In 1999 and again in 2005, the USAF conducted an Air Installation Compatible Use Zone (AICUZ) Study for the US Air Force Academy (Academy). The purpose of an AICUZ is to promote and inform compatible land development in areas off base that may be affected by military operations on base (e.g. aircraft noise). One part of an AICUZ study identifies noise contours associated with the specific flight operations of a particular air installation, using a metric called the Day-Night Average A-Weighted Sound Level (DNL), which covers noise levels over a 24-hour period. The recommended land use compatibility for residential development is 65 DNL. In areas where noise contours exceed compatibility levels, corresponding development is either discouraged or measures are recommended to reduce the noise signature.

A 2-year recurring analysis, called a noise validation study, re-validates noise impacts of flight operations on the community. The current noise validation study was conducted in 2015 in order to ensure the noise-specific component of the Academy's 2005 AICUZ study remained valid. It concluded that all noise contours associated with the Academy's flight operations remained confined to Academy property. This does not mean that noise does not go off the installation, but based on the DNL taken from current airfield operations, noise from these operations do not exceed the compatibility land use levels.

Information from the Air Installation Compatible Use Zone Study Resource Book, July 2015

Noise Environment Descriptor

The noise zone methodology used by the USAF is the day–night average sound level (DNL) metric, which describes the average noise level over the course of a 24-hour period. Efforts to provide a national uniform standard for noise assessment have resulted in adoption by the U.S. Environmental Protection Agency of DNL as the standard noise descriptor. The U.S. Air Force (USAF) uses the DNL descriptor in assessing the amount of aircraft noise exposure and as a metric for community response to the various levels of exposure. The DNL values used for planning purposes are 65, 70, 75, and 80 decibels (dB). Land use guidelines are based on the compatibility of various land uses with these noise exposure levels.

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. DNL begins with a single-event descriptor and adds corrections for the number of events and the time of day. Since the primary development concern is residential, nighttime events are considered more annoying than daytime events and are weighted accordingly. DNL values are computed from the single-event noise descriptor, plus corrections for number of flights and time of day (see below figure).

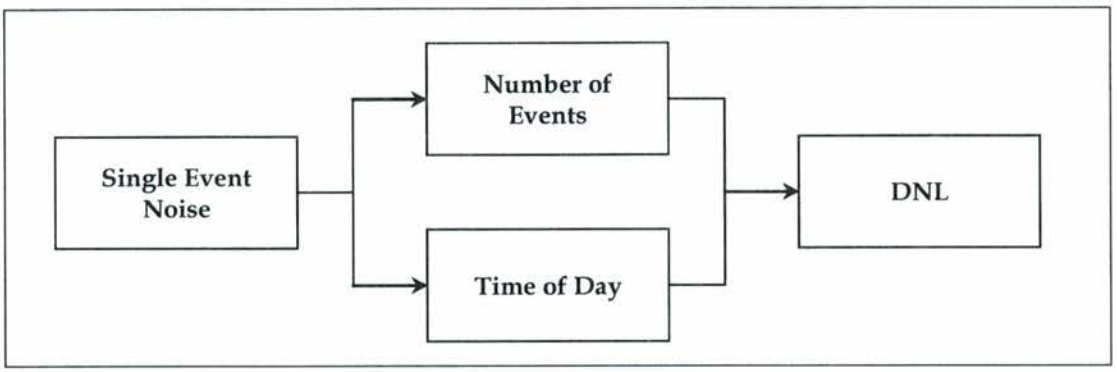


Figure. Day–Night Average A-Weighted Sound Level

As part of the extensive data collection process, detailed information is gathered on the type of aircraft, the number, and time of day of flying operations for each flight track during a typical day. This information is used in conjunction with the single-event noise descriptor to produce DNL values. These values are combined on an energy summation basis to provide single DNL values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

Noise Event Descriptor

The single-event noise descriptor used in the DNL system is the sound exposure level (SEL). The SEL measure is an integration of an A-weighted noise level over the period of a single event, such as an aircraft flyover, in decibels.

Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data is collected for various types of aircraft and engines at different power settings and phases of flight. The figure below shows the relationship of the single-event noise descriptor (SEL) to the source sound energy.

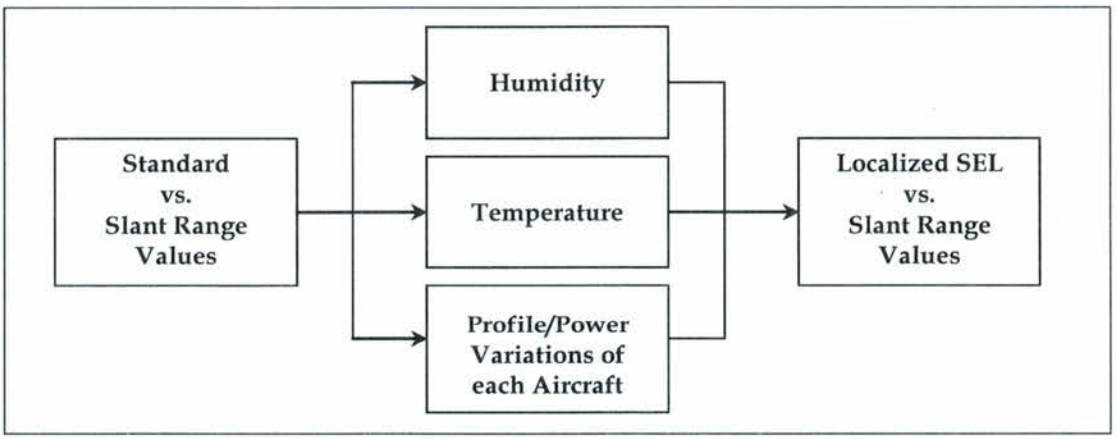


Figure. Sound Exposure Level

SEL versus slant range values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek, and Newman, Inc., in conjunction with and carried out by the USAF's Armstrong Laboratory. These standard day, sea level values form the basis for the single-event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, and variations from standard profiles and power settings.

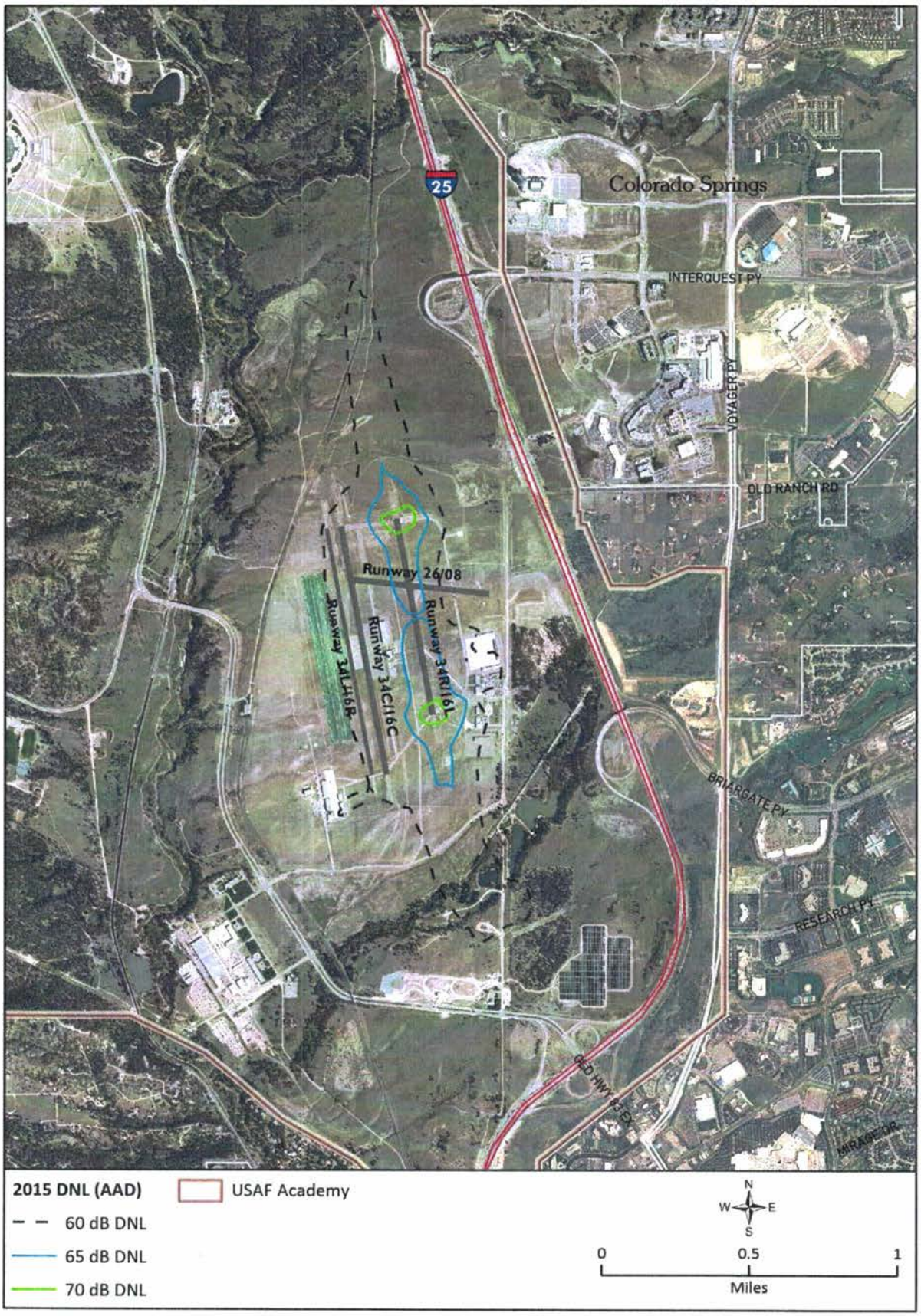
Ground-to-ground sound propagation characteristics are used for altitudes up to 500 feet absolute with linear transition between 500 and 700 feet and air-to-ground propagation characteristics above 700 feet.

In addition to the assessment of aircraft flight operations, the DNL system also incorporates noise resulting from engine and aircraft maintenance checks on the ground. Data concerning the orientation of the noise source, type of aircraft or engine, number of test runs on a typical day, power settings used and their duration, and use of suppression devices is collected for each ground run-up or test position. This information is processed and the noise contribution added (on an energy summation basis) to the noise generated by flying operations to produce noise zones reflecting the overall noise environment with respect to aircraft air and ground operations.

Noise Zone Production

Data describing flight track distances and turns, altitudes, airspeeds, power settings, flight track operational utilization, maintenance locations, ground run-up engine power settings, and number and duration of runs by type of aircraft and engine is assembled by each individual air force base (AFB). The data is screened by the Headquarters Air Force Civil Engineer Center (HQ AFCEC). Flight track maps are generated for verification and approval by the base and theMajor Command (MAJCOM). After any required changes have been incorporated, DNL contours are generated by the computer using the supplied data and standard source noise data corrected to local weather conditions. These contours are plotted and prepared for reproduction.

Source: The US Air Force Academy's The Air Installation Compatible Use Zone Study Resource Book, July 2015.


Colorado Springs
25
INTERQUEST PY
VOYAGER PY
OLD RANCH RD
Runway 26/08
Runway 34L/16R
Runway 34C/16C
Runway 34R/16L
BRIARGATE PY
RESEARCH PY
OLD HWY 85
MIRAGE DR
2015 DNL (AAD)
60 dB DNL
65 dB DNL
70 dB DNL
USAF Academy
N
W
E
S
0
0.5
1
Miles


SANBORN RD
Runway 17/35
Bullseye
2015 DNL (AAD)
60 dB DNL
N
W
E
S
0
0.5
1
Miles