RUSSELL ACOUSTICS, LLC
Consulting Engineers in Sound and Vibration

1525-A BEAVER DAM ROAD
POINT PLEASANT, NJ 08742
973.283.0001
973.464.9724 (CELL)

11 October 2020

Mr. Rex J. Alexander
Five-Alpha LLC
12308 Redding Dr
Fort Wayne, IN 46814

Re: Minnesota Heliport Sound Study
Complying with Minnesota Rule 7030

Dear Mr. Alexander:

You asked for my review of the above State of Minnesota rule regarding noise exposures and the proposed use of a helistop for DKPA Heli in Webster. As I understand it the proposed use is for a helicopter (Bell 206L). You asked that I review the use with respect to the Minnesota noise exposure requirements.

The MPCA says this about the limits:

> For residential locations (NAC 1), the limits are L10 = 65 dBA and L50 = 60 dBA during the daytime (7:00 a.m. – 10:00 p.m.) and L10 = 55 dBA and L50 = 50 dBA during the nighttime (10:00 p.m. – 7:00 a.m.) (Minn. R. 7030.0040). This means that during a one-hour period of monitoring, daytime noise levels cannot exceed 65 dBA for more than 10 percent of the time (six minutes) and cannot exceed 60 dBA more than 50 percent of the time (30 minutes).

The Rule considers the sound over an hour. During that time the sound level from the source in question can exceed 65 dBA for not more than six minutes; that could be one six minute period, two three minute periods, etc. It doesn't matter what the sound level is if it is over 65 dBA, just that the total exceedance time can't be more than six minutes in an hour.

Note that the metric is "dBA," or A-weighted decibels. Not EPNdB, not SEL, not Leq, etc. I mention this because people tend to latch on to "decibel" numbers and compare them when, in fact there are many different kinds. Further, the measurements are to be made with an instrument meeting the "specifications for ANSI S1.4-1983 Type 0, 1, 2, or S." This is not an "app" on a cell phone. The MPCA document, "A Guide to Noise Control in Minnesota," is a good primer on the subject.

A key question, then, is how long does a helicopter approach or departure last? Given a few basic parameters and high school Physics we can calculate the expected times.

You told me the angle of approach would be 12 degrees; this is, from my experience, a typical, reasonable number. The FAA defines the designated air space, i.e. the 8:1 approach/departure surface, of all private-use heliports, as being 4,000 feet in length and starting at the edge of the Final Approach and Takeoff Area, which varies in size according to the design aircraft. In that distance a

helicopter on a normal approach, besides descending from its starting altitude (about 840 feet above pad elevation), has to slow down from its cruise speed of 110 knots (horizontal) to 0 knots at three feet above the pad. From 500 fee altitude if we do the math this means the decent would take 25.8 seconds.

A take-off or departure is a bit more complicated because the aircraft accelerates forward, while climbing, and gets to a speed that gives it a "best rate of climb," whereupon it holds a constant speed until reaching altitude. From the Bell 206L published performance data, the time to reach 500 and a maximum gross weight of 4,000 pounds, that time is 27.3 seconds.

Assuming the helicopter lands and departs within the same hour (I'm assuming a sliding one-hour window, not integer clock hours) the total time is 53.1 seconds. The Minnesota Rule limits the time in an hour (assuming the sound levels are all above 65 dBA) to six minutes, or 360 seconds. The proposed use could have upwards of six takeoffs and six landings in an hour, every hour, from 7 AM to 10 PM, and fully comply with the Minnesota rule. The number of allowable approaches and departures may in fact be greater, however we would need to conduct a full on-site sound study that measured the ambient background noise levels to calculate those numbers.

The sound exposure from the proposed use is very small compared to the allowable criterion and meets the Minnesota requirements.

Yours truly,

Norman R. Dotti, PE, PP, INCE
Principal

NRD/me