

August 14, 2023

Lena La Fleur  
Four Paws Pet Services  
3440 Meadow Road  
Verona, Wisconsin 53593

Re: Results of Sound Study for the Proposed Four Paws Pet Services Facility

Lena,

This letter describes the methods and results of an assessment of potential noise impacts from the proposed Four Paws Pet Services facility (Facility) located at 3440 Meadow Road in the Town of Middleton, Wisconsin. The following provides a summary of the results of our study, followed by details of our qualifications, testing, and analysis of results.

### **EXECUTIVE SUMMARY**

- Both broadband “white noise” and a recording of multiple dogs barking were broadcast over a powerful speaker system inside the proposed Facility at very high levels (~100 dBA). This is considered representative of worst-case conditions where multiple dogs are barking vehemently and simultaneously. It was uncomfortably loud inside during the test, and it is unlikely that it will be that loud. It was louder than operational kennels we have experienced.
- All windows were closed during the tests, as will be the case during Facility operations.
- The roll-up door on the east end of the building was closed, as an internal wall is planned inside the Facility that would block noise from reaching this door.
- Regarding the west roll-up door, tests were conducted both with this door fully open and fully closed, as the applicant would prefer to have the option of opening this door on warm days.
- Observations (listening) tests were conducted at the residences to the southeast on Feather Edge Drive. The broadband noise from the Facility was not audible at all, even during lulls in sounds from residential air conditioners, birds/insects, occasional construction, and distant traffic. Ambient noise levels were ~35 dBA, which is a typical quiet suburban daytime level.
- Observations were made around the Facility property with the door open and door closed while both broadband and dog noise was being produced inside the Facility.
- At the southeast corner of the property, broadband sound and dog noise were barely audible, even with the west roll-up door open. The nearest residences in this direction are twice as far from the Facility as this southeast observation point. Given this, we do not believe dogs barking inside the Facility will be audible at the residences on Feather Edge Drive.
- At the northeast corner of the property the generated sounds were barely audible with the west door open or closed. The nearest residence in this direction is twice as far from the Facility as this northeast observation point, therefore audibility there is expected to be lower.
- At the northern border of the property the generated sounds were barely audible with the door closed. The nearest residence in this direction is four times as far from the Facility as this northern observation point. But opening the west roll-up door causes an increase in the audibility of noise generated inside the Facility.

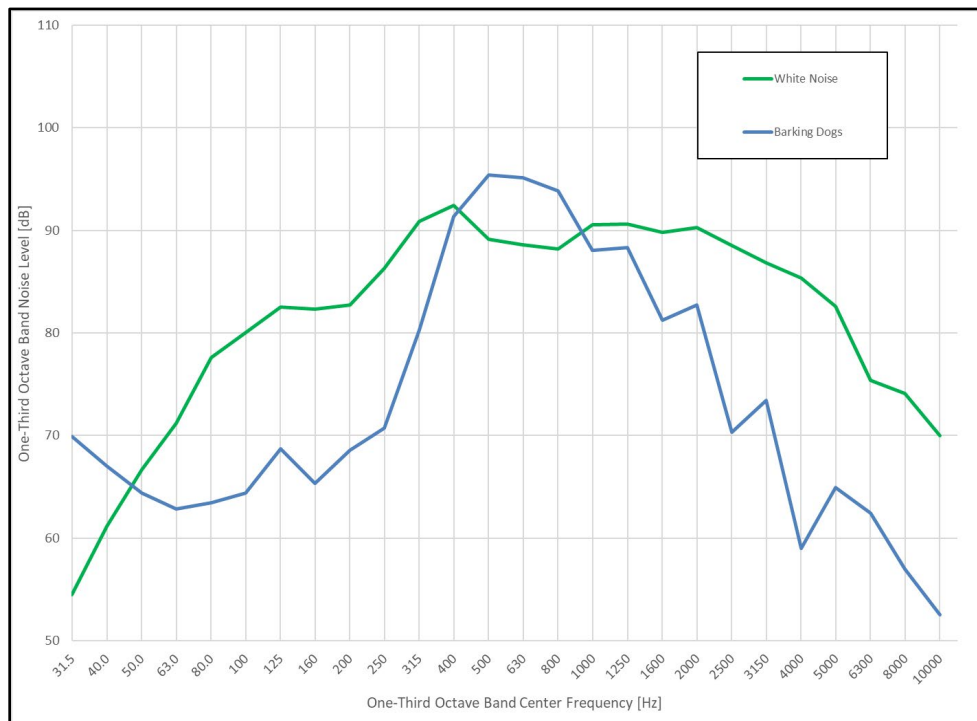
- Noise levels could be reduced by installing sound absorption materials inside the Facility, if necessary due to complaints. This would reduce noise inside, benefiting staff and dogs, as well as reduce the amount of noise outside.

## QUALIFICATIONS

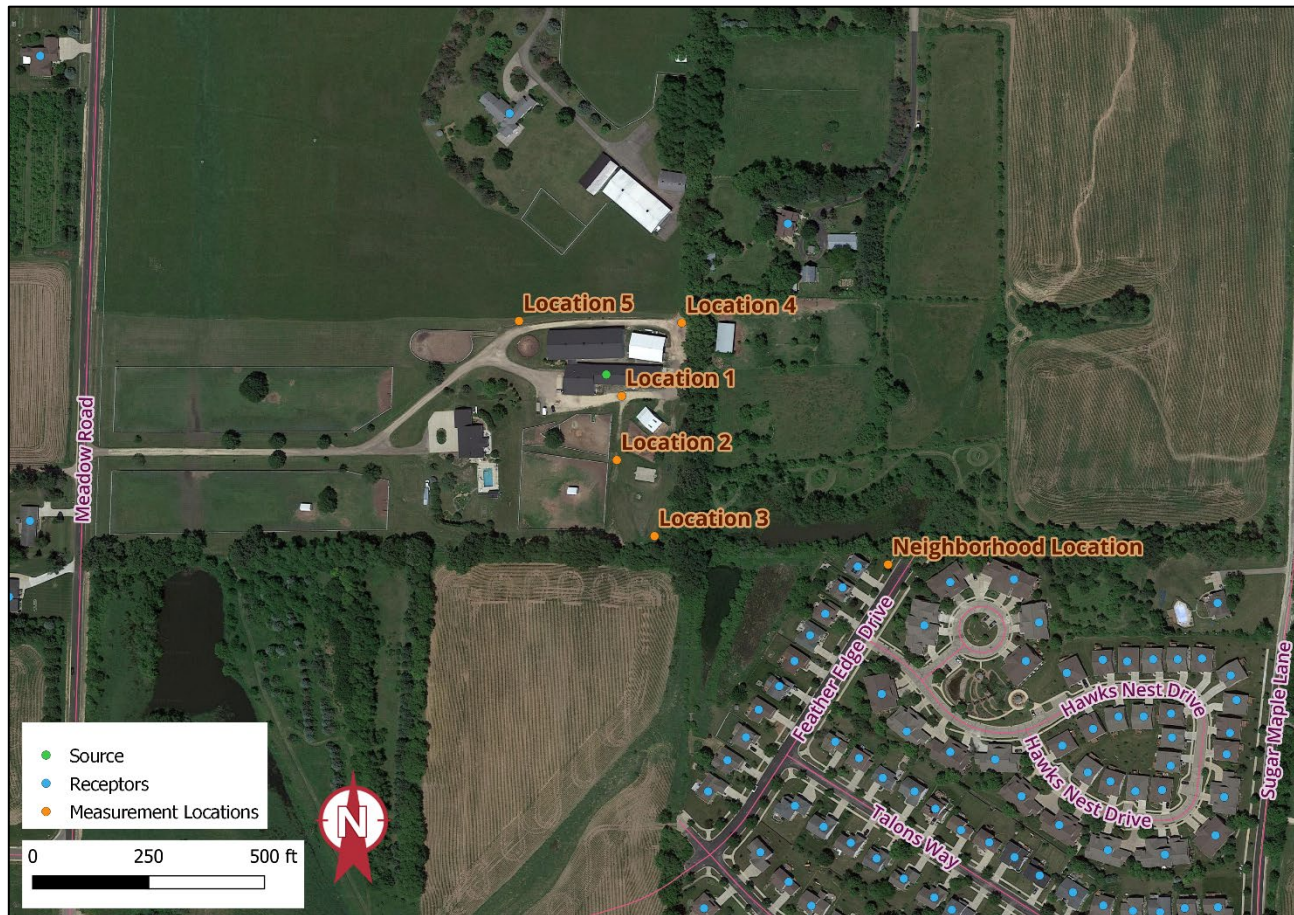
Mr. Hankard has been practicing in the field of acoustics for the past 33 years. His firm, Hankard Environmental, Inc., has completed over 600 environmental noise projects relating to land development of various types (including dog kennels), gravel pits, wind and solar energy facilities, transmissions lines, and mines. Mr. Hankard has experience in all aspects of environmental noise, including field measurements, predictions, mitigation design, and expert testimony at local, state, and court proceedings. His professional resume is attached. See [www.hankardinc.com](http://www.hankardinc.com) for more information. Mr. Spencer Thomas, who assisted in this effort, graduated from the University of Hartford with a degree in mechanical engineering with a concentration in acoustics. He has worked on a variety of acoustical consulting projects, including dog kennel noise analyses.

## TEST DETAILS

A set of Vidsonix Super Nova X12A powered speakers and a Brüel & Kjaer Omnipower dodecahedral speaker powered by a Yamaha P1600 amplifier were set up in the center of the proposed kennel area inside the Facility. Larson Davis 831 sound level meters (ANSI Type 1) were used to measure resulting noise levels outside the Facility. The meters were calibrated during the survey using a handheld calibrator and were certified by an accredited laboratory within the past year. Broadband noise, which is a random signal of sound with equal intensity across the audible frequency spectrum, was played, as was a recording of dogs barking. Both were produced at levels of 97 to 100 dBA inside the Facility, which represents the scenario of a large group of dogs barking loudly (Purdue University, 2016). Figure 1 shows the frequency spectrum of both sources.



**Figure 1. 1/3 Octave Band Noise Levels Produced Inside Facility**



**Figure 2. Site Overview**

## LISTENING TEST RESULTS

While the recording of dogs barking was playing, listening tests were conducted at the locations shown in Figure 2 around the edges of the property both with the roll-up door on the west end of the building closed and open.

- With the east and west roll-up doors closed:
  - Barking was audible at Locations 1 and 4.
  - Barking was audible, but barely, at Locations 2 and 5.
  - At Location 3, barking was only audible during times of very low background noise and only when one listened carefully. In other words, not audible most of the time.
- Opening the west roll-up door did not significantly change the audibility of noise at Locations 1 through 4. Audibility did increase at Location 5, and barking may be more audible at the residence to the north with this door open.
- One listening test was conducted on Feather Edge Drive while the broadband noise was being produced and the west roll-up door was both open and closed. Noise from the Facility could not be discerned at all, even when straining to listen for it, and even during lulls in sounds from other sources, such as local traffic, construction at the soccer fields, etc.

## NOISE LEVEL MEASUREMENT RESULTS

Table 1 shows the results of the measurement of noise levels both inside and outside the Facility while broadband noise was being produced. The  $L_{90}$  was used to present noise levels, which is the noise level that is exceeded 90% of the time. The  $L_{90}$  is representative of the constant noise in an environment (which in this case was the broadband noise being played) and the transient noise in an environment (traffic, birds chirping, etc.).

The results show that, in the direction of the Feather Edge Drive residences, measured levels are much lower at Location 2 than at Location 1, but do not significantly drop from Location 2 to Location 3. This is indicative of noise from the Facility being the controlling noise source only relatively close to the building. Once one moves to Location 3 ambient sounds are just as loud and noise from the Facility is no longer controlling the measured total noise level. This is consistent with the results of the listening tests. The distance from the Facility to the residences on Feather Edge Drive is almost double the distance from the Facility to Location 3, which means that noise from the Facility is expected to be 6 dBA less at the residences than that measured at Location 3, making it even less audible. Again, this comports with the result of the Feather Edge Drive listening test. In the direction of the residences to the northeast and northwest, measured noise levels were also in the 40 dBA range.

**Table 1. Measurement Results – Broadband Noise**

Measurement Location	$L_{90}$ (dBA)	
	Door Closed	Door Open
Inside Barn	100	98
Location 1	50	48
Location 2	41	41
Location 3	40	37
Location 4	40	-
Location 5	-	-
Feather Edge Drive	36	-

- No measurement

## CONCLUSIONS AND RECOMMENDATIONS

- Overall, the existing building does a very good job of blocking noise from reaching nearby residences. This conclusion is valid for the case of all windows being closed and the east roll-up door closed, as will the case during Facility operations.
- In fact, noise from dogs inside the Facility is not expected to be audible at any of the adjoining residences a majority of the time, particularly at the Feather Edge Drive neighborhood.
- This conclusion is true for the case with the west roll-up door open in the direction of Feather Edge Drive and the nearest residence to the northeast, but less so for the residence to the northwest.
- The applicant discussed with us the possibility of installing acoustic baffles inside the Facility to absorb noise and make the interior environment more palatable to workers (and dogs, perhaps). This would serve to further reduce exterior noise levels as well.

- Panels covered in nylon or PVC fabric, such as the NetWell Noise Control VET baffles, or similar, should be considered for ease of cleaning. Ten to 15 2'x4' baffles will significantly lower reverberation time and improve speech audibility inside.
- During the tests it was noted that one of the ways for sound from the interior to escape the building is through the ventilation cupolas that extend through the roof. If noise from the Facility does pose a problem for neighbors, these ventilation shafts can be lined with acoustically absorptive material. Again, panels covered in nylon or PVC fabric should be considered for ease of cleaning.
- Note that an exterior dog run is also being proposed, which was not analyzed as part of this study.

Thank you very much for commissioning Hankard Environmental for this study. If I can answer any questions or provide additional information, please call.

Sincerely,



Michael Hankard  
*Owner / Principal Acoustical Consultant*  
*Member INCE and ASA*