



Portable Noise Monitor Report

Prepared by: Aircraft Noise Office
For: Loma Riviera Dr., San Diego, CA

June 16, 2023

Portable Noise Monitoring Summary

? WHEN WAS NOISE MEASURED

May 8 – 18, 2023



	S	M	T	W	T	F	S
May 2023		8	9	10	11	12	13
	14	15	16	17	18		

 Partial measurement (setup / takedown) days.

 Full (24-hour) measurement days.

✈ HOW MANY NOISE EVENTS OCCURRED

 1,605 SAN AIRCRAFT NOISE EVENTS

 3 NON-SAN AIRCRAFT NOISE EVENTS

 49 COMMUNITY NOISE EVENTS

MOST FREQUENT AIRCRAFT FLIGHTS DURING THE MEASUREMENT PERIOD

Rank	Aircraft Type	Airport ID
1	B737 	SAN
2	B738 	SAN
3	E75L 	SAN
4	A321 	SAN

💡 CONCLUSION

During the 9 full (24-hour) day measurement period, the average Community Noise Equivalent Level (CNEL) from aircraft noise* was 59 decibels (dB), while the CNEL from community noise was 54.4 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
59	54	60

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.

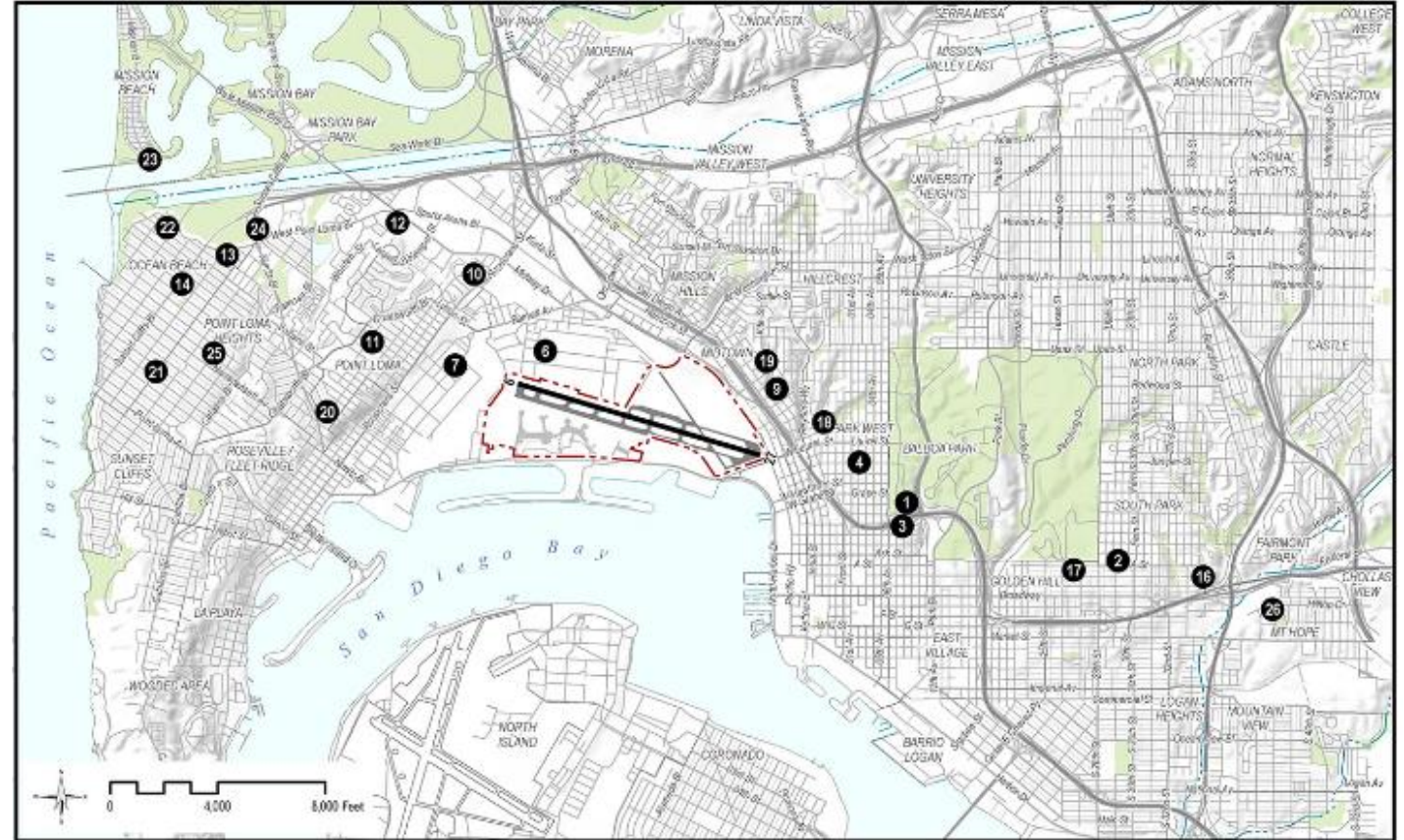


Figure 1. Map of the 23 permanent RMT locations at SAN, San Diego, CA.

Location

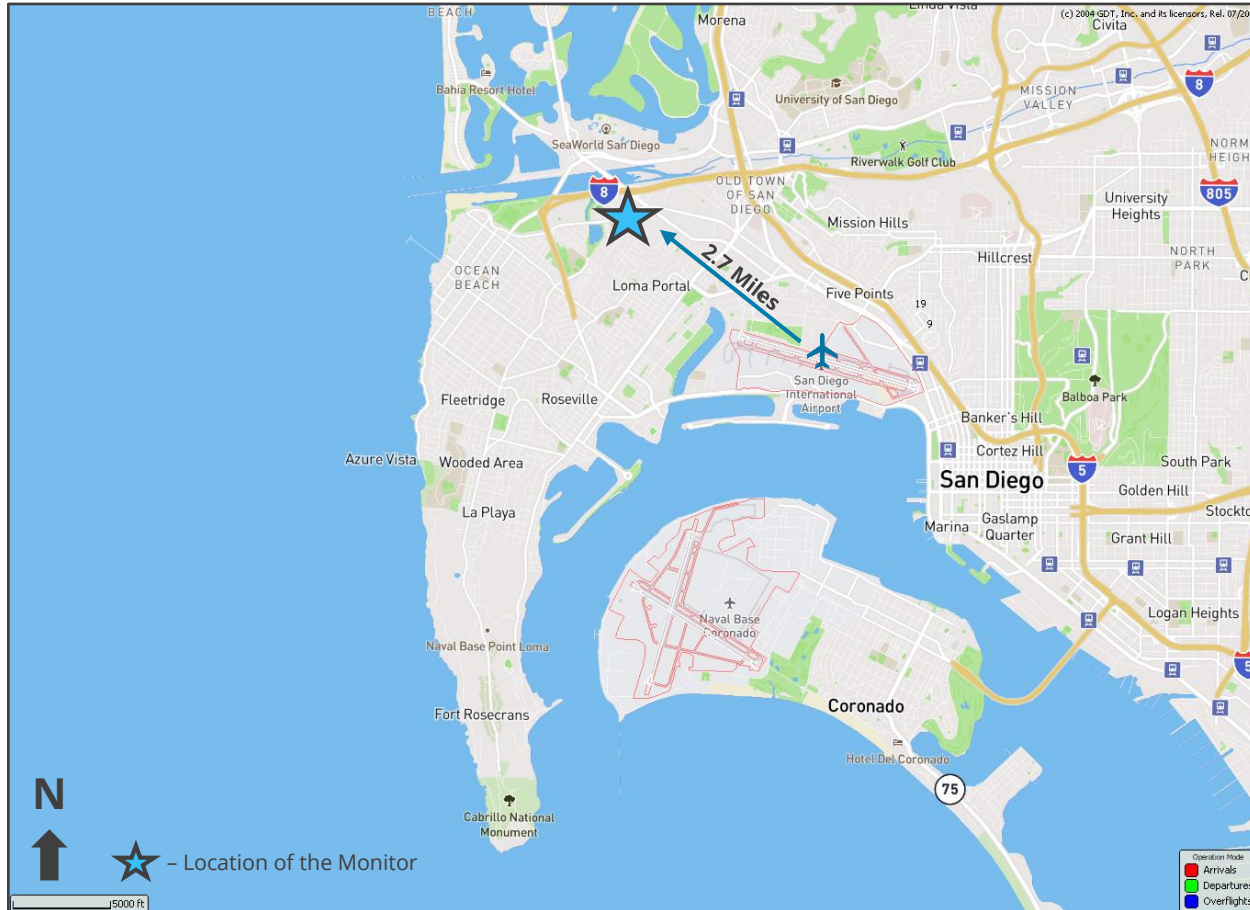


Figure 2. Map of the Portable Noise Monitoring location during May 9 – 17, 2023.

Location: Loma Riviera Drive, San Diego, CA 92110.

Dates of Monitoring: May 8 – 18, 2023.

Distance from SAN: The monitor was located approximately 2.7 miles northwest from the center of the Airport.

On-Site Set Up: The noise monitor was placed in the backyard of a private and secure property. The monitor operated continuously during the entire 11-day measurement period. First and last days were partial measurement days, used for setup and take-down. The monitor was placed on a solid surface. Microphone was approximately six feet above the ground, and about one foot off the fence.

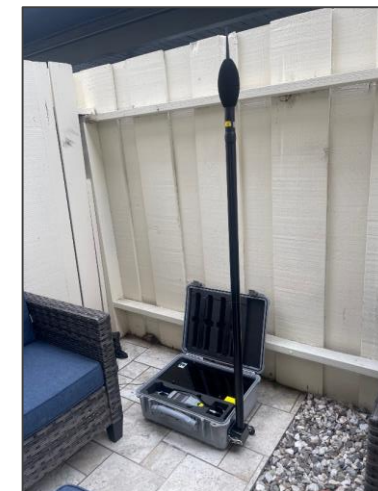


Figure 3. Portable Monitor at Location.

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: 62 dBA for Daytime (7:00 a.m. – 10:00 p.m.), 60 dBA for Evening (07:00 p.m. – 10:00 p.m.) and 60 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 11 sec, 12 sec, and 14 sec for Daytime, Evening, and Nighttime respectively. 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 4. 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

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.

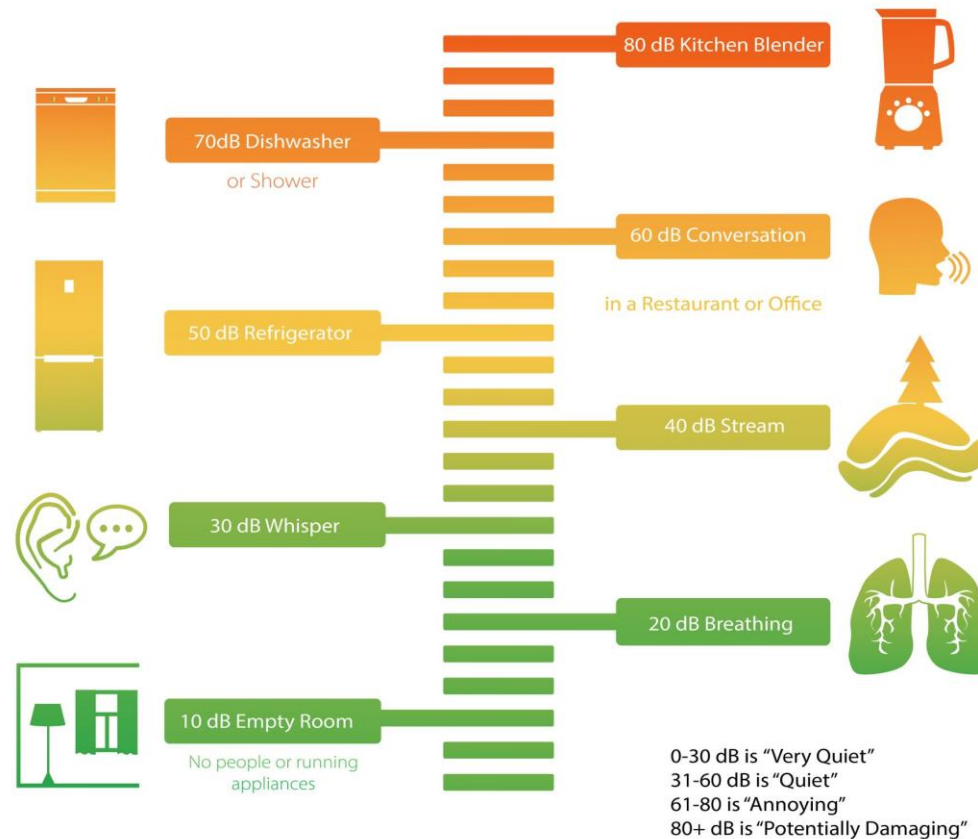


Figure 5. Common Sound Levels.

Source: <https://www.sylvane.com/blog/how-loud-is-a-decibel/>

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.

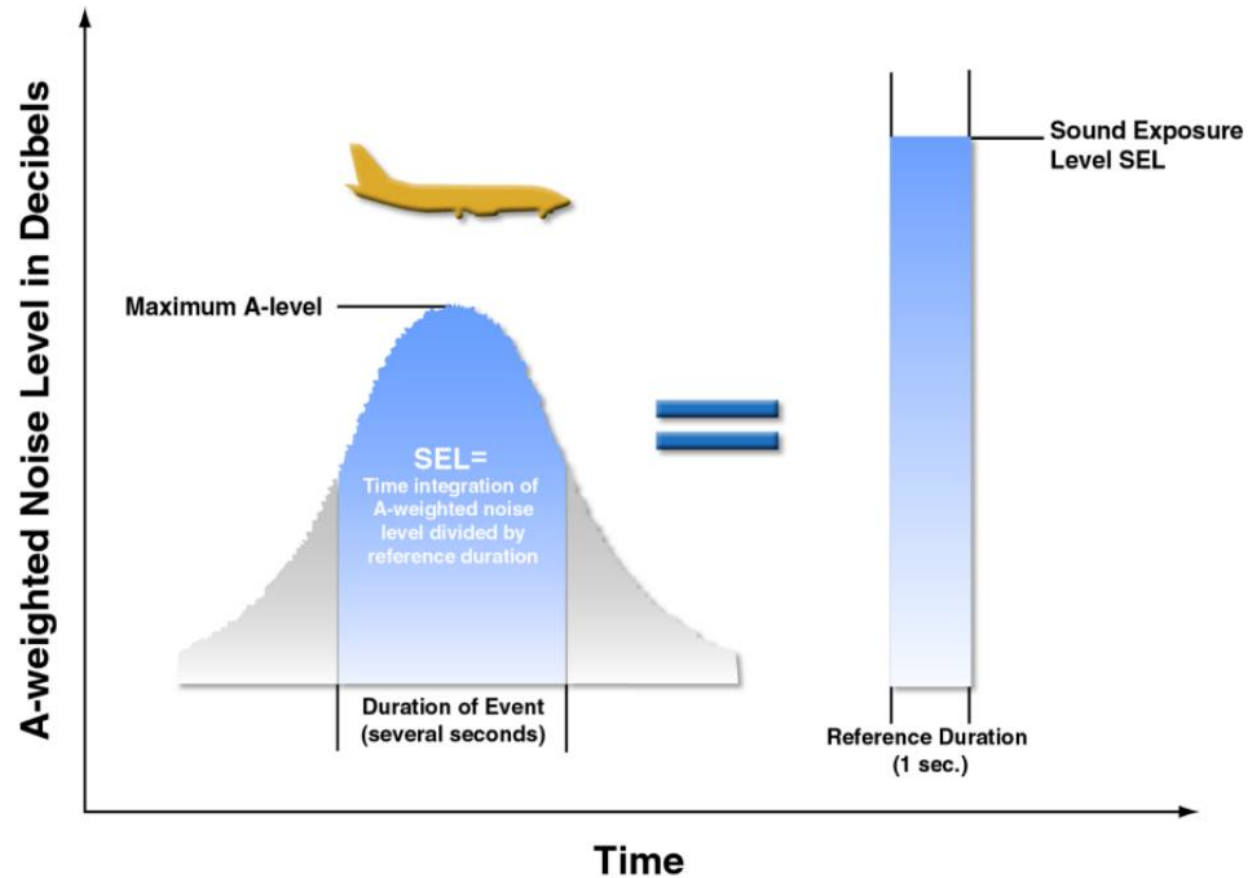


Figure 6. Sound Exposure Level and Maximum Sound Level.
Source: Brown-Buntin Associates, Inc.

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.

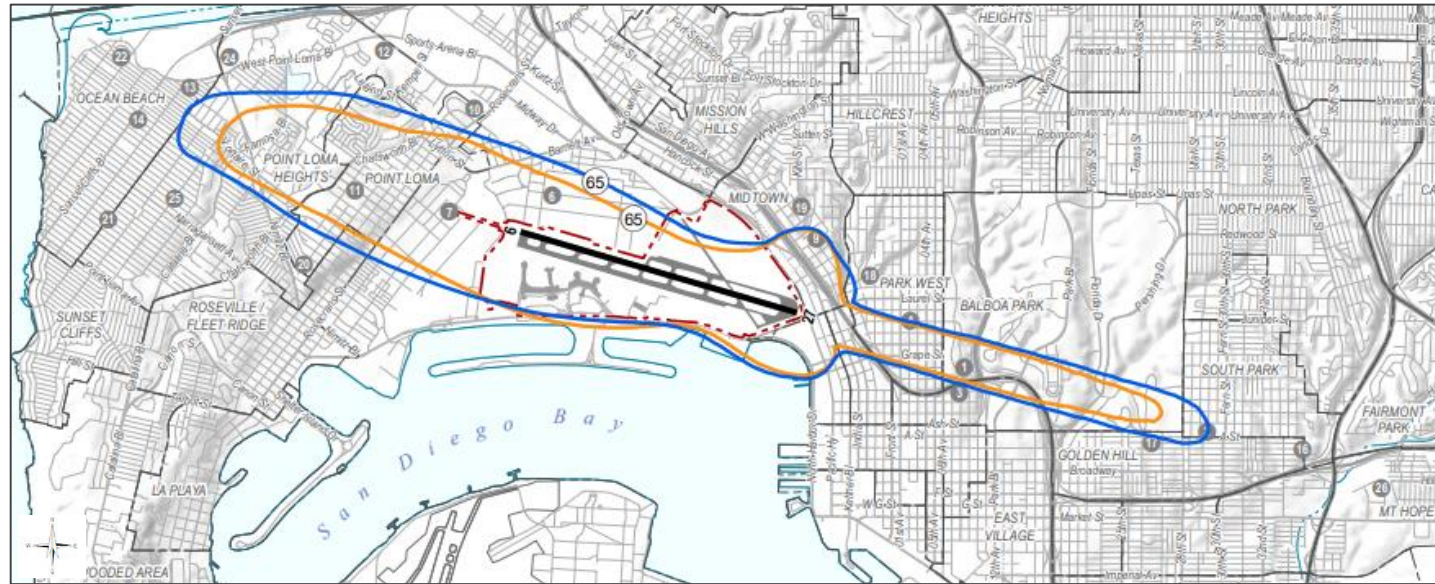


Figure 7. Example of CNEL contour; Source: 4th Quarter 2022, State of California Quarterly Noise Report for SAN.

Aircraft Operations

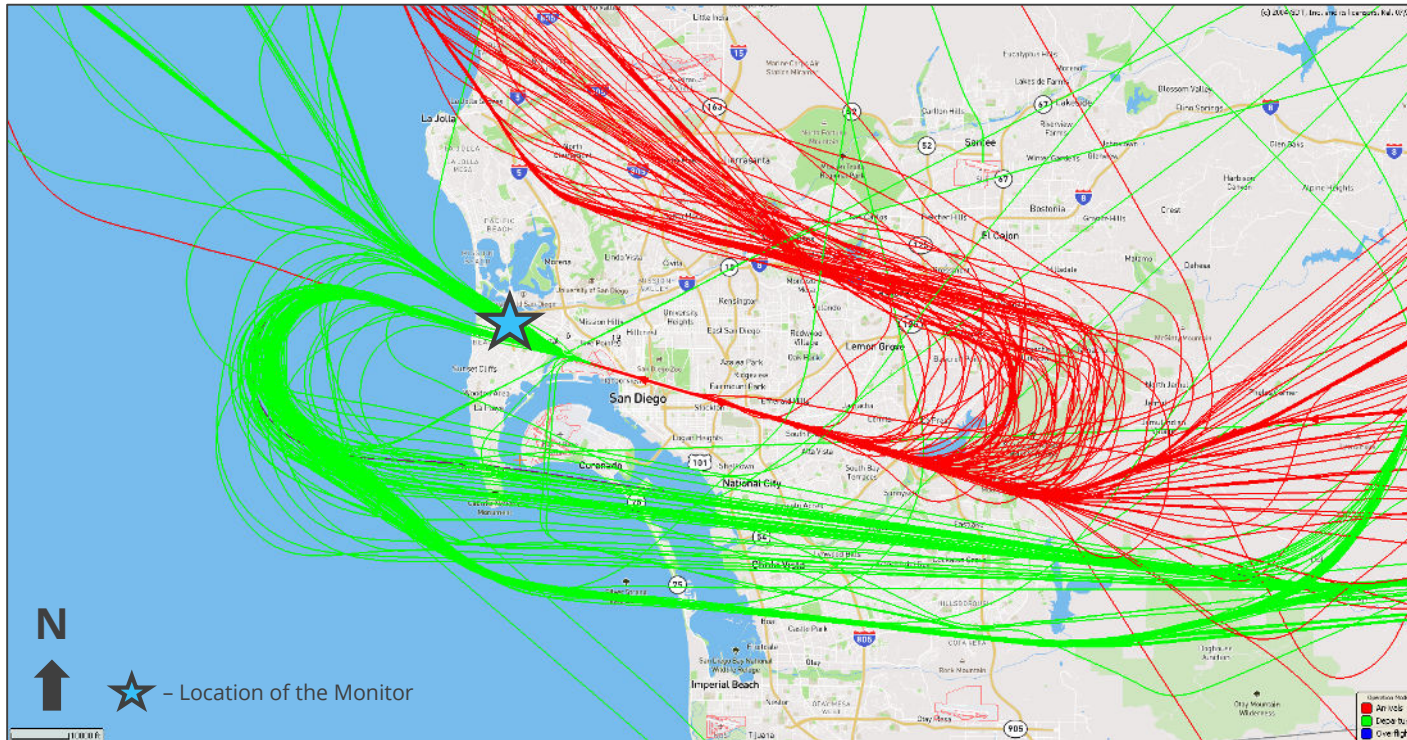


Figure 8. Flight Tracks during an average day in the testing period.
Location: Loma Riviera Dr., San Diego, CA.
Source: ANOMS.

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 1.7% of the total annual operations.

During the full 9-day measurement period, there were 5,333 total SAN operations: 2,664 Arrivals, and 2,669 Departures. The average number of flights per day was 593.

Flight tracks in Figure 8 are a sample of a "typical" day taken from May 9, 2023, and represent 584 flights.

Daily Noise Event Data

SAN Aircraft				Non-SAN Aircraft			Community		
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)
5/9/2023	210	82	73	0	0	0	15	85	75
5/10/2023	218	82	72	0	0	0	1	78	62
5/11/2023	218	83	72	2	91	79	8	90	79
5/12/2023	221	82	72	1	86	80	7	90	81
5/13/2023	117	80	71	0	0	0	5	80	65
5/14/2023	142	81	71	0	0	0	3	79	65
5/15/2023	211	82	72	0	0	0	9	91	80
5/16/2023	151	82	72	0	0	0	0	0	0
5/17/2023	117	81	71	0	0	0	1	90	90

Figure 9. Daily noise events averages.
Location: Loma Riviera Dr., San Diego, CA.
Source: ANOMS.

Note: Full 24-hour days of measurements are displayed. Partial measurement (setup / takedown) days are not shown. Quantity "zero" noise events and average levels indicate that those were not registered by the Sound Level Meter.

Loudest Aircraft Noise Events

Aircraft Type	Airline	Event Date / Time	Airport	SEL (dB)	Lmax (dB)	Altitude ¹ at Lmax (Feet MSL ²)
B737	Southwest Airlines	5/12/23 12:33 PM	San Diego International Airport	96.2	84.8	2,135
T206	General Aviation	5/11/23 5:02 PM	McClellan-Palomar Airport	92.1	80.7	1,362
A321	American Airlines	5/11/23 3:13 PM	San Diego International Airport	91.7	75.8	1,881
A321	American Airlines	5/9/23 12:08 PM	San Diego International Airport	91.6	87	2,425
B737	Southwest Airlines	5/11/23 12:14 PM	San Diego International Airport	89.3	78.7	1,900
A321	American Airlines	5/11/23 6:34 AM	San Diego International Airport	89.1	82.4	2,442
B738	Southwest Airlines	5/17/23 6:12 PM	San Diego International Airport	89	77.1	2,148
A321	Spirit Airlines	5/11/23 4:32 PM	San Diego International Airport	88.8	78.5	1,279
A321	American Airlines	5/9/23 12:08 PM	San Diego International Airport	88.1	77.7	1,905
B38M	Southwest Airlines	5/15/23 1:27 PM	San Diego International Airport	87.7	78.3	1,731

Figure 10. Loudest aircraft noise events May 9- 17, 2023.

Location: Loma Riviera Dr., San Diego, CA.

Altitude¹ – at which Lmax was registered.

MSL² – Above Mean Sea Level.

Source: ANOMS.

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.

Date	Daily SAN Aircraft CNEL (dB)
5/9/2023	60.3
5/10/2023	60.1
5/11/2023	61.2
5/12/2023	60.3
5/13/2023	54.3
5/14/2023	56.9
5/15/2023	59.0
5/16/2023	57.4
5/17/2023	57.7

Figure 11. Daily Aircraft CNEL Levels for Loma Riviera Dr., San Diego, CA.
Source: ANOMS.

Noise Event Breakdown	
SAN Aircraft	1,605
Non-San Aircraft	3
Community Events	49

Figure 13. Registered Noise Events May 9- 17, 2023.
Location: Loma Riviera Dr., San Diego, CA.
Source: ANOMS.

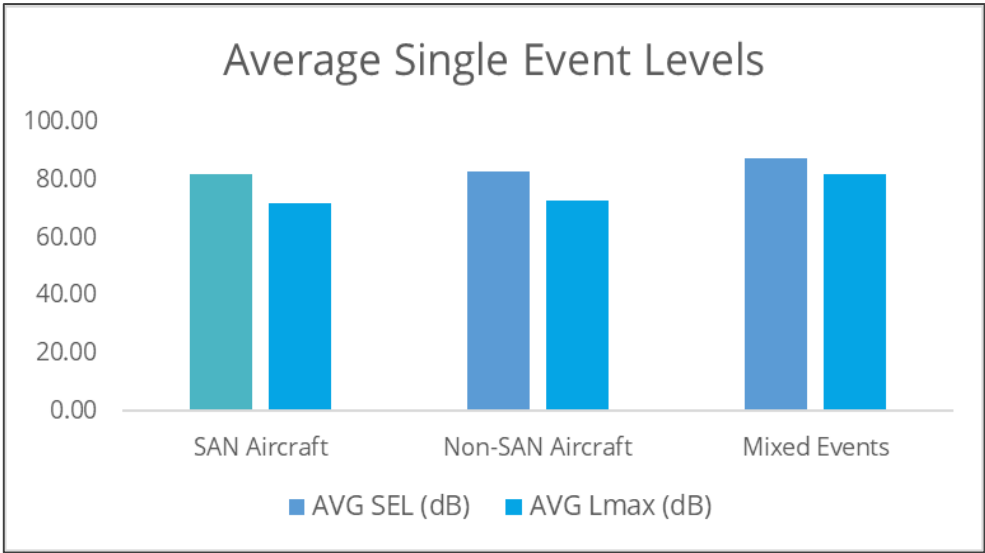
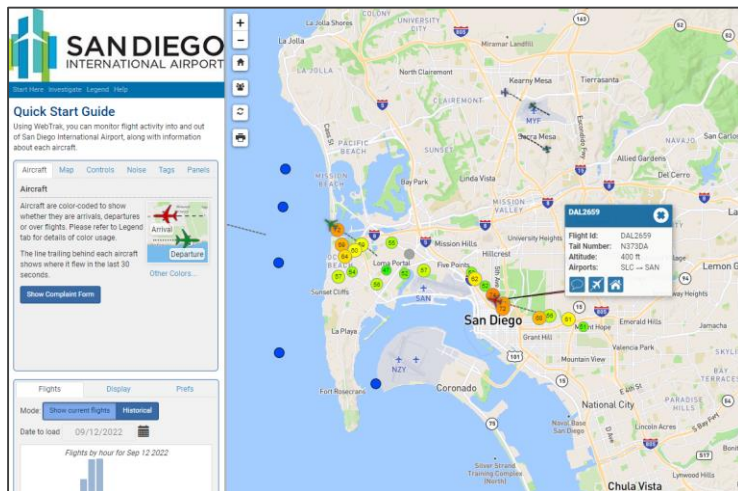


Figure 12. Average Single Event Levels May 9- 17, 2023.
Location: Loma Riviera Dr., San Diego, CA.
Source: ANOMS.

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>