Amax}) noise levels from car door slams can also be assessed. Based on in-house survey data, L_{Amax} levels for a typical door closure are around 61dB at 6.1m. Assuming a nominal screening loss of 5dB for a boundary fence (to ground floor rooms only, with first floor rooms robustly assumed to see over the fence to the closest car parking space), typical L_{Amax} levels from the closest parking spaces at the most affected receptor can be assessed. Calculations are given in **Appendix E**, with predicted noise levels compared against prevailing ambient L_{Amax} levels in Table 13

Table 13 Predicted L_{Amax} car park sound levels at receptor

Receptor	L_{Amax}, dB	
	Predicted from door slam	Prevailing ambient level
R2 ground floor	55	57-88
R2 First floor	58	57-88

10.10. It can be seen that predicted L_{Amax} noise levels, at the most affected receptor from the closest parking spaces, are at the lower end of the currently prevailing ambient noise levels in the absence of car park activity.

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 many days including a weekend.

- 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 4142 assessment indicates that noise from deliveries is of potential adverse impact, though it should be noted that main warehouse deliveries occur no more than twice in any day and not in the early morning or late evening. The impact of noise from deliveries is to be minimised by application of a noise management plan.

11.3. 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.

Noise from customers using car park

11.4. 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 in planning terms.

11.5. L_{Amax} levels from door slams are predicted to be at the lower end of the range of the currently prevailing ambient noise levels in the absence of car park activity, and will therefore not be out of keeping with the prevailing noise climate.

Plant noise

11.6. Plant noise levels have been predicted at the most affected residential receptors. Inclusive of the proposed acoustic enclosures and housings, noise levels have been shown to be within acceptable limits and of no worse than a "low impact" when assessed using the methodology in BS 4142:2014 + A1:2019.

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-operative store to be located on the site of the former Maghull Methodist Church, Liverpool Road North, Maghull.

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 4142:2014 was utilised. Further assessments were undertaken taking into consideration guidance from the World Health Organisation and BS 8233:2014. Reference noise measurements of delivery activity at a similar operating convenience store were used in the assessment.

12.4. A possible adverse noise impact is predicted due to main warehouse deliveries to the store, although it must be noted that the site is located on a busy road. All best practical means have been considered to minimise the 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 noise 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. 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.

12.6. Plant noise levels have been predicted at the most affected residential receptors. Inclusive of the proposed acoustic enclosures and housings, noise levels have been shown to be within acceptable limits and of no worse than a "low impact" when assessed using the methodology in BS 4142:2014 + A1:2019.

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 s1 and s2 is given by 20 $\log_{10}$ (s1/s2). 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 20µPa. 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

Store plan and delivery vehicle route, showing car park zones and receptors

Appendix C Environmental sound survey

Details of environmental sound surveys

C.1 Measurements of the existing background sound levels were undertaken between 13.15 hours on Thursday 23rd March and 14.00 hours on Monday 27th March 2023.

C.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

C.3 The representative measurement position was located on a lamppost on Clent Avenue, representative of the nearest noise-sensitive property (location indicated on the site plan in **Appendix B**). This location is a similar distance from the main Liverpool Road carriageway and benefits from screening from intervening buildings.

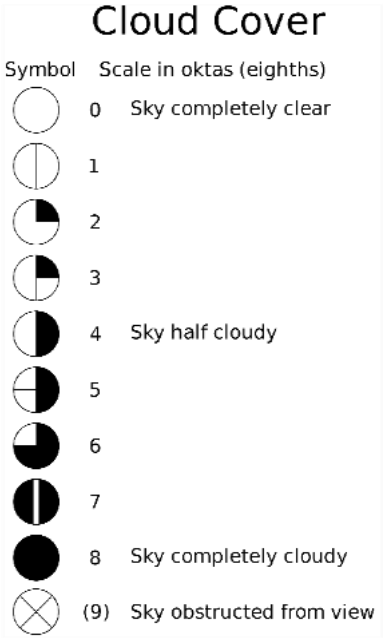
C.4 In accordance with BS 7445-2:21991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

Equipment

C.5 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	Rion NL-52 / 00654035	30/08/2022	TCRT22/1544
Condenser microphone	Rion UC-59 / 14826		
Preamplifier	Rion NH-25 / 87474		
Calibrator	Rion NC-74 /34235932	04/10/2022	1503480-1

C.6 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.

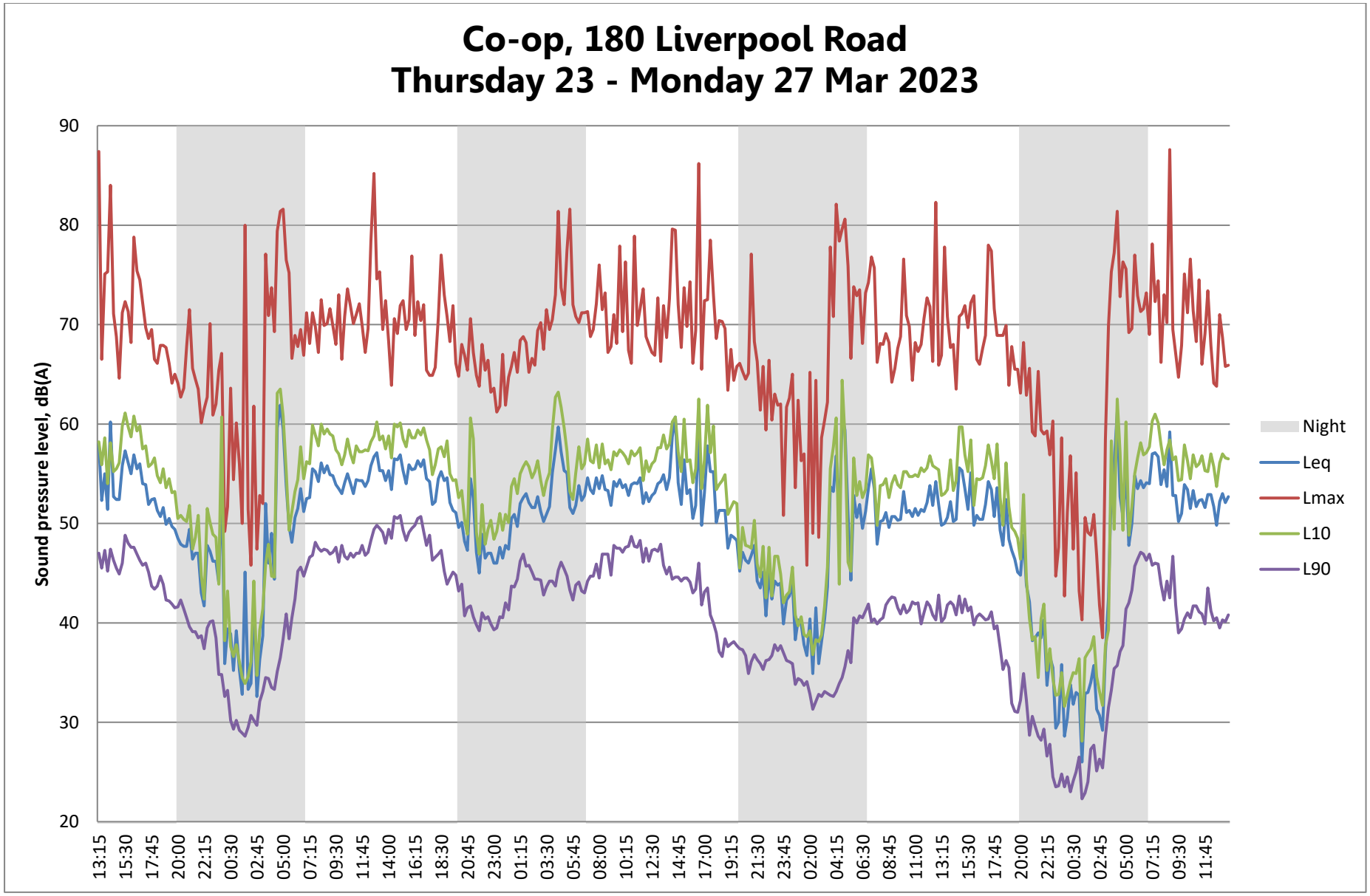
Weather Conditions				
Measurement Location	**Time/Date**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	13.15 23 Mar - 14.00 27 Mar 2023	Temperature (°C)	6	7
		Precipitation:	Damp	No
		Cloud cover (oktas – see guide)	8	5
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Wet	No
		Wind Speed (m/s)	<1	<1
		Wind Direction	N	NW
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 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 local and distant road traffic, with occasional noise from pedestrians.

C.8 While there was some rain during the survey, sufficient periods of clement weather prevailed such that a robust assessment of representative background noise levels can be made.

C.9 The results of the survey are presented in a time history graph overleaf.


Co-op, 180 Liverpool Road
Thursday 23 - Monday 27 Mar 2023
Sound pressure level, dB(A)
90
80
70
60
50
40
30
20
13:15
15:30
17:45
20:00
22:15
00:30
02:45
05:00
07:15
09:30
11:45
14:00
16:15
18:30
20:45
23:00
01:15
03:30
05:45
08:00
10:15
12:30
14:45
17:00
19:15
21:30
23:45
02:00
04:15
06:30
08:45
11:00
13:15
15:30
17:45
20:00
22:15
00:30
02:45
05:00
07:15
09:30
11:45
Night
Leq
Lmax
L10
L90

Appendix D Delivery noise impact calculations

Receptor 1 – Nearest house on Clent Avenue (closest and most affected receptor)

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	33	-10	0	58	52	0	58
Lorry manoeuvring-first movement (no reversing alarms)	75	66	1	0	25	-8	0	70	58	3*	73
Unloading cages on to lift	71	74	10	10	20	-6	0	75	68	6**	81
Unloading pallets on to lift	75	73	10	10	20	-6	0	79	67	6**	85
Lift up	73	65	10	10	20	-6	0	77	59	3*	80
Lift down	71	71	10	10	20	-6	0	75	65	3*	78
Unloading cages into BoH	69	75	10	10	21	-6	0	82	69	6**	88
Lorry departure	75	68	1	0	25	-8	0	67	60	0	67
							Combined	**86**			**91**
							Overall feature correction				**+5**
							$L_{Aeq\ (1hour)}$	**50**			
							Range of L_{Amax}		**52-69**		

**+3dB correction for intermittency*

***+6dB for impulsivity clearly perceptible*

Appendix E Car park activity noise assessment

Receptor R1 – Adjacent property on Clent Avenue overlooking car park

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 A (Spaces 1-6)											
Car Pass by	58	3	15	70	60	36*	40	40	-12	0	28
People talking	60	1	15	72	52	36	32	40	-12	0	20
ZONE B (Spaces 7 to 12)											
Car Pass by	58	3	15	70	60	36	40	55	-15	0	25
People talking	60	1	15	72	52	36	32	45	-13	0	19
ZONE C (Spaces 13 to 18)											
Car Pass by	58	3	15	70	60	36	40	45	-13	0	27
People talking	60	1	15	72	52	36	32	40	-12	0	20
ZONE D (Spaces 19 to 23)											
Car Pass by	58	3	15	70	60	30	39	28	-9	0	30
People talking	60	1	15	72	52	30	31	27	-9	0	22
ZONE E (Spaces 24 to 27)											
Car Pass by	58	3	15	70	60	24	38	19	-6	0	32
People talking	60	1	15	72	52	24	30	19	-6	0	24
									Total dB $L_{Aeq,1hr}$		**37**

**6no. spaces, each used 3 times, with each car entering and exiting the car park. 6x3x2=36 movements.*

Receptor R2 – Adjacent property on Clent Avenue overlooking car park

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 A (Spaces 1-6)											
Car Pass by	58	3	15	70	60	36*	40	34	-11	0	29
People talking	60	1	15	72	52	36	32	34	-11	0	21
ZONE B (Spaces 7 to 12)											
Car Pass by	58	3	15	70	60	36	40	44	-13	0	27
People talking	60	1	15	72	52	36	32	44	-13	0	19
ZONE C (Spaces 13 to 18)											
Car Pass by	58	3	15	70	60	36	40	30	-10	0	30
People talking	60	1	15	72	52	36	32	30	-10	0	22
ZONE D (Spaces 19 to 23)											
Car Pass by	58	3	15	70	60	30	39	9	1	0	40
People talking	60	1	15	72	52	30	31	9	1	0	32
ZONE E (Spaces 24 to 27)											
Car Pass by	58	3	15	70	60	24	38	13	-2	0	36
People talking	60	1	15	72	52	24	30	13	-2	0	28
									Total dB $L_{Aeq,1hr}$		**43**

**6no. spaces, each used 3 times, with each car entering and exiting the car park. 6x3x2=36 movements.*

Receptor R3 – Property on Liverpool road N to south of site entrance

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 A (Spaces 1-6)											
Car Pass by	58	3	15	70	60	36*	40	13	-2	0	38
People talking	60	1	15	72	52	36	32	32	-10	-5	17
ZONE B (Spaces 7 to 12)											
Car Pass by	58	3	15	70	60	36	40	13	-2	0	38
People talking	60	1	15	72	52	36	32	35	-11	0	21
ZONE C (Spaces 13 to 18)											
Car Pass by	58	3	15	70	60	36	40	13	-2	0	38
People talking	60	1	15	72	52	36	32	32	-10	-5	17
ZONE D (Spaces 19 to 23)											
Car Pass by	58	3	15	70	60	30	39	13	-2	0	37
People talking	60	1	15	72	52	30	31	32	-10	-5	16
ZONE E (Spaces 24 to 27)											
Car Pass by	58	3	15	70	60	24	38	13	-2	0	36
People talking	60	1	15	72	52	24	30	32	-10	-5	15
									Total dB $L_{Aeq,1hr}$		**45**

**6no. spaces, each used 3 times, with each car entering and exiting the car park. 6x3x2=36 movements.*

Receptor R4 – Property on Liverpool road N to north of site

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 A (Spaces 1-6)											
Car Pass by	58	3	15	70	60	36*	40	27	-9	0	31
People talking	60	1	15	72	52	36	32	33	-10	0	22
ZONE B (Spaces 7 to 12)											
Car Pass by	58	3	15	70	60	36	40	27	-9	0	31
People talking	60	1	15	72	52	36	32	20	-6	0	26
ZONE C (Spaces 13 to 18)											
Car Pass by	58	3	15	70	60	36	40	27	-9	0	31
People talking	60	1	15	72	52	36	32	24	-8	0	24
ZONE D (Spaces 19 to 23)											
Car Pass by	58	3	15	70	60	30	39	27	-9	0	30
People talking	60	1	15	72	52	30	31	35	-11	0	20
ZONE E (Spaces 24 to 27)											
Car Pass by	58	3	15	70	60	24	38	27	-9	0	29
People talking	60	1	15	72	52	24	30	35	-11	0	19
									Total dB $L_{Aeq,1hr}$		**38**

**6no. spaces, each used 3 times, with each car entering and exiting the car park. 6x3x2=36 movements.*

L_{max} assessment at closest receptor (R2)

Receptor	L_{Amax}, dB	at, m	Dist to receptor, m	Dist correction, dB	Screening	L_{Amax} at receptor
R2 ground floor	61	6.1	6.5	-0.6	-5*	55.4
R2 first floor	61	6.1	9.0	-3.4	0	57.6

*Conservative 5dB reduction from boundary fence

Appendix F Manufacturer plant noise data

Reference	Make / Model	No. units	Notes	Sound pressure level, dBA, at distance
AC1	Mitsubishi PUZ-ZM250YKA2	1	Installed within acoustic enclosure	36dBA at 1m*
AC2	Mitsubishi PUZ-ZM250YKA2	1	Installed within acoustic enclosure	36dBA at 1m*
AC3	Mitsubishi PUZ-ZM100YKA2	1	Installed within acoustic enclosure	25dBA at 1m*
DA Pack	Hubbard	1	Installed within acoustic housing	37dBA at 10m day 28dBA at 10m night**
Chiller condenser	Copeland	1	Installed within acoustic housing	37dBA at 10m day 28dBA at 10m night**
Freezer Condenser	Copeland	1	Installed within acoustic housing	37dBA at 10m day 28dBA at 10m night**

*Inclusive of acoustic enclosure
**Inclusive of dedicated acoustic housing

Appendix G Plant noise calculations

R1 - Daytime

Plant	Plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 Feature Correction (dB)	Lp at receptor (dBA)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)		
AC3	25	1	12	-22	0	0	3	6
AC2	36	1	15	-24	0	0	3	15
AC1	36	1	18	-25	0	0	3	14
DA Pack	37	10	21	-6	0	0	3	34
Chiller Condenser	37	10	20	-6	0	0	3	34
Freezer Condenser	37	10	23	-7	0	0	3	33
							CUMULATIVE:	**38**

R1 – Night-time

Plant	Plant noise level at source		DISTANCE		DIRECTIVITY	SCREENING	BS4142 Feature Correction (dB)	Lp at receptor (dBA)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)		
DA Pack	28	10	21	-6	0	0	3	25
Chiller Condenser	28	10	20	-6	0	0	3	25
Freezer Condenser	28	10	23	-7	0	0	3	24
							CUMULATIVE:	**29**

Appendix H Delivery noise management plan

Noise Management Plan

Central Coop, Maghull (Former Methodist Church)

Site Location

180 Liverpool Road North, Liverpool, L31 2HP

Co-op Fleet and Deliveries

Central Coop operates its own ambient and chilled delivery vehicle fleet as detailed below:

- 18 ton four wheel rigid:
  - Length 10.4m
  - Width 2.6m
  - Wheelbase 6.3m

- 26 ton six wheel rigid
  - Length 12.0m
  - Width 2.6m
  - Wheelbase 7m

- In addition to deliveries undertaken by the Central Coop distribution fleet and the Co-Operative Group (frozen foods), various independent companies will also make direct deliveries to the proposed store – vehicles used by these suppliers are no larger than the 12m rigid. The smaller, daily deliveries such as newspapers and fresh sandwiches are all undertaken using light commercial vehicles (e.g. transit van) only.

- All deliveries will have planned delivery windows which will be staggered to ensure an efficient delivery control process. Any delivery unable to make their delivery window must contact the store manager and rearrange. This is to ensure no more than one delivery vehicle is on site at any one time.

- It is also intended that all manoeuvres shall take place entirely within the site without encroaching on the public highway and with all delivery vehicles entering and leaving the site in

forward gear, in accordance with the swept path analysis drawings appended to the planning application.

Code of Best Delivery Practice

There are a number of Codes of Best Practice procedures that will be adopted to further facilitate the delivery process. These include;

- The Co-op's delivery fleet management will endeavour to ensure that the store is made aware of any delivery unable to meet scheduled delivery times, and to ensure the store delivery area will be vacant at the alternative time to enable safe vehicle access and unloading. External suppliers will be requested to operate any abnormal delivery arrangements in a similar manner.

- A quiet approach strategy will be adopted which will require the low revving of engines, no slamming of cab doors, voices to be kept at a low volume and to ensure radios are off in the cabs.

- The final approach to the store should be made with the minimum amount of noise with no use of the horn at any time.

- Vehicles will manoeuvre on-site with as little noise as possible. Drivers should ensure they engage gears quietly, keep engine revs to a minimum, apply brakes gently and close driver's door quietly.

- A full risk assessment will be carried out by Central Coop Distribution at the completed site prior to commencement of delivery services and opening of the store for trading. If relevant, member(s) of staff from the store will be trained to act as marshal(s) supervising the reversing of service vehicles in public space to ensure pedestrian safety.

- Each supplier servicing the site will be contacted in advance of commencing deliveries to the store, with a request to confirm their vehicle size and their delivery time window and to clarify the restrictions that will be placed upon them when servicing the site. They will be provided

with a copy of the Code of Best Practice showing the correct on-site delivery tracking route, available parking area(s) and any other relevant restrictions in force.

- All vehicles will keep engines switched off whilst stationary and unloading is taking place. Signage will be displayed close to the warehouse entrance reminding drivers to switch off engines.
- Vehicle mounted refrigeration units will be kept switched off during deliveries wherever feasible and always when/ if delivering between the hours of 7pm – 10pm.
- Vehicles will be unloaded as quietly as possible, with care undertaken to minimise cage contact with trailer walls, lift guardrails and any other obstructions.
- A Central Coop Distribution Management contact number will be made available and provided to the LPA, and immediate neighbours as necessary in order to address any comments or concerns that may arise once operations commence.
- Delivery Drivers will immediately report to the Store's Duty Manager upon arrival. The Duty Manager will supervise the implementation of the measures stated to minimise any disturbance caused by deliveries.