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Sainsbury's
The Maltings
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Plant Noise Impact Assessment

On behalf of

Sainsbury's

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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 supermarket located at the Maltings, Salisbury.

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 to undertake a noise impact assessment of proposed replacement plant serving the existing Sainsbury's Superstore at The Maltings, Salisbury.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels outside the nearest noise sensitive receptors to the plant room.

1.3. NSL has attended locations at the site to undertake noise measurements in order to determine the existing levels of plant noise emissions, and to determine compliance with local authority requirements.

1.4. 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.

1.5. A glossary of acoustic terminology is given in **Appendix A**.

2.0 Site details

2.1. The Sainsbury's supermarket is located within The Maltings shopping precinct in Salisbury city centre. Existing external refrigeration equipment is located on a roof top plant area, surrounded on three sides by a parapet roof and on the fourth by an internal plantroom containing additional equipment.

2.2. There is an intention to replace the existing refrigeration plant within the plantroom. Proposals include for two gas coolers with an associated compressor pack, all to be located externally on a flat roof area to the south of the store building. In addition, four false load evaporators (FLEs) will be located externally on this flat roof area.

2.3. An air handling unit (AHU) will be located on the flat roof area toward the centre of the building.

2.4. The refrigeration plant will operate at all times, with a potential for reduced duty during the night-time period.

2.5. Manufacturer noise data for the proposed plant is shown in **Appendix E**.

3.0 Noise sensitive receptors

3.1. The surrounding area is predominantly commercial in nature, with shops and car parking in the immediate vicinity of the store. The river Avon passes approximately north to south beyond a small park to the east of the store.

3.2. Fisherton Street, to the south, has smaller shops on both sides along with restaurants and public houses.

3.3. There are understood to be residential premises above shops on the north side of Fisherton Street. The nearest of these to the store, Receptor R1, is around 56m from the closest point of the roof top plant area, although line of sight to the plant is prevented by the intervening building structure.

3.4. It is understood that there are proposals to build a hotel to the south of the store (Receptor R2). Windows on the north elevation will be around 40m from the nearest plant item.

3.5. Although screening is likely to be provided by the surrounding parapet, to ensure a robust assessment no screening to either receptor has been assumed to plant on the south roof area.

3.6. **Appendix B** contains an aerial photograph showing the site and receptor.

4.0 Existing noise climate and surveys

Unattended environmental noise survey

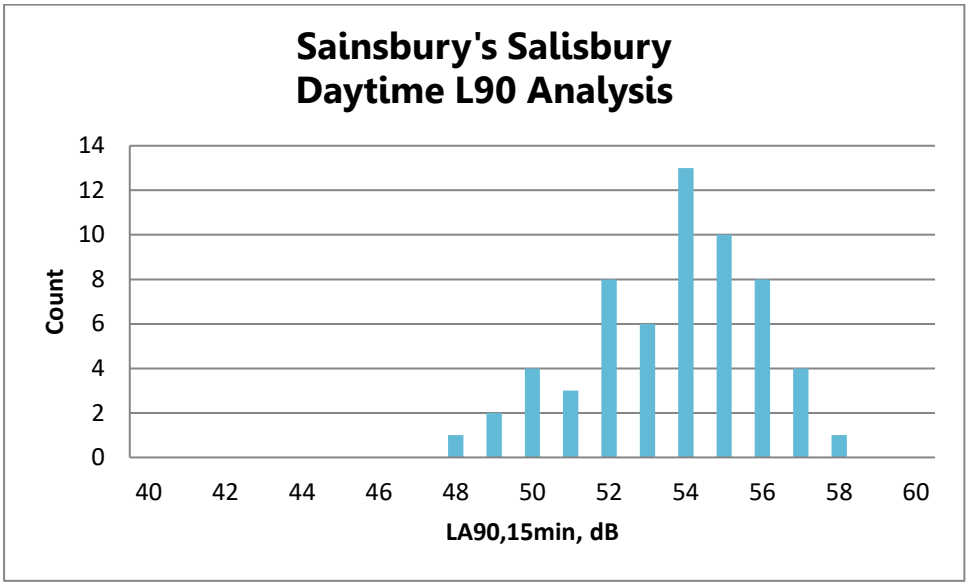
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at the receptor site, including the quietest times at which the plant will operate.

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 15-minute 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)	60-78	74-105	64-70	48-58
Night-time (23.00 – 07.00 hours)	48-62	66-88	45-67	43-49

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



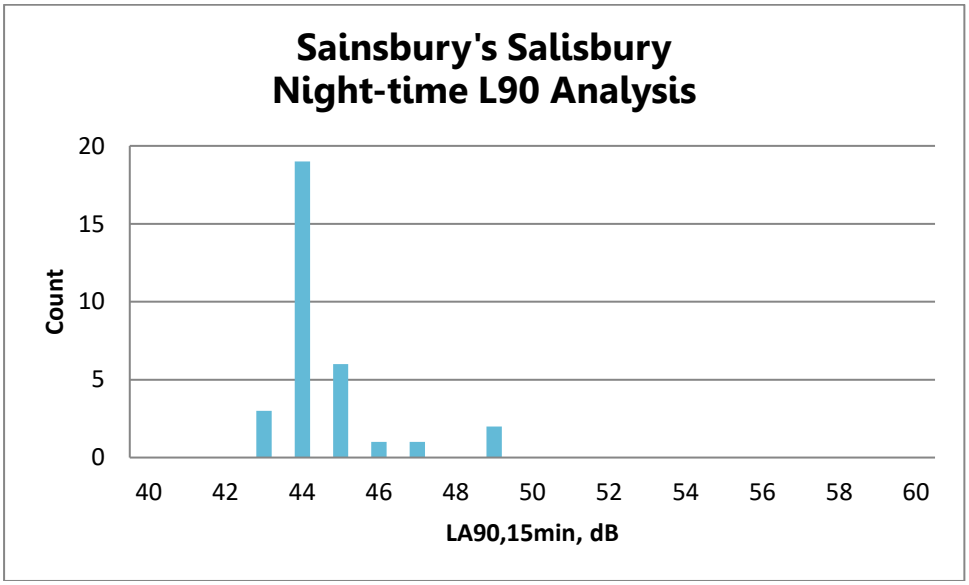
4.3. Further statistical analysis has been carried out on the data; the mean, modal and median values are shown in Table 2 below.

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

dB, L_{A90} daytime period	
mean	54
modal	54
median	54

4.4. From review of the time history chart, 50 dBA 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	44
modal	44
median	44

4.6. Again, from the time history chart, 44 dBA 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 representative of the existing background sound pressure levels at the unattended measurement location:

- 50 dB L_{A90} during the daytime period; and
- 44 dB L_{A90} during the night-time period.

Attended plant noise survey methodology

4.8. Noise Solutions Ltd attended the site during the afternoon of Tuesday 4th Jully 2023 to measure noise levels from existing refrigeration plant at the store. At the time of testing, two larger three-fan condenser units were not running, possibly being out of commission. As such, measurements were limited to an existing air handling unit on the rooftop.

4.9. Details of the equipment used for the readings are detailed in the following table.

Table 4 Details of noise monitoring equipment

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977D / 99070	11/05/2023	Factory conformation certificate
Condenser microphone	ACO Pacific 7052E / 81197		
Preamplifier	Svantek SV18A / 130661		
Calibrator	Rion NC-74 / 35094453	06/09/2022	1503192-1

4.10. Weather conditions during the survey were still with overcast skies, and suitable for measurements of plant noise.

4.11. Measurements of plant noise emissions were undertaken over 30 second periods. This is considered more than adequate to account for a robust measurement.

4.12. Both broadband and one-third octave band frequency data were measured. In addition to the overall L_{Aeq} noise parameter, the measured L_{A90} noise data are presented and used for some measurements in this assessment since noise from the plant was constant during operation and this minimised influence from transient extraneous sources, such as aircraft and road traffic.

4.13. The results of the plant noise measurements are summarised in **Appendix D**.

5.0 Guidance and assessment 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 (NPPF[1]) 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 (NPSE[2]).

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."*

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

[2] Noise Policy Statement for England, DEFRA, March 2010

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"*.

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"*.

Wiltshire County Council

5.8. It is understood that Wiltshire County Council typically requires an assessment to be undertaken in accordance with BS 4142:2014, with the plant rating level being at least 5dB below the background level.

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

5.9. BS 4142:2014 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment".

5.10. The procedure contained in BS 4142:2014 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 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.

Summary of requirements

5.19. The local authority's usual requirement is that the plant noise level at the nearest noise-sensitive windows should be at least 5dB below the representative L_{A90} background sound level.

5.20. A summary of the recommended plant noise limits is given in Table 7.

Table 5 Proposed plant noise level at noise sensitive residential receptors

Period	Cumulative plant noise level, dB(A)
Daytime (07.00 – 23.00 hours)	45
Night-time (23.00 – 07.00 hours)	39

6.0 Assessment of existing plant

BS 4142:2014 assessment

6.1. This assessment uses predictions of the cumulative plant noise levels at the nearest noise sensitive receptors based on measurements made at the site and presented in **Appendix D**. The predictions have been based on all measured plant operating at their measured duty, which was understood to be close to or at maximum.

6.2. It is noted that the two existing three-fan condenser units on the roof were on-operational at the time of testing These units would be likely to increase the overall noise level of the installation, potentially significantly, when running.

6.3. The table below summarises the results of the assessment at the identified receptors. All other nearby receptors benefit from increased distance/screening to the plant.

Table 6 Assessment of existing plant noise levels at the nearest noise sensitive receptors

Receptor	Period	Existing plant noise rating level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
R1	Daytime (07.00 - 23.00 hours)	28	45	-17
	Night-time (23.00 – 07.00 hours)		39	-11

6.4. The assessment shows that existing noise levels (of the plant in operation at the time of testing) currently comply with the typical requirements of Wiltshire County Council

Context and uncertainties

6.5. 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;
- 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.

6.6. 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 understood that the existing plant has been operational for circa 20 years. Noise emissions from the equipment may have increased over time as the equipment has aged.

Uncertainties

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

- All sound level meters and calibrators used have a traceable laboratory calibration and were field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established method.

7.0 Plant noise impact assessment

7.1. 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.

7.2. 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 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...".*

7.3. Table 7 summarises the results of the assessment at the most affected residential properties. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in **Appendix F**.

Table 7 Predicted plant noise level at receptors

Receptor	Period	Predicted rating level at receptor, L_{Aeq} dB	Criterion, dB	Excess, dB
R1	Daytime (07.00 – 23.00 hours)	35	45	-10
	Night-time (23.00 – 07.00 hours)	35	39	-4
R2	Daytime (07.00 – 23.00 hours)	39	45	-6
	Night-time (23.00 – 07.00 hours)	39	39	0

Context and uncertainties

7.4. 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.

7.5. 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.

8.0 Summary

8.1. Noise Solutions Ltd (NSL) has been commissioned to provide a noise impact assessment of replacement plant serving the existing Sainsbury's store The Maltings, Salisbury.

8.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate at the nearest noise sensitive receptors to the site.

8.3. Noise from the existing plant has been measured.

8.4. The cumulative noise level due to the new plant has been predicted at the nearest noise-sensitive receptors and assessed against Wiltshire County Council's usual requirements.

8.5. 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 s1 and s2 is given by 20 log10 (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 Aerial photograph of site showing areas of interest

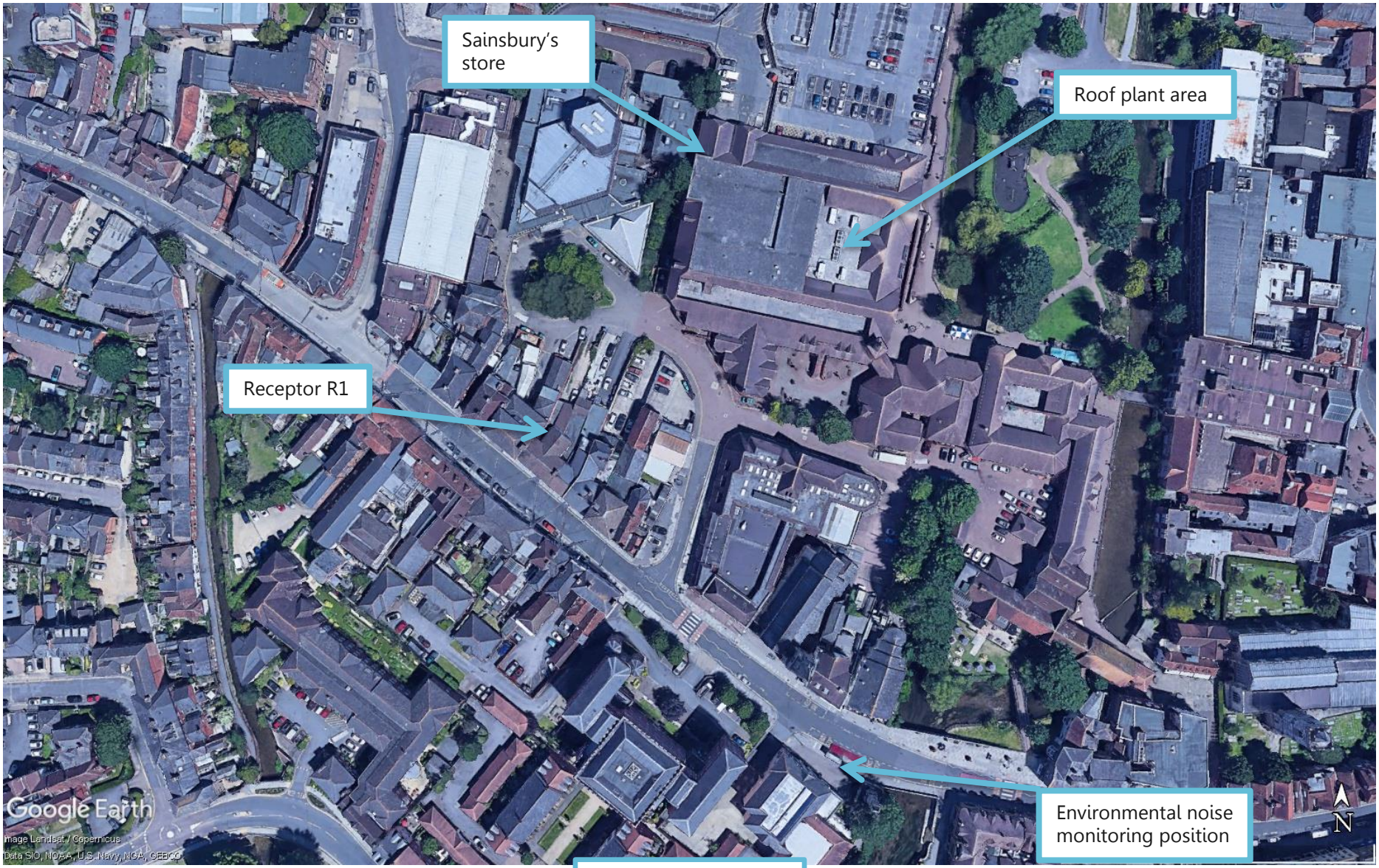


Image © Google 2023

Appendix C Unattended environmental sound survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken between 13.00 hours on Monday 3rd July and 12.00 hours on Tuesday 4th 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 sound level meter was positioned on a lamp-post on Fisherton Street. 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

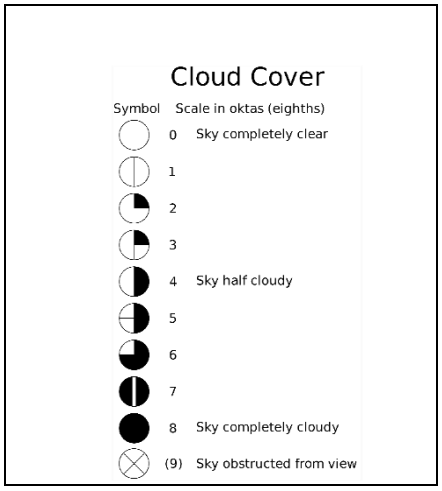
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

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.

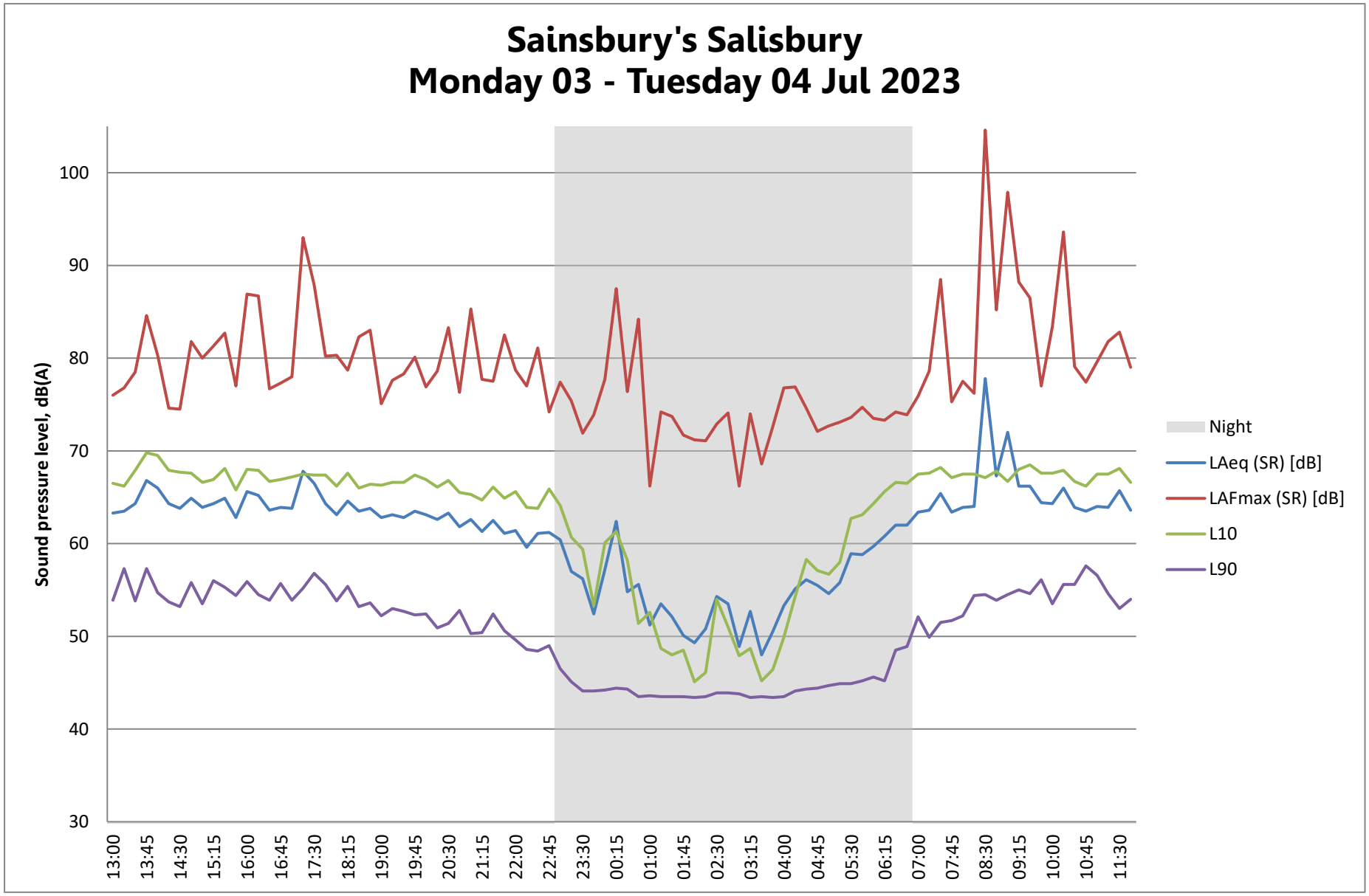
Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	13.00 3 Jul - 12.00 4 Jul 2023	Temperature (°C)	17	16
		Precipitation:	Slight	Yes
		Cloud cover (oktas - see guide)	8	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	Damp
		Wind Speed (m/s)	2-3	2-3
		Wind Direction	S	SE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	n/a	n/a

Results

C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at receptors close to the monitoring location, during the quietest times at which the plant will operate. Although there was some rain during the survey, there were sufficient periods of clement weather to assess typical prevailing noise level. In addition, a robust assessment of representative background noise levels has been undertaken.

C.8 The predominant noise sources noted at the start and end of the survey were local road traffic and pedestrians on Fisherton Street.

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


Sainsbury's Salisbury
Monday 03 - Tuesday 04 Jul 2023
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
13:00
13:45
14:30
15:15
16:00
16:45
17:30
18:15
19:00
19:45
20:30
21:15
22:00
22:45
23:30
00:15
01:00
01:45
02:30
03:15
04:00
04:45
05:30
06:15
07:00
07:45
08:30
09:15
10:00
10:45
11:30
Night
LAeq (SR) [dB]
LAFmax (SR) [dB]
L10
L90

Appendix D Existing plant noise calculations

Plant	Source sound pressure level		Distance (m)	Correction (dB)	Directivity (dB)	Screening (dB)	BS4142 Feature (dB)	Rating level at receptor
	dBA	at (m)						
Air handling unit	68	2	86	-33	0	-10	3	28
Rating level (daytime – all plant running)								**28**
Rating level (night – ventilation plant off)								**-**

Appendix E Plant noise data

Plant Ref	Manufacturer / Model	Operating Hours	Sound level
Pack	-	24hr	L_p 45dBA at 10m
Gas cooler 1-2	-	24hr	L_p 42dBA at 10m
False load evaporator 1-4	-	24hr	L_w 56dBA

Plant ref	Manufacturer / Model	No. units	Notes	Sound levels, dB, at octave band frequencies (Hz)								
				63	125	250	500	1K	2K	4K	8K	dB(A)
AHU	EcoAir Box EAB 10000 LTHW SO EH	1	Intake L_w	78	86	84	77	79	79	84	74	88
			Discharge L_w	81	87	84	84	85	83	85	78	91
			Breakout L_w (assumed)	71	72	66	59	55	51	50	43	63

Appendix F Calculations

Receptor 1 – residences on Fisherton Street

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)				
Pack	45dB at 10m	60	-16	0	0	3	32
Gas cooler 1	42dB at 10m	59	-15	0	0	3	30
Gas cooler2	42dB at 10m	72	-17	0	0	3	28
FLE1	56dB L_w	56	-43	0	0	3	16
FLE2	56dB L_w	62	-44	0	0	3	15
FLE3	56dB L_w	70	-45	0	0	3	14
FLE4	56dB L_w	77	-46	0	0	3	13
AHU (see calc)	70dB L_w	87	-47	0	-5	3	21
				Combined (daytime and night-time)			**35**

Receptor 2 – Proposed hotel to south

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)				
Pack	45dB at 10m	40	-12	0	0	3	36
Gas cooler 1	42dB at 10m	40	-12	0	0	3	33
Gas cooler2	42dB at 10m	40	-12	0	0	3	33
FLE1	56dB L_w	44	-41	0	0	3	18
FLE2	56dB L_w	40	-40	0	0	3	19
FLE3	56dB L_w	40	-40	0	0	3	19
FLE4	56dB L_w	44	-41	0	0	3	18
AHU (see calc)	70dB L_w	71	-45	0	-5	3	23
				Combined (daytime and night-time)			**39**

AHU calculation

Notes	Sound levels, dB, at octave band frequencies (Hz)								
	63	125	250	500	1K	2K	4K	8K	dB(A)
Intake L_w	78	86	84	77	79	79	84	74	88
Discharge L_w	81	87	84	84	85	83	85	78	91
Attenuator insertion loss	-5	-8	-15	-25	-32	-31	-28	-22	
Attenuated inlet L_w	73	78	69	52	47	48	56	52	**65**
Attenuated outlet L_w	76	79	69	59	53	52	57	56	**67**
Assumed casing loss	-10	-15	-18	-25	-30	-32	-35	-35	
Breakout L_w	71	72	66	59	55	51	50	43	**63**
Total L_w	79	82	73	62	58	55	60	58	**70**