

M&S
121-123 Bancroft
Hitchin
SG5 1LS

Plant Noise Impact Assessment

On behalf of



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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by City Build Engineering Services to provide a noise impact assessment of new plant serving the M&S store, located at 121-123 Bancroft, Hitchin.
- 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. Noise levels from the plant have been predicted at the nearest noise-sensitive receptors and assessed using the methodology given in BS 4142:2014 and other recognised standards.
- 1.4. A glossary of acoustic terminology is given in [Appendix A](#).

2.0 Details of development proposals

- 2.1. M&S Hitchin is positioned within a typical high street setting and occupies an end of terrace retail unit located at the junction of Bancroft and Portmill Lane.
- 2.2. One new condenser unit is to be located externally upon the roof of the building. Further works include a new evaporator unit which is to be installed internally and as such, is beyond the scope of this report.
- 2.3. The proposed external refrigeration plant may operate at any time, however, when the store is closed, ambient temperatures are lower, and demands placed upon the system are lessened, it is expected that the unit will operate at a reduced load.
- 2.4. To mitigate the risk of structure borne noise, all plant and associated pipework/ductwork should be fitted with suitable anti vibration mounts/hangers.

3.0 Nearest noise sensitive receptors

- 3.1. The area immediately surrounding the site is predominantly commercial (retail and office) properties.
- 3.2. The nearest noise sensitive residential receptor (Reference R1) is the residential dwelling located south of the M&S store at the junction of Bancroft and Churchyard Walk, approximately 39m from the proposed plant. The geometry of the store will provide screening between the plant and Receptor R1.

- 3.3. Additionally, the office windows located north of the proposed plant location (Receptor R2) have also been included within this assessment. These windows are located approximately 16m from the proposed plant.
- 3.4. All other nearby residential receptors benefit from increased distance/screening to the plant area such that compliance with the typical local authority's requirements will be achieved.
- 3.5. **Appendix C** contains an aerial photograph showing the site and surrounding area.

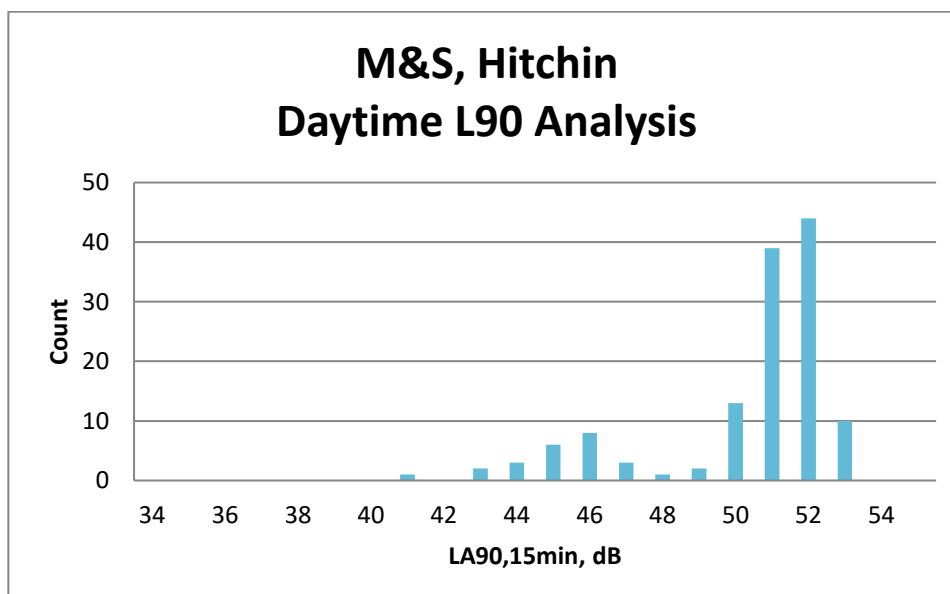
4.0 Existing noise climate

- 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 D**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Amax} (15mins)	L _{Aeq} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 - 23.00 hours)	50-64	60-88	53-66	41-53
Night-time (23.00 - 07.00 hours)	41-62	57-89	42-64	36-51

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

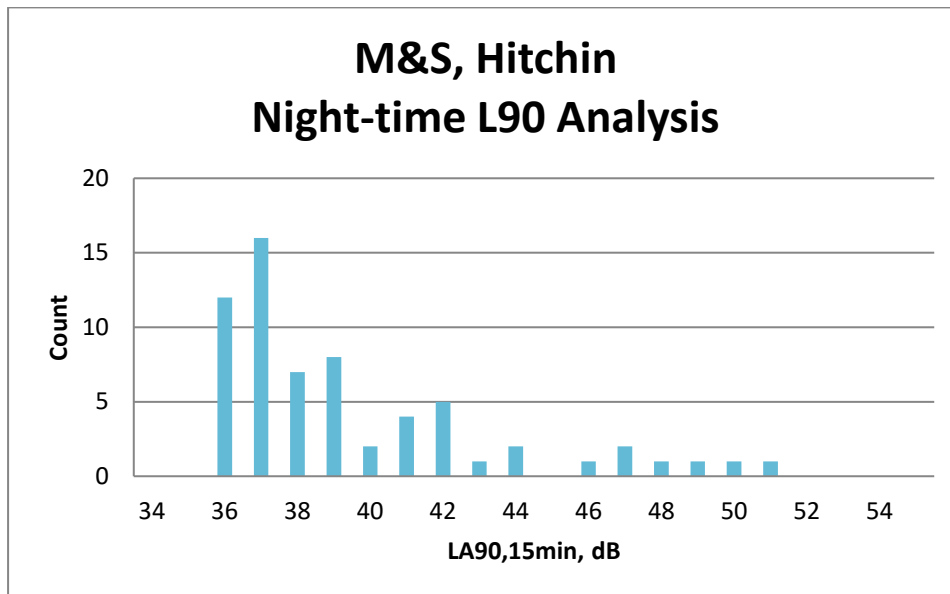


- 4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

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

dB, L_{A90} daytime period	
mean	50
modal	52
median	51

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



- 4.4. Further statistical analysis has been carried out on the data and the mean 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	39
modal	37
median	38

- 4.5. The following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 45dB L_{A90} during the daytime period; and
- 36dB 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 December 2023 and came into effect immediately. The original National Planning Policy Framework (NPPF¹) was published in March 2012, with subsequent revisions made periodically - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 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 180 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 191:
- "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 123 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"*.

North Hertfordshire District Council

- 5.8. The NHDC Local Plan 2011-2031 Proposed submission was published in October 2016. Policy D3 *Protecting living conditions* states:

Planning permission will be granted for development proposals which do not cause unacceptable harm to living conditions.

Where the living conditions of proposed developments would be affected by an existing use or the living conditions of an existing development would be affected by a proposed use, the Council will consider whether there are mitigation measures that can be taken to mitigate the harm to an acceptable level. If the Council is not satisfied that mitigation proposals would address the identified harm, development proposals will not be permitted.

- 5.9. The narrative to the policy indicates that "such harm may arrive from ... noise" as well as other issues.

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

- 5.10. BS 4142:2014 +A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014³ includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.
- 5.11. 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.
- 5.12. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

³ For brevity, references to BS 4142 and BS 4142:2014 should be read as BS 4142:2014 + A1:2019

-
- 5.13. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*
- 5.14. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*
- 5.15. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- *Typically, the greater this difference, the greater the magnitude of the impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
 - *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- 5.16. The standard does state that *"adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- 5.17. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*
- 5.18. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:
- "An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*
-

- 5.19. BS 4142:2014 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

- 5.20. 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.
- 5.21. 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} .
- 5.22. 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.

- 5.23. 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.
- 5.24. 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 requirements

- 5.25. It is proposed that the noise emitted by the proposed plant should be controlled, such that it does not exceed the representative L_{A90} background sound level at the nearest residential property. Doing so will ensure only a "low impact" when assessed in accordance with BS 4142:2014 at any local residential dwelling.
- 5.26. Furthermore, a proposed criterion has been provided for commercial office space, based upon guidance found in BS 8233:2014.
- 5.27. The cumulative noise level for the proposed plant at the nearest receptors considered should not therefore exceed the limits shown in the table below:

Table 4 Proposed plant noise level limits at noise sensitive residential/commercial receptors

Period	Cumulative plant Rating noise level, dB(A)
Daytime (07.00 – 23.00 hours)	45
Night-time (23.00 – 07.00 hours)	36
Commercial office space (at any time)	50*

**Specific noise level, not Rating level*

6.0 Plant noise impact assessment

- 6.1. The cumulative plant noise levels at the most affected noise sensitive receptors have been predicted based on noise data for the proposed equipment. The assessment has taken into consideration distance attenuation and directivity.
- 6.2. It should be noted that none of the proposed plant is anticipated to exhibit any tonal or impulsive characteristics providing it is well maintained. The new proposed plant is inverter driven and, therefore, will gently ramp up and down depending on the demands placed upon the system.
- 6.1. Table 5 summarises the results of the assessment at the most affected properties. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in [Appendix E](#).

Table 5 Assessment of predicted levels at the nearest noise sensitive receptors

Receptor	Period	Predicted rating level at receptor, $L_{A_r,Tr}$ (dB)	Criterion (dB)	Difference over proposed criterion (dB)
R1 (Residential)	Daytime (07.00 - 23.00 hours)	22	45	-23
	Night-time (23.00 - 07.00 hours)	22	36	-14
R2 (Office)	Daytime (07.00 - 23.00 hours)	*43	50	-7
	Night-time (23.00 - 07.00 hours)	*43	N/A	N/A

**Specific level*

- 6.1. The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at the most affected noise sensitive residential and commercial properties. In accordance with BS 4142:2014, plant noise levels will be of 'low impact' at the nearest noise sensitive receptors.

Context and uncertainties

- 6.1. 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 position was representative of the noise climate outside the nearby residential dwellings and not in a position where higher noise levels were present.
 - The above guidance is based on a minimum distance of around 39m between the proposed plant to the nearest residential receptor and 16m to the nearest commercial (office) receptor.

7.0 Summary

- 7.1. Noise Solutions Ltd (NSL) has been commissioned by City Build Engineering Services to provide a noise impact assessment of new plant serving the existing M&S located at 121-123 Bancroft, Hitchin.
- 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 plant area.
- 7.3. The assessment shows that noise from the plant will be significantly below the representative L_{A90} background sound level when assessed at the nearest residential property. In accordance with BS 4142:2014, plant noise levels will be of 'low impact' at the nearest noise sensitive receptors.
- 7.4. Additionally, further consideration was given to nearby commercial receptors to ensure compliance with guidance found in BS8233.
- 7.5. Given the results of the assessment, noise from plant should not be grounds for refusal of planning permission.

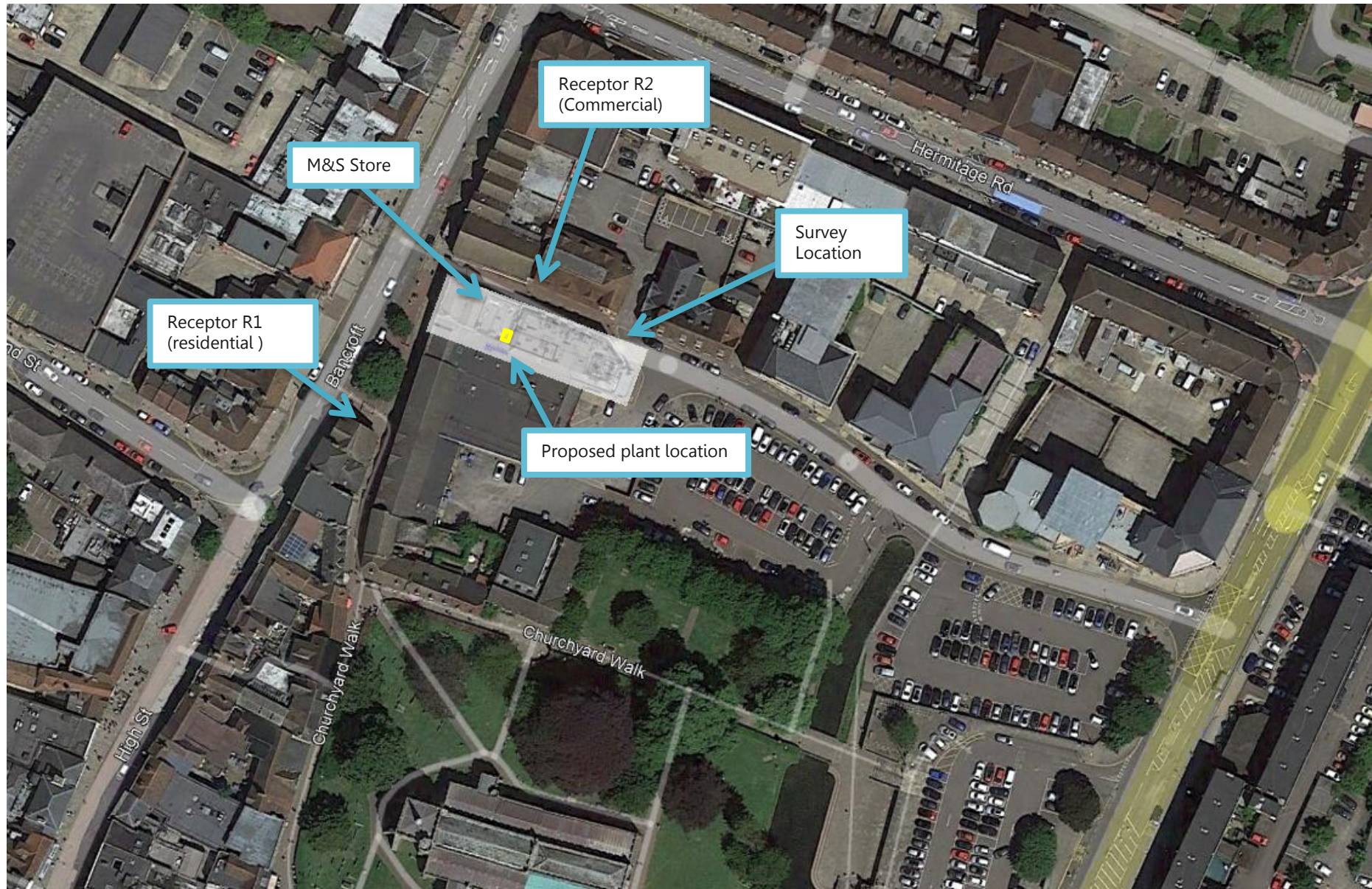
Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LAeq,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), LAx	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.
LAeq,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.
Lmax,T	A noise level index defined as the maximum noise level recorded during a noise event with a period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. LA10,18h is the A-weighted arithmetic average of the 18 hourly LA10,1h values from 06:00-24:00.

Appendix B Plant information and manufacturer published sound pressure levels

Plant Item	Make/Model	Quantity	Sound pressure level
Condensing Unit	J&E Hall/ JEHS-0750-B4-L-3	1	41dB at 10m

Appendix C Aerial photograph of site



Appendix D Environmental sound survey

Details of environmental sound survey

- D.1 Measurements of the existing environmental sound levels were undertaken between 12.00 hours on Tuesday 23rd July and 13.00 hours on Thursday 25th July 2024.
- D.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the survey.

Measurement position

- D.3 The sound level meter was positioned on a lamp post along Portmill Lane Hitchin (approximate location indicated on the site plan in Appendix C). 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 with the microphone positioned at a height of approximately 3m above ground level.

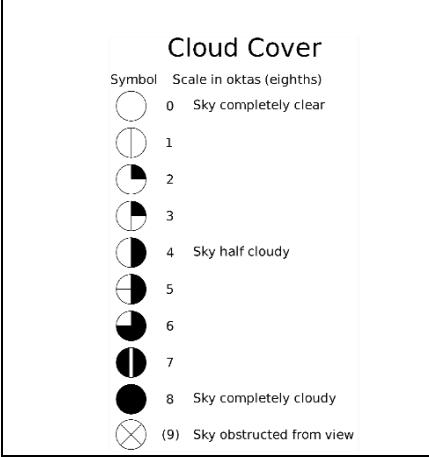
Equipment

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

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977 / 36190	20/04/2023	1505154-2
Condenser microphone	ACO Pacific 7052E / 74975		
Preamplifier	Svantek SV12L / 10325		
Calibrator	Svantek SV33B / 125546	04/06/2024	1508883-1

Weather conditions

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

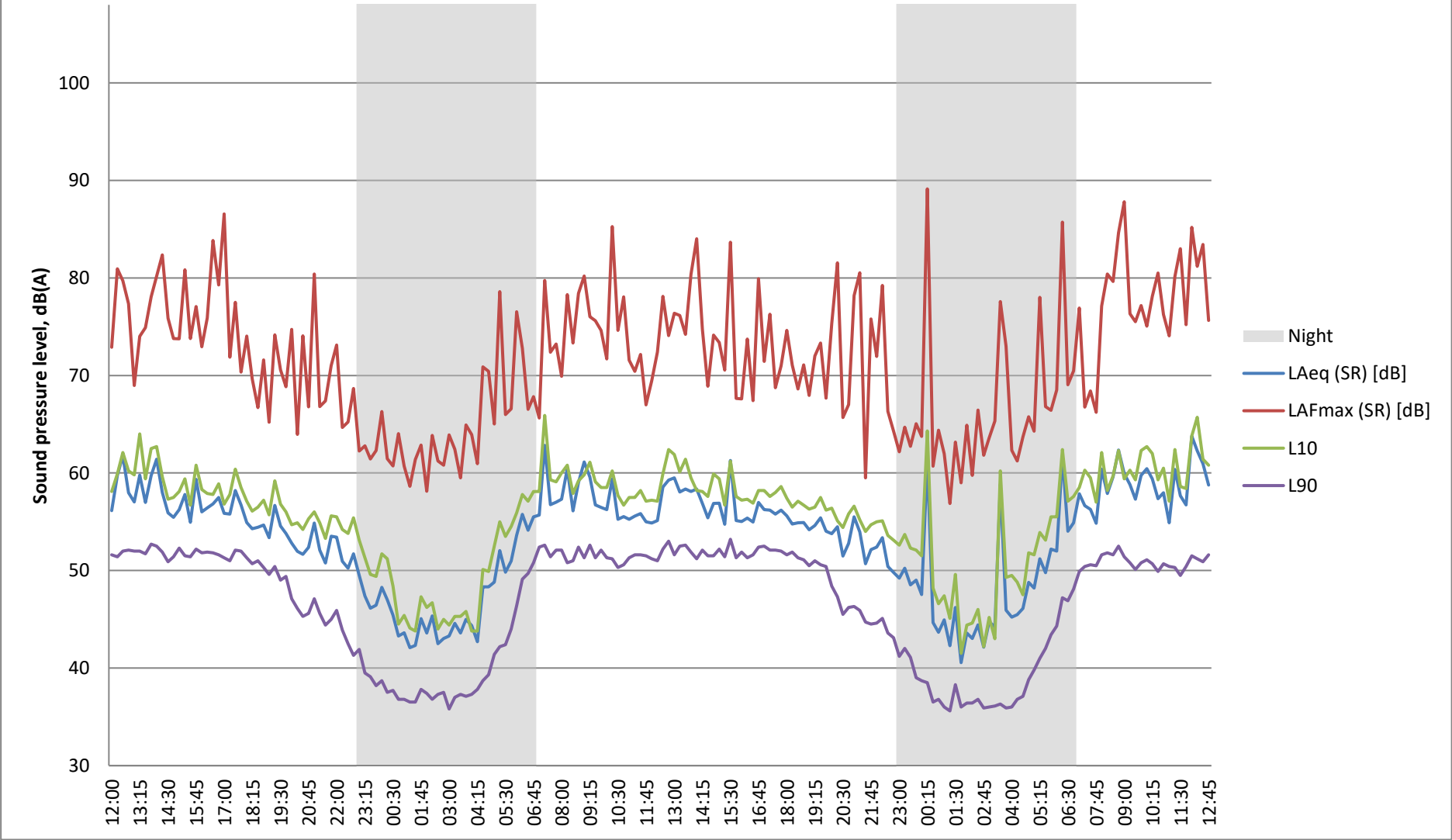
Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix C	12.00 23/7/24 - 13.00 25/7/24	Temperature (°C)	19	19
 Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Precipitation:	No	No
		Cloud cover (oktas - see guide)	8	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Mostly Dry	No
		Wind Speed (m/s)	2	3
		Wind Direction	From NW	From SE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- D.6 The results of the survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate. The noise climate at the start and end of the survey period was dominated by local road traffic movements and plant noise, with further influence to a lesser degree from pedestrians and birdsong. Noise from scaffolders was also noted upon the meters collection.
- D.7 Please note that although plant noise was noted at the time of the meters set-up collection, it does not appear to have unduly interfered with the results of the survey. The results of the survey are presented in a time history graph overleaf.

M&S, Hitchin

Tuesday 23 - Thursday 25 Jul 2024



Plant	Maximum plant noise level at source		Distance		Directivity (dB)	Screening (dB)	BS 4142:2014 feature correction	Plant rating noise level at receptor (dBA)
	L _p (dBA)	Distance (m)	Distance (m)	Correction (dB)				
CU-1	41	10	16	-4	6	0	N/A	43
Specific level								43