Environment Agency | Department of the Environment | Natural Resources Wales

Guidance

Method implementation document (MID) for BS 4142

Updated 22 December 2023

Applies to England, Northern Ireland and Wales

Contents

Bibliography Standards publications

This publication is available at https://www.gov.uk/government/publications/method-implementation-document-mid-for-bs-4142/method-implementation-document-mid-for-bs-4142

National and international standards sometimes need supporting ‘Method implementation documents’ (MIDs) to make sure they are followed consistently. MIDs explain how to use the standards and guidance for regulatory monitoring when you are applying for a permit or complying with permit conditions.

The Environment Agency, Natural Resources Wales and Northern Ireland Environment Agency have produced this guidance to help holders and potential holders of permits. When we use the term ‘environment agencies’ in this guidance we mean these 3 organisations.

This MID supplements BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound (BS 4142).

You must follow the requirements in this MID if you are:

- applying to the environment agencies for a new environmental permit or applying to vary an existing permit
- sending sound monitoring and assessments to the environment agencies – you must also follow the requirements of BS 4142 and the guidance Noise and vibration management: environmental permits (https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits)

The section numbers in this MID follow the clause numbers of BS 4142. This document does not repeat text from the standard or re-state all its provisions. It just provides extra guidance where needed.

BS 4142 is the authoritative document and you must read and comply with all its requirements. If there is a dispute, the accreditation body will decide how to resolve it.

1. Scope

1.1 The environment agencies require operators to assess industrial sound (and sound of an industrial nature) following BS 4142 – where appropriate and relevant.

BS 4142 is a method to assess the impact on humans in residential premises.

It is appropriate for assessing sound levels outside a building that are from:

- industrial premises, manufacturing premises or fixed installations

- mobile plant, vehicles, train or ship movements within the permit boundary

It is not appropriate for:

- any non-human receptors, including bats, birds or other protected species
- non-residential premises such as offices, schools, churches or outdoor areas such as recreational parks, gardens or sports grounds

1.2 The term ‘outside a building’ does not just apply to external gardens or land, it applies to balconies and outside any room where occupants would expect or need quiet – studies, bedrooms, sitting rooms. If there is no clear evidence that a room is unoccupied, you must presume that it is, for example an attic window.

1.3 You must use BS 4142 to investigate complaints.

You must also use it to assess sound from industrial or commercial sources that are:

- existing
- proposed
- new
- modified
- additional

You must also use it to assess sound at proposed new dwellings or premises used for residential purposes.

You must not use the standard to assess whether sound amounts to a noise nuisance. That is not within the scope of BS 4142.

You should not use BS 4142 to assess impact from vehicles or fixed installations that are outside of a site’s permitted boundary. For example, if a waste wagon drives to a site, while it is outside the permitted boundary the sound is ‘road noise’ and is covered by planning or nuisance. Once it is inside the permitted boundary, it is part of the commercial or industrial sound.

2. Normative references

If you are using a soundscape assessment to work out context as part of the BS 4142 assessment, then you should also refer to the following documents:

- ISO 12913-1:2014, Acoustics — Soundscape — Part 1: Definition and conceptual framework.
- ISO/TS 12913-2:2018, Acoustics — Soundscape — Part 2: Data collection and reporting requirements.
- ISO/TS 12913-3:2019, Acoustics — Soundscape — Part 3: Data analysis

3. Terms and definitions

You should round all character corrections to the nearest whole decibel – round up a value of 0.5.

3.1 acoustic environment

Note the updated reference to BS ISO 12913-1:2014.

3.2 to 3.12

No additional comments.

4. Preparation

You can find comprehensive guidance on context in Noise and vibration management: environmental permits (https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits). Soundscape is an important aspect of context and your assessment should follow the principles of the ISO 12913 series.

5. Instrumentation

5.1 General

You must measure equivalent continuous sound levels in terms of LAeq,T. Use an integrating-averaging sound level meter which conforms to class 1 (or better) of BS EN 61672-1.

You must not visually average the indication of a sound level meter under any circumstances.

To measure background sound level, LA90,T, you must use an integrating-averaging sound level meter which conforms to class 1 (or better) of BS EN 61672-1.

5.2 Verification

You must include valid calibration certificates in each report.

6. Measurement procedure

6.1 Field calibration check

You should carry out additional calibration checks during monitoring, and if you have turned the equipment off and on during measurement.

You must note and report calibration checks, including the offset, the offset change and the field calibration result. You must report values to 1 decimal point. It is not acceptable to just report that there was no significant drift.

6.2 Measurement locations

You should choose outdoor measurement locations to give results that are representative of the ambient sound and residual sound at the assessment locations. If you use a garden as the measurement location, it should be close to the existing or future residence. You must include photographs, sketches, or street maps of the actual monitoring locations. Generic photographs of a sound level meter (SLM) are not acceptable.

6.3 Precautions against interference

During measurements, you should stand away from the microphone where possible. This is so you:

- do not screen sounds from a source
- reduce the risk of sound reflections caused by the body in the immediate vicinity of the microphone
- do not make sounds that could influence the measurement

You can use shielded extension cables between a microphone and a SLM to reduce the undesirable effects of screening and reflections. The cables should be as short as reasonably practical and should be part of the calibration chain. Alternatively, the operator can control the SLM and take readings remotely with a mobile phone app if supplied by the SLM developer. You must report details of the app used.

6.4 Weather conditions

You must fully report weather conditions. You may need to perform measurements in a range of conditions. The weather conditions must be the same during ambient sound and residual sound measurements, particularly wind speed and wind direction. In situations where meteorological conditions are likely to affect sound levels you must follow one of the approaches described in BS 7445-1.

You must measure wind speed and wind direction at the monitoring location using a hand-held anemometer or logging weather station. You must report both wind speed and direction. Cup anemometers are more accurate than fan anemometers for erratic wind directions.

During attended measurements, you should log the wind speed and wind direction:

- at the start
- every 15 minutes during the measurement period
- at the end

You should note any events like gusts or changes in wind direction. For unattended monitoring, you must use a logging weather station.

Meteorological data from a third-party weather station is not acceptable, even if local. You must assess weather at the microphone location and monitor it in real-time. You must not use weather archive websites (for example, wunderground.com) to report weather conditions

You should not use specific, residual or background sound measurements taken during or immediately after rainfall. The SLM operator must wait until any standing road water has disappeared before starting acoustic monitoring.

You must use microphone windshields for every acoustic measurement.

7. Specific sound level

7.1 General

No additional comments.

7.2 Reference time interval

You must not measure during the most unfavourable reference time interval and claim it is representative of the whole day or night period. For example during rush hour, or during late evening when traffic or other sound sources can still be heard.

7.3 Determination of the specific sound level

7.3.1 You must take care to avoid or minimise the influence of other sound and other factors that may affect the results, such as:

- wind induced noise (directly on the microphone and indirectly on trees)
- reflections from buildings
- sound from pumps or wind chimes

The character of these sound sources may make it difficult, or even impossible, to carry out any corrections.

7.3.2 to 7.3.4 No additional comments.

7.3.5 If the residual sound pressure level is less than 3dB below the measured ambient sound pressure level, this will significantly affect your

assessment of the specific sound level and the measurement uncertainty will be large.

You may still report the results and they may be useful for working out an upper boundary to the sound pressure level of the specific source under investigation. But you must clearly state in the text of the report, as well as in graphs and tables of results, that you have not met the requirements of this test method.

If the residual is above the measured ambient you should investigate the reason and you must repeat the measurements.

7.3.6 If the residual sound pressure level is more than 3dB below the ambient sound pressure level, you can deduce the specific sound level by decibel subtraction.

You work out the specific sound level by applying the procedures in section 7.3 and in Annex A of the standard. You do this by using measurements or calculations, or a combination of both. You should take care to reduce uncertainty, as described in sections 10.2 and 10.3.

The preferred method of BS 4142 is to measure the ambient and residual sound levels at the assessment location and work out the specific sound level from these measurements. In some situations this is not possible, for example:

- because the difference between the ambient sound level and the residual sound level is less than 3 dB
- where new industrial plant is not in operation yet
- if the specific sound cannot be switched off

In these cases it is possible to either use a proxy location, or work out the specific sound level through measurements and calculations, depending on the situation.

You should avoid using the manufacturer’s data for a plant item or machine. You should only use this if the plant or machine is not in operation yet or where other methods are deemed not possible. You must provide clear justification for the method you used to work out the specific level.

Specific sound level from measurements of the ambient and residual levels:

If you use the ambient and residual sound level at the assessment locations to determine the specific sound level you must measure:

- over representative measurement duration periods
- during similar meteorological conditions

- during the same season

If you pause during ambient sound measurement, for example, for passing cars or nearby voices, you should use the same pausing approach during the residual sound measurement. You must justify and report any pausing.

If a specific sound source would only operate during rush hour periods and it is located next to a busy road, it would be unreasonable to pause each time a car passes the assessment location. Similarly, you must not pause for every passing aircraft if the site is located under a flightpath or close to an airport. You should consider constant sound sources to be a typical element of the acoustic environment.

The measurement period must be representative of the period when the specific sound source is audible.

You should round all measured sound levels to the nearest whole decibel. In practice, it would be appropriate to also round any propagation predictions to the nearest whole decibel. The measurements and predictions should not be unrealistically precise.

Specific sound level from surrogate measurement locations

Measurements made in a surrogate location are acceptable where you can demonstrate that the fundamental acoustic characteristics of the surrogate location are similar to the original location under investigation, for example:

- the residual sound sources at the surrogate location are similar to the original receptor location
- the surrogate microphone location is at a similar elevation and over similar terrain to the original receptor location
- any screening effects between the surrogate microphone location, and between the receptor and non-specific sound sources making up the local sound climate are similar

You can find a good example in example 10 Annex A (subsection A.8) of the standard.

You cannot assume that the specific sound level of an industrial source already operating in one geographical location would be the same at a different location. This is true even if the distance between the source and the assessment location is the same. If you use levels from the same industrial plant that has been already installed somewhere else, you must justify why you have done so.

Determination of specific sound by a combination on measurements and calculations

If the specific sound source is already operating, measurements of the sound level rather than of sound power are preferable. This is because measurements of sound power on site pose a high risk of uncertainty.

The greatest sources of uncertainty include the:

- directivity of the sound source
- propagation mode
- mobile sources
- varying distance
- varying operational modes

You can find more details of uncertainty associated with near field measurements in section 10.1 of this MID document. Example 11 in Annex A (subsection A.9) of BS 4142 is a good example of how to work out the specific sound level by using both measurements and calculations.

It is essential that any alternative location (closer to the specific sound source) is on the propagation path between the specific sound source and the assessment locations.

Your calculations should use the procedures described in the ISO 9613-2 standard.

You should also take into account all screening effects and changes in elevation between the alternative and assessment locations.

You should only measure the ambient sound level at the alternative location (closer to the source) when industrial sound sources that are not part of your assessment have stopped, or when their influence is suppressed.

You should carry out separate measurements and calculations for each sound source if:

- the specific sound source combines different parts
- there are different moving sources at the site under assessment

You should do this because each of the sources will have different directivity or distance (or both) to the assessment location. If the location of a specific sound source is not stationary, you should carry out the assessment when the source is located at the most unfavourable location. This will typically be closer to the assessment locations and not screened by a barrier or other structures or equipment on site.

You must not carry out measurements of the specific sound level in the near field unless you can provide valid assumptions of a measurement surface area. For example, a parallelepiped for sound power determination (Lp + 10xLog (surface area)). If you are doing this you should follow a procedure

required by BS EN ISO 3744:2010 to work out sound power level in-situ. Otherwise, if you are using a single sound pressure measurement, you must meet the far-field conditions where hemispherical propagation can be assumed and provide proof of this.

Specific sound level from calculations

Working out the specific sound level by calculation alone is only acceptable when the source is not yet operating. If this is the case, give a detailed report of the method of calculation used and the reason for using it.

Appropriate data must consider the directivity of the sound source. Unweighted sound power levels in full octave bands or one-third octave bands covering the frequency range between 32Hz – 8kHz would be expected. You can use sound power data from the manufacturer or it can be measured using appropriate standards. If you are using sound power data from the manufacturer, establish how the data was obtained and what standard was followed.

You must apply appropriate propagation methods and justify their use when using sound emission data to calculate specific sound level at the assessment locations. You should take care when using generic source data from BS 5228 as these figures can be inaccurate and only contain broadband values in dBA. Doing this presents a much higher degree of uncertainty which you will need to report, and you will need to consider the risk to the overall assessment outcome.

You must round any propagation predictions to the nearest whole decibel. Measurements and predictions should not be unrealistically precise.

It is important to note that this MID does not address using noise modelling software to predict specific sound levels. Noise modelling is not within the scope of this MID and will be covered by a separate, dedicated MID.

7.3.7 to 7.3.15 No additional comments.

8. Background sound level

8.1 General

Background sound levels should be recent. If you are using older data you must fully justify that it is representative.

8.2 Proposed, new, modified or additional specific sourcess

You must not include existing site sounds in the background sound or residual sounds when assessing the impact of new or modified sources on site. During measurements, all site activities should be reduced to a level where they no longer contribute to the LA90, T and where they cannot be heard at the measurement location.

If sound from a site increases, you must consider ambient sound as all sound from the site, not just the new or increased portion. The background sound level must not include any sound from the site.

8.3 Existing specific sources not operating continuously

No additional comments.

8.4 Existing specific sources operating continuously

Whenever possible, encourage the operator to temporarily stop the source operating. Alternatively, use a surrogate monitoring position and justify this.

8.5 Introduction of a new noise sensitive receptor

You must not use BS 8233 to assess noise pollution from an industrial or commercial sound. BS 8233 is a method to identify sound insulation requirements from constant sound sources such as traffic or railways. It does not take into account any acoustic features such as:

- tonality
- impulsivity
- intermittency
- other distinguishable features usually associated with industrial and commercial sound sources

You should consider any proposed new noise sensitive receptors and any planning applications that have been granted. Additionally, if reductions in

background sound are likely in the coming years, for example due to expected changes to road use or layout, you should also take these into account in the assessment.

8.6 Precision when reporting a sound level measured

No additional comments.

9. Rating level

9.1 General

You can only add character corrections where the acoustic feature is audible at the receptor, not at a location closer to the source or at an artificially quieter time.

You should round any character corrections to the nearest whole decibel.

You must apply character corrections using simple linear addition. You must add all corrections regardless of the scale of each individual correction. Character corrections are added to the specific sound level and not the residual sound level.

The calculated methods are designed to replicate human hearing. This includes both the objective and reference methods to assess tonality and the prominence of impulsivity. If the calculated methods do not match human observations, then the observations should take priority over the calculations and this decision should be fully explained. You should only rely on the calculated methods when your observations are ‘insufficient’.

Comparing the rating level to the background sound level gives an indication of impact, depending on context. You should include a comprehensive subjective description of context, particularly if the numerical assessment indicates an adverse or significantly adverse impact, but subjectively it falls in a much lower category of impact.

A +5 dB difference may not be acceptable if it is likely that other future developments will add to ambient sound levels. This can lead to so-called ‘creeping background’. More correctly, this is creeping ambient sound as the

LAeq,T is more likely to be influenced than the LA90,T. This is a concern that sometimes arises around developing industrial areas. This concern can be valid in some cases, but in others it may not be so serious.

Creeping ambient or background sound levels occur where a series of developments or changes at a site cause incrementally small or insignificant increases in ambient (LAeq,T) or background (LA90,T) sound levels (or both). Examples could be:

- as additional new air handling units appear on the outside of an existing building
- a new scheme incorporating sound generating activity is proposed for a location with existing industrial sound sources

While the new units may be regarded as individually having a negligible impact when rated using the BS 4142 methodology, the collective effect may be that they contribute towards an upward ‘creep’ of ambient and background environmental sound levels.

The Environment Agency standard rules permit condition requires operators to prevent noise, and where that is not possible, to minimise it. There is no single level that is acceptable (such as +5dB over background), rather there is a sliding scale of pollution severity that should be as low as is reasonably practicable.

For a proposed new site, you should use the subjective method if a new specific sound source is not active yet. You can assess the character correction based on:

- spectral power emission data
- duration of a proposed sound source
- the nature of the industrial or commercial process
- equipment type and operating pattern

9.2 Subjective method

There must be a full description of what can be heard during the assessment and measurement period.

Commentary on 9.2

Tonality

When subjectively applying a correction for tonality of the specific sound, assess the character of the tone in the context of the acoustic environment as follows:

- is it masked by, or similar to, other sources?
- does it have distinguishing features?

The objective (one-third octave) and reference (FFT based) methods may not correctly identify some tones, particularly moving or intermittent tones. These methods should only be used when the subjective method is insufficient.

Impulsivity

You should assess the impulsivity of the specific sound source in the context of the acoustic environment. You should make a distinction between highly impulsive sound sources and regular impulsive sound sources.

Highly impulsive sound sources include:

- hammering on metal or wood
- nail guns
- drop-hammer
- pile driver
- drop forging
- punch presses
- pneumatic hammering
- pavement breaking
- metal impacts

Intermittency

You may add a +3dB correction if the specific sound has an identifiable on or off character. However, the impact of intermittency greatly depends on the speed of the on or off phases and duration of the on period. For example, a sound which switches on and off every second would be more intrusive than a sound source which runs for 20 minutes every hour.

For a slowly intermittent source (like a temperature triggered cooling fan running continuously for 20 mins per hour) it is best to only measure the ambient sound level when the specific sound source is on. You should then correct the specific sound level for the greatest expected on time (see example 7.3.14 & A.4 in BS 4142).

In some circumstances intermittency can add a level of annoyance to a sound beyond +3dB. If you add a correction of more than 3dB, you must

provide a detailed justification.

Other source characteristics

Where an acoustic feature that could be described as a whine, hiss, screech, non-tonal hum, rattle or rasp is present, you must apply the other sound character correction of +3dB, or greater if justified. You should ideally illustrate the correction with a spectrogram or by using descriptive psychoacoustic parameters.

9.3 Objective methods

9.3.1 General

Both methods require frequency analysis at one-third octave band resolution or finer – narrow band Fast Fourier Transform (FFT) to objectively demonstrate tones or tonality.

9.3.2 One-third octave method

No additional comments.

9.3.3. Reference methods – tonality

To identify tones using the reference method you usually need to use dedicated software applied to the audio signal recorded on site. You must listen to the recorded sounds to verify that the tone the software has found is from the site under investigation. It is also important to identify a period when the tone is prominent – if it is less than the reference interval (1 hour in the day) then you may apply a lesser correction proportionate to the duration.

In certain circumstances (for example if dedicated software is not available) you can identify tonality and apply correction as follows.

1. Listen for a tone on the audio recording and check it is from the source under investigation.

2. Assess the tone using one-third octaves (using the side band method).

3. If it passes the one-third octave criteria, apply a 6dB correction if the tone is always present.

4. If the tone is not always present, or fails the one-third octave criteria, then apply a lesser subjective correction.

If the one-third octave method fails to identify a prominent tone but a tone is still audible, it does not mean that the specific sound source is not tonal. It just means that it is not prominently tonal (and will require a lesser or subjective penalty).

9.3.3. Reference methods – impulsivity

You should only assess impulsivity using the reference method at the receptor location. You must not measure the prominence of the impulsive features closer to the source or deduct it from the source data and then replicate it back to the receptor.

Annex E of the standard has a detailed method for assessing impulsivity that you can easily apply using a calculation spreadsheet. You can also use dedicated software.

If you do use software, it is important to record the audio file alongside the SPL measurements. You must then listen to 10 most prominent events in the reference period to check they are from the site. It is important to eliminate mid and high frequency events (like bird song) from the analysis as these can result in false impulsivity identification. You should always check the calculated corrections with a subjective assessment. If the subjective assessment does not agree with the results from the software, use the subjective assessment. You should ament the results of the calculations and explain this in the report.

There is also a risk that the reference method can overestimate the prominence of short mid frequency events (like clicks). Very short duration clicks can result in corrections of +9dB compared to massive crashes resulting in corrections of +5dB. This is due to the lower frequencies and slower onset rates. So, the measurement should support the perception, not the other way round.

To assess the prominence of impulsivity, analyse the most notable impulses within a 30 minute segment using a reference method, and then assess the rest subjectively. As the correction is based on the strongest event (Pmax), there is no need to assess lesser events

Assessing more impulses over a longer period can help reduce the uncertainty if the correction could affect the assessment outcome.

10. Uncertainty

10.1 General

Every measurement and prediction has an element of uncertainty associated with it. Although quantifying uncertainty is difficult, you should focus on minimising uncertainty rather than trying to give it a number. The uncertainty associated with measurements and predictions does not necessarily mean they are incorrect. It just means they may not accurately represent the whole truth. Understanding these uncertainties is critical when making assessments of impact.

The uncertainty associated with the measuring device is the typically the smallest and least important source of uncertainty in the assessment, if you use the device properly and calibrate it regularly.

10.2 Uncertainty of measured values

If you are measuring the sound power level of the specific sound source, you should follow the methodology of an appropriate standard. You should present the calculations and measurements in full and justify their use.

The most common ways of measuring sound power level would be through measuring near field sound pressure level or intensity and then applying engineering methods for sound power level calculations. The potential sources of uncertainty associated with sound pressure level measurements in the near field are as follows:

- distance
- directivity
- operating duration
- different machine operators
- different materials
- other sound sources
- measurement period
- weather conditions

When measuring near field sound level close to a plant or machine, it is almost impossible to know the exact distance between each individual sound source and the measurement location. However, a misjudgement of just 1m out of a 10m distance would bring an error of +0.8dB(A) to

-0.9dB(A). You should use a laser meter or a tape measure to accurately measure distance.

The directivity of a sound source, in relation to the position of the SLM and noise sensitive receptor, is potentially the second greatest uncertainty associated with the measurements.

An error in how long a sound source operates for is the third quantifiable source of uncertainty. An error of 30 mins from 1 hour per day, averaged over an 8-hour day, would result in an uncertainty of +1.7dBA to – 3dBA (+0dBA to -3dBA if kept to a 1 hour reference interval).

Different machine operators or drivers tend to use machinery in different ways – using higher revs or different handling methods. Machine operators may also work in a quieter way when they know they are being observed and measured. The level of the uncertainty that this might introduce is a big unknown, but ±5dBA could be expected. This is bigger than the values above.

Different materials used in the operations, for example on the conveyor of a recycling plant affects the sound emission of the plant. To reduce uncertainty, you should make your measurement intervals long enough to catch the different materials processed.

If other sound sources on site have not been switched off (other than the specific source under the assessment) they would also contribute to the measurement.

The uncertainty due to measurement interval will depend on the character of a specific sound source, but generally longer monitoring periods (over several days) provide more reliable data. The uncertainty is highest when the monitoring periods are short and when the sound source is erratic or variable.

Sound levels are affected by meteorological conditions, especially when the transmission distance is large. The uncertainty due to weather conditions can be significant.

The uncertainty for far field measurements is generally the same as those listed for the near field measurements. However, the uncertainly due to directivity may be less prominent, particularly for distances when the spherical pattern of directivity becomes dominant.

The following measures could prevent or minimise measurement uncertainty (both in near and far fields):

- careful distance measurements to the sound source
- measuring on the propagation pathway if possible (directivity)

- greater distances to the source (creates a point source for far field measurements)
- operating diaries to establish typical usage
- strict operating procedures for plant use
- longer measurement durations (representative)
- multiple measurements of each source
- measurements of ambient, residual and background (and specific where appropriate) sound level under the same weather conditions

10.3 Uncertainty in calculations

If you use modelling software to predict specific sound level, it is very important that you provide the assumptions made during the modelling. The guidance Noise impact assessments involving calculations or modelling (https://www.gov.uk/guidance/noise-impact-assessments-involving-calculations-or-modelling) gives the minimum requirements for submitting reports containing modelling and predictions.

Where you have used the sound power level for calculating sound pressure levels, the source data should be representative of the conditions under which it is expected to operate.

You should consider weather conditions at the proposed site and apply the least favourable weather conditions. For example, a site located at the coast may typically experience high wind speeds, which may increase the specific sound level. Alternatively, the wind direction may also increase the background sound level and therefore reduce the calculated level of impact.

If it is not possible to predict the uncertainty of modelling associated with weather conditions, you may need to carry out post-evaluation and verification during the operation phase of the site to reduce risk of underestimating the impact.

11. Assessment of the impacts

Taking into account the context in which sound occurs is an important part of a BS 4142 assessment. The guidance Noise and vibration management: environmental permits (https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits) provides a list of what you could consider as context. However, it is important to bear in mind that it is not an exhaustive list as many elements could make a context more (or less)

sensitive. If you change the assessment outcomes based on context, you must provide a full justification for this. You should consider the following issues while making decisions about context:

- what the sound ‘means’
- weekdays versus weekends
- time of day
- the absolute level of sound
- where the sound occurs
- new industry or new residences
- intrinsic links between the source and receptor
- local attitudes
- the residual acoustic environment
- the land use at the receptor (for example, gardens versus yards)
- the exceedance (traditional BS 4142)
- plus whatever else might be particular to that individual situation

You should also assess more sensitive context versus less sensitive context, including but not limited to the following.

More sensitive

This could be:

- more houses
- antisocial hours
- weekends
- well used amenity area (private rear gardens)
- natural soundscape
- high absolute levels of pollution
- meaningful sound – one that has an unpleasant meaning beyond its acoustic content, for example
- new industry
- highly sensitive receptor

Less sensitive

This could be:

- more industry
- 9am to 5pm
- weekdays only
- rarely used amenity area (open front gardens)
- polluted soundscape
- low absolute levels of pollution
- bland sound
- long-standing industry
- less sensitive receptor

To assess context you need to experience the sound in the same way that the receptor would. It goes beyond simple data analysis and decibels. You need to listen and form a subjective view of the sound, as the receptor might. You should use experience and professional judgement to inform your interpretation of the raw numbers.

In addition, you should use the assessment of soundscape as a tool to help you objectively demonstrate context. An assessment of soundscape should follow the methodology in the ISO BS 12913 series.

If an industry has been contributing to the overall acoustic environment, and that industry is an intrinsic part of the local community, then you should consider this as an element of context.

12. Information to be reported

Section 12 of BS 4142 describes the information you must provide in a report.

Where appropriate, the environment agencies require you to include the following information in your report.

Introduction

This should include:

- aims, objectives and scope of the report
- author and assessor’s names, qualifications, and contact details

Sources under investigation

These should include:

- a description of sources and of sound emission – either as sound power level or sound emission at a stated distance
- the hours of operation of the scheme overall and the individual sound sources
- the mode of operation (for example, continuous, twice a day, only in hot weather)
- a description of the premises in which the source is situated (if applicable)
- the spatial relationship to the nearest noise sensitive receivers

Subjective impressions

These should include the:

- dominance or audibility of the specific sounds from the operation
- main sources not associated with the operation that contribute to the underlying (residual) sound, and their distance and direction from the measurement location

The existing context

This should include an assessment of the receptor’s sensitivity.

A description of the operation

This should include the:

- site and location of measurement positions
- distance of the measurement positions from the specific sound sources
- make-up and topography of the intervening ground
- distances from the specific sound source and any reflecting surface other than the ground – including a dimensioned sketch with a north marker

Details of the sound measuring instruments and calibrator

This should include the:

- type
- manufacturer
- serial number
- details of the latest verification test including dates
- reference level of the calibrator
- meter reading before and after measurements taken with the calibrator applied

Description of premises likely to be affected

This should include:

- a physical description of the spatial relationship to the source, for example, distance and bearing
- the presence of any intervening screening, for example, buildings
- the site’s use for example, residential, commercial or educational
- an assessment of noise sensitivity, for example, low, medium or high

Weather conditions

Describe the conditions at each measurement location, including:

- wind speed and direction
- presence of any conditions likely to lead to temperature inversion (for example, calm nights with little cloud cover)
- precipitation
- fog
- temperature
- humidity

Date and time of measurements

This should include:

- measurement time intervals

- whether the monitoring was attended or unattended

Sound levels

This should include:

- sound indices – include a definition and justify your selection
- the measurement interval – justify your selection
- the residual sound level and the method you used to work this out
- the ambient sound levels and the method you used to work this out
- the specific sound level and the method you used to work this out
- a justification of why you used particular methods
- details of any corrections you applied
- the ranking of the specific sound levels (with applied corrections where appropriate) at each assessment location

Background sound levels and measurement time intervals

If measurements were taken at an equivalent location, give the reasons for presuming the location is equivalent.

Rating levels

This should include:

- specific sound levels
- any acoustic features of the specific sound
- rating levels

Impact assessment methodology and selected assessment criteria

This should include:

- the excess of the rating level over the measured background sound level and the assessment
- the assessment criteria you used – justify why you selected them
- an appraisal of the change in sound level summary of relevant impact assessment methodologies
- an assessment of soundscape where appropriate
- a discussion of any limitations to the methodology and assessment criteria you applied

Recommendations on noise mitigation measures (where appropriate)

Recommended noise mitigation measures should start from the most audible or dominant at the assessment location sound source.

You should include:

- details of how effective each proposed noise mitigation measure is when applied to each most audible or dominant source at the assessment location – quantify this in terms of decibels level reduction
- a justification to show that mitigating a most audible or dominant source will not result in another, less audible source becoming audible, for example, due to the reduced masking effect
- a robust cost-benefit assessment of each proposed noise mitigation measure – present each one as an estimated cost, an estimated sound reduction (dB for each £) and as a feasibility assessment

Summary

Also include a summary section in your report.

Annex A (informative)

Examples of how to use the standard to obtain ratings.

A.1 to A.5

We have no comments on the following:

- A.1 Example 1: Hums: General acoustic feature correction
- A.2 Example 2: Sound to be rated does not significantly exceed the background sound
- A.3 Example 3: Effect of residual sound
- A.4 Example 4: Sound is intermittent and cyclic
- A.5 Example 5: Sound being investigated being louder than residual and background sound level, which cannot be measured at the assessment location

A.6 Examples 6, 7 and 8: Intermittent sound source close to dwellings

A.6.1 Example 6: Intermittent sound source operating at night potentially affecting residents indoors, A1 and producing a relatively low sound level within slight tonality or impulsivity outdoors, but not significant acoustically distinguishing characteristics indoors A1.

Table A.6 Results – Assessment indicates low impact due to plant noise at the receptor.

In the Commentary column, the statement that residual sound within the dwelling will further mask sound from the plant is not justified or explained.

The BS 8233 limit has been misquoted as 35dB LAeq,T indoors for bedrooms at night-time. The correct limit is actually set in the standard as 30dB LAeq,T.

Note that the limits set in BS 8233 apply to all of these:

- external sounds entering a room from outside
- internal sounds being transmitted through the internal partitions
- internal sounds generated inside a room, for example, from mechanical ventilation

BS 8233 assumes that external sounds are constant sounds such as from traffic or railways. It does not take into account other distinguishable features that are usually associated with an industrial or commercial sound source, or any acoustic features such as:

- tonality

- impulsivity
- intermittency

The example assumes that an open window will provide 10dB sound reduction from outdoor to indoor without proper justification. NANR116 has demonstrated that the level of sound insulation of an open window depends on various parameters including:

- types of a window and frame
- glazing area
- degree of an opening
- directivity of a sound source outside
- angle of incident
- source and receiver locations
- other

The example states that no specific acoustic features are distinguishable inside the bedroom under the assessment. It is not acceptable to simply assume this without a clear justification, particularly in relation to low frequency sound that is a common sound from industrial or commercial plant.

A.6.2 to A.9

We have no additional comments on the following:

- A.6.2 Example 7
- A.6.3 Example 8
- A.7 Example 9: impulsive and intermittent sound acoustic feature corrections
- A.8 Example 10: the use of a surrogate measurement location
- A.9 Example 11: propagation corrections

Annex B to Annex E

We have no additional comments on these annexes.

Bibliography Standards publications

The standard provides a comprehensive list of references. For date references, only the edition cited applies. For updated references, the latest edition of the referenced document (including any amendments) applies.