Low-Level Noise: Effects on Nature and People

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Summary

Low-level noise harms wildlife and people even when it is too quiet to notice at once. A review of two decades of wildlife studies found that terrestrial animals begin to respond at about 40 dBA, and that one in five studies recorded effects below 50 dBA. For people, the main concerns are broken sleep, annoyance and, over years, heart and stress effects. Low-frequency hum is a particular problem because standard noise meters undercount it while people still feel it.

How low-frequency hum travels

Low-frequency sound has long wavelengths, so it passes through walls and windows easily and loses energy more slowly over distance than higher-pitched sound. In open country, sound from a single source drops by roughly 6 dB each time the distance doubles, and calm, cool desert nights can carry it further.

Rural nights are quiet. A rural valley is often around 30 dBA after dark, so a steady hum that would be lost in a city stands out clearly. Leventhall, Pelmear and Benton's 2003 review for the UK government found that low-frequency noise produces complaints and annoyance even at levels that look low on a standard A-weighted meter, because that meter discounts low frequencies heavily.

Does the noise get through walls?

Yes, and low frequencies get through most easily. A typical wood-frame wall cuts higher-pitched sound by roughly 20 to 30 decibels, but low frequencies around 50 to 100 Hz may drop only 5 to 10 decibels. Windows and door gaps let through more than the wall itself. Low-frequency waves are long enough to bend around obstacles and set the whole structure vibrating, so people often feel the hum as pressure or a rattle, not just hear it.

These are typical building figures, not measurements at this site. The real reduction depends on construction, windows and distance, so the noise study should measure indoor levels at the nearest homes as well as outdoor levels at the property line.

Effects on wildlife

The 2016 synthesis in *Biological Reviews* by Shannon and colleagues, covering research from 1990 to 2013, found that most studies documented effects. The reported responses were:

- **Fewer animals** in noisy habitat, meaning lower abundance and changes in which species are present.
- **Changes in behavior**, such as more time watching for danger and less time feeding.
- **Changes in calls**, with animals singing louder, higher, or at different times to be heard over the noise.
- **Effects on fitness and community structure**, which can ripple through a whole ecosystem.

Most of the research so far covers songbirds and marine mammals, and mostly species in Europe and North America. The authors note that other animal groups, including insects, amphibians and nocturnal mammals, are underrepresented. The absence of studies is not evidence of no effect.

Effects on birds and roosting cranes

A 2018 study by Kleist and colleagues tested chronic compressor noise on cavity-nesting birds in New Mexico. The authors called noise "a chronic, inescapable stressor." Their key findings:

- **Stress hormones changed in both directions.** Baseline stress hormone levels fell in adult females and nestlings, while nestlings' response to a sudden stress rose.
- **Breeding success dropped for one species.** Western bluebirds hatched fewer eggs as noise rose. The other two species showed no clear hatching effect.
- **Growth followed a curve.** Nestling growth peaked at intermediate noise levels, around 70 dB, and fell at both lower and higher levels.

The study measured birds in gas fields, not cranes, so it does not settle how cranes would respond. Still, it shows that noise can change hormones and breeding in birds at levels common near industrial sites.

For cranes, the relevant risk is at roost. A roost is where birds sleep, and disturbance there can cost them rest and time to feed. Noise also makes it harder to hear one another: birds raise their calls to be heard, which uses energy, and a constant hum can hide the calls of predators and flock-mates.

Effects on people

WHO's 2018 environmental noise guidelines reviewed the health evidence for transport and other environmental noise. They link noise to these outcomes: cardiovascular and metabolic effects, annoyance, sleep disturbance, cognitive impairment, hearing problems and tinnitus, adverse birth outcomes, and reduced quality of life and mental health.

The effects that matter most for a quiet rural community are these:

- **Sleep.** Noise that breaks sleep, even when people do not fully wake, can leave them tired and less alert the next day. Night noise is the most important exposure to limit.
- **Annoyance.** A steady, unpredictable hum can be a daily source of stress even when it is not loud. Annoyance is the most common response to noise in surveys, and it is strongest for sounds people cannot control or escape.
- **Heart and stress.** WHO's review links long-term exposure to road traffic noise with higher rates of heart disease. Stress from chronic noise is one proposed route, though the strength of that link for industrial sources is less studied.

Low-frequency hum adds a complication. Because the sound is felt as much as heard, people often report pressure, vibration and headaches in addition to annoyance, and these reports are hard to test with standard meters.

Levels and what they do

These levels are drawn from the studies above and are not a single standard. Night levels in WHO's guidelines are the ones to check against any project's noise study.

Level	What the research shows	Source
About 30 dBA	Typical quiet rural night, the baseline a new hum would stand out against	Local ambient level, cited in our crane piece
40 dBA	Terrestrial wildlife responses begin	Shannon et al. 2016

Level	What the research shows	Source
40 dB at night (Lnight)	WHO's night-noise guideline level, set to protect sleep	WHO Night Noise Guidelines, 2009 (verify before quoting)
45 dB at night (Lnight)	WHO 2018 night guideline for road traffic noise	WHO Europe (verify the value in the full report)
50 dBA	One in five wildlife studies recorded effects at or below this	Shannon et al. 2016
About 58 dB	Normal conversation; a rough estimate for a source about one-third of a mile away	Our calculation from Environmental and Energy Study Institute data (March 2026), as in the crane piece
About 70 dB	Nestling growth peaked near this level and fell above it in a New Mexico study	Kleist et al. 2018 (measured in dB(F))

The last two rows are not comparable to the first ones. Wildlife studies use A-weighting or other scales, and the Kleist study uses a different measure. Read each row against its own source.

What the research does not yet show

- **Industrial hum specifically.** Most human studies look at road, rail or aircraft noise. Few have measured people living beside a data center or similar low-frequency industrial source.
- **Rural and dark-sky settings.** The wildlife synthesis found research concentrated in a few species and regions. Desert and high-plains species, including the sandhill crane, are not well covered.
- **Long-term, round-the-clock exposure.** Most studies last weeks or a few years. The effects of a source running for decades, or of one that never stops, are largely unknown.
- **Measurement.** Standard A-weighted meters undercount low frequencies, so the level people feel may not match the number on a report. Noise studies should measure low frequencies directly.

These gaps cut both ways. Where the research is thin, a project's developer can say the effect is unknown. Equally, no one can show that a site this size is safe. That is why the County's noise study should be required before any hearing.

Sources

- Shannon, G. et al. (2016). A synthesis of two decades of research documenting the effects of noise on wildlife. *Biological Reviews* 91(4).
- Kleist, N. et al. (2018). Chronic anthropogenic noise disrupts glucocorticoid signaling and has multiple effects on fitness in an avian community. *journal to verify*.
- World Health Organization Europe. New WHO noise guidelines for Europe released, October 2018.
- Leventhall, G., Pelmear, P. and Benton, S. (2003). A review of published research on low frequency noise and its effects. UK Department for Environment, Food and Rural Affairs.
- Environmental and Energy Study Institute (March 2026), data center noise levels, as cited in *Sandhill Cranes, the Willcox Playa, and Data Center Noise* (October 30, 2026).

Not yet verified in full: the WHO 2009 and 2018 numeric night-noise values in the levels table. Check them against the WHO *Environmental noise guidelines for the European Region* before quoting.