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INTERNATIONAL AIRPORT
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Portable Noise Monitor Report

Prepared by: Aircraft Noise Office

For: Muir Ave. San Diego, CA

October 20, 2022

Portable Noise Monitoring Summary

WHEN
WAS NOISE MEASURED

Monday, July 18, 2022, to
Thursday, July 28, 2022

11 Days

July/August 2022

S	M	T	W	T	F	S
	18	19	20	21	22	23
		measurements				
24	25	26	27	28	29	30
measurements						

Partial Measurement Days for Setup/Takedown

HOW MANY
AIRCRAFT NOISE EVENTS OCCURRED

234 SAN AIRCRAFT NOISE EVENTS / PER DAY

2 COMMUNITY NOISE EVENTS / PER DAY

0 NON-SAN AIRCRAFT NOISE EVENTS / PER DAY

MOST FREQUENT AIRCRAFT OVERFLIGHTS DURING THE MEASUREMENT PERIOD

Rank	Aircraft Type	Airport ID
1	Boeing 737-800	SAN
2	Boeing 737-700	SAN
3	Airbus A321	SAN
4	Embraer 170	SAN

CONCLUSION

During the nine, full (24-hour) day measurement period, the Community Noise Equivalent Level (CNEL) from aircraft noise* was 63 decibels (dB), while the CNEL from community noise was 55 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
63	55	64

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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 Noise Monitoring Terminals (NMT'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 NMT's. This information augments overall ANOMS data collection.

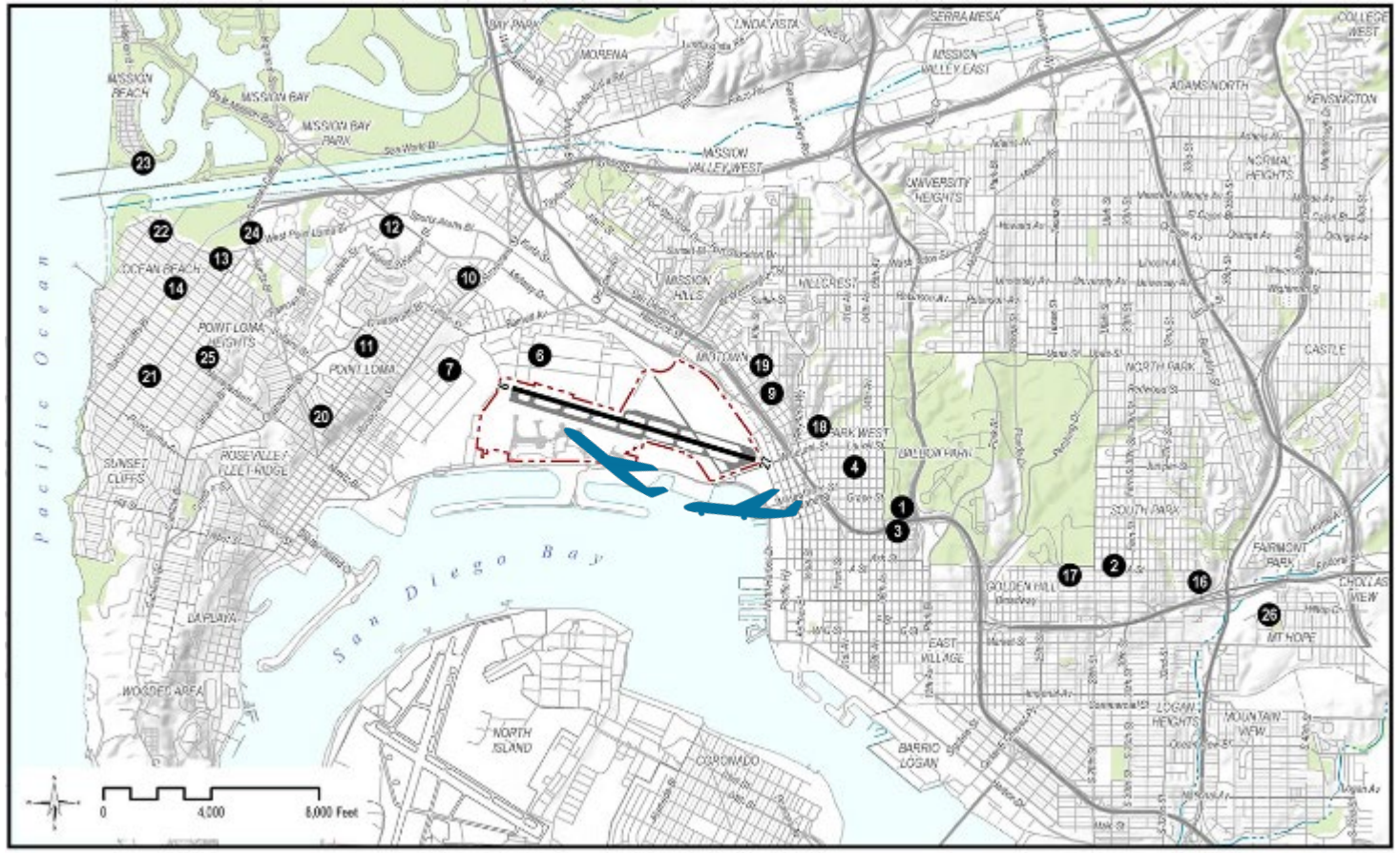

Figure 1. Map of the 23 permanent NMT locations at SAN. San Diego, CA.

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Location

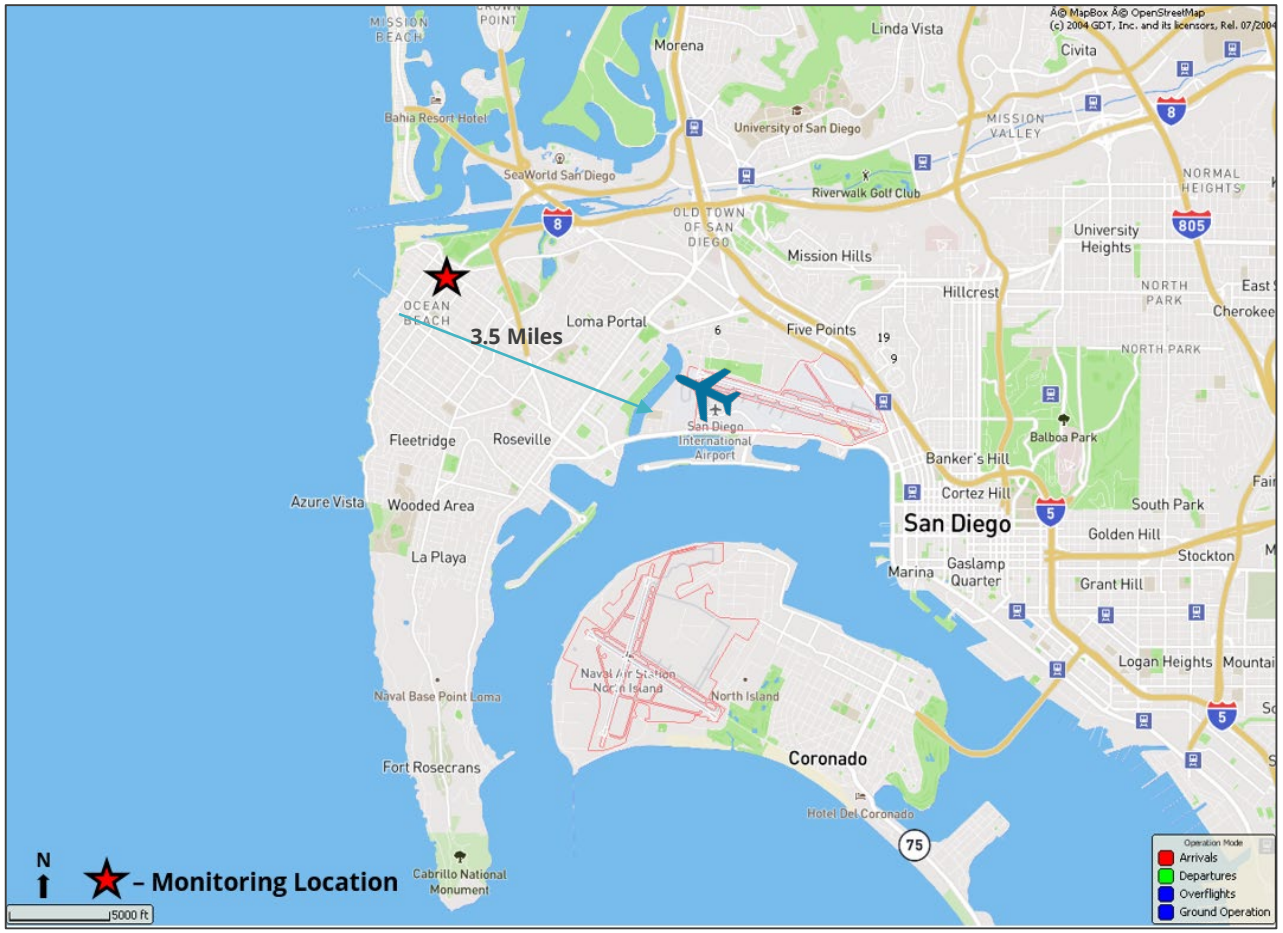

Figure 2. Map of the Portable Noise Monitoring location during July 18-28, 2022.

Location: Muir Ave., San Diego, CA 92107.

Dates of Monitoring: July 18-28, 2022.

Proximity from SAN: The monitor was located approximately 3.5 miles northwest from the center of the airport.

On-Site Set Up: The noise monitor was placed on the second-floor balcony of a private and secure property. The monitor operated continuously during the entire 9–day measurement period. The microphone was approximately 15 feet above the ground.

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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: 65 dBA for daytime (5:00 AM – 6:59 PM), 62 dBA for evening (07:00 PM – 21:59 PM) and 60 dBA for nighttime (10:00 PM – 4:59 AM). The baseline threshold levels were established to match the nearest permanent NMT. For a sound event to trigger, the Equivalent Continuous Sound Level (LEQ) needed to exceed 50 dBA and last for over five seconds (minimum duration). 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.

* 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.

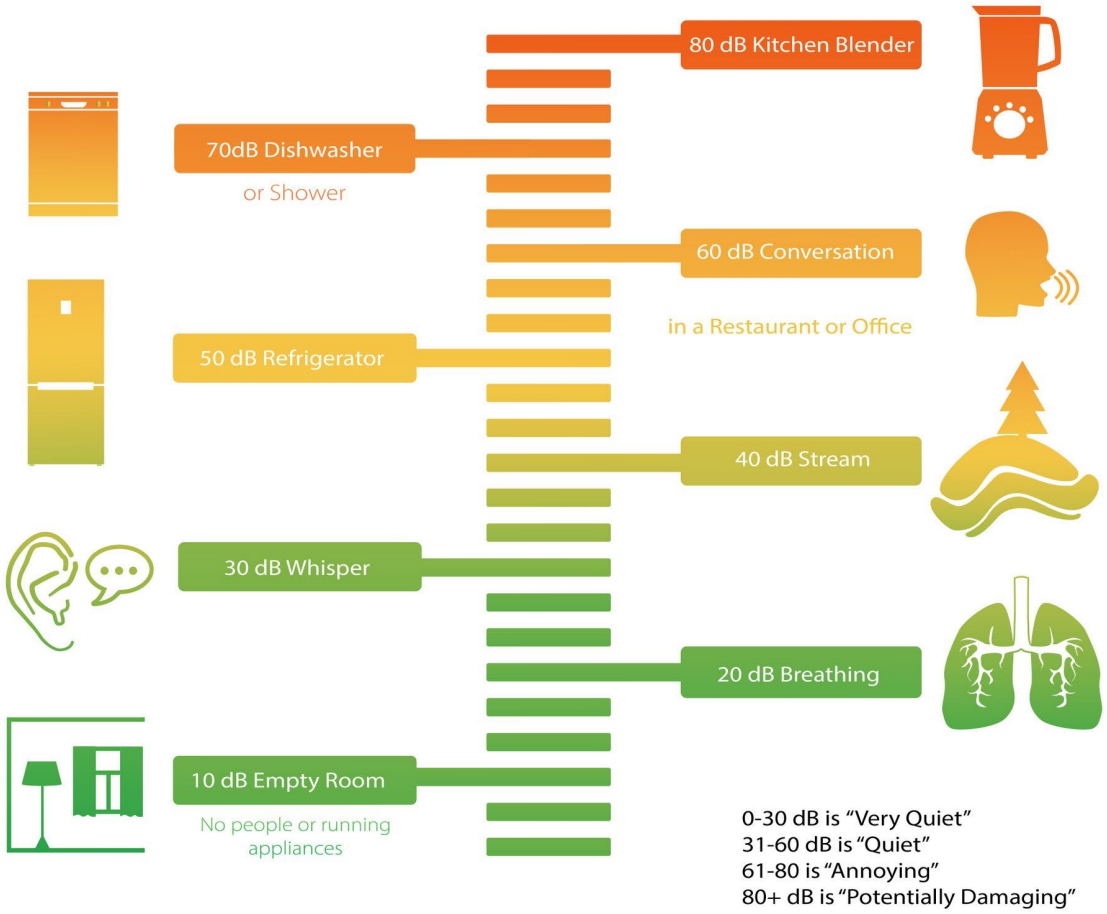

Figure 4. Common Sound Levels, Source: https://www.sylvane.com/blog/how-loud-is-a-decibel/.

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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.

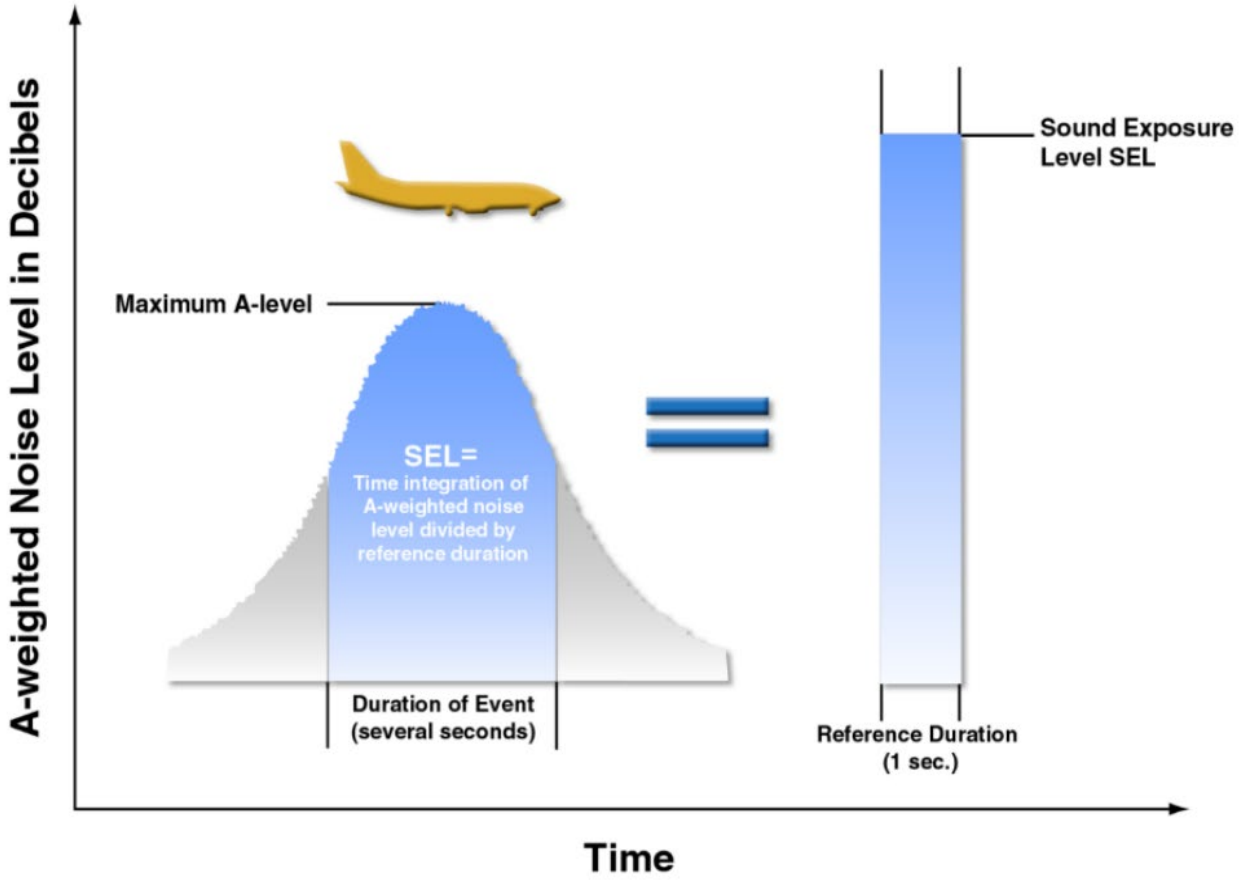

Figure 5. Sound Exposure Level and Maximum Sound Level, Source: Brown-Buntin Associates, Inc.

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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 PM – 10 PM for evening hours, and a penalty of 10 dBA is added for the nighttime hours of 10 PM – 7 AM.

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.

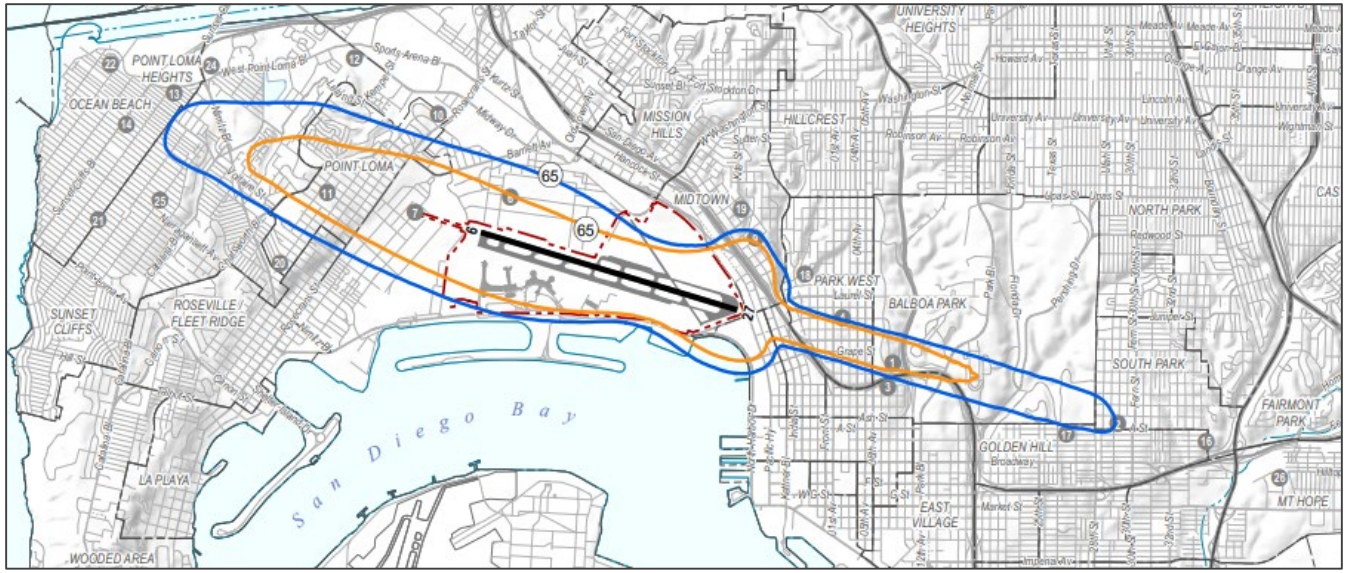

Figure 6. Example of CNEL contour, Source: 2nd Quarter 2022, State of California Quarterly Noise Report for SAN.

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Aircraft Operations

Figure 7: Flight Tracks during an average day in the testing period. 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, they might operate in a reverse flow departing to the east and arriving to the west, however "east flow" is infrequent and represents approximately 1.7% of the total annual operations.

During the 9-day measurement period, there were 5,782 total operations: 2,893 Arrivals and 2,889 Departures. The average number of flights per day was 642.

The flight tracks in this figure are a sample of a "typical" day taken from July 21, 2022, and represent 702 flights.

Location: Muir Ave, San Diego, CA

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Daily Noise Event Data

	SAN Aircraft			Non-SAN Aircraft			Community		
Date:	#of Noise Events	AVG SEL	AVG LMAX	#of Noise Events	AVG SEL	AVG LMAX	#of Noise Events	AVG SEL	AVG LMAX
18-July	216	84	75	0	0	0	10	97	78
19-July	205	85	75	0	0	0	2	0	0
20-July	224	84	75	0	0	0	4	87	75
21-July	233	84	75	2	80	71	0	0	0
22-July	262	85	76	0	0	0	0	0	0
23-July	207	86	76	0	0	0	1	77	72
24-July	266	85	75	0	0	0	0	0	0
25-July	245	85	75	0	0	0	2	84	72
26-July	240	85	75	0	0	0	6	83	74
27-July	221	85	75	0	0	0	0	0	0
28-July	134	85	76	0	0	0	0	0	0

Figure 8: The table presents the daily noise event averages. Source: ANOMS

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Location: Muir Avenue, San Diego

Loudest Aircraft Noise Events*

Aircraft	Airline	Event Date/Time	Airport	SEL (dB)	LMAX	Altitude (ft. MSL)
Boeing 737-900	United Airlines	7/18/2022 21:40	SAN	92.3	85.3	1,711
Airbus A321	jetBlue Airways	7/24/2022 21:29	SAN	91.5	83	2,255
Boeing 767-300	Delta Air Lines	7/23/2022 13:16	SAN	91.4	84.2	2,071
Airbus A321	jetBlue Airways	7/26/2022 13:01	SAN	91.3	82.2	2,229
Airbus A321	jetBlue Airways	7/22/2022 14:01	SAN	91.0	82.4	2,369
Airbus A321	jetBlue Airways	7/22/2022 12:54	SAN	90.9	82.8	2,044
Airbus A321	jetBlue Airways	7/23/2022 14:31	SAN	90.9	83.3	2,159
Airbus A321	jetBlue Airways	7/22/2022 20:48	SAN	90.9	82.2	2,461
Boeing 737-900	Alaska Airlines	7/22/2022 9:49	SAN	90.8	83.9	1,516

Location:
Muir Avenue. San Diego, CA

Figure 9: Loudest aircraft noise events July 19-27, 2022.

*Note: The above graph denotes the 9 loudest aircraft noise events.

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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, also known as Ambient, sound are the sound events from all other sources such as vehicular traffic, landscaping activities, conversations, construction activities, kids playing, etc.

Noise Event Breakdown	
SAN Aircraft:	2,082
Non-SAN Aircraft:	2
Community:	13

Figure 12. Noise Events for Muir Avenue, San Diego, CA July 18-28, 2022

Date	Daily SAN Aircraft CNEL
7/19/2022	62
7/20/2022	62
7/21/2022	62
7/22/2022	64
7/23/2022	63
7/24/2022	63
7/25/2022	63
7/26/2022	63
7/27/2022	63

Figure 10. Daily Aircraft CNEL Levels for Muir Ave, San Diego

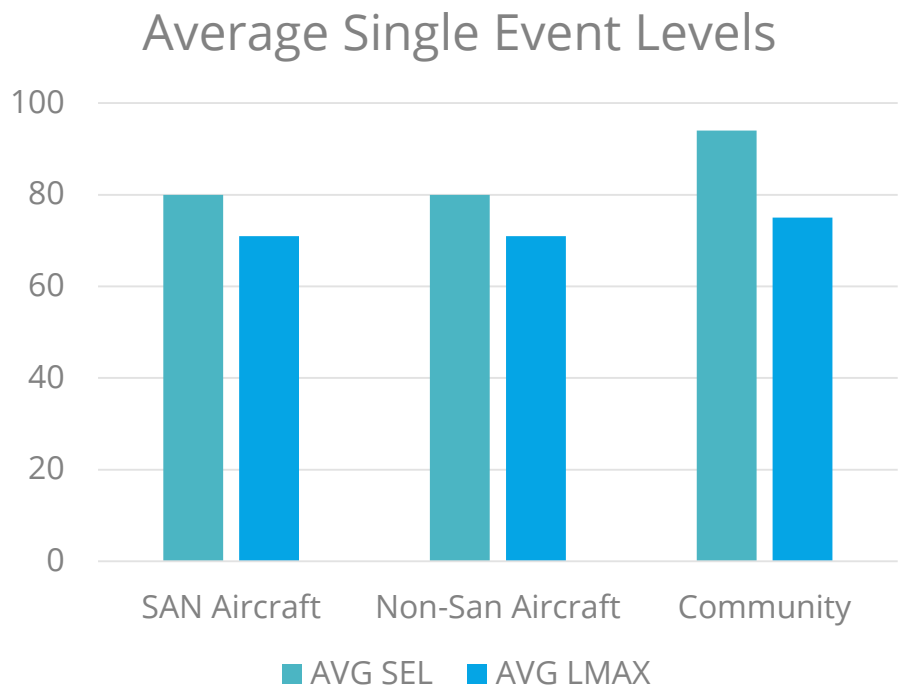

Figure 11. Average Single Event Levels for Muir Avenue, San Diego, CA

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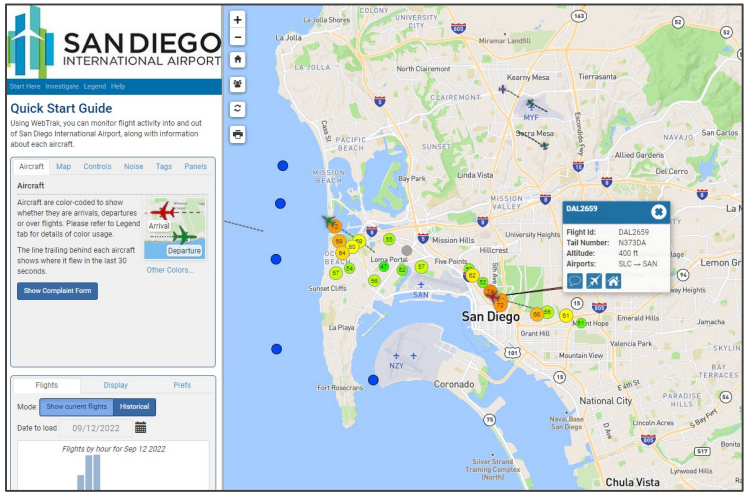
Additional Resources

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 nearly real-time flight tracks on our website at:

https://webtrak.emsbk.com/san

Three ways to file a complaint:

1. On the web at https://webtrak.emsbk.com/san
2. Through the app, which can be found at https://viewpoint-app.emsbk.com/san4/login
3. By telephone at 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.**

You can find out more information and location on our website here:

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

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