

Sainsbury's Local
Hare Hill Road
Littleborough
OL15 9BA

**Plant Noise
Impact Assessment**

On behalf of

Sainsbury's

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For and on behalf of Noise Solutions Ltd				

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Executive Summary

Noise Solutions Limited has undertaken a noise impact assessment of proposed replacement plant to be installed at a Sainsbury's Local store on Hare Hill Road in Littleborough.

The assessment shows that noise emissions from the proposed plant will comply with the local authority's typical requirements.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by Sainsbury's Stores Limited to undertake a noise impact assessment of proposed replacement plant serving an existing Sainsbury's Local store located on Hare Hill Road in Littleborough.
- 1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.
- 1.3. Cumulative plant noise emission levels for the replacement plant have been predicted at the most affected noise sensitive receptors and assessed against the local authority's usual requirements.
- 1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The Sainsbury's Local store occupies a dedicated single-storey building on the north east side of Hare Hill Road, opposite the junctions with Greenwood Street and Regent Street. New air conditioning (AC) and refrigeration plant is proposed to be located in an existing plant area within a service yard / car park at the north west end of the store.
- 2.2. The AC will operate only when the store is open. The refrigeration plant will operate at all times but will typically run at reduced duty at night. Manufacturer's noise data for the plant is shown in [Appendix D](#).
- 2.3. A site plan showing the site and surrounding area and the noise monitoring location used in this assessment is presented in [Appendix B](#).

3.0 Nearest noise-sensitive receptors

- 3.1. The area surrounding the site contains a mixture of commercial and residential property. The closest residential dwellings (Receptor R1) are to the south west, on the opposite side of Hare Hill Road, at a distance of approximately 21m from the plant area. Line of sight of the proposed plant will be prevented by existing building structure.
- 3.2. There are buildings occupied by office accommodation to the west (Receptor R2) and north east (Receptor R3) of the plant area, at around 12m and 16m, respectively, from the nearest plant items. These receptors may have full line of sight of the plant.

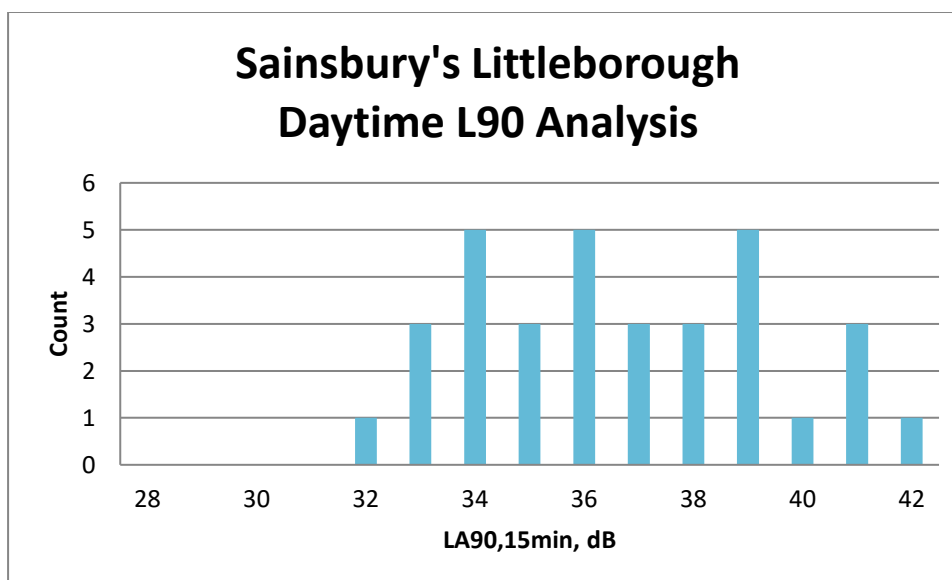
4.0 Existing noise climate

- 4.1. 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 to the proposed plant area during the quietest times at which the plant will operate.
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in [Appendix C](#).

Table 1 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)	41-54	62-78	41-57	32-42
Night-time (23.00 – 07.00 hours)	31-49	37-72	33-50	29-35

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



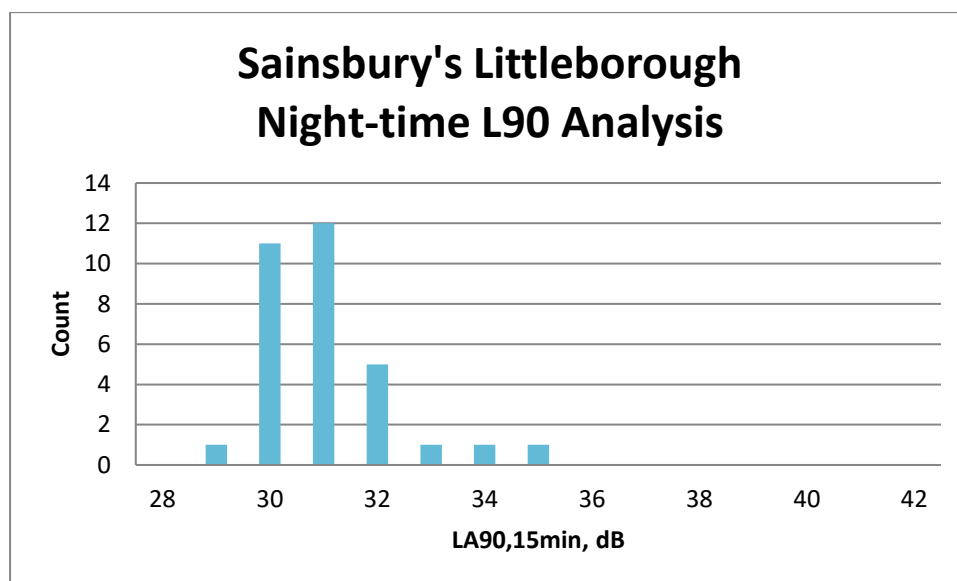
- 4.3. Further statistical analysis has been carried out on the data; the mean, modal and median values are shown in Table 2 below.

Table 2 Statistical analysis of L_{A90,15min} levels during the daytime period

dB, L _{A90} daytime period	
mean	37
modal	39
median	36

- 4.4. From the histogram analysis, 34dB has been selected to be a robust representation of the background noise level during the daytime period.

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



- 4.5. Further statistical analysis has been carried out on the data; the mean, modal and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} night-time period	
mean	31
modal	31
median	31

- 4.6. Again, from the histogram analysis, 30dB has been selected to be a robust representation of the background sound level during the night-time period.
- 4.7. Therefore, the following values are considered to be the lowest existing background sound pressure levels at nearby noise sensitive premises:
- 34dB L_{A90} during the daytime period; and
 - 30dB L_{A90} during the night-time period.

5.0 Plant noise design criteria

National Planning Policy Framework

- 5.1. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF¹) was published in March 2012, with revisions in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.
- 5.2. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*
- 5.3. The NPPF goes on to state in Paragraph 185:
- "planning policies and decisions should ...*
- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;*
 - b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...*
- 5.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE²).
- 5.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*
- 5.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed"*.

¹ National Planning Policy Framework, DCLG, March 2012

² Noise Policy Statement for England, DEFRA, March 2010

- 5.7. Paragraph 119 states that *"Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land"*.

Rochdale Metropolitan Borough Council

- 5.8. Rochdale Metropolitan Borough Council's Unitary Development Plan 2001-2016 (which is still in place) contains policy S/7 for local shops and services, which states:

The development of, or change of use to, shops and other services of an appropriate

The development of, or change of use to, shops and other services of an appropriate scale to serve local needs will be permitted, and will be encouraged in new large scale housing and employment development, outside the existing centres (defined in Policy G/S/1 - "Hierarchy and Role of Centres") provided that:

...

d) it will not unduly affect the amenity of nearby residents or other uses by reason of noise, traffic generation and hours of opening.

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

- 5.9. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014+A1:2019 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.
- 5.10. The procedure contained in BS 4142:2014+A1:2019 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 5.11. 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.
- 5.12. 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."*

- 5.13. 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."*
- 5.14. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- *Typically, the greater this difference, the greater the magnitude of the impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
 - *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- 5.15. The standard does state that *"adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- 5.16. 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."*
- 5.17. 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."*
- 5.18. BS 4142:2014+A1:2019 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Criterion at commercial property

- 5.19. Typically, local authorities do not consider office premises to be as sensitive to noise as residential properties and, therefore, emissions criteria are generally relaxed at these locations.
- 5.20. However, it is considered appropriate to control plant noise levels within offices to meet the recommended internal noise levels provided in BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'. The standard states a range of noise levels for various spaces used for 'study and work requiring concentration' between 35 and 50dB L_{Aeq} .
- 5.21. In addition, BS 8233 provides general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:

If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.

- 5.22. This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of much greater than 15dB is expected for non-openable standard double-glazed windows. However, in order to assess the worst-case scenario, this report assumes that windows may be opened if desired.
- 5.23. Based on the above and assuming a worst-case internal criterion of 35dB L_{Aeq} , cumulative plant noise levels at the façade of the nearest office premises should not exceed 50dB L_{Aeq} .

Summary of criteria

- 5.24. In the absence of specific criteria from the local authority, it is considered appropriate for noise emissions from the plant, rated as per the methodology of BS 4142:2014, to be controlled to a level not above the representative L_{A90} background sound level. This would ensure no worse than a '*low impact*'.
- 5.25. The following cumulative plant noise limits apply:

Table 4 Proposed plant sound emissions level limits at nearest residential receptors

Receptor	Period	Plant rating level (dB L _{Ar,Tr})
Residential	Daytime (07.00 – 23.00 hours)	34
	Night-time (23.00 – 07.00 hours)	30
Commercial	Daytime (07.00 – 23.00 hours)	50
	Night-time (23.00 – 07.00 hours)	-

6.0 Plant noise impact assessment

- 6.1. The cumulative noise level due to the plant has been predicted at the nearest noise-sensitive receptors and assessed against the local authority's usual requirements.
- 6.2. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. However, a penalty of 3dB as described in BS 4142:2014+A1:2019 has been applied for the possible presence of "...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...".
- 6.3. Table 5 summarises the results of the assessment at the most affected residential properties. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in [Appendix E](#).

Table 5 Predicted plant noise levels

Receptor	Period	Predicted rating level at receptor, L_{Aeq} dB	Criterion, dB	Excess, dB
R1	Daytime (07.00 – 23.00 hours)	27	34	-7
	Night-time (23.00 – 07.00 hours)	15	30	-15
R2	Daytime (07.00 – 23.00 hours)	37*	50	-13
	Night-time (23.00 – 07.00 hours)	24*	-	-
R3	Daytime (07.00 – 23.00 hours)	38*	50	-12
	Night-time (23.00 – 07.00 hours)	25*	-	-

**specific level, not Rating level*

Context and uncertainties

6.4. 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 noise sensitive windows. The impact on all other nearby receptors will be lower due to screening and distance attenuation.
- The noise level predictions are based on the proposed equipment running at maximum daytime/night-time duty. The plant will not run in this manner at all times (for example, when demands for heating/cooling are lower) and, therefore, this is a robust assessment.

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

- The measurement of the background sound levels was undertaken over a period including the quietest times of the day and night.
- The sound level meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise

climate outside the nearby residential dwellings and not at a position where higher noise levels are present.

7.0 Summary

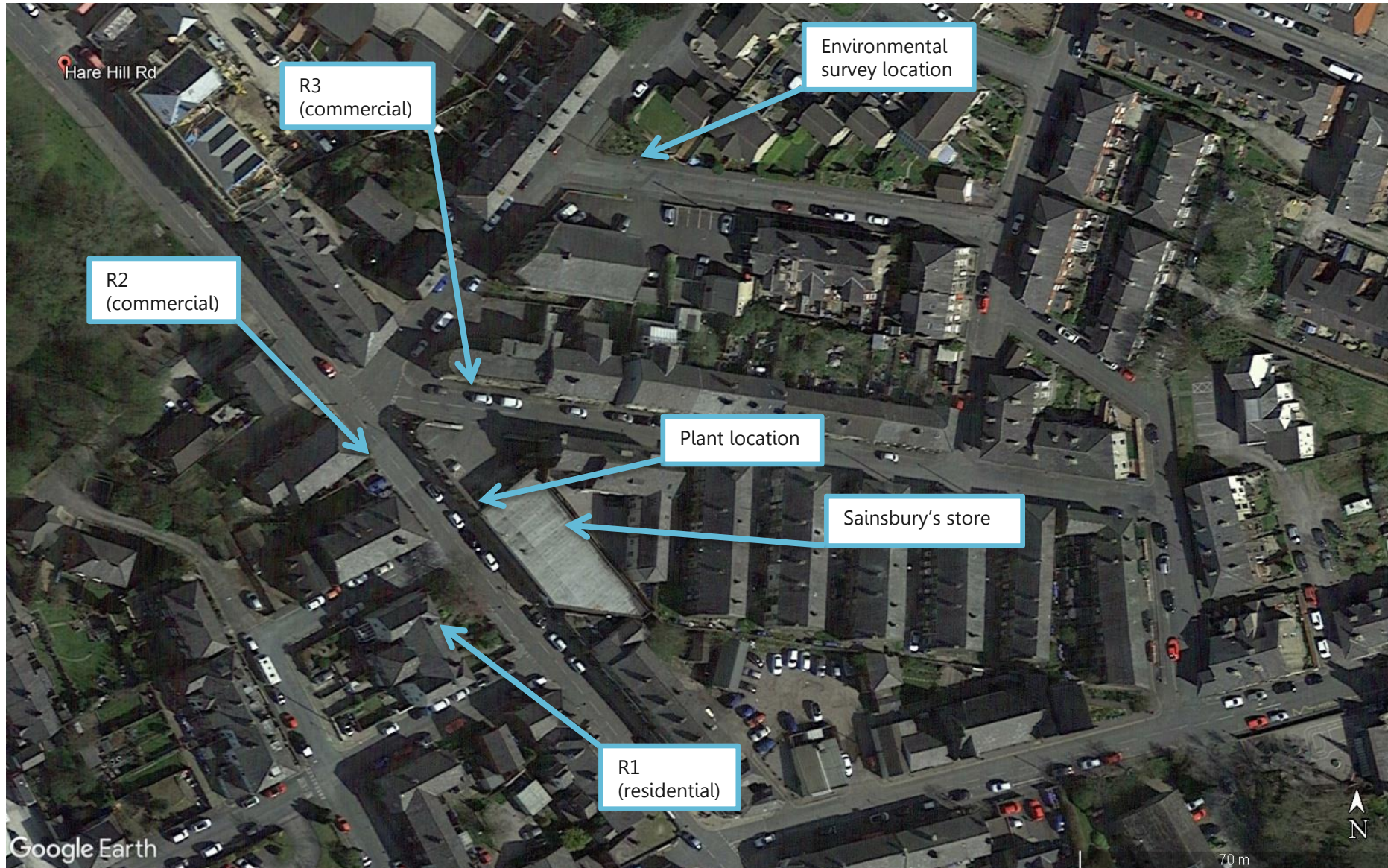
- 7.1. Noise Solutions Ltd (NSL) has been commissioned by Sainsbury's Stores Limited to provide a noise impact assessment for proposed replacement plant serving an existing Sainsbury's Local store located on Hare Hill Road in Littleborough.
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the proposed site.
- 7.3. The cumulative noise level due to the new plant has been predicted at the nearest noise-sensitive receptors and assessed against Rochdale Metropolitan Borough Council's usual requirements.

The assessment indicates that cumulative noise emissions from the proposed plant will comply with local authority requirements.

Appendix A Acoustic terminology

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

Appendix B Photograph of site showing areas of interest



Appendix C Environmental sound survey

Details of environmental sound survey

- C.1 Measurements of the existing background sound levels were undertaken between 17.45 hours on Monday 24th July and 10.00 hours on Tuesday 25th July 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 lamp post along Sutcliffe Street. This location is approximately representative of the levels of road traffic noise at the closest receptor. The approximate location of the microphone is indicated on the plan in [Appendix B](#).
- C.4 In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.

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.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 97446	16/01/2023	1504305-1
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Svantek SV12L / 106487		
Calibrator	Svantek SV 30A / 10847	01/06/2023	1505421-1

Weather conditions

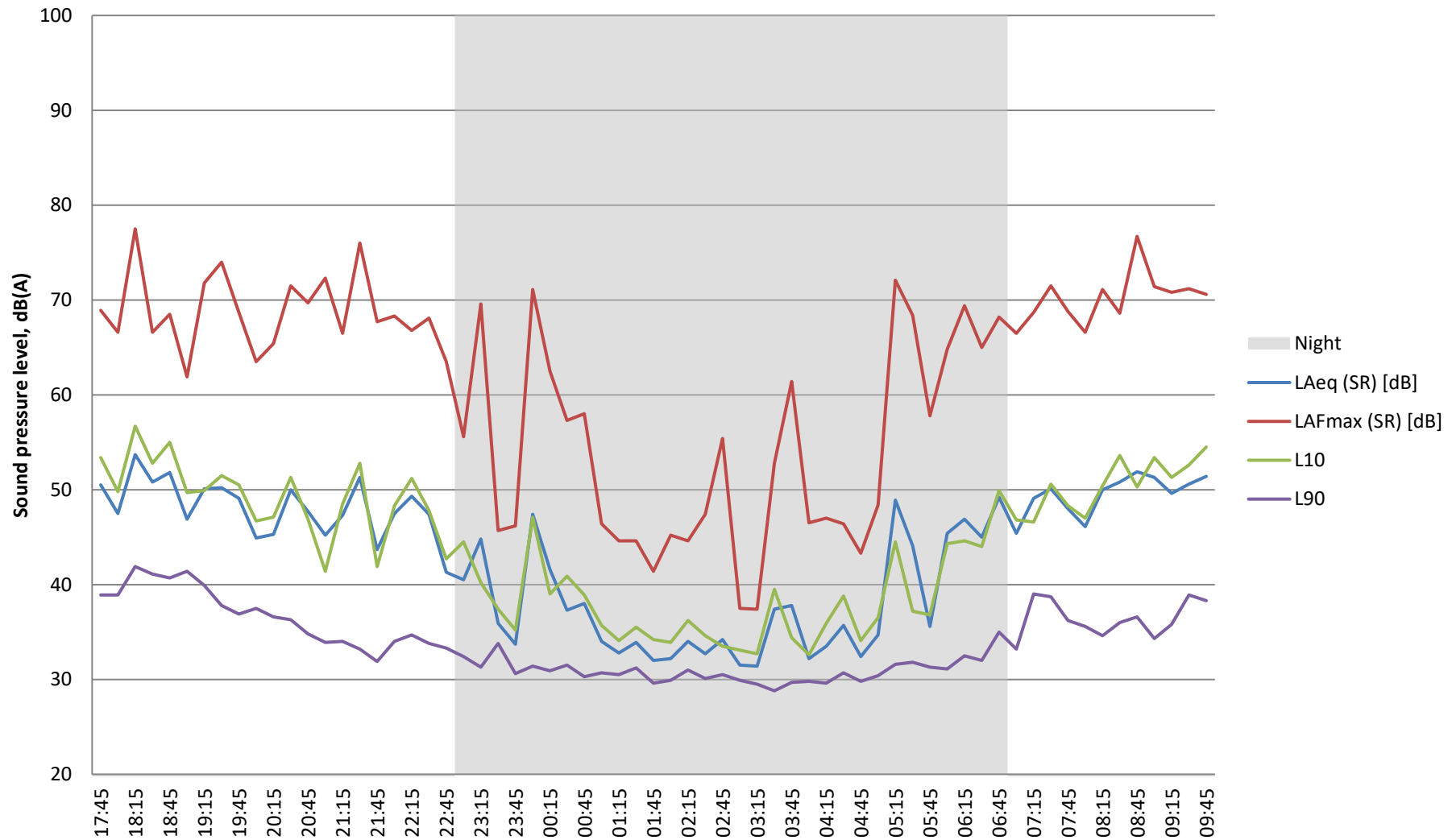
- C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	17.45 24 Jul - 10.00 25 Jul 2023	Temperature (°C)	17	15
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)	7	6
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	1	2
		Wind Direction	Westerly	Westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The predominant noise source affecting the area was local traffic. The results of the survey are presented in a time history graph overleaf.

Sainsbury's Littleborough Monday 24 - Tuesday 25 Jul 2023



Appendix D Plant noise data

Plant Ref	Manufacturer / Model	Operating Hours	Sound pressure level
AC1-2	Mitsubishi PUZ-ZM125YKA	Daytime only	52dBA at 1m
AC3	Mitsubishi PUZ-ZM35YKA	Daytime only	46dBA at 1m
Refrigeration condenser	Kelvion GF-MC1023G3H-091R400	24hr	23dBA at 10m

Appendix E Calculations

Receptor R1 - daytime

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
AC1	52dBA at 1m	21	-26	0	-5	3	24
AC2	52dBA at 1m	21	-26	0	-5	3	24
AC3	46dBA at 1m	21	-26	0	-5	3	18
Gas cooler	23dBA at 10m	21	-6	0	-5	3	15
				Combined (daytime)			27

Receptor R1 – night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
Gas cooler	23dBA at 10m	21	-6	0	-5	3	15
				Combined (night-time)			15

Receptor R2 - daytime

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
AC1	52dBA at 1m	12	-22	3	0	0	33
AC2	52dBA at 1m	12	-22	3	0	0	33
AC3	46dBA at 1m	12	-22	3	0	0	27
Gas cooler	23dBA at 10m	12	-2	3	0	0	24
				Combined (daytime)			37

Receptor R2 – night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
Gas cooler	23dBA at 10m	12	-2	3	0	0	24
				Combined (night-time)			24

Receptor R3 - daytime

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
AC1	52dBA at 1m	16	-24	6	0	0	34
AC2	52dBA at 1m	16	-24	6	0	0	34
AC3	46dBA at 1m	16	-24	6	0	0	28
Gas cooler	23dBA at 10m	16	-4	6	0	0	25
				Combined (daytime)			38

Receptor R3 – night-time

Plant item	Source Sound level (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating level at façade L _{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
Gas cooler	23dBA at 10m	16	-4	6	0	0	25
				Combined (night-time)			25