2021

(•) 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 ± 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 (https://syv.noiselab.casper.aero).   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.

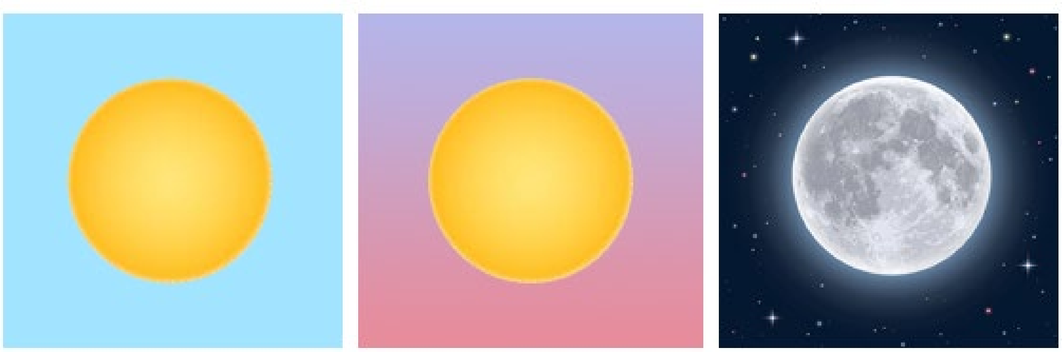
When reading this report, it is essential to consider the following factors:

- 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 Q2-2021.

SUNNYVALE OVERFLIGHTS BY TIME OF DAY



DAY = 8,753   EVENING = 1,125   NIGHT = 578

SJC AIRPORT SOUTH FLOW DATA FOR Q2 – 2021

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.

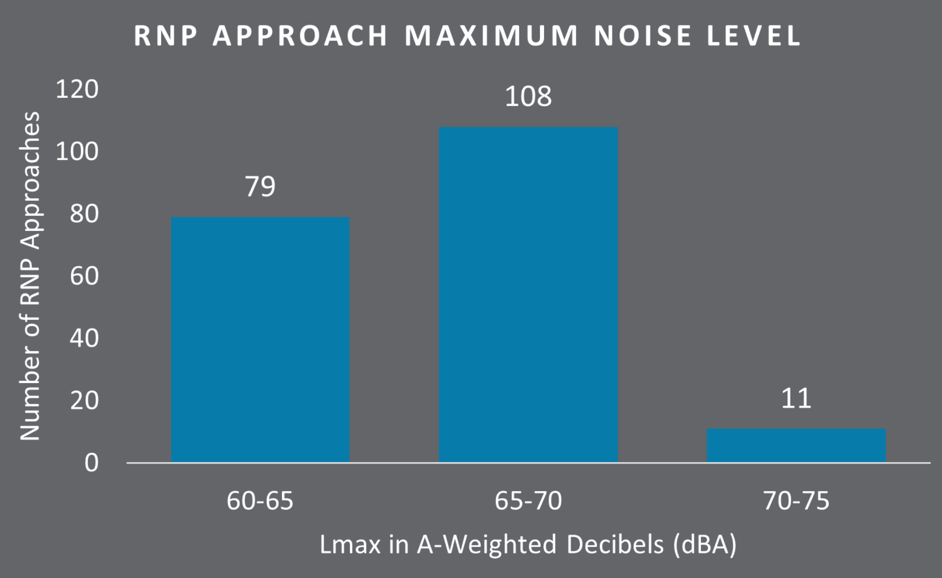
The ILS/Visual approach has a wide lateral footprint because the pilots are flying vectors (headings) under ATC's direction. The controller determines their turn onto the final approach. By contrast, the RNP approach is a precision instrument procedure that utilizes fixed GPS waypoints that must be precisely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

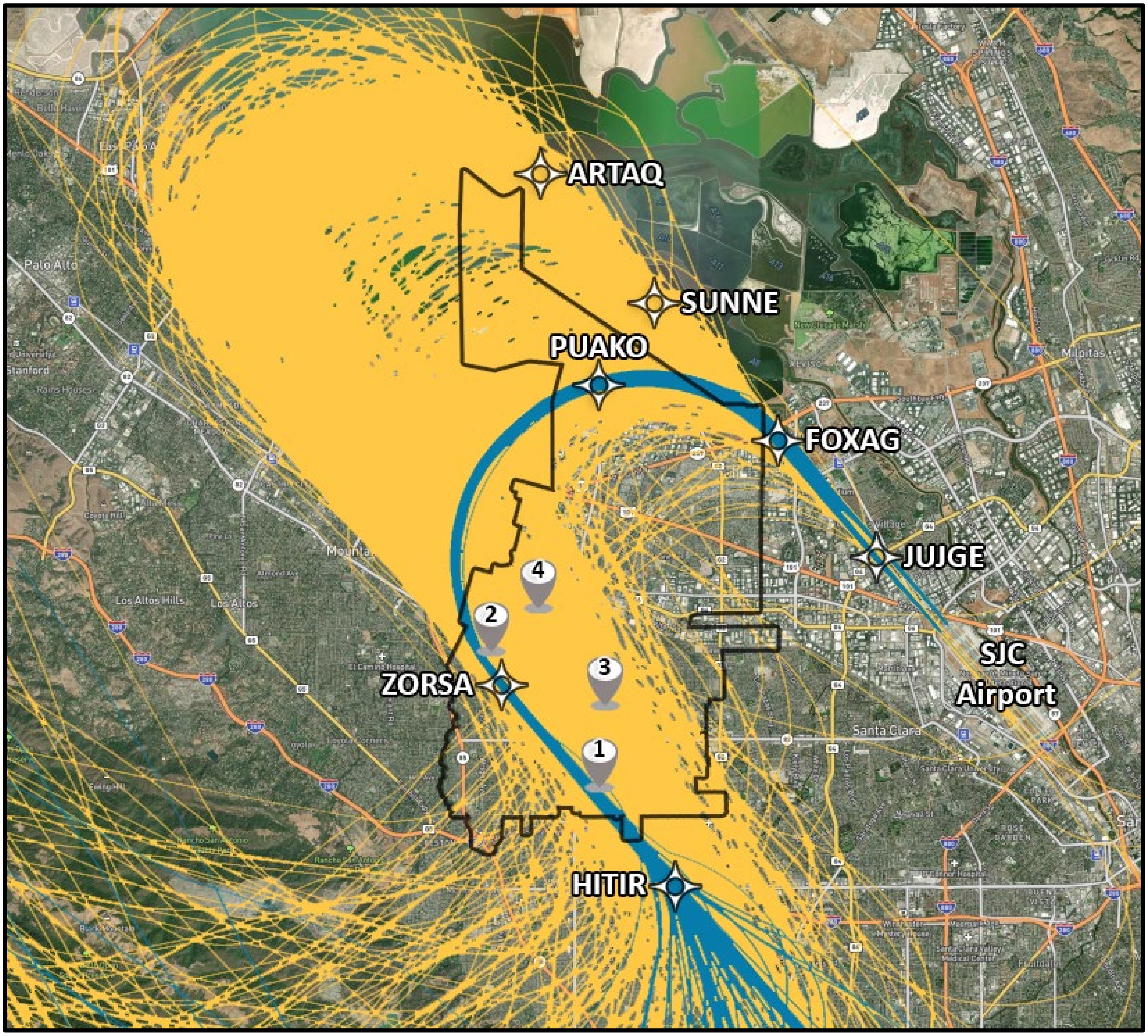
Because of the wide dispersion caused by the ILS/Visual approach, a single noise monitoring terminal (NMT) cannot capture a noise event for each flight. However, the concentrated flight path of the RNP approach makes it possible to capture noise events at SYV-2 Dona Ave. for the vast majority of aircraft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

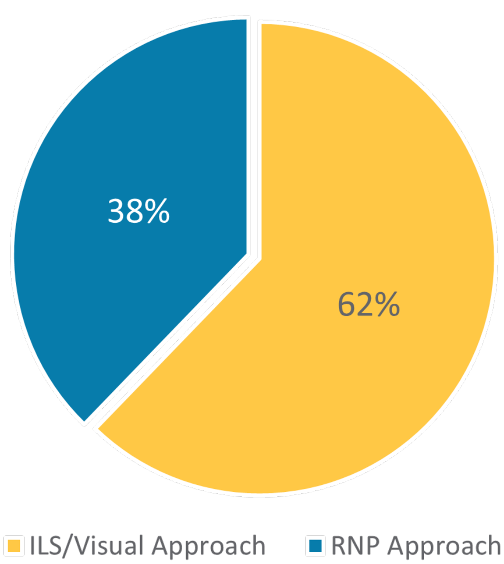
In the 2nd quarter of 2021, the Casper system successfully captured noise events for 93**%** of the total South Flow RNP approaches flown to SJC Airport, the distribution of which is shown in the chart below.

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.







SOUTH FLOW APPROACHES IN Q2-2021

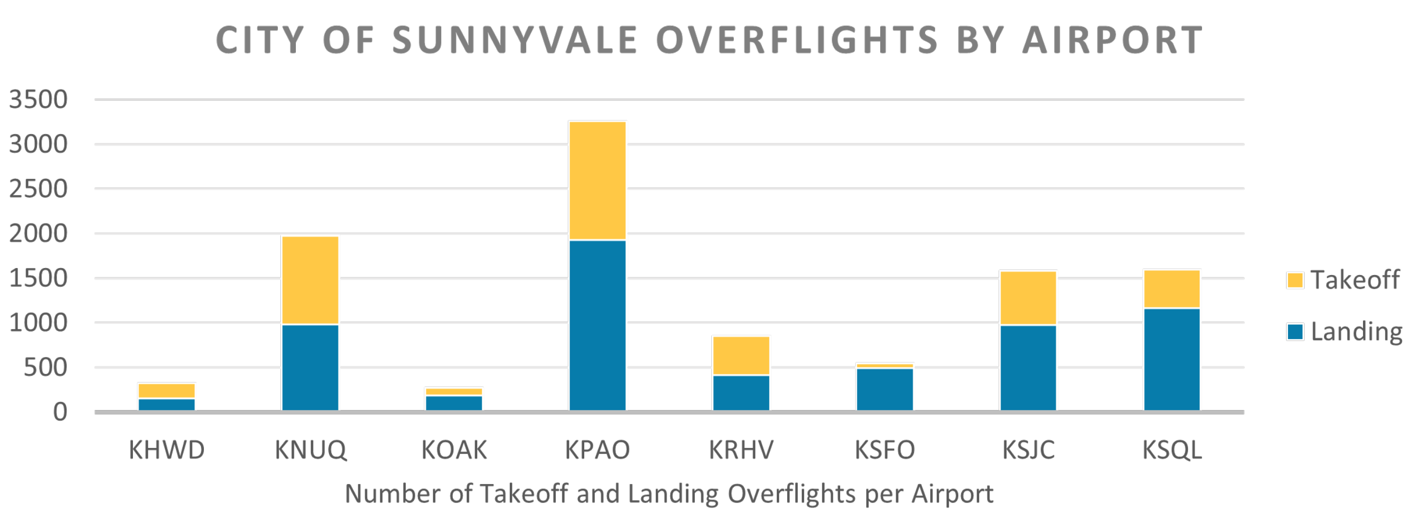
	ILS/Visual	RNP
Average Altitude ft.	3,159	3,184
Runway 12L App.	16	27
Runway 12R App.	335	186
Total Approaches	351	213

CITY OF SUNNYVALE OVERFLIGHT DATA FOR Q2 – 2021

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.

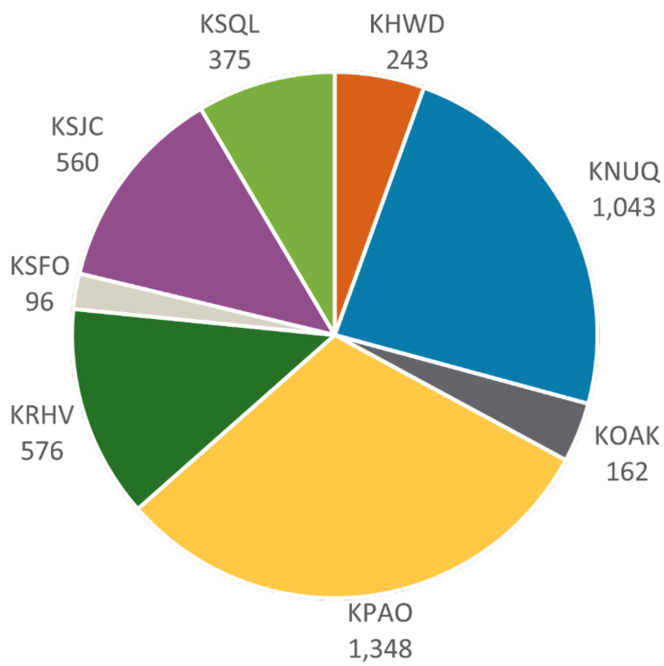
AIRPORTS OF INTEREST

- 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

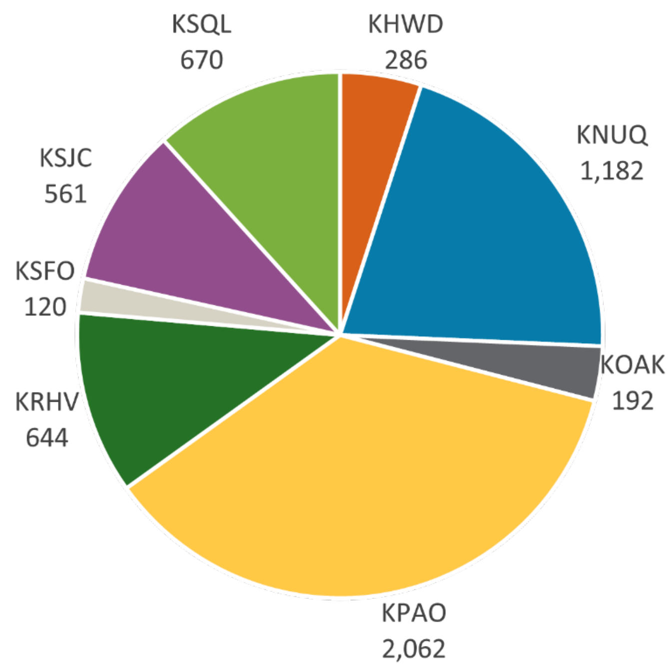


The City of Sunnyvale is comprised of four primary zip codes (94085, 94086, 94087, 94089), which bisect the City forming four unique zones from North to South. The volume of overflights on any given day can vary significantly across the City. Seasonal wind patterns play the most significant role in dictating 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 2021.

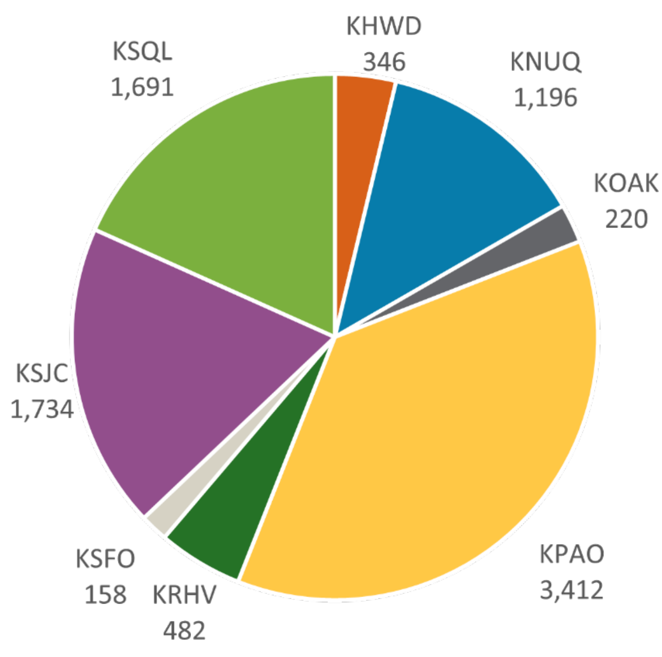
OVERFLIGHTS BY AIRPORT IN ZIP CODE 94085



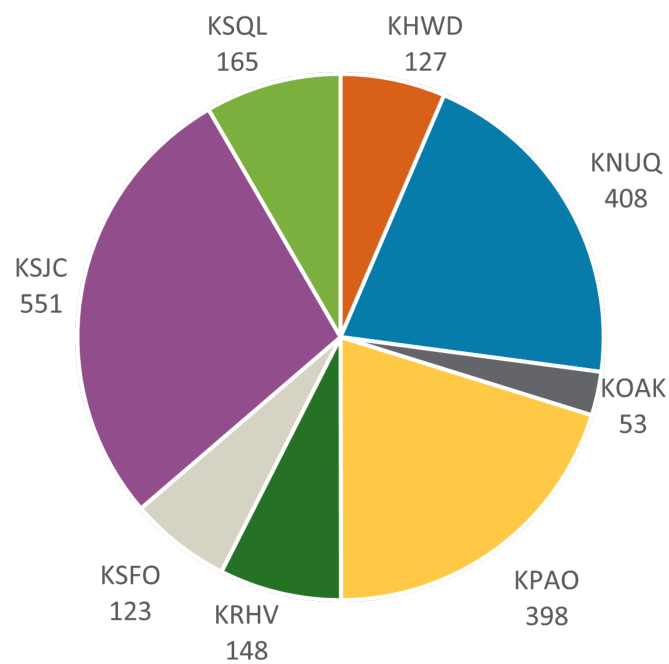
OVERFLIGHTS BY AIRPORT IN ZIP CODE 94086



OVERFLIGHTS BY AIRPORT IN ZIP CODE 94087

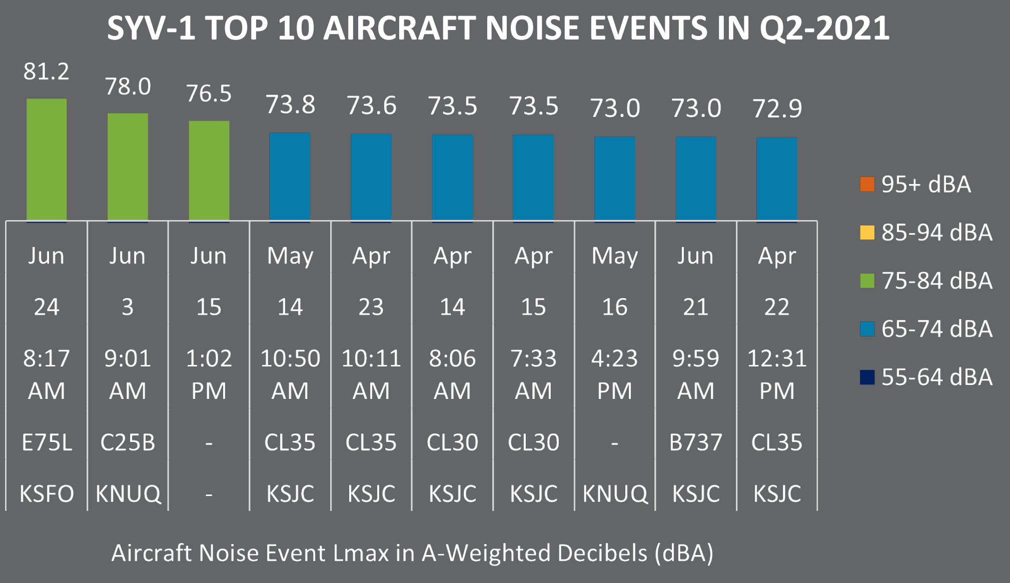


OVERFLIGHTS BY AIRPORT IN ZIP CODE 94089



SYV-1 ORTEGA PARK NMT DATA Q2 – 2021

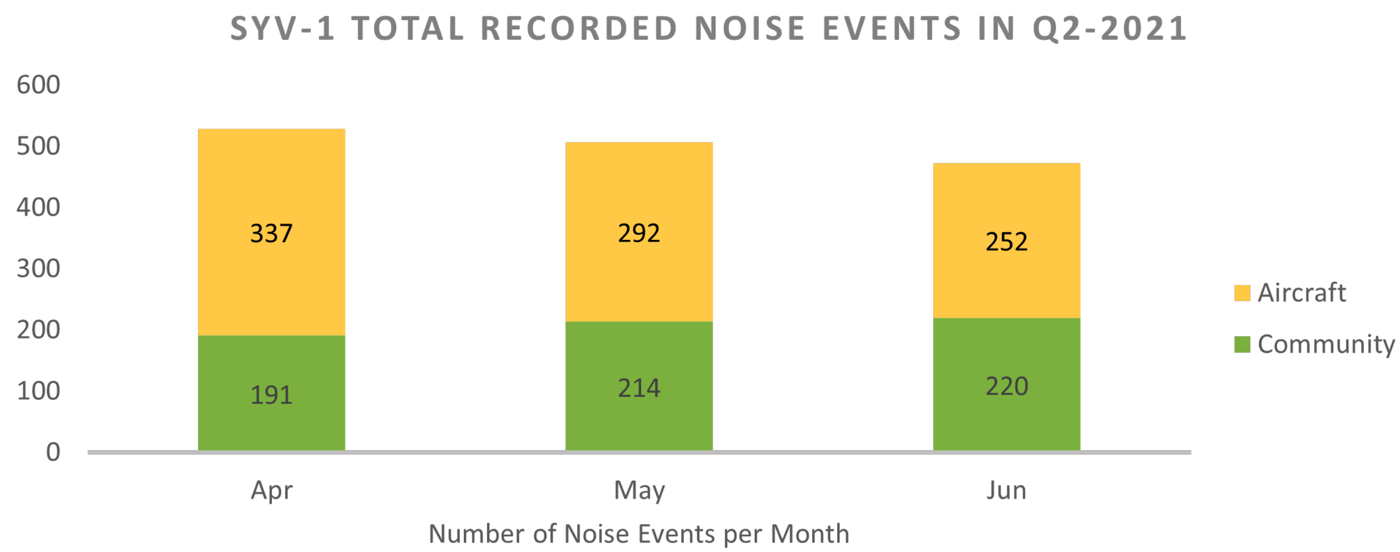
Noise Monitoring Terminal SYV-1 is in Ortega Park. Its primary purpose is to capture RNP arrivals to SJC Airport in South Flow and secondarily flight activity associated with Moffett Field, Palo Alto, Reid-Hillview, and San Carlos Airports. The image below is an aerial depicting the location of the NMT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



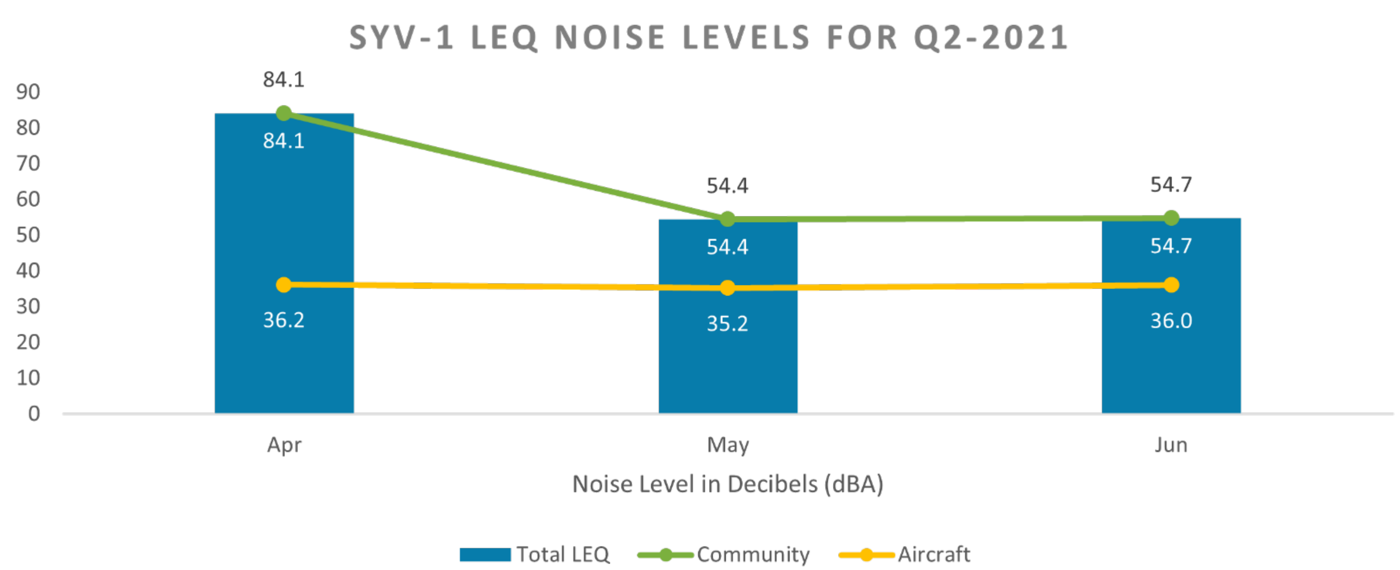
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-1 in the 2nd Quarter of 2021. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

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.

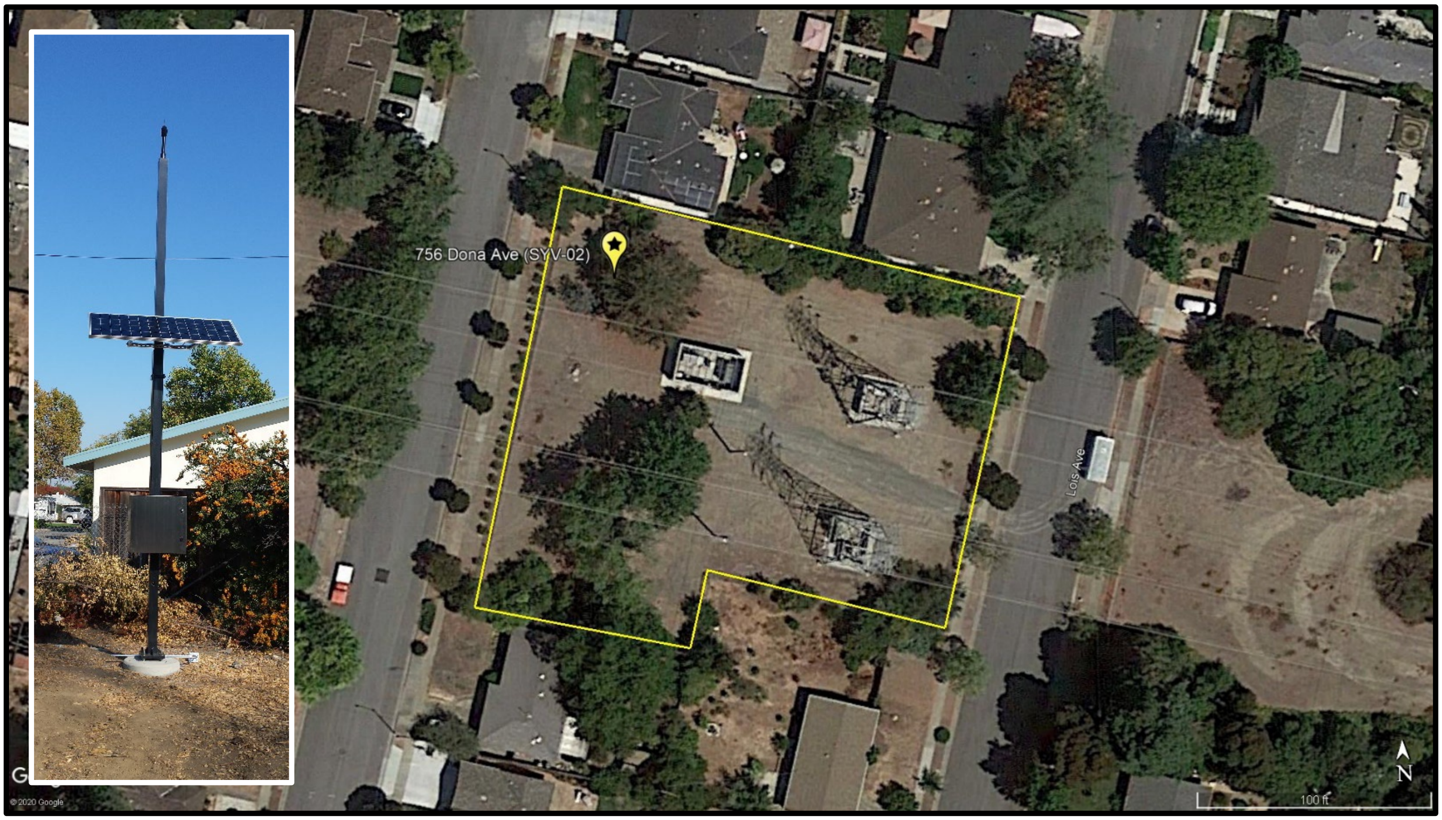


Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical 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.

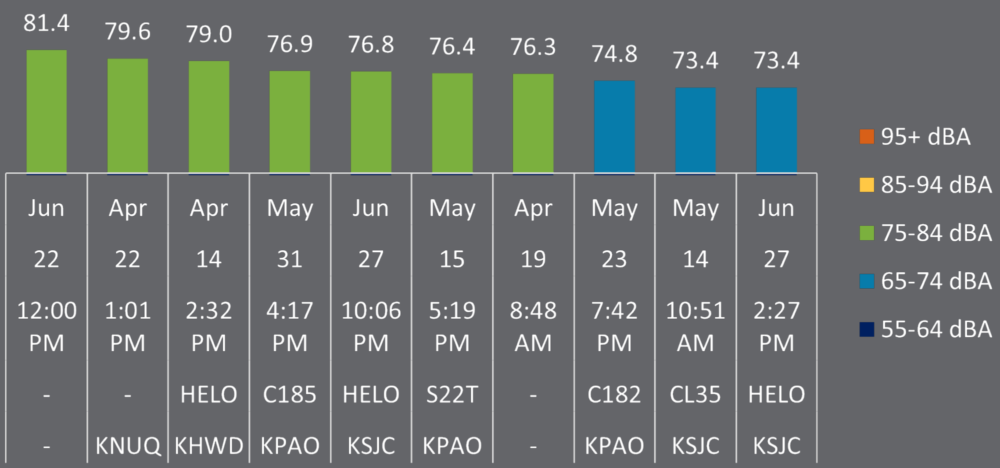


SYV-2 DONA AVE NMT DATA Q2 – 2021

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 Q2-2021



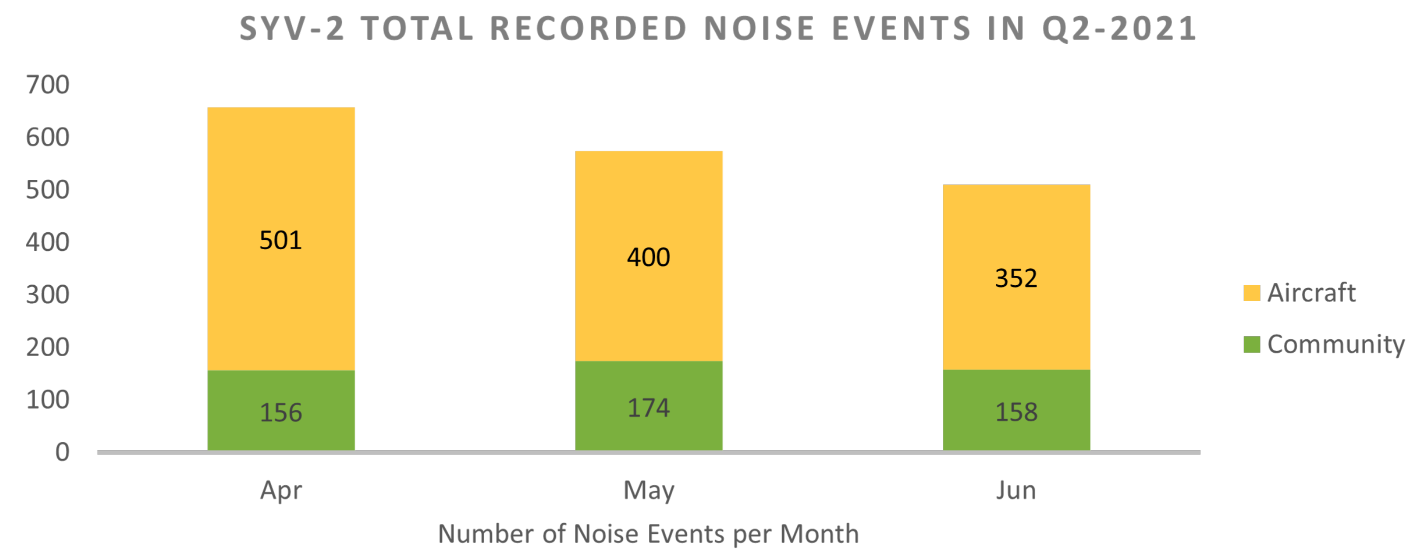
81.4	79.6	79.0	76.9	76.8	76.4	76.3	74.8	73.4	73.4
Jun	Apr	Apr	May	Jun	May	Apr	May	May	Jun
22	22	14	31	27	15	19	23	14	27
12:00 PM	1:01 PM	2:32 PM	4:17 PM	10:06 PM	5:19 PM	8:48 AM	7:42 PM	10:51 AM	2:27 PM
-	-	HELO	C185	HELO	S22T	-	C182	CL35	HELO
-	KNUQ	KHWD	KPAO	KSJC	KPAO	-	KPAO	KSJC	KSJC

Aircraft Noise Event Lmax in A-Weighted Decibels (dBA)

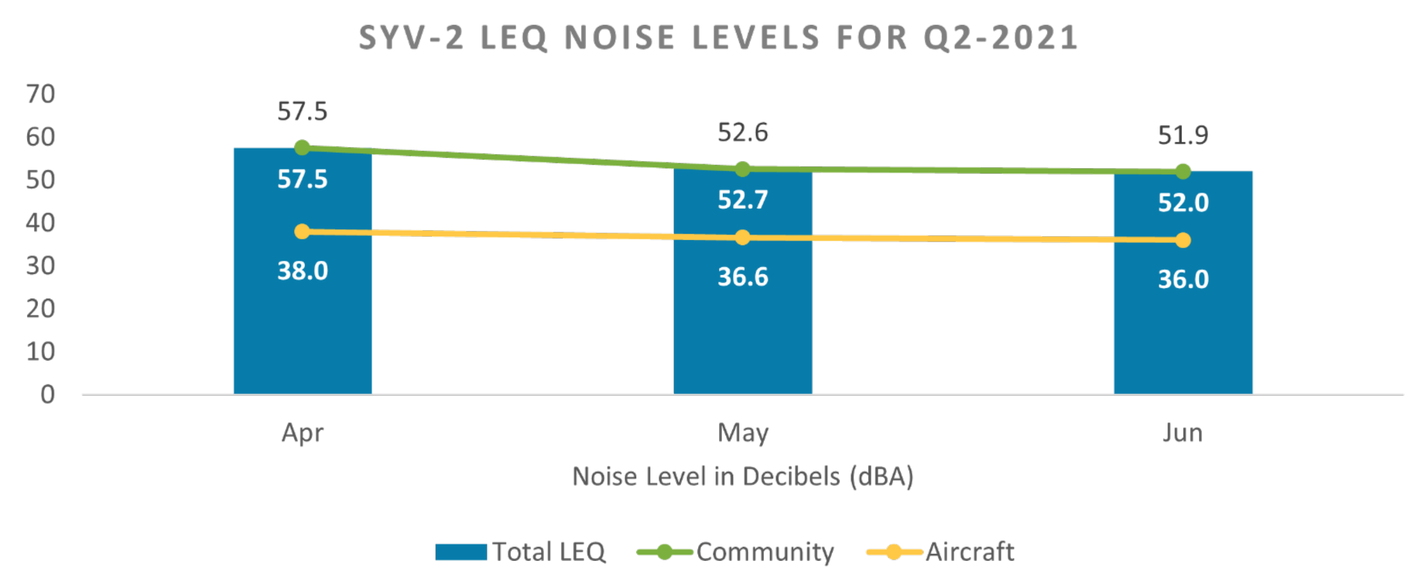
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-2 in the 2nd Quarter of 2021. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

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.

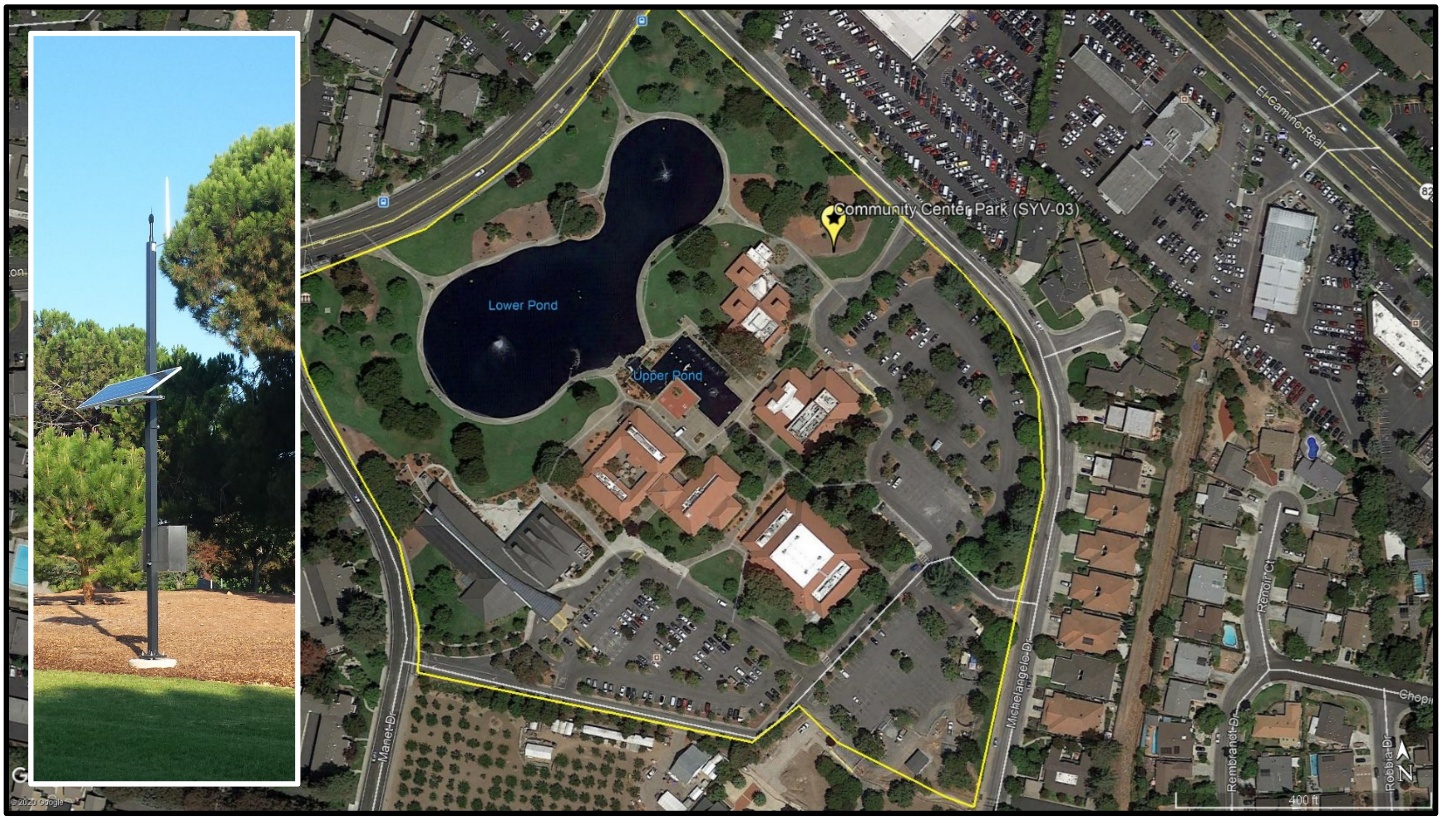


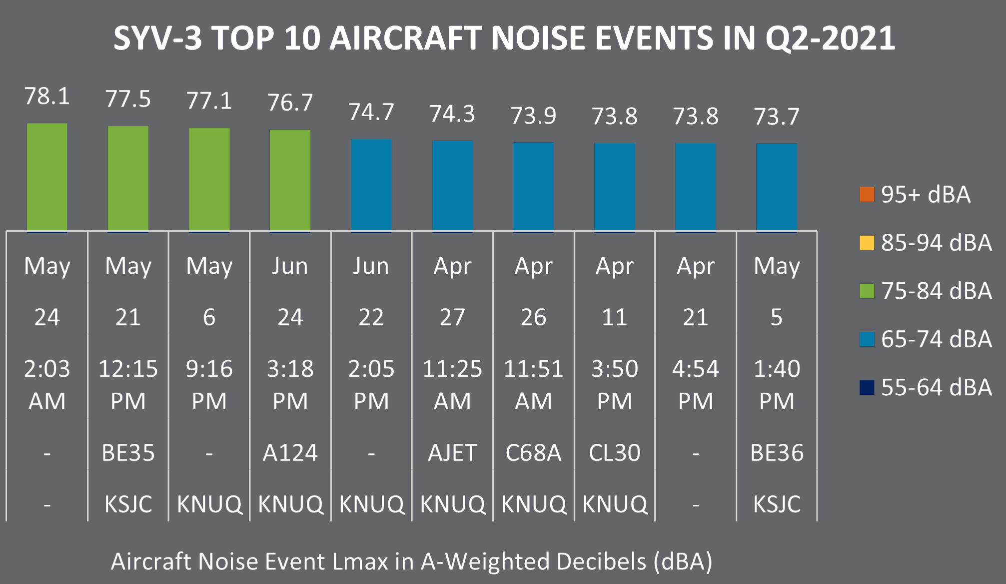
Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical 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 COMMUNITY CENTER PARK NMT DATA Q2 – 2021

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.

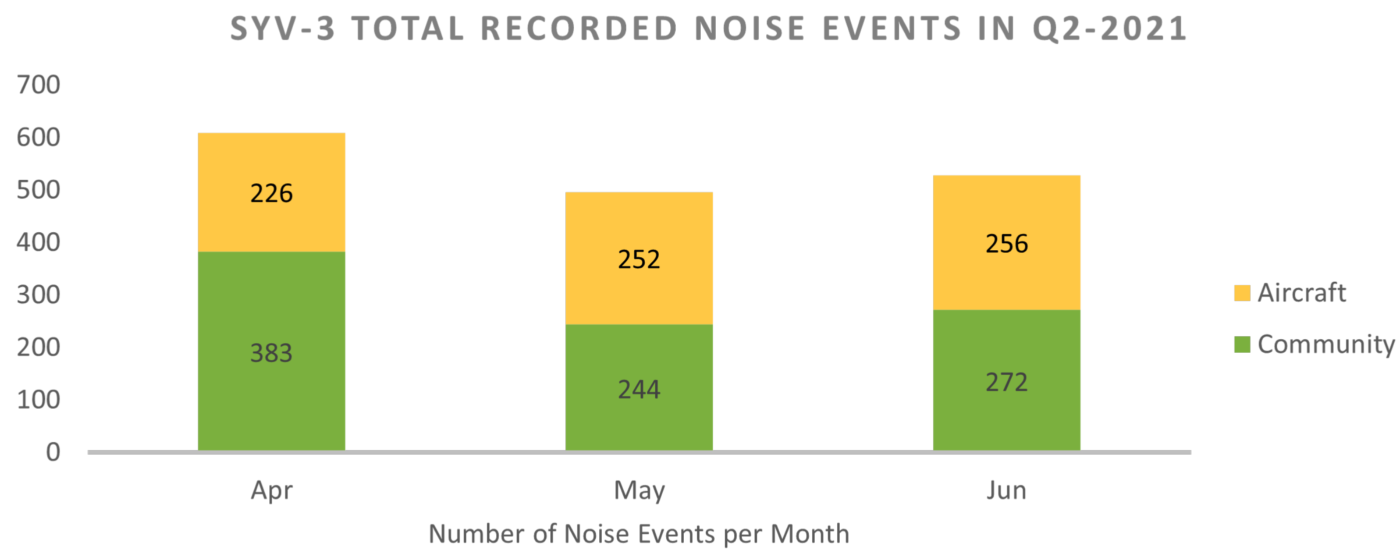




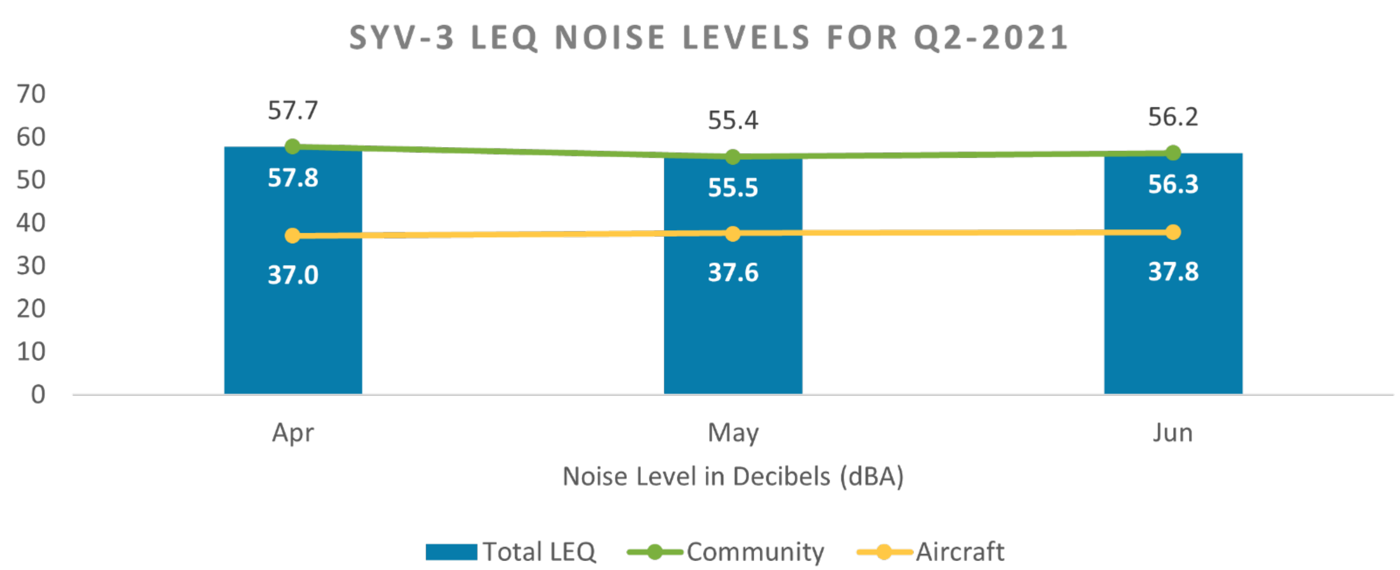
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-3 in the 2nd Quarter of 2021. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

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.

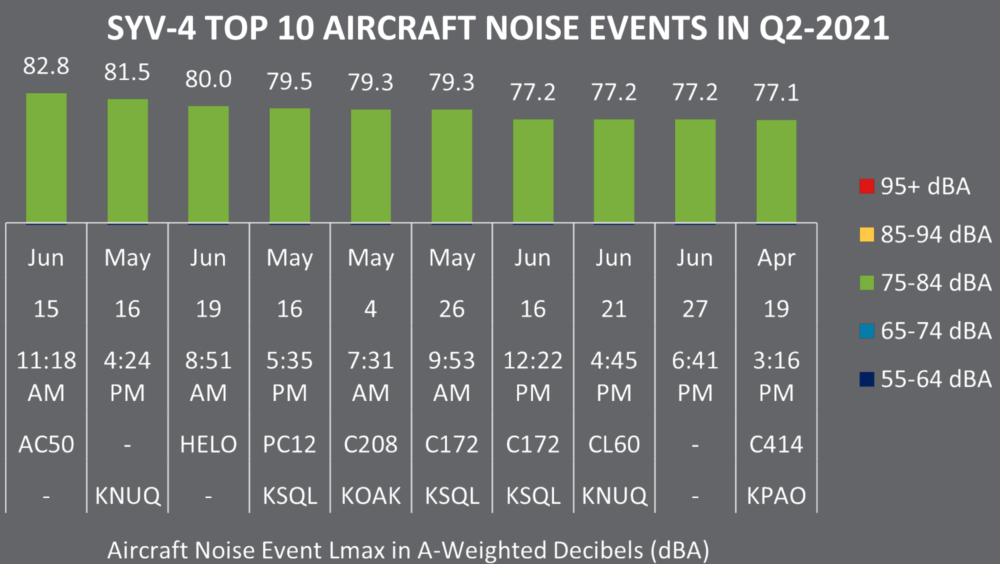


Noise events captured by the NMTs are analyzed on the fly as they happen. Based on their categorization as community or aircraft noise, the system automatically calculates an hourly Aircraft, Community, and Total LEQ (equivalent continuous sound level). Equivalent signifies that the total acoustical 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 WASHINGTON PARK NMT DATA Q2 – 2021

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.

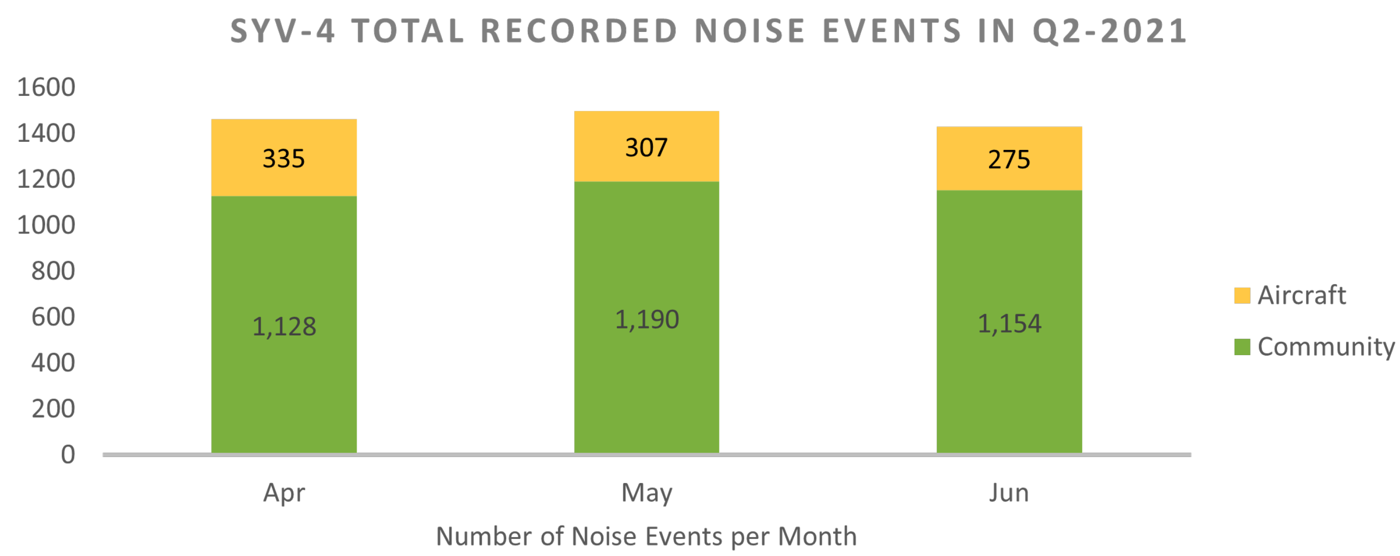


Jun	May	Jun	May	May	May	Jun	Jun	Jun	Apr
15	16	19	16	4	26	16	21	27	19
11:18 AM	4:24 PM	8:51 AM	5:35 PM	7:31 AM	9:53 AM	12:22 PM	4:45 PM	6:41 PM	3:16 PM
AC50	-	HELO	PC12	C208	C172	C172	CL60	-	C414
-	KNUQ	-	KSQL	KOAK	KSQL	KSQL	KNUQ	-	KPAO

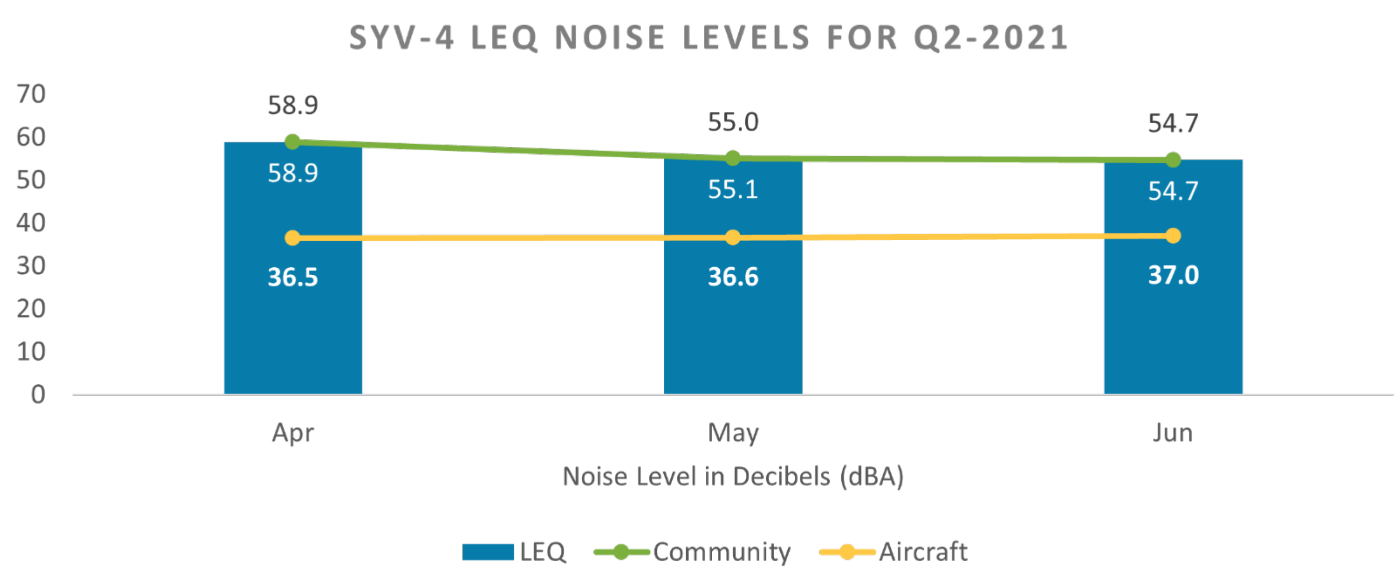
The chart at left illustrates the Top 10 aircraft noise events ranked by maximum noise level (Lmax) as measured at SYV-4 in the 2nd Quarter of 2021. Below each bar is the date of the event and the four-letter ICAO aircraft code of the aircraft type involved.

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.



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.



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	Type
A124	Antonov An-124 Ruslan	Cargo Jet
A306	Airbus A300-600	Commercial Jet
AC50	Aero Commander 500	General Aviation Piston
AJET	Dassault Alpha Jet	Military Jet Trainer
B430	Bell Helicopter 430	General Aviation Helicopter
B737	Boeing 737-700	Commercial jet
B763	Boeing 767-300	Commercial Jet
BE9L	Beechcraft 90 King Air	General Aviation Turboprop
BE35	Beechcraft 35 Bonanza	General Aviation Piston
BE36	Beechcraft 36 Bonanza	General Aviation Piston
C25B	Cessna Citation CJ3	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
C208	Cessna 208 Caravan	General Aviation Turboprop
C414	Cessna 414 Chancellor	General Aviation Piston
CL30	Bombardier Challenger 300	Business Jet
CL35	Bombardier Challenger 350	Business Jet
CL60	Bombardier Challenger 600	Business Jet
E75L	Embraer 175 (Long Winglet)	Commercial Jet
EC45	Airbus Helicopters EC-145	General Aviation Helicopter
GLEX	Bombardier Global Express	Business Jet
GLF6	Gulfstream G650	Business Jet
H25B	Hawker Beechcraft 800	Business Jet
HELO	Generic Helicopter	General Aviation Helicopter
PC12	Pilatus PC-12	General Aviation Turboprop
S22T	Cirrus SR22 Turbocharged	General Aviation Piston
T6	North American T-6 Texan	Military Piston Trainer