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Portable Noise Monitor Report

Prepared by: Aircraft Noise Office

For: Russell St., San Diego, CA

April 16, 2024

Portable Noise Monitoring Summary

WHEN
WAS NOISE MEASURED

March 4–18, 2024

15 Days

March 2024

S	M	T	W	T	F	S
	4	5	6	7	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

2,305 SAN AIRCRAFT NOISE EVENTS

9 NON-SAN AIRCRAFT NOISE EVENTS

188 COMMUNITY NOISE EVENTS

MOST FREQUENT AIRCRAFT FLIGHTS DURING THE MEASUREMENT PERIOD

Rank	Aircraft Type	Airport ID
1	B737 	SAN
2	E75L 	SAN
3	A321 	SAN
4	B767 	SAN

CONCLUSION

During the 13 full (24-hour) day measurement period, the Community Noise Equivalent Level (CNEL) from aircraft noise* was 59.1 decibels (dB), while the CNEL from community noise was 57.9 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	58	62

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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. These sources include noise events from 23 permanent Remote Monitoring Terminals (RMTs), 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 RMTs. This information augments the overall ANOMS data collection.

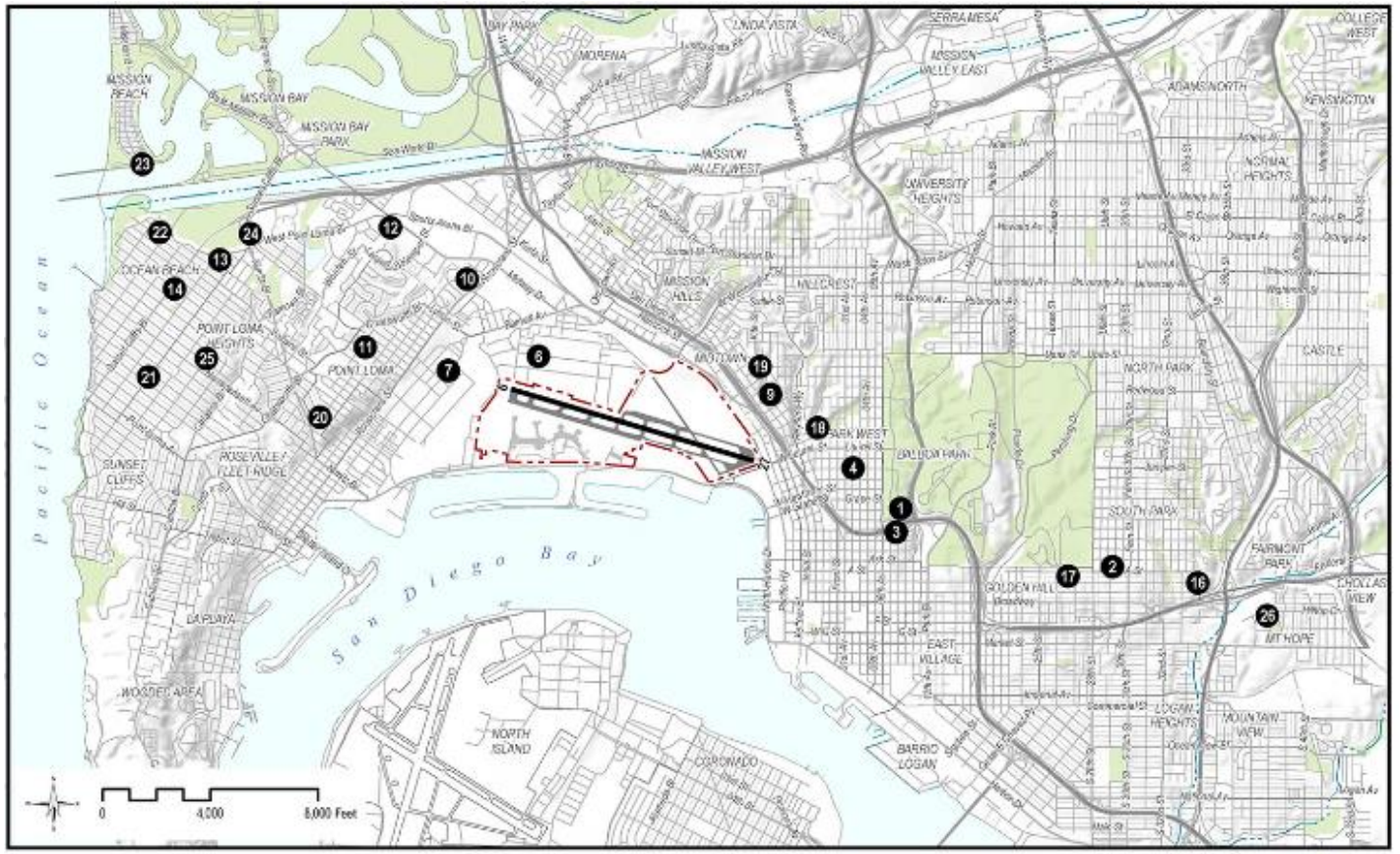

Figure 1. Map of the 23 permanent RMT locations at SAN, San Diego, CA.

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Location

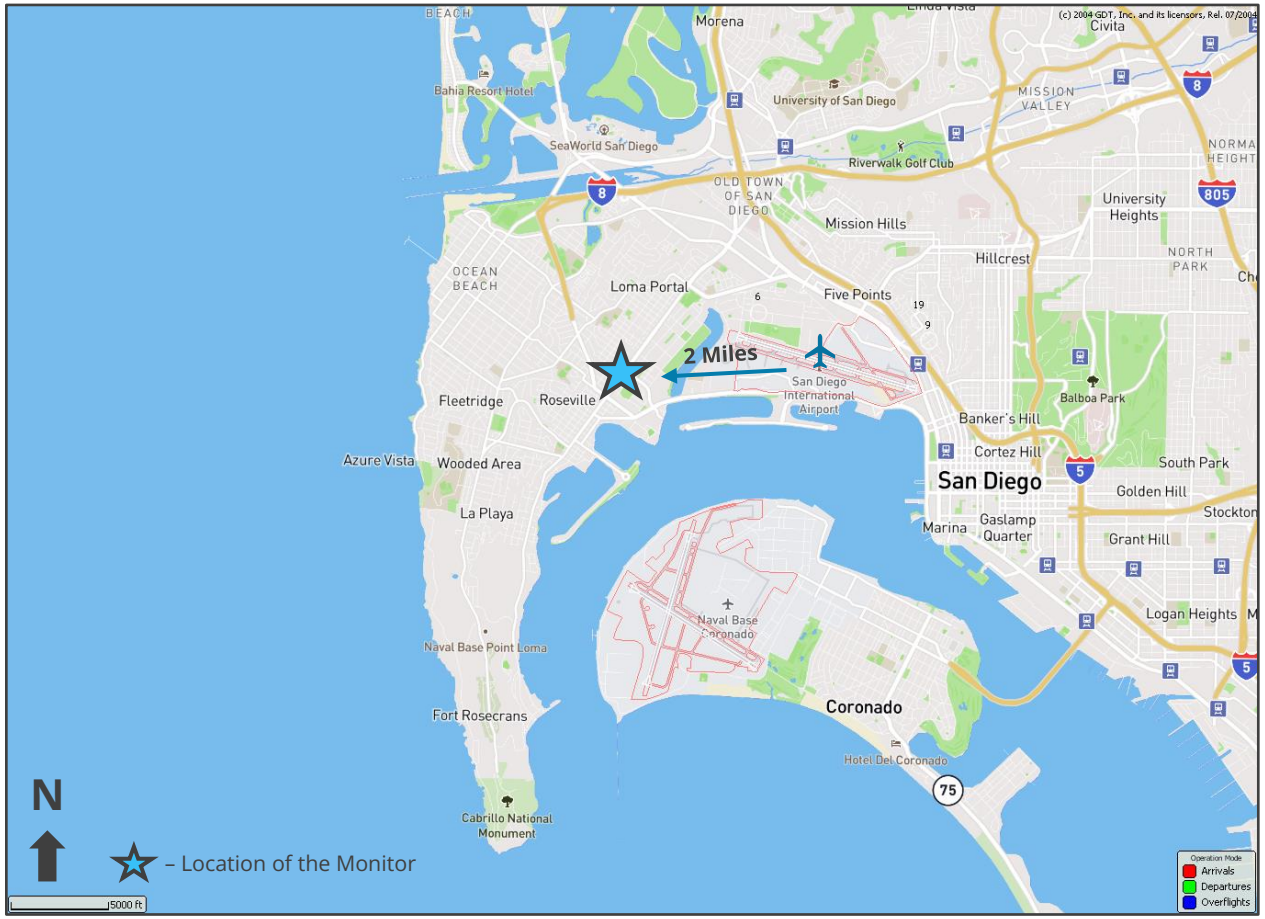

Figure 2. Map of the Portable Noise Monitoring location during March 5–17, 2024 measurement.

Location: Russell Street, San Diego, CA 92106.

Dates of Monitoring: March 5–17, 2024.

Distance from SAN: The monitor was located approximately 2 miles west–southwest from the center of the Airport.

On-Site Set Up: The noise monitor was placed on the patio of a private and secure property. The monitor operated continuously during the entire 15–day measurement period. The first and last days were partial measurement days, used for setup and take-down.
The monitor was placed on a dry, solid surface, and the microphone was approximately six feet above the surface and was obstruction free.

Figure 3. Portable Monitor.

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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: 62 dBA for Daytime (7:00 a.m.–7:00 p.m.), 60 dBA for Evening (7:00 p.m.–10:00 p.m.) and 58 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 predetermined minimum duration of time, which was 11 seconds for Daytime, 11 seconds for Evening, and 13 seconds for 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 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

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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 5. 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 represents the sum of sound energy over the duration of a noise event. Conceptually, it equates to an equivalent noise event with a one-second duration.

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

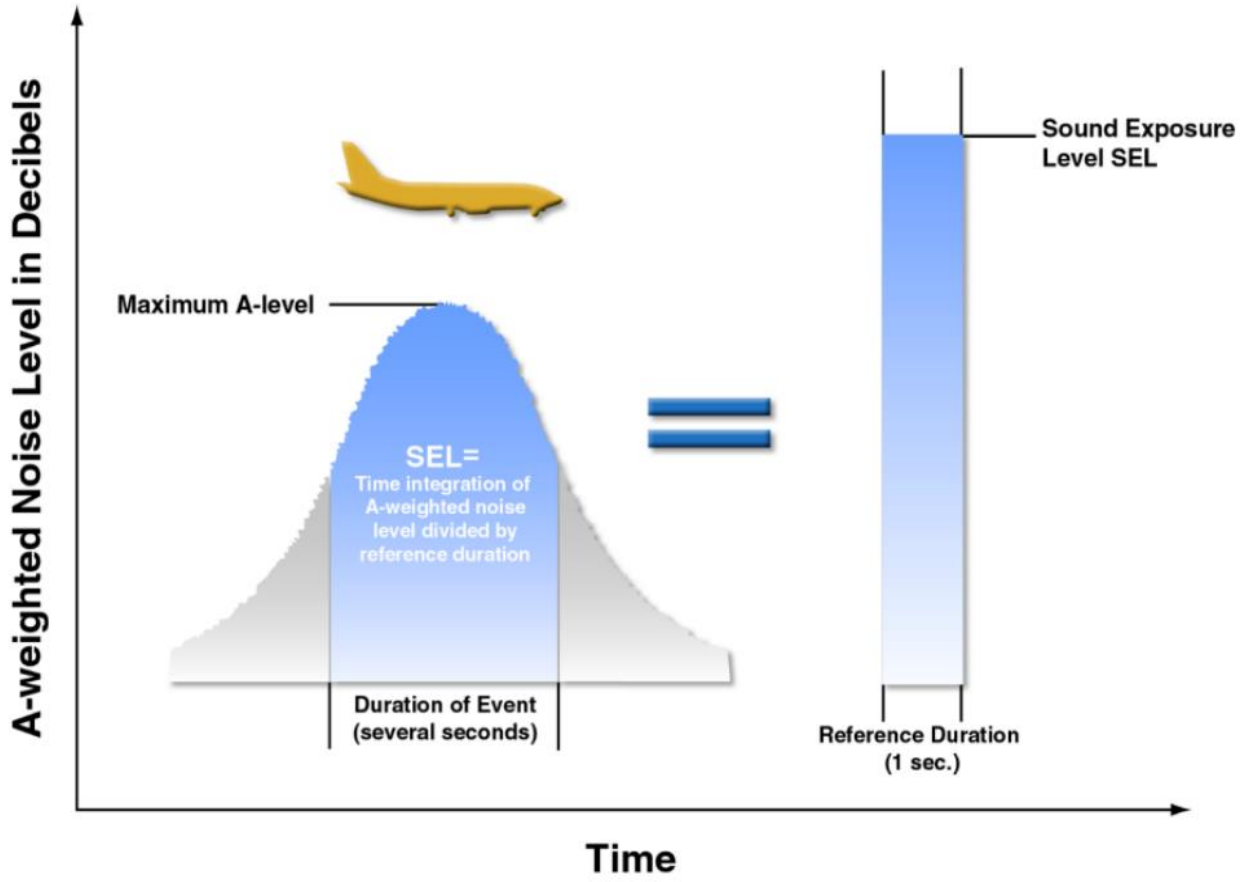

Figure 6. Sound Exposure Level and Maximum Sound Level.
Source: Brown-Buntin Associates, Inc.

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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.

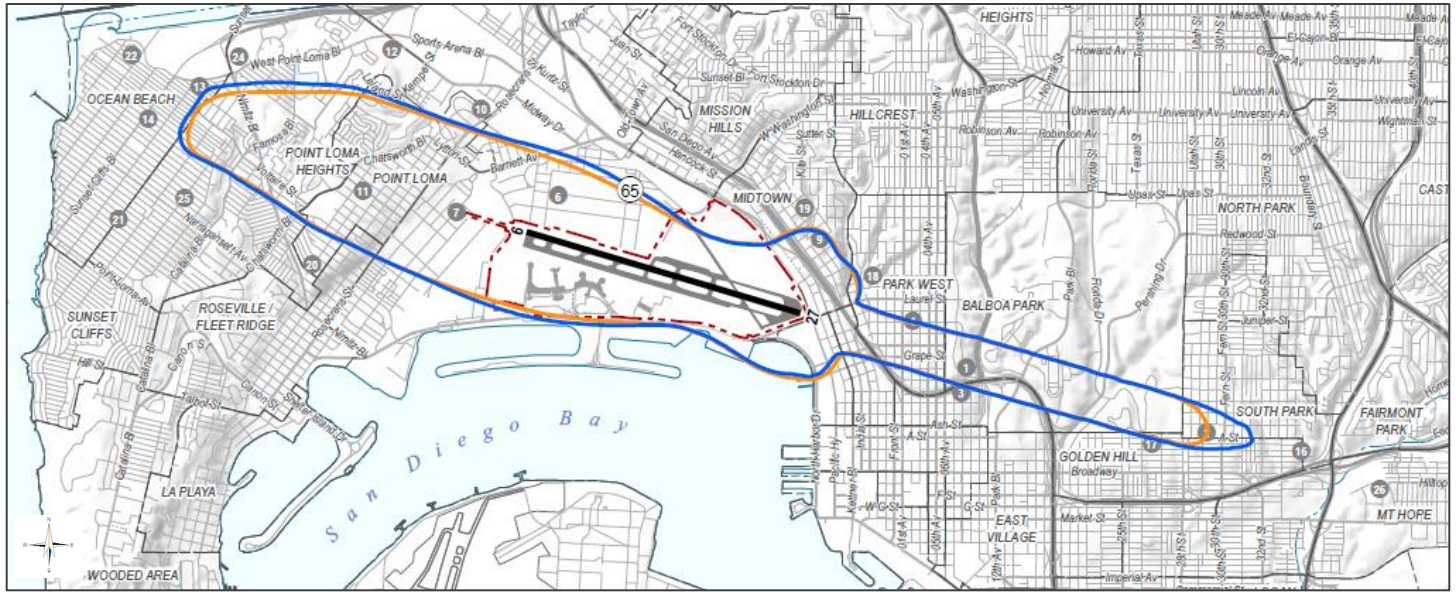

Figure 7. Example of CNEL contour; Source: 4th Quarter 2023, State of California Quarterly Noise Report for SAN.

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Aircraft Operations

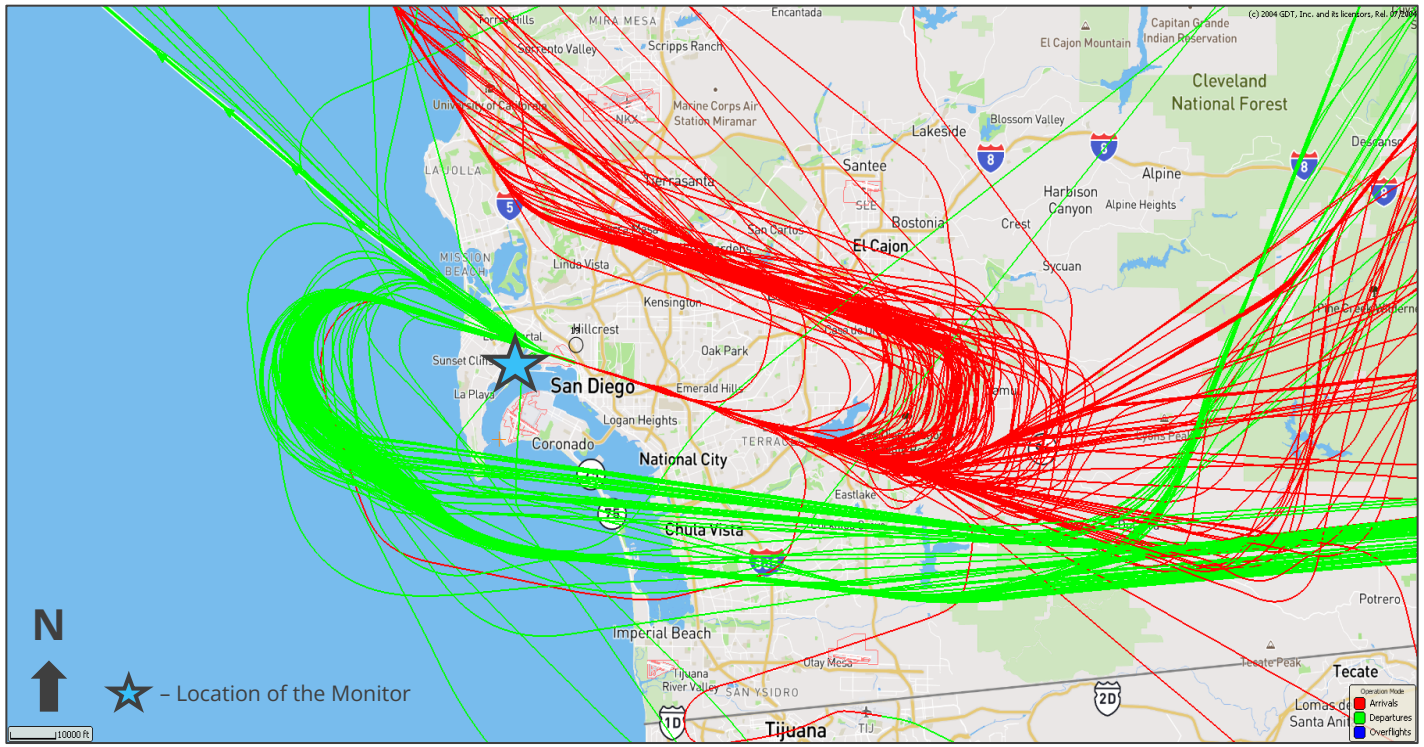

Figure 8. Flight Tracks during an average day in the testing period.
Location: Russell St., San Diego, CA.
Source: ANOMS.

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 4.8% of the total annual operations.

During the full 13-day measurement period, there were 7,361 total SAN operations: 3,681 Arrivals, and 3,679 Departures. One flight was diverted due to inclement weather conditions. The average number of flights per day was 566.

Flight tracks in Figure 8 are a sample of a "typical" day taken from March 13, 2024, and represent 597 flights.

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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)
3/5/2024	158	82	73	1	78	65	10	85	75
3/6/2024	151	81	73	1	72	62	31	79	67
3/7/2024	192	81	72	0	0	0	6	81	71
3/8/2024	191	81	72	0	0	0	20	78	70
3/9/2024	150	82	73	0	0	0	31	79	71
3/10/2024	183	81	72	0	0	0	18	82	74
3/11/2024	192	81	72	2	79	71	11	85	72
3/12/2024	173	81	72	1	77	69	6	82	73
3/13/2024	186	81	72	0	0	0	7	77	68
3/14/2024	159	81	72	4	75	64	11	78	69
3/15/2024	200	81	73	0	0	0	26	83	74
3/16/2024	172	81	73	0	0	0	6	84	75
3/17/2024	198	82	72	0	0	0	5	79	71

Figure 9. Daily noise events averages.
Location: Russell St., 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.

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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])
A321	Delta Air Lines	3/9/24 7:38 AM	San Diego International Airport	89.6	81.2	1,859
A321	Delta Air Lines	3/9/24 12:44 PM	San Diego International Airport	89.5	80.6	1,859
A321	Delta Air Lines	3/13/24 7:39 AM	San Diego International Airport	89.5	80.7	1,808
A321	Delta Air Lines	3/6/24 6:48 AM	San Diego International Airport	89.3	80.5	1,777
A321	Delta Air Lines	3/14/24 12:48 PM	San Diego International Airport	89.3	81.3	1,843
A321	Delta Air Lines	3/8/24 3:26 PM	San Diego International Airport	88.9	79.2	2,078
A321	Delta Air Lines	3/17/24 6:35 AM	San Diego International Airport	88.9	81.1	1,914
A321	Delta Air Lines	3/5/24 6:47 AM	San Diego International Airport	88.8	82.6	1,497
A321	Delta Air Lines	3/10/24 7:31 AM	San Diego International Airport	88.7	79.6	1,812
A321	Delta Air Lines	3/5/24 11:44 AM	San Diego International Airport	88.6	80.8	1,880

Figure 10. Loudest aircraft noise events March 5–17, 2024.
Location: Russell St., 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 – 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)
3/5/2024	61
3/6/2024	62
3/7/2024	61
3/8/2024	62
3/9/2024	61
3/10/2024	61
3/11/2024	61
3/12/2024	61
3/13/2024	61
3/14/2024	62
3/15/2024	63
3/16/2024	61
3/17/2024	62

Figure 11. Daily Aircraft CNEL Levels for Russell St., San Diego, CA.
Source: ANOMS.

Noise Event Breakdown	
SAN Aircraft	2,305
Non-San Aircraft	9
Mixed Events	188

Figure 13. Registered Noise Events for Russell St., San Diego, CA.
Source: ANOMS.

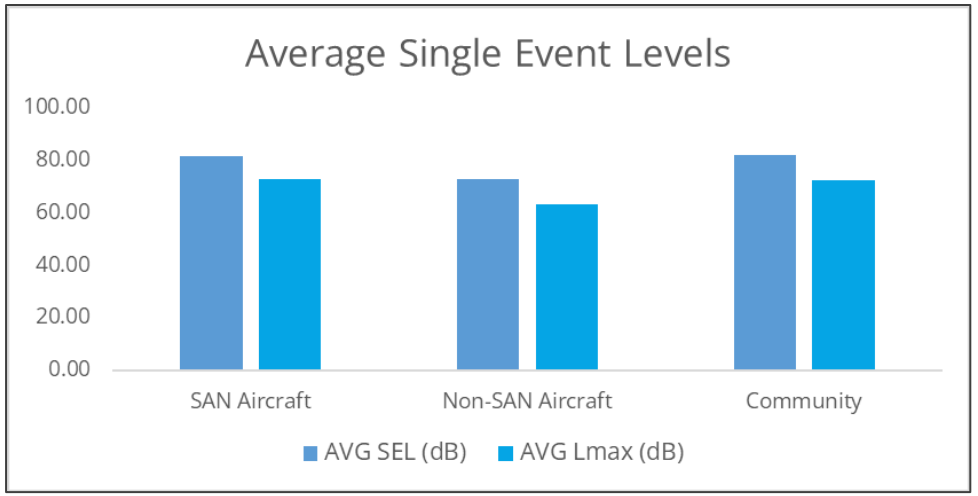

Figure 12. Average Single Event Levels for Russell St., San Diego, CA.
Source: ANOMS.

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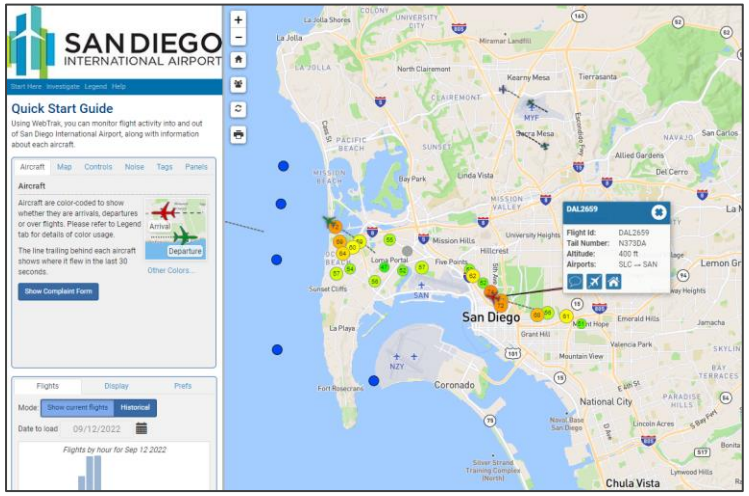
Additional Resources

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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