UK Government

Updated Guidance for the Assessment and Rating of Wind Turbine Noise

Summary of consultation responses received and government response

Department for Energy Security and Net Zero (2026)

Contents

Executive Summary

Background

Technical guidance for the assessment of noise emissions from onshore wind turbines, known as ETSU-R-97[1], was published in 1996. Whilst a best practice addendum was published in 2013 and additional Government-commissioned research in 2016, the guidance itself has remained unchanged[2].

In 2023, an independent technical scoping review considered whether the guidance could be refreshed[3]. Government carefully considered the recommendations from the review, concluding that guidance would benefit from targeted updates. To update the guidance, government has worked closely with noise policy leads, academics and professionals at the Institute for Acoustics, expert acoustic consultants with experience in the field of wind turbine noise assessment, and wind industry acoustic engineers.

On the 4 July 2025, the government published the 'Updated Guidance for the Assessment and Rating of Wind Turbine Noise' consultation on GOV.UK. This consultation sought feedback on proposed updates and was published alongside the Draft Assessment and Rating of Wind Turbine Noise Guidance. The consultation closed on 29 August 2025. The content of the consultation is not repeated in full within this publication, therefore this document should be read together with the consultation document. This publication summarises the consultation responses received and outlines the government's position in response.

Overview of consultation proposals

The consultation sought views on two key areas of ETSU-R-97 identified by the independent technical scoping review: (I) noise limits and (II) the approach to controlling the impact of Amplitude Modulation (AM)[4]. It also sought views on other technical updates which aimed to deliver on the wider recommendations in the 2023 scoping review.

Noise Limits

The 2023 scoping review specifically recommended that noise limits during the night should not be higher (i.e. less stringent) than during the day. To achieve this recommendation, Government proposed the approach of a single 'limit'. This allowed for separate background noise measurements to be taken across day and night, and instructed developers and planning

[1] HM Government, The Assessment and Rating of Noise From Wind Farms, 1996.
[2] Institute of Acoustics, Good Practice Guide on Wind Turbine Noise, 2013. & HM Government, Review of the Evidence on the Response to Amplitude Modulation from Wind Turbines, 2016.
[3] WSP, Report for UK Government: A Review of Noise Guidance for Onshore Wind Turbines, 2023.
[4] Amplitude Modulation means the variation of sound level in time. This can describe blade swish, an inherent feature of wind turbine noise, or a more recently identified acoustic phenomenon where wind turbines make unusual intermittent sounds in some instances, which can be described as sounding like thudding or pulsing.

authorities to select a single 'limit' from these measurements to be applied across both periods. This single 'limit' was derived from the minimum of the day and night limit at each wind speed and applies at all times.

Additionally, government reviewed the specific decibel level (dB) limits set by the guidance. To balance opportunities for energy generation with the impact of noise emissions from turbines on the public, government proposed raising the lower value for the day-time noise limit range to 37 dB. This resulted in a day-time noise limit range of 37- 40 dB.[5]

Amplitude Modulation

The 2023 scoping review concluded that previous guidance did not adequately control for the impact of AM. It recommended updated guidance include advice for assessing and controlling the impact of AM, building on Government commissioned research published in 2016[6]. To deliver on this recommendation, government proposed that an AM character correction be included in updated guidance.

Other technical updates

A number of other technical updates were also proposed, which sought to deliver on wider recommendations made in the 2023 Scoping Review. Some of the technical updates included clarification on the interpretation of 'financially involved' receptors; developing further guidance on cumulative impacts; and providing example planning condition wording and associated technical notes.

Summary of responses to the consultation proposals

The government is grateful to those who have taken time to engage with the consultation. In total, 79 responses were received which answered at least one of the six questions in the consultation. Responses were received from a range of stakeholders, including Local Planning Authorities (LPAs), onshore wind developers, community groups, as well as members of the public. The government has carefully considered all views. Table 1 provides a breakdown of responses by respondent type.

Table 1: Consultation responses by respondent type

Respondent Type	Number of responses
Members of the public	36
Onshore wind developers (and related trade associations)	14

[5] For reference, 25dB is roughly equivalent to quiet breathing at 1 metre, while 50dB is comparable to a humming fridge at 1 metre.
[6] HM Government, Review of the Evidence on the Response to Amplitude Modulation from Wind Turbines, 2016.

Local Planning Authorities (LPAs)	10
Community Groups	6
Other	13

Noise Limits

Around one third of respondents supported the proposed single-limit approach. This included most LPAs, IOA members, and some members of the public. Supporters felt it would simplify assessments, improve enforcement, and provide better protection for residents at night. Around one tenth of respondents said they did not know. The remaining respondents opposed the proposal, citing a lack of evidence for moving away from the ETSU-R-97 framework. They also raised concerns about applying a single limit across periods with different background noise levels. Developers warned that a single limit could constrain future onshore wind development and reduce energy generation. Community groups highlighted the risk of continued noise nuisance, particularly at night.

There was limited support for raising the daytime lower noise limit to 37 dB. Only 14% of respondents supported the proposal, while around one fifth did not know. The majority opposed it, including the public, LPAs, community groups, developers and technical experts. Key concerns included increased complaints, impacts on amenity in low background noise areas, and disadvantages for larger schemes in cumulative scenarios. Those in favour considered the impacts to be limited and argued it could support increased generation if appropriate safeguards were applied.

Amplitude Modulation

Most respondents welcomed the inclusion of amplitude modulation (AM) guidance, particularly the clearer definition of AM and use of the Institute of Acoustics methodology. However, views were divided on whether the guidance was sufficient, with only around a fifth in agreement and around half considering it inadequate. Developers and technical bodies generally supported addressing AM at the compliance stage, noting it cannot be reliably identified during design, while community groups and some members of the public argued this placed undue risk on communities and called for earlier intervention or alternative measures. Respondents also expressed mixed views on the proposed penalties, with some calling for automatic mitigation to better protect residents and others warning that the proposed correction could lead to excessive curtailment and affect project viability, particularly where it interacts with site-specific noise limits.

Other technical updates

Overall, around half of respondents supported some or all of the technical updates, around a third opposed them, and the remainder were unsure. Responses covered a range of technical

updates, including wind speed references and assessment ranges, the approach to selecting the daytime lower limiting value, and the use of generation capacity or alternative metrics. Comments also covered the treatment of financially involved receptors, cumulative impact assessment, site-specific noise limits, and the calculation of character corrections. Further topics included the scope of guidance for small-scale wind, the presentation of case studies, and the clarity and application of example planning conditions.

Summary of the government response to the consultation

Noise Limits

The Government will retain separate daytime and night-time noise limits for onshore wind, consistent with ETSU-R-97. The daytime lower limit range will be set at 35–40 dB, with a night-time lower limit of 43 dB, measured at the noise receptor. The applicable noise limit at any given time will be determined as the greater of:

- a limit of 35 to 40 dB during the day or 43 dB at night; or
- a limit set at 5 dB above the background noise level at each wind speed.

The proposed single-limit approach will not be taken forward, reflecting consultation feedback and consideration of impacts on energy generation and residential amenity.

Amplitude Modulation

The Government will retain an amplitude modulation (AM) character correction in the updated guidance, supported by clearer wording. As AM cannot be reliably identified at the design stage, a compliance-based monitoring approach will be used, applying the Institute of Acoustics methodology, which is widely regarded as robust, practical and freely available. Alternative approaches, such as the IEC 61400 series, will not be referenced to ensure clarity and consistency. While views differed on whether the proposed controls provide sufficient protection, the Government considers that the 5 dB correction is supported by the available evidence and previous research, offering an appropriate balance between protecting residents and enabling continued onshore wind development.

Other technical updates

The Government updated the technical guidance in response to consultation feedback, making targeted wording changes to improve clarity and consistency. This included providing additional case studies to support selection of daytime noise limits. Further updates addressed the treatment of financially involved receptors, cumulative impacts and small-scale wind, including the introduction of a minimum capacity threshold for cumulative assessments. The guidance also retained and refined the approach to example planning conditions, character corrections and site-specific noise limits.

Noise limits

Aligning day-time and night-time noise criteria

Proposals

The 2023 Scoping Review specifically recommended that “controlling values for noise during the night should not be higher (i.e., less stringent) for night-time than during the day”. This was recommended due to the potentially increased prevalence of AM at night, which, combined with a higher noise limit, could increase night-time noise impacts compared with daytime. Additionally, the scoping review noted that the higher night-time limit is ‘unusual’ and appears to be unique to the UK and Ireland.

Whilst the draft updated guidance continued to allow for separate background noise measurements to be taken across day and night, to achieve this recommendation, it instructed developers and planning authorities to select a single ‘limit’ from these measurements to be applied across both periods. This single ‘limit’ is the minimum of the day and night limit at each wind speed and applies at all times. **Question 1** sought to gauge the level of agreement with this approach.

Summary of responses

In total, 97% of respondents answered this question. Around 10% of respondents stated that they did not know, while approximately one third agreed with the proposed approach of a single ‘limit’. The remaining respondents did not agree with the proposal, and several arguments were made to justify this position.

Some respondents raised concerns around the lack of evidence underpinning the proposed single limit approach. Developers, trade associations, and acoustic consultants noted that while the scoping review identified areas for further research, respondents were not convinced that sufficient additional work had been undertaken to justify such a significant move away from the approach set out in ESTU-R-97. Equally, they argued that no evidence had been presented to illustrate the impacts of new guidance on the potential for the UK to accommodate additional onshore wind developments. Some Institute of Acoustics members felt that the document was not clear on what basis (i.e. dose-response) that the single ‘limit’ was being proposed.

Respondents also argued that the original rationale for separate day and night limits set out in ETSU-R-97 remains valid. ETSU-R-97 limits aimed to protect residential amenity in the day, with night limits set to protect against sleep disturbance indoors, while taking into account the reduction in noise level from outside a building to inside. Equally, it was emphasised that the split day and night limits in ETSU-R-97 are consistent with established planning advice, World Health Organisations (WHO) guidelines, and British Standards such as BS4142 and BS8233.

The rationale for implementing a single limit was also questioned. Developers and trade associations questioned the justification for varying levels background noise, which differs across day and night, impacting a single limit which applies at all times.

Developers raised concerns that this approach could unnecessarily constrain at both daytime and nighttime. Several developers presented evidence to support this position. This consistently indicated that, for daytime generation, the proposed and existing noise limits were very similar up to a wind speed of around 8 m/s. Above this windspeed, daytime noise limits are constrained by low night-time background noise. For nighttime generation, evidence highlighted that the proposed approach would result in a reduction in night-time noise limits at low to medium wind speeds. Developers suggested that this could have a significant impact on generation and on the financial viability of future developments.

One developer commissioned a modelling and assessment exercise as part of their consultation response, comparing noise limit exceedances across wind speeds under the existing ETSU-R-97 methodology and the draft proposed guidance. The study found that the proposed approach would be more restrictive than ETSU-R-97, limiting generation even at times when noise impacts would otherwise be acceptable. However, it should be noted that this study misinterpreted elements of the draft guidance, particularly in relation to cumulative noise impacts. As a result, some of the noise limit exceedances identified would not arise if the draft guidance were applied as intended.

Civil society groups and members of the public mentioned noise nuisance to be an issue that would remain under the proposed draft guidance. These included concerns around noise being more intrusive in areas with exceptionally low background noise and concerns around potential health impacts of noise.

Approximately a third of respondents agreed with the new single limit approach. Most respondents who were in favour were LPAs, stating that it would simplify the application process and enforcement. A few also noted that taking the minimum of the day and night limits was a conservative approach and would therefore provide additional protections to residents.

Most members of the Institute of Acoustics (IOA) also supported the single limit, arguing that it would simplify assessment and prioritise public health, particularly sleep quality at night when amplitude modulation can be more prevalent. They added that a single limit is clearer and easier to enforce, and prevents an increase in allowable wind turbine noise at night.

Some members of the public supported the single limit because it aligns with the recommendation in the scoping review. They highlighted that background noise is much lower at night, making turbine noise more perceptible and potentially more annoying, and therefore agreed that night-time limits should not be higher than daytime limits. Some also noted that during warm weather people are more likely to keep windows open, which further increases the perceptibility of turbine noise.

Policy response

The Government intends to amend the updated guidance so that, as in ETSU-R-97, the noise criteria differentiate between day-time and night-time periods. The day-time lower limit range (35–40 dB) will be set lower than the night-time lower limit (43 dB), measured at a noise receptor outside any affected property[7]. The applicable noise limit at any given time will be determined as the greater of:

- a limit of 35 to 40 dB during the day or 43 dB at night; or
- a limit set at 5 dB above the background noise level at each wind speed.

As a result, the single-limit approach considered as part of the consultation will not be taken forward. This decision reflects feedback from the consultation, in which the majority of respondents did not agree with the single-limit approach, and consideration of how changes to noise limits could impact both energy generation and residential amenity.

With regards to energy generation, modern commercial-scale turbines typically reach, or are close to, their maximum noise output at wind speeds of approximately 8 m/s. As a result, changes to noise limits above this wind speed are of limited relevance for modern turbines, and the single-limit approach would therefore be expected to have minimal impact on daytime generation. However, a single-limit approach could result in a reduction in the night-time noise limit at low to medium wind speeds (below approximately 8 m/s). Evidence submitted by developers indicated that this could have a significant impact on night-time generation of some new developments and affect the financial viability of future projects. The Government has also considered these potential impacts in the context of decarbonisation objectives and the role of onshore wind in supporting the National Electricity System Operator (NESO) to balance supply and demand and manage overnight energy costs.

The Government has considered positive feedback on a single-limit approach, including potential simplification of application and enforcement, but does not consider that these benefits outweigh the impacts identified above.

The Government has also considered what impact this decision could have on the residential amenity of wind farm neighbours. The single-limit approach was originally proposed in response to the 2023 scoping review recommendation that night-time noise limits should not be higher (i.e. less stringent) than day-time limits. The scoping review recommendation was made with reference to the potentially increased prevalence of amplitude modulation (AM) at night,

In this update, the Government has introduced new guidance on AM in the form of a character correction. In practice, this applies a penalty to the overall noise limits to reflect the increased audibility and potential disturbance associated with this noise characteristic (this is discussed further later in this response). The Government considers that these character controls provide

[7] Noise limits are set as dB LA90 values, i.e. the noise level exceeded for 90% of the time, to allow for measurement at receptor distances minimising the influence of transient (non-wind turbine) contributory sources.

an appropriate level of additional protection for residents, including in respect of the potentially increased prevalence of AM at night.

The scoping review also observed that higher night-time noise limits are unusual and appear to be unique to the UK and Ireland. The Government has reviewed a range of international approaches and considers that the current framework used across the United Kingdom remains appropriate.

Taken together, the Government considers that retaining separate daytime and night-time noise limits represents a proportionate and evidence-based approach. This reflects consultation feedback, the assessed impacts on energy generation and system operation, and the need to support decarbonisation objectives, while ensuring appropriate protection for residents.

Raising the lower value for the day-time noise limit range

Proposals

Government proposed to raise the lower value for the day-time noise limit range to 37 dB. The daytime LLV (lower limiting value) was proposed to be set within the range 37 to 40 dB LA90, depending on site-specific factors. The new lower value of 37 dB represents an increase with respect to the original guidance which was set at 35 dB. This was proposed to balance opportunities for energy generation with the impact of noise emissions from turbines on the public. **Question 2** sought to gauge the level of agreement with this approach.

Summary of responses

In total, 97% of respondents answered this question. Around a fifth stated that they did not know, while only 14% agreed with the proposed approach. The remaining majority did not agree with the proposal, and several arguments were made to justify this position. Those who were not in favour of raising the lower value to 37 dB, included members of the public, LPAs, developers and related trade associations, as well as technical consultants and community groups.

Most respondents including LPAs, community groups, and members of the public, agreed that raising the lower limit to 37 dB could lead to a greater occurrence of complaints. Concerns were also raised that it could unnecessarily impact local amenity, particularly in areas with low background noise. Health concerns also featured in responses to this question with some respondents, such as members of the public and a community group, calling for a review of health impacts from onshore wind noise.

Developers and related trade associations raised concerns that the increased lower limit could disproportionately favour smaller projects, by taking a portion of the noise ‘budget’ away from larger, more impactful projects in cumulative scenarios. Additionally, concerns were raised that the narrow range of LLV from 37 to 40 dB wouldn’t account for the difference in scale of future developments.

A number of alternative suggestions about how to set the day-time noise limit range were made. Several respondents suggested retaining the 35 dB limit for single wind turbine projects. Others suggested that a separate lower limit range of 35 to 37 dB could be applied to smaller projects. A few developers suggested a flat limit for smaller developments, set 2 dB below the lowest LLV being considered for larger schemes (e.g. 35 dB based on the suggested minimum LLV of 37 dB). Another proposal suggested tying the LLV directly to the generating capacity of the project: 35dB for projects less than 500kW; 36dB for projects less than 2MW; and 37 to 40dB for projects less than 2MW.

Of those respondents who agreed with the proposal to lower the daytime limit, there were a mixture of members of the public, academics, technical consultants and LPAs. These respondents suggested that raising the lower limit would not result in significant noise impacts and may help to maximise generation potential whilst not exceeding limits. Some of these positive responses were given with suggested safeguards in place such as background noise checks and character-noise penalties.

Policy response

The Government intends , as in ETSU-R-97, to retain the day-time limit range of 35-40 dB. As a result, the proposal to raise the lower value for the day-time noise limit range to 37 dB will not be taken forward. This decision reflects consultation feedback, in which the majority of respondents did not agree with the proposal.

The proposal to raise the lower value to 37 dB was intended to balance opportunities for energy generation with the potential impact of turbine noise on the public. It was informed by analysis of how different dB limits could affect the amount of land available for onshore wind and the number of residential properties in close proximity to potential developments.

However, the Government recognises that narrowing the day-time range reduces the flexibility to set limits based on site-specific factors. Consultation feedback also raised concerns about potential impacts on residential amenity and about whether, in cumulative scenarios, very small schemes could contribute a greater share of overall noise.

The Government has considered suggestions to address these issues, such as setting a specific LLV for single-turbine or small projects, or linking the LLV directly to generating capacity. However, the Government considers that the LLV should be selected based on all relevant site-specific factors, including the number and exposure of nearby noise-sensitive receptors, and not solely on energy generation. The Government therefore considers it appropriate to retain the 35-40 dB LLV range set out in ETSU-R-97, and has updated the daytime LLV case studies in Appendix C accordingly.

Alternative options for updating noise limits

Proposals

Government proposed changes to the noise assessment criteria and lower value for the day-time noise limit range as described above. However, there are a number of alternative approaches updated guidance could take, including continuing to use the approach outlined in ETSU-R-97, which differentiates dB noise criteria by day and night. For those who did not agree with the proposed approach of using a single 'limit', **Question 3** sought views on what alternative approaches may be appropriate.

Summary of responses

Approximately 70% of respondents answered this question. Most of those who answered were opposed to the adoption of a single limit. The majority of responses strongly advocated for retaining separate day and night limits, as in the ETSU-R-97 guidance. Several arguments were made to justify this position, which are covered in summary of Question 1 and so are not repeated here.

While overall respondents to this question showed a clear preference for retaining the approach of ETSU-R-97, some did provide alternative proposals which aim to address the 2023 Scoping Review recommendation, without moving to a single limit approach.

Suggestions included maintaining separate limits with a night limit of 43 dB and a daytime range of 35–43 dB, or adjusting the daytime LLV range to 37–42 dB. These alternatives were rationalised to allow a single limit to be applied across all periods if appropriate, while maintaining flexibility for different scales of development and without resorting to a single-limit approach. Other suggestions included implementing a single limit derived from averaging data from both periods, as opposed to the current proposal of taking separate day and night measurements and taking the lower value.

Respondents also provided feedback on the changes to decibel level (dB) limits. Some advocated reducing limits, particularly at night, to better protect rural communities, while others suggested increasing limits to align with international benchmarks such as those in Denmark, Germany, and Sweden. As with Question 2, respondents also raised concerns that raising of the lower day LLV to 37dB meant smaller developments may take up more noise allowance and suggested reverting back to the 35dB minimum daytime limit.

A few respondents, particularly community groups and some members of the public, recommended replacing ETSU-R-97 with BS4142, arguing that this guidance better links noise to impacts on health and quality of life. Others proposed alternative measures such as setback distances or separate noise limits for quiet rural areas. Community concerns also featured in responses to this question, with many citing concerns around potential health impacts.

Policy response

The government recognises that noise can be a concern for communities. That is why we have worked closely with acoustic experts and leading scientists to ensure that planning authorities from across the UK have access to the best guidance, so that they can measure and take account of noise emissions when making decisions on onshore wind infrastructure.

Noise from contemporary wind turbines is primarily generated when the rotating blades displace air, producing an audible ‘swoosh’, rather than the steady sound associated with an engine or gearbox. As a result, wind turbine noise should be assessed using dedicated guidance rather than BS4142, which is the standard used to assess many other forms of industrial or commercial sound. The scope of BS 4142 is clear that it does not apply to certain sources, where other guidance clearly applies and is more appropriate, such as for onshore wind.

Government has carefully considered the alternative approaches suggested by consultation respondents. However, in order to protect residential amenity, government does not consider it appropriate to raise the day-time LLV range to above 40 dB to accommodate a single-limit approach. As outlined above, the government intends, to retain noise criteria from ETSU-R-97 to differentiate between day-time and night-time periods and to set a day-time LLV of 35–40 dB. In light of consultation feedback, government considers this range to be the most appropriate, as it maintains flexibility for different types of development while adequately protecting residential amenity.

Amplitude Modulation

Proposals

In some cases, the character of the noise arising from the operation of a wind farm may contain one or more distinctive acoustic characteristics that are not typical of wind turbine noise. As noise character may increase the impact of a noise, it is common practice to add a ‘character correction’.

Amplitude Modulation (AM) is where the sound level (amplitude) varies with time in a repetitive manner (modulation). AM is an inherent feature of wind turbine sound and is acknowledged by ETSU-R-97. However, since the publication of ESTU-R-97 it has been identified that, in some instances, this modulation can become more pronounced and the magnitude of AM can exceed certain thresholds, leading to increased perception of turbine noise. AM is sometimes referred to as blade ‘swish’, but if the AM becomes more pronounced this can lead to the sound being described as thudding or pulsing.

The 2023 Scoping Review stated that previous guidance did not adequately control for the impact of AM and specifically recommended the development of advice for assessing and controlling the impact of AM, building on Government commissioned research published in

2016[8]. To deliver on this recommendation, government proposed that an AM character correction be included in updated guidance. In practice, this results in a penalty to the overall noise limits, to reflect the increased audibility and potential disturbance the noise character causes. **Question 4** sought views on whether updated guidance provided adequate advice for assessing and controlling the impact of Amplitude Modulation.

Summary of responses

A total of 95% of respondents answered this question. While a fifth of respondents considered the guidance on AM sufficient, approximately half felt it did not provide adequate advice. Others stated that they did not know whether the guidance was adequate or not.

Opinions on the general compliance monitoring approach proposed in the draft guidance varied. Developers, energy consultants, and professional bodies generally supported applying character corrections only at the compliance stage, noting that AM cannot be reliably identified during design. Conversely, civil groups and several members of the public argued that this approach places risk on communities and called for AM to be addressed earlier in the planning process. A few respondents suggested using setback distances as an alternative measure.

Many respondents, including most LPAs, developers, and acousticians, welcomed the inclusion of AM guidance as a significant improvement, providing a clearer definition of AM and how it should be measured. They generally supported the use of the Institute of Acoustics (IOA) methodology for quantifying AM, describing it as robust and practical. However, they recommended tightening the wording to establish a clear, enforceable penalty regime and suggested adding worked examples and flowcharts, similar to those provided for tonality.

Views also differed on whether the proposed character controls offer adequate levels of protection. Some community groups and members of the public called for automatic mitigation measures, such as temporary curtailment. On the other hand, some developers and trade associations warned that the proposed 5 dB correction could be too strict, leading to excessive curtailment and affecting project viability. Concerns were also raised about the interaction between AM penalties and Site-Specific Noise Limits (SSNLs), with developers noting that even minor AM could result in SSNL breaches.

A few respondents questioned the use of the 2013 RUK penalty scale used in the guidance, instead pointing to alternative penalty regimes available. These respondents also referenced emerging international standards (IEC 61400 series), stressing the need for clearer justification and transparency on the evidence base supporting the current methodology.

Community concerns were raised by some respondents, particularly civil groups and members of the public. These responses raised concern about the potential harm of onshore wind noise in general, as well as specifically in relation to AM. This included the increased prevalence of AM at night and potential links to sleep disturbance, as well as perceived health impacts in relation to AM.

[8] HM Government, Review of the Evidence on the Response to Amplitude Modulation from Wind Turbines, 2016.

Policy response

The Government intends to retain the inclusion of an amplitude modulation (AM) character correction in the updated guidance. The Government has carefully considered feedback and suggestions from the consultation and has adjusted the wording where necessary to improve clarity.

As it is not possible to identify AM at the design stage, the Government considers a compliance-based monitoring approach to be the most appropriate mechanism for controlling the impacts of AM. The Institute of Acoustics (IOA) methodology for quantifying AM has been selected because it is freely available and is generally regarded by planning authorities and the onshore wind industry as a robust and practical method. This view was also informed by discussions with specialist workshop attendees.

An alternative approach referenced in some consultation responses, the IEC 61400 series, is not freely available and applies a different tonal analysis methodology. To avoid confusion and ensure clarity and consistency, the Government therefore considers it preferable not to reference IEC 61400 within the guidance.

The Government recognises that views were mixed on whether the proposed character controls provide adequate levels of protection. Some respondents supported stricter penalties, while developers raised concerns about the potential for increased curtailment where AM is detected. The character correction set out in the guidance is informed by the available evidence and previous research in this area. The Government considers that a 5 dB correction provides an appropriate level of protection for residents, while allowing for the continued development of onshore wind.

Technical guidance updates

Proposals

A number of other technical updates were also proposed, which sought to deliver on wider recommendations made in the 2023 Scoping Review. These included:

- Updated descriptions of the profile of noise emissions from wind turbines, and relevant wind speed references and range, given evolutions in the technology since 1996.
- Clarification of guidance on determining noise limits such that developments are prioritised according to generation capacity.
- Providing clarification on the interpretation of ‘financially involved’ receptors for the application of noise controls
- Developing further guidance on cumulative impacts, incorporating existing evidence and best practice advice.

- Providing example planning condition wording and associated technical notes which can be referenced to simplify planning controls.
- Defining the way in which character corrections are to be calculated and combined.

Question 5 sought views on whether respondents agreed with these technical updates. The technical updates and feedback from respondents are considered in turn below.

Summary of responses

In total, 95% respondents answered this question. Around half of respondents agreed with some or all of the technical updates. Approximately a third of respondents did not agree with the technical updates, while the remaining of those who responded stated they did not know.

Descriptions of the profile of noise emissions from wind turbines, and relevant wind speed references and range

Respondents broadly supported the proposed upper wind speed limit, noting that it would simplify assessments. A few respondents requested clearer guidance on wind speed references, including when assessments should extend beyond 10 m/s and how 10 m wind speeds should be derived where required. Some developers and trade associations raised concerns that the update omits key guidance on deriving 10 m wind speeds from hub heights, previously included in the IOA Good Practise Guide and urged reinstating or referencing this guidance to ensure consistency and accuracy in assessments.

Choosing the day-time lower limiting value

Several responses addressed the draft guidance's approach to choosing the day-time lower limiting value (LLV) and in particular, the prioritisation of limits according to generation capacity. A few respondents welcomed the changes, noting they reflect modern technology and the need to consider energy output. However, some developers and trade associations raised concerns about the use of vague language, and suggested wording was refined to improve clarity and reduce the risk of inconsistent application in planning decisions.

Others questioned whether generation capacity was an appropriate measure, with alternative suggestions including energy produced in megawatt-hour (MWh). A few responses suggested that daytime LLV could instead be prioritised on variables, such as grid capability or carbon savings.

Some respondents, particularly developers, trade associations, and acousticians, questioned whether Appendix C in the draft guidance document provided adequate examples for selecting daytime LLVs. While examples were seen as useful, many argued that the scale of development included could be improved. It was suggested that guidance should include cases between 20 MW and 100 MW, which are more typical of future developments and will be important for meeting the Government's Clean Power 2030 targets. Equally concerns were raised about the selection of dB limits for the examples available, warning that current

examples were too restrictive and could effectively lower noise limits. The lack of case studies for small or single turbines in Appendix C was also raised as a concern.

Further clarity on how cumulative impacts should influence the selection of the daytime LLV was requested from a few respondents. Specifically, whether LLV should reflect only the proposed development's capacity, or the total capacity of nearby existing wind farms.

Clarification on the interpretation of 'financially involved' receptors

A few respondents, such as civil groups and several members of the public, suggested that financially involved properties should still comply with standard noise limits. Responses from trade associations requested a wider definition of financial involvement, which include financial interest or a formal agreement with the occupier. Developers and LPAs broadly supported the guidance on financially involved properties, however, there were some areas where greater clarity was requested. A few responses highlighted ambiguity around what constitutes a "profitable (not merely compensatory)" benefit and requested clearer distinction. Practical concerns were also raised about properties involved in multiple developments, the implications for enforcement if occupiers change or withdraw from financial involvement, and about the treatment of short-term lets.

Cumulative impacts

Responses on cumulative impacts were mixed. Some respondents welcomed the inclusion of cumulative impact guidance but called for more stringent controls, including on the basis that cumulative impacts may be particularly significant in rural areas. LPAs requested additional detail to support application in more complex cumulative scenarios.

Developers and trade associations generally supported drawing on the IOA Good Practice Guide but emphasised the need for clearer and more consistent wording. Respondents requested clearer guidance on the proposed 1 dB tolerance, the treatment of consented schemes, and the approach where existing wind farms do not meet the updated criteria. They also suggested additional worked examples and flowcharts to support interpretation.

One respondent suggested setting a lower capacity threshold for turbines included in cumulative assessments, to avoid very small turbines disproportionately influencing cumulative limits given their different acoustic profiles and operating conditions.

Most developers, trade associations and the IOA objected to treating all turbines as downwind in cumulative assessments, arguing that this does not reflect directional variation in practice and that the evidence base is unclear. Respondents warned that the approach could increase curtailment and constrain operation across wind directions, including in areas close to existing wind farms and in areas with high wind resource or available grid capacity.

Example planning condition

Respondents generally welcomed the inclusion an example planning condition. LPAs, developers and trade associations were broadly supportive of the approach, but requested refinements to improve clarity and usability, including the addition of a flow chart.

Respondents also requested clearer terminology and made a number of technical suggestions. A number of respondents highlighted the increasing use of alternative assessment methods in cumulative scenarios and suggested that the condition should better recognise these approaches. Some respondents further suggested that timeframes for the submission and approval of compliance protocols should be clearer, realistic and capable of extension where required to secure appropriate monitoring conditions.

A minority of respondents did not support the inclusion of an example planning condition. These respondents considered that it would be ineffective without clear, timely and independent enforcement arrangements. Others considered that the draft condition placed too much reliance on resident complaints and called for stronger and more automatic mechanisms to ensure compliance.

Character corrections

Some respondents welcomed the draft guidance on the calculation and combination of character corrections but requested additional worked examples to support consistent application. Others questioned the evidence base underpinning the AM and tonal penalty methodology and called for further research. One respondent questioned why a tonal or AM character correction is applied, as opposed to combining the two.

Site-Specific Noise Limits

Developers and trade associations raised concerns about the proposed approach to SSNLs, including that applying SSNLs more widely than in current practice (beyond cumulative noise scenarios) could lead to unnecessarily low limits and additional operational constraints. They requested clearer drafting, including more consistent use of mandatory and advisory language, and noted the potential for SSNLs to reduce flexibility in turbine selection and micro-siting. Developers also highlighted the interaction between SSNLs and character corrections, and potential implications for cumulative assessments and the complexity of planning conditions. LPAs also requested clearer wording in the draft guidance on this topic.

Small-scale wind

Respondents raised questions about the scope of the guidance in relation to small turbines. Several developers and trade associations suggested setting a minimum capacity threshold (with proposals ranging from 50 kW to 250 kW) and, more generally, did not agree that the guidance should apply to all turbines other than those permitted under PDRs. Reasons cited included the risk that small turbines could consume noise budget in cumulative scenarios, increased workload for planning authorities, and the limited availability of robust noise data for small turbines.

Other respondents cautioned against excluding small schemes, noting that this could create a gap in guidance and would not necessarily avoid impacts on receptors or cumulative noise budgets.

Policy response

Descriptions of the profile of noise emissions from wind turbines, and relevant wind speed references and range

The Government has reviewed feedback from the consultation, including requests for specific wording changes, and made adjustments to aid clarity were necessary. It is not considered necessary to include wind speeds up to 12 m/s, as contemporary turbine technology typically reaches maximum noise output at around 8–9 m/s. The draft guidance clearly refers to the use of standardised wind speeds, addressing areas of uncertainty in ETSU-R-97. Institute of Acoustics Good Practice Guidance is referenced within the guidance; however, it is important to note that the IOA Good Practice Guide remains a separate document and is not replaced by this guidance.

Choosing the day-time lower limiting value

Wording has been reviewed to improve clarity in this section where appropriate. The guidance has been drafted to allow flexibility for case-by-case interpretation, though the in light of consultation feedback, the Government has also added supplementary case studies to support clearer and more consistent application.

The Government considers that the choice of daytime lower limiting value should be based on generating capacity rather than predicted energy generation, as it is not feasible to accurately estimate generation at the planning stage using publicly available information. Generating capacity is clearly defined by turbine size and number, is consistently provided within planning applications, and is already used to determine the applicable planning regime. Energy output, by contrast, is influenced by variable factors such as wind conditions and cannot be reliably quantified in advance.

Clarification on the interpretation of ‘financially involved’ receptors

The wording in this section was adapted from the High Court judgment in Joicey v Northumberland County Council. Nevertheless, the Government has reviewed the wording and made edits where necessary to improve clarity. Consideration was also given to whether the guidance should explicitly cover other noise-sensitive locations, such as holiday lets or camping sites; however, given the range of potential scenarios, it was considered that these matters were best addressed on a case-by-case basis through agreement with relevant stakeholders.

Cumulative impacts

Wording was updated in response to consultation feedback and to improve clarity where appropriate. In addition, a minimum capacity threshold below which turbines do not need to be

included in cumulative assessments has been introduced. Turbines with generating capacities of 50 kW or less are considered to have localised noise impacts and are therefore excluded from cumulative noise assessment. Turbines with generating capacities above 50 kW and up to a few hundred kilowatts may also be excluded where it can be demonstrated that their noise impacts are localised and that inclusion in a cumulative assessment would result in disproportionate constraints on larger developments.

Example planning condition

The approach to the example planning condition, which requires action to be taken in response to a complaint, is commonly applied to noise conditions for a range of development types, not solely wind farms. The alternative approach of requiring operators to demonstrate compliance in the absence of complaints was considered but was not regarded as consistent with the requirements of planning conditions, as it could potentially be considered unnecessary and/or unreasonable. Therefore, the Government intend to continue to include an example planning condition but has reviewed consultation feedback, including requests for specific wording changes, and has made adjustments where necessary to improve clarity.

Character corrections

The Government intends to continue to include updates to character corrections and has reviewed consultation feedback, making adjustments where necessary to improve clarity. The Government does not consider it appropriate to add penalties for tonal noise and amplitude modulation in the same way as character corrections under BS 4142, as these characteristics typically occur under different conditions. In addition, there is insufficient evidence to determine how multiple penalties should be combined to reflect the overall impact on annoyance, whether through arithmetic, logarithmic or other methods. These issues were discussed during the workshops and were taken into account in developing the guidance. The Government also considers that the introduction of combined penalties could result in overly restrictive outcomes.

Site-Specific Noise Limits

The Government intends to continue to include updates to SSNLs and has reviewed consultation feedback, making adjustments where necessary to improve clarity. The wording was drafted to allow flexibility, with the use of “shall” and “should” applied intentionally. Nevertheless, wording has been reviewed and amended where appropriate.

It was already standard practice to apply reduced SSNLs in cumulative scenarios. This approach was extended more generally in the updated guidance to avoid unduly restricting future wind farm development by a single scheme using the entirety of the available turbine noise allowance capacity (TNAC) where this was not necessary. The guidance now also allows for the SSNL to be set equal to the TNAC where this is justified, for example where applying a lower limit would unreasonably restrict development, including by requiring a reduction in generating capacity.

Small-scale wind

The updated guidance applies to all wind turbines except those covered by permitted development rights. Turbines operating under permitted development rights are instead required to comply with separate planning requirements, which vary across the United Kingdom and do not relate directly to generating capacity. As set out above however, a minimum capacity threshold has been introduced below which turbines do not need to be included in cumulative assessments, mitigating the risk that small turbines could disproportionately consume available noise budget in cumulative scenarios.

Further comment

Question 6 asked whether respondents had any further comments on the proposed updates. Where issues were raised that are not addressed elsewhere in this document, they are summarised below.

Summary and policy response

Health Concerns

Some members of the public and community groups expressed concerns about the perceived health impacts of onshore wind noise. These concerns related to low frequency noise and infrasound, amplitude modulation, and ground-borne vibration, and included reported effects such as sleep disturbance and annoyance, as well as concerns about serious health conditions. Some respondents also considered that the onshore wind industry was being prioritised over local communities. Conversely, developers supported the clarification provided in the draft guidance on infrasound, ground-borne vibration and low frequency noise.

The government recognises that noise from wind turbines can be a concern for communities, which is why the government has undertaken this review and update of ETSU-R-97. In their 2018 report on Environmental Noise Guidelines for the European Region, the World Health Organisation (WHO) was unable to find any evidence of substantial physical health impacts from wind turbine noise (such as cardiovascular disease or hearing impairment, for instance).[9] The report did conclude that noise from wind farms can be "a source of above average annoyance" with potential impacts on sleep disturbance. The WHO rated the evidence base of turbine noise impacts on annoyance and sleep disturbance as "low quality" due to the potential of self-reported bias in study results. The 2023 scoping review could not find any studies published since the WHO report that were able to demonstrate a stronger link between turbine noise, annoyance and sleep disturbance.[10]

The 2023 scoping review specifically considered the impacts of Low Frequency Noise and Infrasound. Based on all of their research, WSP concluded that the weight of evidence on the

[9] World Health Organisation, Environmental noise guidelines for the European Region, 2018.
[10] WSP, Report for UK Government: A Review of Noise Guidance for Onshore Wind Turbines, 2023.

effects of infrasound and low frequency sound at present supports the conclusions that (a) wind turbine infrasound at exposure levels typical for dwellings has no adverse effects on health and reported symptoms are more likely to be psychogenic in origin, and (b) that controls on A-weighted wind turbine sound levels are expected to be sufficient to control the effects of low frequency noise.

Nevertheless, government wishes to keep this under review. To assess the evidence further, the Inter-Departmental Group for the Costs and Benefits of Noise (IGCB(N)) has commissioned a review of the latest evidence on noise from wind turbines and health effects. The review will recommend whether the evidence is sufficiently robust to conduct a meta-analysis of data on self-reported annoyance and sleep disturbance to generate exposure-response relationships applicable to the UK.

Planning

Respondents requested clearer guidance on the application of the updated guidance across different planning regimes, including where developments are considered to be Nationally Significant Infrastructure Projects.

Respondents also sought clarity on the treatment of repowering and life extension projects, including whether such projects should retain existing consented limits where sites have operated without substantiated complaints. Some respondents suggested that repowering and life extension projects should be exempt from the updated guidance.

Respondents also requested clearer transitional arrangements, including how the updated guidance would apply to current and pending planning applications, to avoid uncertainty.

The updated guidance applies to all wind turbines except those covered by permitted development rights. This includes developments considered to be Nationally Significant Infrastructure Projects. Where repowering or life-extension projects required a new planning application, these are required to comply with the updated guidance.

This publication is available from: https://www.gov.uk/government/consultations/assessment-and-rating-of-wind-turbine-noise-guidance-proposed-updates

Any enquiries regarding this publication should be sent to us at:
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