



Acoustic Report on Wind Turbine Noise in a Rural Sheep Farm in Scotland¹

— Synopsis —

Current U.K. Government Policy on wind turbine noise does not measure, monitor, or examine the full acoustic environment. It completely ignores the lower frequencies and denies that they could be problematic. This report examines scientific data gathered by IARO and provides an explanation for the debilitating health effects developed in the nearby residents.

Background

Wind Power Plant (WPP) A began testing operations adjacent to the Rural Sheep Farm in Nov 2021.

Five WPPs are now within 7 km of the Rural Sheep Farm.

Severe health deterioration reported only after installation of the WPP A.

Standard noise compliance assessments yield no explanation for acute health effects.

Recording the Soundscape

Over 1000 hours of high-resolution recordings of the soundscape (Mar 2022-Mar 2023).

Nine different recording locations within the Rural Sheep Farm, including inside and outside the homes, and in animal pens.

Wind Turbine Acoustic Signature (WTAS)

Trains of multiple pressure pulses, arriving regularly every 0.5–2 seconds, often reaching 20 dB above environmental background level, and that characteristically emanate from industrial wind turbines within the infrasonic range.

Soundscape at the Rural Sheep Farm

WTAS were continuously present at the Rural Farm.

No amplitude modulation was identified.²

Ineffective UK legislation and recommendations sustained by the Scottish Government

ETSU-R-97 and the Good Practice Guide to the Application and Implementation of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, Institute of Acoustics (UK), 2013.

ETSU-R-97 created without any medical input—does not recognize

The existence of WTAS nor their health effects.

The existence of infrasonic phenomena nor their health effects.

The irrelevance of the human hearing threshold for infrasonic-induced health effects.

Current Situation

Rural Sheep Farm residents forced to remain in noxious and toxic environment.

Livestock developing unexplained reproductive problems.

Three hospitalizations required for 2 of the residents in 2023.

¹ Document Number: IARO24-3. Full Report available at iaro.org.nz.

² Amplitude modulation is not detectable with the analyses used in this report. AM was observed by researchers undertaking the recordings and a subsequent, modified analysis did detect AM

Vulnerable residents unprotected and ignored (autistic child, history of auto-immune diseases).
Ongoing reporting of unresolved debilitating health impacts.
Non-response from governmental authorities bordering on medical negligence.

Executive Summary³

1. In the UK, and worldwide, citizens living in the vicinity of onshore Wind Power Plants (WPPs) have been complaining of adverse health effects, also observed in pets and livestock. In Scotland, at the request of residents of a Rural Sheep Farm, a scientific analysis of the acoustic environment was undertaken. To date, this is the most comprehensive study undertaken in the UK, examining the full-spectrum soundscape in and around multiple homes of the Rural Sheep Farm, located within 7 km of five WPPs.
2. Severe health deterioration began in November 2021, after WPP A commenced testing operations adjacent to the confines of the Rural Sheep Farm. Farm workers (both permanent residents and those who attend during key activities, such as calving and lambing) also complain of adverse health impacts when working in the livestock sheds and pens located in the proximity of the turbines.
3. However, Wind Turbine Noise measurements conducted in accordance with UK legislated and recommended practices (ETSU-R-97 and Good Practice Guide by the Institute of Acoustics, IoAGPG) yielded no explanation for the health complaints. Noise compliance monitoring has deemed this location as operating within acceptable noise exposure levels. However, standard sound level meters used for routine noise measurements, as imposed by ETSU-R-97, are too rudimentary and of insufficient resolution to fully characterize soundscapes, as demonstrated herein [See Fig. 68 and Annex A, Section 3-IX].
4. This Report documents scientific-grade, high-resolution recordings that were conducted at nine different locations within the Rural Sheep Farm [See Figs 1 & 2] (from March 2022 to March 2023), to identify the acoustic disturbances that are causing ill-health among the residents and livestock. Acoustical phenomena that would have otherwise gone undetected are herein identified and quantified [See Fig. 68]. IARO does not use computerized noise models, all data is based on field measurements.
5. Wind Turbine Acoustic Signatures (WTAS) are trains of multiple pressure pulses, arriving regularly every 0.5–2 seconds, often reaching 20 dB above environmental background level, and that characteristically emanate from industrial wind turbines within the infrasonic range [See Fig. 68A and Annex A, Figs. 810]. These are not considered to be harmful and are routinely truncated from analysis through the methodologies imposed by ETSU-R-97.
6. WTAS occur at frequencies below 10 Hz—well within the infrasonic range. Neither the 1/3rd-octaveband analyses nor the use of any filtering system (A, C or G) provide sufficient resolution to correctly reflect the physical reality of the soundscapes to which residents and workers are exposed, both inside and outside homes [See Fig. 68].
7. WTAS were continuously present at all hours of day and night at the Rural Sheep Farm. Cumulative effects of the infrasonic output of the multiple WPPs show a 24/7 exposure to WTAS [See Fig. 56 and Annex A, Section 3-V]. Respite from this acoustically aggressive environment is only achieved by physically leaving the Farm to a distance of 3 or 4 miles, depending on the weather.
8. Decision-makers are being told that:
 - a. *There is no difference between natural infrasound and that produced by wind turbines*—This is categorically false (as comprehensively demonstrated in Annex A, Section 3, Fig. 11B versus Fig. 13). The infrasonic output of wind turbines is often brushed away with the frequently-used

³ Acoustics Report on the Rural Sheep Farm in Scotland, December 2023. Document Number: IARO24-3. Full Report available at iaro.org.nz.

statement: "it occurs at similar levels to pre-existing background levels."—This is categorically false [See Annex A, Fig. 16].

- b.** *The infrasonic outputs of WPPs are irrelevant to human health as they are below the human hearing threshold* ("what you can't hear, can't hurt you")— This is categorically false as WTAS have already been correlated to adverse health effects, namely sleep disturbance [See Annex A, Fig. 22].
- 9.** The wind industry complies with ESTU-R-97 and IoAGPG which is backed by current Scottish Government Policy. Therefore, there is no legal responsibility to monitor the low frequency and infrasonic disturbances generated by their WPP operations.
- 10.** No evidence of amplitude modulation was identified in any of recordings of the Rural Sheep Farm soundscapes. Amplitude Modulation is an audible disturbance covered by ETSU-R-97 and IoAGPG (associated with the turbines "whoosh" or "swish" sounds), and is considered to be of significant importance for the development of adverse health effects [See Annex A, Fig. 15].
- 11.** Annex A provides laypersons with substantial, 'user-friendly' information, shattering the myth that only acousticians can understand the complexities of acoustic measurements. The 'Current State of Affairs in the U.K.' regarding onshore wind power plants is given in Section 1; A brief explanation of the 'SAM Technology' is provided in Section 2, and the 'Types of Analyses' obtained with the SAM Technology can be graphically consulted in Section 3.
- 12.** The creation of ETSU-R-97 had zero input from medical professionals [See Annex A, Section 1-II]. Health Protection Scotland and the U.K. National Healthcare Service attribute a psychosomatic origin to the adverse health effects developed in people living near WPPs ("it is all in their heads"). In the U.K., the immediate and long-term health effects of this unique type of 'noise' are not recognized and therefore, not investigated. A separate Report on the human and animal health events and behaviours observed at the Rural Sheep Farm is referenced.
- 13.** Since November 2021, numerous (and ongoing) communications have been exchanged between the residents at the Rural Sheep Farm and the local Council, Renewable Energy Systems (RES, the commercial entity responsible for WPP A) and Environmental Health Officers. The Minister for Public Health and Women's Health Scotland, the Scottish Energy Minister and the Consultant in Health Protection NHS Highland are also engaged in this unfolding disaster. The family's GP has acknowledged the deterioration of their health due to the "significant impact of noise pollution."
- 14.** Evidence from Annex B (withheld for data protection), demonstrate how RES constrained the nearest turbines to the Rural Sheep Farm as an initial response to the complaints (Nov-Dec 2021). Repairing and testing of the turbines followed before they were then incrementally returned to operational status. By Feb-Mar 2023, full operational power output had resumed. Despite the copious and severe health complaints from the Rural Sheep Farm residents, RES claimed that all turbines were compliant with the ETSU Condition 32. It should be noted that the infrasonic acoustic output of WPPs increases with increasing power output.
- 15.** The residents have pleaded with the council to implement a Statutory Noise Nuisance case for two years, but their health complaints are apparently deemed insufficient to do so, and they have been forced to remain in a noxious and toxic residential environment. They cannot leave their farm and home as animal welfare would be at risk.
- 16.** A council representative on 'Noise' (Clachaig Glen Hearing WIN-130-7) has stated that councils are very unlikely to take action (and it has only rarely happened in Scotland) as it is considered "Not in the Public Interest" to take on a large wind development company in a Statutory Noise Nuisance Case.