# Marks + Spencer Simply Food

## 99-107 High Street
## Teddington
## TW11 8HG

## Plant Noise Survey

On behalf of

Wates

Project Reference: 92125| Revision: - | Date: 5th September 2024

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## Document Information

| | | |
|---|---|---|
| **Project Name** | : | **Marks + Spencer, Teddington** |
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| | Name | Qualifications | Initials | Date |
|---|---|---|---|---|
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| **For and on behalf of Noise Solutions Ltd** | | | | |

| Revision | Date | Description | Prepared | Reviewed/ Approved |
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# Contents



## Appendices

# 1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Wates to undertake a plant noise commissioning survey at the Marks + Spencer Simply Food store located along the High Street in Teddington.

1.2. NSL has attended site to undertake plant noise measurements in order to determine compliance with local authority requirements.

1.3. 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 Site layout

2.1. The Marks + Spencer Simply Food store occupies a dedicated building along the High Street in Teddington.

2.2. External plant serving the store comprises two compressor packs with a gas cooler, and air handling unit (AHU) and a VRF air conditioning unit on the roof of the store. The rooftop plant is surrounded by an acoustic screen on four sides.

# 3.0 Nearest noise sensitive receptors

3.1. The nearest noise sensitive receptors are the residential dwelling along Watts Lane behind the store (Reference R1) at a distance of approximately 18 metres from the plant, the residential dwellings in Cambridge house (Reference R2) at a distance of approximately 34 metres from the plant and the residential dwellings above the store (Reference R3) at a distance of approximately 22 metres from the plant.

3.2. All receptors benefit from screening due to the existing acoustic enclosure around the plant area.

3.3. An aerial photograph showing the site and surrounding area, the nearest noise sensitive properties and the noise monitoring location used in this assessment is presented in **Appendix B**.

# 4.0 Existing noise climate

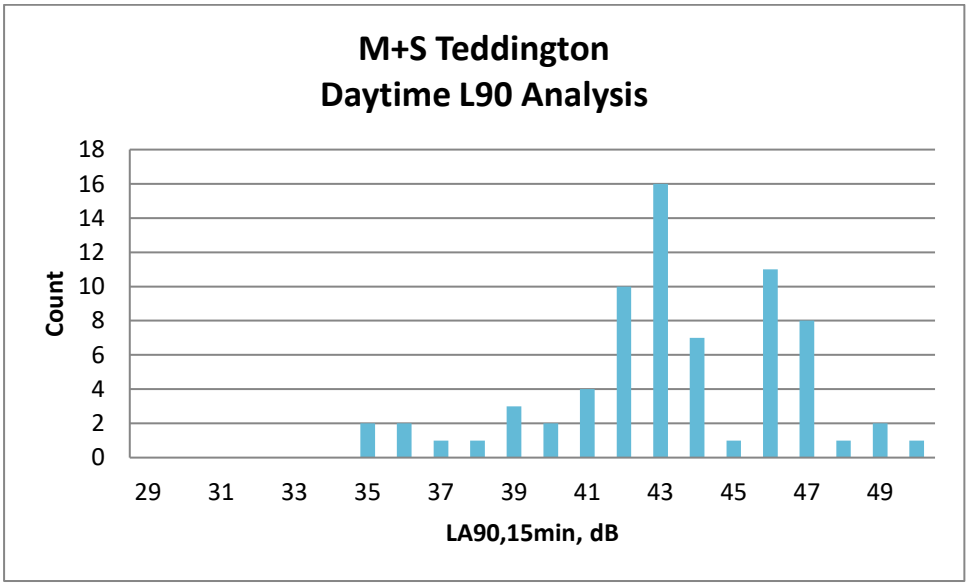
4.1. An environmental noise survey was previously undertaken for the NSL Plant Noise Impact Assessment (reference 92125/NIA/Rev4, revised 27th March 2024) to establish the typical background sound levels at a location representative of the noise climate outside the façades of the noise sensitive receptors nearest to the plant, 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) | | | |
|---|---|---|---|---|
| | $L_{Aeq(15mins)}$ | $L_{AFmax(15mins)}$ | $L_{A10(15mins)}$ | $L_{A90(15mins)}$ |
| Daytime (07.00 – 23.00 hours) | 55-74 | 71-101 | 53-67 | 35-50 |
| Night-time (23.00 – 07.00 hours) | 34-56 | 50-83 | 35-60 | 29-46 |

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



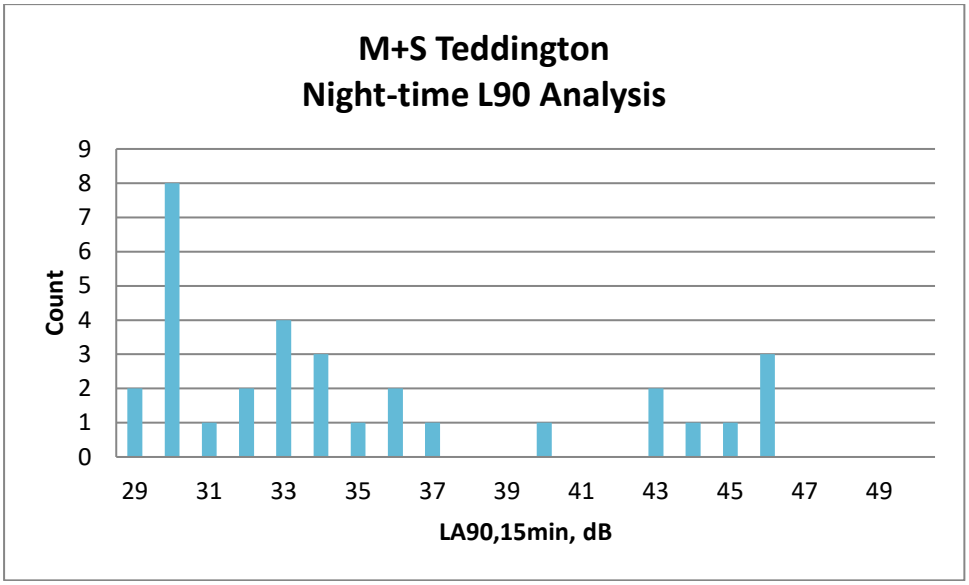

4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in Table 2 below.

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

| dB, $L_{A90}$ daytime period | |
|---|---|
| **mean** | 43 |
| **modal** | 43 |
| **median** | 43 |

4.4. From the histogram analysis, 39dB 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 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** | 35 |
| **modal** | 30 |
| **median** | 33 |

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 representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 39dB $L_{A90}$ during the daytime period; and
- 30dB $L_{A90}$ during the night-time period.

# 5.0 Plant noise design criteria

## London Borough of Richmond upon Thames Council

5.1. The following table is taken from the London Borough of Richmond Upon Thames's Supplementary Planning Document for Development Control for Noise Generating and Noise Sensitive Areas. All terms in the table are defined in BS 4142:2014+A1:2019:

*Table 4 Taken from London Borough of Richmond Upon Thames's Supplementary Planning Document for Development Control for Noise Generating and Noise Sensitive Areas*

| *Noise Significance Risk* | *BS4142 Outcome* | *Planning Advice* |
|---|---|---|
| *Minimal* | $L_{A,Tr} - L_{A90,T} \leq -5$ | *Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The Borough will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.* |
| *Low* | $L_{A,Tr} - L_{A90,T}$ *is* $> -5 \& \leq 0$ | *Where the rating level of noise is equal to, or below the background noise level by up to 5dB, this indicates that the proposed NGD may be accept able from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally) Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects.* |
| *Medium* | $L_{A,Tr} - L_{A90,T}$ *is* $> 0 \& \leq +5$ | *Where the rating level of noise is equal to, or above the background noise level by up to 5dB, this indicates that the proposed NGD is less likely to be acceptable from a noise perspective and will be context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is typically only applicable to non-sensitive sites or where there are overriding other reasons why development should be considered. It will typically be necessary for the applicant to confirm how adverse impacts from the NGD will be mitigated and minimised. It is less likely that planning consent will be granted.* |
| *High* | $L_{A,Tr} - L_{A90,T} > +5$ | *Where the rating level of noise is above the background noise level by more than 5dB, this indicates that the proposed NGD is unlikely to be acceptable from a noise perspective and planning consent is likely to be refused on noise grounds.* |

5.2. In order to be robust, it is proposed that the rating level of the plant is at least 5dB below the background noise level, in order to comply with the "minimal noise significance risk" category.

5.3. In addition, the London Borough of Richmond Upon Thames council have proposed the following condition:

*The plant hereby permitted shall be installed in strict accordance with the details provided in the acoustic report submitted by Noise Solutions Ltd reference 92125 version 03 dated 13th February 2024. The plant shall thereafter be retained as approved. The plant shall not be used unless the equipment is installed in compliance with these details.*

*A commissioning acoustic test report shall be undertaken within two weeks of the mechanical services installation in order to demonstrate the limiting noise levels detailed in the above report have been achieved. The results of the tests shall be submitted to and approved in writing by the Local Planning Authority.*

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

5.4. 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".

5.5. 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.

5.6. 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.

5.7. 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."

5.8. 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."

5.9. 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.*

5.10. 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."

5.11. 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."

5.12. 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."*

5.13. 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.

### Summary of proposed criteria

5.14. The referenced NSL report derived the following:

*Table 5 Plant noise emissions level limits at nearest 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 |

## 6.0 Site Visit 28th August 2024

6.1. Noise Solutions Ltd attended site between 18.00 and 21.00 hours on 28th August 2024 to measure noise emissions from the installed plant.

### External Plant Assessment

6.2. Plant investigated includes the two compressor packs and associated gas cooler, the AHU and the VRF air conditioning unit.

6.3. Measurements were undertaken to establish the external sound level emissions from the refrigeration and ventilation plant installed at the store.

6.4. All plant was switched off in order to measure the residual sound level. Each plant item was then switched on to measure the specific sound level in isolation. Measurements were taken over short time intervals to minimise the effects of transient noise sources such as passing vehicles. The measurements were taken above a temporary scaffolding tower close to the upper storey windows at Receptor R2, as the most affected receptor with the least screening from the plant enclosure.

6.5. All plant was verified to be running at the design duties. Each pack is associated with one row (total two rows of three fans each) of gas cooler fans so each pack measurement includes three gas cooler fans.

6.6. The initial measurements are shown in Table 6 below:

*Table 6 External plant sound pressure level survey results*

| Plant item | Sound pressure levels (dB) | | |
|---|---|---|---|
| | Plant on | Plant off | Specific level |
| All plant | 47 | 47 | <37* |
| Pack 1 | 47 | 47 | <37* |
| Pack 2 | 47 | 47 | <37* |
| AHU | 47 | 47 | <37* |
| VRF | 47 | 47 | <37* |

**Where the measured plant noise level does exceed the residual (all plant off) level by at least 3dB an upper limit of 10dB below the residual level is shown. It should be noted that this is not a true specific noise level, but the upper limit to the possible specific level (the true specific level may be significantly lower)*

## 7.0 Discussion of results

### All plant

7.1. The NSL report predicted the cumulative rating level outside receptor R2 to be 33dB(A). There was no difference between the measured sound pressure levels with all plant on and all plant off,

so the plant was inaudible with a maximum possible sound pressure level of 37dB(A). This is fully consistent with the NSL report.

## 8.0 Conclusions

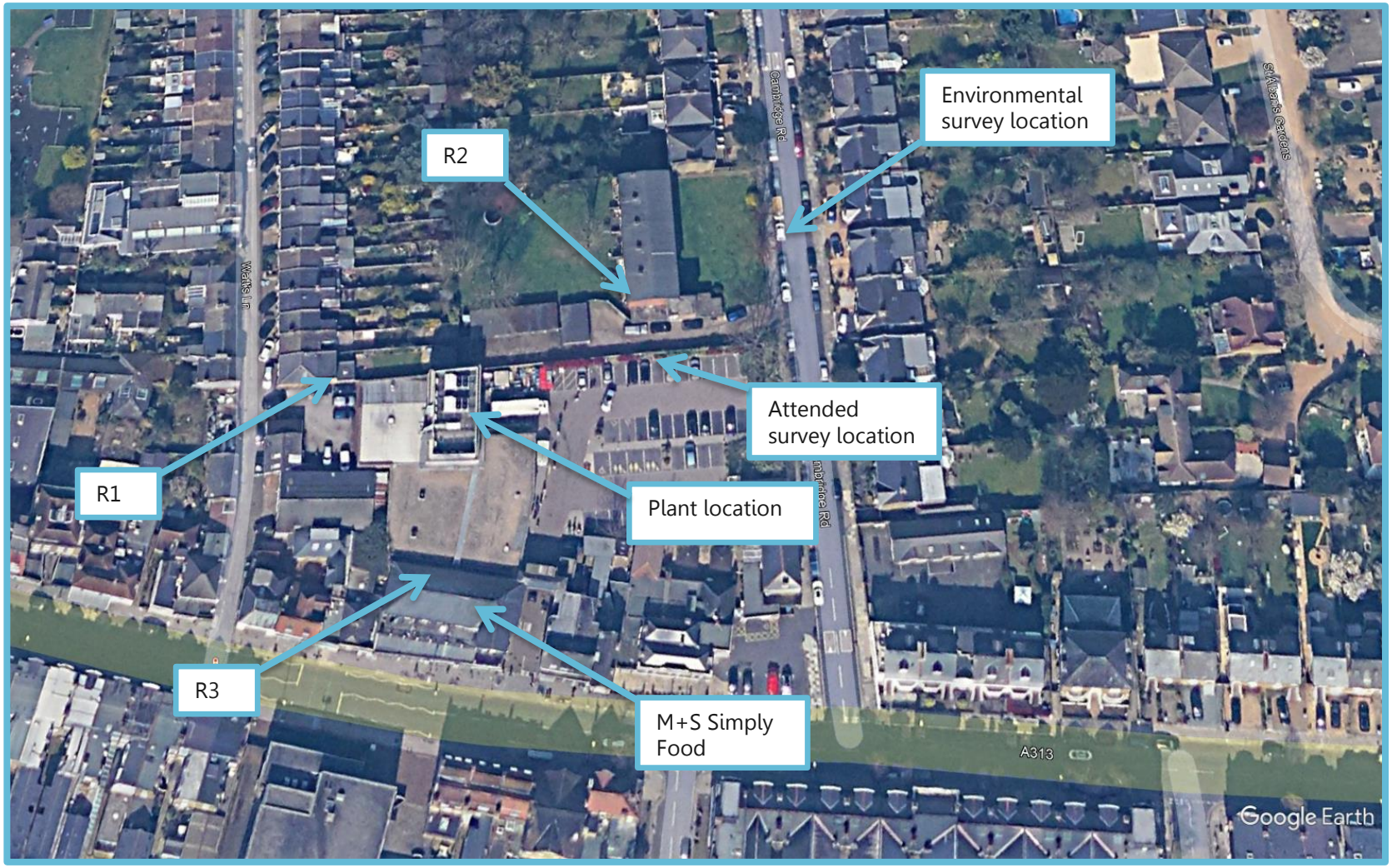
8.1. Noise Solutions Ltd (NSL) has been commissioned by Wates to undertake a plant noise commissioning survey at the Marks + Spencer Simply Food store located along the High Street in Teddington.

8.2. The plant noise measurements are fully consistent with the NSL noise impact assessment report.

# 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 Leq 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 site showing areas of interest




Photograph 1 Courtesy of Google Earth

# Appendix C Environmental sound surveys

## Details of sound surveys

C.1 Measurements of the existing background sound levels were undertaken between 10.45 hours on Wednesday 7th February and 12.45 hours on Thursday 8th February 2024.

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 15-minute sample periods for the duration of the noise survey.

## Measurement positions

C.3 The representative measurement position was located on a lamp post along Cambridge Road. The approximate location of the microphone during the survey is indicated on the plan in Appendix B. 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 facade conditions.

## Equipment

C.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

*Environmental sound pressure level survey*

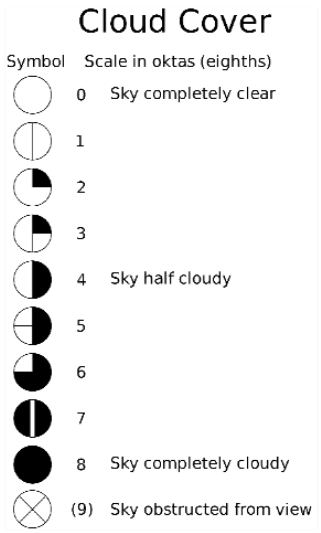
| Description | Model / serial no. | Calibration date | Calibration certificate no. |
|---|---|---|---|
| Class 1 Sound level meter | Svantek 977D / 99071 | 11/05/2023 | Factory conformation certificate |
| Condenser microphone | ACO Pacific 7052E / 81197 | | |
| Preamplifier | Svantek SV18A / 130661 | | |
| Calibrator | Svantek SV 33B / 83850 | 30/10/2023 | 1506985-2 |

*Plant sound pressure level survey*

| Description | Model / serial no. | Calibration date | Calibration certificate no. |
|---|---|---|---|
| Class 1 Sound level meter | Svantek 977D / 99472 | 07/02/2024 | Factory conformation certificate |
| Condenser microphone | Microtech MK255 / 26247 | | |
| Preamplifier | Svantek SV12L / 144643 | | |
| Calibrator | Svantek SV33B / 148015 | 06/03/2024 | Factory conformation certificate |

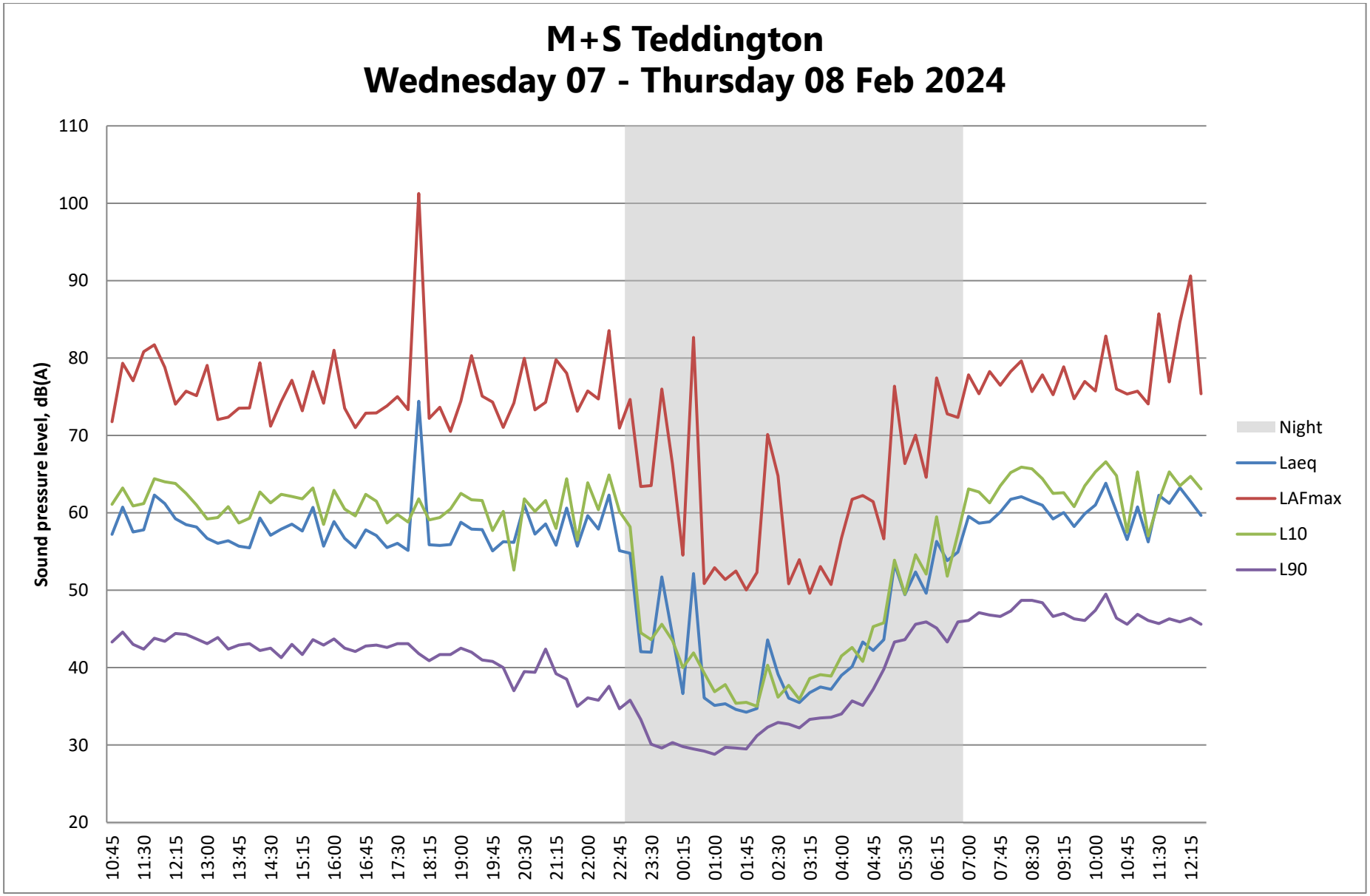
## Weather Conditions

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

| Weather Conditions | | | | |
|---|---|---|---|---|
| **Measurement Location** | **Date/Time** | **Description** | **Beginning of Survey** | **End of Survey** |
| As indicated on Appendix B | 10.45 7/2/24 - 12.45 8/2/24 | Temperature: | 6 | 9 |
|  | | Precipitation: | No | No |
| | | Cloud cover (oktas - see guide) | 8 | 8 |
| | | Presence of fog/snow/ice | No | No |
| | | Presence of damp roads/wet ground | Yes | Yes |
| | | Wind Speed (m/s) | 0 | 1 |
| | | Wind Direction | - | Southerly |
| | | Conditions that may cause temperature inversion (i.e. calm nights with no cloud) | No | No |

## Results

C.6 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 the table overleaf.


M+S Teddington
Wednesday 07 - Thursday 08 Feb 2024
Sound pressure level, dB(A)
110
100
90
80
70
60
50
40
30
20
10:45
11:30
12:15
13:00
13:45
14:30
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04:00
04:45
05:30
06:15
07:00
07:45
08:30
09:15
10:00
10:45
11:30
12:15
Night
Laeq
LAFmax
L10
L90

# Appendix D Plant noise measurement location