



A C Goatham and Sons

NEW GREEN FARM

Noise Assessment





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1. INTRODUCTION

1.1. INSTRUCTION

- 1.1.1. WSP has been appointed by A C Goatham and Son to undertake a noise assessment for the proposed new cold store at New Green Farm, Shorne, Gravesend.

1.2. PROJECT BACKGROUND

- 1.2.1. The site is bounded by a site access road to the north and is otherwise surrounded by open fields. The closest noise sensitive receptors (NSRs) are one existing and five proposed seasonal worker caravans located on land owned by the applicant immediately to the north of the site. The next closest NSR is Kennel House, a residential property located approximately 350m north of the site on Lower Road.
- 1.2.2. The existing site layout and the extent of the application site (in red) are shown in Figure 1-1 below.

Figure 1-1 - Aerial Photograph of the Site and Immediate Surrounds



1.3. PROPOSED DEVELOPMENT

- 1.3.1. The proposed development comprises a new cold store approximately 750 m to the east of Green Farm Lane and approximately 330m to the south of Lower Road. An existing farm building is in proximity to the proposed cold store to the north-west and there is planning permission for six seasonal worker caravans between the existing farm building and proposed cold store.

- 1.3.2. The proposed development layout is shown in Figure 1-2 below and the existing and proposed seasonal worker caravans are shown in Figure 1-3 below.
- 1.3.3. This report is necessarily technical in nature and a glossary of acoustic terminology is provided in **Appendix A**.

Figure 1-2 - Proposed Development Layout

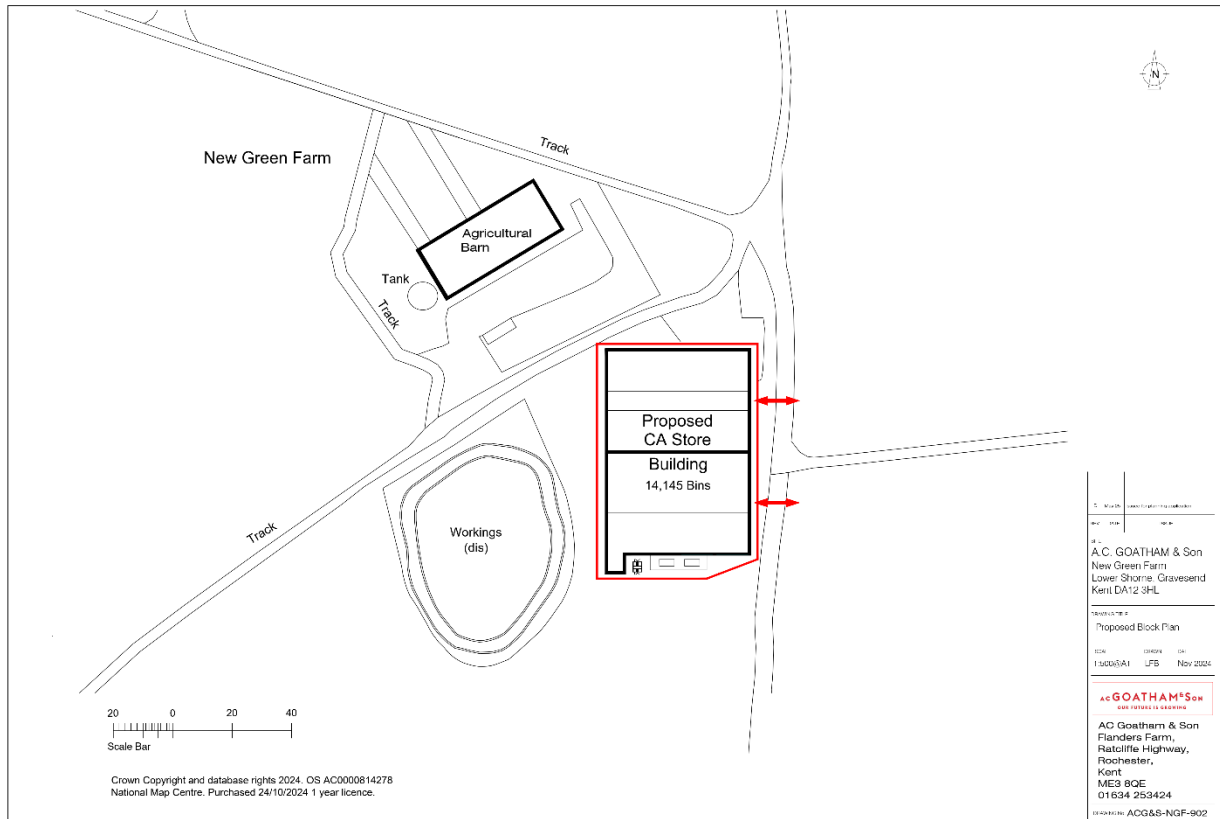
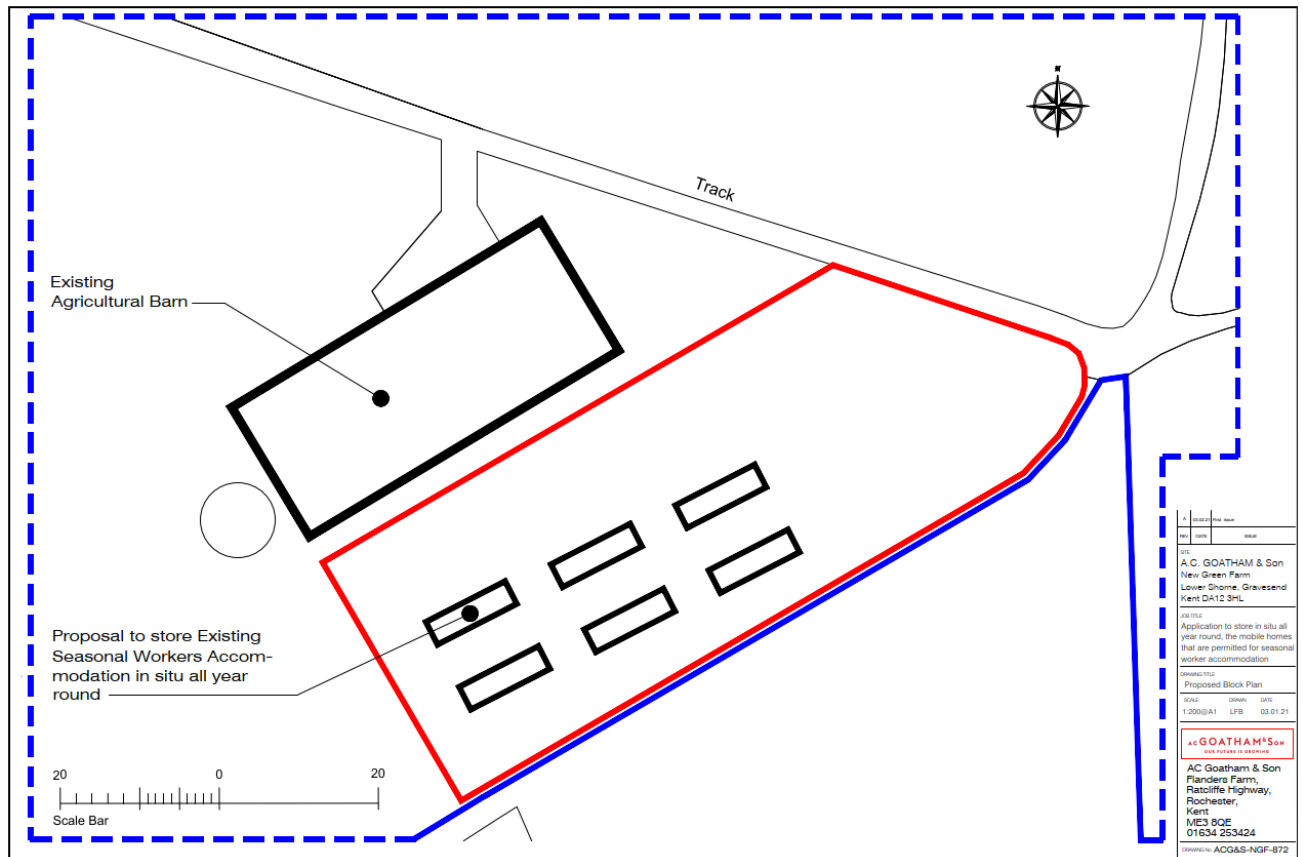


Figure 1-3 - Existing and Proposed Mobile Homes



2. POLICY, GUIDANCE AND STANDARDS

2.1. OVERVIEW

- 2.1.1. This section considers relevant national and local planning policies and national and international guidance and standards.

2.2. NATIONAL PLANNING POLICY

THE NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

- 2.2.1. The latest version of the NPPF was published in December 2024. It is a concise document that provides its position on noise primarily in paragraph 198 which is reproduced below:

‘Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they 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 the quality of life⁷² ;*
- 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; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

Footnote 72 See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)’

THE NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

- 2.2.2. This provides more detail than the NPPF setting out the long-term vision of Government noise policy and applies to all forms of noise excluding occupational noise. The NPSE repeatedly refers to the management and control of noise within the context of Government Policy on sustainable development.
- 2.2.3. The NPSE also stresses that noise should not be considered in isolation from other related factors. At paragraph 2.7 for example it states:
- ‘...the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications.’*
- 2.2.4. The NPSE introduces and describes three categories, or levels, describing the presence or absence of noise effects but does not quantify those categories, stating that the corresponding objective levels are likely to be different for different noise sources, receptors and times of the day or night. These categories are:

- NOEL – No Observed Effect Level – This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise
- LOAEL – Lowest Observed Adverse Effect Level – This is the level above which adverse effects on health and quality of life can be detected
- SOAEL – Significant Observed Adverse Effect Level – This is the level above which significant adverse effects on health and quality of life occur.

2.2.5. The NPSE recognised that, at the time of publication, further research was needed into how these categories might be quantified for different scenarios. There is still no robust, universally accepted method of deriving suitable values and a variety of approaches are adopted in different circumstances.

2.3. LOCAL PLANNING POLICY

2.3.1. The Gravesham Local Plan Core Strategy adopted September 2014 sets out the planning policies that guide development within the borough.

2.3.2. Policy CS19: Development and Design Principles states:

“New development will be located, designed and constructed to:

- *safeguard the amenity, including privacy, daylight and sunlight, of its occupants and those of neighbouring properties and land;*
- *avoid adverse environmental impacts from pollution, including noise, air, odour and light pollution, and land contamination; and*
- *not pose an unacceptable risk or harm to the water environment, including the quality and/or quantity of ground waters, surface waters, wetlands and coastal water systems;”*

2.4. GUIDANCE AND STANDARDS

PLANNING PRACTICE GUIDANCE (PPG)

2.4.1. The Government launched the PPG web-based resource in March 2014 and refreshed it in July 2019. The section on noise provides tabulated descriptions of example outcomes of the categories introduced in the NPSE based on the likely average response. It also adds a fourth category termed Unacceptable Adverse Effect (UAE). The tabulated descriptions are summarised in Table 2-1 below.

Table 2-1 – Outcome Descriptors for Noise Effect Levels

Perception	Examples of outcomes	Increasing effect levels	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.4.2. The PPG recognises that there is not a simple relationship between measured or predicted noise levels and the resultant impact and that this will depend on how various factors combine. The factors thought to be most relevant in this assessment are:

- The source and absolute level of the noise together with the time of day it occurs

- For non-continuous sources of noise, the number of noise events and the frequency and pattern of occurrence of the noise
- The spectral content and general character of the noise i.e. tonal or with other particular features
- The local topology and topography
- The existing or, where appropriate, planned character of the area

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

- 2.4.3. This Standard provides an assessment method for noise arising from commercial noise sources, including external plant and on-site vehicle movements and unloading, at residential receptors. It is a relative assessment approach whereby the predicted commercial sound level (suitably penalised for potentially annoying characteristics if appropriate) is compared with the prevailing background noise level. A summary of the BS 4142 approach is set out below.
- Establish the specific sound level of the source(s);
 - Measure the representative background sound level;
 - Correct the specific sound level for on-time and any noise contributions from unrelated sources if necessary;
 - Rate the specific sound level to account for distinguishing characteristics;
 - Estimate the impact by subtracting the background sound level from the rating level; and
 - Consider the initial impact estimation in the context of the noise and its environs.
- 2.4.4. Where the sound source is not yet present, the specific sound level is established by calculation. The representative background sound level is established by measurement at the receptor location.
- 2.4.5. The specific sound level can then be upwardly adjusted, by adding feature corrections for one or more distinctive characteristics, to derive the sound rating level. The feature corrections are summarised below:
- | | |
|-------------------------------|------------|
| ■ Tonality | up to 6 dB |
| ■ Impulsivity | up to 9 dB |
| ■ Other sound characteristics | up to 3 dB |
| ■ Intermittency | 3 dB |
- 2.4.6. An initial estimate of the impact of specific sound is obtained by subtracting the measured background sound level from the rating level as described in section 11 of BS 4142. The results of this comparison are assessed on the basis of the following guidance:
- Typically, the greater the 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.

2.4.7. All pertinent contextual considerations should be taken into account including the following:

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

2.4.8. The 2014 Standard has certain specific reporting requirements which include the following:

- Photographs of the site, surroundings and the monitoring location(s).
- Details of instrumentation used, including calibration data provided at **Appendix B**.
- An assessment of the uncertainty associated with all stages of the assessment. WSP assess uncertainty on a project specific basis but using a semi-standardised matrix. This uncertainty assessment is included at **Appendix C**.
- Weather conditions, shown in Figure 4-2.
- For the purposes of the assessment of noise within this document BS 4142 comprises the most applicable standard to the assessment of noise from conventional industrial/commercial sources. However, some consideration of absolute sound level criteria applicable to residential receptors is necessary to inform the contextual assessment required based on BS 4142. For that reason, the relevant parts of BS 8233:2014 are described below.

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

2.4.9. The guidance provided includes appropriate internal and external noise level criteria, which are applicable to dwellings exposed to steady external noise sources. It is stated that it is desirable for internal ambient noise levels not to exceed the criteria set out in Table 4 of the Standard, which are reproduced in Table 2-2 below, although Note 7 to the table states that reasonable internal conditions can still be achieved with the tabulated values relaxed by up to 5 dB.

Table 2-2 - Summary of Internal Ambient Noise Level Criteria for Habitable Rooms from BS 8233:2014

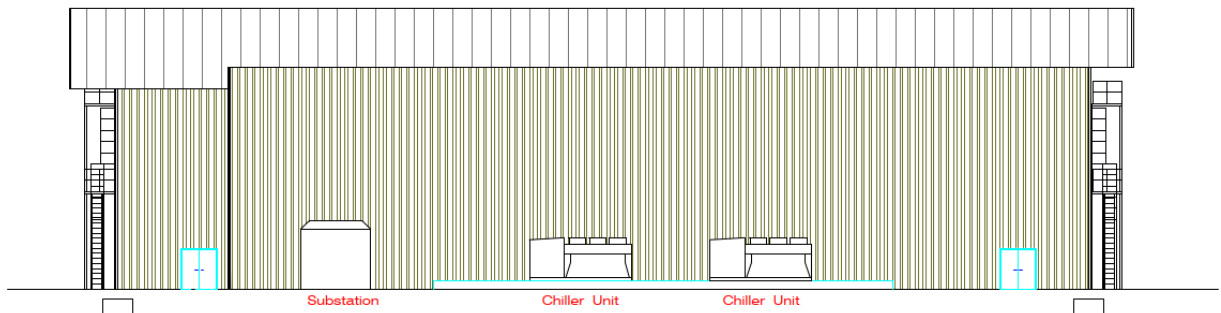
Activity	Location	Period	
		07:00 to 23:00 hrs	23:00 to 07:00 hrs
Resting	Living Room	35 dB $L_{Aeq,16h}$	
Dining	Dining Room/area	40 dB $L_{Aeq,16h}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

- 2.4.10. Note 4 to Table 4 advises that regular noise events (for example, scheduled aircraft) can cause sleep disturbance and that a 'guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night'.
- 2.4.11. With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,16h}$, with an upper guideline value of 55 dB $L_{Aeq,16h}$, being acceptable in noisier environments.

3. NOISE ASSESSMENT APPROACH AND ASSUMPTIONS

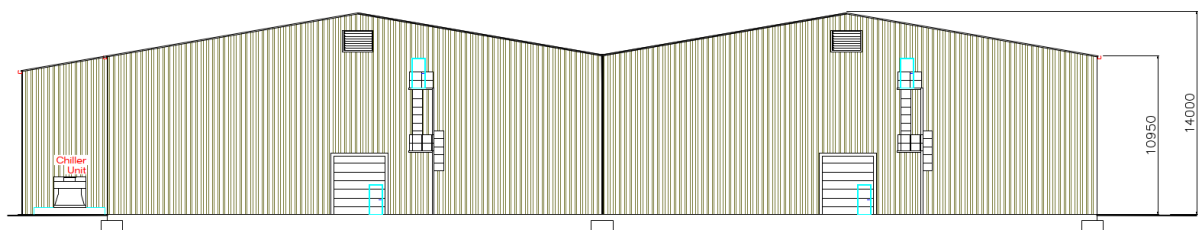
- 3.1.1. The basic approach to the noise assessment is to consider the potential impact of noise which would result from the proposed development.
- 3.1.2. Three potential sources of noise are considered in this report. These are:
1. External refrigeration fans which will be located on the south elevation of the proposed cold store.
 2. Loading/unloading operations associated with the proposed cold store which will occur at the east elevation.
 3. Additional on-site vehicle movements that will be generated by the development.
- 3.1.3. The south and east elevations of the proposed building are shown in Figures 3-1 and 3-2 below.

Figure 3-1 - South Elevation of the Proposed Building



Proposed South Elevation -

Figure 3-2 – East Elevation of the Proposed Building



Proposed East Elevation -

- 3.1.4. With respect to point 3, on-site noise from HGV and tractor movements between the east elevation, the access road and the orchard lines are not included in this assessment as no increase in the maximum number of movements is anticipated during the applicable assessment period as a result

of the application. This is because movements associated with the loading/unloading of the proposed cold store would be no different from those already permitted.

- 3.1.5. HGV and forklift truck ('FLT') movements have been modelled as point sources as they will approach the proposed cold store from the existing access road to the east of the cold store.
- 3.1.6. Changes to future noise levels have been predicted by noise modelling within the CadnaA® noise modelling environment running ISO 9613 algorithms.
- 3.1.7. For commercial/industrial type noise sources, predicted noise levels have been appropriately rated to account for feature corrections before comparing the rating levels with the adopted background sound levels to derive the initial impact estimation based on the BS 4142 assessment method.
- 3.1.8. Finally, the initial impact estimations have been subjected to a contextual assessment prior to the final impact assessment being considered in terms of extant planning policy.

4. NOISE SURVEY

4.1. SURVEY METHODOLOGY

- 4.1.1. An unattended noise survey was undertaken between Wednesday 5th March and Wednesday 12th March 2025 to establish the prevailing background sound levels at a location close to the nearest existing and proposed noise sensitive residential receptors (the assessment locations). Measurements were made at two positions.
- 4.1.2. Measurement Position 1 (MP1) was located at the Barn closest to the existing residential caravan and was representative of the one existing and five proposed seasonal worker caravans.
- 4.1.3. Measurement Position 2 (MP2) was located at Kennel House, lower road and was representative of the residential properties on Lower Road.
- 4.1.4. Figure 4-1 presents the location of the monitoring positions.
- 4.1.5. The monitoring systems comprised an 'in-calibration' class one sound level meter, attached to an external battery supply in a case, with a tripod mounted microphone connected via an extension cable. The assembled systems were subject to field calibration checks prior to commencing the measurement runs.

Figure 4-1 – Survey Locations



- 4.1.6. For the purposes of this report, the unattended measurements of the baseline noise level undertaken at survey location 1 are suitable to inform the selection of appropriate baseline sound levels to underpin the assessment.

4.2. NOISE SURVEY RESULTS

- 4.2.1. The logarithmic average sound levels ($L_{Aeq,T}$) derived for each of the survey days (07:00-23:00) and nights (23:00-07:00) and the average $L_{A90,15min}$ data for MP1 are presented in **Table 4-1** and for MP2 in **Table 4-2**.

- 4.2.2. The results from MP1 contain a number of incomplete periods due to a temporary equipment malfunction although sufficient data were captured to underpin the assessment.

Table 4-1 – Average ($L_{Aeq,T}$) and background ($L_{A90,T}$) sound levels MP1

Date	Day	Day time 07:00 – 23:00			Night-time 23:00 – 07:00		
		$L_{Aeq,16h}$	Mode $L_{A90,15min}$	Mean $L_{A90,15min}$	$L_{Aeq,8h}$	Mode $L_{A90,15min}$	Mean $L_{A90,15min}$
05 March	WED	58	42	41	46	36	38
06 March	THU	51	44	45	-	-	-
07 March	FRI	-	-	-	-	-	-
08 March	SAT	-	-	-	-	-	-
09 March	SUN	-	-	-	-	-	-
10 March	MON	-	-	-	-	-	-
11 March	TUE	39	35	34	47	34	35
12 March	WED	49	38	39	-	-	-

Table 4-2 – Average ($L_{Aeq,T}$) and background ($L_{A90,T}$) sound levels MP2

Date	Day	Day time 07:00 – 23:00			Night-time 23:00 – 07:00		
		$L_{Aeq,16h}$	Mode $L_{A90,15min}$	Mean $L_{A90,15min}$	$L_{Aeq,8h}$	Mode $L_{A90,15min}$	Mean $L_{A90,15min}$
05 March	WED	70	41	41	54	37	37
06 March	THU	70	45	44	53	40	41
07 March	FRI	60	43	44	52	40	39
08 March	SAT	60	44	42	51	42	40
09 March	SUN	58	42	42	52	38	38
10 March	MON	63	42	41	53	34	34
11 March	TUE	68	35	40	54	36	36
12 March	WED	64	44	42	-	-	-

4.3. METEOROLOGICAL CONDITIONS

- 4.3.1. Representative weather data were obtained to assess precipitation, wind speeds and directions for the duration of the survey. Whilst the use of noise monitoring data acquired when wind speeds are greater than 5ms^{-1} is sometime avoided, that is not always appropriate for exposed locations such as this. Indeed, in the *Association of Noise Consultants BS 4142:2014+A1:2019 Technical Note* the working group (WG) states the following:

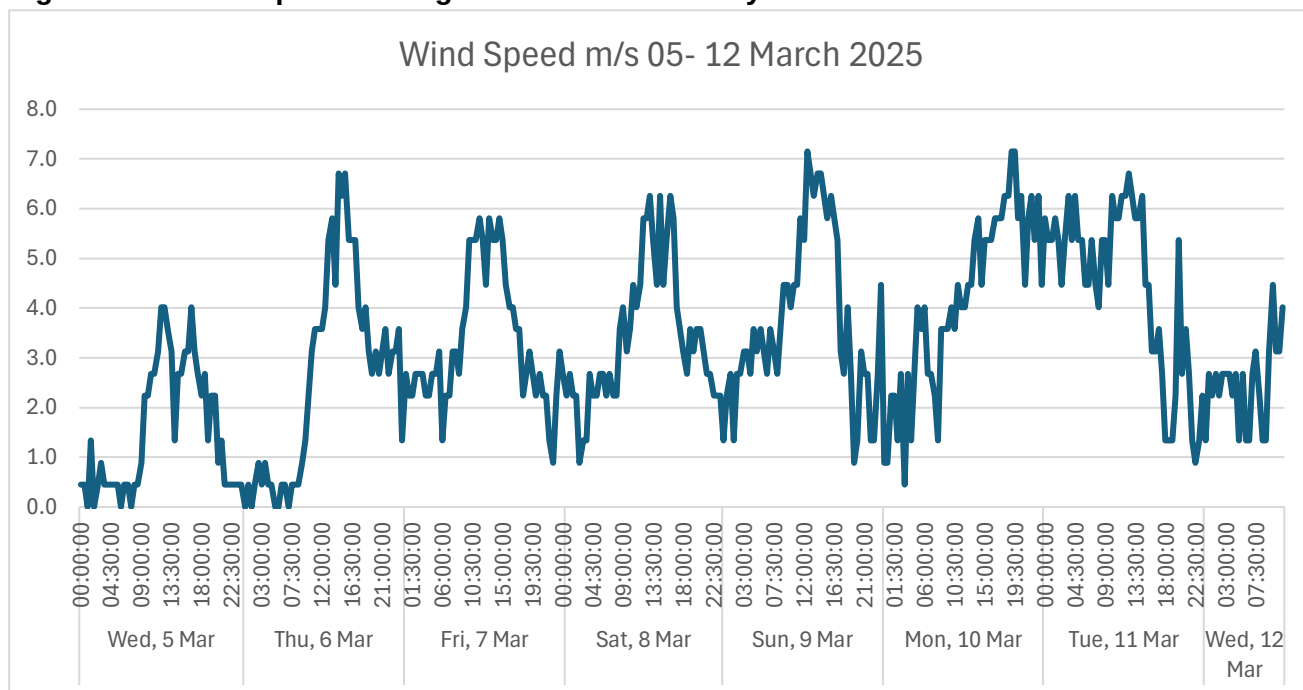
The WG is concerned that the generally accepted limitation of sound measurements to wind conditions $<5\text{m/s}$ may result in an underestimation of background sound levels in areas with high wind speeds where the background sound levels are largely determined by weather conditions. It is common practice to avoid measuring, or to discard data recorded, whilst these higher wind speeds are evident even though they may legitimately contribute to the background sound levels for a significant proportion of the time.

Experience with wind farm noise assessments has demonstrated that background sound levels can be accurately measured at higher wind speeds and that, in the absence of other dominant sound sources, wind induced sound can be the primary determinant of background sound levels.

- 4.3.2. On analysis it was not considered necessary to remove any of the noise survey results on account of wind conditions. A graph showing the windspeed over the duration of the survey is presented in

Figure 4-2 below. Comparing this with the measured noise survey results indicates that wind conditions did not affect noise levels.

Figure 4-2 - Wind Speed Throughout the Noise Survey



5. NOISE PREDICTIONS

5.1. Noise Sources and Modelling Assumptions

- 5.1.1. Noise levels from three types of sources have been predicted in the CadnaA® noise modelling software using ISO 9613 Pt 11 algorithms. The approaches adopted in the modelling of the respective sources are described below.

SOURCE 1 – REFRIGERATION FANS

- 5.1.2. The two external refrigeration fans will be located on the south elevation of the proposed cold store. The fans are both Daikin EWAQ-F units, each with a sound power level of 89 dBA modelled as an area source at 1.5m height. Both fans were assumed to be operating continuously.

SOURCE 2 – LOADING/UNLOADING OPERATIONS

- 5.1.3. For FLT activity it was assumed that FLT's would engage in a combination of fast driving, manoeuvring, revving and reversing in proximity to the roller shutter doors on the east building elevation. It was assumed that loading and unloading a fully laden lorry takes around 30 minutes. A worst-case assessment scenario is therefore based on one FLT operating continuously for 30 minutes (in a given hour) each during the daytime and night-time.
- 5.1.4. The sound power level assumed for a single FLT engaged in combined operations (manoeuvring, reversing, and revving) was 88.6 dBA. These sound power levels were modelled as point sources adjacent to the roller doors on the east elevation.

SOURCE 3 – ON-SITE VEHICLE MOVEMENTS

- 5.1.5. The vehicle movements which will take place to the east of the cold store were modelled as point sources adjacent to the roller doors on the east elevation. This was due to loading taking place at the roller doors on the east elevation of the development, where it was assumed that the vehicles would then leave the site via the access road immediately east of the development site.
- 5.1.6. Worst-case operating conditions have been adopted based on the peak hour HGV flows predicted during the daytime and night-time periods.
- 5.1.7. It has been assumed that all HGVs arriving and departing from the development site will contain fridge motors.
- 5.1.8. It has also been assumed that all HGVs arriving and departing from the development site have tonal reversing alarms. This is a precautionary assumption, which may not occur in reality, and should ensure a worst-case assessment of potential noise impact.
- 5.1.9. The vehicle movements adopted in the assessment are presented in Table 5-1.

Table 5-1 – Worst-case hourly vehicle movements ancillary to the cold store

Period	HGVs	FLT's
Daytime	1	1
Night-time	1	1

- 5.1.10. The sound power levels adopted for the individual sources associated with on-site vehicle movements are presented in Table 5-2.

Table 5-2 – Adopted Sound Power Levels

Source	Sound power level dB(A)
HGV slow speed manoeuvring	94
HGV reversing alarm	107
Air brakes	97
Door slam	95
HGV fridge motor	103

- 5.1.11. The HGV sound power levels were time corrected based on the number of vehicle movements and their transit times in each manoeuvre (arrival, reversing, departure).

5.2. NOISE MODEL SCENARIOS

- 5.2.1. Two noise model scenarios are presented in this section.

- 1) All noise sources operating simultaneously (subject to the 'on-times' described above) during the daytime with predictions made at a grid height of 1.5 m above local ground level (agl).
- 2) All noise sources operating simultaneously during the night-time with predictions made at a grid height of 1.5 m agl.

- 5.2.2. Sound level predictions were made at two assessment locations:

- Assessment location (AL1) around 3.5 m from the south façade of the most southern proposed seasonal worker caravan.
- Assessment location (AL2) around 3.5 m from the south façade of Kennel House.

- 5.2.3. The sound level predictions are presented in Table 5-3 below.

Table 5-3 – Specific Sound Level Predictions

Scenario	Assessment Location	Predicted Specific Sound Level L _{Aeq,T} dB
Daytime at 1.5 m agl	AL1	29
	AL2	19
Night-time at 1.5 m agl	AL1	30
	AL2	20

- 5.2.4. Plots of the model outputs, with the ALs indicated as black and white circles, are presented in Error! Reference source not found..

6. NOISE IMPACT ASSESSMENT

6.1. OVERVIEW

6.1.1. The noise predictions set out in Table 5-3 above have been adopted as the specific sound levels used in the following assessment. The predicted sound levels described in Section 5 above have been used to derive the applicable feature corrections. The background sound levels derived in Section 4 have also been adopted in the assessment.

6.2. BS 4142 INITIAL IMPACT ESTIMATION

6.2.1. The initial impact estimation based on the BS 4142:2014 approach is set out in the following tables.

Table 6-1 – Initial Impact Estimation

Scenario	AL	Specific Sound Level dB $L_{Aeq,T}$	Backgrd Sound Level dB $L_{A90,T}$	Feature Correction, dB	Rating Level dB L_{Ar}	Rating minus Backgrd dB	Impact
Daytime at 1.5 m agl	AL1	29	34	0	29	-5	Low
	AL2	19	43	0	19	-24	Low
Night-time at 1.5 m agl	AL1	30	34	+3	33	-1	Low
	AL2	20	37	0	20	-17	Low

6.2.2. A feature correction of +3 dB has been applied to AL1 for the night-time scenario as it is anticipated that the introduction of mechanical noise from the chillers on the south elevation of the proposed development site would be audible. The noise from the chillers would be classed as 'other sound characteristics' under BS 4142 due to it being potentially distinctive in the absence of any other significant noise.

6.2.3. The predicted rating levels are below the background sound level in all cases.

6.2.4. In terms of the three contextual factors specifically referred to in BS 4142:

- The absolute level of the sound is relatively low being below any relevant absolute criteria set out in BS 8233:2014 or World Health Organisation Guidelines. The absolute level of the sound therefore detracts from the magnitude of the apparent impact.
- The level of the specific sound is significantly below that of the residual sound levels ($L_{Aeq,T}$), as presented in Tables 4-2 and 4-3. Whilst the character of the specific sound differs from that of farm noise (the dominant noise source at the receptor location) it is comparable to noise from existing activities on the New Green Farm site. On balance, this contextual factor is considered to detract from the magnitude of the apparent impact.
- The sensitivity of the receptor is considered to be relatively low. This is because it is in close proximity to an access road and consists of accommodation for seasonal workers, who will be

working on the farm throughout the daytime and night-time operational hours. As such there are unlikely to be any vulnerable occupants (such as children or elderly) and resident expectations will be informed by the established noise climate. This contextual factor detracts from the magnitude of any impact.

- 6.2.5. On balance, it is considered that the potential noise impact from the proposed development would be low and acceptable in planning terms.

7. ASSESSMENT UNCERTAINTY

- 7.1.1. WSP seek to minimise assessment uncertainty where possible throughout the assessment process and to report any residual uncertainty and provide comments on its potential significance.
- 7.1.2. This report relies on monitoring data from two monitoring locations, one of which failed to log data for some of the deployment period.
- 7.1.3. The background sound levels adopted for ML1, where some periods of data were missing, were the lowest of all the mean and mode period L_{A90} levels derived for that location and were therefore thought to be sufficiently robust to underpin a precautionary assessment.
- 7.1.4. In view of the above it is recognised that there is some uncertainty with respect to the background sound levels utilised in the assessment. However, given the margin by which the predicted rating levels are below any indication of adverse impact and the likelihood that any underestimation of the background sound level is relatively small, it is considered that this element of uncertainty would not change the conclusions of the report.
- 7.1.5. The WSP uncertainty matrix, which covers all of the aspects of the assessment, is set out in **Appendix C**.

8. CONCLUSIONS

- 8.1.1. The proposed development plans have been informed and refined based on preliminary noise assessment work and, as such, comprise a good acoustic design.
- 8.1.2. HGV deliveries and dispatches and loading/unloading activities will be effectively screened from the residential receptors by the new cold store building, significantly reducing any potential noise impacts from those sources.
- 8.1.3. Refrigeration plant proposed on the south elevation of the cold store have been sited so as to minimise noise propagation towards the residential caravans and nearby house.
- 8.1.4. All significant noise sources proposed with the development have been appropriately assessed, based on the BS 4142 methodology. The assessment indicates that noise will not comprise an adverse impact to the occupiers of the neighbouring residential caravans and nearby house.

Appendix A

ACOUSTIC GLOSSARY



ACOUSTIC GLOSSARY

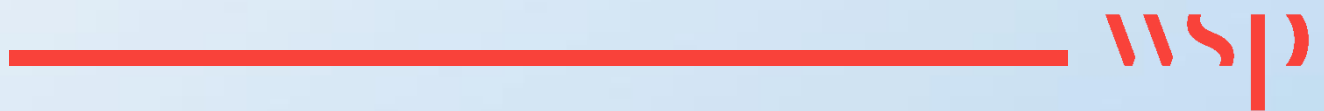
- Acoustic environment: Sound from all sound sources as modified by the environment. Can be actual or simulated, outdoor or indoor, as experienced or in memory. Modifications by the environment includes: effects on sound propagation, resulting, for example, from meteorological conditions; absorption; diffraction; reverberation; and reflection.
- Airborne sound: Sound that reaches the point of interest by propagation through air.
- Ambient sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.
- A-weighting, dB(A): The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
- Background sound: Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
- Broadband sound/ noise: Sound whose energy is distributed over a wide section of the audible range.
- Calibration: The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
- Class 1: The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however WSP use Class 1 (or Type 1) meters by default, as required by BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*', for example.
- Context: The circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood. When considering context, pertinent factors include: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; evidence on human response to the sound; and the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.
- Decibel (dB): A scale for comparing the ratios of two quantities, including sound pressure and sound power. 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 Pa.
- Dwelling: A building used for living purposes. A mobile home used for permanent living should be included in an assessment. If calculations are being conducted for compensation purposes, then some mobile homes are dealt with under the Highways Noise Payments and Moveable Homes Regulations.

- Façade/ façade level: At a distance of 1 m in front of a large sound reflecting object such as a building façade. According to BS 8233:2014, “Façade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the façade.” The Calculation of Road Traffic Noise (1988) uses 2.5 dB, whilst BS 5228-1:2009+A1:2014 recommends 3 dB. Owing to the latter examples, together with other historical documents, it is more usual to apply 3 dB.
- Fast time-weighting (F): Averaging time used in sound level meters. Defined in BS EN 61676-2:2013+A1:2017 Electroacoustics. Sound level meters. Pattern evaluation tests.
- Free-field/ free-field Level: Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.
- Heavy goods vehicle (HGV): See Heavy vehicles.
- Heavy vehicles: According to the Calculation of Road Traffic Noise (1988), ‘heavy vehicles’ are vehicles with unladen weight greater than 1.525 tonnes. Those vehicles with an unladen weight between 1.525 and 3.5 tonnes should be treated as light vehicles. Note: heavy duty vehicle (HDV) and heavy goods vehicle (HGV) are typically used interchangeably, as if describing all heavy vehicles matching the adopted weight threshold.
- Hertz (Hz): The unit of Frequency or Pitch of a sound. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
- $L_{AF90,T}$: The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F). Generally used to describe the ‘background’ sound conditions.
- L_{AFmax} : The maximum A-weighted sound pressure level during a given time period. L_{max} is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).
- $L_{eq,T}$: A sound level index called the equivalent continuous sound 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. Where the value is A-weighted, will be presented ‘ $L_{Aeq,T}$ ’ or ‘dBA $L_{eq,T}$ ’, otherwise it should be an un-weighted (or linear) value.
- Line source: A sound source composed of many point sources in a defined line, such as a train, flow of traffic on a motorway, or constant aircraft take-offs and landings. Sound levels measured from line sources decrease at a rate of 3 dB per doubling of distance.
- L_p : See Sound pressure level.
- L_w : See Sound power level.
- Noise-sensitive receptor (NSR): A term representing any premises used as a dwelling (including gardens), place of worship, educational establishment, hospital or similar institution, or any other property likely to be adversely affected by an increase in sound level.
- Octave/ octave band: Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit. For example, the 1000 Hz (1 kHz) octave band contains noise energy at all frequencies from 707 to 1414 Hz.

- Percentile level: The sound pressure level exceeded for N% of a specified time interval, see $L_{AF90,T}$ etc.
- Point source: A sound source whose dimensions are small compared to the propagation distances involved. Due to the Inverse Square Law, the sound level pressure level decreases by 6 dB every time the distance between the measurement point and the source is doubled.
- Rating level, $L_{Ar,Tr}$: The equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$, see also Specific sound level) of the sound, plus any adjustment for the characteristic features of the sound.
- Reference time interval, T_r : Specified interval over which the specific sound level is determined. This is 1 hour during the day from 07:00 to 23:00 hours and 15 minutes at night from 23:00 to 07:00 hours.
- Residual sound: ambient sound remaining at the assessment location when the specific sound source is suppressed (or absent) to such a degree that it does not contribute to the ambient sound.
- Residual sound level, $L_r = L_{Aeq,T}$: Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
- Sound level metrics, indices or parameters: Sound levels usually fluctuate over time, so it is often necessary to consider an average or statistical sound level. This can be done in several ways, so a number of different metrics have been defined, according to how the averaging or statistics are carried out.
- Sound power level, L_W : Sound power measured on a decibel scale, relative to a reference value of 10^{-12} W.
- Sound power: The sound energy radiated per unit time by a sound source. Measured in Watts (W).
- Sound pressure level (sound level), L_p : The sound level is the sound pressure relative to a standard reference pressure of 20 Pa (20×10^{-6} Pascals) on a decibel scale.
- Sound pressure: Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
- Specific sound level, $L_S = L_{Aeq,Tr}$: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
- Specific sound source: Sound source being assessed.
- Type 1: See Class 1 above.

Appendix B

NOISE SURVEY DETAILS



NOISE SURVEY EQUIPMENT

Table B-1 – Details of Noise Survey Equipment

Measurement Position	Description	Manufacturer Type and Number	Serial Number
MP1	Sound Level Meter	01 dB CUBE 'Integrating-Averaging Sound Level Meter'	10748
	Pre-amplifier	Acoem PRE 22 Preamplifier	11102
	Microphone	GRAS Type 40CD Condenser Microphone	224197
	Calibrator	01dB-Stell Cal 21	35054825
MP2	Sound Level Meter	01 dB CUBE 'Integrating-Averaging Sound Level Meter'	10630
	Pre-amplifier	Acoem PRE 22 Preamplifier	10261
	Microphone	GRAS Type 40CD Condenser Microphone	231588
	Calibrator	01dB-Metravib Cal 21	34344461

PHOTOGRAPHS

Figure B-1 - MP1

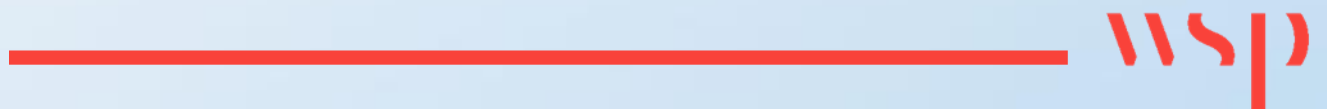


Figure B-1 - MP2



Appendix C

UNCERTAINTY ASSESSMENT



WSP UNCERTAINTY ASSESSMENT MATRIX

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Measurement		
Only use in calibration Type/Class 1 equipment and check (and record) calibration level before and after measurements	✓	Yes
Take measurements using the time and frequency weighting specified by the relevant standard	✓	Yes
Make detailed notes, including details of the equipment, weather, survey positions (including approximate distances), contributing noise sources, presence of screening etc.	✓	Yes
Take photographs, and record survey locations	✓	Yes
Avoid standing waves/interference – listen for effects, take spatial average from several locations or conduct a sweep	✓	No such phenomena apparent
Take measurements at different distances to establish propagation	✓	Yes
Take measurements at different heights where relevant	×	No
Don't just measure at the "noisiest" parts of site, but establish how "quiet" it is, too, where relevant to the assessment	×	No
Measure under different operating conditions relevant to your assessment / adopt worst case if known	✓	A range of operations and conditions assessed
Measure more than one cycle/ event (ideally at least three)	✓	Yes
Determine state of repair of any associated source, where relevant	×	No
Use a windshield and avoid windy conditions (i.e. gusts regularly exceeding 5 m/s)	✓	Yes
Avoid wet conditions (particularly in terms of rain on the windshield/mic and on neighbouring surfaces)	✓	Yes
Avoid electrical and electromagnetic interference (such as from power cables and radio transmitters)	×	N/A
Avoid extreme temperatures – traffic conditions can be different in freezing conditions, whilst meters can overheat and fail in a case when in direct sunlight during the summer.	✓	Yes
Make measurements during different weather conditions (particularly relevant in terms of wind direction for sites affected by aircraft movements, but also for sites affected by other distant, but significant, sources of noise, in different directions)	✓	Yes – background/residual measurements undertaken during range of wind directions
Where only one source is dominant (such as a main road), as a minimum, measure during conditions favourable to propagation (i.e. when wind direction is within +/-45° of the line between the source and receiver or during temperature inversion, such as on clear calm nights)	×	No
Avoid tree/leaf (movement) sound where possible – ideally take measurements at comparable distance to receptor locations	✓	Yes
Avoid dawn chorus sound where possible – ideally take measurements the same distance from trees and bushes as any receptors of interest	✓	Yes – potential contributions would have been insignificant

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Measure outside the receptor in question where possible; however, it is worst case typically to measure under free-field conditions and apply +3 dB correction to convert to “façade” where applicable – for most planning (new residential development) assessments, free-field is preferable	✓	Yes - free-field positions adopted
Where it is not possible to install a meter outside the receptor in question, install a meter elsewhere and undertake additional attended measurements, either outside the receptor or at a representative location (when not adequately covered by the installed meter)	✓	No constraints
Avoid atypical traffic conditions (such as during school holidays and road works – road traffic incidents can significantly affect flows, but which can't be predicted and their occurrence can't always be established after the survey – check the data for anomalies)	✓	Yes
Avoid presence of you and/or the microphone resulting in atypical conditions.	✓	Yes
Data handling		
Download data immediately after survey and process promptly whilst details are fresh in your head	✓	Yes
Use digital transfer methods and double check data read-off manually	✓	Yes
Look at the time-history (in as fine a resolution as possible) for any unexpected events – preferably with active spectral data (i.e. in dBTRAIT)	✓	Yes – undertaken in Excel
If removing any data (due to an atypical event, for example), 'save as' a new file and provide a note to the data.	✓	Original and weather exclusions data sets both retained
Prediction		
Use measurement data at different distances to verify propagation	×	No – ambient dominated by road traffic noise
Different height measurements to verify screening effects, if relevant	×	No – no significant screening
Use propagation calculation procedure relevant to source and distance	✓	Yes
Use detailed traffic flow data applicable to the methodology	×	N/A
Use detailed sound source data (including octave-bands levels), accounting for size, height and directivity, where known	✓	A weighted levels considered adequate
Use detailed topographical data and base mapping	✓	Yes

Uncertainty Control Measures	Applicable?	Adopted?/Comments
Identify different ground types	✓	Absorbent ground conditions observed
Apply an order of reflections of at least one	✓	Yes
Use 3D view feature to check model accuracy of the model	✓	Yes
Produce contour plots as a further means of identifying any abnormalities or errors in the model	✓	Yes

Appendix D

NOISE MODEL PLOTS

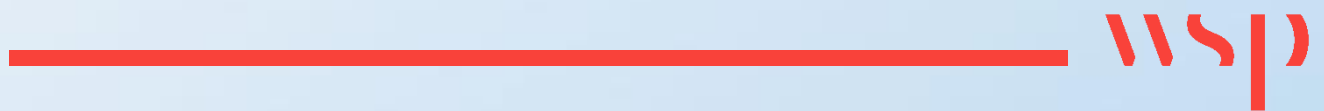


Figure D1 – Noise Model Plot, Daytime (07:00 – 23:00) dB L_{Aeq,1h} 1.5 m agl



Figure D3 – Noise Model Plot, Night-time (23:00 – 07:00) dB L_{Aeq,15min} 4.5 m agl



Appendix E

LIMITATIONS





LIMITATIONS

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