Portable Noise Measurement Report

King George Drive, Glen Burnie, MD 21061

Maryland Aviation Administration

March 2025

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION

MARYLAND AVIATION ADMINISTRATION

Introduction

PURPOSE

The purpose of the *Portable Noise Measurement Report* is to summarize aircraft and community noise levels at a specific location upon request of a homeowner. The program is offered by the Maryland Department of Transportation Maryland Aviation Administration (MAA), with technical support and report preparation provided by Harris Miller Miller & Hanson Inc. (HMMH) and Airport Design Consultants, Inc. (ADCI).

NOISE DATA

It should be noted that the noise data provided in this report represents noise and operating levels only during the period of the measurements. Noise levels associated with aircraft overflights can vary with the number of operations, wind and weather patterns, temperatures, pilot procedures and Air Traffic Control instruction, and other variables.

MONITORING TIME AND LOCATION

This report presents the measured aircraft and community noise levels from February 8, 2025 to February 23, 2025, at King George Drive, Glen Burnie, MD 21061. The monitoring location is approximately 3.3 statute miles from the center of Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport. **Figure 1** shows the location of the measurement site (marked as BW349) relative to BWI Marshall.

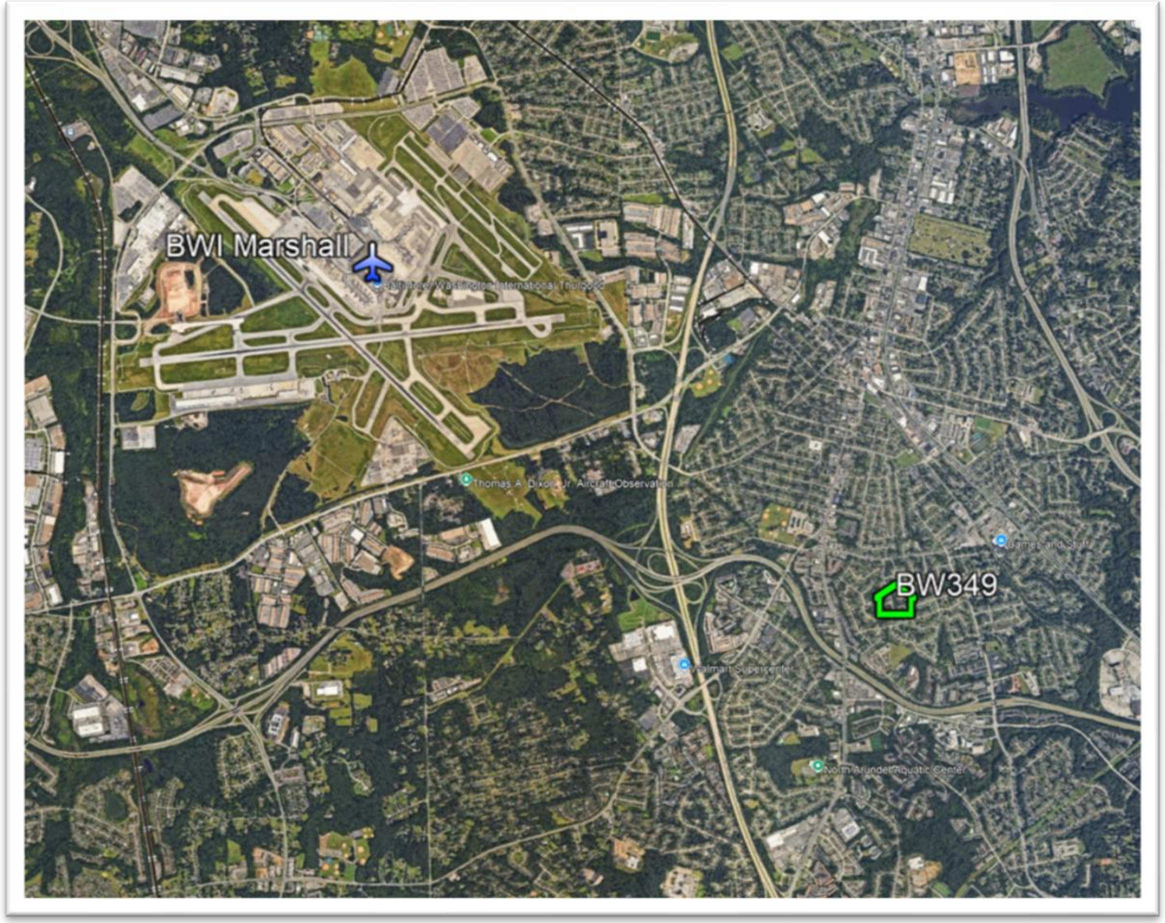

Figure 1. Noise Monitoring Location in Relation to BWI Marshall

Site BW349 Summary

? WHEN
WAS NOISE MEASURED

Saturday, February 8, 2025 to Sunday, February 23, 2025

16 DAYS

February 2025

S	M	T	W	T	F	S
2	3	4	5	6	7	8
9	10	11	12	13	14	15
measurements						
16	17	18	19	20	21	22
measurements						
23	24	25	26	27	28	1

HOW MANY
AIRCRAFT NOISE EVENTS OCCURRED AND WHAT WERE THEY

32 EVENTS / 24 HRS. ON AVERAGE

90 EVENTS / 24 HRS. AT THE MOST

9 EVENTS / 24 HRS. AT LEAST

TOP 3 MOST FREQUENT AIRCRAFT DURING THE MEASUREMENT PERIOD

Rank	Aircraft Type	Operation Type and Runway
1	Boeing 737-700	Departure, 15R
2	Boeing 737-800	Departure, 15R
3	Boeing 737-800 MAX	Departure, 15R

CONCLUSION

During the 16-day measurement period, the Day Night Average Noise Level (DNL) from aircraft noise events was 50 decibels (dB), while the DNL from community noise was 55 dB.

FAA's threshold for land use compatibility is an aircraft-only DNL of 65 dB based on annual average daily aircraft operations.

Aircraft DNL	Community DNL	Total DNL	FAA Threshold
50 dB	55 dB	57 dB	65 dB

Aircraft Operations

FLIGHTS DURING MEASUREMENT PERIOD

Operations at BWI Marshall fluctuate on a daily basis. During the measurement period, there were 9,214 flights in and out of BWI Marshall (4,603 arrivals, 4,611 departures), in addition to overflights to other airports.

FIXED-WING OPERATIONS

The number of flights per day ranged from 488 to 666. Flights in the vicinity of this site are primarily departures from BWI Marshall Runway 15R and Arrivals from Runway 33R. BWI Marshall has three runways, designated as Runway 10/28, Runway 15R/33L, and Runway 15L/33R. Runway 10/28 is 10,502 feet in length, while Runway 15R/33L is 9,500 feet in length. Runway 15L/33R is 5,000 feet in length and is only used by certain aircraft. As aircraft cannot arrive and depart from the same runway, BWI Marshall generally operates in two configurations: west flow (primarily departures from Runway 28 and arrivals to Runway 33L) and east flow (primarily departures from Runway 15R and arrivals to Runway 10). On an annual basis, west flow is used approximately 70% of the time, while east flow is used approximately 30% of the time. During west flow, aircraft operations primarily consist of arrivals to BWI Marshall Runway 33L and departures from Runway 28. During east flow, aircraft operations primarily consist of departures from BWI Marshall Runway 15R and arrivals to Runway 10. Arrivals to BWI Marshall were generally 800 to 900 feet above ground level at their point of closest approach to the measurement site. Departures from BWI Marshall were generally 1,800 to 2,800 feet above ground level at their point of closest approach to the measurement site. During the measurement period, the west flow runway use was 78% (**Figure 2**), and the east flow runway use was 22% (**Figure 3**).

West Flow Runway Use

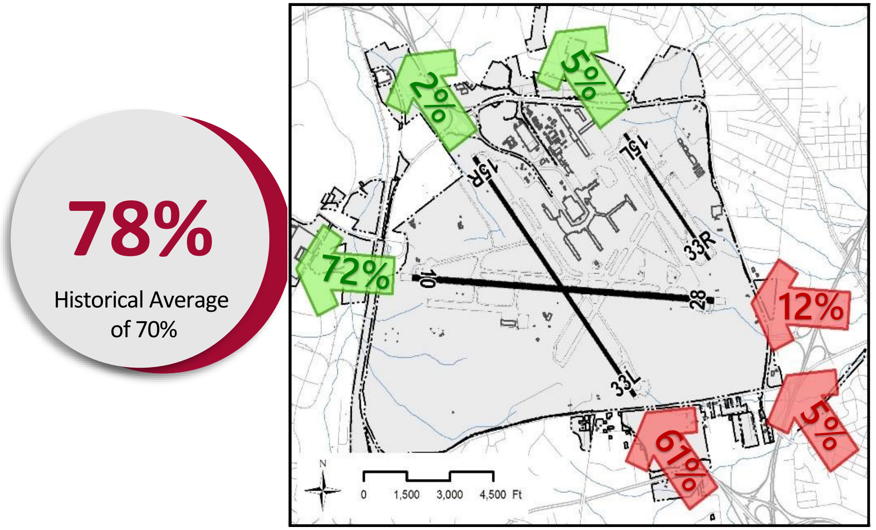

Figure 2. West Flow Runway Use During Measurement Period

East Flow Runway Use

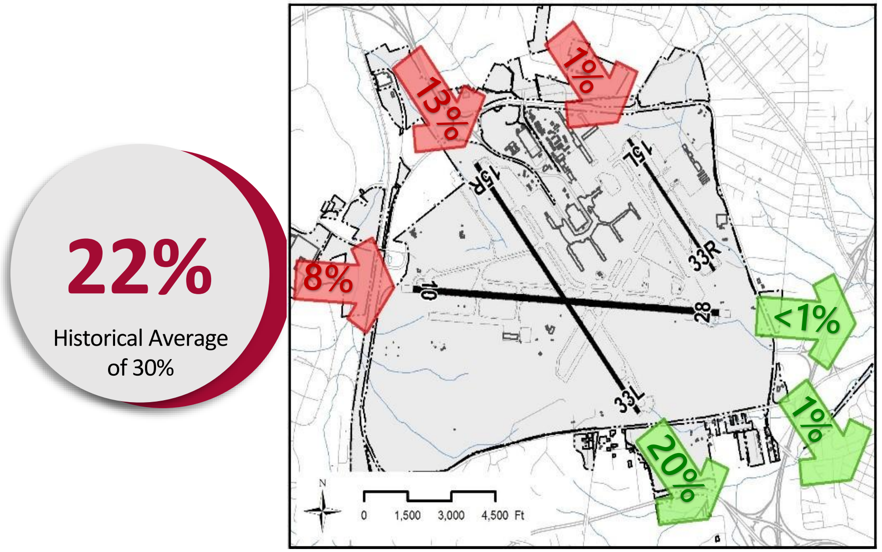

Figure 3. East Flow Runway Use During Measurement Period

Methodology and Location

MEASUREMENT LOCATION AND SETUP

Aircraft noise levels were measured from February 8, 2025 to February 23, 2025, at King George Drive, Glen Burnie, MD 21061.

The noise monitor is a Type I sound level meter and was regularly calibrated. Additionally, the system was checked every two to four days during the measurements to ensure proper operation. During setup, a baseline threshold was established for the noise monitor. Once the sound level exceeded the baseline threshold for 5 seconds, a noise event was recorded. For each noise event, the sound level meter recorded date, time, duration, and noise levels.

The noise monitor was placed in the backyard of the residence. Notable noise sources at this site included aircraft overflights to and from BWI Marshall as well as overflights to and from other airports, and other typical suburban sounds such as local vehicle traffic.

DATA COLLECTION

Once the temporary noise monitoring period was complete, the noise event data was collected from MAA’s Noise and Operating Monitoring System (NOMS) to analyze the times of noise events at the site to its database of aircraft radar flight paths. The NOMS conservatively attributes any noise event to an aircraft if the aircraft is within 8,000 feet of the measurement site at an altitude no greater than 10,000 feet. Noise events which occurred while aircraft were passing within the vicinity were associated with an actual aircraft flight and therefore assigned as aircraft noise events. Noise events that did not correlate with an aircraft overflight were assigned as community noise events. Using this methodology, some noise events that are correlated with aircraft overflights may include other community noise, which may or may not exceed the noise level from the aircraft overflight. **Figure 4** on the next page displays all arrivals and departures to and from BWI Marshall during the measurement period. **Figure 5** displays all arrivals and departures to and from BWI Marshall that were correlated with aircraft noise events.

Arrivals and Departures

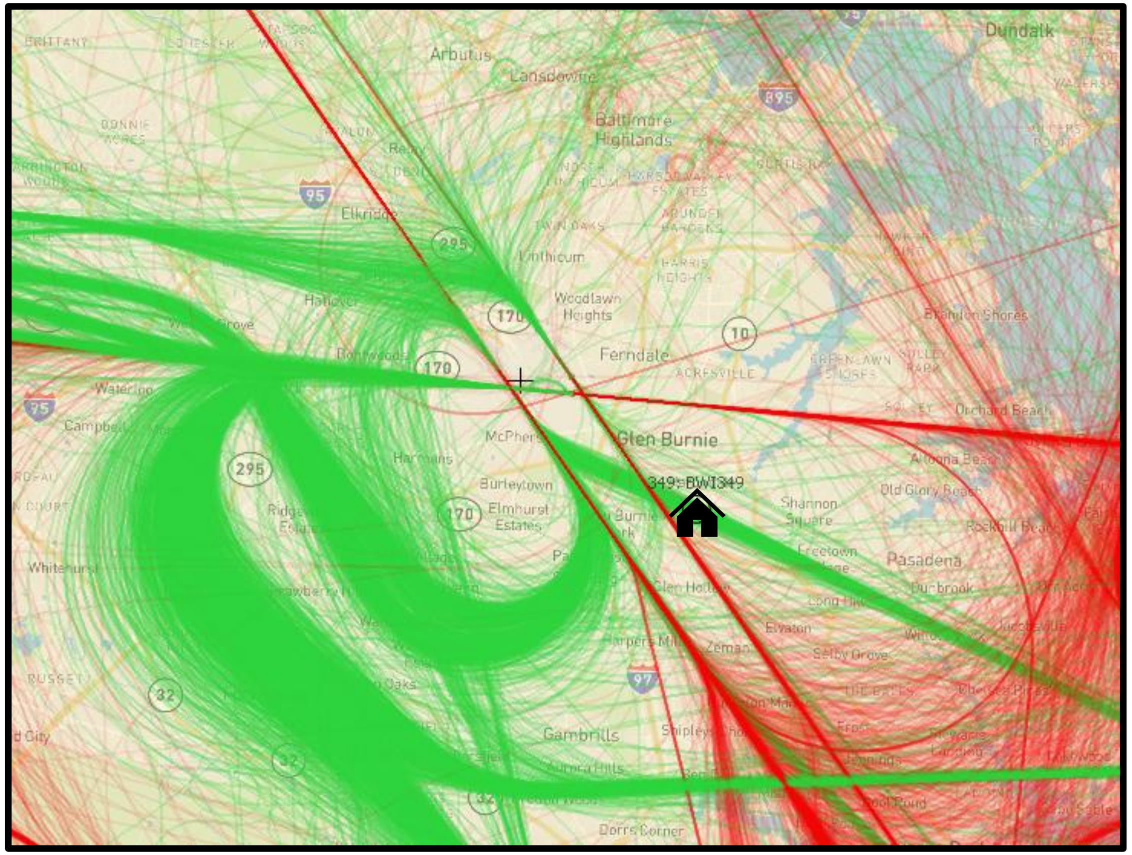

Figure 4. All BWI Marshall Arrivals and Departures During the Measurement Period
Note: Green = Departures, Red = Arrivals

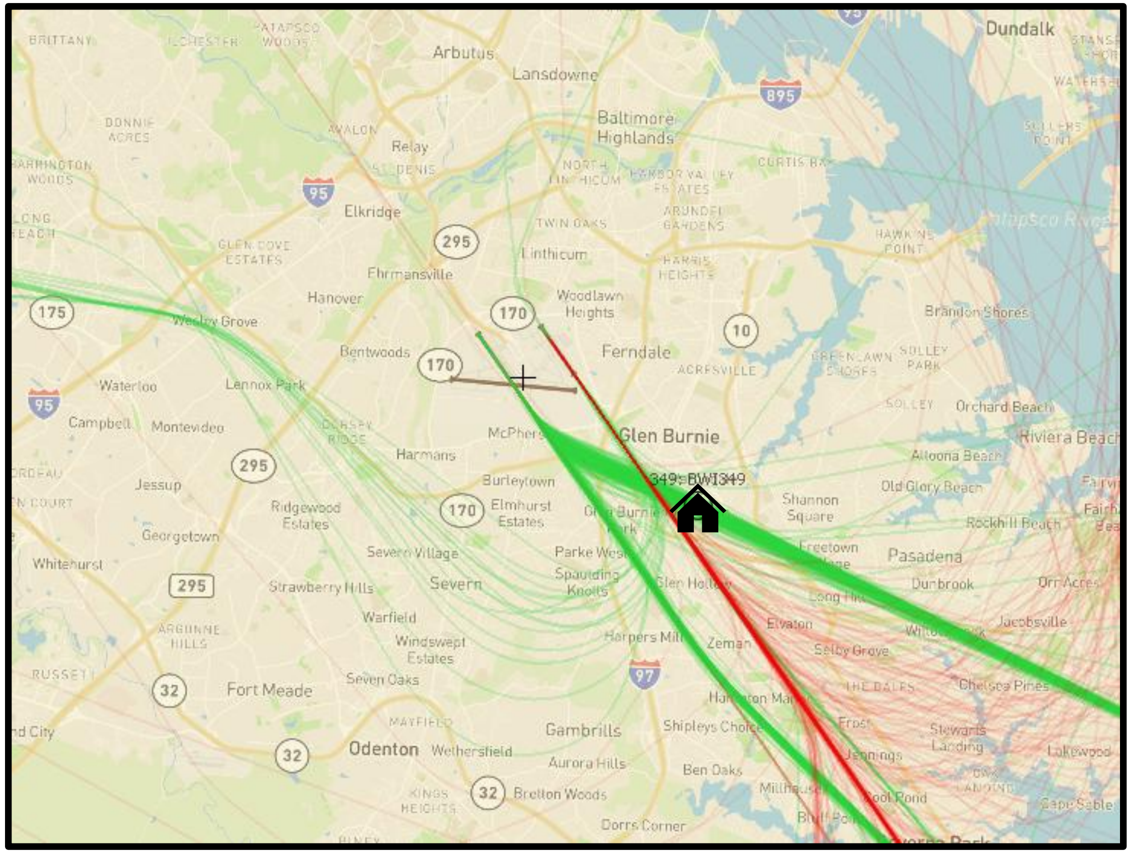

Figure 5. BWI Marshall Arrivals and Departures Correlated to Aircraft Noise Events During the Measurement Period
Note: Green = Departures, Red = Arrivals

Measured Noise Levels

NOISE METRICS

There are several key metrics that are used to describe aircraft and community noise on a single-event and cumulative basis. The appendix titled "How Do We Describe Aircraft Noise" provides a more detailed overview of the metrics which are discussed in this section. Single-event metrics such as Maximum A-Weighted Sound Level (Lmax) are indicators of the intrusiveness, loudness, or noisiness of individual noise events while cumulative metrics like Day-Night Average Sound Level (DNL) are generally used to measure long-term noise and are indicators of community annoyance and land use compatibility.

Figure 6 presents the range of maximum single-event sound levels for 514 aircraft overflights at the measurement site for the complete measurement period. For a particular noise event, such as an aircraft overflight, the loudest level at any instant during the event is the Lmax. For typical conversational speech at approximately 3 feet, speech is interrupted by noise levels at or above 65 dB. Any noise events shown in this figure with a maximum level at or above 65 dB would interrupt typical conversations outdoors (briefly for quieter events and longer for louder events). **Figure 7** shows common environmental A-weighted noise levels for typical outdoor sounds.

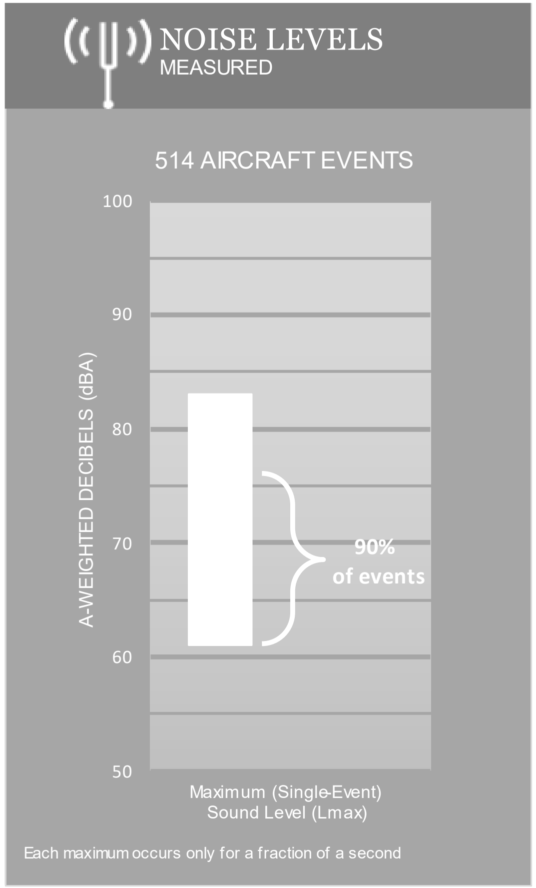

Figure 6. Maximum Single Event Aircraft Noise Levels

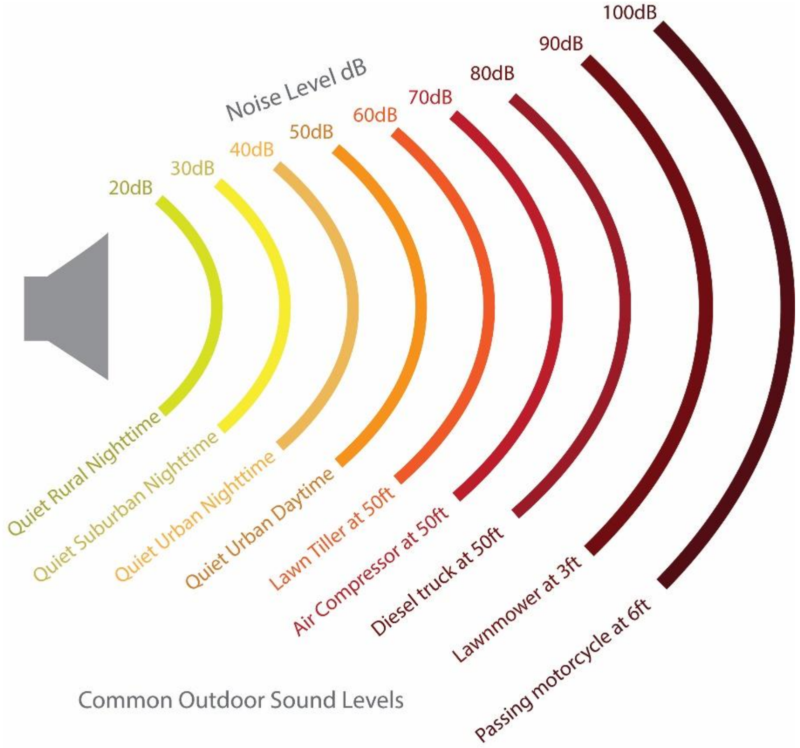

Figure 7. Common Environmental Noise Levels

Loudest Aircraft Events

Table 1 shows the top 15 loudest aircraft events that occurred during the measurement period including details about the date and time the event occurred, aircraft type, operation type, runway, and slant range (the line-of-sight distance between the receptor and the aircraft). Note that these events only represent the noisiest aircraft events at the measurement site, and the majority of aircraft overflights at the measurement site were less noisy than those shown in **Table 1**.

Table 1. Top Fifteen Loudest Aircraft Events During the Measurement Period

Rank	Flight Time	Airline	Aircraft Type	Operation Type	Runway	Altitude (ft. AGL)	Slant Range (ft.)	Maximum Sound Level (dBA)
1	2/14/2025 14:11	N/A	Piper Cheyenne 1	Arrival	33R	837	2,733	83
2	2/8/2025 21:27	BRITISH AIRWAYS	Boeing 777-200	Departure	15R	1,752	4,646	81
3	2/15/2025 20:57	BRITISH AIRWAYS	Boeing 777-200	Departure	15R	1,806	4,514	80
4	2/11/2025 8:38	U.S. ARMY	Beechcraft Super King Air	Arrival	33R	872	2,792	79
5	2/21/2025 10:01	MAC MOUNTAIN AIR CARGO, INC.	Cessna Grand Caravan	Arrival	33R	907	2,792	79
6	2/9/2025 7:10	Atlanta Air Charter	Beechcraft Super King Air	Arrival	33R	889	2,867	79
7	2/17/2025 18:23	N/A	Piper PA-31 Navajo	Arrival	33R	880	2,890	79
8	2/16/2025 13:25	Republic Airways	Embraer 170	Departure	15R	2,265	3,159	79
9	2/9/2025 12:41	N/A	Dassault Falcon 50	Arrival	33R	894	3,202	79
10	2/11/2025 15:00	Southwest	Boeing 737-700	Departure	15R	2,199	3,491	78
11	2/13/2025 13:26	Sky Quest	Raytheon Hawker 800	Arrival	33R	848	3,038	78
12	2/15/2025 22:33	Southwest	Boeing 737-700	Departure	15R	1,757	3,461	78
13	2/15/2025 14:41	Southwest	Boeing 737-700	Departure	15R	1,789	3,117	78
14	2/22/2025 3:27	N/A	Pilatus PC12	Arrival	33R	689	2,999	78
15	2/11/2025 9:28	N/A	Dassault Falcon 50	Arrival	33R	854	3,084	78

Note: In some cases, community events may occur simultaneously with aircraft overflights, causing aircraft overflights to have higher recorded sound levels.

Conclusion

DAY-NIGHT AVERAGE SOUND LEVEL

Figure 8 on the following page presents the cumulative DNL at the measurement site for the 16 complete days of the measurement period for community, aircraft, and total noise exposure. **Figure 9** on the following page presents the daily DNL at the site for aircraft noise exposure. DNL sums the noise from every noise event over the day. The formula for DNL gives an extra 10 decibel weighting to nighttime noise events to account for the intrusive nature of these events. The aircraft DNL ranged from 40 to 56 dB during the measurement period. The total aircraft DNL for the measurement period was 50 dB. The DNL for all recorded community noise events (wildlife, landscaping, weather, etc.) during the measurement period was 55 dB. The total DNL at the measurement site, which includes both aircraft and community noise events, was 57 dB.

AIRCRAFT OPERATIONS

Aircraft noise levels at this site are higher when BWI Marshall operates in east flow. During the measurement period, BWI Marshall operated in east flow 22% of the time and in west flow 78% of the time, which is a higher usage of west flow than the annual average of 70% west flow operations and 30% east flow operations.

MONITORING RESULTS

The results of the portable noise monitoring are for informational purposes only and capture the aircraft noise environment for a snapshot in time. The conditions during a monitoring period can vary greatly due to wind and weather (atmospheric conditions), the runway(s) in use at the time for arrivals and departures, and the number and type of operations occurring during the monitoring period. From the data collected, aircraft noise levels in terms of the DNL were calculated and resulted in a 16-day average of 50 dB.

GUIDELINES AND REGULATIONS

In Appendix A of 14 CFR Part 150, the Federal Aviation Administration provides guidelines for the compatibility of land uses with various annual DNL values. Code of Maryland Regulations (COMAR) 11.03.03.03 establishes limits for cumulative noise exposure for certain land uses around BWI Marshall. These guidelines consider residential land use to be noncompatible when the DNL is 75 dB or greater. For noise levels between 65 dB and 75 dB DNL, residential land use is considered noncompatible, but where the community determines that this land use must be allowed, measures to achieve greater than typical outdoor to indoor noise level reduction should be incorporated into building codes. The guidelines designate all land uses, including residential, as compatible for DNL values below 65 dB.

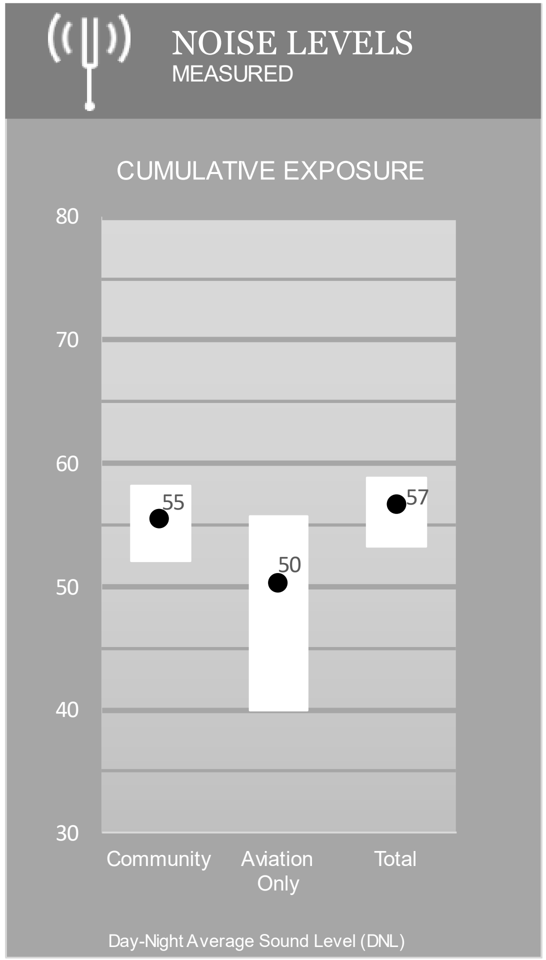

Figure 8. Cumulative Noise Exposure from Aircraft and Community Sources

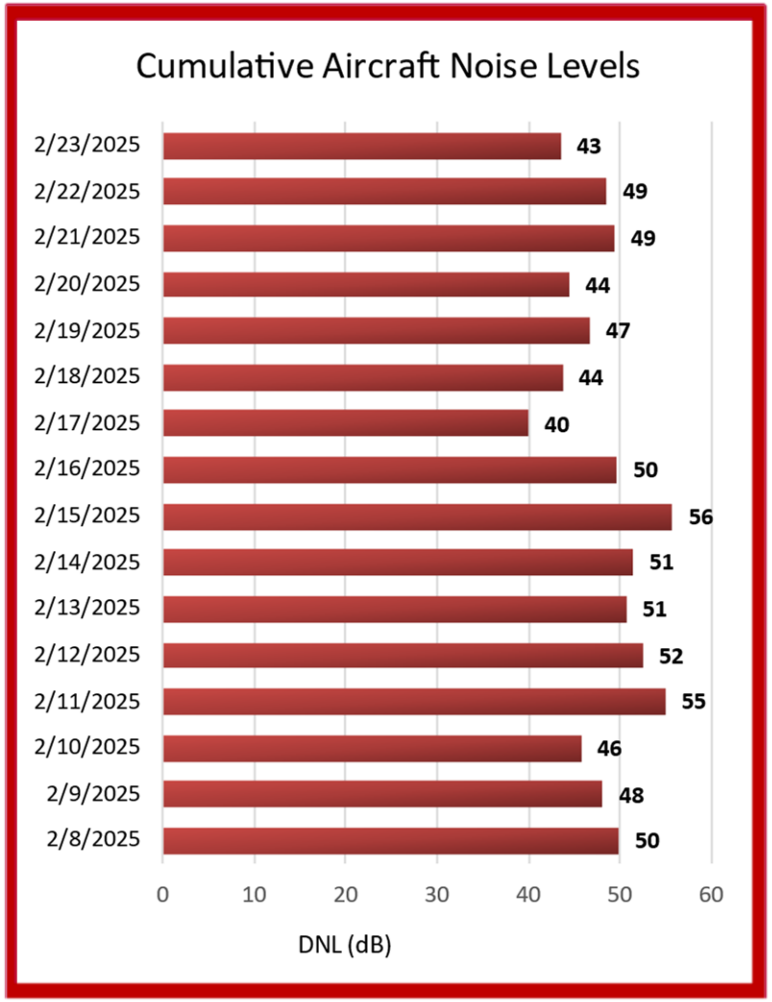

Figure 9. Measured Daily Aircraft Noise Levels

More Information

ADDITIONAL RESOURCES

Website: www.bwiairport.com
Twitter: @BWI_Airport

MAA'S NOISE PROGRAM

Information about Maryland Department of Transportation Maryland Aviation Administration's (MAA's) Noise Program activities can be found at marylandaviation.com. Frequent topics of interest include:

NOISE COMPLAINTS

MAA provides multiple methods to submit aircraft noise complaints, including an on-line form or 24-hour noise complaint and information hotline at 410-859-7021. MAA reviews noise complaints daily, and logs, reviews, and analyzes all noise complaints on a regular basis.

https://marylandaviation.com/environmental/airport-noise/noise-complaints/

QUARTERLY NOISE REPORTS

Each quarter, MAA prepares and publishes a quarterly noise report. The report provides information on operational trends (including the number of jet and cargo operations, and the number of nighttime operations), runway use, flight corridors/flight density maps, noise complaints received, outreach efforts, permanent noise monitoring data and MAA's noise assistance programs.

ENEWS EXPRESS

Stay up-to-date on planned runway closures, as well as other important aviation topics, by subscribing to the BWI Marshall eNews Express at https://marylandaviation.com/environmental/airport-noise/enews-express-signup/.

AIRPORT NOISE ZONE

The BWI Noise Abatement Plan and Airport Noise Zone, first established in 1976, includes a wide variety of strategies that are intended to reduce noise impacts for communities around the Airport while maintaining efficient airport operations. Noise abatement at BWI includes operational procedures such as aircraft arrival and departure procedures and a preferential runway use system intended to direct aircraft operations over less populated areas, where and when possible. Other elements of the Noise Abatement Plan include land use restrictions and programs such as land acquisition and soundproofing.

How do we Describe Aircraft Noise?

We use a number of terms to describe aircraft noise. These metrics form the basis for the majority of noise analyses conducted at most airports in the U.S.

The Decibel, dB

All sounds come from a source – a musical instrument, a voice speaking, an airplane. The energy that produces these sounds is transmitted through the air in waves, or sound pressures, which impinge on the ear, creating the sound we hear.

The decibel is a ratio that compares the sound pressure of the sound source of interest (e.g., the aircraft over flight) to a reference pressure (the quietest sound we can hear). Because the range of sound pressures is very large, we use logarithms to simplify the expression to a smaller range, and express the resulting value in decibels (dB). Two useful rules of thumb to remember when comparing individual noise sources are: (1) most of us perceive a six to ten dB increase to be about a doubling of loudness, and (2) changes of less than about three dB are not easily detected outside of a laboratory.

The A-Weighted Decibel, dB(A)

Frequency, or "pitch", is an important characteristic of sound. When analyzing noise, we are interested in how much is low-, middle-, and high-frequency noise. This breakdown is important for two reasons. First, our ears are better equipped to hear mid- and high-frequencies; thus, we find mid- and high-frequency noise more annoying. Second, engineering solutions to noise problems are different for different frequency ranges. The "A" filter approximates the sensitivity of our ear and helps us to assess the relative loudness of various sounds.

Maximum A-weighted Sound Level, Lmax

A-weighted sound levels vary with time. For example, the sound increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance. Figure 1 illustrates this phenomenon. We often describe a particular noise "event" by its maximum sound level (Lmax). Figure 2 shows typical Lmax values for some common noise sources. In fact, two events with identical Lmax may produce very different total exposures. One may be of very short duration, while the other may be much longer.

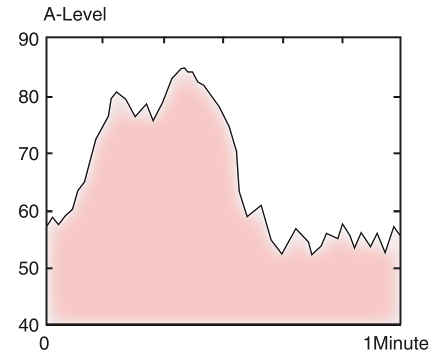

Figure 1. A-weighted Sound Levels Over Time

Sound Exposure Level, SEL

The most common measure of cumulative noise exposure for a single aircraft flyover is the Sound Exposure Level (SEL). Mathematically, it is the sum of the sound energy over the duration of a noise event – one can think of it as an equivalent noise event with a one-second duration. Figure 3 shows that portion of the sound energy included in this event. Because the SEL is normalized to one second, it will almost always be larger in magnitude than the Lmax for the event. In fact, for most aircraft events, the SEL is about 7 to 12 dB higher than the Lmax. Also, the fact that it is cumulative measure means that a higher SEL can result from either a louder or longer event, or some combination.

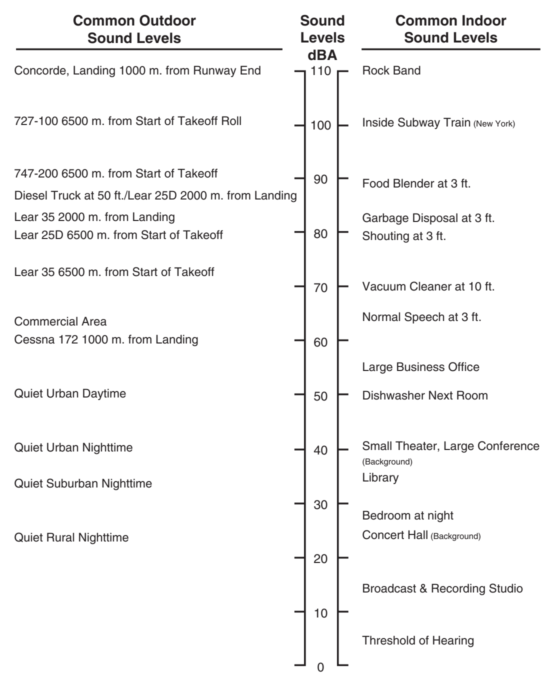

Figure 2. Common Environmental Sound Levels

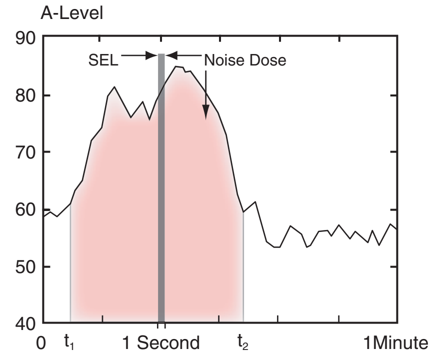

Figure 3. Sound Exposure Level

SEL provides a comprehensive way to describe noise events for use in modeling and comparing noise environments. Computer noise models base their computations on SEL values.

Day-Night Average Sound Level, DNL

The Day-Night Average Sound Level (DNL) represents noise as it occurs over a 24-hour period, with the assumption noise events occurring at night (10 p.m. to 7 a.m.) are 10 dB louder than they really are. This 10 dB penalty is applied to account for greater sensitivity to nighttime noise, and the fact that events at night are often perceived to be more intrusive because nighttime ambient noise is less than daytime ambient noise.

Figure 4 depicts a hypothetical daily noise dose. The top frame repeats the one-minute noise exposure that was shown in Figure 1. The center frame includes this one-minute interval within a full hour; now the shaded area represents the noise during that hour with 16 noise events, each producing an SEL. Finally, the bottom frame includes the one-hour interval within a full 24 hours. Here the shaded area represents the listener's noise dose over a full day.

DNL normally can be measured with standard monitoring equipment or predicted with computer models.

Most aircraft noise studies utilize computer-generated estimates of DNL, determined by accounting for all of the SELs from individual events which comprise the total noise dose at a given location on the ground.

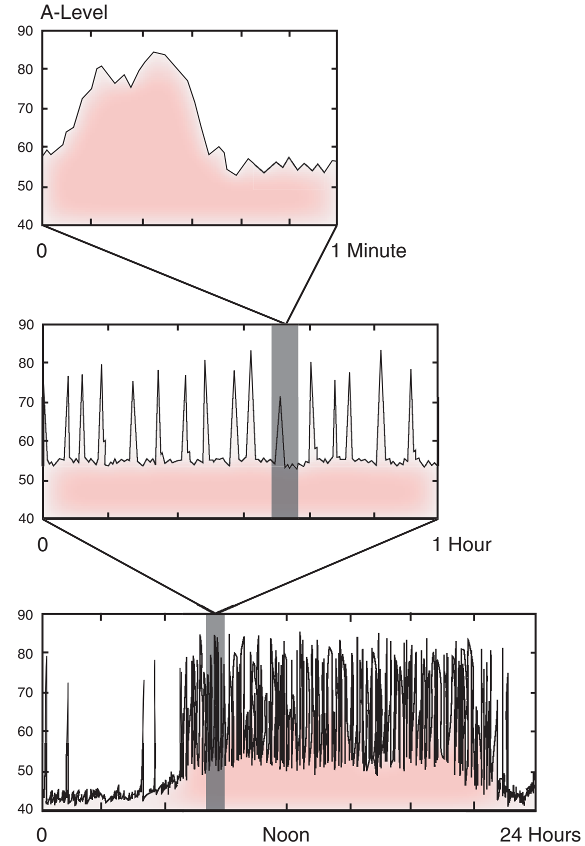

Figure 4. Daily Noise Dose

Computed values of DNL are often depicted as noise contours reflecting lines of equal exposure around an airport (much as topographic maps indicate contours of equal elevation). DNL contours usually reflect annual average operating conditions, taking into account the average number of flights each day, how often each runway is used throughout the year, and where over the surrounding communities the aircraft normally fly.