

# $(\bullet) CASPER$

CITY OF SUNNYVALE Q2 – FLIGHT OPERATIONS AND NOISE REPORT

CASPER AIRPORT SOLUTIONS, INC. | 1055 Westlakes Drive, Suite 300, Berwyn, PA 19312 | https://casper.aero

### DISCLAIMER

Casper Airport Solutions, Inc. provides the data in this report on behalf of the City of Sunnyvale for informational purposes only. It has no legal standing and is not recognized as an official source by either the State of California or the Federal Aviation Administration (FAA).

The City of Sunnyvale is not an airport authority. It has no statutory reporting obligation under Title 21 of the California Department of Transportation.

The sound level meters installed by Casper are certified by the manufacturer Larson Davis to meet all ANSI performance requirements for a Type 1 sound level meter.

The FAA System Wide Information Management (SWIM) flight track position data has a stated minimum accuracy of  $\pm$  150 feet and temporal accuracy of approximately 1 second.

# INTRODUCTION

The City of Sunnyvale's primary goal in procuring a Noise and Operations Monitoring System (NOMS) is to monitor flight activity and the aircraft noise associated with overflights that affect residents living within the city limits. Secondly, to provide this data to interested parties in a transparent and unfiltered way.

The data contained in this report is presented with that goal in mind. On each page, you will find an explanation of how to read the various charts and definitions of the different metrics and data types. What you will not find is any interpretation by the "City" about the data in this report.

For a more detailed explanation of the various noise metrics, general aircraft operations, or ATC procedures discussed in this report, please refer to the Education section of the City of Sunnyvale's NoiseLab website (<u>https://syv.noiselab.casper.aero</u>). The website also contains interactive data browsers that allow interested parties to view detailed noise and flight operations statistics concerning areas around the City of Sunnyvale.

When reading this report, it is essential to consider the following factors:

- This report's data may vary from San Jose International Airport's (SJC) information as this report does not include South Flow arrivals to SJC that did not overfly the "City".
- Not every aircraft overflight is captured by one of the four NMTs due to spikes in ambient noise levels, which may obscure the aircraft event or environmental factors such as wind speed and direction.
- The maximum noise level of a specific flight may vary based on the point of closest approach (PCA) slant distance and altitude of the aircraft in relation to the NMT. In addition, aircraft engine power settings, flap position, and landing gear state also influence the maximum noise level and event duration.
- The City's noise monitors capture noise events from all sources such as people, vehicles, animals, trains, and planes. The NOMS system analyzes every noise event captured by each NMT to determine if it meets the parameters to identify it as an aircraft noise event. Once the system identifies the source of a noise event as an aircraft, the NOMS system then attempts to match the noise event based on the time stamp, altitude, and lateral distance from the noise monitor to a specific flight.

# 24 HOUR VIEW OF AIRCRAFT NOISE

Most aircraft overfly the City during daytime hours between 7:00 AM and 7:00 PM when ambient noise levels tend to be higher due to increased community activity. Aircraft overflight volumes during the evening (7:00 PM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods are significantly reduced. However, individual events during these periods can be more disturbing to residents due to the lower ambient noise levels in the City. Below is the breakdown of flights by time of day in Q2-2024.



### SUNNYVALE OVERFLIGHTS BY TIME OF DAY

DAY = 9,529

EVENING = 1,327

NIGHT = 731

## SJC AIRPORT SOUTH FLOW DATA FOR Q2 – 2024

One of the City of Sunnyvale's primary objectives in installing a Noise and Operations Monitoring System (NOMS) was to monitor and report on South Flow arrivals that overfly the City on their approach to land to Norman Y. Mineta San Jose International Airport (SJC).

There are two types of approaches flown by airplanes landing in South Flow at SJC Airport. The widely dispersed ILS/Visual approach is shown in yellow. The highly concentrated RNP approach is shown in blue on the facing page.

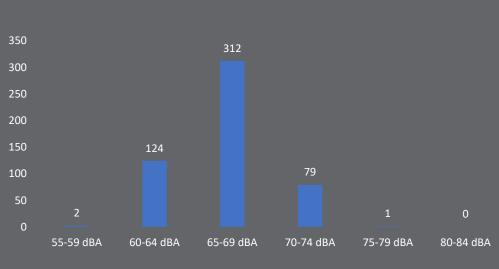
The ILS/Visual approach has a wide lateral footprint because the pilots are flying vectors (headings) under ATC's direction. The controller determines their turn onto the final approach. By contrast, the RNP approach is a precision instrument procedure that utilizes fixed GPS waypoints that must be precisely overflown and have very small lateral error tolerances.

Because of the wide dispersion caused by the ILS/Visual approach, a single noise monitoring terminal (NMT) cannot capture a noise event for each flight. However, the concentrated flight path of the RNP approach makes it possible to capture noise events at SYV-2 Dona Ave. for the vast majority of aircraft flying this approach.

In the 2nd Quarter of 2024, the Casper system successfully captured noise events for 89% of the total South Flow RNP approaches flown to SJC Airport, the distribution of which is shown in the chart below.

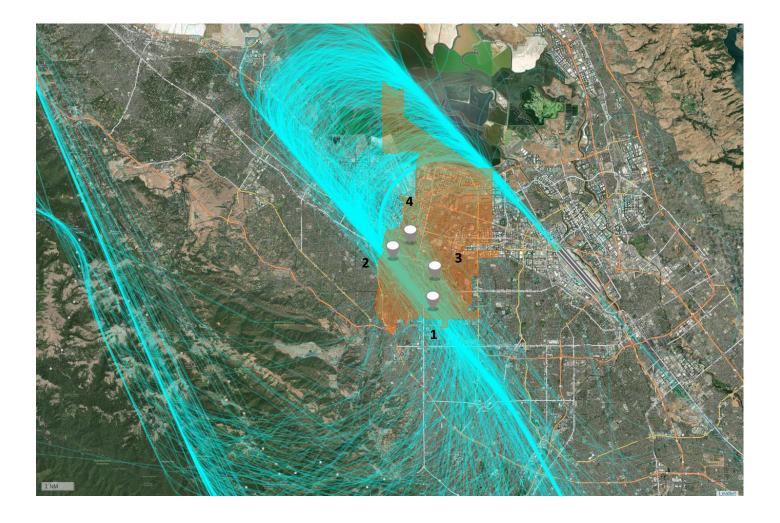
The chart at right illustrates the maximum noise level (Lmax) recorded at the Dona Ave (SYV-2) permanent noise monitor for aircraft that flew the RNP Approach to Runway 12L or 12R at SJC Airport and passed over the City of Sunnyvale.

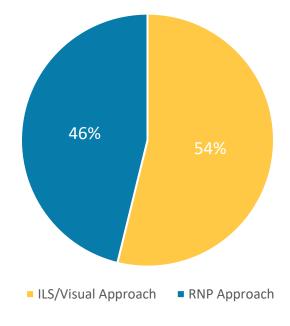
The number above each bar represents the total number of aircraft noise events in which the Lmax fell within the specific five decibel bucket identified on the chart.



#### RNP/ILS APPROACH MAXIMUM NOISE LEVEL

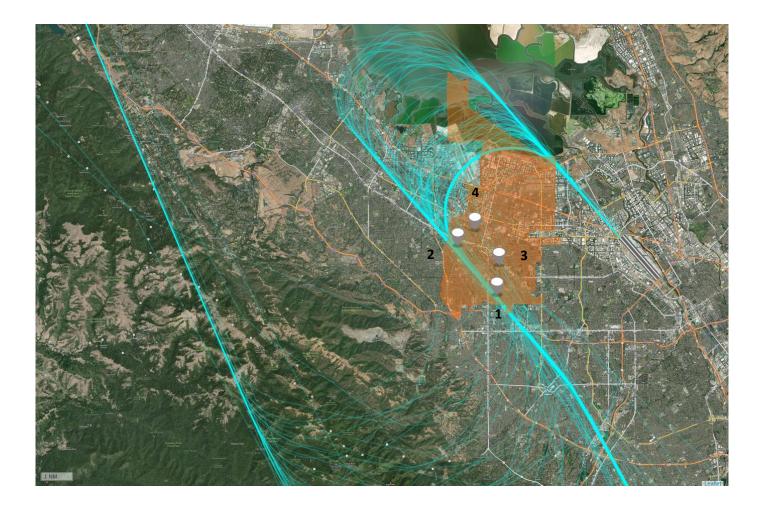
Lmax in A-weighted Decibels

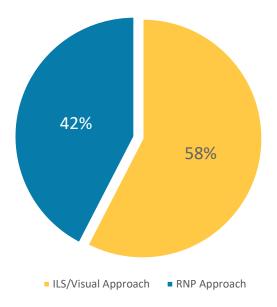




### SOUTH FLOW APPROACHES IN Q2-2024 April 1 – June 30

	ILS/Visual	RNP
Average Altitude ft.	3,249	3,179
Runway 12L App.	9	15
Runway 12R App.	673	570
Total Approaches	682	585





### PEAK SOUTH FLOW DAY IN Q2-2024 June 12

	ILS/Visual	RNP
Average Altitude ft.	3,117	3,162
Runway 12L App.	2	2
Runway 12R App.	112	82
Total Approaches	114	84

The following charts detail the Peak South Flow Approach Day Top 10 loudest (by Lmax) noise events measured at SYV-1 and SYV-2 noise monitoring terminals (NMTs) during the 2nd Quarter. Keep in mind that these events only pertain to aircraft that overflew the City of Sunnyvale on a South Flow Approach to SJC Airport and were not necessarily the loudest overall for the Quarter. For information on the loudest overall aircraft noise events, see the individual NMT summaries starting on page 10.

<b>SY</b> 76.7	7 <b>V-1 PEA</b> 73.9	<b>к SOU<sup>-</sup></b> 68.0	<b>TH FLO</b> 67.8	<b>W DAY</b> 67.7	7 <b>A/C N</b> 67.5	OISE E\ 66.8	<b>/ENTS</b> 66.5	IN Q2-; 66.5	<b>2024</b> 66.2	
										<b>95+ dBA</b>
06/1	2 06/12	06/12	06/12	06/12	06/12	06/12	06/12	06/12	06/12	■ 85-94 dBA
10:37 AM		3:42 PM	5:30 PM	7:14 PM	4:43 PM	10:13 PM	9:49 AM	9:49 AM	9:07 AM	■ 75-84 dBA ■ 65-74 dBA
ILS 12	R	RNP Z 12L/R	ILS 12R	RNP Z 12L/R	ILS 12R	ILS 12R	RNP Z 12L/R	RNP Z 12L/R	ILS 12R	■ 55-64 dBA
B738	BE55	B737	CL30	B737	A20N	B739	B737	B737	CL30	
KDFV	V KPAO	KSAN	KCRQ	KSNA	KDFW	KATL	KSNA	KSNA	KRNO	

The chart at left illustrates the Top 10 SJC South Flow Peak Day aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-1 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data.

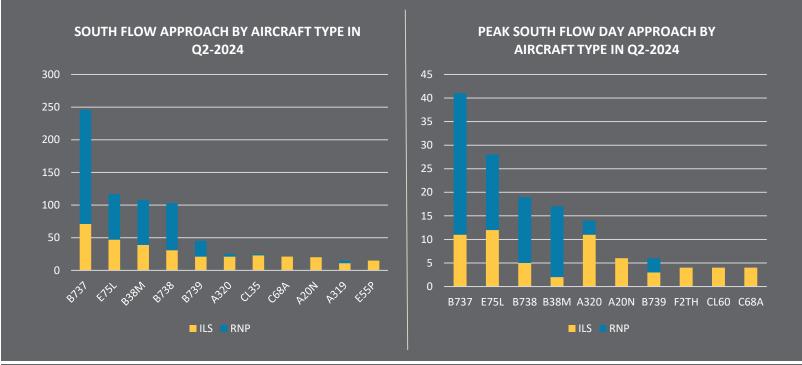
#### SYV-2 PEAK SOUTH FLOW DAY A/C NOISE EVENTS IN Q2-2024

76.1	74.4	71.2	70.8	70.7	70.7	69.5	69.5	69.4	69.0	
										■ 95+ dBA
06/12	06/12	06/12	06/12	06/12	06/12	06/12	06/12	06/12	06/12	<b>85-94 dBA</b>
1:24	12:35	5:31	10:46	1:27	1:27	9:08	9:08	10:33	10:38	🔳 75-84 dBA
PM	PM	PM	AM	PM	PM	AM	AM	PM	AM	65-74 dBA
RNP Z 12L/R	RNP Z 12L/R	ILS 12R	RNP Z 12L/R	RNP Z 12L/R	RNP Z 12L/R	ILS 12R	ILS 12R	RNP Z 12L/R	ILS 12R	■ 55-64 dBA
B38M	A320	CL30	B739	E75L	E75L	CL30	CL30	B737	B738	
KONT	KMSP	KCRQ	KATL	KLAX	KLAX	KRNO	KRNO	KAUS	KDFW	

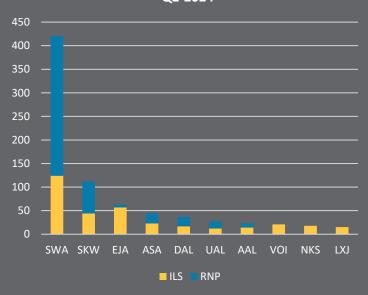
The chart at left illustrates the Top 10 SJC South Flow Peak Day aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-2 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data.

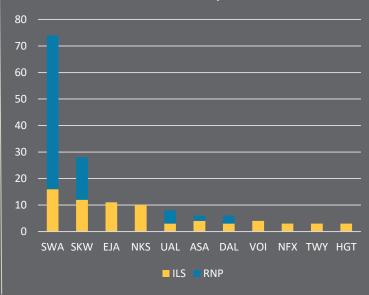
The following charts show the most frequent aircraft types and operators to fly the South Flow approach to SJC for the 2nd Quarter and the Peak South Flow Approach Day. The total for each column is derived by adding the number of ILS/Visual, and RNP approaches flown. Keep in mind that this data only pertains to aircraft that overflew the City of Sunnyvale on a South Flow Approach to land at SJC Airport.



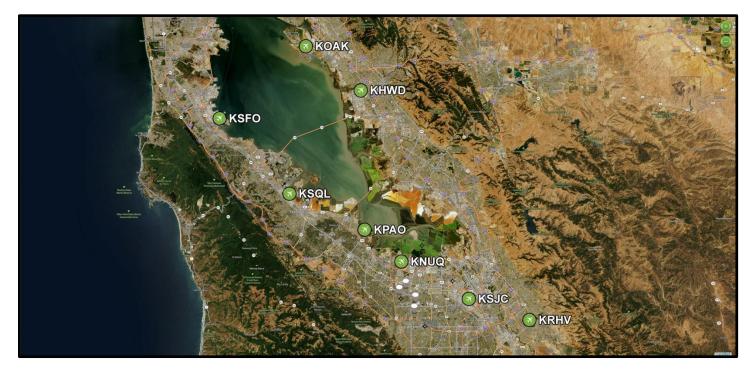
SOUTH FLOW APPROACH BY OPERATOR IN Q2-2024



PEAK SOUTH FLOW DAY APPROACH BY OPERATOR IN Q2-2024



### **CITY OF SUNNYVALE** OVERFLIGHT DATA FOR Q2 – 2024

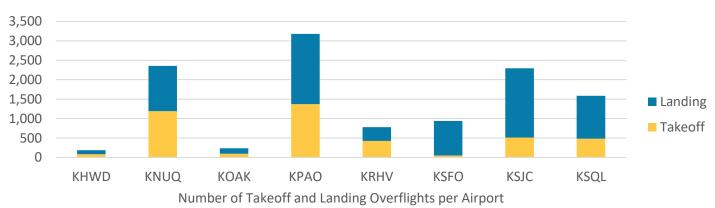


While SJC Airport is the closest major airport to the City of Sunnyvale, residents are overflown by aircraft arriving and departing from many different airports in the region. The data in this section quantifies overflights associated with each of the eight primary airports of interest listed below and helps explain the distribution of flights across the four zip codes that fall within the City limits.

#### **AIRPORTS OF INTEREST**

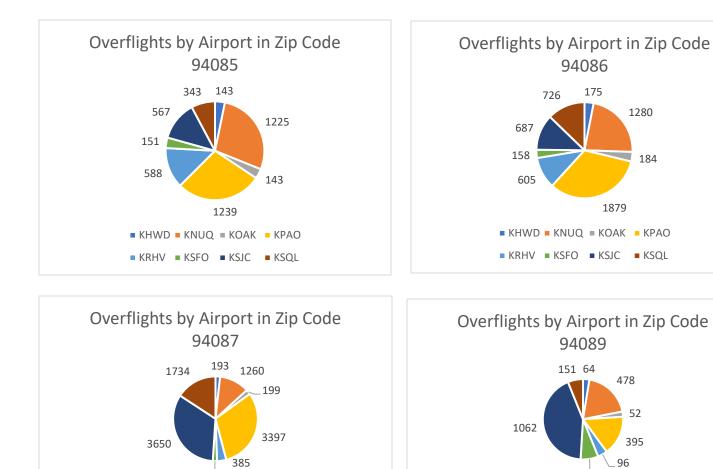
- KHWD Hayward Executive Airport
- KNUQ Moffett Federal Airfield
- KOAK Metro Oakland Int'l Airport
- KPAO Palo Alto Airport

- KRHV Reid-Hillview Airport of Santa Clara County
- KSFO San Francisco Int'l Airport
- KSJC Norman Y Mineta San Jose Int'l Airport
- KSQL San Carlos Airport



#### **CITY OF SUNNYVALE OVERFLIGHTS BY AIRPORT**

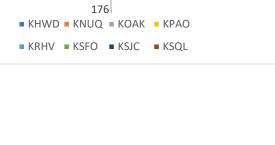
The City of Sunnyvale is comprised of four primary zip codes (94085, 94086, 94087, 94089), which bisect the City forming four unique zones from North to South. The volume of overflights on any given day can vary significantly across the City. Seasonal wind patterns play the most significant role in dictating the arrival and departure patterns into a specific airport. The current wind direction largely determines which Sunnyvale neighborhoods are overflown by aircraft during their arrival or departure to that airport. The charts below illustrate the pattern of overflights for each of the four zip codes for the 2nd Quarter of 2024.



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KHWD KNUQ KOAK KPAO

KRHV KSFO KSJC KSQL

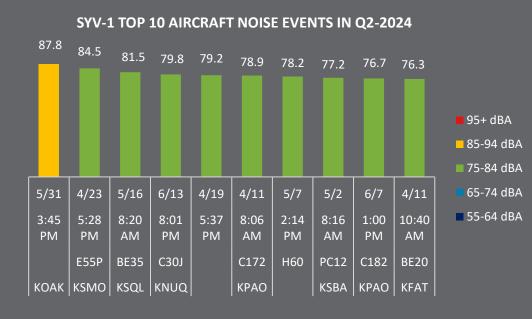


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## **SYV-1** ORTEGA PARK NMT DATA Q2 – 2024

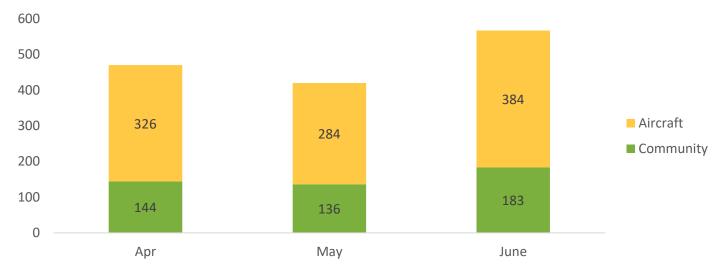
Noise Monitoring Terminal SYV-1 is in Ortega Park. Its primary purpose is to capture RNP arrivals to SJC Airport in South Flow and secondarily flight activity associated with Moffett Field, Palo Alto, Reid-Hillview, and San Carlos Airports. The image below is an aerial depicting the location of the NMT in the park and a photo of the installed equipment.





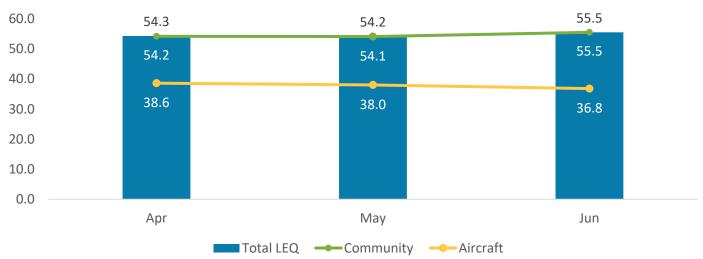
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-1 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data. The charts below illustrate the relationship between aircraft and community noise and their contribution to the total noise environment measured by the noise monitoring terminal SYV-1 in Ortega Park.



#### SYV-1 TOTAL RECORDED NOISE EVENTS IN Q2-2024

Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical energy associated with the continually fluctuating noise level (during the specified period); in this case, a month is equal to the total acoustic energy associated with the steady noise level. Hourly LEQs are averaged to derive a Daily LEQs, which is averaged to derive a monthly LEQ. The Total LEQ considers both the aircraft and community contributions to the noise environment.

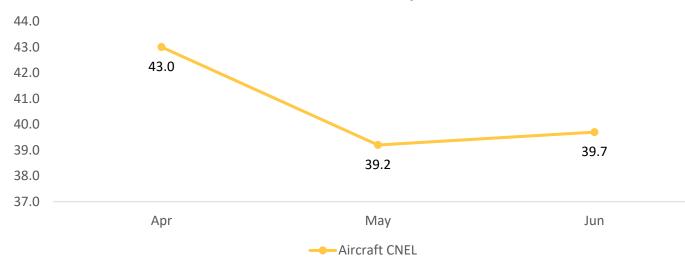


#### SYV-1 LEQ NOISE LEVEL FOR Q2-2024

While most singular noise events are expressed in Lmax or LEQ dB(A), cumulative noise exposure originating from aircraft expressed over longer periods of time are typically done in DNL, or day-night average sound level. This adds more "weight" to aircraft noise levels during more sensitive times of the day, typically during night hours. However, the State of California uses a slightly modified version of DNL called CNEL, or Community Noise Equivalent Level. Taken from the FAA's website on guidance for managing community noise,

"While DNL is the primary metric FAA uses to determine noise impacts, FAA accepts the Community Noise Equivalent Level (CNEL) in California as California adopted the use of CNEL prior to FAA adopting DNL. While CNEL, like DNL, adds a ten times weighting (equivalent to a 10 dBA "penalty") to each aircraft operation between 10:00 p.m. and 7:00 a.m., CNEL also adds a three times weighting (equivalent to a 4.77 dBA penalty) for each aircraft operation during evening hours (7:00 p.m. to 10:00 p.m.)"

DNL and CNEL are most effective when calculating for only aircraft noise events, or acne. The below chart displays the trend in CNEL over the course of the last quarter



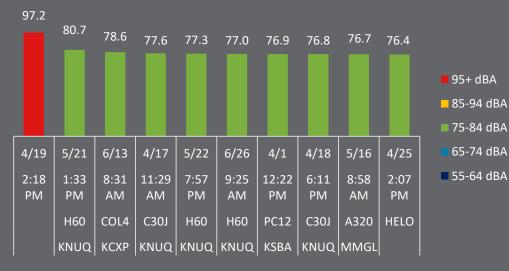


### SYV-2 DONA AVE NMT DATA Q2 – 2024

Noise Monitoring Terminal SYV-2 is on Dona Ave. Its primary purpose is to capture RNP arrivals to SJC Airport in South Flow and secondarily flight activity associated with Moffett Field, Palo Alto, Reid-Hillview, and San Carlos Airports. The image below is an aerial depicting the location of the NMT and a photo of the installed equipment.

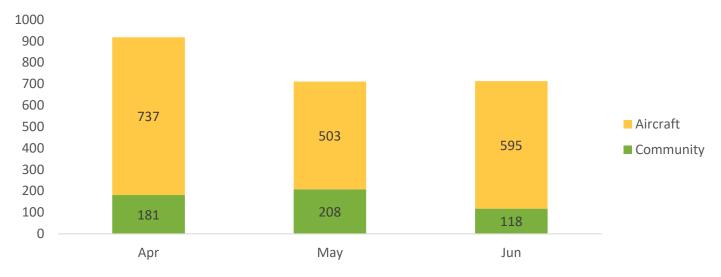


### SYV-2 TOP 10 AIRCRAFT NOISE EVENTS IN Q2-2024



The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-2 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data. The charts below illustrate the relationship between aircraft and community noise and their contribution to the total noise environment measured by the noise monitoring terminal SYV-2 on Dona Avenue.



#### SYV-2 TOTAL RECORDED NOISE EVENTS IN Q2-2024

Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical energy associated with the continually fluctuating noise level (during the specified period); in this case, a month is equal to the total acoustic energy associated with the steady noise level. Hourly LEQs are averaged to derive a Daily LEQs, which is averaged to derive a monthly LEQ. The Total LEQ considers both the aircraft and community contributions to the noise environment.

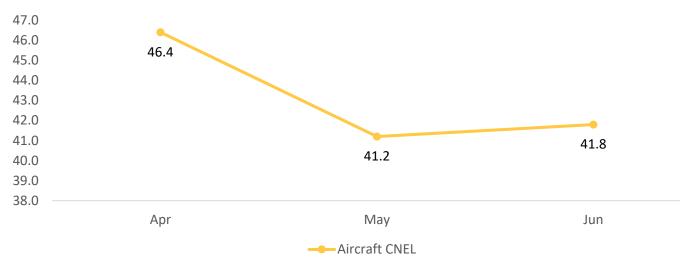


#### SYV-2 LEQ NOISE LEVEL FOR Q2-2024

While most singular noise events are expressed in Lmax or LEQ dB(A), cumulative noise exposure originating from aircraft expressed over longer periods of time are typically done in DNL, or day-night average sound level. This adds more "weight" to aircraft noise levels during more sensitive times of the day, typically during night hours. However, the State of California uses a slightly modified version of DNL called CNEL, or Community Noise Equivalent Level. Taken from the FAA's website on guidance for managing community noise,

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DNL and CNEL are most effective when calculating for only aircraft noise events, or acne. The below chart displays the trend in CNEL over the course of the last quarter

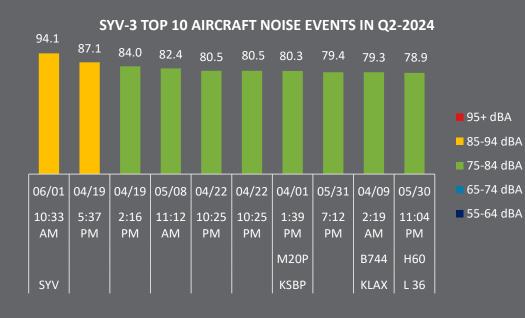


SYV-2 CNEL FOR Q2-2024

# SYV-3 COMMUNITY CENTER PARK NMT DATA Q2 – 2024

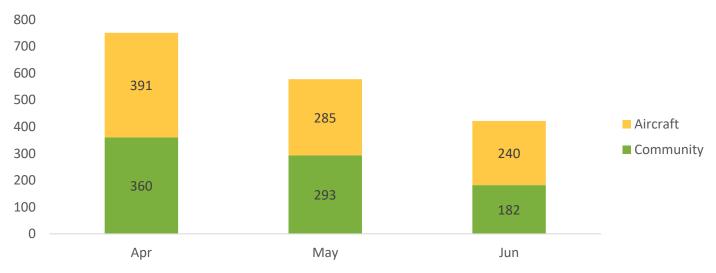
Noise Monitoring Terminal SYV-3 is in Community Center Park. Its primary purpose is to capture RNP arrivals to SJC Airport in South Flow and secondarily flight activity associated with Moffett Field, Palo Alto, Reid-Hillview, and San Carlos Airports. The image below is an aerial depicting the location of the NMT and a photo of the installed equipment.





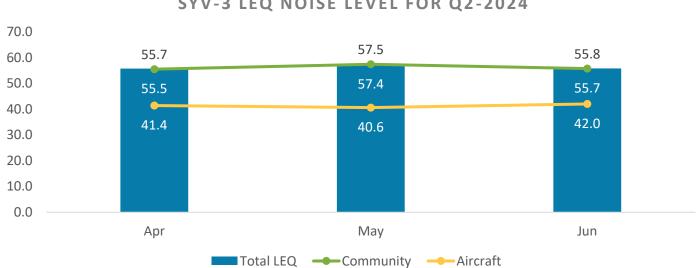
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-3 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data. The charts below illustrate the relationship between aircraft and community noise and their contribution to the total noise environment measured by the noise monitoring terminal SYV-3 in Community Center Park.



#### SYV-3 TOTAL RECORDED NOISE EVENTS IN Q2-2024

Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical energy associated with the continually fluctuating noise level (during the specified period); in this case, a month is equal to the total acoustic energy associated with the steady noise level. Hourly LEQs are averaged to derive a Daily LEQs, which is averaged to derive a monthly LEQ. The Total LEQ considers both the aircraft and community contributions to the noise environment.

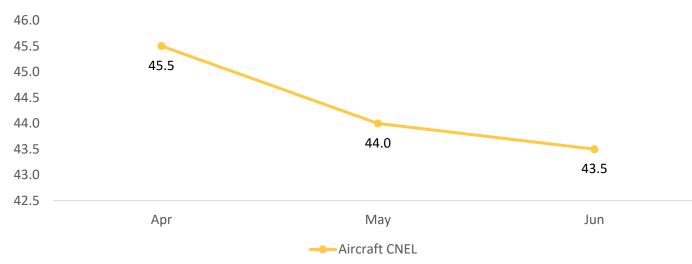


#### SYV-3 LEQ NOISE LEVEL FOR Q2-2024

While most singular noise events are expressed in Lmax or LEQ dB(A), cumulative noise exposure originating from aircraft expressed over longer periods of time are typically done in DNL, or day-night average sound level. This adds more "weight" to aircraft noise levels during more sensitive times of the day, typically during night hours. However, the State of California uses a slightly modified version of DNL called CNEL, or Community Noise Equivalent Level. Taken from the FAA's website on guidance for managing community noise,

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DNL and CNEL are most effective when calculating for only aircraft noise events, or acne. The below chart displays the trend in CNEL over the course of the last quarter

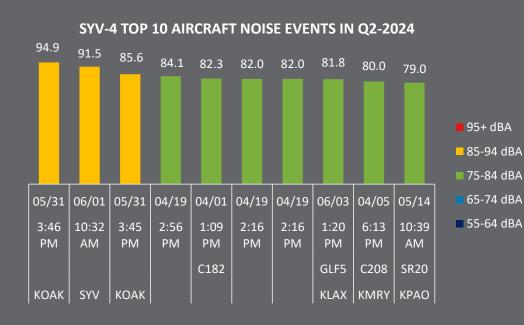


SYV-3 CNEL FOR Q2-2024

# **SYV-4** WASHINGTON PARK NMT DATA Q2 – 2024

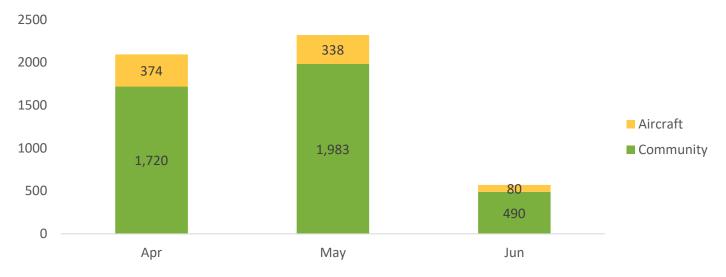
Noise Monitoring Terminal SYV-4 is in Washington Park. Its primary purpose is to capture RNP arrivals to SJC Airport in South Flow and secondarily flight activity associated with Moffett Field, Palo Alto, Reid-Hillview, and San Carlos Airports. The image below is an aerial depicting the location of the NMT and a photo of the installed equipment.





The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-4 in the 2nd Quarter of 2024. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

Events with no aircraft type denote that an aircraft type was not identified in the FAA data. The charts below illustrate the relationship between aircraft and community noise and their contribution to the total noise environment measured by the noise monitoring terminal SYV-4 in Washington Park.



#### SYV-4 TOTAL RECORDED NOISE EVENTS IN Q2-2024

Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical energy associated with the continually fluctuating noise level (during the specified period); in this case, a month is equal to the total acoustic energy associated with the steady noise level. Hourly LEQs are averaged to derive a Daily LEQs, which is averaged to derive a monthly LEQ. The Total LEQ considers both the aircraft and community contributions to the noise environment.

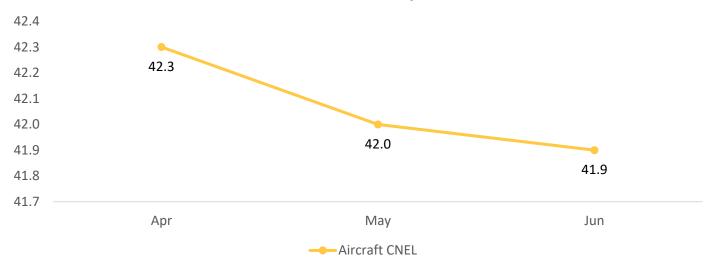


#### SYV-4 LEQ NOISE LEVELS FOR Q2-2024

While most singular noise events are expressed in Lmax or LEQ dB(A), cumulative noise exposure originating from aircraft expressed over longer periods of time are typically done in DNL, or day-night average sound level. This adds more "weight" to aircraft noise levels during more sensitive times of the day, typically during night hours. However, the State of California uses a slightly modified version of DNL called CNEL, or Community Noise Equivalent Level. Taken from the FAA's website on guidance for managing community noise,

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DNL and CNEL are most effective when calculating for only aircraft noise events, or acne. The below chart displays the trend in CNEL over the course of the last quarter



SYV-4 CNEL FOR Q2-2024

**Note:** The noise monitor at site 4 was undergoing maintenance from June 12 to June 30. The noise events from this time are not reflected in this quarterly report and are not included in the averages in the charts on pages 19, 20, and 21. Flight information was not affected during this time, nor were the noise data points for NMTs 1, 2, or 3.

# ICAO AIRCRAFT CODE REFERENCE

Below is a list of the ICAO aircraft codes referenced in the Top-10 Aircraft Noise Event charts.

ICAO Aircraft Code	Common Name	Туре		
A109	AugustaWestland 109	General Aviation Helicopter		
A124	Antonov An-124 Ruslan	Cargo Jet		
A306	Airbus A300-600	Commercial Jet		
A21N	Airbus A321neo	Commercial Jet		
A319	Airbus A319-100	Commercial Jet		
A320	Airbus A320-200	Commercial Jet		
AC50	Aero Commander 500	General Aviation Piston		
AJET	Dassault Alpha Jet	Military Jet Trainer		
B38M	Boeing 737 MAX 8	Commercial Jet		
B407	Bell Helicopter 407	General Aviation Helicopter		
B430	Bell Helicopter 430	General Aviation Helicopter		
B733	Boeing 737-300	Commercial Jet		
B737	Boeing 737-700	Commercial Jet		
B738	Boeing 737-800	Commercial Jet		
B763	Boeing 767-300	Commercial Jet		
BCS1	Airbus A220-100	Commercial Jet		
BCS3	Airbus A220-300	Commercial Jet		
BE9L	Beechcraft 90 King Air	General Aviation Turboprop		
BE20	Beechcraft 200 Super King Air	General Aviation Turboprop		
BE35	Beechcraft 35 Bonanza	General Aviation Piston		
BE36	Beechcraft 36 Bonanza	General Aviation Piston		
BE60	Beechcraft 60 Duke	General Aviation Piston		
C25B	Cessna Citation CJ3	Business Jet		
C680	Cessna Citation Sovereign	Business Jet		
C68A	Cessna Citation Latitude	Business Jet		
C172	Cessna Skyhawk	General Aviation Piston		
C180	Cessna 180 Skywagon	General Aviation Piston		
C182	Cessna 182 Skylane	General Aviation Piston		
C185	Cessna 185 Skywagon	General Aviation Piston		
C206	Cessna 206 Stationair	General Aviation Piston		
C208	Cessna 208 Caravan	General Aviation Turboprop		
C414	Cessna 414 Chancellor	General Aviation Piston		
C56X	Cessna Citation Excel	Business Jet		
CL30	Bombardier Challenger 300	Business Jet		
CL35	Bombardier Challenger 350	Business Jet		
CL60	Bombardier Challenger 600	Business Jet		
E300	Extra EA-300	General Aviation Piston		
E55P	Embraer Phenom 300	Business Jet		
E75L	Embraer 175 (Long Winglet)	Commercial Jet		
EC45	Airbus Helicopters EC-145	General Aviation Helicopter		
FA50	Dassault Falcon 50	Business Jet		
F900	Dassault Falcon 900	Business Jet		
GL5T	Bombardier Global 5000	Business Jet		
GLEX	Bombardier Global Express	Business Jet		

GLF3	Gulfstream III	Business Jet
GLF4	Gulfstream IV	Business Jet
GLF5	Gulfstream V	Business Jet
GLF6	Gulfstream G650	Business Jet
H25B	Hawker Beechcraft 800	Business Jet
HELO	Generic Helicopter	General Aviation Helicopter
LJ60	Bombardier Learjet 60	Business Jet
M20P	Mooney M20	General Aviation Piston
MD11	McDonnell Douglas MD-11	Commercial Jet
P180	Piaggio P.180 Avanti	Business Jet
PC12	Pilatus PC-12	General Aviation Turboprop
RV8	Van's Aircraft RV-8	General Aviation Piston
S22T	Cirrus SR22 Turbocharged	General Aviation Piston
SR20	<u>Cirrus SR20</u>	General Aviation Piston
Т6	North American T-6 Texan	Military Piston Trainer
TBM7	Socata TBM 7	General Aviation Turboprop