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Portable Noise Monitor Report

Prepared by: Aircraft Noise Office

For: Avalon Ct., San Diego, CA

May 26, 2023

Portable Noise Monitoring Summary

WHEN
WAS NOISE MEASURED

April 17 – 21, 2023

5 Days

April 2023	S	M	T	W	T	F	S
		17	18	19	20	21	

Partial measurement (setup / takedown) days.

Full (24-hour) measurement days.

HOW MANY
NOISE EVENTS OCCURRED

518 SAN AIRCRAFT NOISE EVENTS

8 NON-SAN AIRCRAFT NOISE EVENTS

21 MIXED NOISE EVENTS

MOST FREQUENT AIRCRAFT FLIGHTS DURING THE MEASUREMENT PERIOD

Rank	Aircraft Type	Airport ID
1	B737 	SAN
2	B738 	SAN
3	A321 	SAN
4	B38M 	SAN

CONCLUSION

During the 5 – day measurement period, the average Community Noise Equivalent Level (CNEL) from aircraft noise* was 60.6 decibels (dB), while the average CNEL from community noise was 58.1 dB.

The FAA and State of California's threshold for land use compatibility is an aircraft CNEL of 65 dB.

*Aircraft CNEL only includes operations from SAN.

Aircraft CNEL	Community CNEL	Total CNEL
60.6	58.1	62.6

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Introduction

Aircraft noise at the San Diego International Airport (SAN) has been monitored since the 1970s.

The Airport Noise and Operations Monitoring System (ANOMS) collects, analyzes, and processes data from several sources of information. The sources include noise events from 23 permanent Remote Monitoring Terminals (RMT's), Federal Aviation Administration (FAA) radar data, weather data, and noise complaints.

The purpose of the Portable Noise Monitoring program is to provide additional aircraft noise information beyond the Airport Authority's 23 RMT's. This information augments overall ANOMS data collection.

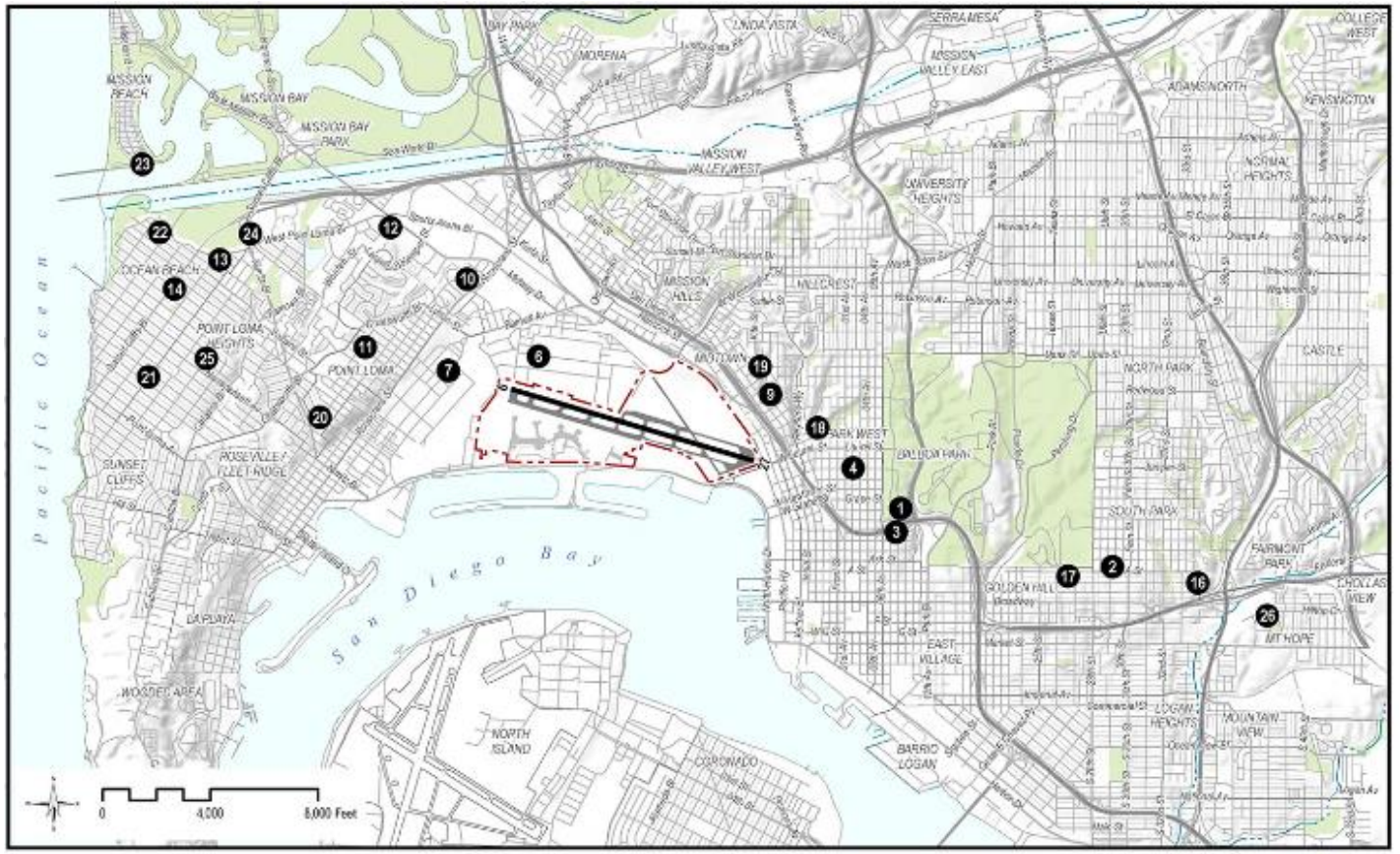

Figure 1. Map of the 23 permanent RMT locations at SAN, San Diego, CA.

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Location

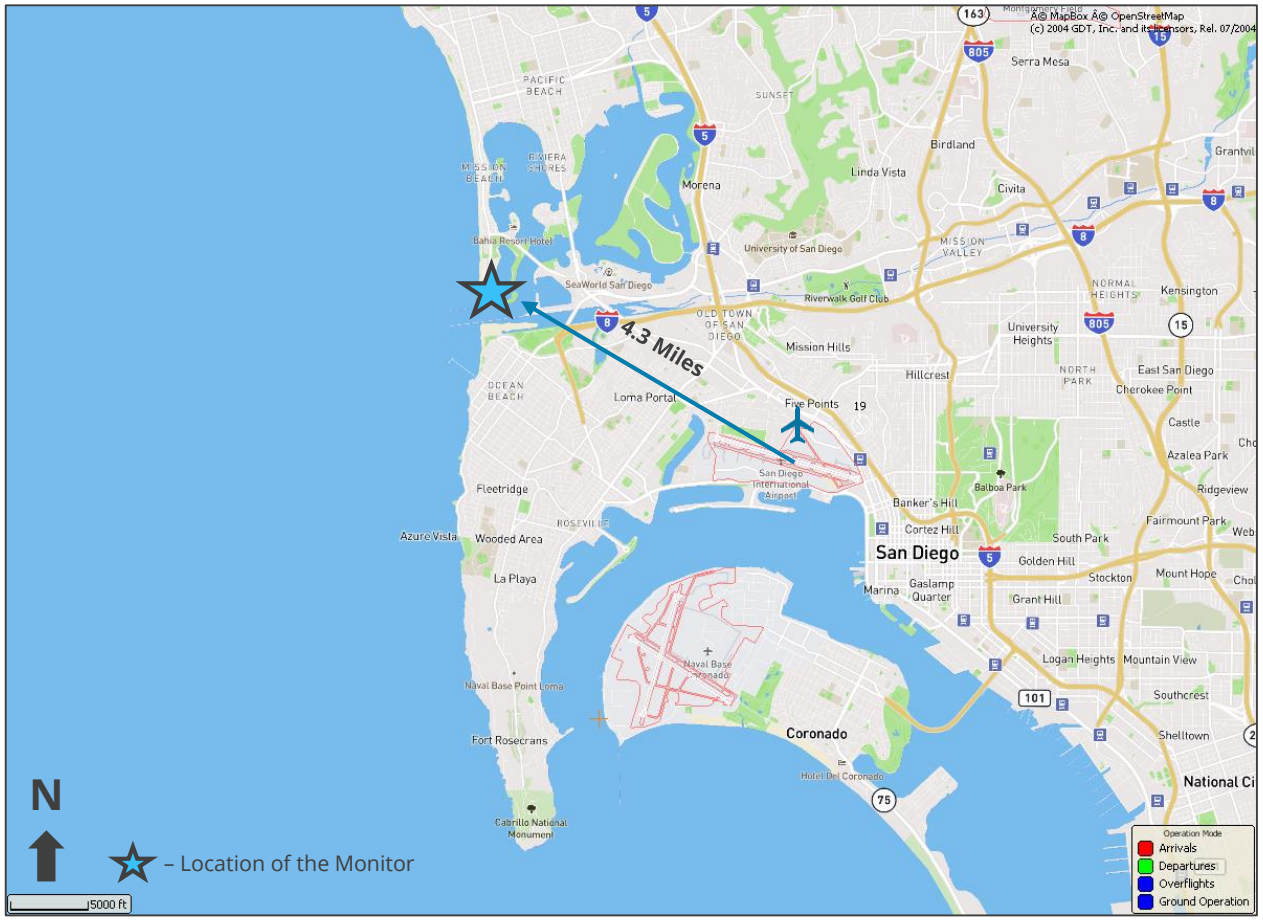

Figure 2. Map of the Portable Noise Monitoring location during April 17 – 21, 2023.

Location: Avalon Court, San Diego, CA 92107.

Dates of Monitoring: April 17 – 21, 2023.

Distance from SAN: The monitor was located approximately 4.3 miles northwest from the center of the Airport.

On-Site Set Up: The noise monitor was placed on a second-floor patio of a private and secure property. The microphone was approximately 20 feet above the ground, operating continuously.

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Methodology

Measurements were taken using a B&K Class I, 2250 Sound Level Meter.* The meter is a 'precision' grade analyzer, which was calibrated prior to the test.

The following baseline thresholds were established: 64 dBA for Daytime (7:00 a.m. – 7:00 p.m.), 64 dBA for Evening (07:00 p.m. – 10:00 p.m.) and 62 dBA for Nighttime (10:00 p.m. – 7:00 a.m.). The baseline threshold levels were established to match the nearest permanent RMT. For a sound event to register, the Equivalent Continuous Sound Level (LEQ) needed to exceed the corresponding threshold, and last for a pre-determined minimum duration of time, which was 12 sec for Daytime, Evening, and Nighttime. The maximum duration was 60 seconds and an event would be discarded beyond that time. For consistency, the portable monitor clock was synchronized to the same source used by ANOMS. The sound level meter recorded the following information about each noise event: date, time, duration, and noise levels.

Figure 3. B&K Class I, 2250 Sound Level Meter and associated field equipment.

Note: https://www.bksv.com/en/instruments/handheld/sound-level-meters/2250-series/type-2250-l
* This meter meets Class I American National Institute Standards, Inc. (ANSI) S1.4:2014

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Noise Definitions

Noise by definition is unwanted sound. There are many ways to describe noise (metrics) however, the most commonly relied on metric is the **decibel (dB)**.

A-weighting (dBA) is used to adjust (filter) for frequency range of human hearing.

A number of factors affect sound, including, weather, ground effects, as well as human reaction to the noise source.

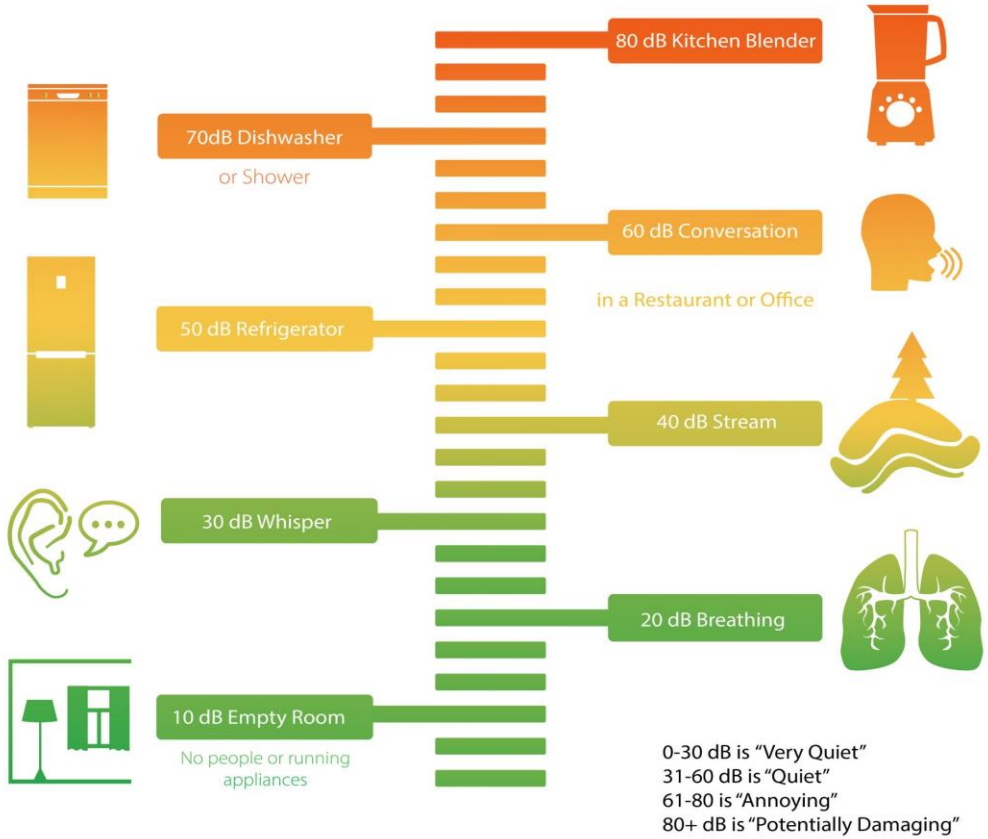

Figure 4. Common Sound Levels.
Source: https://www.sylvane.com/blog/how-loud-is-a-decibel/

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Noise Definitions (cont.)

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.

Lmax – Maximum Sound Level is a measurement of the peak level of a sound event.

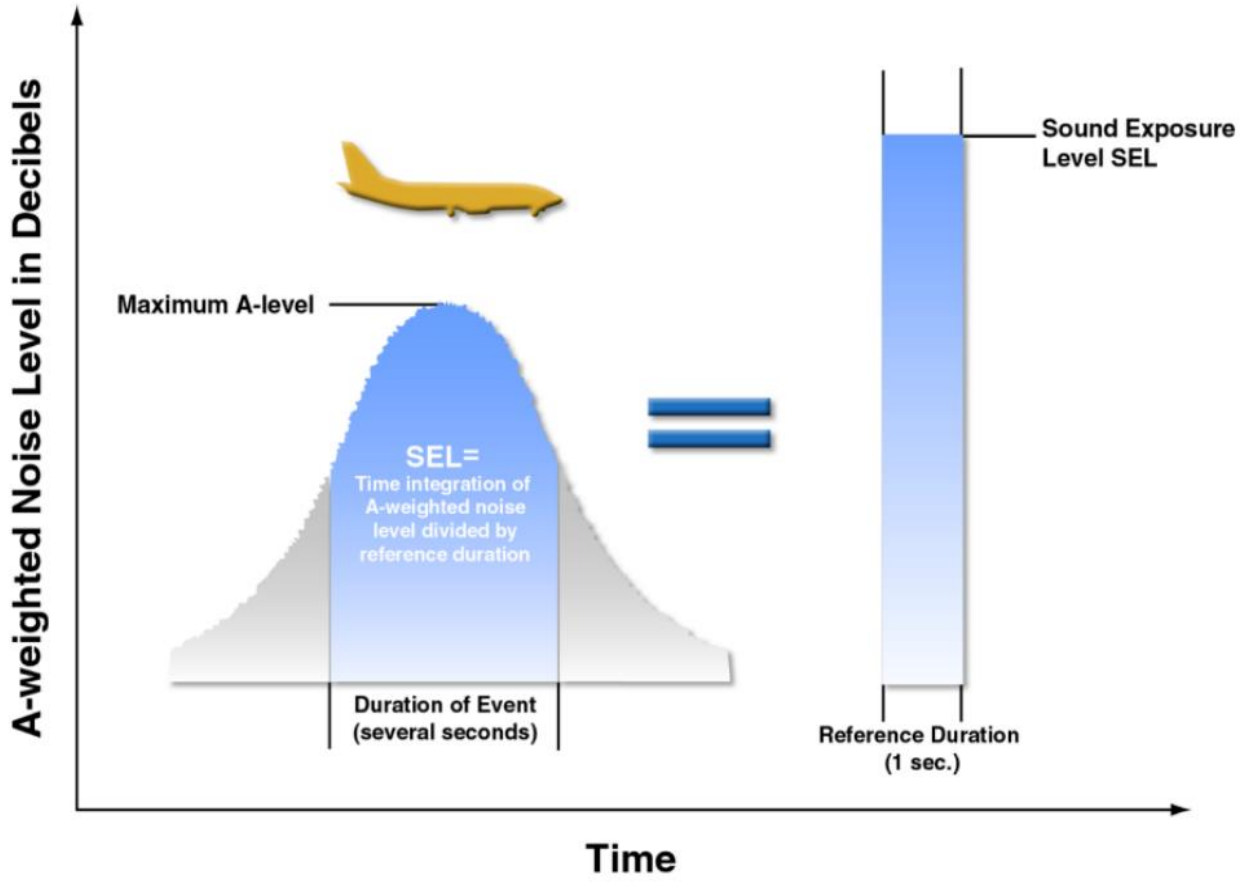

Figure 5. Sound Exposure Level and Maximum Sound Level.
Source: Brown-Buntin Associates, Inc.

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Metrics

The FAA and other federal agencies have established land use compatibility guidelines based on the Community Noise Equivalent Level (CNEL). CNEL is a weighted average of noise level over a 24–hour period. For CNEL calculation, a penalty of 5 dBA is added between 7 p.m. – 10 p.m. for evening hours, and a penalty of 10 dBA is added for the nighttime hours of 10 p.m. – 7 a.m.

The logic behind these applied penalties is that residents are usually more sensitive to noise at night and during evening hours. CNEL is frequently used in regulations of airport noise impact on the surrounding community. A CNEL (for aircraft noise) exceeding 65 dBA is generally considered a threshold for land use compatibility.

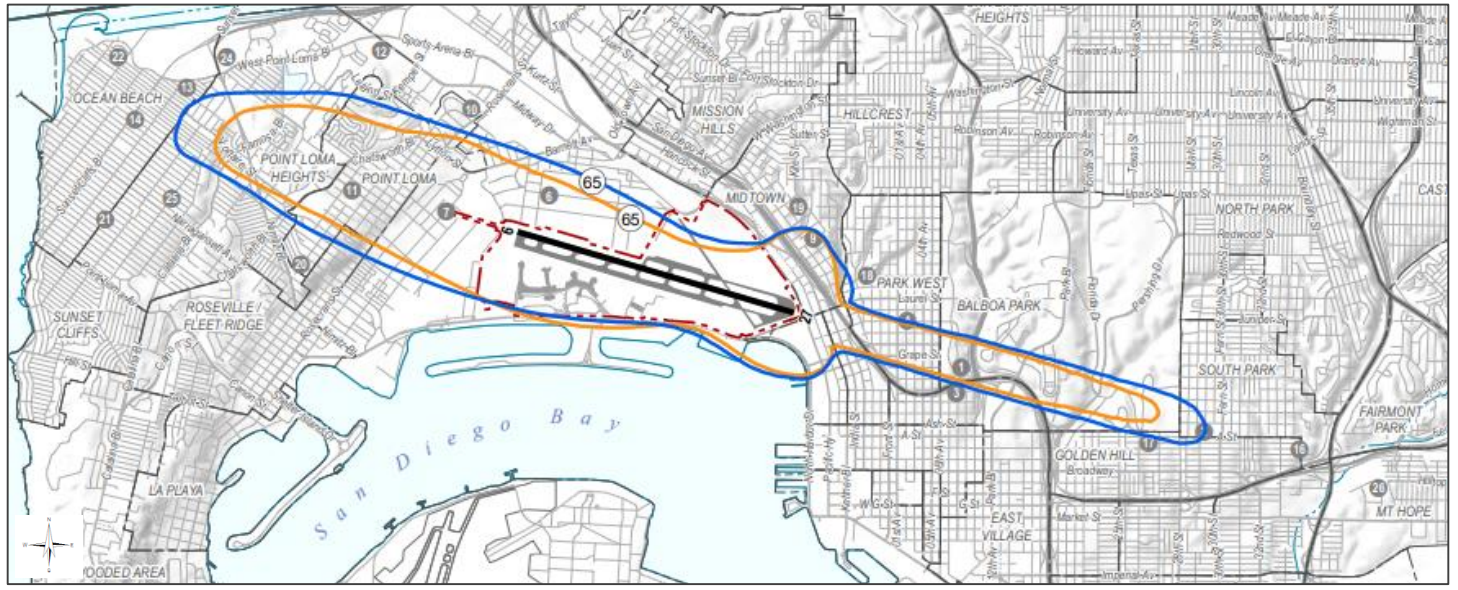

Figure 6. Example of CNEL contour; Source: 4th Quarter 2022, State of California Quarterly Noise Report for SAN.

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Aircraft Operations

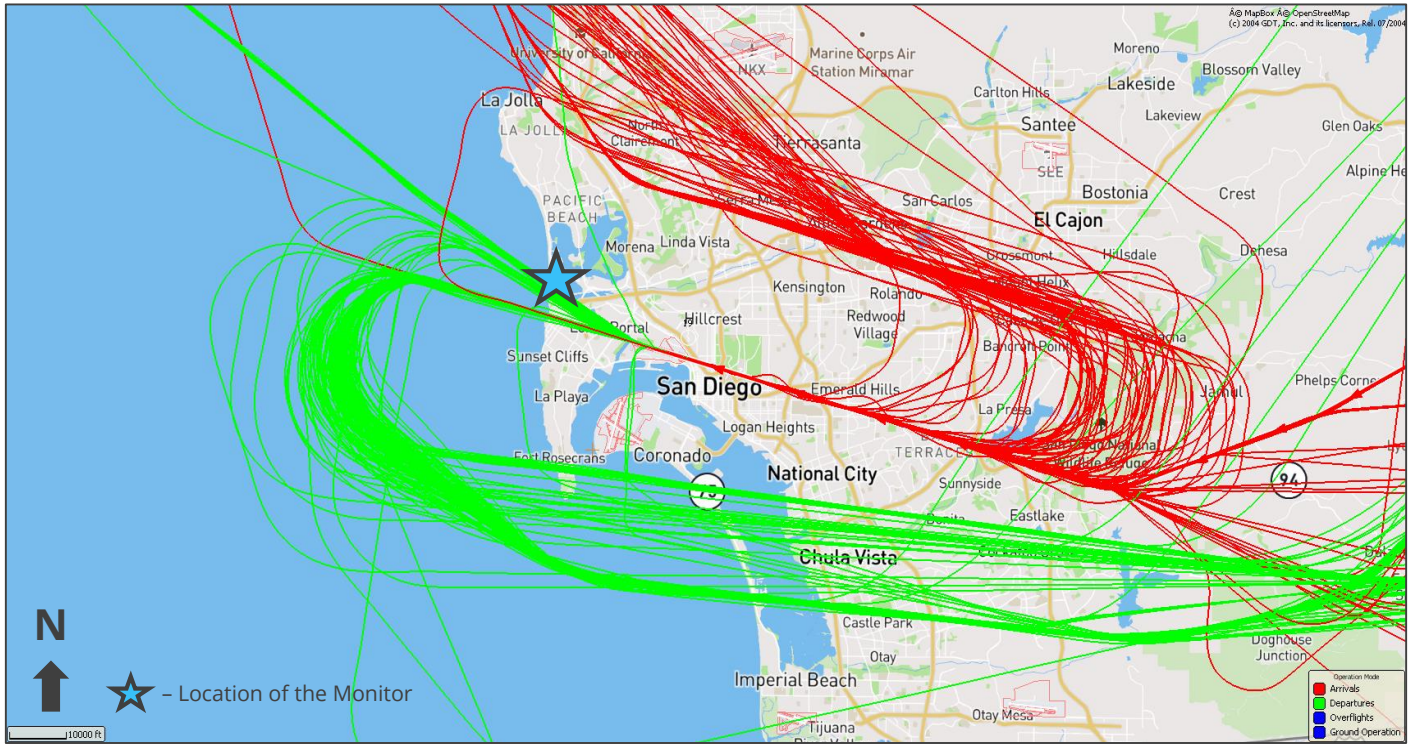

Figure 7. Flight Tracks during an average day in the testing period.
Location: Avalon Court, San Diego, CA.
Source: ANOMS.

Aircraft at SAN typically operate in a "west flow" pattern, where they arrive from the east and depart to the west. During inclement weather or high wind conditions, aircraft might operate in a reverse flow, departing to the east and arriving from the west, however this "east flow" pattern is infrequent and represents approximately 3% of the total annual operations.

During the 5 – day measurement period, there were 3,005 total SAN operations: 1,496 Arrivals, and 1,508 Departures. One flight was diverted due to inclement weather conditions.

Flight tracks in Figure 7 is a sample of a "typical" day taken from April 19, 2023, and represent 601 flights, which is an average number of flights per day, during the measurement period.

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Daily Noise Event Data

	SAN Aircraft			Non-SAN Aircraft			Mixed Noise Events		
Date	Noise Events (quantity)	Average SEL (dB)	Average Lmax (dB)	Noise Events (quantity)	Average SEL (dB)	Average Lmax (dB)	Noise Events (quantity)	Average SEL (dB)	Average Lmax (dB)
4/17/2023	110	84	75	3	81	71	2	86	77
4/18/2023	121	84	75	1	81	81	10	83	73
4/19/2023	135	84	74	3	80	71	6	84	75
4/20/2023	131	83	74	1	81	81	3	84	74
4/21/2023	21	83	75	0	0	0	0	0	0

Figure 8. Daily noise events averages.
Location: Avalon Court, San Diego, CA.
Source: ANOMS.

Note: Full 24-hour days and partial measurements are displayed. Quantity "zero" noise events and average levels indicate that those were not registered by the Sound Level Meter.

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Loudest Aircraft Noise Events

Aircraft Type	Airline	Event Date / Time	Airport	SEL (dB)	Lmax (dB)	Altitude[1] at Lmax (Feet MSL[2])
A332	Hawaiian Airlines	4/19/23 8:36 AM	San Diego International Airport	91.7	83.1	1,959
A332	Hawaiian Airlines	4/20/23 9:01 AM	San Diego International Airport	90.5	81.0	2,004
B738	Alaska Airlines	4/19/23 8:06 AM	San Diego International Airport	89.7	81.7	1,744
B739	United Airlines	4/18/23 11:05 PM	San Diego International Airport	89.5	79.3	2,480
B739	United Airlines	4/19/23 10:35 PM	San Diego International Airport	89.2	80.1	1,909
B738	Delta Air Lines	4/17/23 10:15 PM	San Diego International Airport	88.9	79.8	2,051
B738	Alaska Airlines	4/20/23 10:37 AM	San Diego International Airport	88.9	79.9	1,890
A321	Delta Air Lines	4/18/23 10:40 PM	San Diego International Airport	88.7	80.6	1,810
B738	Alaska Airlines	4/17/23 11:04 AM	San Diego International Airport	88.2	79.5	1,679
B737	Southwest Airlines	4/17/23 10:19 AM	San Diego International Airport	88.2	77.6	3,558

Figure 9. Loudest aircraft noise events April 17 - 21, 2023.
Location: Avalon Court, San Diego, CA.
Altitude[1] – at which Lmax was registered.
MSL[2] – Above Mean Sea Level.
Source: ANOMS.

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Noise Summary

In general, there are three sources of emitted energy, as it relates to sound measurements.
SAN Aircraft is sound solely attributed to aircraft operating at SAN.
Non-SAN Aircraft sound is measured for all "other" aircraft that do not operate in or out of SAN.
Community sound, also known as Ambient, includes sound events from all other sources such as vehicular traffic, landscaping activities, conversations, construction activities, kids playing, etc.

Noise Event Breakdown	
SAN Aircraft	518
Non-San Aircraft	8
Mixed Events	21

Figure 12. Registered Noise Events for Avalon Court, San Diego, CA.
Source: ANOMS.

Date	Daily SAN Aircraft CNEL (dB)
4/17/2023	62.5
4/18/2023	60.4
4/19/2023	60.4
4/20/2023	60.1
4/21/2023	58.7

Figure 10. Daily Aircraft CNEL Levels for Avalon Court, San Diego, CA.
Source: ANOMS.

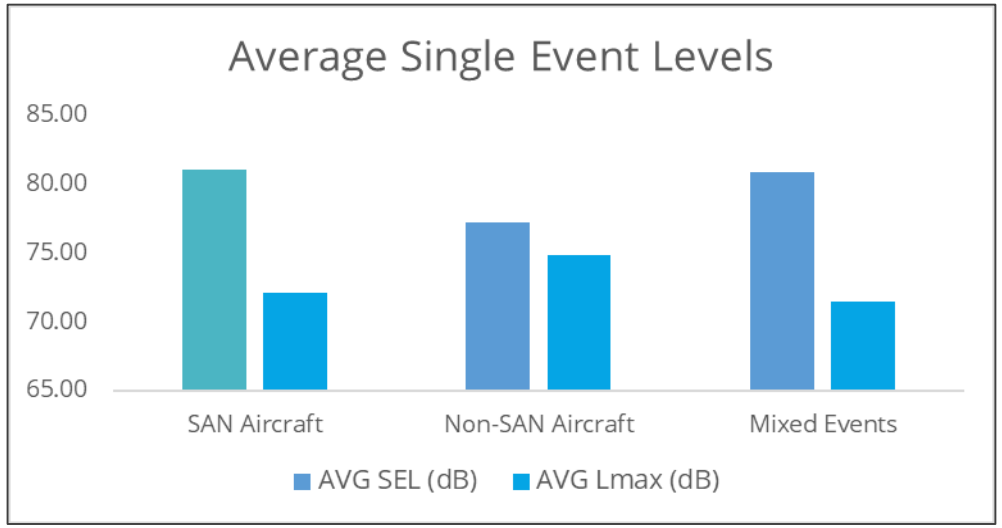

Figure 11. Average Single Event Levels for Avalon Court, San Diego, CA.
Source: ANOMS.

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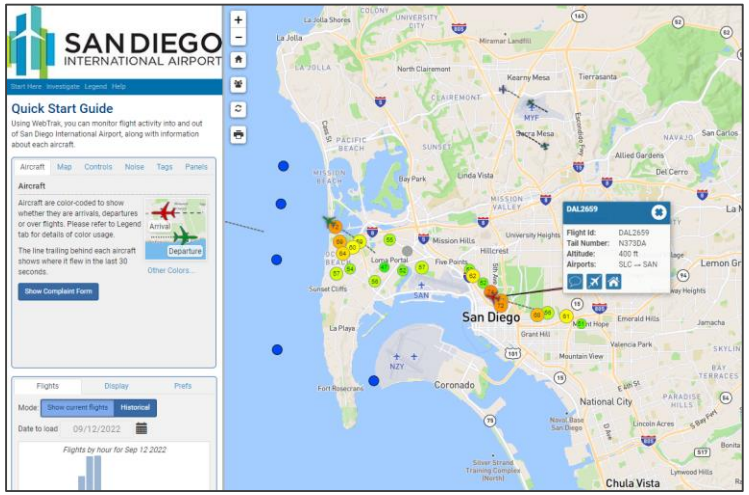
Additional Resources

If you have any additional questions about the information in this report, or any other aircraft noise related concerns, please contact our Aircraft Noise Office at **619-400-2660** and ask for a Noise Specialist. For additional information you can review aircraft flight tracks, file a noise complaint, or attend an Airport Noise Advisory Committee (ANAC) meeting.



If you want to research an aircraft, you can view the near-real time flight tracks on our website:

https://webtrak.emsbk.com/san

Three ways to file a complaint:

1. On the Web: https://webtrak.emsbk.com/san
2. Through the Mobile App: https://viewpoint-app.emsbk.com/san4/login
3. By telephone: 619-400-2799

Learn more about what efforts have been done to reduce aircraft noise in the community or voice a concern about aircraft noise by attending a quarterly **Airport Noise Advisory Committee meeting.**

More information can be found on our website:

https://www.san.org/Aircraft-Noise/Initiatives

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