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THANET GRAB HIRE

NOISE IMPACT ASSESSMENT

Environmental Permit Application

For: Thanet Grab Hire Limited
By: Chris Wood MSc MIOA

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1. INTRODUCTION AND SUMMARY

1.1 Chris Wood Acoustics has been commission by Thanet Grab Hire Limited to undertake a noise impact assessment to support an Environmental Permit application being made the Environment Agency. The site address and development description are:

> Little Cliffsend Farm, Chalk Hill, Cliffsend, Ramsgate CT12 5HP (approximate National Grid reference TR 3577 6448).
>
> The facility will receive, treat and store inert and excavation waste for subsequent use elsewhere, with the aim of avoiding disposal to landfill. The site will have a weighbridge, storage bays, office and welfare facilities.

1.2 An assessment has been requested by the Environment Agency, to be undertaken in accordance with **BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound** and the Environment Agency's guidance.

1.3 Key to note is that the site is relatively small (less than 2,700 m^2/0.27 Ha), part of a wider commercial estate, and with the activity emitting the most sound, the use of a crusher, occurring one or two days a month only. There are also only a few dwellings in proximity, separated by other commercial sites, but where the nearest boundaries of which are around 50 m away, and so there is potential for sounds from site to be audible at least.

1.4 Accordingly, the site has been visited on two occasions, and short-term attended and long-term unattended sound level measurements have been made on and off the site.

1.5 The site visits and measurements reveal that the site was operating appropriately, and thus in a controlled and expected manner.

1.6 The main activity with respect to sound emissions was observed to be the use of the crusher – the survey being timed to when this was on hire – with the associated use of an excavator. It was observed that the crusher was located largely behind a wall comprising large concrete blocks, with unscreened sound levels at 10 m of around 76 dB ($L_{Aeq,T}$).

1.7 This activity was audible off site, but not considered to be dominant, and would only occur for a day or two per month. The screening was also found to be audible, but barely so. For the majority of the time, it is expected that the site is not/would not be audible.

1.8 For the nearest residential premises, the 1 and 2 Little Cliffsend Farm Cottages, an assessment has been undertaken based on the guidance in **BS 4142**, whereby the measured and calculated operational sound levels have been compared to the background and residual conditions at the properties, and the potential noise impact determined, taking context into account as far as is practicable.

1.9 Adopting a worst-case approach of comparing the site sound levels, including a 3 dB character correction, with the background conditions typically, results in an exceedance of up to 15 dB. For a new site, this could indicate a potentially significant impact, but where the site is in existing use, the specific sound levels are typically below relevant thresholds for external amenity and not dissimilar to the residual conditions, and where such conditions occur for a small minority of time, such that conditions for the residents should generally be acceptable. Indeed, we are aware of example cases where background levels were exceeded by up +20 dB, which were considered acceptable by the Environment Agency at the time in context.

1.10 Overall, therefore, it is considered that the controlled operation of the site should not result in a significant adverse noise impact. Indeed, based on the wording in the **National Planning Policy Framework**'s guidance, it is considered that there should be **No Observed Adverse Effect**, whereby "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 change in the quality of life."

1.11 In broad terms, therefore, it is considered that, where the site operates as it was witnessed and measured to do so, it could be considered to be operating appropriately. This is not to say that there isn't room for further adoption of BAT (best available techniques). Indeed, it is discussed that there could be benefit to increasing the size of the acoustic barrier next to the crusher, together with operating the screener at ground level, where feasible. Furthermore, a barrier is proposed for the site's southern boundary. This is not considered to be imperative to the operation of the site, but where some addition acoustic benefit could be achieved from the site as a whole.

1.12 Accordingly, notwithstanding such measures, it is considered that noise need not be a barrier to the Environment Agency providing the required Permit.

1.13 This report is set out as follows: Statements of the surveyor and author's credentials are presented in **Section 2**. Policy and assessment requirements are presented in **Section 3**. Descriptions of the site and nearest receptors are given in **Section 4**. The baseline survey and on-site measurement details and results are given in **Sections 5** and **6**. **Section 7** presents the assessment of the operational sound levels in keeping with the guidance in **BS 4142**. **Section 8** presents discussion on control measures, whilst conclusions and next steps, where applicable, are given in **Section 9**. A glossary of terms in presented as **Appendix A**, details of the national noise policy is given in **Appendix B**, the sound level measurement equipment calibration certificates are presented in **Appendix C**, whilst the unattended survey results are tabulated in **Appendix D**.

2. STATEMENT OF QUALIFICATIONS, COMPETENCY, PROFESSIONAL MEMBERSHIPS AND EXPERIENCE

2.1 The survey and the preparation of this report have been undertaken by Mr Chris Wood. Chris has over 25 years' relevant experience in acoustics, sound, noise and vibration. He is a Corporate Member of the Institute of Acoustics (MIOA), and has the Diploma and Master of Science Degree from the IOA in Acoustics and Noise Control. He has undertaken a number of surveys and assessments for similar schemes, and for many other industrial and commercial schemes, whilst following the relevant guidance.

3. POLICY AND ASSESSMENT REQUIREMENTS

NATIONAL POLICY

3.1 The current national policy regarding "noise" is presented in **Appendix B**. Since the associated documentation doesn't include detailed assessment methodology or criteria, it is still necessary to refer to applicable guidance documents, as presented below. However, the **National Planning Policy Framework** (**NPPF**) does include helpful descriptions in terms examples of outcomes based on different levels of noise exposure, which have been referred to in this report.

LOCAL POLICY

3.2 We visited Borough of Broxbourne Council's website at the time of writing, and reviewed its Local Plan 2018 – 2033 (June 2020). This includes Policy EQ4: Noise, and the first part of which states the following:

ENVIRONMENT AGENCY REQUIREMENTS

Noise and vibration management: environmental permits (Updated 31 January 2022)

3.3 The Environment Agency, together with the Scottish Environment Protection Agency (SEPA), Natural Resources Wales and Northern Ireland Environment Agency, has produced the guidance **Noise and vibration management: environmental permits** (Updated 31 January 2022) to help holders and potential holders of permits apply for, vary, and comply with their permits.

3.4 It includes the following statements:

> Operators must prevent significant pollution and also comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution.
>
> Noise impact assessments should be carried out to an appropriate standard and by competent personnel, for example, holders of either an Institute of Acoustics… Diploma in Acoustics and Noise Control… Certificate of Competence in Environmental Noise Measurement…
>
> 'BS 4142: Methods for rating and assessing industrial and commercial sound'… must be used …to quantify the level of environmental noise impact from industrial processes.

3.5 The following four steps are outlined:

> Step 1: desktop risk assessment
>
> Step 2: off-site monitoring survey
>
> Step 3: source assessment
>
> Step 4: BAT or appropriate measures justification

3.6 For the most part, following the guidance in **BS 4142**, as outlined further below, is the main requirement. In terms items specific to the Environment Agency guidance, there is reference under Step 3 to the following:

- Unacceptable level of audible or detectable noise. It is stated that, "The closest corresponding BS 4142 descriptor is 'significant adverse impact' (following consideration of the context)."
- Audible or detectable noise. "The closest corresponding BS 4142 descriptor is 'adverse impact' (following consideration of the context)."
- No noise, or barely audible or detectable noise. "The closest corresponding BS 4142 descriptor is 'low impact or no impact' (following consideration of context)."

3.7 Also specific to the EA guidance, Step 4 briefly covers the requirement to demonstrate BAT (best available techniques) or appropriate measures, which are interchangeable terms within the guidance. It is stated that, "The BAT justification is the critical part of any noise impact assessment submitted to the environment agencies." Indeed, whilst not covered by **BS 4142**, this is a natural and important extension to the **BS 4142** assessment.

3.8 The guidance goes onto cover the following topics to some extent. The relevance in this instance is noted:

- Noise impact on other species. Understandably, the guidance in limited in this regard. This could be said to be relevant here since the site is close to equestrian facilities, including stables, fields and training areas, whereby there are horses in addition to the human receptors. It is beyond the scope of this assessment, however, to consider such specifically, but where it is assumed that the assessment presented in terms of residential receptors would provide an adequate guide to the potential impact on the horses.
- Vibration impact assessments. We see no reason for vibration to be an issue under normal operational conditions, and so this is not considered further.
- How the context affects an assessment. The advice, which is similar to that in **BS 4142** in any case, is considered within the assessment presented in **Section 7.2**.
- Dealing with uncertainty. The advice, which is, again, similar to that within **BS 4142**, is considered within the assessment presented in **Section 7.3**.
- Soundscape assessment. This is not to be confused with the assessment of tranquillity, which is not mentioned in the guidance, and not considered relevant here. Soundscape is defined as the "acoustic environment as perceived or experienced and/or understood by a person or people, in context"[1]. The aim being to fully describe and/or account for all sounds present when considering the outcome from a human perspective. This should, however, be adequately covered by considering "context" as part of the **BS 4142** assessment, whereby it is not considered necessary to cover this separately.
- Noise conditions in permits. The current, "standard rules" permit includes subsection 3.3 'Noise and vibration', which includes actions to take (primarily, the production of a Noise Management Plan (NMP) should the site be "notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration…" In the absence of such notification, as far as we are aware, there is no NMP in place currently, but which is being prepared as per of the permit application relevant to this report.
- Appropriate measures to meet permit conditions. This section includes generic good practice guidance on appropriate measures to reduce or control noise. This is considered within **Sections 7** and **8**.
- Noise management plans (NMP). Advice is provided on preparing a NMP. This has been followed in the preparation of the NMP for the site prepared by Waterman Infrastructure & Environment Limited.
- Engaging with neighbours. Advice is provided on engaging with neighbours, including in terms of responding to complaints. This is not relevant to this report, but where the advice on responding to complaints is followed in the aforementioned Noise Management Plan.
- Monitoring. A brief overview of the monitoring methods is provided. As above, this is accounted for in the Noise Management Plan.
- Suggested noise impact assessment (NIA) report structure. The advice is reflected in the structure of this report, with the required information having been provided.

3.9 Notably, being based around the **BS 4142** methodology, where conditions are to be judged on a case-by-case basis, no sound level thresholds or other acoustic-based criteria are presented in the Environment Agency guidance. We are aware, however, of example cases where background levels were exceeded by up +20 dB, which were considered acceptable by the Environment Agency at the time in context.

[1] BS ISO 12913-1 Acoustics — Soundscape — Part 1: Definition and conceptual framework

BAT REFERENCE DOCUMENTS

3.10 The above Environment Agency guidance requires consideration of BAT (best available techniques), which is the consideration of the available techniques best for preventing or minimising emissions and impacts on the environment. In this regard, the European Commission (EC) produces BAT reference documents (BREFs) for installations.

3.11 Applicable to this site, there are BREFs for ferrous and non-ferrous metals processing, refs. BREFBATC (11.2022) and BREFBATC (06.2016), respectively. Brief, generic guidance is provided in the latter, covered in the Environment Agency guidance in any case, whilst the following table is provided in the former (referred to in the BREF as BAT 33). The table is proceeded by the statement: "In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below."

Table 3.1: BAT 33 table from BREFBATC (11.2022)

Technique		Description	Applicability
a.	Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating the exits or entrances of the buildings.	For existing plants, the relocation of equipment and the exits or entrances of the buildings may not be applicable due to a lack of space and/or excessive costs.
b.	Operational measures	These include techniques such as: — inspection and maintenance of equipment; — closing of doors and windows of enclosed areas, if possible; — equipment operation by experienced staff; — avoidance of noisy activities at night, if possible; — provisions for noise control, e.g. during production and maintenance activities, transport and handling of feedstock and materials.	Generally applicable.
c.	Low-noise equipment	This includes techniques such as direct drive motors, low-noise compressors, pumps and fans.	
d.	Noise and vibration control equipment	This includes techniques such as: — noise reducers; — acoustic and vibrational insulation of equipment; — enclosure of noisy equipment (e.g. scarfing and grinding machines, wire drawing machines, air jets); — building materials with high sound insulation properties (e.g. for walls, roofs, windows, doors).	Applicability to existing plants may be restricted by a lack of space.
e.	Noise abatement	Inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	Only applicable to existing plants, as the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may not be applicable due to a lack of space.

3.12 The above represents good practice guidance, therefore, but where, perhaps to be expected, no specific guidance, criteria or examples are given. Key, however, is the recognition that space and cost constraints are to be taken into account.

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

3.13 As per the title, **BS 4142** provides methods for rating and assessing sound/noise of an industrial or commercial nature in relation to residential premises. The assessment methodology evaluates the "specific sound level" of each industrial or commercial sound source, corrects, where required, for distinguishable features to derive the "rating level", and compares this with the "background sound level".

3.14 The advice is that the background sound level ($L_{AF90,T}$) should be derived from continuous measurement of normally not less than 15 minute intervals over the period of interest, and that it should not be the lowest level, but representative of typical conditions at the noise-sensitive receiver(s) relevant to the period(s) of operation.

3.15 The specific sound level (Ls = $L_{Aeq,Tr}$) is obtained (by measurement or calculation) over a reference period of 1 hour in terms of the daytime (07:00 to 23:00) and 15 minutes during the night-time (23:00 to 07:00).

3.16 The rating level ($L_{Ar,Tr}$) is the specific sound level corrected to account for any acoustic features present in the sound in question, as experienced at the receptor, such as distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.). Where no correction is warranted, the rating level is equal to the specific sound level.

3.17 The "subjective method" to calculate the rating level incorporates the following corrections (particularly appropriate for new sources that cannot be measured in-situ):

- up to +6 dB due to tonality, subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible;
- up to+9 dB for impulsivity, subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and
- up to +3 dB for other acoustic features that are neither tonal nor impulsive, though readily distinctive at the receptor.

3.18 An "initial estimate" of the impact of the specific sound is calculated by subtracting the background sound level from the rating level. The following advice applies:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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.

3.19 Key is the statement "depending on context", since the significance of the sound in question depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. 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.

3.20 Where the initial estimate of the impact needs to be modified due to the context, the assessment should take into account all pertinent factors, including:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

3.21 Helpfully, **BS 4142** includes some example assessments, one of which includes the following statement:

> …the residual acoustic environment varies considerably with time, which also tends to mask sound from the source, reducing its relative significance…

3.22 An assessment, therefore, is effectively in two parts. The first part results in an initial indication of the impact, which is subsequently considered in terms the context unique to the situation at hand; and where this second part may require consideration of alternative guidance and metrics. Alternatively, the context can be considered upfront and a specific threshold (or set of thresholds) determined accordingly in place of the default values presented in points a) to d) quoted above.

BS 8233 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

3.23 The core method in **BS 4142** (outlined above) compares the sound in question with the background conditions (i.e. part one of an assessment). When it comes to part two – taking into account context – it is in keeping with the **BS 4142** guidance to also consider the significance of the absolute level of the commercial/industrial sound. This is typically done in terms of the absolute noise thresholds given in **BS 8223**. This provides guideline values for internal and external noise levels for dwellings.

3.24 It states that, "In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4." This table is reproduced as **Table 3.2** below.

Table 3.2: BS 8233 indoor ambient noise levels for dwellings

Activity	Location	07-23 (Daytime)	23-07 (Night-time)
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 $L_{Aeq,8h}$

3.25 For habitable rooms, the lower guideline value is 35 dB $L_{Aeq,16h}$ during the daytime period, and where the value for bedrooms at night is 30 dB $L_{Aeq,8h}$. Assuming a partially open window providing 15 dB (during use for cooling, for example), the equivalent external level/limit would be in the order of 50 dB during the daytime period and 45 dB during the night-time period. This is a free-field level unaffected by any façade-reflected sound.

3.26 In respect of sound levels within outdoor amenity areas, the guidance in **BS 8233** suggests that, "it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments…"

3.27 **BS 8233** does caution that the (internal) guideline values are for sources without a specific character, and that where any such characteristics are present, "lower noise levels might be appropriate." Accordingly, when it comes to commercial/industrial sound of any nature, some reduction in the standard values would be considered prudent. Either way, external levels of less than 50 dB during the day and 45 dB at night can be seen to be relatively low.

GUIDANCE SUMMARY

3.28 Based on the guidance in **BS 4142** for an "initial estimate of impact", a rating level the same as the background sound level is an indication of a low impact, depending on the context.

3.29 Whilst, based on the guidance in **BS 8233**, as referenced in **BS 4142**, external levels of less than 50 dB during the day would be lower than the default external and internal noise criteria for dwellings.

3.30 Ultimately, therefore, the judgement of noise impact/the potential significance of sound depends on a combination of the background sound level(s), the site-specific contextual factors and/or the absolute sound levels. Accordingly, these are considered in **Section 7**.

4. THE SITE AND ENVIRONS

THE SITE AND NEAREST RECEPTOR LOCATIONS

4.1 The site and nearest noise-sensitive receptors are shown in **Figures 4.1** and **4.2**, with street view images presented in the figures overleaf. Note, the operations on site are described in the following subsection.

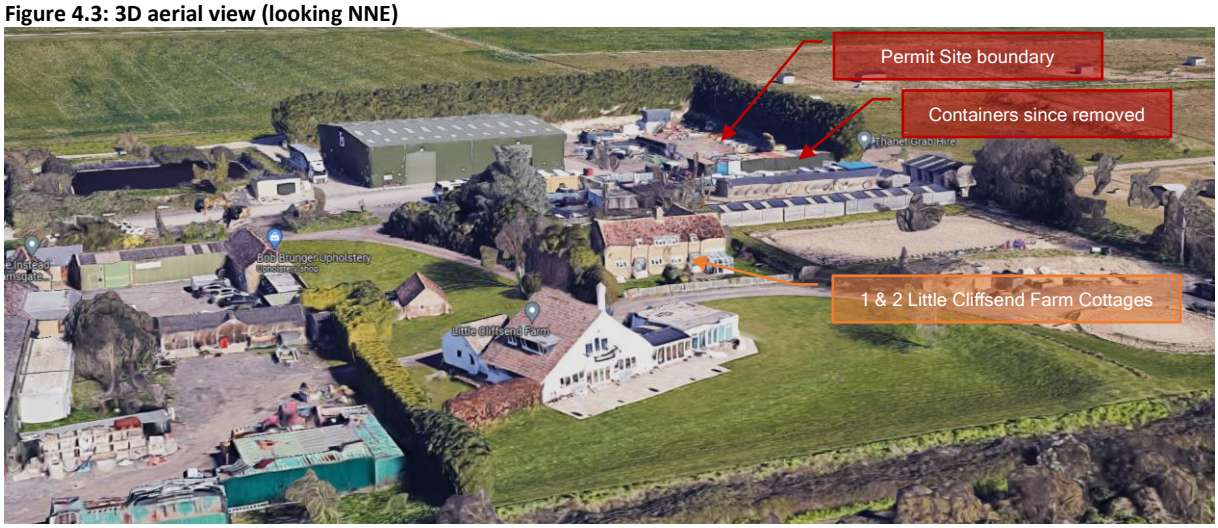
Figure 4.1: Thanet Grab Hire site location and wider area (north is up)

Source: Imagery ©2023 Google (annotated by Chris Wood Acoustics)

Figure 4.2: Thanet Grab Hire sit location and immediate environs (north is up)

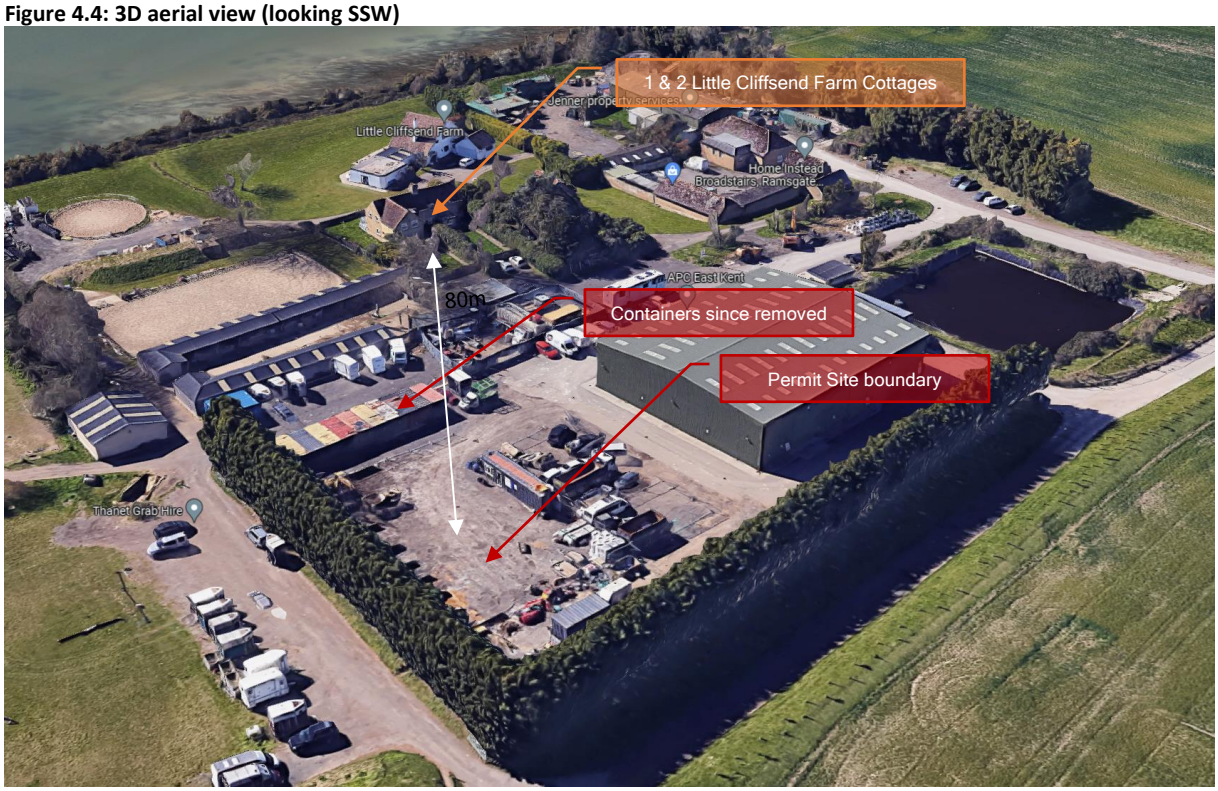
Source: Imagery ©2023 Google (annotated by Chris Wood Acoustics)
Note: The site layout has changed since the image was taken – see site photographs presented later

Figure 4.3: 3D aerial view (looking NNE)



Source: Imagery ©2023 Google (annotated by Chris Wood Acoustics)

Figure 4.4: 3D aerial view (looking SSW)



Source: Imagery ©2023 Google (annotated by Chris Wood Acoustics)

4.2 The nearest residential properties (i.e. dwellings) are, therefore, the pair of two-storey cottages, around 80 m from the centre of the site. Behind these is the farmhouse.

4.3 In addition to which, in terms of additional noise-sensitive spaces, could be said to be the stables and surrounding fields used for grazing horses. Relative to the likely sensitivity to noise, however, and the degree of sound emitted from the site, these spaces are considered sufficiently away from the site in order not to be a concern. It should be borne in mind that the site (leased by Thanet Grab Hire) and surrounding land are owned by the Farmer, who the author has spoken with and who expressed no concerns in these regard.

4.4 Next in terms of potential noise-sensitivity would be the neighbouring commercial units, but which, again, relative to their likely sensitivity and the sound emissions from site, these spaces are not considered be of concern.

THE SITE OPERATIONS

4.5 The facility will receive, treat and store inert and excavation waste. The site is already set up with a weighbridge, storage bays, office and welfare facilities, together with the following plant:

- HIAB lorry
- Screener: Maximus 409
- Wheeled loading shovel: CASE 521F
- Tracked 360° excavator: JCB 131X LC

4.6 A crusher will be hired for a day or two per month, which, at the time of writing, would be the:

- Finlay J-960 Portable Jaw Crusher.

4.7 In addition to which, the site will receive up to around 10 lorry and van movements per day, either delivering waste material or collecting processed material.

4.8 In terms of the deliveries, the majority of the vehicles will be tipper trucks, which will drive towards the middle of the site and reverse as directed, with the material tipped onto the ground. The loading shovel will then move the material to the appropriate location on site, typically toward the rear ready for crushing or screening.

4.9 In terms of collections, the vehicles (mostly lorries) will drive onto site, with the material loaded onto the load beds via the loading shovel, either whilst the vehicles are parked in the central area of the site or on the weighbridge.

4.10 The material requiring crushing will be stockpiled until such time as the crusher is hired, which, as mentioned, would be for one to two days per month. Outside of this, the screener will operate around two days per week, together with the loading shovel, transferring the screened material from beneath the screener conveyor belt arms to the relevant storage bays.

4.11 The approximate layout of the site is shown in **Figure 4.5** overleaf.

Figure 4.5: Site layout plan

Source: Waterman

5. BASELINE SOUND LEVEL MEASUREMENTS

TIMING, LOCATION AND EQUIPMENT DETAILS

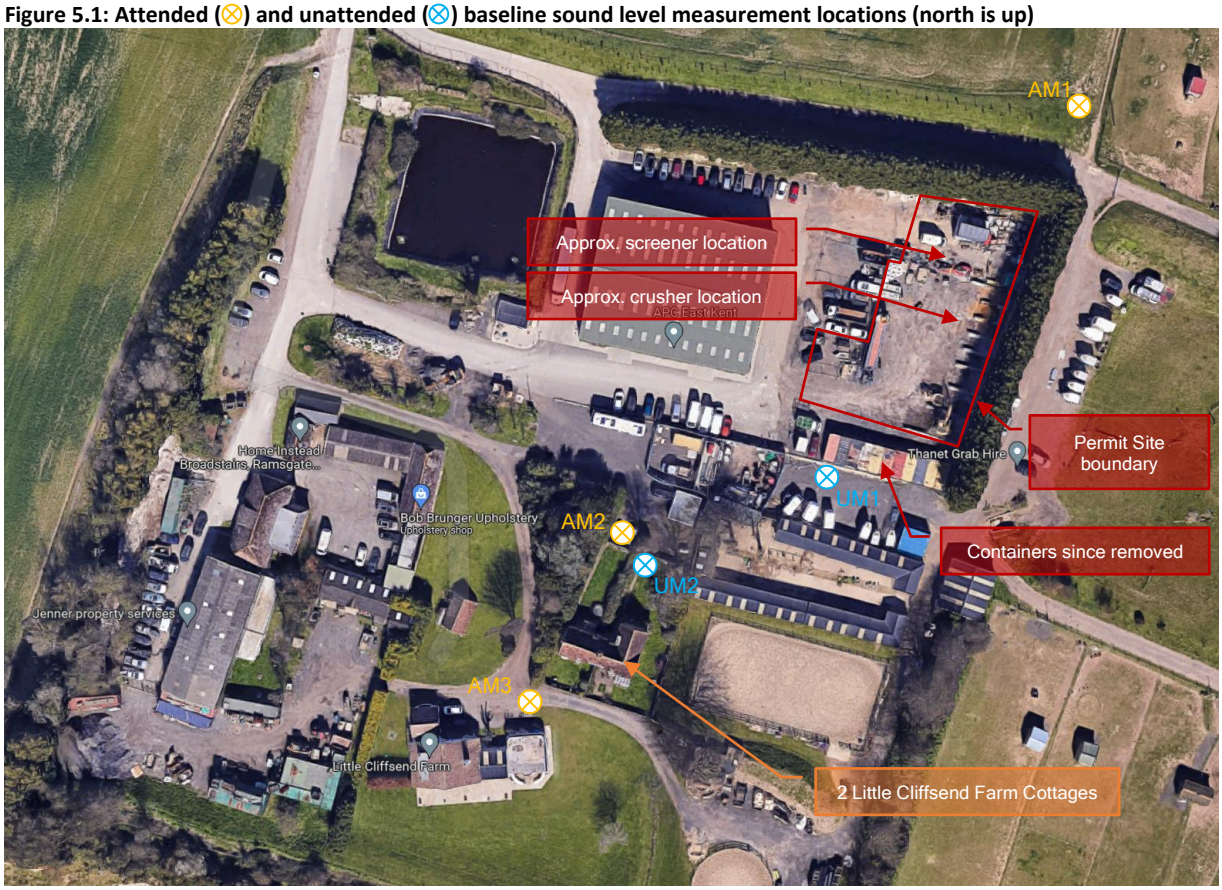
5.1 In order to describe the existing acoustic environment at the noise-sensitive receptors, a combination of brief attended, and continuous unattended, sound levels measurements were made, the latter over a four-five day between 12:00 hours on Friday 29th September and 10:00 hours on Tuesday 3rd October 2023.

5.2 The positions are shown in the figures below. For the initial attended measurements, the meter was positioned just beyond the rear gardens of the two cottages. Subsequently, a position was also adopted to the front of the cottages, close to the farmhouse. For the unattended measurements, permission was gained to install the meter in the rear garden of one of the cottages (No.2). In practice, the acoustic conditions at the two positions are not expected to be too dissimilar.

5.3 A second unattended position was adopted on the site itself, as also shown below, which acted as a control in terms of when the site was operational. It should also help identify when events recorded at the off-site meter could have been due to activities on site, as opposed to those from other sources, such as the operation of the neighbouring commercial premises and/or from the cottages themselves. This meter was installed for the same period as noted above.

5.4 Prior to these measurements, measurements were made on site in proximity to the various sources and activities. These are described in the following section.

Figure 5.1: Attended (⊗) and unattended (⊗) baseline sound level measurement locations (north is up)



Source: Imagery ©2023 Google (annotated by Chris Wood Acoustics)
Note: The site layout has changed since the image was taken – see site photographs presented later

Figures 5.2 and 5.3: Position AM1, beyond the NE corner of the site, close to the horse grazing fields (looking S and E)

Source: Chris Wood Acoustics (images captured September 2023)

Figures 5.4 and 5.5: Position AM2, behind rear gardens of 1 & 2 Little Cliffsend Farm Cottages (looking NE and S)

Source: Chris Wood Acoustics (images captured September 2023)

Figures 5.6 and 5.7: Position AM3, between the cottages and farmhouse (looking N and W)


Source: Chris Wood Acoustics (images captured October 2023)

Figures 5.8 and 5.9: Position UM1, on southern boundary of the wider site (looking NE and W)


Source: Chris Wood Acoustics (images captured September 2023)

Figures 5.10 and 5.11: Position UM2, northern end of garden (looking NE and S)


Source: Chris Wood Acoustics (images captured September 2023)

5.5 As can be seen, the microphones were protected with windshields and mounted in "free-field" conditions (i.e. away from acoustically reflective vertical surfaces other than the ground), approx. 1.5 m high about the ground.

5.6 The equipment details are presented in **Table 5.1** below, and where the meters were set to store the 15-minute L_{Aeq} ("ambient"), L_{AF90} ("background") and L_{AFmax} ("maximum") levels, together with the corresponding

unweighted frequency spectra in the one-third octave-bands between 8 Hz and 20,000 Hz. The sound pressure levels (L_{Aeq} and L_{eq} in one-third octave-bands) were also obtained at a resolution of 100 ms.

5.7 Each measurement chain was field-calibrated before the survey using an acoustic calibrator to generate a level of 94.0 dB at 1 kHz. The level was checked at the end of the survey, with no significant drift observed. The meters and calibrator hold valid laboratory calibration certificates, as presented **Appendix C**.

Table 5.1: Survey equipment details

Equipment (ID)	Make & Model	Serial No.
Sound level meter (SLM1)	Svantek 971A	121136
Microphone	ACO 7152	84699
Preamplifier	Svantek SV 18A	113784
Sound level meter (SLM2)	Svantek 971A	131651
Microphone	ACO 7152	85537
Preamplifier	Svantek SV 18	139344
Sound level calibrator	SV33B	140764

WEATHER CONDITIONS

5.8 At the time the equipment was installed and removed, and the attended measurements were taken, i.e. during the mornings of Friday 29th September and Tuesday 3rd October, conditions were dry, breezy and clear. A handheld anemometer was used to measure the temperature and wind speed, which were around 18°C and less than 5 m/s, respectively. On the Friday, the wind direction was judged to be westerly (i.e. towards the east), which broadly tied-in with forecast (towards the north-east) conditions (see **Table 5.2** below). On the Tuesday, the wind direction was judged to be northerly (i.e. towards the south), which broadly tied-in with forecast (towards the south-east) conditions.

5.9 At the time, therefore, the conditions were conducive to the reliable measurement of sound, without risk of unwanted effects on the microphone, for example. Arguably, the wind directions were not worst case in terms of the relationship between the site and dwellings – this would be north-easterly – but where, due to the proximity of the site/dwellings, it is anticipated that changes in wind direction, or other meteorological conditions, do not result in significant variation in sound from site in any case. Furthermore, the prevailing conditions are westerly (i.e. towards the east), and thus, not towards the dwellings, whereby wind directions that do favour propagation towards the site would be in the minority.

5.10 In terms of the conditions during the unattended monitoring, these have been determined as shown in **Table 5.2** based forecasts on the BBC website, which were checked and noted daily. As relevant to the operation of the site, the daytime conditions are described only.

Table 5.2: Summary of daytime weather conditions

Date (Sep-Oct '23)	General description (according to BBC website)	Predominant wind direction (toward the…) (and speed, mph)	Temperature (degrees Celsius)		Rain?
			High	Low	
Fri 29th	Light rain and moderate breeze [1]	NE (11)	17	21	Light rain first thing, stopped before survey started
Sat 30th	Sunny and a moderate breeze	NE (8)	12	19	None
Sun 1st	Sunny and a moderate breeze	NE (13)	17	23	None
Mon 2nd	Sunny intervals and light winds	N [2] (5)	15	21	None
Tue 3rd	Light rain and moderate breeze [1]	SE (16)	15	19	Light rain first thing, stopped before the attended measurements

1 In practice, the light rain had passed by around 8.30 am, before the survey/attended monitoring started.
2 Went from NE to N to NW across the day.

5.11 In practice, there was minimal rain on the Friday and Monday, with no rain on the Saturday, Sunday or Monday, whereby the monitoring is not considered to be adversely affected in this regard.

5.12 In terms of wind speeds, these were typically below 11 mph, which is equivalent to the limit of 5 m/s recommended in **BS 4142**. Speeds where higher at times on the Friday and Tuesday, but not significantly so. The risk of unwanted influence on the microphones, therefore, is likely to be highly limited.

5.13 Accordingly, in terms of the potential effect on the microphone and local acoustic conditions, the weather conditions are considered conducive to the reliable measurement of sound.

5.14 In the breezy conditions on the Friday, Sunday and Tuesday, there was some sound from the movement of leaves, both in terms of the smaller trees surrounding the cottages, and the large conifer trees surrounding the site. Given the coastal location of the site, however, this is anticipated to be the case for the majority of the time, and where, in any case, data have also been obtained (on the Saturday and Monday, at least) during calmer conditions.

5.15 In terms of the potential effect of the weather on the propagation of sound, this is considered in the following subsection, but where, in terms of the sound from the site at least – given the site's proximity to the dwellings – any effected is anticipated to be limited. There is, however, the potential effect on other sources, such as distant road traffic to consider, which could affect the background sound conditions, as considered later.

5.16 Generally speaking, therefore, with the survey covering a number of days, and wind speeds and directions to some extent, it is considered that sufficient sound level data have been obtained for the purposes of a robust assessment.

OBSERVATIONS

5.17 For such an operation, the site is relatively small, with, typically, activities occurring in isolation, rather than lots happening at a time. Whilst there are regular van and lorry movements, these were witnessed to be spaced out and relatively quiet, both in terms of entering and leaving the site, and whilst on site. The exception to this, in terms of sound emissions, is during the delivery and loading of harder materials (e.g. rubble/stones). When materials are delivered, this is usually via tipper lorry, and where harder materials can scrape against the lorry's metal load bed as the bed is tipped up (hydraulically). Likewise, when harder materials are loaded into the bed of a lorry via the loading shovel, the first load tends to strike the metal load bed. In both cases, however, apart from not being a feature of every delivery or collection, the resultant sound is brief. In terms of the deliveries/collections, these were the only events audible off site.

5.18 On balance, therefore, it is considered that vehicle movements and associated deliveries are not a cause for concern, especially bearing in mind the wider use of the area by other commercial premises. These (premises) weren't actually found to generate much sound during the site visits, but which were certainly responsible for additional vehicle movements, meaning that the site was not an outlier in this regard.

5.19 Other than the vehicle movements, and the excavator and loading shovel movements, which tended to pail into insignificance compared to the crushing plant at least, the next most common source of sound would typically be the screener. Perceptively, this appears quieter than the crusher, and, indeed, it is towards the front, which is facing the dwelling, and where, with its multiple arms/conveyor belts, it's larger than the crusher (meaning one naturally stands further back from it), and with screening process being a less impactful process than crushing. Based on the sound level data obtained close to the screener and crusher, however – as presented in the following section – they emit similar sound levels on average (with estimated sound power levels of 105 dB and 104 dB, respectively).

5.20 At the time of the associated site visit (on the Tuesday morning), the screener wasn't judged to be audible at the cottages, but which was without the use of the excavator, which was awaiting repair having stopped working on the Monday. As shown below, however, the use of the screener (and/or the excavator) does appear to influence the sound levels measured at the cottages, which is an indication that this activity might be audible at times.

5.21 Not surprisingly, both perceptually and in terms of the measured conditions at the dwellings, the crusher is the source of the most discernible sound, but where it only operates for around a day or two per month. On balance, therefore, any such sound is not anticipated to be as significant as a short-term view may suggest. This is considered in the assessment section (**Section 7**) presented later.

5.22 In terms of reversing alarms, only the white-noise variety were witnessed, with such not being a particular feature of the operation of the site. None were audible at the cottages. When the crusher was blocked and unable to run, a traditional two-tone alarm did sound for a few moments at a time, as attempts were made to restart the crusher before the blockage was fully cleared. This was audible at the cottages, but which should not occur very often typically.

5.23 As for other sources of sound at the dwellings, there were no particularly significant sources observed during the site visits, but where there were plenty of sources audible, and with a number of other premises in the vicinity, some of which (sources/premises) were considered to have the potential to be of some significance at times.

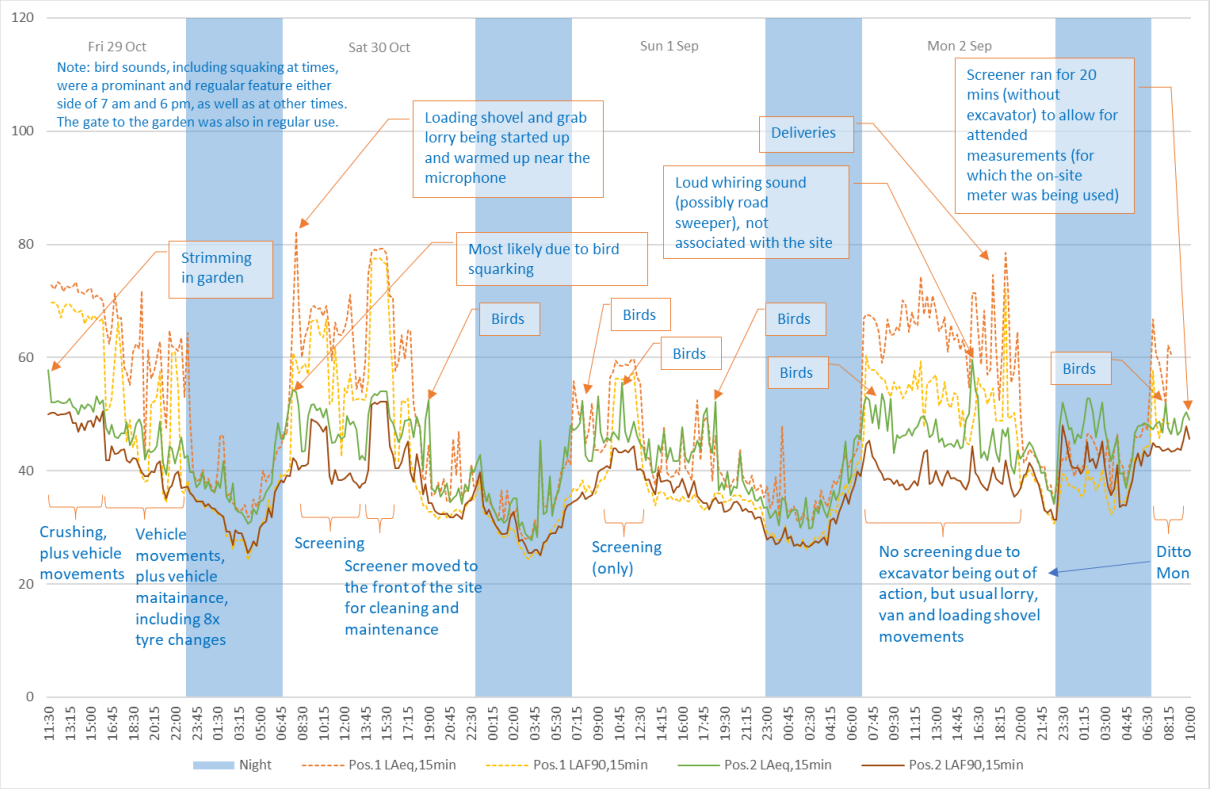
5.24 The most prevailing sound, though not particularly loud, was distant road traffic, from the A299 (to the north and west) etc. There was also the sound from the numerous surrounding trees, from birds, from light activities at the various commercial/light industrial units, from voices at the neighbouring stables/training areas, and from ploughing fields in the distance.

5.25 The large (green) light industrial units to the west of the site, north of the dwellings, were relatively quiet, with no internal sound audible externally, but where sounds were generated outside occasionally, including light vehicle movements. There was an articulated lorry trailer parked up immediately west of the units, indicating some association with the units, as if there would be such deliveries or collections at times, but where none were observed. In other words, generally speaking, the application site would appear to be the more active of the surrounding commercial uses, but where it is certainly not the only sound source in the vicinity.

UNATTENDED SURVEY RESULTS
RAW DATA AND INITIAL DISCUSSION

5.26 In the first instance, the 15-minutely data from the measurements at the two (on- and off-site) positions are presented in graphical/time-history form in **Figure 5.12** below. It is considered most helpful to compare the two sets of $L_{Aeq,15min}$ (energy average, "ambient" level) and $L_{AF90,15min}$ (90th percentile, "background" level) data for the on-site and off-site positions. At this stage in the report, it is a case of attempting to best understand the data and how they may or may not interrelate, and/or be a factor of the weather conditions, for example. Key observations are highlighted and discussed subsequently.

Figure 5.12: Survey results in 15-minute intervals



5.27 The following are observed from the data:

- There are clear "humps" in both sets of data, whereby it can be seen that both the L_{Aeq} (ambient) and L_{AF90} (background) sound levels off-site seem to respond to events on site. Where both the L_{Aeq} and L_{AF90} levels are affected similarly, this would be due to a source or sources present for a prolonged period, such as the crusher or screener. Where the L_{Aeq} level is more affected/elevated than the L_{AF90} level, then this would be due to a source or sources present for a limited time, which could be from the site, such as a lorry movement or loading event close to the southern boundary, or something more local to the cottages.

- The site was active on Sunday morning. This wouldn't normally be the case, and wouldn't be under the applied application, but where the opportunity was taken to use the screener on this occasion whilst being monitored.

- The site was relatively inactive on the Monday and Tuesday morning. This was due to the excavator breaking down, such that there was no means of feeding the screener. The fault wasn't fixed until after the survey finished. The screener was briefly run, however, on the Tuesday morning to allow for source sound measurements in proximity, as reported later.

- During the periods of little or no site activity, the background (and ambient) conditions are quite variable, which is not uncommon for a relatively quiet environment that can be more susceptible to change. In this

instance, this could be due to ad-hoc, local sources, such as associated with the neighbouring commercial uses and trees, or meteorological conditions affecting remote sources, such road traffic. Certainly, bird sounds were a regular feature in the garden, together with use of the garden gate, but which would have affected the L_{Aeq} (ambient) levels more than the L_{AF90} (background) levels.

5.28 Generally, therefore, the data are as expected, and, in the absence of extreme weather conditions, it is considered that the survey is fit for purpose, and where the processed data relevant to the assessment methodology is presented and discussed below.

PROCESSED AMBIENT (LAEQ) AND BACKGROUND (LAF90) SURVEY DATA

5.29 In keeping with **BS 4142** methodology, the measured $L_{AF90,15min}$ levels have been analysed to determine what could be considered the typical/representative background sound level(s) per periods of interest. It is also useful, however, to consider the ambient conditions, both off- and on-site, for which hourly periods are more commonly of interest (in keeping with the **BS 4142** period applicable to specific and rating levels).

5.30 Accordingly, together with the off-site $L_{AF90,15min}$ levels, the on- and off-site $L_{Aeq,1h}$ levels are as presented in the tables below. The latter have been determined in the normal way by logarithmically averaging the $L_{Aeq,15min}$ levels per hour. In addition to the hourly and daily averages, the modal (most commonly occurring) values have been determined for $L_{A90,15min}$ level. Where more than one mode was found for day, the lowest is presented.

5.31 The levels are presented for the period 07:00 to 19:00, thus including the normal/proposed hours of operation (i.e. 07:30-16:30 weekdays and 08:00-13:00 Saturdays, with the crusher or screener used 09:00-16:00 weekdays only). The levels have been condition formatted in Microsoft Excel using the default Red – Yellow – Green colours to show the range in levels across the hours and days. They are not related to any particular thresholds – just a comparison of the data presented.

5.32 The tables are presented over the page to keep them together for ease of viewing.

Table 5.3: Summary of the ambient ($L_{Aeq,1h}$) sound levels (free-field) – on-site (UM1)

Day (Sep-Oct '23)	07	08	09	10	11	12	13	14	15	16	17	18	Ave. 08-17
Fri 29						73	73	72	71	67	68	60	**71**
Sat 30	50	76	67	69	64	68	59	76	79	68	64	49	**70**
Sun 1	52	50	44	57	59	59	43	44	40	44	48	48	**49**
Mon 2	66	65	65	68	66	71	68	65	62	69	63	69	**67**
Tue 3	62	59											-
Ave.	**58**	**63**	**44**	**49**	**63**	**68**	**61**	**64**	**63**	**62**	**61**	**57**	**63**

Table 5.4: Summary of the ambient ($L_{Aeq,1h}$) sound levels (free-field) – off-site (UM2)

Day (Sep-Oct '23)	07	08	09	10	11	12	13	14	15	16	17	18	Ave. 08-17
Fri 29						52	52	51	52	50	47	47	**51**
Sat 30	51	50	51	50	46	48	44	53	53	47	48	48	**49**
Sun 1	48	47	49	46	51	47	44	44	43	44	44	48	**46**
Mon 2	52	52	49	46	48	48	46	45	48	56	45	45	**49**
Tue 3	48	49	48	43									**47**
Ave.	**50**	**50**	**49**	**46**	**48**	**49**	**47**	**48**	**49**	**49**	**46**	**47**	**48**

Table 5.5: Summary of the background ($L_{AF90,15min}$) sound levels (free-field) – off-site (UM2)

Day (Sep-Oct '23)	07:00	07:15	07:30	07:45	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45	Ave. (8-5)	Mode (8-5)	Range (7-7)
Fri 29																			*	50	50	50	50	50	50	50	48	48	47	48	47	49	49	48	50	49	51	42	42	44	43	43	44	44	42	41	42	42	**48**	**50**	41-51
Sat 30	38	39	39	42	42	40	41	41	41	49	49	49	48	47	48	39	38	40	38	38	39	39	40	38	38	37	38	38	40	52	52	52	52	52	52	44	43	40	41	42	44	45	40	38	43	40	36	38	**43**	**38**	36-52
Sun 1	34	35	35	35	36	35	35	36	37	40	40	41	41	40	44	44	43	43	44	43	44	44	40	40	40	38	39	37	36	40	38	38	38	38	36	37	37	39	37	35	37	38	36	35	34	34	33	35	**39**	**40**	33-44
Mon 2	39	42	45	45	43	42	40	39	38	39	39	38	38	37	38	37	37	38	38	37	40	43	44	38	38	40	38	37	39	40	39	39	38	38	37	37	38	44	40	39	38	37	37	39	41	39	38	38	**39**	**38**	37-45
Tue 3	45	44	44	44	44	44	43	44	44	44	45	48	46																																						**45**	**44**	43-48
Ave.	**39**	**40**	**41**	**42**	**41**	**40**	**40**	**40**	**40**	**43**	**43**	**44**	**43**	**41**	**43**	**40**	**39**	**40**	**40**	**42**	**43**	**44**	**44**	**42**	**42**	**41**	**41**	**40**	**41**	**45**	**44**	**45**	**44**	**44**	**44**	**42**	**42**	**41**	**40**	**40**	**41**	**41**	**39**	**39**	**40**	**39**	**37**	**38**	**42**		

* Excluded due to influence from gardening.

Table 5.6: Difference ambient ($L_{Aeq,1h}$) (Table 5.4) and background ($L_{AF90,15min}$) (Table 5.5) sound levels – off-site (UM2)

Day (Sep-Oct '23)	07:00	07:15	07:30	07:45	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45	Range (7-7)
Fri 29																					2	2	2	2	2	2	4	4	4	3	4	2	3	4	2	3	-1	8	8	6	4	4	3	3	5	6	5	5	-1 to 8
Sat 30	13	12	12	9	8	10	9	9	10	2	2	2	2	3	2	11	8	6	8	8	9	9	8	10	6	7	6	6	13	1	1	1	1	1	1	9	4	7	6	5	4	3	8	10	5	8	12	10	1 to 13
Sun 1	14	13	13	13	11	12	12	11	12	9	9	8	5	6	2	2	8	8	7	8	3	3	7	7	4	6	5	7	8	4	6	6	5	5	7	6	7	5	7	9	7	6	8	9	14	14	15	13	2 to 15
Mon 2	13	10	7	7	9	10	12	13	11	10	10	11	8	9	8	9	11	10	10	11	8	5	4	10	8	6	8	9	6	5	6	6	10	10	11	11	18	12	16	17	7	8	8	6	4	6	7	7	4 to 18
Tue 3	3	4	4	4	5	5	6	5	4	4	3	0																																					0 to 6

5.33 The following are observed from the above data:

- The greatest correlation between the on-site L_{Aeq} levels and the off-site L_{Aeq} and L_{AF90} levels occurs during the use of the crusher on the Friday, the screening (and other activities) on the Saturday morning, and the cleaning and maintenance of the screener on the Saturday afternoon.
- There appears to be further correlation between the on-site L_{Aeq} levels and the off-site L_{AF90} levels on the Sunday during the use of the screener, but where the off-site L_{Aeq} levels appear less influenced. This would seem to confirm that the screener results in lower sound levels at the cottages than the crusher (and other activities), which can affect the background conditions, but not necessarily the ambient conditions (which remain dictated by other, local sources).
- The highest $L_{Aeq,1h}$ level off-site (between 4 and 5 pm on the Monday) was thought to be due to a source not associated with the site.
- The highest levels likely due to contribution from activity on site were up to 53 dB $L_{Aeq,1h}$ and 52 dB $L_{AF90,15min}$.

- The levels in the absence of significant activity on site were typically in the order of 46 dB $L_{Aeq,1h}$ and 40 dB $L_{AF90,15min}$.
- The differences presented in **Table 5.6** provide an idea of how the relationship between the L_{Aeq} and L_{AF90} levels can vary, whether due to the influence from the site or otherwise, bearing in mind that the **BS 4142** assessment methodology stems around the comparison of the site sound in L_{Aeq} against the background sound in L_{AF90}. The theory being that, together with any required penalty for notable acoustic characteristics, a difference between the two can indicate the potential for noise impact. In practice, however, the background level(s) will naturally be exceeded on a regular basis, regardless of activity on the site in question; though, not necessarily by "unwanted" sources. Which is where "context" is important, as considered as part of the assessment. Notwithstanding this, when the conditions are unlikely to have been affected by the site, differences of 10 dB and above can be seen to be a regular occurrence.

5.34 In terms of selecting a value to use in a **BS 4142** assessment to represent the background conditions typically for comparison with the sound from the site, such a value would appear from **Table 5.5** to be in the region of 40 dB ($L_{AF90,15min}$).

5.35 In terms of sound from the site, this could be said from **Table 5.4** to be no more than 53 dB $L_{Aeq,1h}$, but which is likely to include some influence from other sources. As stated above, ambient levels in the absence of influence from the site would appear to be in the region on 46 dB $L_{Aeq,1h}$ (but certainly could be higher at times). As a worst-case level, therefore, subtracting 46 dB from 53 dB gives a value of 52 dB – this is the specific sound level for the site (worst-case), such as during the use of the crusher.

5.36 Since, however, the crusher is only used for one or two days per month, with the screener being the more regular sound source, it is appropriate to also consider the conditions during the use of the screener. The clearest, most relevant data for which is considered to be that obtained on the Sunday. Discounting the 15-minute period that was influenced by a squawking bird (which elevated the $L_{Aeq,1h}$ level presented for 11 am in **Table 5.5**), the average during the screening (at the garden) was 46 dB. This, again, would include the influence from other sources, with the data either side of the period of screening suggesting around 42 dB ($L_{Aeq,15min}$). Subtracting 42 dB from 46 dB gives a value of 44 dB – this is the specific sound level for the operation of the screener (and excavator).

5.37 As for the other routine activities, namely the delivery and collection vehicle movements, and the associated loading shovel movements, it is considered that the representative specific sound level can be determined from the data obtained on the Monday, when no screening or crushing occurred. Excluding the hour affected by the loud whirring sound not thought to be due to the site, but rather a road sweeper, the average of the levels (08-17h) was 48 dB ($L_{Aeq,1h}$). Correcting again for a typical ambient level of 46 dB results in a specific sound level of 44 dB ($L_{Aeq,1h}$).

5.38 These levels are considered in terms the **BS 4142** assessment approach in **Section 7**.

ATTENDED SURVEY RESULTS

5.39 The results of the off-site attended measurements are presented in **Table 5.7**, with the locations shown in the figures previously. The equivalent frequency spectra are presented in the following section, together with the measurements close to the crusher and screener. Note, there are limited measurements since there was a meter installed in a relevant position (in relation to the cottages at UM2), whilst there is limited risk of noise impact at the other surrounding uses. The equivalent $L_{Aeq,15min}$ values from UM1 and UM2 are also presented for information, as available.

Table 5.7: Summary of off-site attended measurement results, with equivalent UM1 results (free-field)

Position	Start time (dur. T)	UM1/2	Attended measurements		Notes
		$L_{Aeq,15min}$, dB	$L_{Aeq,T}$, dB	$L_{AF90,T}$, dB	
Friday 29 September 2023					
AM1 (horse fields)	08:57 (15min)	UM1 73.0 [1]	55.0	52.8	**Crusher running** (with excavator)
AM2 (behind cottages)	09:18 (15min)	UM1 72.9 [1]	55.9	50.9	Ditto
	09:33 (15min)	UM1 67.0 [1]	52.4	47.9	**Crusher mostly not running** due to blockage – alarm sounding occasionally
	09:48 (15min)	UM1 69.1 [1]	52.5	48.0	Ditto
	10:03 (15min)	UM1 73.4 [1]	54.9	51.1	**Crusher running** (with excavator)
	10:18 (15min)	UM1 72.6 [1]	54.8	52.1	Ditto
Tuesday 3 October 2023					
AM1 (horse fields)	08:59 (15min)	UM2 46.4 [1]	49.8	45.9	**Limited activity on site** – snapshot of background conditions, which were dominated by distant road traffic, with some local (but quiet) vehicle movements to and from farm/stables
AM3 (between cottages and farmhouse)	09:17 (5min) [2]	UM2 47.1 [1]	49.8	46.4	Ditto, with conditions comminated by distant road traffic, with the addition of leaves in the breeze, birds, distant reversing alarm (not from site) and ploughing faintly in the distance
AM2 (behind cottages)	09:47 (1min) [3]	UM2 50.4 [1]	56.2	49.5	**Screener running** (no excavator), barely audible, with sound from distant road traffic, leaves, aircraft in the distance, birds and possibly ploughing in the distance
AM1 (horse fields)	09:51 (1min) [3]	UM2 50.4 [1]	65.7	54.5	Ditto, screener clearly audible and the dominant source

1 Strictly, these are based on the levels starting at 09:00, 09:15 etc.
2 Cut short to capture a delivery event on site.
3 Short to avoid running the screening for unnecessarily long (for test purposes only), but long enough since the sound was constant.

5.40 Key to note is that the levels in the absence of significant activity on site were around 50 dB $L_{Aeq,T}$ and 46 dB $L_{AF90,T}$. These are higher than determined previously based on the longer-term data (i.e. 46 and 40 dB), but which are in the range of what would be expected given the natural variation of ambient and background conditions, regardless of activity on site. Whilst the two positions in question are more in the open than AM2.

5.41 The levels at the cottages during the operation of the crusher are as expected based on the longer-term data, which clearly include some contribution from other sources. The L_{Aeq} level for the measurement at the cottages (AM2) with the screener running is higher than expected. This is thought to be due to higher/more variable ambient conditions at the time, likely due to the breezy conditions, and the proximity of trees to the cottages, especially to AM2. Indeed, it can be seen that the 15-minute level at UM2 (i.e. 50 dB) is more as expected, indicating limited influence, if any, from the screener.

6. ACTIVITY SOUND LEVEL MEASUREMENT

6.1 In addition to the baseline data presented above, which included a position on the site itself (UM1), brief measurements were undertaken in proximity to the main activities and sources. The monitoring served a dual purpose of obtaining data that could be used in any future noise modelling and to observe how the activities were being performed and the plant operated.

6.2 Suffice to say in this latter regard, we didn't observe anything untoward, and whilst certainly moderately high, and characterful, at times, only as to be expected. Of course, in terms of the measurements in proximity, it has to be acknowledged that the operatives were aware of our presence, but where, in terms of the crusher and screener, the sound is dictated by the machine, and not by how it's operated. Whilst, from position UM1, we have a record of sound levels, not just in our presence, but also over a number of days.

6.3 The hourly data from UM1 (as per **Table 5.3** above) is represented in **Table 6.1**.

Table 6.1: Summary of the ambient ($L_{Aeq,1h}$) sound levels (free-field) – on-site (UM1)

Day (Sep-Oct '23)	07	08	09	10	11	12	13	14	15	16	17	18	Ave. 08-17
Fri 29						73	73	72	71	67	68	60	**71**
Sat 30	50	76	67	69	64	68	59	76	79	68	64	49	**70**
Sun 1	52	50	44	57	59	59	43	44	40	44	48	48	**49**
Mon 2	66	65	65	68	66	71	68	65	62	69	63	69	**67**
Tue 3	62	59											-
Ave.	**58**	**63**	**44**	**49**	**63**	**68**	**61**	**64**	**63**	**62**	**61**	**57**	**63**

6.4 The results of the on-site attended measurements are presented overleaf. Based on the estimated distances between the microphone and the nearest part of the plant/source in question, and assuming hemispherical wave radiation, the equivalent A-weighted sound power levels (L_{AW}) have been determined. In this way, the relative sound emissions from the various sources (which can depend on orientation) can be compared. It should be borne in mind that these are just estimates, however, and where the perceived sound level in practice, and the potential for noise impact, will depend on factors including the nature of the sound and the duration of occurrence.

Table 6.2: Summary of on-site attended source measurements results

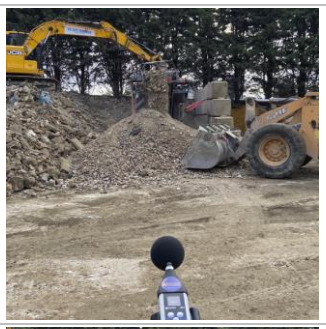
Position/Source/Description	Site photo	Dur. T (mm:ss)	$L_{Aeq,T}$ (dB)	L_{AW} (dB)	Ave. L_W (dB)
Crusher related					
In front of crusher (c13m away)		05:00	74	104	104
In front of crusher, to left side (c6m away; c7m to 360)		05:00	80	103	
Behind crusher, left side (c6m away)		03:00	81	104	
Behind crusher, right side (c6m away)		03:00	80	104	

Table continued overleaf/...

Table 6.2: Summary of on-site attended source measurements results continued/…

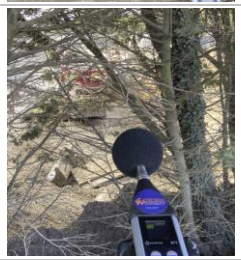
Position/Source/Description	Site photo	Dur. T (mm:ss)	$L_{Aeq,T}$ (dB)	L_{AW} (dB)	Ave. L_W (dB)
Screener related					
RH side of screener (c7m away)		02:00	79	104	
Behind screener, RH side (c7m away)		01:00	82	107	
In front of screener (c7m away)		01:00	71	96	
LH side of screener (c4m away)		01:00	84	104	105
Behind screener (c5m away)		01:00	85	107	
Site boundary behind screener (c19m away)		01:00	75	109	
Side boundary to the side of screener (c22m away)		01:00	72	107	

Table continued overleaf/…

Table 6.2: Summary of on-site attended source measurements results continued/…

Position/Source	Site photo	Dur. T (mm:ss)	$L_{Aeq,T}$ (dB)	L_{AW} (dB)	Ave. L_W (dB)
Loading shovel, delivery and collection related					
Loading shovel loading lorry with type 1 (c9m away)		01:08	73	100	N/A
Loading shovel idling (c5m away)	No photo	00:41	66	88	
Loading shovel passing by (c5m away)		00:11	70	92	
Loading shovel manoeuvring (c10m away)		00:48	68	96	
Loading shovel shovelling (c20-25m away)		01:00	66	100	
Loading shovel shovelling (c8m away)	No photo	0:36	72	98	
Lorry offloading rubble (c7m away)		02:00	78	103	
Lorry offloading “soft” material (c7m from lorry side)		01:40	71	96	

6.1 Generally, the levels are as expected. The only slight anomaly appears to be the level of the screener on the site boundary to the rear of the screener. The other data would suggest a sound power level of no more than 107 dB, not 109 dB. It might, however, be that at the great distance from the screener, the sound from the various elements/sides of the screener combined to result in a higher level than at the closer positions.

6.2 At this time, the data is not used further, but presented for interest/subsequent use, as required. The equivalent frequency data are presented overleaf.

Table 6.3: Linear (un-weighted) sound levels in one-third octave-bands (and equivalent dBA level) from on-site attended source measurements

Position/Source	8 Hz	10 Hz	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz	20 kHz	dBA
In front of crusher (c13m away)	72	70	68	73	65	63	74	75	73	77	76	79	74	72	68	68	65	65	67	67	66	63	60	61	61	60	60	57	56	56	53	50	48	44	40	74
In front of crusher, to left site (c6m away; c7m to 360)	71	70	69	74	64	66	75	75	73	78	75	73	76	71	75	75	73	73	74	71	71	69	68	68	67	66	66	63	61	63	60	56	56	49	45	80
Behind crusher, left side (c6m away)	66	65	70	85	62	63	74	72	73	77	74	74	72	72	73	73	71	72	71	71	74	72	69	72	70	68	66	63	62	61	58	53	50	47	40	81
Behind crusher, right side (c6m away)	65	64	67	81	61	62	70	71	73	79	74	73	72	70	73	73	70	70	71	71	71	73	71	70	68	66	64	61	59	59	56	52	48	44	38	80
RH side of screener (c7m away)	72	70	68	80	67	68	71	70	76	73	73	72	70	72	71	70	71	71	69	71	68	68	67	67	67	68	66	64	64	63	60	60	56	53	42	79
Behind screener, RH side (c8m away)	82	79	76	82	73	72	72	74	74	71	78	70	67	67	71	70	72	72	71	76	71	71	70	70	68	69	69	71	73	68	66	62	56	53	43	82
In front of screener (c7m away)	76	73	71	77	66	71	70	66	70	65	75	68	68	67	67	69	66	64	66	63	60	59	59	59	56	54	53	52	51	48	44	42	41	34	29	71
LH side of screener (c4m away)	80	77	76	79	70	70	71	70	75	80	76	73	73	78	76	70	72	73	73	73	73	70	73	71	72	72	72	73	73	70	66	62	56	52	46	84
Behind screener (c4m away)	73	72	70	84	67	66	68	77	69	73	78	71	69	71	71	68	72	71	70	74	72	71	75	74	73	73	73	75	77	72	68	64	57	53	44	85
Site boundary behind screener (c19m away)	88	87	85	84	82	80	79	77	74	70	69	63	61	60	57	58	60	60	62	66	63	62	64	63	66	62	65	65	67	60	57	52	44	39	29	75
Side boundary to side of screener (c22m)	66	65	64	67	60	63	66	67	67	65	66	59	59	61	62	61	61	62	62	67	62	60	60	58	60	57	59	59	59	55	53	49	43	38	27	72
Loader loading lorry with type 1 (c9m)	71	60	79	77	76	74	72	71	78	82	77	73	75	66	60	66	60	63	60	61	63	62	63	63	63	62	61	61	61	61	60	59	56	53	50	73
Loader idling (c5m)	74	65	71	70	67	66	64	65	79	74	61	76	72	61	58	59	55	57	58	61	59	57	59	59	54	52	52	50	50	50	47	44	43	38	34	66
Loading passing by (c5m away)	71	60	80	78	75	74	71	71	79	84	76	75	80	65	62	72	61	62	58	61	61	59	61	64	58	59	57	57	54	54	53	52	50	47	47	70
Loader manoeuvring (c10m away)	71	60	78	77	75	73	70	68	67	72	77	80	68	64	61	69	67	63	57	56	57	53	55	63	56	54	53	52	51	50	49	48	46	44	43	68
Loader shovelling (c20-25m away)	71	60	71	69	70	65	64	62	70	75	75	79	72	59	60	70	64	62	54	55	56	52	53	61	55	54	52	51	50	50	48	47	45	43	42	66
Loader shovelling (c8m away)	74	65	75	72	71	70	69	67	75	80	83	87	75	69	67	73	68	64	61	62	63	60	60	65	60	59	61	60	56	54	51	50	49	46	45	72
Lorry offloading rubble (c7m away)	78	56	79	78	75	74	71	71	76	75	76	70	69	69	67	68	69	67	66	65	66	67	66	66	66	66	66	67	66	68	69	64	58	56	52	78
Material delivery (soft) (c7m from side)	72	68	66	66	63	61	71	67	60	67	67	65	65	62	62	61	60	61	61	62	63	62	61	61	60	59	56	54	51	47	45	43	41	37	33	71

6.3 The above frequency data are presented in line chart form in the following figures. In terms of the crusher and screener data, these are presented separately together with the corresponding off-site data. The remaining, loading shovel, delivery and collection related data are presented last.

Figure 6.1: On- and off-site frequency data during crushing

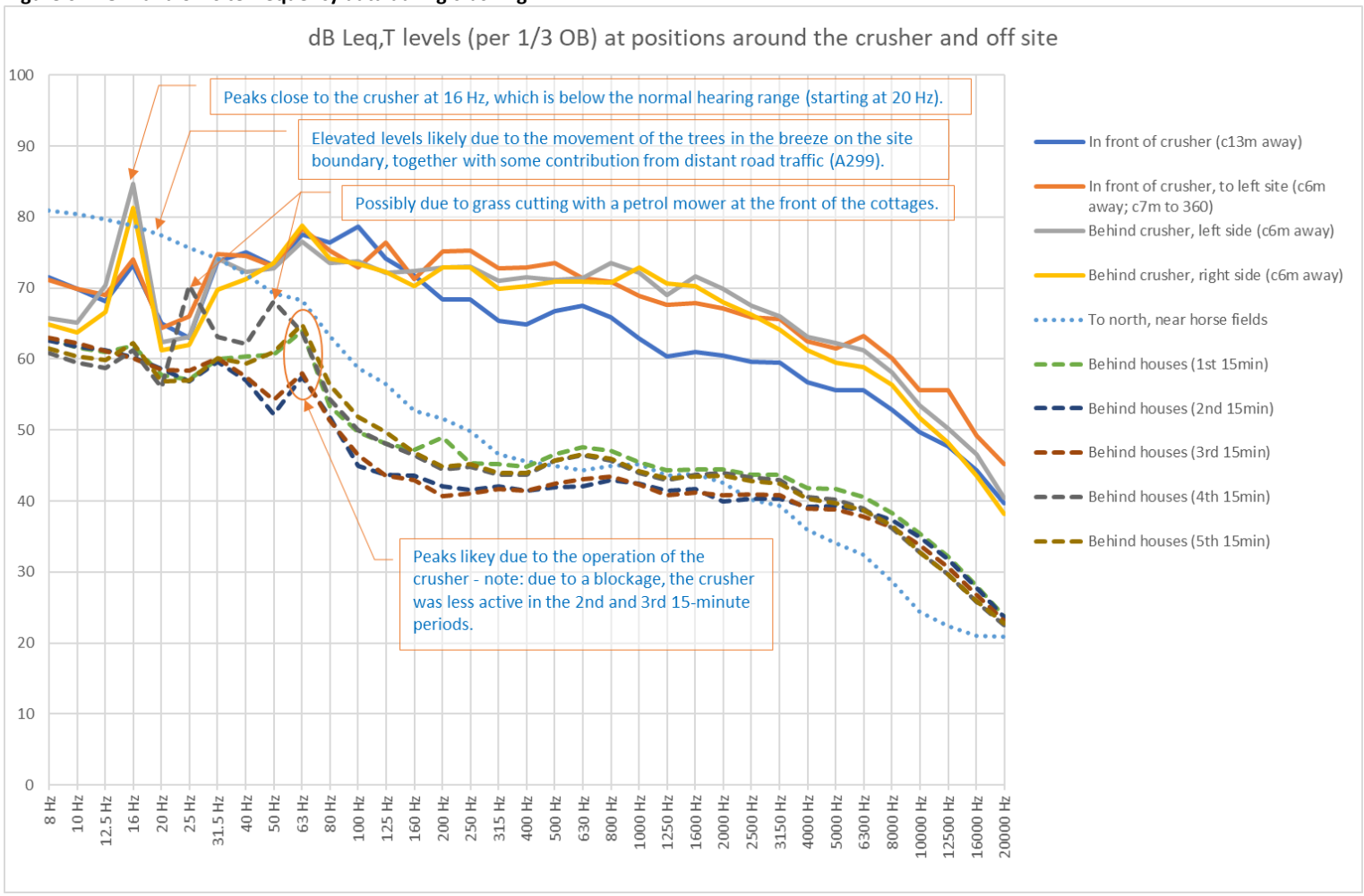


Figure 6.2: On- and off-site frequency data during screening (no excavator)

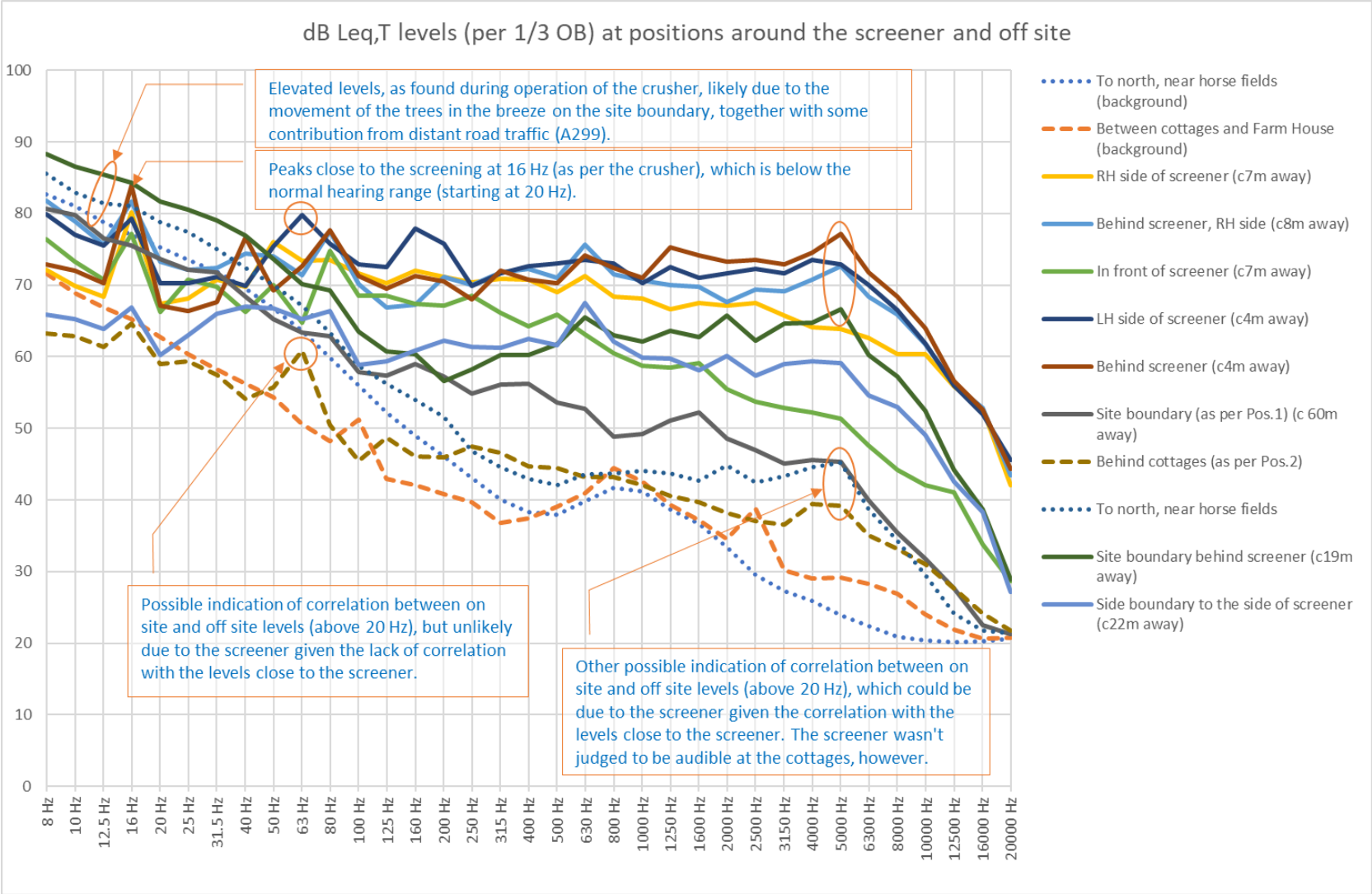
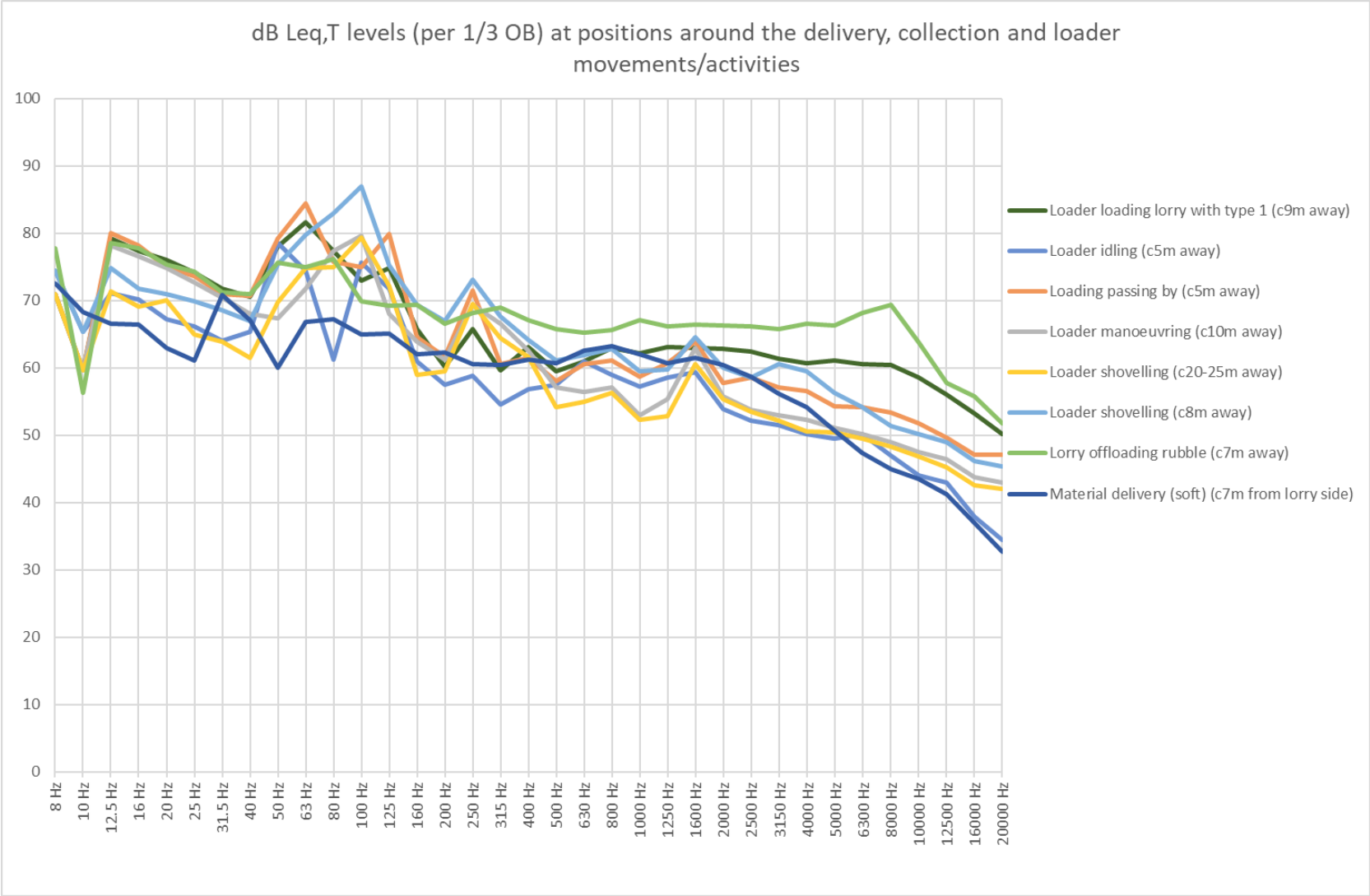


Figure 6.3: On-site frequency data during loading shovel, delivery and collection movements/activities



7. NOISE IMPACT ASSESSMENT

INITIAL ESTIMATE

7.1 Based on the measurements and listening undertaken at the cottages, the operation of the crusher is audible and influences the ambient and background conditions. Given, however, the crusher would only operate one or two days per month, and the site's existing use, and the nature of the wider area, this does not necessarily result in a noise impact.

7.2 In terms of an assessment in accordance with **BS 4142**, it is a question of determining the relevant background, specific and rating levels. A worst-case approach would be to compare the measured $L_{Aeq,1h}$ levels at UM2 during the crusher's operation with the adopted background ($L_{AF90,15min}$) level for the cottages.

7.3 From **Table 5.4**, it was concluded (following the tables) that levels from the operation of the crusher alone was no more than 52 dB ($L_{Aeq,1h}$). Whilst, from **Table 5.5**, it was concluded that background conditions typically appear to be in the order of 40 dB ($L_{AF90,15min}$). Without accounting for any character correction, therefore, this indicates a difference of around 12 dB.

7.4 Other than a peak at 16 Hz, which is below the audible range of normal hearing, the sound from the crushing process is reasonably broadband (i.e. not tonal) – indeed, the actual action of crushing is well-muted by the body and design of the crusher (and somewhat masked by engine noise). And whilst the sound is otherwise characterful in proximity, but by the time it reaches the cottages, at a relatively low sound level, much of the character is lost. It is, however, discernible, and so a correction of 3 dB could be deemed to apply as worst case.

7.5 This results in a very worst-case rating level of up to 55 dB ($L_{Ar,1h}$). This is, therefore, 15 dB above the background conditions typically.

7.6 According to **BS 4142**, "A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context." This, however, is likely to represent the case for no more than a day per month, which is considered, together with other contextual factors in the following subsection. Notwithstanding this, we are aware of example cases where background levels were exceeded by up +20 dB and were considered acceptable by the Environment Agency at the time in context.

7.7 In terms of the majority of the time, as represented by the operation of the screener, the delivery and collection movements, and the loading shovel movements, the equivalent specific sound level is taken to be 44 dB (as presented in **paragraphs 5.34** and **5.35**).

7.8 In terms of the screener, which is barely audible, no character correction is considered applicable. For the deliveries and collections, which can result in short bursts of sound, a correction of 3 dB is considered applicable. It could be argued that a higher correction would apply to some events, but where such events are few and far between.

7.9 Accordingly, the equivalent rating levels would be 44 dB for the screener and 47 dB for the deliveries and collections. These are 4 and 7 dB above the adopted background level, respectively.

7.10 According to **BS 4142**, "A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context."

7.11 Whether, therefore, the site sound is likely to represent a potentially significant impact or not is subject to further consideration of context, as presented below.

CONTEXT AND FINAL APPRAISAL

7.12 In terms of context, **BS 4142** recommends that consideration be given to:

1) the absolute level of sound;
2) the character and level of "residual sound" compared to the character and level of the specific sound; and
3) the sensitivity of the receptor and whether design measures are in place that secure good acoustic conditions (such as façade insulation treatment).

7.13 In terms of the first point, it is discussed following **Table 3.2** (as per the targets in **BS 8233**) that external levels of 50 dB would typically be considered sufficiently low for residential amenity (in terms of both outside and inside conditions). Whilst the advice is that a lower limit might be appropriate where the sound in question contains a specific character, at up to 44 dB for the majority of the time (excluding crushing), the specific sound levels are somewhat lower than the 50 dB threshold. And whilst the specific levels are up to 52 dB during crushing, this is only slightly above the 50 dB threshold, and where **BS 8233** does also specify an upper guideline value of 55 dB as being acceptable in noisier environments.

7.14 The "residual sound" referenced in the second point relates to the ambient ($L_{Aeq,T}$) sound conditions in the absence of the site activities, where both the "level" and "character" are of interest. In terms of level, it is shown in **Table 5.4** that on the Sunday afternoon levels ranged from 44 to 47 dB ($L_{Aeq,1h}$), and from 45 to 52 on the Monday (excluding the atypical level) when there was limited activity on site. Such levels are similar to the specific sound levels presented above, whereby the site is not necessary the dominant source. Indeed, this was found not to be the case typically.

7.15 In terms of character of the residual sound, there is considered to be nothing quite equivalent to the operation of the site, whereby this may not be a mitigating factor, but whereby there are plenty of other sources, nonetheless, including of a commercial nature.

7.16 The third point applies where the receptor in question is more or less sensitive to noise than would typically be the case. Whilst we don't imagine that the cottages have been altered with the current status of the site in mind, the site is in use already, whereby there should be both an expectation of, and some habituation to, sounds from the site. Whilst it should be borne in mind that the site, as proposed, would operate normal working hours only, without encroaching into evening or night-time periods.

7.17 Overall, therefore, given the existing use of the site, and with the specific sound levels typically below the **BS 8233** lower threshold for external amenity, and not dissimilar to the residual conditions, it is considered that the controlled operation of the site should not result in a significant adverse noise impact. Whilst, based on the wording in the **NPPF**'s **PPG-N** (see **Table B.1** of **Appendix B**), since there didn't appear to be a need to speak more loudly, for example, and in the absence of disturbance at night, it is considered that there should be **No Observed Adverse Effect**, whereby "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 change in the quality of life."

7.18 Accordingly, no specific measures are required necessarily, and it is considered that operating the site as proposed would be in keeping with national noise policy.

7.19 Notwithstanding this, together with a separate Noise Management Plan, Noise Management Controls are presented as **Section 8**, in order to assist with keeping operational sound levels to a practicable minimum.

UNCERTAINTY

7.20 In all assessments, it is good practice to consider uncertainty, which can arise from a number of different aspects of an assessment. There is a degree of uncertainty associated with: the instrumentation itself; the use of instrumentation; the source data; the sound propagation model, where applicable; and, of course, the subjective response of recipients.

7.21 In terms of the assessment presented above, uncertainty due to instrumentation error has kept to a minimum by the use of the highest standard of instrumentation and by ensuring that all instrumentation is calibrated before and after each measurement period and is within accepted calibration intervals.

7.22 In terms of the baseline data, the management of uncertainty has included carrying out the survey over a number of days, being mindful of the weather conditions, and clearly presenting and reviewing the data.

7.23 Regarding subjective response, the guidance adopted for the assessment is based on the subjective response of the majority of the population, with care taken to consider relevant contextual factors.

7.24 On the basis of the above, therefore, whilst the magnitude of uncertainty cannot be quantitatively defined, it is considered that sufficient measures have been taken to minimise this to an acceptable degree.

8. BEST AVAILABLE TECHNIQUES (BAT)

8.1 At a surface level, with the use of modern plant, and with activities seemingly being well-controlled during the site visits, it would appear that the BAT approach is being followed. Whilst it should be borne in mind that the site's operational hours will be limited to 07:30-16:30 weekdays and 08:00-13:00 Saturdays, with the crusher or screener used 09:00-16:00 weekdays only. This would seem entirely reasonable under the circumstances.

8.2 It is understood the site layout has been arranged with both noise and logistics in mind, and which broadly seems to be the case. The crushing and screening activities broadly as far away from the dwellings as feasible, bearing in mind the distances the loading shovel needs to travel and minimising the need for the excavator to move.

8.3 In terms of the crusher, this (when hired) is located at ground level and behind a substantial wall comprised of "Lego" concrete blocks (currently with a length of 9.6 m (at the upper point), a height of 3.2 m and a width of 0.4 m), as shown in **Figure 8.1** below. Whilst the crusher is loudest towards the rear, which is facing to the east, away from the dwellings to the south-west.

Figures 8.1 and 8.2: Crusher and associated barrier

Source: Chris Wood Acoustics (images captured September 2023)

8.4 It could seemingly, however, usefully be higher, if not longer. It should be borne in mind that the inner surface of the barrier is acoustically reflective, as will parts of the crusher, whereby the additional height could be additionally beneficial to help counteract the reflected sound. Bearing in mind, of course, that use of the crusher is the exception rather than the rule.

8.5 In terms of the screener, with its three conveyor belt arms and greater height, this is a notably larger item of plant, such that screening would be more challenging, but where it is at least located with the loudest end facing away from the dwellings. It was noted to be used on a platform of material at least 1 m high, and so there could be some acoustic benefit of operating the screener at ground level, thus making the most of the existing screening between the site and dwellings.

8.6 Otherwise, it is understood a barrier is to be erected on the site's southern boundary, which could help reduce the sound emissions from site globally. Since, however, it will be somewhat remote from the crusher and screener, and where there is already screening to some extent, including from the garages, fencing etc. associated with the intervening commercial/storage areas, and the neighbouring stables, such that any additional benefit may be limited. Accordingly, it is not considered that this measure is imperative, but rather something to incorporate where viable.

8.7 Accordingly, no specific measures are proposed at this stage. See also, however, the Noise Management Plan, within which general management control measures are presented to keep sound emissions to a practicable minimum.

9. CONCLUSION AND NEXT STEPS

9.1 As far as we have been able to determine, the site is adopting BAT and operating appropriately with respect to sound emissions.

9.2 Furthermore, whilst the site can be audible at the nearest dwellings, this is considered to be the exception rather than the rule, and rarely clearly or the dominant source of sound. The author does not believe that, in context, the resultant sounds and associated sound levels should result in a significant noise impact. Indeed, in terms of the wording in the **NPPF**'s **PPG-N** (see **Table B.1** of **Appendix B**), it is considered that there should be **No Observed Adverse Effect**, whereby "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 change in the quality of life."

9.3 In light of the above, no specific measures are considered necessarily, and where the layout broadly appears to be appropriate acoustically. However, it is considered that there could be acoustic benefits in increasing the length and height of the barrier next to the crusher as far as feasible, and operating the screener at ground level.

9.4 It is understood that a barrier is proposed for the southern site boundary, which could provide some additional, global benefit, but which isn't considered to be imperative acoustically.

9.5 Otherwise, no further steps are proposed at this time.

APPENDIX A: GLOSSARY

Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response, and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.[2] Care has been taken in this document to use the most relevant of these terms (whereby 'sound' is used predominantly); however, in most reference documents, and, indeed, generally, 'sound' and 'noise' are used interchangeably. Consequently, just because the term 'noise' is used, doesn't necessarily mean a negative effect exits or will occur, and the context of the accompanying text should be taken into account.

Normal human hearing is able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble), and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify sound in a manner that approximates the response of the human ear, a weighting mechanism is used, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

The weighting mechanism that best corresponds to the response of the human ear (though not necessarily perfectly) is the 'A'-weighting scale. This is widely used for environmental sound measurement, and the levels are denoted as dBA, dB(A) or L_{Aeq}, L_{Amax} etc. according to the metric being measured or determined (see the Definitions below).

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dBA increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dBA is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. Where other changes occur (associated with the change in sound level), such as additional vehicle movements on a road, which can be seen, then these may result in changes in sound level being more noticeable than they might otherwise be.

Further to such visual clues, and any other non-acoustical factors that affect people's response (such personal characteristics, and social, residential or environmental factors), the subjective response to a sound is dependent not only upon the sound pressure level and component frequencies, but also its intermittency. Consequently, various metrics have been developed to try and correlate people's attitudes to different sounds with the sound level and its fluctuations. The metrics used in this document, as per the relevant guidance, are defined below.

- 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.
- BAT (best available techniques). Means the available techniques that are the best for preventing or minimising emissions and impacts on the environment. The European Commission (EC) produces Best Available Technique reference documents or BREF notes. They contain BAT for some installations. The Environment Agency (EA) see BAT as equivalent to the term 'appropriate measures', whilst is could also be seen as equivalent to best practicable means (BPM), defined in Part III of the Environmental Protection Act

[2] Taken from the Foreword to BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

1990 as: "'Practicable' means reasonably practicable in terms of local conditions/circumstances, the current state of technical knowledge, and financial implications."

- 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, Chris Wood Acoustics use Class 1 (or Type 1) meters by default, as required by BS 4142, 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 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 20 µPa.
- 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.
- EA (Environment Agency): The EA is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs (Defra). Within England, it is responsible for: regulating major industry and waste; treatment of contaminated land; water quality and resources; fisheries; inland river, estuary and harbour navigations; conservation and ecology; and managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
- 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 61672-2:2013 Electroacoustics. Sound level meters. Pattern evaluation tests.
- 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.
- IOA: The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society (a daughter society of the Institution of Mechanical Engineers). It is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.
- $L_{AF90,T}$: 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, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.

- Octave/ octave band: Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit. E.g. the 1000 Hz octave band contains sound energy at all frequencies from 707 to 1414 Hz.
- 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 Level) of the sound, plus any adjustment for the characteristic features of the sound.
- 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.
- Sound power level, LW: Sound power measured on a decibel scale, relative to a reference value of 10 12 W.
- Sound pressure level (sound level), L_p: The sound level is the sound pressure relative to a standard reference pressure of 20 µPa ($20x10^{-6}$ Pascals) on a decibel scale.
- Specific sound level, Ls = $L_{Aeq,Tr}$: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr.
- Specific sound source: Sound source being assessed.

APPENDIX B: NATIONAL NOISE POLICY

B.1 NATIONAL POLICY

The national policy of relevance comprises the Noise Policy Statement for England (NPSE, 2010) and the online National Planning Policy Framework (NPPF, regularly updated) and its associated planning practice guidance on "Noise" (also regularly updated). The guidance is necessarily generic and primarily geared towards local authorities preparing their own policies and associated guidance. The documents are described below.

B.1.1 Noise Policy Statement for England (NPSE, 2010)

The **NPSE** is the Government's overarching statement on noise policy for England, and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy, which is to:

> "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

Which is supported by the following noise policy aims:

> "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
>
> - Avoid significant adverse impacts on health and quality of life;
> - Mitigate and minimise adverse impacts on health and quality of life; and
> - Where possible, contribute to the improvement of health and quality of life."

When discussing the meaning of "significant adverse" and "adverse" within an "**Explanatory Note**", the **NPSE** states:

> "There are two established concepts from toxicology that are currently being applied to noise impacts for example, by the World Health Organisation. They 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."

To which the **NPSE** added the following related concept:

> "SOAEL – Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur."

The **Explanatory Note** continues:

> "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

The **NPSE** concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed above. Logically, it starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL, when "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development." The final aim envisages proactive management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

B.1.2 National Planning Policy Framework (NPPF, 2021)

First published in 2012, and most recently updated in July 2021, the **NPPF** sets out the Government's planning policies for England, and how these are expected to be applied. Noise is referenced within the **NPPF** as follows. These are effectively the **NPPF**'s policies on noise.

> "174. Planning policies and decisions should contribute to and enhance the natural and local environments by:
>
> "…e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…"

> "185. 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 life[60]…"

Reference number 60 of the above quotation points to the **Explanatory Note** to the **NPSE** (see above).

The following policy is also relevant to noise.

> "187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

As mentioned above, the Government has published accompanying web-based planning guidance for a number of categories, including noise (see below).

B.1.3 NPPF Planning Practice Guidance, Noise (PPG-N, 2019)

Following initial release in 2014, the **planning practice guidance** now forms part of the **NPPF**, referred to as "relevant planning practice guidance", which includes guidance on the category of "Noise". The guidance is often referred to as **PPG-Noise**, **PPG-N** or **PPG(N)**.

In keeping with the **NPSE** and **NPPF**, no values (in dB) are presented; however, plenty of guidance is provided as to the issues to consider in assessing noise and determining suitable thresholds. Whilst, in keeping with this report, reference is made to **BS 8233**.

A "noise exposure hierarchy table" is provided, which summarises the noise exposure hierarchy based on the likely average response of those affected, and is reproduced below. It includes "examples of outcomes" relevant to the NOEL, LOAEL and SOAEL effect thresholds described in the **NPSE**. These outcomes are in descriptive form; there is no numerical definition of the NOEL, LOAEL and SOAEL.

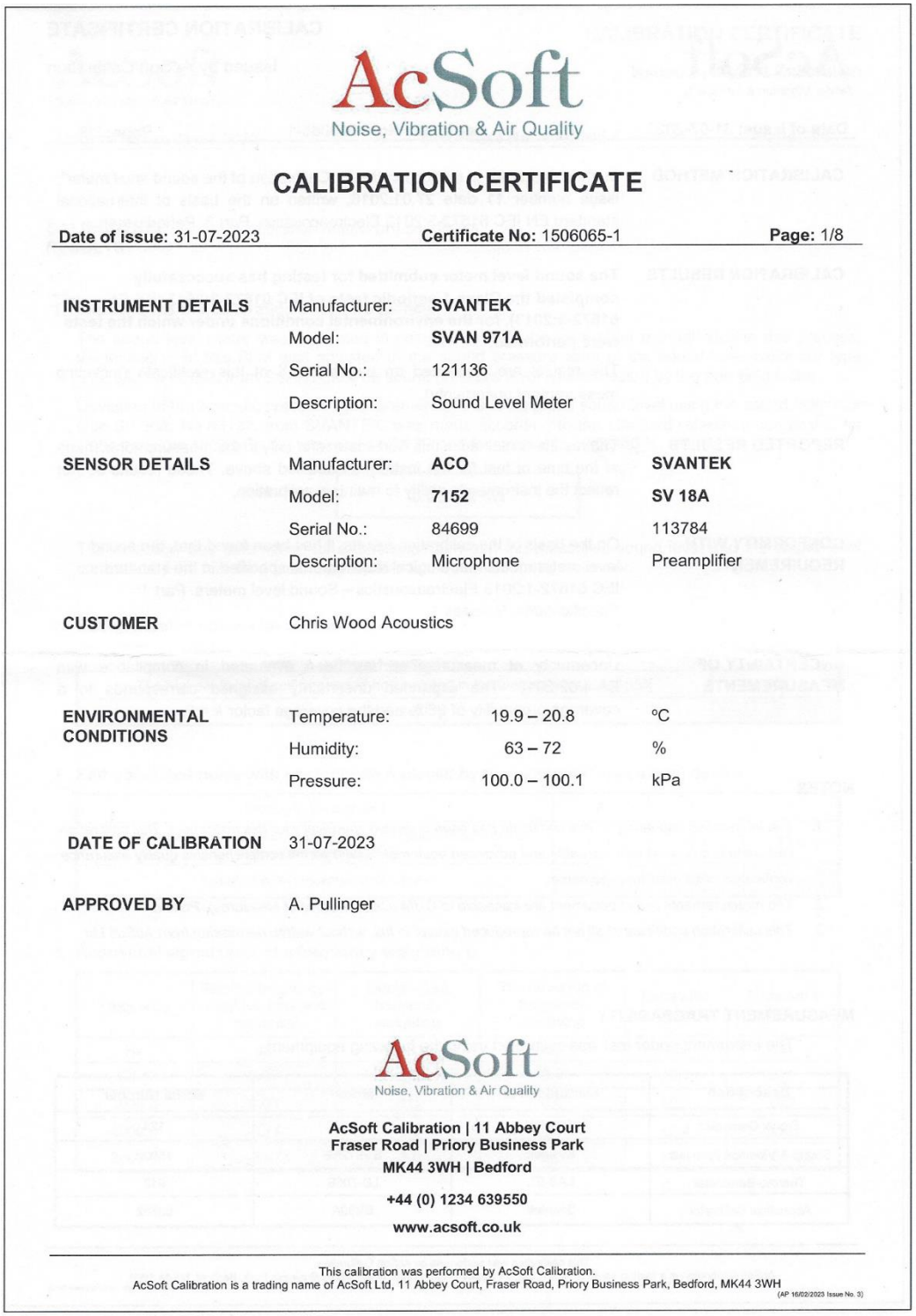
Table B.1: Noise exposure hierarchy table (as per PPG-N)

Response	Examples of outcomes	Increasing effect level	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 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 or 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

It is left to other guidance documents (e.g. BS 4142 and BS 8233) and professional opinion to determine thresholds where required.

APPENDIX C: CALIBRATION CERTIFICATES

SLM1



AcSoft
Noise, Vibration & Air Quality

CALIBRATION CERTIFICATE

Date of issue: 31-07-2023 **Certificate No:** 1506065-1 **Page:** 1/8

INSTRUMENT DETAILS	Manufacturer:	**SVANTEK**	
	Model:	**SVAN 971A**	
	Serial No.:	121136	
	Description:	Sound Level Meter	
SENSOR DETAILS	Manufacturer:	**ACO**	**SVANTEK**
	Model:	**7152**	**SV 18A**
	Serial No.:	84699	113784
	Description:	Microphone	Preamplifier
CUSTOMER	Chris Wood Acoustics		
ENVIRONMENTAL CONDITIONS	Temperature:	19.9 – 20.8	°C
	Humidity:	63 – 72	%
	Pressure:	100.0 – 100.1	kPa
DATE OF CALIBRATION	31-07-2023		
APPROVED BY	A. Pullinger		

AcSoft
Noise, Vibration & Air Quality

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www.acsoft.co.uk

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(AP 16/02/2023 Issue No. 3)

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SLM2

AcSoft
Noise, Vibration & Air Quality

CALIBRATION CERTIFICATE

Date of issue: 31-07-2023 **Certificate No:** 1506065-2 **Page:** 1/8

INSTRUMENT DETAILS	Manufacturer:	**SVANTEK**	
	Model:	**SVAN 971A**	
	Serial No.:	131651	
	Description:	Sound Level Meter	
SENSOR DETAILS	Manufacturer:	**ACO**	**SVANTEK**
	Model:	**7152**	**SV 18**
	Serial No.:	85537	139344
	Description:	Microphone	Preamplifier
CUSTOMER	Chris Wood Acoustics		
ENVIRONMENTAL CONDITIONS	Temperature:	18.9 – 20.4	°C
	Humidity:	63 – 75	%
	Pressure:	100.0 – 100.1	kPa
DATE OF CALIBRATION	31-07-2023		
APPROVED BY	A. Pullinger		

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Noise, Vibration & Air Quality

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(AP 16/02/2023 Issue No. 3)

Note: First page presented only for brevity

Calibrator

SVANTEK ISO9001 certified

Sound Level Calibrator

Type: **SV33B** Serial No: **140764**

Calibration Chart

Sound pressure level: **114.06 dB** (THD: **0.34 %**)

Frequency: **1000 Hz**

Short term level stability: 0.05 dB
Frequency stability: 0.01 %

Measurement conditions
Temperature: **23 °C**
Relative humidity: **49 %**
Ambient pressure: **997 hPa**

Reference conditions
Temperature: 23.0 °C
Relative humidity: 50 %
Ambient pressure: 1013.2 hPa

CONFORMITY & TEST DECLARATION

The stated level is valid at reference conditions.
Measured according to IEC 60942:2003.
The stated level is relative to 20 µPa .

The level is traceable to GUM (Central Office of Measures, Poland) with a calculated uncertainty less then ± 0.15 dB (2*sd).

Calibration specialist : .....

Date : 2023-06-26

APPENDIX D: UNATTENDED SURVEY RESULTS

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Fri 29/09/2023	11:30	-	-	-	79	58	50
Fri 29/09/2023	11:45	87	73	70	63	52	50
Fri 29/09/2023	12:00	84	72	70	74	52	50
Fri 29/09/2023	12:15	90	73	69	61	52	50
Fri 29/09/2023	12:30	89	73	67	68	52	50
Fri 29/09/2023	12:45	83	72	69	61	52	50
Fri 29/09/2023	13:00	97	73	69	70	52	50
Fri 29/09/2023	13:15	84	72	69	70	53	50
Fri 29/09/2023	13:30	88	73	69	72	51	48
Fri 29/09/2023	13:45	93	73	68	68	51	48
Fri 29/09/2023	14:00	87	72	68	71	50	47
Fri 29/09/2023	14:15	86	72	68	65	52	48
Fri 29/09/2023	14:30	89	71	66	62	51	47
Fri 29/09/2023	14:45	92	72	67	69	52	49
Fri 29/09/2023	15:00	93	72	67	66	51	49
Fri 29/09/2023	15:15	82	70	68	63	50	48
Fri 29/09/2023	15:30	94	71	67	76	53	50
Fri 29/09/2023	15:45	97	71	67	73	52	49
Fri 29/09/2023	16:00	81	70	67	63	53	51
Fri 29/09/2023	16:15	82	65	51	61	48	42
Fri 29/09/2023	16:30	84	62	51	65	47	42
Fri 29/09/2023	16:45	89	65	53	64	48	44
Fri 29/09/2023	17:00	91	71	60	65	46	43
Fri 29/09/2023	17:15	70	67	66	58	46	43
Fri 29/09/2023	17:30	80	67	61	65	47	44
Fri 29/09/2023	17:45	70	58	52	64	47	44
Fri 29/09/2023	18:00	77	57	45	73	49	42
Fri 29/09/2023	18:15	74	55	49	58	44	41
Fri 29/09/2023	18:30	75	61	44	61	46	42
Fri 29/09/2023	18:45	78	62	46	74	48	42
Fri 29/09/2023	19:00	85	62	40	78	49	41
Fri 29/09/2023	19:15	89	72	39	64	48	40
Fri 29/09/2023	19:30	61	42	38	54	42	39
Fri 29/09/2023	19:45	75	61	38	57	44	39
Fri 29/09/2023	20:00	72	56	52	59	43	40
Fri 29/09/2023	20:15	72	58	52	57	44	40
Fri 29/09/2023	20:30	78	60	53	63	44	41
Fri 29/09/2023	20:45	77	63	58	65	49	42
Fri 29/09/2023	21:00	75	53	36	60	41	37
Fri 29/09/2023	21:15	71	48	34	57	39	35
Fri 29/09/2023	21:30	83	65	41	62	44	37

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Fri 29/09/2023	21:45	71	62	61	67	44	37
Fri 29/09/2023	22:00	76	62	61	57	41	39
Fri 29/09/2023	22:15	78	61	55	62	43	40
Fri 29/09/2023	22:30	84	64	37	68	46	37
Fri 29/09/2023	22:45	80	53	36	58	42	37
Fri 29/09/2023	23:00	91	64	38	64	43	37
Fri 29/09/2023	23:15	76	49	36	53	40	36
Fri 29/09/2023	23:30	56	40	35	57	40	36
Sat 30/09/2023	23:45	53	38	35	44	37	35
Sat 30/09/2023	00:00	52	39	35	50	38	35
Sat 30/09/2023	00:15	57	40	34	56	40	35
Sat 30/09/2023	00:30	49	38	34	46	37	34
Sat 30/09/2023	00:45	52	39	34	49	38	34
Sat 30/09/2023	01:00	53	37	33	47	36	33
Sat 30/09/2023	01:15	50	36	33	44	36	33
Sat 30/09/2023	01:30	62	40	32	56	38	33
Sat 30/09/2023	01:45	66	46	32	53	37	32
Sat 30/09/2023	02:00	72	46	32	64	42	32
Sat 30/09/2023	02:15	52	35	28	62	35	29
Sat 30/09/2023	02:30	49	36	29	46	34	29
Sat 30/09/2023	02:45	50	34	26	63	38	27
Sat 30/09/2023	03:00	48	34	28	42	33	30
Sat 30/09/2023	03:15	46	33	28	44	33	29
Sat 30/09/2023	03:30	44	33	28	47	33	29
Sat 30/09/2023	03:45	49	34	27	48	32	27
Sat 30/09/2023	04:00	46	32	24	41	31	25
Sat 30/09/2023	04:15	47	32	26	47	31	26
Sat 30/09/2023	04:30	48	35	27	44	33	28
Sat 30/09/2023	04:45	45	34	27	43	32	27
Sat 30/09/2023	05:00	49	35	30	49	35	30
Sat 30/09/2023	05:15	64	40	31	47	35	31
Sat 30/09/2023	05:30	51	38	32	48	36	31
Sat 30/09/2023	05:45	50	39	35	46	37	34
Sat 30/09/2023	06:00	59	40	32	59	38	32
Sat 30/09/2023	06:15	62	42	37	63	45	36
Sat 30/09/2023	06:30	69	44	38	73	48	37
Sat 30/09/2023	06:45	63	44	40	66	46	38
Sat 30/09/2023	07:00	70	47	39	76	46	38
Sat 30/09/2023	07:15	68	46	40	78	49	39
Sat 30/09/2023	07:30	74	55	40	73	52	39
Sat 30/09/2023	07:45	96	68	61	74	54	42

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Sat 30/09/2023	08:00	96	82	59	67	54	42
Sat 30/09/2023	08:15	89	70	57	65	51	40
Sat 30/09/2023	08:30	78	60	58	58	43	41
Sat 30/09/2023	08:45	78	64	59	58	44	41
Sat 30/09/2023	09:00	73	65	57	65	50	41
Sat 30/09/2023	09:15	80	69	66	64	52	49
Sat 30/09/2023	09:30	83	69	67	67	52	49
Sat 30/09/2023	09:45	87	69	67	62	51	49
Sat 30/09/2023	10:00	94	69	64	67	51	48
Sat 30/09/2023	10:15	74	67	64	57	49	47
Sat 30/09/2023	10:30	82	69	67	68	51	48
Sat 30/09/2023	10:45	78	64	52	62	47	39
Sat 30/09/2023	11:00	78	59	52	64	45	38
Sat 30/09/2023	11:15	80	66	62	64	45	40
Sat 30/09/2023	11:30	83	64	54	73	47	38
Sat 30/09/2023	11:45	84	64	43	67	46	38
Sat 30/09/2023	12:00	85	65	55	61	46	39
Sat 30/09/2023	12:15	85	67	54	75	50	39
Sat 30/09/2023	12:30	104	71	57	75	48	40
Sat 30/09/2023	12:45	76	63	52	77	49	38
Sat 30/09/2023	13:00	70	54	53	73	47	38
Sat 30/09/2023	13:15	71	57	53	61	42	37
Sat 30/09/2023	13:30	69	54	53	64	43	38
Sat 30/09/2023	13:45	84	59	53	58	42	38
Sat 30/09/2023	14:00	86	75	56	58	50	40
Sat 30/09/2023	14:15	86	78	77	62	53	52
Sat 30/09/2023	14:30	90	79	78	65	54	52
Sat 30/09/2023	14:45	86	79	77	61	53	52
Sat 30/09/2023	15:00	87	79	78	62	54	52
Sat 30/09/2023	15:15	90	79	77	67	54	52
Sat 30/09/2023	15:30	86	78	76	61	54	52
Sat 30/09/2023	15:45	90	71	65	63	49	44
Sat 30/09/2023	16:00	88	71	57	62	48	43
Sat 30/09/2023	16:15	76	58	42	64	47	40
Sat 30/09/2023	16:30	78	59	42	59	45	41
Sat 30/09/2023	16:45	86	64	53	58	46	42
Sat 30/09/2023	17:00	77	60	52	64	49	44
Sat 30/09/2023	17:15	81	65	53	60	49	45
Sat 30/09/2023	17:30	84	65	42	79	49	40
Sat 30/09/2023	17:45	73	52	40	67	46	38
Sat 30/09/2023	18:00	69	48	37	71	50	43

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Sat 30/09/2023	18:15	72	48	36	71	48	40
Sat 30/09/2023	18:30	63	38	34	54	40	36
Sat 30/09/2023	18:45	64	39	34	79	49	38
Sat 30/09/2023	19:00	68	45	33	75	52	34
Sat 30/09/2023	19:15	50	36	33	53	37	34
Sat 30/09/2023	19:30	50	36	32	49	36	33
Sat 30/09/2023	19:45	58	38	32	53	37	33
Sat 30/09/2023	20:00	54	36	32	48	35	32
Sat 30/09/2023	20:15	57	39	33	54	36	32
Sat 30/09/2023	20:30	47	35	32	67	38	32
Sat 30/09/2023	20:45	52	35	32	49	34	32
Sat 30/09/2023	21:00	68	46	33	51	35	32
Sat 30/09/2023	21:15	66	39	33	51	36	32
Sat 30/09/2023	21:30	70	47	33	54	37	32
Sat 30/09/2023	21:45	50	35	33	50	34	32
Sat 30/09/2023	22:00	49	36	34	52	38	34
Sat 30/09/2023	22:15	47	37	34	46	36	35
Sat 30/09/2023	22:30	73	41	36	66	41	35
Sat 30/09/2023	22:45	48	37	35	51	40	36
Sat 30/09/2023	23:00	48	38	36	68	41	38
Sat 30/09/2023	23:15	50	40	39	53	43	40
Sat 30/09/2023	23:30	45	36	33	45	37	34
Sat 30/09/2023	23:45	51	35	32	44	35	32
Sun 01/10/2023	00:00	46	35	32	43	36	33
Sun 01/10/2023	00:15	48	34	31	41	34	32
Sun 01/10/2023	00:30	50	33	30	40	33	31
Sun 01/10/2023	00:45	45	31	29	40	31	30
Sun 01/10/2023	01:00	56	37	29	47	32	29
Sun 01/10/2023	01:15	48	31	28	45	31	29
Sun 01/10/2023	01:30	64	37	28	49	31	29
Sun 01/10/2023	01:45	46	32	30	43	34	32
Sun 01/10/2023	02:00	47	32	30	41	35	33
Sun 01/10/2023	02:15	55	33	28	55	35	30
Sun 01/10/2023	02:30	49	30	27	38	30	28
Sun 01/10/2023	02:45	45	29	26	40	31	28
Sun 01/10/2023	03:00	47	28	25	40	29	27
Sun 01/10/2023	03:15	45	28	24	43	28	26
Sun 01/10/2023	03:30	48	28	25	37	28	26
Sun 01/10/2023	03:45	49	31	25	47	31	26
Sun 01/10/2023	04:00	47	28	26	43	28	26
Sun 01/10/2023	04:15	63	44	25	68	45	25

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Sun 01/10/2023	04:30	58	34	27	47	32	27
Sun 01/10/2023	04:45	45	34	28	45	33	28
Sun 01/10/2023	05:00	54	37	29	59	39	29
Sun 01/10/2023	05:15	46	34	30	43	32	29
Sun 01/10/2023	05:30	51	34	30	56	35	29
Sun 01/10/2023	05:45	57	37	31	55	36	30
Sun 01/10/2023	06:00	63	40	31	59	39	30
Sun 01/10/2023	06:15	64	41	35	66	44	33
Sun 01/10/2023	06:30	62	42	35	63	42	34
Sun 01/10/2023	06:45	59	41	36	71	48	34
Sun 01/10/2023	07:00	82	56	37	67	47	35
Sun 01/10/2023	07:15	73	52	37	74	48	35
Sun 01/10/2023	07:30	75	49	37	71	48	35
Sun 01/10/2023	07:45	76	52	38	77	52	36
Sun 01/10/2023	08:00	73	45	36	70	43	35
Sun 01/10/2023	08:15	68	47	37	61	42	35
Sun 01/10/2023	08:30	80	52	36	66	42	36
Sun 01/10/2023	08:45	66	44	36	76	46	37
Sun 01/10/2023	09:00	66	44	38	75	53	40
Sun 01/10/2023	09:15	61	43	38	63	47	40
Sun 01/10/2023	09:30	61	44	38	60	45	41
Sun 01/10/2023	09:45	63	45	40	59	46	41
Sun 01/10/2023	10:00	78	57	41	59	45	40
Sun 01/10/2023	10:15	65	57	51	57	47	44
Sun 01/10/2023	10:30	81	60	56	56	46	44
Sun 01/10/2023	10:45	71	59	56	62	46	43
Sun 01/10/2023	11:00	71	59	56	81	56	43
Sun 01/10/2023	11:15	73	59	56	64	47	44
Sun 01/10/2023	11:30	72	59	56	56	45	43
Sun 01/10/2023	11:45	72	60	57	62	47	44
Sun 01/10/2023	12:00	71	60	57	79	49	44
Sun 01/10/2023	12:15	77	57	51	65	46	40
Sun 01/10/2023	12:30	72	56	45	62	45	40
Sun 01/10/2023	12:45	72	46	39	59	44	40
Sun 01/10/2023	13:00	59	42	38	56	42	38
Sun 01/10/2023	13:15	60	42	36	78	46	39
Sun 01/10/2023	13:30	55	40	36	60	40	37
Sun 01/10/2023	13:45	54	38	34	57	40	36
Sun 01/10/2023	14:00	59	41	36	53	45	40
Sun 01/10/2023	14:15	55	40	36	66	43	38
Sun 01/10/2023	14:30	71	48	36	69	47	38

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Sun 01/10/2023	14:45	59	40	35	56	42	38
Sun 01/10/2023	15:00	57	39	36	69	44	38
Sun 01/10/2023	15:15	53	39	35	54	42	36
Sun 01/10/2023	15:30	59	40	35	61	42	37
Sun 01/10/2023	15:45	62	39	34	62	42	37
Sun 01/10/2023	16:00	65	48	36	65	48	39
Sun 01/10/2023	16:15	60	40	35	60	42	37
Sun 01/10/2023	16:30	63	40	35	62	41	35
Sun 01/10/2023	16:45	53	38	35	66	43	37
Sun 01/10/2023	17:00	70	46	36	66	43	38
Sun 01/10/2023	17:15	77	53	35	73	45	36
Sun 01/10/2023	17:30	62	42	34	72	44	35
Sun 01/10/2023	17:45	71	49	33	78	50	34
Sun 01/10/2023	18:00	74	50	34	72	51	34
Sun 01/10/2023	18:15	71	47	33	65	45	33
Sun 01/10/2023	18:30	58	38	35	67	43	35
Sun 01/10/2023	18:45	71	46	36	80	52	35
Sun 01/10/2023	19:00	67	40	36	48	37	34
Sun 01/10/2023	19:15	51	39	36	51	38	34
Sun 01/10/2023	19:30	51	38	34	49	37	33
Sun 01/10/2023	19:45	47	37	35	69	40	33
Sun 01/10/2023	20:00	52	37	35	43	36	33
Sun 01/10/2023	20:15	51	39	36	54	37	34
Sun 01/10/2023	20:30	54	38	36	45	37	35
Sun 01/10/2023	20:45	61	44	36	61	43	34
Sun 01/10/2023	21:00	56	39	35	65	38	33
Sun 01/10/2023	21:15	47	38	35	53	37	33
Sun 01/10/2023	21:30	49	37	35	47	36	33
Sun 01/10/2023	21:45	56	39	35	56	37	33
Sun 01/10/2023	22:00	46	37	33	43	35	32
Sun 01/10/2023	22:15	48	37	33	45	35	32
Sun 01/10/2023	22:30	50	37	34	47	35	32
Sun 01/10/2023	22:45	51	35	31	49	33	30
Sun 01/10/2023	23:00	62	37	29	53	34	28
Sun 01/10/2023	23:15	52	33	29	39	32	28
Sun 01/10/2023	23:30	50	34	29	46	32	28
Mon 02/10/2023	23:45	67	39	28	54	33	27
Mon 02/10/2023	00:00	45	32	28	52	30	27
Mon 02/10/2023	00:15	72	48	28	55	35	28
Mon 02/10/2023	00:30	46	35	30	58	35	30
Mon 02/10/2023	00:45	46	33	27	43	32	28

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Mon 02/10/2023	01:00	45	33	29	45	33	28
Mon 02/10/2023	01:15	56	34	27	53	33	27
Mon 02/10/2023	01:30	45	31	27	59	33	27
Mon 02/10/2023	01:45	44	31	27	42	30	27
Mon 02/10/2023	02:00	45	33	28	41	31	27
Mon 02/10/2023	02:15	45	32	26	58	35	27
Mon 02/10/2023	02:30	45	31	27	42	30	27
Mon 02/10/2023	02:45	44	31	27	39	30	27
Mon 02/10/2023	03:00	48	35	28	47	33	28
Mon 02/10/2023	03:15	46	33	28	53	32	27
Mon 02/10/2023	03:30	50	36	29	48	35	28
Mon 02/10/2023	03:45	45	35	29	43	33	28
Mon 02/10/2023	04:00	45	34	28	42	32	27
Mon 02/10/2023	04:15	46	36	33	42	34	31
Mon 02/10/2023	04:30	53	38	33	50	37	32
Mon 02/10/2023	04:45	47	37	33	50	35	31
Mon 02/10/2023	05:00	50	39	35	50	36	33
Mon 02/10/2023	05:15	54	41	36	65	40	34
Mon 02/10/2023	05:30	56	43	38	64	45	36
Mon 02/10/2023	05:45	49	41	36	48	38	34
Mon 02/10/2023	06:00	60	42	38	48	39	36
Mon 02/10/2023	06:15	53	43	40	64	45	37
Mon 02/10/2023	06:30	57	44	41	69	46	40
Mon 02/10/2023	06:45	60	48	42	67	46	39
Mon 02/10/2023	07:00	93	67	46	71	52	42
Mon 02/10/2023	07:15	84	68	60	77	53	45
Mon 02/10/2023	07:30	84	67	58	72	52	45
Mon 02/10/2023	07:45	83	67	58	67	48	43
Mon 02/10/2023	08:00	83	66	58	74	52	42
Mon 02/10/2023	08:15	83	65	57	70	47	40
Mon 02/10/2023	08:30	72	59	56	80	54	39
Mon 02/10/2023	08:45	77	61	56	77	52	38
Mon 02/10/2023	09:00	88	67	54	71	47	39
Mon 02/10/2023	09:15	84	64	53	77	53	39
Mon 02/10/2023	09:30	84	64	56	61	43	38
Mon 02/10/2023	09:45	86	66	54	70	46	38
Mon 02/10/2023	10:00	83	65	55	70	46	37
Mon 02/10/2023	10:15	92	70	53	66	46	38
Mon 02/10/2023	10:30	92	69	54	64	46	37
Mon 02/10/2023	10:45	90	64	55	73	47	37
Mon 02/10/2023	11:00	84	68	54	66	46	38

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Mon 02/10/2023	11:15	83	66	58	74	47	38
Mon 02/10/2023	11:30	84	66	54	78	48	37
Mon 02/10/2023	11:45	88	74	59	79	49	40
Mon 02/10/2023	12:00	89	68	48	72	50	43
Mon 02/10/2023	12:15	89	71	55	68	48	44
Mon 02/10/2023	12:30	85	67	56	65	46	38
Mon 02/10/2023	12:45	87	71	56	67	47	38
Mon 02/10/2023	13:00	86	68	57	78	49	40
Mon 02/10/2023	13:15	84	65	52	69	45	38
Mon 02/10/2023	13:30	83	66	53	66	46	37
Mon 02/10/2023	13:45	92	67	56	69	44	39
Mon 02/10/2023	14:00	81	61	52	61	45	40
Mon 02/10/2023	14:15	84	66	51	61	45	39
Mon 02/10/2023	14:30	84	63	54	61	44	39
Mon 02/10/2023	14:45	80	64	54	73	46	38
Mon 02/10/2023	15:00	81	61	48	63	44	38
Mon 02/10/2023	15:15	82	63	51	65	44	37
Mon 02/10/2023	15:30	81	61	45	73	49	37
Mon 02/10/2023	15:45	80	55	45	76	50	38
Mon 02/10/2023	16:00	86	71	48	76	60	44
Mon 02/10/2023	16:15	87	71	51	67	54	40
Mon 02/10/2023	16:30	80	65	56	69	53	39
Mon 02/10/2023	16:45	70	59	55	55	42	38
Mon 02/10/2023	17:00	100	68	54	58	43	37
Mon 02/10/2023	17:15	74	57	52	64	42	37
Mon 02/10/2023	17:30	86	58	53	68	45	39
Mon 02/10/2023	17:45	101	75	55	74	47	41
Mon 02/10/2023	18:00	74	62	49	59	43	39
Mon 02/10/2023	18:15	69	52	49	56	42	38
Mon 02/10/2023	18:30	84	62	49	67	47	38
Mon 02/10/2023	18:45	104	79	72	68	46	42
Mon 02/10/2023	19:00	100	72	49	64	48	40
Mon 02/10/2023	19:15	77	56	50	56	41	37
Mon 02/10/2023	19:30	79	58	50	58	39	35
Mon 02/10/2023	19:45	85	65	45	64	44	36
Mon 02/10/2023	20:00	76	50	37	67	42	37
Mon 02/10/2023	20:15	60	41	39	60	43	39
Mon 02/10/2023	20:30	56	42	39	55	44	40
Mon 02/10/2023	20:45	65	44	40	58	45	41
Mon 02/10/2023	21:00	56	43	39	55	44	41
Mon 02/10/2023	21:15	57	42	38	55	43	39

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Mon 02/10/2023	21:30	53	41	38	55	41	38
Mon 02/10/2023	21:45	52	41	37	52	40	36
Mon 02/10/2023	22:00	55	41	33	57	40	33
Mon 02/10/2023	22:15	52	37	32	56	37	33
Mon 02/10/2023	22:30	54	37	32	54	36	33
Mon 02/10/2023	22:45	49	34	31	49	34	31
Mon 02/10/2023	23:00	49	37	32	53	38	31
Mon 02/10/2023	23:15	50	40	36	60	48	39
Mon 02/10/2023	23:30	52	42	40	61	52	48
Tue 03/10/2023	23:45	60	42	39	58	50	46
Tue 03/10/2023	00:00	68	45	37	60	47	42
Tue 03/10/2023	00:15	60	41	37	62	48	41
Tue 03/10/2023	00:30	48	39	37	57	45	40
Tue 03/10/2023	00:45	51	41	37	58	46	41
Tue 03/10/2023	01:00	54	40	36	56	46	40
Tue 03/10/2023	01:15	51	41	36	64	49	40
Tue 03/10/2023	01:30	62	46	41	66	53	45
Tue 03/10/2023	01:45	60	46	38	65	53	42
Tue 03/10/2023	02:00	60	45	39	62	51	42
Tue 03/10/2023	02:15	69	44	37	57	46	41
Tue 03/10/2023	02:30	59	42	38	65	49	43
Tue 03/10/2023	02:45	58	44	40	64	52	45
Tue 03/10/2023	03:00	56	41	37	58	48	41
Tue 03/10/2023	03:15	68	46	34	59	45	37
Tue 03/10/2023	03:30	45	36	32	53	42	36
Tue 03/10/2023	03:45	58	44	33	55	44	37
Tue 03/10/2023	04:00	59	46	41	56	46	41
Tue 03/10/2023	04:15	58	42	34	53	39	34
Tue 03/10/2023	04:30	62	41	35	58	40	34
Tue 03/10/2023	04:45	47	37	34	48	37	34
Tue 03/10/2023	05:00	50	41	37	51	40	36
Tue 03/10/2023	05:15	52	43	38	54	42	38
Tue 03/10/2023	05:30	57	46	42	57	47	41
Tue 03/10/2023	05:45	64	46	42	67	48	43
Tue 03/10/2023	06:00	58	46	42	68	48	41
Tue 03/10/2023	06:15	60	48	44	60	48	44
Tue 03/10/2023	06:30	59	47	44	64	48	43
Tue 03/10/2023	06:45	73	54	45	68	48	43
Tue 03/10/2023	07:00	93	67	58	65	47	45
Tue 03/10/2023	07:15	79	60	49	79	48	44
Tue 03/10/2023	07:30	76	59	46	76	49	44

Date	Time (Start)	UM1 L_{AFmax}, dB	UM1 $L_{Aeq,15min}$, dB	UM1 $L_{AF90,15min}$, dB	UM2 L_{AFmax}, dB	UM2 $L_{Aeq,15min}$, dB	UM2 $L_{AF90,15min}$, dB
Tue 03/10/2023	07:45	70	56	49	63	47	44
Tue 03/10/2023	08:00	71	52	49	72	52	44
Tue 03/10/2023	08:15	80	62	48	73	48	44
Tue 03/10/2023	08:30	86	61	49	59	46	43
Tue 03/10/2023	08:45	-	-	-	71	49	44
Tue 03/10/2023	09:00	-	-	-	64	46	44
Tue 03/10/2023	09:15	-	-	-	69	47	44
Tue 03/10/2023	09:30	-	-	-	61	49	45
Tue 03/10/2023	09:45	-	-	-	60	50	48
Tue 03/10/2023	10:00	-	-	-	69	49	46

REPORT END