Fact Sheet on Proposal for Outlying Landing Field (OLF):

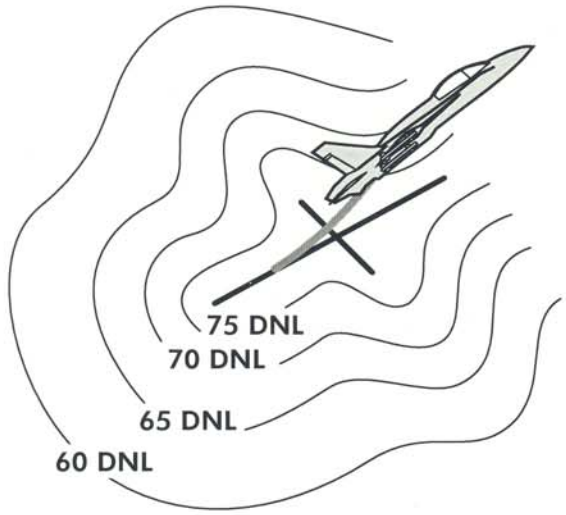
Noise Summary

North Carolina OLF Study Group • Elizabeth City, NC • October 23, 2007

Noise is measured in A-weighted decibels abbreviated as dBA and commonly shortened to dB. A dB is a unit of sound pressure with greater intensity than the ambient, or background, sound. It is the unit of measure that best reflects the range of human hearing. The smallest increase in noise levels that is perceptible to the human ear is generally a 3-dB noise increase. The Navy measures noise levels of aircraft operations using two common noise metrics: the day-night average sound level (DNL) and the sound exposure level (SEL).

Day-Night Average Sound Level (DNL)

The day-night average sound level (DNL) is the average of all sounds made over a 24-hour period. DNL accounts for the maximum noise levels, the duration of the operations, and the number of operations that occur over a 24-hour period.



The DNL is depicted as a continuous contour line around a noise source usually with 5-dB increments between the contours. The area between two noise contours is known as a noise zone. The U.S. Environmental Protection Agency, Federal Aviation Administration, and Department of Defense use this metric to recommend what land uses are compatible within specific noise zones.

- **Noise Zone 1** (less than 65 dB DNL) is generally considered an area of low or no noise impact. Social surveys have shown that less than 15% of the population would be expected to be highly annoyed. However, studies have shown that people living in rural areas are used to low ambient noise levels and perceive impacts at DNL levels less than 65 dB DNL.
- **Noise Zone 2** (65 to 75 dB DNL) is an area of moderate impact where some land use controls are recommended. Social surveys have shown that between 15% and 39% of the population would be expected to be highly annoyed.

- **Noise Zone 3** (greater than 75 dB DNL) is the most severely impacted area and the most land use controls are recommended. Social surveys have shown that more than 39% of the population would be expected to be highly annoyed.

Although DNL provides a measure of overall cumulative noise, it does not provide information on the specific individual sound levels that occur during the day.

Sound Exposure Level (SEL)

The sound exposure level (SEL) more closely represents the instantaneous sound level of a single aircraft flight over a specific location by averaging sound levels over one second instead of 24 hours. For example, the SEL for an aircraft overflight averages the lower sound levels of an aircraft's approach and departure plus the maximum sound level of the aircraft passing by a specific point. Individual response to noise levels varies and is influenced by many factors, including:

- The activity the individual is engaged in at the time of the noise;
- General sensitivity to noise;
- Time of day;
- Length of time an individual is exposed to a noise; and
- Predictability of noise.

A small change in dB would not generally be noticeable. As the change in dB increases, individual perception is greater, as shown below.

How Does Aircraft Noise Compare?

Noise Source	Sound Levels
Civil Defense Siren (100 feet away)	130 dB
F/A-18 Super Hornet (1,000 feet above ground level)	114 dB
Rock Music Concert	110 dB
Action Movies	100 dB
Power lawn mower (3 feet away)	95 dB
Dishwasher (5 feet away)	60 dB
Air Conditioner Unit (100 feet away)	55 dB

Decibel units of two or more sounds can not be directly added or subtracted because sound levels in decibels are logarithmic. To determine the combined sound level from two individual sources, the sound levels are converted to an expression of the acoustic energy, added together, and then converted back to decibels.

As an example, combining the sound levels of two noise sources of 50 dB each does not produce a combined sound level of 100 dB, but rather 53 dB which represents twice the sound power.

Responses to Changes in A-Weighted Decibels

Change	Change in Perceived Loudness
1 dB	Requires close attention to notice
3 dB	Barely perceptible
5 dB	Quite noticeable
10 dB	Dramatic - perceived as twice or half as loud