



## 7-Steps to Solving Noise Nuisance Complaints About Stationary Farm Equipment



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**Abstract.** Noise is unwanted sound. Although rural areas are generally quiet, farmers live in a competitive world, and modern farms sometimes use noisy stationary equipment. Unresolved rural noise problems can result in poor neighbour relationships. Most farms in Ontario are covered under *The Farming and Food Production Protection Act, 1998 (FFPPA)*, which protects farmers against nuisance complaints (such as noise) from neighbours if it is caused by a normal farm practice. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Engineers working in a field office respond to nuisance complaints such as agricultural noise as part of their jobs. These are tricky to solve as not all staff have the same background in sound measurement and abatement. This paper includes a flowchart with seven steps to resolve agricultural noise nuisance complaints about commonly used stationary farm equipment. It also provides information on describing noise nuisance from stationary farm equipment, the attenuation of sound, and common noise nuisance complaints.

**A Community of**

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## Introduction

Noise is unwanted sound. Although rural areas are generally quiet, farmers live in a competitive world, and modern farms sometimes use noisy stationary equipment (Figure 1). Unresolved rural noise problems can result in poor neighbour relationships. Avoid problems before they start by using best management practices and common sense. This paper includes a flowchart with seven steps to resolve agricultural noise nuisance complaints about commonly used stationary farm equipment. It also provides information on describing noise nuisance from stationary farm equipment, the attenuation of sound, and common noise nuisance complaints.



Figure 1. Wind machines are used worldwide to protect crops against cold injury.

### ***Agricultural Noise Regulations***

Most farms in Ontario are covered under *The Farming and Food Production Protection Act, 1998 (FFPPA)*, which protects farmers against nuisance complaints (such as noise) from neighbours if it is caused by a normal farm practice. The FFPPA defines ‘normal’ as one that:

- is conducted in a manner consistent with proper and acceptable customs and standards, as established and followed by similar agricultural operations under similar circumstances, or
- makes use of innovative technology in a manner consistent with proper advanced farm management

It is unrealistic to eliminate all noise produced on farms, but if noise complaints escalate and cannot be solved locally, the Normal Farm Practices Protection Board (NFPPB) — a quasi-judicial board appointed by the provincial government under the FFPPA — may get involved.

### ***Steps to Solving Noise Nuisance Complaints***

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Engineers working in a field office respond to nuisance complaints such as agricultural noise as part of their jobs. These are tricky to solve as not all staff have the same background in sound measurement and abatement.

The author attempts to follow a logical sequence of investigation (Figure 2). All complaints are different, so this sequence varies. Discussion of the steps follows.

## **Step 1**

OMAFRA has a 1-877 phone number for the *Agricultural Information Contact Centre (AICC)*. Clients receive information from staff on every imaginable topic, including nuisance complaints. The FFPPA refers to a client with a nuisance complaint as an *Applicant* and the farmer alleged to be creating the nuisance as a *Respondent*. AICC are often able to resolve complaints right on the phone or email. However, some cases need more investigation, so AICC staff sends a report on the ones they cannot solve to the relevant OMAFRA field engineer for Step 2.

## **Step 2**

Before responding to an *Applicant*, the author does a preliminary investigation. It saves time. The AICC report gives *Applicant* addresses and sometimes the *Respondent's*. The author uses aerial photos, topographic maps, and *Google Street View™* (Figure 3) to help put perspective on the lay of the land. It demonstrates to an *Applicant* you take their concern seriously and improves communication. It helps to know distances between stationary farm equipment and an *Applicant's* dwelling, topographical differences between sites, prevailing wind direction and ground surfaces. Ask if the *Applicant* has spoken to the *Respondent*, which is unlikely. *Respondents* are never happy when someone complains to a third party. Ask them about the loudness, character, hedonic tone, timing, exposure and nature of sound – all described in this paper. Sometimes, this phone call ends the complaint. If not, it is time for Step 3.

## **Step 3**

Before meeting an *Applicant*, the author drives by their home to park and 'listen' to understand the alleged noise nuisance without the *Applicant's* knowledge. Often, facts have been skewed and need to be verified. When you do meet the *Applicant*, bring aerial photos and topographical maps. Let the *Applicant* tell you their story and ask probing questions, many which may have little to do with the alleged noise, as there is often more to the story than you realize. There may be a history of conflict on other things between the *Applicant* and *Respondent*.

Write notes on current/prevailing wind directions, current wind speed, air temperature, relative humidity, precipitation, cloud cover and time of day. Is it a new sound, or if not new, what has changed? Why does it bother them now? Are they spending more time at home now? Do they work shifts? Is the noise worse in some locations or at some times? Listen to the alleged noise nuisance at locations inside and outside the dwelling. Is there low frequency noise with long wave lengths which travel long distances? If it is an intermittent noise, time the interval between those noises. Is it an impulsive sound, or tonal? Can the source be seen? Is the noise produced by a stationary source closer to the *Applicant's* dwelling than the *Respondent's*?

Taking sound measurements is not always necessary. Sound studies are time consuming, must be done under proper conditions and timing, and can be costly. Regardless what a sound meter measures, if an *Applicant* is bothered by a noise, they are bothered by it regardless if it is 50 dBA or 80 dBA, which are drastically different sound levels. Taking your body temperature will tell you if you have a fever, but if you feel lousy, you feel lousy, regardless of your temperature. The author has measured sound levels of 50 dBA that bother people, and levels of 80 dBA that do not. Discuss management of the stationary farm equipment. For wind machines, they may not know how, or why, or how often it is used. Sometimes, more information is all an *Applicant* wants and they drop their complaint. However, if they do not, it is time for Step 4, but this will alert the *Respondent* and even though the author will not tell them who complained, it often is obvious. The author gets the *Applicant's* permission to proceed knowing there is this possibility.

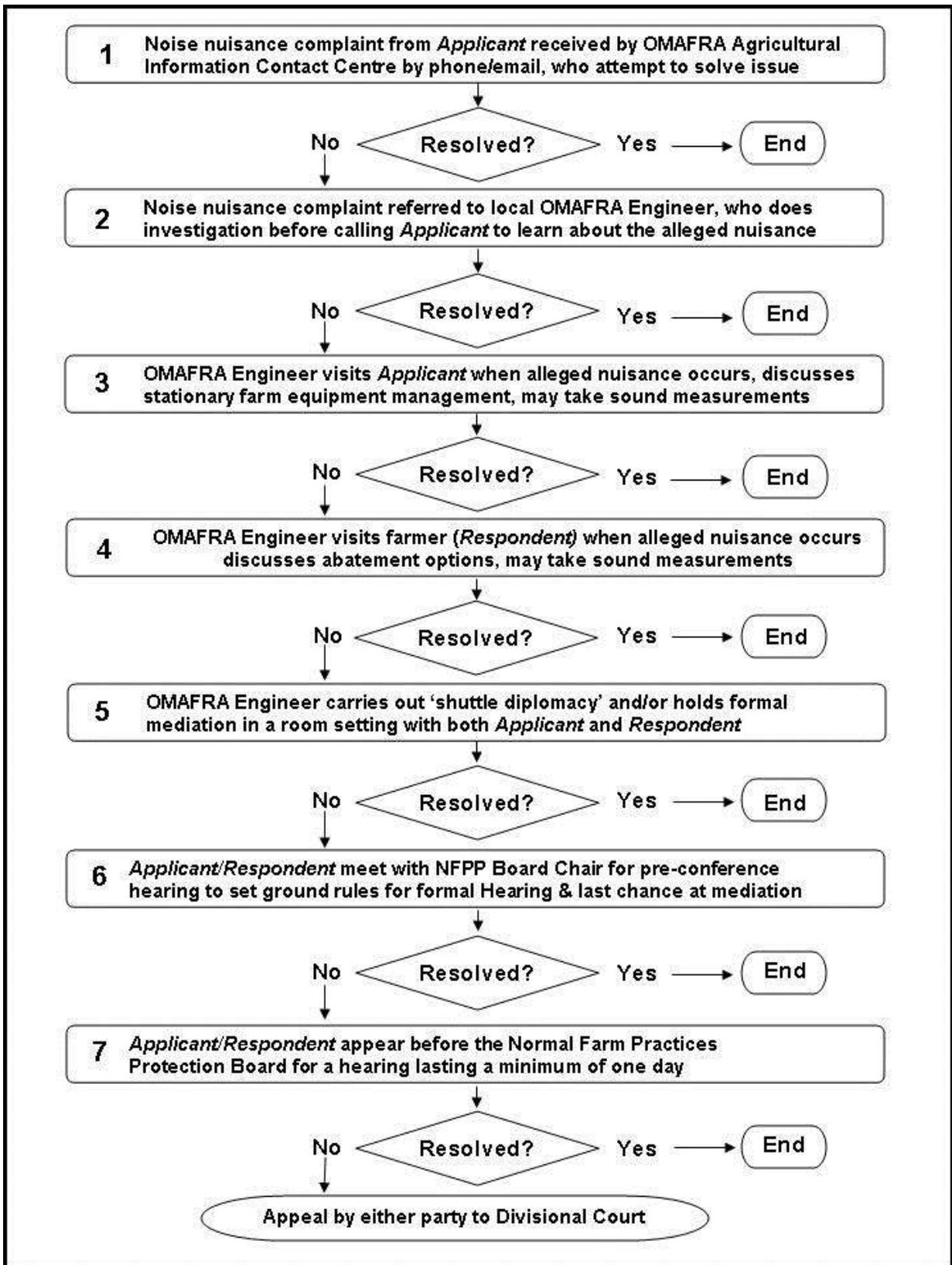


Figure 2. Flowchart of steps for solving agricultural noise nuisance complaints



Figure 3. Google Street View™ is a helpful tool in solving noise nuisance complaints because it helps put perspective on the lay of the land. The author's office is on this site.

#### **Step 4**

Up to this point, the farmer, or *Respondent*, has no knowledge there has been an alleged noise nuisance complaint. The author always calls a *Respondent* on the phone to make this first contact. Visiting them on a cold call to tell them there has been a complaint is a bad idea. It puts one in an adversarial, regulatory role rather than a helpful, extension role. Putting *Respondents* at ease is important, but difficult. Often, a *Respondent* will invite you to visit to discuss the matter, which is much better than telling them you are coming out. OMAFRA Engineers have no authority to go on someone's property without their permission, so by invitation is the only way.

One must be prepared for a *Respondent* to get their back up. They will be upset the person who complained didn't speak to them first. They will ask who complained and of course this cannot be divulged. Discuss the concerns of the *Applicant*. Do not take sides, nor say what they are doing is, or isn't, normal farm practice. Discuss best management practices, preferably published ones. Discuss options to reduce the alleged noise nuisance. The extension way is to give options and let them decide the best alternative for them. Do not prejudge solutions.

Discuss what could happen if the situation escalates to a Hearing of the Normal Farm Practices Protection Board (NFPPB). If the *Respondent* agrees to do some things to reduce the alleged noise nuisance and you are sure this will stop complaints, this may be all that is necessary. You can call the *Applicant* and this may end the complaint. If not, move to Step 5.

#### **Step 5**

The author calls this step 'shuttle diplomacy' meaning in more difficult issues, there could be a few back and forth phone calls, or visits to the *Applicant* and *Respondent* that may or may not involve the two parties meeting to discuss things. Usually, there is no interaction between the parties. Sometimes shuttle diplomacy ends the complaint. However, a formal mediation meeting of both parties in a neutral room setting might be appropriate. It is beyond the scope of this paper to discuss everything that should happen at this type of meeting, but it is an interest-based mediation, attempting to come to a simple written agreement that satisfies as many of both parties 'interests' as possible. This agreement is confidential between the parties, but signed as a witness by the author. However, agreements are not always possible, and this leads to Step 6.

## Step 6

At this point, the *Applicant* may elect to make a formal application to the NFPPB for a hearing. This application may have already been done earlier in the process as well. However, no Board hearing can proceed until all attempts at mediation have been exhausted. This has to be confirmed in writing to the Secretary of the NFPPB by the OMAFRA Agricultural Engineer.

The Secretary starts the process of booking dates for a Preconference Hearing and the Board Hearing itself. The purpose of the Preconference Hearing is to set down the ground rules for the Board hearing. It is chaired by either the Chair or the Vice-Chair of the NFPPB and both the Applicant and Respondent, and/or their representatives, plus the Secretary of the NFPPB. This is a last chance for both parties to decide if they truly want to go to a formal Board hearing which can be time consuming, difficult and costly. It also results in a winner and a loser. Sometimes, the noise nuisance complaint is 'solved' right at this step. If not, move to Step 7.

## Step 7

The Board hearing is the last step. If the Chair presided at the Preconference Hearing, the Vice-Chair will lead the hearing and vice versa. Two other members of the Board are chosen from a pool of farmers from across the Province, all who have had training in this type of work, but none who would know either the *Applicant* or *Respondent*. These farmers will not be from the same part of the Province or even be in a similar farming system. The *Applicant* or *Respondent* may elect to be represented by lawyers, but it is not necessary. Board hearings last at least one day, depending on the number of witnesses called. The OMAFRA Engineer may be subpoenaed as a witness by either the *Applicant* or *Respondent* or in some cases by the Board itself. The Board's decision is made only on the basis of what they are told or shown at the Hearing by witnesses. Their decision is final, although it can be appealed to Divisional Court just like any other court decision.

## Describing Noise Nuisance

The remainder of this paper describes noise nuisance. This is important in solving the issue. Noise is difficult to describe because what annoys people is subjective. Sounds are described by their amplitude, loudness, persistence and character, similar to describing odours (Table 1).

**Table 1. Comparing sound and odour descriptors**

<b>Sound</b>	<b>Odour</b>
<b>Amplitude</b> Strength of sound measured in decibels (dB)	<b>Concentration</b> Strength of odour measured in odour units (OU)
<b>Loudness</b> Perceived changes in sound to human ears	<b>Intensity</b> Perceived strength compared to odour of the chemical n-butanol
<b>Persistence</b> How much distance is needed to dilute a sound below detection level	<b>Persistence</b> How much clean air is needed to dilute an odour below detection level
<b>Character</b> Tonal, beating, impulsive, intermittent	<b>Character</b> Minty, citrusy, fishy, earthy, etc.

### **Amplitude**

Sound amplitude, or level, is measured in decibels (dB). Sound meters use an A-weighting setting that more accurately reflects how humans hear sound (dBA). A-weighting is commonly

used for measuring environmental noise such as from stationary farm equipment. Other weightings are used to reflect very specific types of sound. It takes training to measure sound, and acoustical consultants are often hired to do sound studies.

### **Loudness**

Sound loudness is the perceived change between two sound levels. Human ears are good at perceiving increased or decreased changes in sound, but what does that mean objectively? :

- $\pm 1$  dBA change. Most people would say this is an *undetectable* variation in two sound levels.
- $\pm 3$  dBA change. Most people would say this is a *noticeable* variation in two sound levels.
- $\pm 6$  dBA change. Most people would say this is an *obvious* variation in two sound levels.
- $\pm 10$  dBA change. Most people would say this is twice as loud (or half as loud) as the original sound level. This is considered a *significant* change.

### **Persistence**

Sound persistence is how easily a noise decreases with distance away from a noise source until it is not detectable. This takes long distances for some types of sounds. It is important to understand that some noises can impact a neighbour further away than one might reasonably expect. However, just detecting a sound does not automatically mean it is a nuisance.

### **Character**

Sound character is a subjective descriptor, such as a sound's tonality (whine of a circular saw), beating (wind machine blades beating against a strong wind), impulse (occurring for less than one-tenth of second, such as a door slamming) or intermittence (not continuous, but remaining on longer than 1 second, such as an exhaust fan, with long periods of quiet in between).

### **Hedonic Tone**

Not typically used as a descriptor of sound, hedonic tone is used to describe odours: negative for unpleasant and positive for pleasant. This concept might also help describe a sound. On a scale that ranked the unpleasant sound of fingernails scratching down a blackboard as -10 and the sound of soft harp music as +10, people might subjectively describe noise nuisance as a -7.

## **Attenuation of Sound**

Sound levels attenuate, or decrease in intensity, as a result of absorption of the sound wave energy and scattering out of the path of a receptor such as a neighbour.

### **Ambient Sound Levels**

Sound generated by stationary farm equipment may be considered a noise nuisance if the sound levels are higher than the ambient or surrounding background sound level. In remote rural areas, ambient sound is produced from natural sources, such as wind blowing through trees, running water, birds and insects. In urban areas, ambient sound is produced from human sources, such as road traffic creating an urban hum. Ambient sound levels in rural-urban interface areas may be 5 dBA (or more) higher than in remote rural areas.

## ***Geometric Spreading***

Sound generated by stationary farm equipment reduces by the square of the distance from the equipment. When distance doubles, sound levels typically drop 6 dBA. So, 90 dBA at 5 m is 84 dBA at 10 m, 78 dBA at 20 m, and so on. Because of atmospheric and surface effects, sound levels rarely decrease exactly 6 dBA with doubling of distance.

## ***Atmospheric Effects***

Sound levels are affected by atmospheric effects but are usually only noticeably different at distances beyond 100 m from stationary farm equipment. Sound waves move faster in warm air than cold air. If the wind direction is from the west, sound levels are increased to the east of stationary farm equipment and decreased to the west. Rain, snow or fog has little effect on sound levels. Fog horns have a deep sound because they produce low frequency sounds that travel long distances. Bass sound waves from a music system can travel long distances and penetrate the walls of homes, whereas high-frequency waves, such as “treble” on a music system, do not travel as far and do not penetrate walls as easily. High-frequency sounds are potentially more detectable and potentially more annoying than low-frequency sounds.

Normally, air temperatures decrease with increasing height above ground. This causes sound waves to bend upward and away from receptors. However, under temperature inversions, air temperatures increase with increasing height above ground. These conditions generally occur at night when the wind is calm, the sky is dark and starlit, and daytime heat energy stored in the earth is re-directed back to the atmosphere, leaving behind cold air at the ground. This causes sound waves to bend downward off this upper layer of warm air, so sound waves can be heard at long distances. Low-frequency sound waves from a train already travel long distances, but with temperature inversions, travel even further.

## ***Surface Effects***

Soft thick grass and rough vegetation can reduce sound levels by as much as 10 dBA but hard, smooth surfaces such as concrete, or even water, do not offer much reduction. Low-frequency sounds are reduced little by surface effects. Sounds produced high above ground level are less reduced by surface effects. If stationary farm equipment is pointing so the sound is directed at a neighbour, it has more potential for nuisance than equipment pointing away from them.

A row of trees would only reduce sound waves if the tree screen is at least 30 m thick. However, trees may hide the source of the sound, which has aesthetic and psychological benefits, and might introduce other masking sounds of rustling leaves, singing birds and small animal activity.

## **Common Noise Nuisance Concerns**

If a noise nuisance issue proceeds to the Normal Farm Practices Protection Board, the onus of proof is on the applicant (person complaining about the noise) to establish they are affected by a noise disturbance caused by a respondent (person accused of creating the noise). Noise is sometimes seen as intrusive to one’s privacy, or as interfering with the normal conduct of their lives. Certain rural sounds annoy some residents more than others.

## ***Comparison to Background Sound Levels***

If stationary farm equipment creates sound amplitude levels higher than background levels, they can be perceived as noisy and intrusive, as the noise is immediately recognizable in the presence of low ambient sound amplitude levels.

### ***Summer vs. Winter***

Stationary farm equipment may be perceived as noisier in the summer than in winter as people are more likely to have their windows open in summer or stay outside for longer periods.

### ***Daytime vs. Nighttime***

Stationary farm equipment operating at night, including late evening and early morning, may be perceived as noisier and more intrusive than daytime operation, as some people get annoyed when their sleep is interrupted. Night shift workers might disagree if daytime sleep is interrupted. Sound waves often travel further at night because of atmospheric conditions and of course there are fewer noises to mask the sound.

### ***New Sounds***

Stationary farm equipment operating in neighbourhood never experiencing that particular sound before may be perceived as noisy and intrusive. New sounds are more difficult to get used to.

### ***Exposure Time***

Stationary farm equipment operating long periods can be perceived as noisy. An irrigation pump operated 250–500 hr/yr may seem noisier and more intrusive to someone's life than a wind machine operated 25–50 hr/yr, even if the sound amplitude levels are comparable.

### ***Impulsive vs. Intermittent vs. Continuous Sound***

Some say impulsive or intermittent sounds are a nuisance because of their randomness. The anticipation of the next noisy sound keeps people on edge. Others say continuous sounds are a nuisance because they never stop.

## **Conclusion**

Noise nuisance issues can be difficult to solve. A good discussion between a farmer and their neighbour is the best solution for lasting neighbourhood relationships. Sometimes neighbours are more accepting of noise from stationary farm equipment when they fully understand how that noise is created and if they believe the equipment is being operated under normal farm practice. Farmers often have few options to protect their crops (wind machines and bird bangers), feed their crops (irrigation pumps) or condition their crops (grain dryers). As one grape grower in Niagara told his neighbours, "If I had a fire in my shed, you'd be the first to come to help me save my livelihood. So when my wind machines run, you are also helping me save my livelihood by tolerating the noise a few nights of the year."References

## **References**

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