

Appendix F

Aviation Noise Technical Report



CONNECT SOCAL 2024 PROGRAM ENVIRONMENTAL IMPACT REPORT

Appendix F: Aviation Noise Technical Report

Prepared for
Southern California Association of Governments
900 Wilshire Blvd., Suite 1700
Los Angeles, CA 90017

November 2023



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626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300
esassoc.com



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TABLE OF CONTENTS

Connect SoCal 2024 Program Environmental Impact Report – Appendix F: Aviation Noise Technical Report

	<u>Page</u>
1.0 Introduction and Overview	1
1.1 Terminology	4
1.2 Data Sources	5
2.0 Hollywood Burbank Airport	5
2.1 Airport Location and Physical Description	5
2.2 Aircraft and Cargo Operations	8
2.3 Airport Noise	8
3.0 Imperial County Airport	9
3.1 Airport Location and Physical Description	9
3.2 Aircraft and Cargo Operations	14
3.3 Airport Noise	14
4.0 John Wayne Airport	14
4.1 Airport Location and Physical Description	14
4.2 Aircraft and Cargo Operations	17
4.3 Airport Noise	17
5.0 Los Angeles International Airport	22
5.1 Airport Location and Physical Description	22
5.2 Aircraft and Cargo Operations	25
5.3 Airport Noise	25
6.0 Long Beach Airport	27
6.1 Airport Location and Physical Description	27
6.2 Aircraft and Cargo Operations	30
6.3 Airport Noise	30
7.0 Ontario International Airport	31
7.1 Airport Location and Physical Description	31
7.2 Aircraft and Cargo Operations	34
7.3 Airport Noise	34
8.0 Palm Springs International Airport	36
8.1 Airport Location and Physical Description	36
8.2 Aircraft and Cargo Operations	39
8.3 Airport Noise	39

	<u>Page</u>
9.0 Conclusion	39
9.1 Passenger and Aircraft Operational Growth Forecast.....	39
9.2 Effect of Growth in Airport Operations on Regional Aviation Noise	40

List of Figures

Figure 1	SCAG Region Air Passenger Demand, 2000 – 2022.....	3
Figure 2	SCAG Region Air Cargo Demand, 2000 – 2022	3
Figure 3	Location of BUR.....	6
Figure 4	BUR Airport Diagram	7
Figure 5	BUR – 2019 Annual – 65 CNEL Contour	10
Figure 6	BUR – 2 nd Quarter 2022 – 65 CNEL Contour.....	11
Figure 7	Location of IPL	12
Figure 8	IPL Airport Diagram.....	13
Figure 9	Location of SNA	15
Figure 10	SNA Airport Diagram	16
Figure 11	Location of SNA Permanent Noise Monitors	19
Figure 12	SNA – 2019 Annual – CNEL Noise Contours.....	20
Figure 13	SNA – 2 nd Quarter 2022 – 65 CNEL Contour.....	21
Figure 14	Location of LAX.....	23
Figure 15	LAX Airport Diagram	24
Figure 16	2019 Annual – CNEL Noise Contours	26
Figure 17	2 nd Quarter 2022 – CNEL Noise Contours	27
Figure 18	Location of LGB	28
Figure 19	LGB Airport Diagram.....	29
Figure 20	Location of ONT	32
Figure 21	ONT Airport Diagram	33
Figure 22	ONT – 2019 Annual – 65 CNEL Contour	35
Figure 23	ONT – 1 st Quarter 2022 – 65 CNEL Contour.....	36
Figure 24	Location of PSP	37
Figure 25	PSP Airport Diagram.....	38

List of Tables

Table 1	BUR Aircraft Operations 2019 Aircraft Operations by Operational Category.....	8
Table 2	SNA Aircraft Operations 2019 Aircraft Operations by Operational Category.....	17
Table 3	SNA Noise Threshold Limits (dB SENEL).....	18
Table 4	LAX Aircraft Operations 2019 Aircraft Operations by Operational Category.....	25
Table 5	LGB Aircraft Operations 2019 Aircraft Operations by Operational Category.....	30
Table 6	LGB Noise Threshold Limits	31
Table 7	ONT Aircraft Operations 2019 Aircraft Operations by Operational Category.....	34
Table 8	PSP Aircraft Operations 2019 Aircraft Operations by Operational Category.....	39

CONNECT SOCAL 2024 PROGRAM ENVIRONMENTAL IMPACT REPORT

Appendix F: Aviation Noise Technical Report

1.0 Introduction and Overview

This Aviation Noise Technical Report has been prepared for the Southern California Association of Governments (SCAG) as part of its 2024 Regional Transportation Plan/Sustainable Communities Strategy (“Connect SoCal 2024” or “Plan”) Program Environmental Impact Report (2024 PEIR). SCAG is a Joint Powers Authority collection of governments from six Southern California counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura), and it is responsible for preparing Connect SoCal 2024 which is a long-range transportation plan that focuses on balancing future mobility and housing needs with environmental and public health goals for the Southern California region. SCAG’s primary focus on airport activity is related to surface transportation and airport ground access traffic accessing the airports.

The SCAG region includes the aforementioned six counties of Imperial County, Los Angeles County, Orange County, Riverside County, San Bernardino County, and Ventura County, making it the largest metropolitan planning organization (MPO) in the nation. The region covers 191 cities, over 19 million residents, and 38,000 square miles. The area contains an expansive multiple airport system with eight commercial airports, seven government/military fields, and over 30 reliever and general aviation airports. San Bernardino International Airport added scheduled commercial service passenger flights in 2022.¹

This report focuses on the operational and noise environments of seven commercial airports within the SCAG region:

- Hollywood Burbank Airport
- Imperial County Airport
- John Wayne Airport
- Los Angeles International Airport
- Long Beach Airport
- Ontario International Airport
- Palm Springs Airport

¹ A full San Bernardino International Airport profile is not included in this report since commercial service only began in August 2022. However, it will be included in the 2028 PEIR.

While SCAG does not have any regulatory, developmental, operational, or planning authority over airports and airport operations, understanding passenger demand and local noise environments is critical to the understanding of region-wide transportation needs and the resulting public health effects of aviation noise within communities.

The purpose of this report is to assess aviation noise exposure on a regional scale. The seven commercial airports located in the SCAG region that are the subject of this report, are the airports where employees, passengers, and cargo are traveling on the region's transportation and transit systems. Detailed airport-specific noise analysis was not performed for this report due to SCAG's focus in ensuring adequate ground transportation access to the region's airports, as well as the limitation of available data to forecast future airport operations and potential changes in aircraft technology (vehicle and engine types). While it is acknowledged that nighttime single noise events can be disruptive to the surrounding community, such noise effects are generally addressed on an airport-by-airport basis, as appropriate, as part of the routine environmental review of projects. As such, single noise events are not addressed in this technical report.

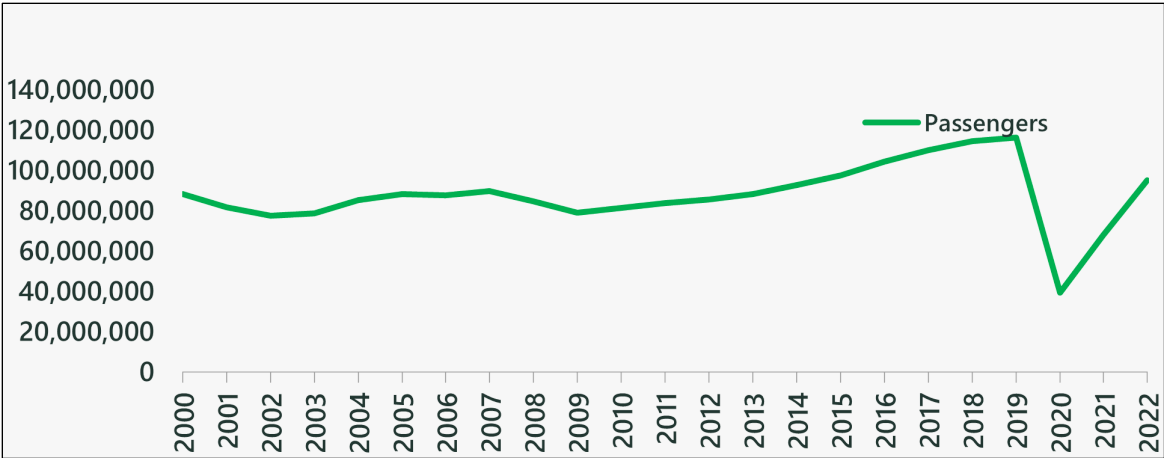
Recent Trends Pre-Pandemic

Prior to the COVID-19 pandemic, air passenger and cargo traffic in the region increased at a steady rate over the past two decades. Despite slow periods following 9/11 and the Great Recession, air passenger and cargo demand always recovered within a few years. Moreover, from 2013 to 2019, air passenger and cargo traffic in the SCAG region increased at dramatic rates.

Pandemic Effects

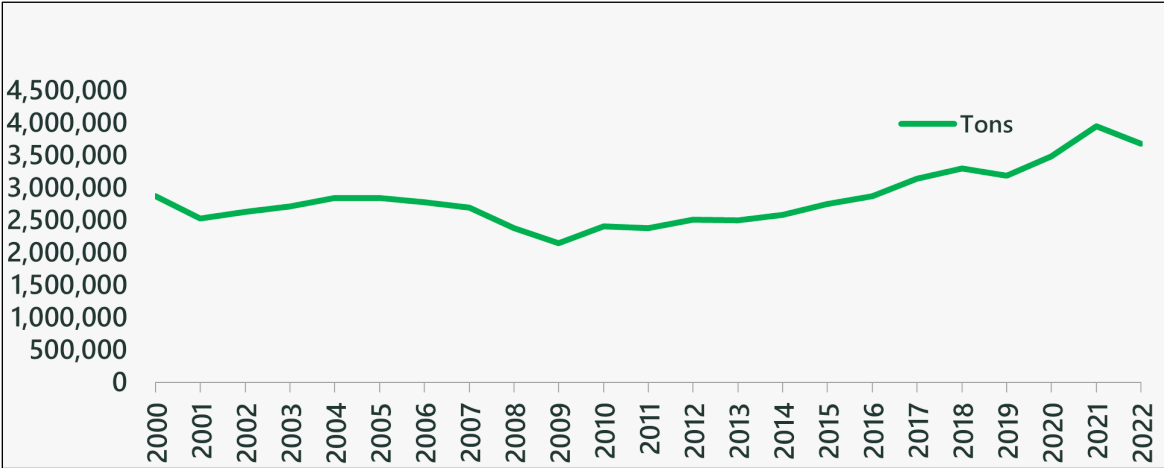
As discussed in detail in the Connect SoCal 2024 Aviation and Airport Ground Access Technical Report, despite downturns and recessions, air passenger and cargo activity in the region has grown steadily over the years. Following a significant downturn of almost 100 percent (versus pre-COVID-19 2019 levels) in passenger demand during March and April 2020, the earliest months of the COVID-19 pandemic, air passenger activity in the region has slowly recovered. However, unlike passenger demand, cargo activity in the region increased during the COVID-19 pandemic. In both 2021 and 2022, almost four million tons of air cargo were flown to and from the SCAG region's airports. Whereas, in 2019, just prior to the COVID-19 pandemic, the SCAG region moved 3.19 million tons of cargo. These air passenger and air cargo trends are depicted in **Figure 1** and **Figure 2** respectively.

Due to the variations in air passenger and air cargo traffic associated with the COVID-19 pandemic, this report relies on 2019 data (where available) for baseline conditions; however, where more recent data are available, this information is also provided as a supplement to the 2019 data and to provide context for more recent trends in aviation activity in the region.



SOURCE: SCAG 2023

Figure 1
SCAG Region Air Passenger Demand, 2000 – 2022



SOURCE: SCAG 2023

Figure 2
SCAG Region Air Cargo Demand, 2000 – 2022

1.1 Terminology

This report often references Community Noise Equivalent Level (CNEL), a cumulative noise metric that is the basis of determination of an airports' noise impact area under California Code of Regulations Title 21 Airport Noise Standard (herein Title 21).² CNEL represents the cumulative noise exposure over a 24-hour period, expressed as the average noise level for an average day of the year based on an airport's average operations.³ CNEL is calculated by averaging the sound energy produced by aircraft operations over a 24-hour period, adding a 5-decibel (dB) penalty for evening operations (between 7 and 10 p.m.), and a 10-dB penalty for nighttime operations (between 10 p.m. and 7 a.m.) to account for the intrusive nature of these flights. The CNEL noise contours shown in this report are calculated using the Federal Aviation Administration (FAA)'s Aviation Environmental Design Tool (AEDT) noise modeling software.⁴ Title 21 defines 65 dB CNEL as the threshold for noise-sensitive land use compatibility with aviation noise.

This report also refers to airport runway nomenclature such as Runway 15/33. Runways are numbered between 01 and 36 representing the magnetic heading of the runway in degrees divided by ten. Runway 09 heads 90 degrees clockwise from magnetic north, or due east, Runway 27 is directed 270 degrees or due west, and Runway 36 (360 degrees, not 0 degrees) points north.⁵ Runway 15/33 heads 150 degrees from magnetic north or southwest. If the runway operates in the opposite direction, 180 degrees difference, the heading is 330 degrees and the runway number is 33. Some airports have parallel runways with identical headings, and the letters L, R, and C are added to distinguish between the left, right, and center runways.

FAA operational categories are defined as follows⁶:

- Air Carrier: Aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds, carrying passengers or cargo for hire or compensation.
- Air Taxi: Aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less, carrying passengers or cargo for hire or compensation.
- General Aviation: Takeoffs and landings of all civil aircraft, except for air carriers or air taxis.
- Military: Operations by all classes of military takeoffs and landings at FAA and FTC facilities.

2 Cal. Code Regs. Tit. 21, § 5012 - Airport Noise Standard | State Regulations | US Law | LII / Legal Information Institute (cornell.edu), accessed December 5, 2022.

3 Fundamentals of Noise and Sound | Federal Aviation Administration (faa.gov), accessed December 5, 2022.

4 FAA: AEDT Support Website

5 <https://worldwide-aviation.blogspot.com/2016/03/naming-for-runways.html>; accessed July 2023

6 OPSNET Reports: Definitions of Variables - ASPMHelp (faa.gov)

1.2 Data Sources

Airport passenger, cargo, and operations data including airport project information and forecasts are developed and provided by the airports. SCAG staff works closely with the region's airport partners. The data and information provided by the airports to SCAG staff was critical for the analysis and development of the Connect SoCal 2024 Aviation and Airport Ground Access Technical Report and this 2024 PEIR Aviation Noise Technical Report.

2.0 Hollywood Burbank Airport

2.1 Airport Location and Physical Description

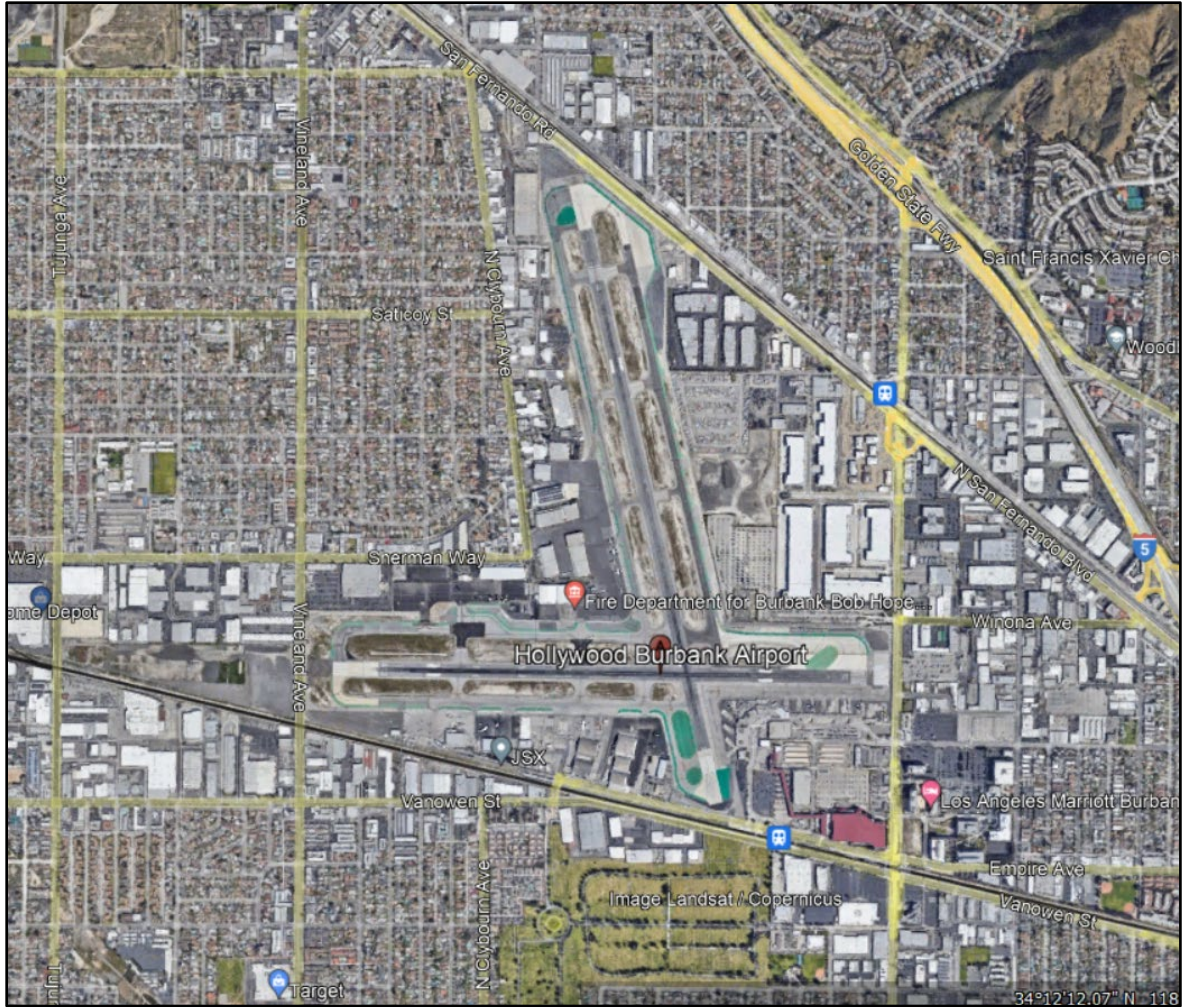
Hollywood Burbank Airport (BUR) is located approximately three miles northwest of downtown Burbank, approximately two miles north of North Hollywood, and approximately twelve miles northwest of downtown Los Angeles in the western part of Los Angeles County. The Interstate 5 Freeway runs one mile to the east of the airport. Densely populated residential neighborhoods surround the airport on all sides, with the closest neighborhoods located directly to the northwest and northeast. Neighborhoods to the south are buffered by a small area of commercial land uses and a cemetery directly south of the airfield, while neighborhoods to the east are buffered by a larger area of commercial land uses. The airport and surrounding areas are shown in **Figure 3**

BUR is categorized by the FAA as a medium-hub commercial service facility. The airfield consists of two intersecting runways with a passenger terminal located on the southeast end of the field.⁷ Runway 15/33 runs along a northeast to southwest direction, while Runway 8/26 runs along a west to east direction. Runway 15/33 is 6,886 feet long by 150 feet wide and is the primary runway for commercial aircraft operations. Runway 8/26 is 5,802 feet long by 150 feet wide. The FAA BUR airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 4**.

BUR has extensive infrastructure and facilities dedicated to transit and rail passengers coming to and from the airport.⁸ In addition to housing rental cars, the ground level of the Regional Intermodal Transportation Center (RITC), which opened in June of 2014, serves as a transit hub for bus riders. Metro Bus and Burbank Bus have stops in the turn-around area on the ground level of the RITC. Currently, BUR is the only airport in the SCAG region with a direct rail connection to Downtown Los Angeles. Additionally, Amtrak and Metrolink passengers stopping at the Burbank Airport-South Train Station can access the RITC via the Empire Avenue street-crossing that leads straight to elevator and escalator access to an elevated walkway. Metrolink also stops at the Burbank Airport-North Station located on San Fernando Road and Hollywood Way. The Burbank-Glendale-Pasadena Airport Authority provides complimentary shuttle service between the Burbank Airport-North Station and the Airport terminal.

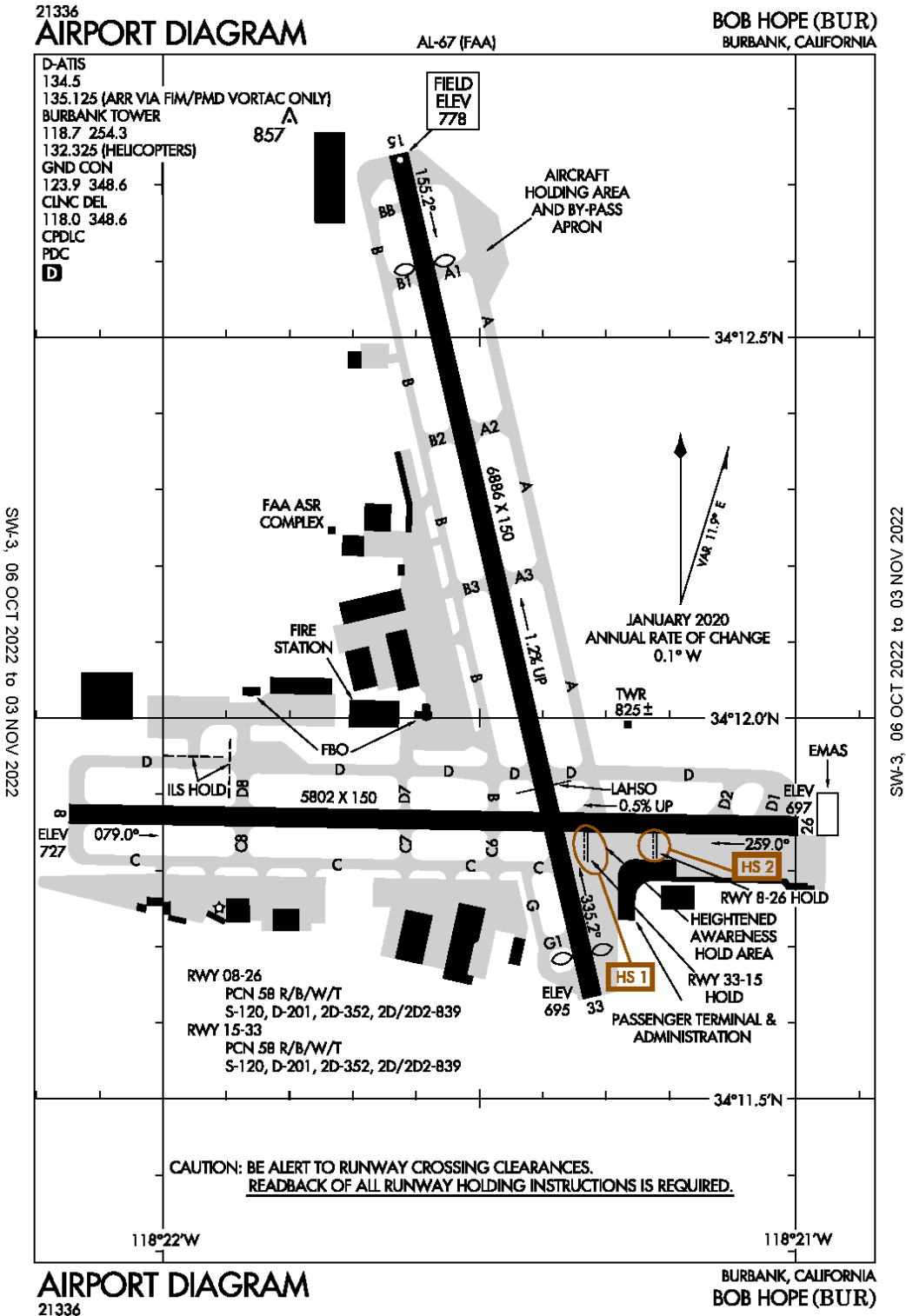
⁷ AirNav: KBUR - Bob Hope Airport, accessed November 16, 2022.

⁸ SCAG. Connect SoCal 2024 Aviation and Ground Access Technical Report, August 2023.



SOURCE: Google, 2023

Figure 3
Location of BUR



SOURCE: FAA and Airmav.com, 2022

Figure 4
BUR Airport Diagram

2.2 Aircraft and Cargo Operations

Aircraft operations at BUR consist of commercial air carrier and air taxi operations as well as general aviation operations. A small number of military operations occur annually at BUR. The total number of 2019 aircraft operations for all operational categories was 146,440 for 2019.⁹ The number of aircraft operations by operational category is broken out in **Table 1**.

The airport accommodated 5.98 Million Annual Passengers (MAP) in 2019 and is forecast to accommodate 8.8 MAP in 2050. Approximately 53,024 tons of cargo passed through BUR in 2019.

TABLE 1
BUR AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
61,643	26,316	57,930	551	146,440

SOURCE: FAA OPSNET, 2023

Commercial operations at BUR are primarily served by medium-range narrowbody aircraft such as the Boeing 737 family and short-range regional jets like the Embraer ERJ145, E175, and the Bombardier CRJ-200. Air taxi and general aviation operations are represented by a wide variety of piston aircraft, turboprops, and business jets. The fleet mix at BUR has remained consistent over the past several years, with the Boeing 737 being the most frequently used aircraft by a large margin. There has been some recent movement of 737 operations at BUR to the quieter MAX variant, but the older and noisier Boeing 737-700 and 737-800 variants continue to dominate the fleet mix.¹⁰ Given the primary operators at BUR, it is anticipated that fleet mix will continue to remain consistent over the next several years with a trend toward newer, quieter aircraft such as the Boeing 737 MAX and Airbus A320 NEO families in the future.

2.3 Airport Noise

As noted in Section 2.1, BUR is surrounded by densely populated residential neighborhoods, and therefore the airport has adopted several voluntary noise abatement measures and procedures to mitigate aviation noise in the surrounding communities. The airport has implemented a voluntary nighttime curfew, in which operators are strongly encouraged not to operate at the airport between the hours of 10 p.m. and 7 a.m.¹¹ The airport has also instated a number of other noise rules governing the types of aircraft allowed to operate at BUR and outlining further stipulations regarding the voluntary curfew.¹² The airport maintains a flight tracking and noise monitoring system that allows the public to view real time and historical flight tracking and noise monitoring data.¹³ The airport manages a Residential Acoustical Treatment Program (RATP) that provides

⁹ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

¹⁰ Federal Aviation Administration (faa.gov), accessed October 21, 2022.

¹¹ Voluntary Curfew Language (hollywoodburbankairport.com), accessed October 10, 2022.

¹² Noise-Rules-4.1.22.pdf (hollywoodburbankairport.com), accessed October 10, 2022.

¹³ WebTrak (emsbk.com), accessed November 17, 2022.

acoustically rated treatments, such as new windows and doors, to homeowners within the noise impact area of the airport.¹⁴

BUR also maintains a total of 20 permanent active noise monitors strategically placed within the communities surrounding the airport. This monitoring data, along with modeled data, are used to produce quarterly CNEL noise contours, as required by Title 21.¹⁵ The Title 21 2019 annual 65 CNEL noise contour is shown in **Figure 5**. The second quarter 2022 65 CNEL noise contour is shown in **Figure 6**. As seen in these figures, the 2019 annual noise contour is somewhat larger than the second quarter 2022 contour. This is primarily due to the effect of the COVID-19 pandemic on air carrier operations at BUR and other commercial airports. As the number of air carrier operations continue to recover to pre-pandemic levels, it is anticipated that future noise contours will more closely resemble the 2019 annual contour.

3.0 Imperial County Airport

3.1 Airport Location and Physical Description

Imperial County Airport (IPL) is located within Imperial County, approximately one mile south of downtown Imperial and three miles north of El Centro. The Interstate 8 Freeway runs four miles to the south of the airport, and State Highway 86 (Imperial Avenue) runs in a north-south orientation directly to the east. The airport is about twelve miles north of the United States – Mexico border. Land uses surrounding the airport consist primarily of a mix of commercial, residential, and agricultural. Residential neighborhoods lie to the northeast, northwest, and southwest of the airport, while the area directly to the south and southeast of the airfield is characterized by predominantly commercial uses. To the west lies several areas of farmland. The location of IPL and surrounding areas is shown in **Figure 7**.

IPL is categorized by the FAA as a non-primary commercial service facility. The airfield consists of two runways with a small passenger terminal located on the eastern end of the field.¹⁶ Runway 14/32 runs along a northwest to southeast direction, while runway 8/26 runs along a west to east direction. Runway 14/32 is 5,308 feet long by 100 feet wide and is the most commonly used runway. Runway 8/26 is 4,501 feet long by 75 feet wide. The FAA IPL airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 8**.

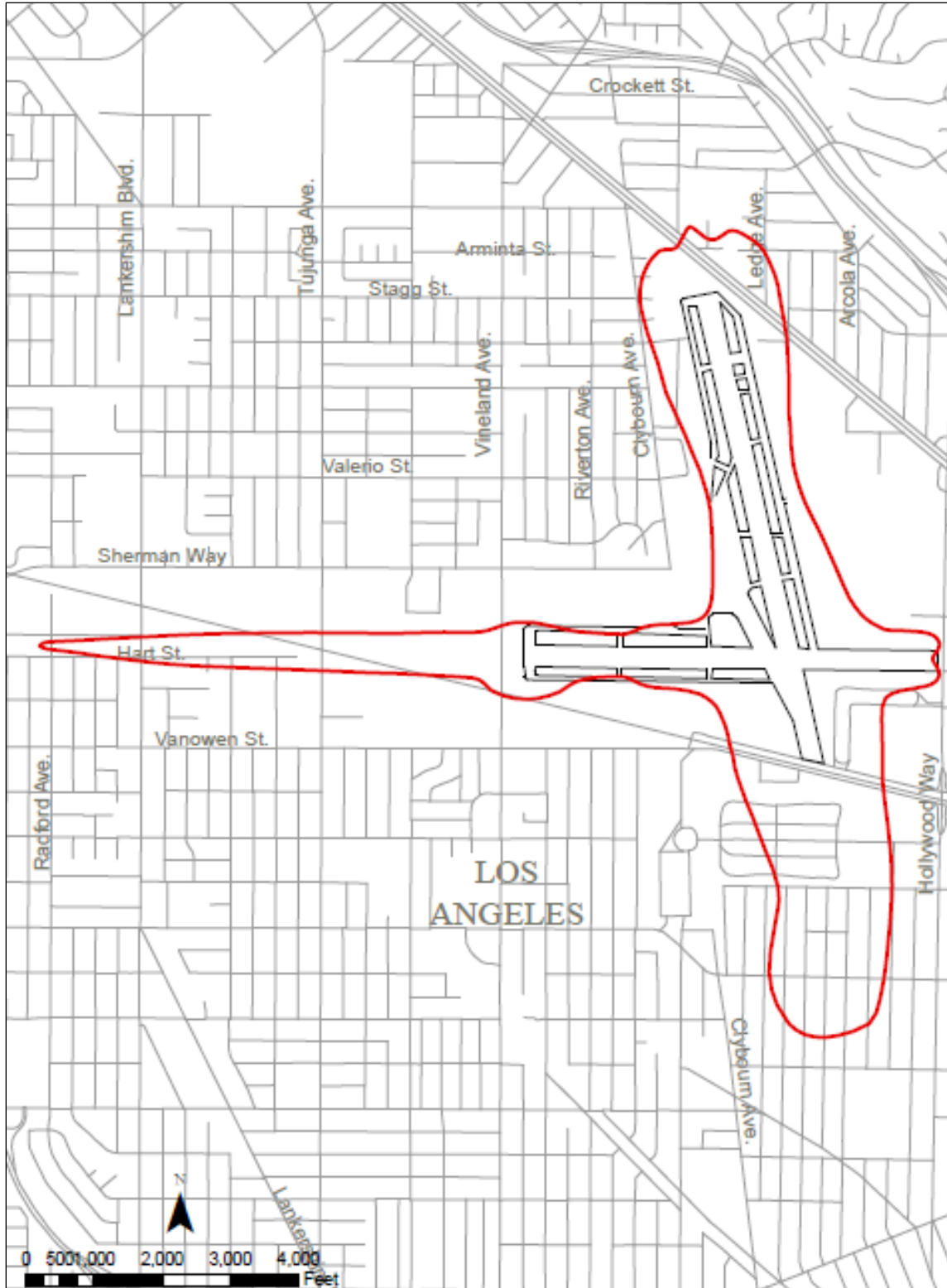
Ground access for IPL is limited to automobiles and shuttle services associated with rental car businesses in the area. There are currently no direct public transit connections to the airport.¹⁷

¹⁴ Noise Issues - Hollywood Burbank Airport, accessed November 17, 2022.

¹⁵ Quarterly Noise Monitoring at Hollywood Burbank Airport Second Quarter 2022, accessed November 17, 2022.

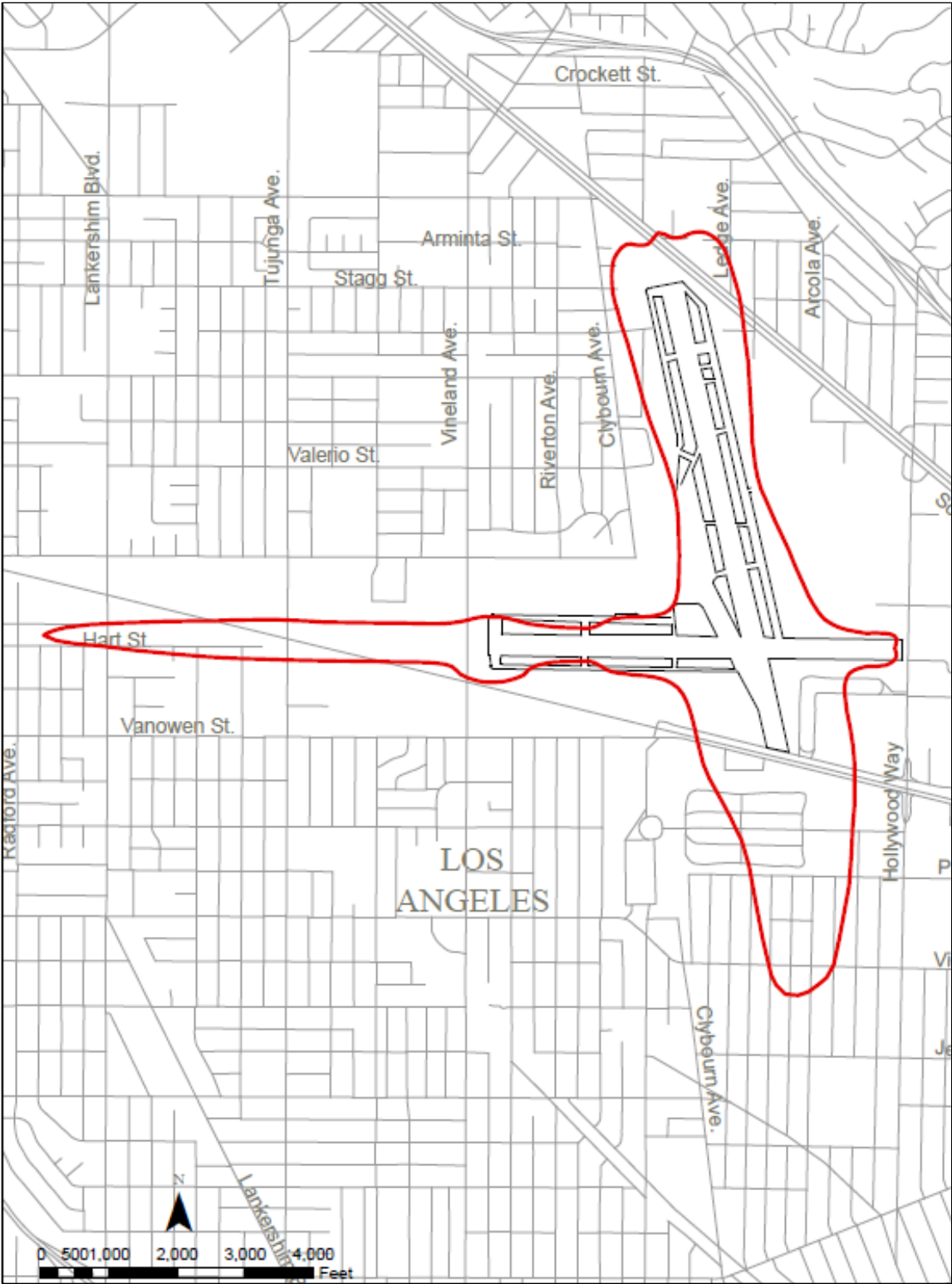
¹⁶ AirNav: KIPL - Imperial County Airport, accessed November 18, 2022.

¹⁷ Imperial Valley Transit. Routes. <https://www.ivtransit.com/>, accessed August 30, 2023.



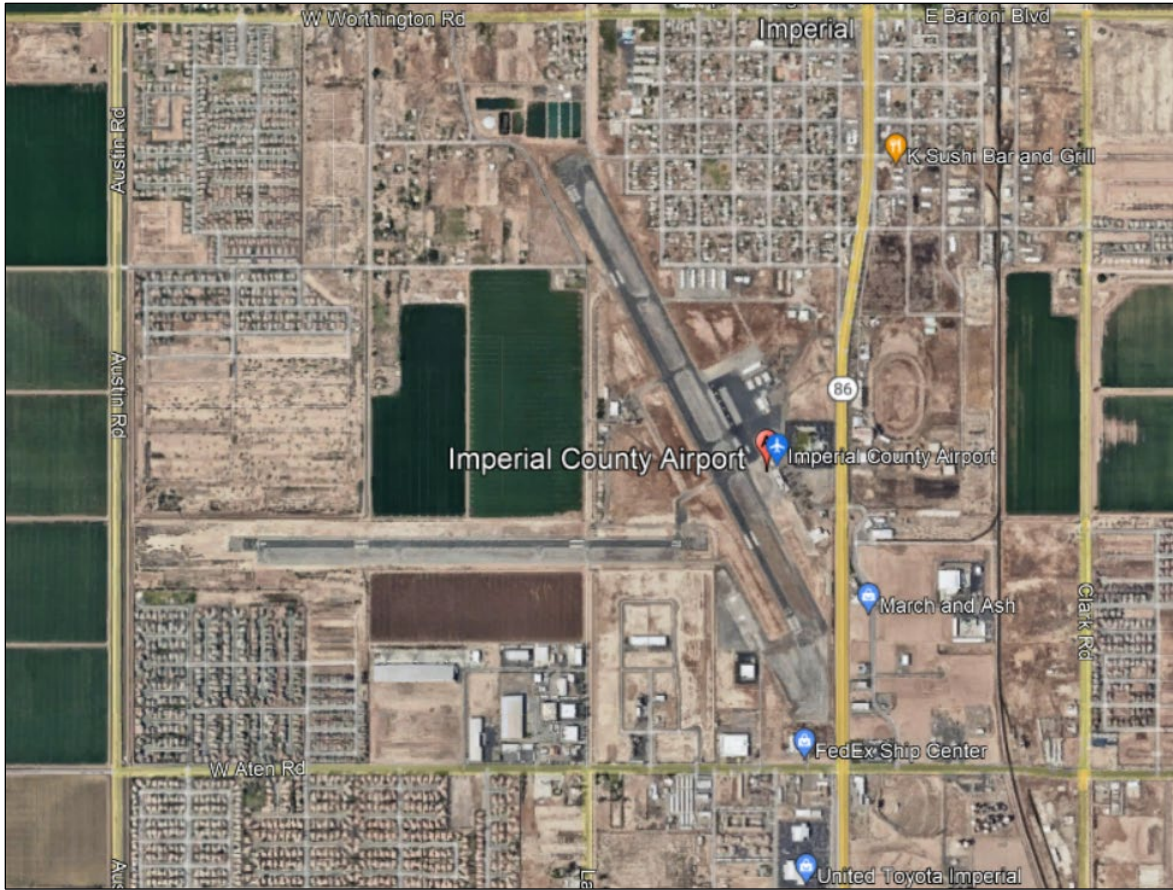
SOURCE: BUR, 2023

Figure 5
BUR – 2019 Annual – 65 CNEL Contour



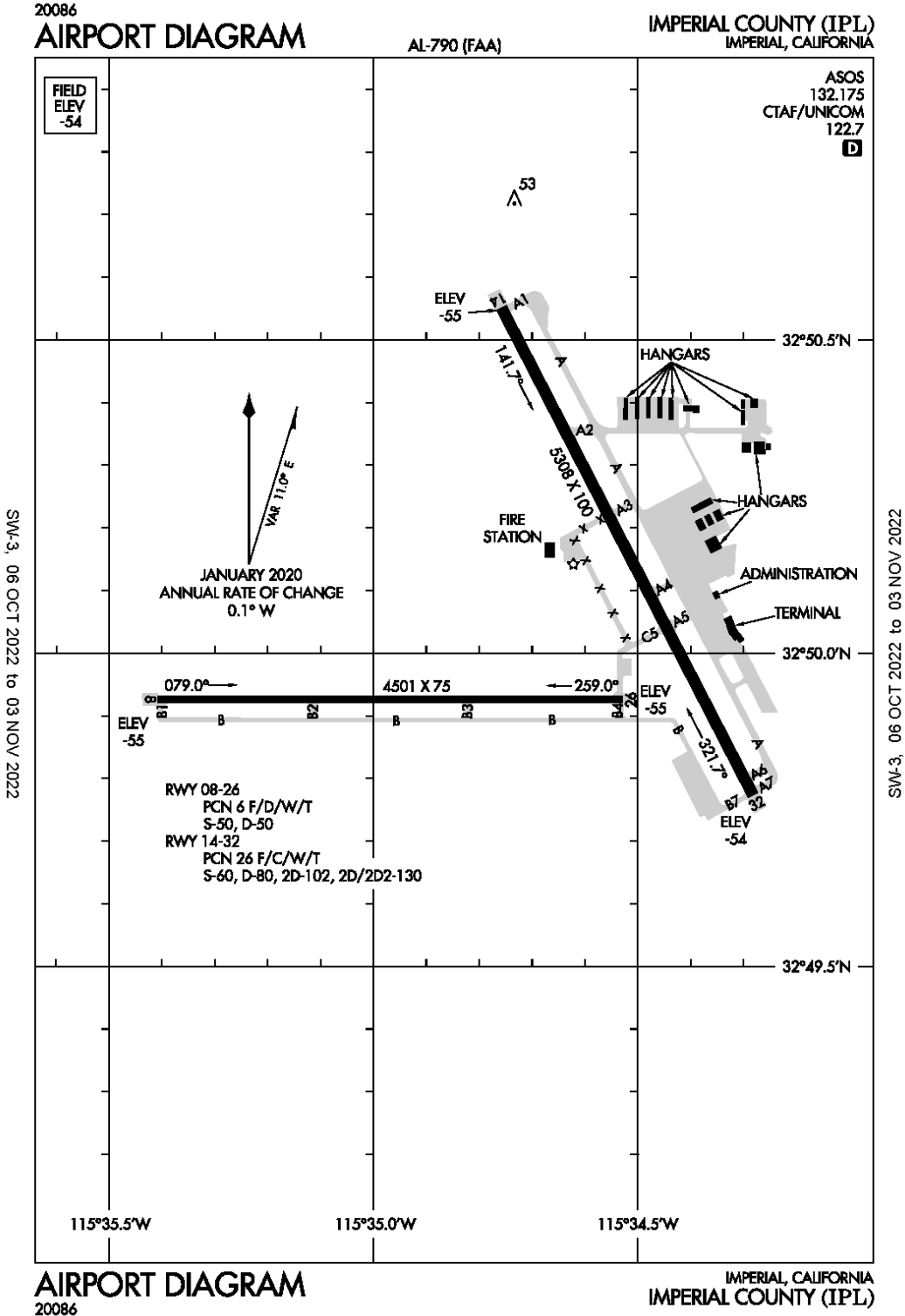
SOURCE: BUR, 2023

Figure 6
BUR – 2nd Quarter 2022 – 65 CNEL Contour



SOURCE: Google, 2023

Figure 7
Location of IPL



SOURCE: FAA and Airmav.com, 2022

Figure 8
IPL Airport Diagram

3.2 Aircraft and Cargo Operations

Aircraft operations at IPL consist of mainly general aviation aircraft, with one commuter airline, Southern Airways Express, currently serving the airport using the Cessna 208 Caravan. The general aviation fleet mix operating at IPL consists of a wide variety of single- and multi-engine piston aircraft. As there is no control tower at IPL and most aircraft operate using visual flight rules (VFR), annual operations counts are not available. The airport accommodated 10,756 annual passengers (the number is too small to identify in MAP) in 2019 and is forecast to accommodate 0.2 MAP in 2050. Approximately 1,276 tons of cargo passed through IPL in 2019.

3.3 Airport Noise

As IPL is a small airport with mainly general aviation operations and little to no jet traffic, there are few noise-related issues at the airport. As such, IPL does not maintain a robust noise abatement and mitigation program like many other Southern California airports. The airport does not maintain a flight tracking and noise monitoring system or noise monitors and has no published noise abatement procedures. IPL does not have any recent (2019 or beyond) noise contours available.

4.0 John Wayne Airport

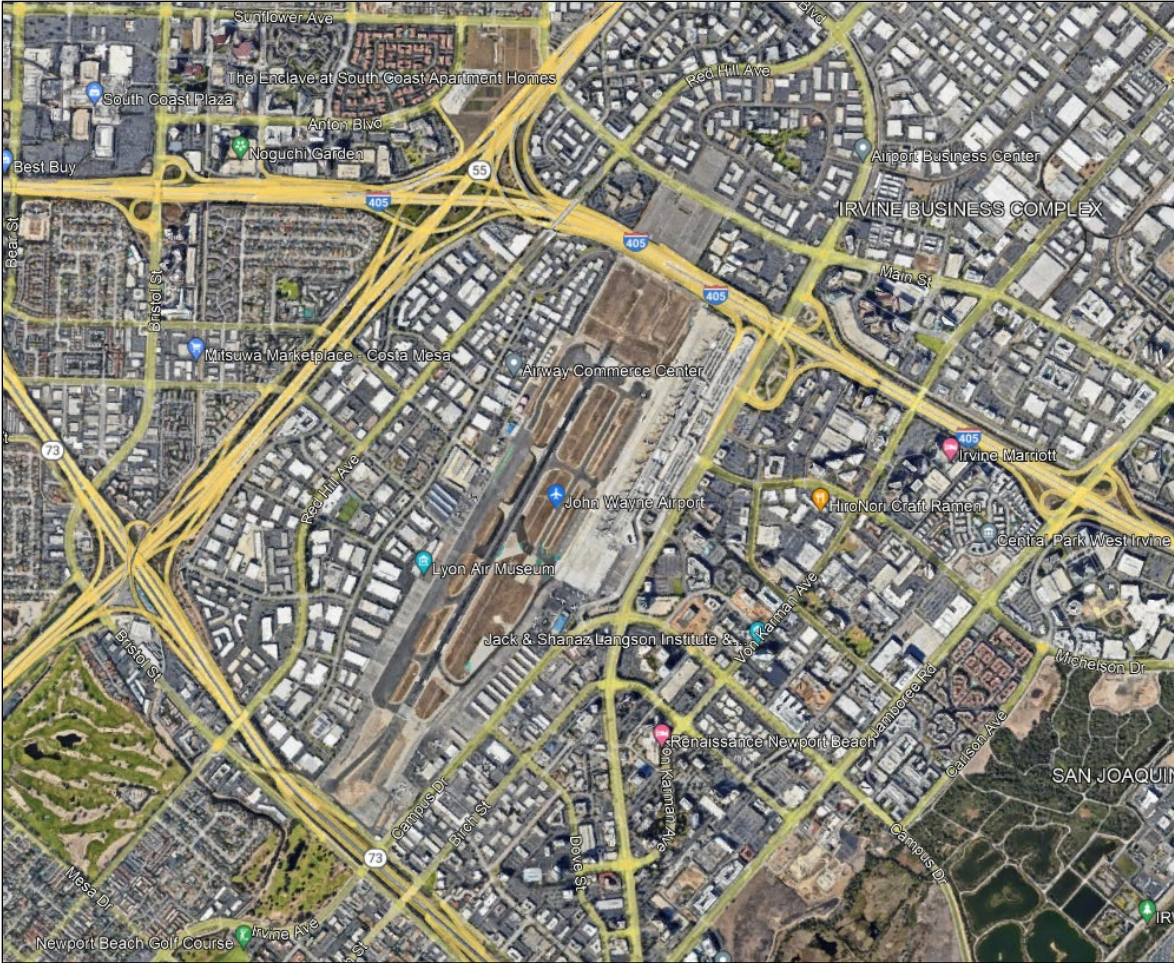
4.1 Airport Location and Physical Description

John Wayne Airport (SNA) is located within Orange County, approximately three and a half miles northeast of downtown Costa Mesa, five miles north of Newport Beach, and five miles south of the center of Santa Ana. Downtown Los Angeles lies approximately 31 miles to the northwest. The airport is located close by several major highways. The Interstate 405 Freeway runs directly to the north, while the State Route 55 Freeway runs directly to the west and the State Route 73 Freeway runs directly to the south. Land uses surrounding the airport consist primarily of a mix of commercial and residential, with mainly commercial areas located immediately adjacent to the airport and very densely populated single- and multi-family land uses located within one and a half miles to the west, south, and east of the airport. The location of SNA and the surrounding area is shown in **Figure 9**.

SNA is categorized by the FAA as a primary commercial service facility. The airfield consists of two parallel runways with a passenger terminal located on the northeastern end of the field.¹⁸ Both Runways 2L/20R and 2R/20L run along a southwest to northeast direction. Runway 2L/20R is 5,700 feet long by 150 feet wide and is the only runway available for commercial jet traffic. Runway 2R/20L is 2,886 feet long by 75 feet wide and is primarily used by small general aviation aircraft. The FAA SNA airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 10**.

Ground access at SNA is provided primarily by automobiles and shuttle services, with no direct public transit service connections to the airport.

¹⁸ AirNav: KSNA - John Wayne/Orange County Airport, accessed November 22, 2022.



SOURCE: Google, 2023

Figure 9
Location of SNA

4.2 Aircraft and Cargo Operations

Aircraft operations at SNA consist of commercial air carrier and air taxi operations as well as general aviation operations. A small number of military operations occur annually at SNA. The total number of 2019 aircraft operations for all operational categories was 318,485.¹⁹ The number of aircraft operations by operational category is broken out in **Table 2**. The airport accommodated 10.66 MAP in 2019 and is forecast to accommodate 12.5 MAP in 2050. Approximately 17,703 tons of cargo passed through SNA in 2019.

TABLE 2
SNA AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
91,105	21,715	204,680	985	318,485

SOURCE: FAA OPSNET, 2023

Commercial operations at SNA are primarily served by medium-range narrowbody aircraft such as the Boeing 737 and Airbus A320. Air taxi and general aviation operations are represented by a wide variety of piston aircraft, turboprops, and business jets. The fleet mix at SNA has remained consistent over the past several years, with the Boeing 737 being the most frequently used aircraft, followed by the Airbus A320. There has been some recent movement of 737 operations at SNA to the quieter MAX variant and A320 operations to the quieter NEO (new engine option) variant, but the older and noisier Next-Generation Boeing 737-700/800 and Airbus A320 CEO (current engine option) variants continue to dominate the fleet mix.²⁰ Given the primary operators at SNA, it is anticipated that fleet mix will continue to remain consistent over the next several years with a trend toward newer, quieter aircraft such as the Boeing 737 MAX and Airbus A320 NEO families in the future.

4.3 Airport Noise

As noted in Section 4.1, there are many densely populated residential neighborhoods in the area of SNA. As such, SNA has adopted several noise abatement measures and procedures in order to mitigate airport noise in the surrounding communities.²¹ The airport operates a Noise and Operations Monitoring System (NOMS) to track flight data and noise levels within surrounding communities on a daily basis. The airport maintains a total of ten permanent noise monitors within the cities of Newport Beach, Irvine, Santa Ana, and Tustin²², and has developed noise threshold limits at each monitor for aircraft operating at SNA.²³ These limits are shown in **Table 3**. The location of permanent noise monitoring stations is shown in **Figure 11**.

¹⁹ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

²⁰ Federal Aviation Administration (faa.gov), accessed October 21, 2022.

²¹ Fly Friendly Brochure (ocair.com), accessed October 10, 2022.

²² SNA Noise Abatement Program Quarterly Report, accessed November 22, 2022.

²³ Noise Limits | John Wayne Airport, Orange County (ocair.com), accessed October 10, 2022.

TABLE 3
SNA NOISE THRESHOLD LIMITS (dB SENEL)

Noise Monitoring Station	Commercial Aircraft		General Aviation	
	Class A	Class E	Daytime	Nighttime
NMS 1S	102.5	94.1	102.5	87.5
NMS 2S	101.8	93.5	101.8	87.6
NMS 3S	101.1	90.3	101.1	86.7
NMS 4S	94.8	86.6	N/A	86.7
NMS 5S	95.3	87.2	N/A	86.7
NMS 6S	96.8	87.2	N/A	86.7
NMS 7S	93.7	86.6	N/A	86.7
NMS 8N	N/A	N/A	N/A	86.9
NMS 9N	N/A	N/A	N/A	86.9
NMS 10N	N/A	N/A	N/A	86.9

NOTE: Operations are assigned Class A or E based on departure weight, with Class E representing short-haul flights and Class A representing longer-haul flights. Daytime hours defined as 7 a.m. to 10 p.m. for departures Monday to Saturday, 7 a.m. to 11 p.m. for arrivals Monday to Saturday, 8 a.m. to 10 p.m. for departures Sunday, and 8 a.m. to 11 p.m. for arrivals Sunday. All other hours are nighttime hours.

SOURCE: SNA, 2022

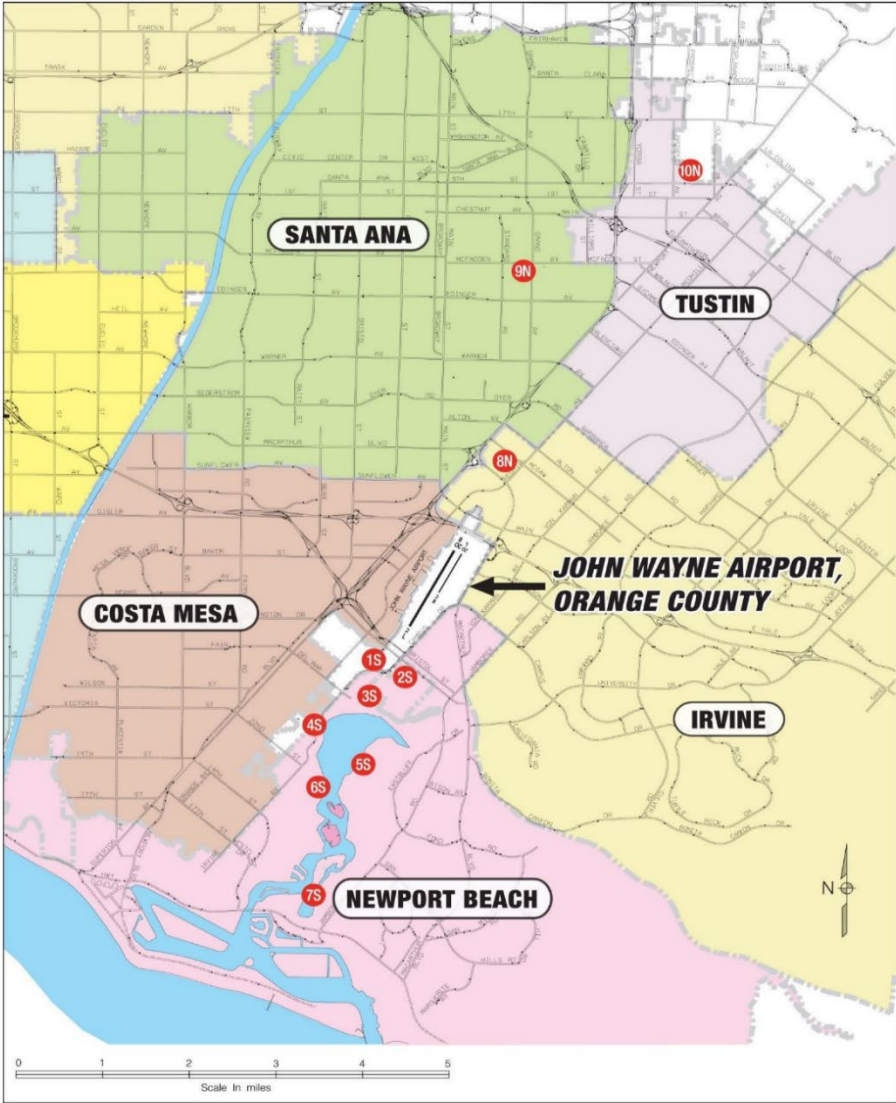
Jet aircraft are permitted to operate at SNA 24 hours a day as long as the noise threshold limits are met, though the airport encourages operators to voluntarily limit nighttime flights. As part of their Fly Friendly program, the airport tracks and awards points to general aviation operators that produce the least amount of noise at the noise monitoring locations and best limit nighttime flights throughout the year. In order to reduce departure noise within Newport Beach, the airport has adopted voluntary noise abatement departure procedure for jet aircraft departing from Runway 20R. Aircraft flying this procedure will quickly climb to 1,000 feet in altitude, reduce power and retract flaps to limit noise while continuing their climb over Newport Beach, then resume normal climb thrust after clear of Newport Beach and reaching 3,000 feet in altitude.

As required by Title 21, the airport produces a quarterly noise report which details quarterly noise monitoring data and includes a quarterly CNEL contour. The Title 21 annual 2019 CNEL noise contours are shown in **Figure 12**. The second quarter 2022 65 CNEL noise contour is shown in **Figure 13**. As seen in these figures, the 2019 annual noise contour is larger than the second quarter 2022 contour. Similar to BUR, this is primarily due to the effect of the COVID-19 pandemic on air carrier operations at SNA. As the number of air carrier operations continue to recover to pre-pandemic levels, it is anticipated that future noise contours will more closely resemble the 2019 annual contour.



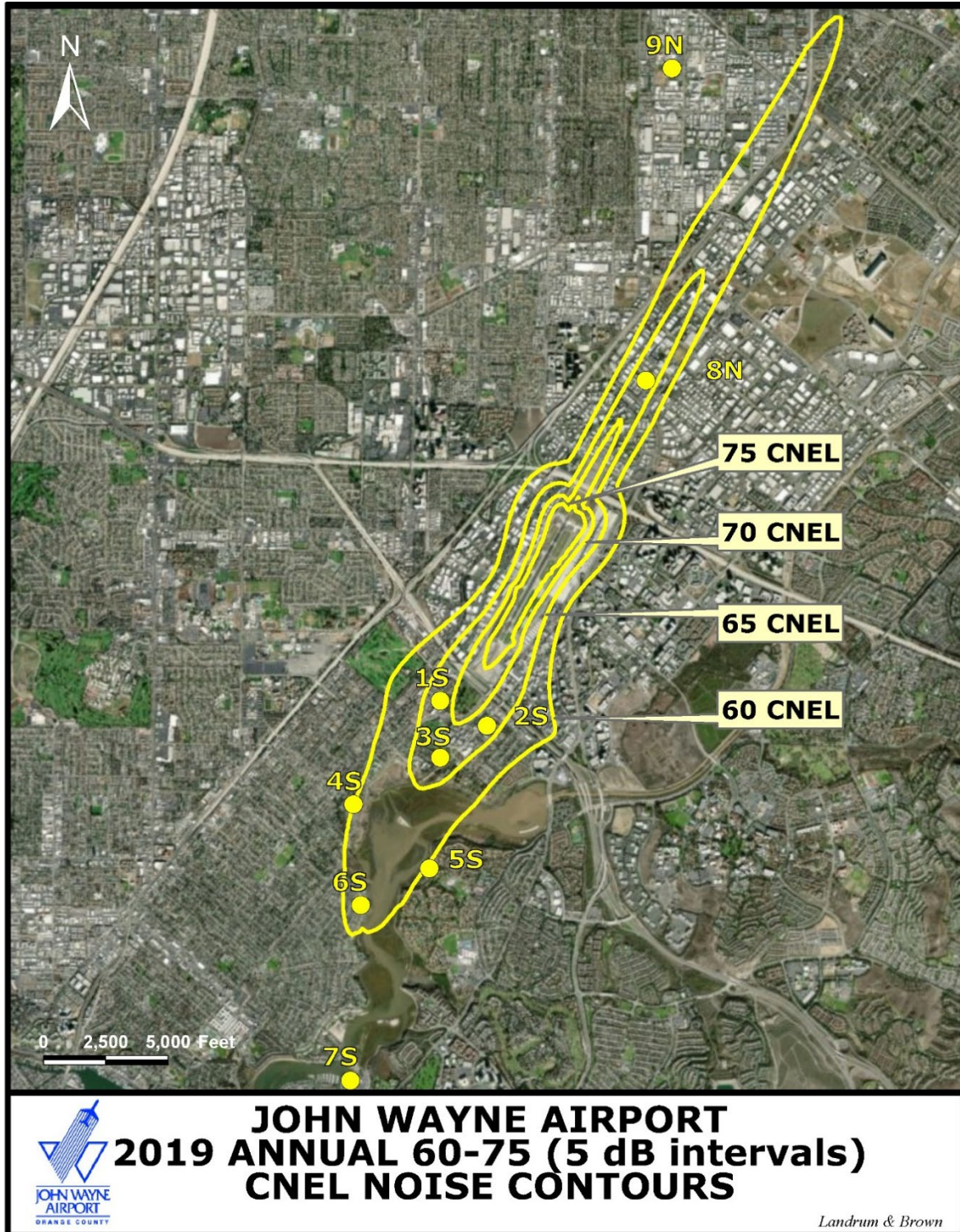
JOHN WAYNE AIRPORT
ORANGE COUNTY

JOHN WAYNE AIRPORT
Noise Monitoring Stations (NMS)
Location Map



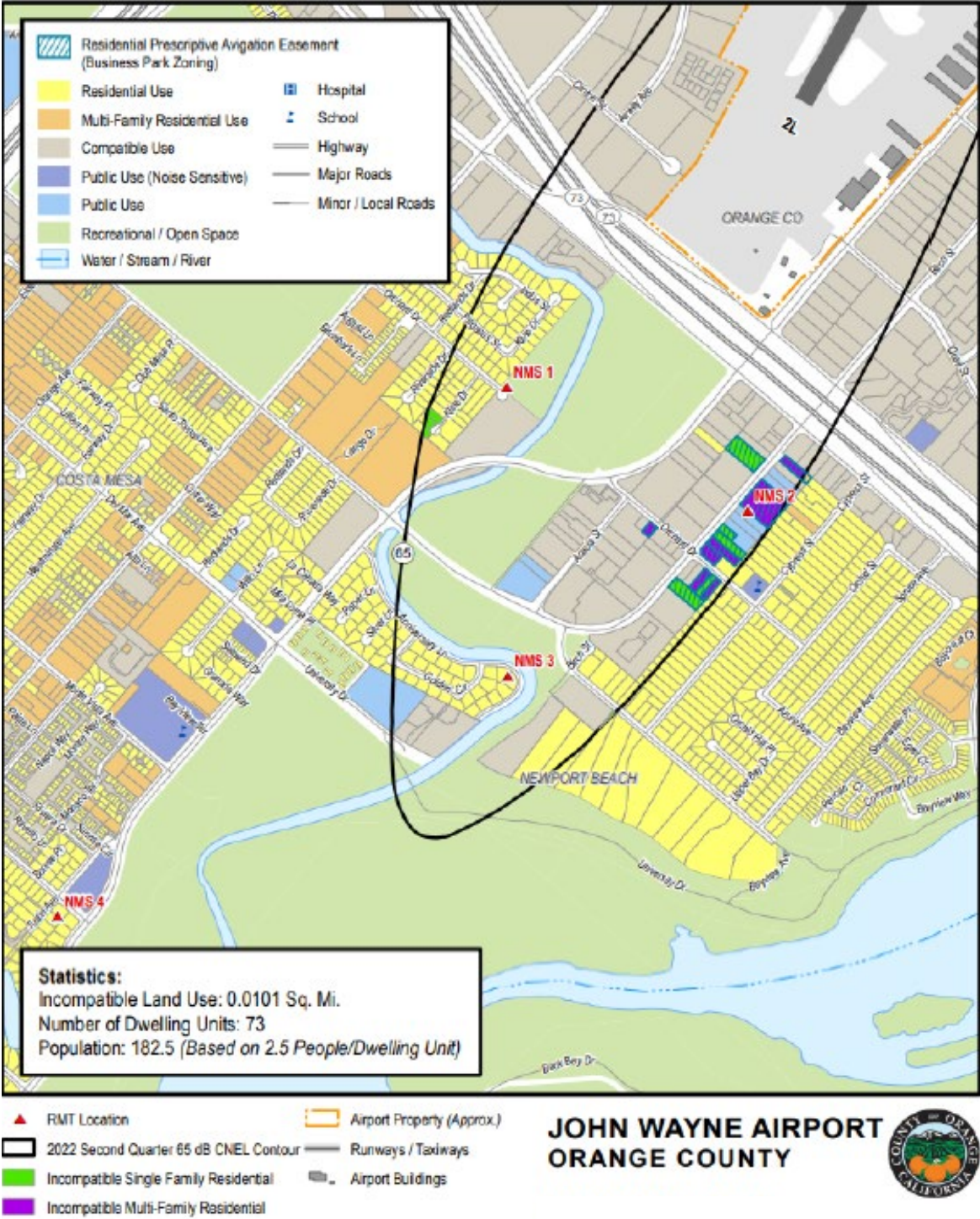
SOURCE: SNA, 2023

Figure 11
Location of SNA Permanent Noise Monitors



SOURCE: SNA, 2023

Figure 12
SNA – 2019 Annual – CNEL Noise Contours



SOURCE: SNA, 2022

Figure 13
SNA – 2nd Quarter 2022 – 65 CNEL Contour

5.0 Los Angeles International Airport

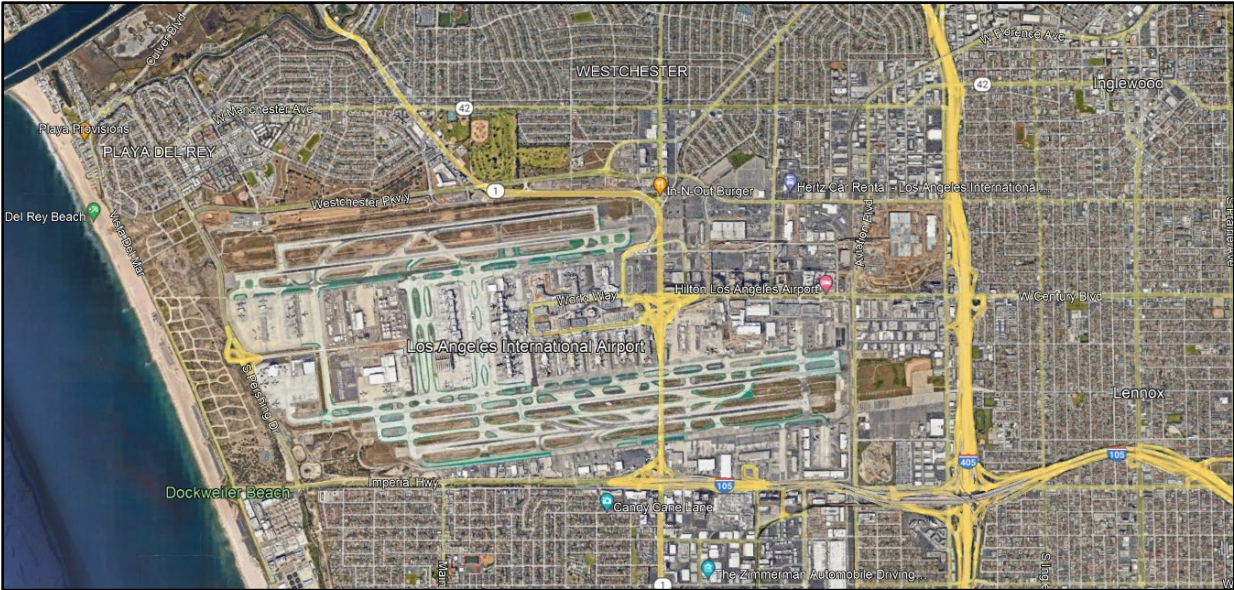
5.1 Airport Location and Physical Description

Los Angeles International Airport (LAX) is located in the Westchester neighborhood of Los Angeles, approximately twelve miles southwest of downtown Los Angeles. Other nearby cities include El Segundo, located one and one-half miles to the south, Hawthorne, located four miles to the southeast, and Inglewood, located three- and one-half miles to the northeast. The airport is located near several major roadways. The Interstate 105 Freeway runs directly to the south of the airport, while the Interstate 405 Freeway runs directly to the east. State Highway 1 runs from north to south directly underneath the airfield and is known in this location as the “Airport Tunnel” or “Sepulveda Boulevard Tunnel”. Land uses surrounding the airport consist of a mix of residential and commercial, with the Pacific Ocean and undeveloped natural land directly bordering the airport to the west. Densely populated residential neighborhoods are located directly to the south of the airport in El Segundo, directly east of the airport in Inglewood, and directly north of the airport in the Westchester Neighborhood of Los Angeles. The location of LAX and the surrounding area is shown in **Figure 14**.

LAX is categorized by the FAA as a large hub primary commercial service facility. The airfield consists of two sets of parallel runways with large passenger terminals located in the center of the airfield between the runways. Remote international gates are located on the western end of the airfield. All runways at LAX run in an east to west direction. Runways 6L/24R and 6R/24L are located on the north side of the airfield and are 8,926 feet long by 150 feet wide and 10,885 feet long by 150 feet wide, respectively. Runways 7L/25R and 7R/25L are located on the south side of the airfield and are 12,923 feet long by 150 feet wide and 11,095 feet long by 150 feet wide, respectively. All runways are available for use by commercial jet traffic. Traffic at LAX generally departs to the west over the Pacific Ocean and arrives from the east over residential areas. Occasionally, onshore winds will necessitate easterly departures over residential neighborhoods. The FAA LAX airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 15**.

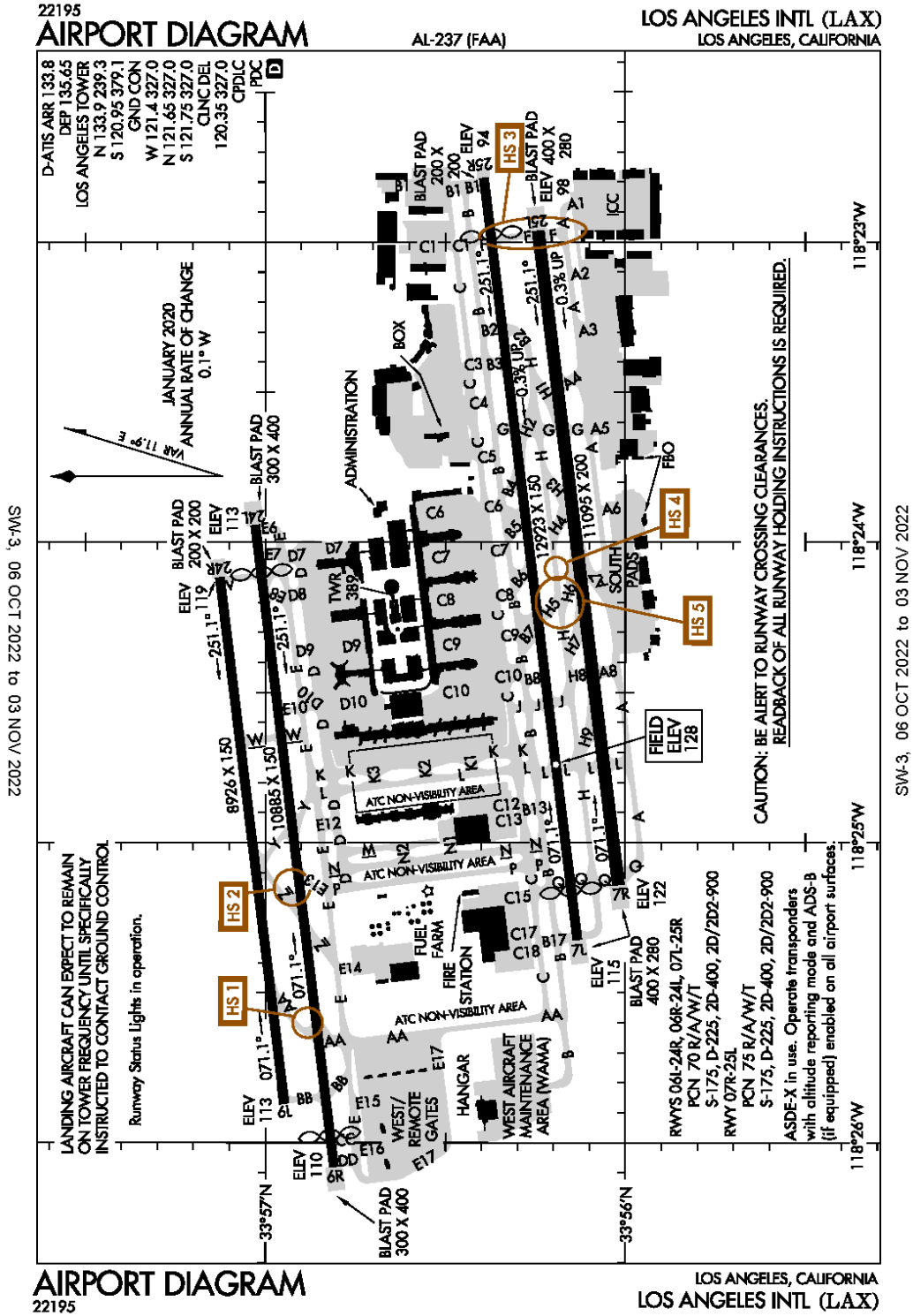
To accommodate current and forecasted passenger traffic to and from the airport, LAX is undergoing a major renovation known as the Landside Access Modernization Program (LAMP). The LAMP will include an elevated Automated People Mover (APM); two Intermodal Transportation Facilities (ITF) with parking areas allowing for drop-offs and pickups from personal vehicles, buses, shuttles, taxis and ride-sharing services; a Consolidated Rental Car Facility (CONRAC), which will consolidate the rental car agencies near the airport at one location; and a comprehensive series of roadway improvements to alleviate traffic congestion in and around airport facilities.²⁴

²⁴ SCAG. Connect SoCal 2024 Aviation and Ground Access Technical Report, August 2023.



SOURCE: Google, 2023

Figure 14
Location of LAX



SOURCE: FAA and Airmav.com, 2022

Figure 15
LAX Airport Diagram

5.2 Aircraft and Cargo Operations

Aircraft operations at LAX consist primarily of commercial air carrier operations with some air taxi and general aviation operations. A very small number of military operations occur annually at LAX. The total number of 2019 aircraft operations for all operational categories was 691,257.²⁵ The number of aircraft operations by operational category is broken out in **Table 4**. The airport accommodated 88.1 MAP in 2019 and is forecast to accommodate 130.4 MAP in 2050. Approximately 2,313,247 tons of cargo passed through LAX in 2019.

TABLE 4
LAX AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
634,515	38,505	17,853	384	691,257

SOURCE: FAA OPSNET, 2023

As LAX is a primary commercial service airport that serves many international and domestic markets, a wide variety of aircraft types operate at the airport. The most commonly operated aircraft types are narrowbody jets like the Embraer 175, Boeing 737 family, and Airbus A320 family which are primarily used by airlines on domestic routes. Larger widebody aircraft like the Boeing 767, 777, 787 and Airbus A330 comprise a significant share of the fleet mix, primarily being used for international service. The overall fleet mix has remained consistent over the past several years. As seen at many airports served by Boeing 737 and Airbus A320 aircraft, some operations have shifted to the quieter MAX and NEO variants, though older models of those aircraft remain the primary variants used at LAX. Recently, LAX has seen an increase in the usage of the Airbus A350, a newer and quieter large widebody aircraft used on international routes, and the Airbus A220, a newer and quieter narrowbody aircraft used on domestic routes. LAX has also seen the retirement of the McDonnell Douglas MD-80 aircraft family, which are no longer used by any mainline carriers.

5.3 Airport Noise

As discussed in Section 5.1, LAX is located near several densely populated residential areas. In particular, many Inglewood neighborhoods directly east of the airport are affected by arrival noise as aircraft typically approach LAX from the east. As such, Los Angeles World Airports (LAWA), the operator for LAX, has implemented a comprehensive noise abatement program that combines operational measures and community outreach efforts.²⁶ The airport has several operational noise abatement measures that help to reduce the impact of aircraft noise in surrounding communities.

LAWA has also implemented a Fly Quieter Program which scores operators based on compliance with these noise abatement measures. These scores are published in an annual report.²⁷ LAWA operates and maintains a NOMS with a total of 26 permanent noise monitors located within

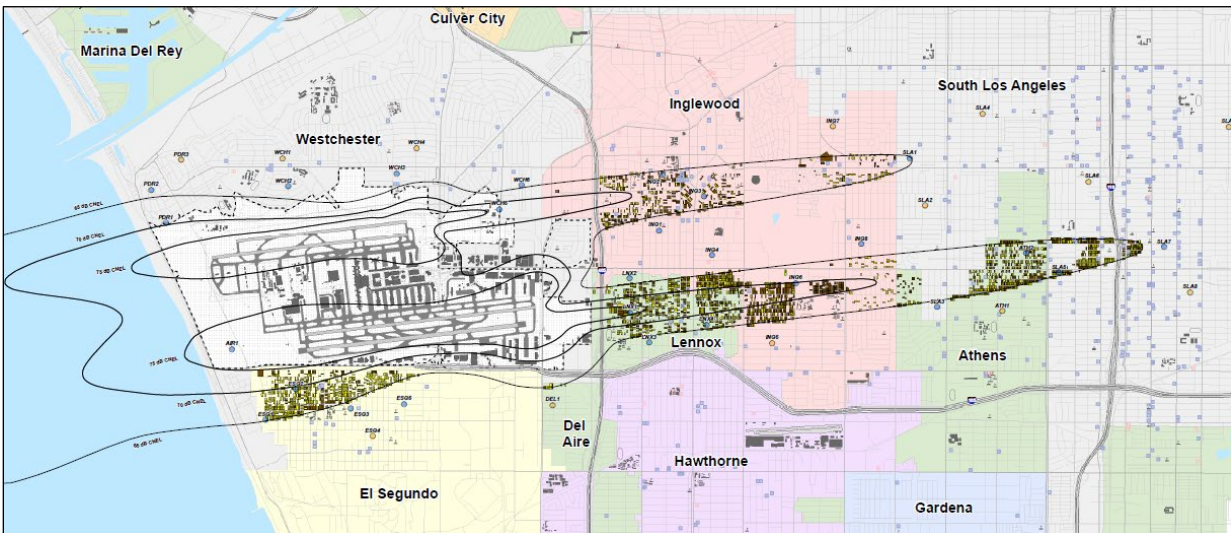
²⁵ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

²⁶ lax-noise-brochure.ashx (lawa.org), accessed November 28, 2022.

²⁷ LAWA Official Site | LAX Fly Quieter Program, accessed October 10, 2022.

communities surrounding the airport. This system includes online flight tracking and real time noise monitoring data. LAWA participates in a community roundtable made up of representatives from neighborhoods surrounding the airport in an effort to provide outreach to these communities and collaborate with community leaders on noise issues at the airport.²⁸ In addition to operational noise abatement measures and community outreach efforts, LAWA has managed a residential sound insulation program since the 1990s and has provided sound insulation treatments to over 10,000 homes in Los Angeles, El Segundo, and Inglewood.²⁹

As required by Title 21, the airport produces a quarterly noise report which details quarterly noise monitoring data and includes a quarterly CNEL contour. The Title 21 annual 2019 CNEL noise contours are shown in **Figure 16**. The second quarter 2022 65 CNEL noise contour is shown in **Figure 17**. As seen in these figures, the 2019 annual noise contour is larger than the second quarter 2022 contour. Similar to BUR and SNA, this is primarily due to the effect of the COVID-19 pandemic on air carrier operations at LAX. As the number of air carrier operations continue to recover to pre-pandemic levels and beyond, it is anticipated that future noise contours will more closely resemble the 2019 annual contour or grow larger as LAX experiences growth as the area's only major hub airport.



SOURCE: LAWA 2023

Figure 16
2019 Annual – CNEL Noise Contours

28 LAWA Official Site | Noise Management | Community Noise Roundtable, accessed November 28, 2022.

29 LAWA Official Site | Sound Insulation Grant Program, accessed November 28, 2022.



SOURCE: LAWA 2022

Figure 17
2nd Quarter 2022 – CNEL Noise Contours

6.0 Long Beach Airport

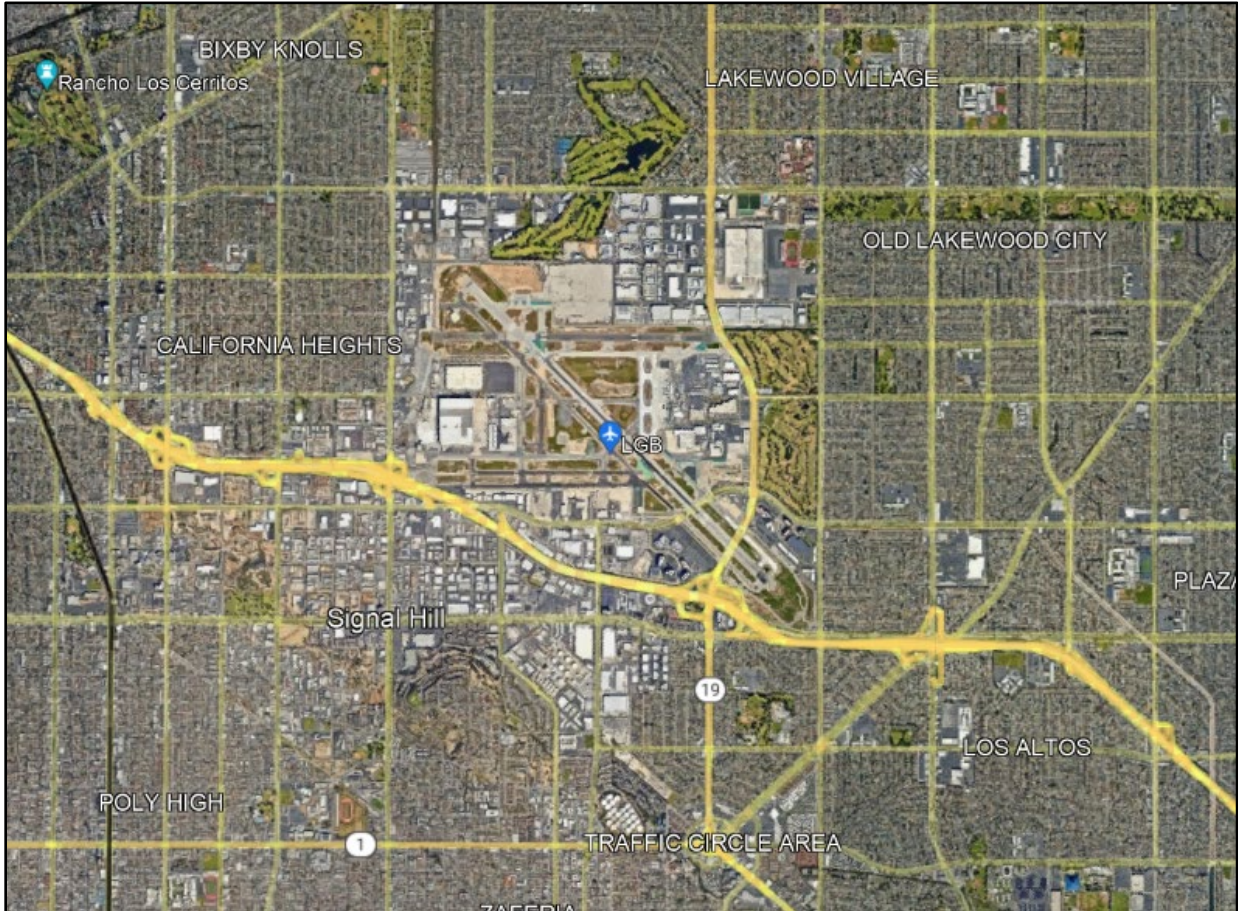
6.1 Airport Location and Physical Description

Long Beach Airport (LGB) is located within the City of Long Beach in Los Angeles County, approximately four miles northeast of the center of Long Beach and four and one-half miles north of the Pacific Ocean. It is two miles northwest of Los Altos, two and one-half miles southwest of Lakewood, five miles south of Paramount, and seven miles southeast of Compton. Major roadways near the airport include the Interstate 405 Freeway, which runs directly to the south, and State Highway 19, which runs directly to the east and underneath the southeast portion of the airfield as a tunnel. Land uses surrounding LGB consist of a mix of commercial and residential. The airport is buffered by commercial areas on all sides, with golf courses extending this buffer directly to the north and east of the airfield. Past these commercial areas lie densely populated residential communities which surround the airport approximately one to one and one-half miles away in any direction. Neighborhoods in nearby Los Altos and the Bixby Knolls section of Long Beach are most affected by aircraft noise at LGB. The location of LGB and the surrounding area is shown in **Figure 18**.

LGB is categorized as a primary commercial service facility. The airfield consists of three runways. Runways 8L/26R and 8R/26L are parallel runways and run in an east to west direction. Runway 8L/26R is 6,192 feet long by 150 feet wide while Runway 8R/26L is 3,918 feet long by 100 feet wide. The longest and most frequently used runway at LGB, Runway 12/30, runs in a southeast to northwest direction and is 10,000 feet long by 200 feet wide. Runways 8L/26R and 12/30 are available for commercial jet operations, while Runway 8R/26L is primarily used for smaller general aviation operations. The passenger terminal is located on the eastern end of the airfield. The FAA

LGB airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 19**.

Ground access to LGB is primarily via automobile and shuttle services, but public transit connections are also available. The closest Metro Rail station to LGB is the Wardlow Station on the A Line (formerly known as Blue Line). The A Line provides rail service between Downtown Los Angeles (7th Street/Metro Center station) and connects with Long Beach Transit Buses at the Transit Mall in downtown Long Beach. Long Beach Transit Bus Routes 102, 104, and 111 provide connections to LGB.³⁰



SOURCE: Google, 2023

Figure 18
Location of LGB

³⁰ Long Beach Airport. 2023. Ground Transportation. <https://www.longbeach.gov/lgb/airlines-destinations/transportation/>, accessed August 30, 2023.

6.2 Aircraft and Cargo Operations

Aircraft operations at LGB consist primarily of commercial air carrier and general aviation operations, with a smaller number of air taxi and military operations annually. The total number of 2019 aircraft operations for all operational categories was 304,357.³¹ The number of aircraft operations by operational category is broken out in **Table 5**. The airport accommodated 3.58 MAP in 2019 and is forecast to accommodate 5.5 MAP in 2050. Approximately 21,120 tons of cargo passed through LGB in 2019.

TABLE 5
LGB AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
33,192	8,103	262,392	670	304,357

SOURCE: FAA OPSNET, 2023

Commercial operations at LGB are primarily served by the Boeing 737 family of aircraft, including a significant usage of the newer, quieter MAX variant. As the primary operator at LGB exclusively uses the 737 family of aircraft, it is anticipated that these aircraft will continue to be the predominant air carrier aircraft operating at LGB in future years. Changes in airlines operating at LGB in recent years have resulted in both a smaller number of annual air carrier operations and a change to the fleet mix. Prior to 2021, the Airbus A320 family of aircraft were the most frequently used air carrier aircraft at LGB, though they now represent a small portion of the commercial fleet mix, along with other narrowbody aircraft such as the Embraer 175 and the Bombardier CRJ-700/900. General aviation and air taxi operations at LGB are operated by a wide variety of piston, turboprop, and small jet aircraft.

6.3 Airport Noise

As discussed in **Section 6.1**, LGB is surrounded by densely populated neighborhoods on all sides of the airfield. As such, the City of Long Beach enacted a strict Airport Noise Compatibility Ordinance in 1995 to minimize noise at the airport.³² The main components of the ordinance are as follows:

- LGB is open 24 hours per day, though air carriers are allowed a minimum of 41 flights per day and commuter carriers are allowed a minimum of 25 flights per day. The maximum number of daily flights is determined by the airport noise budget.
- The airport has established Single Event Noise Exposure Level (SENEL) thresholds for arrivals and departures, per runway and time of day. These levels are the maximum noise levels allowed per operation and are shown in **Table 6**.

³¹ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

³² lgb-noisebrochurelow (longbeach.gov), accessed November 29, 2022.

- The airport utilizes a tiered violation system, which includes a warning letter for first time violators and monetary fines in increasing amounts for subsequent violations.
- The airport only allows air carriers to add flights if it is shown that they would not cause the cumulative annual noise footprint (in terms of CNEL) to increase.
- Maintenance run ups and training operations are limited during early morning hours and on weekends and holidays.
- Runways 8L/26R and 8R/26L are typically closed at night and only used in case of emergency or maintenance closure of Runway 12/30.

TABLE 6
LGB NOISE THRESHOLD LIMITS

Runway	Monitoring Number	7:00 a.m. – 10:00 p.m. SENEL (dBA)	10:00 p.m. – 11:00 p.m. / 6:00 a.m. – 7:00 a.m. SENEL (dBA)	11:00 pm – 6:00 a.m. SENEL (dBA)
	Departure/Arrival	Departure/Arrival	Departure/Arrival	Departure/Arrival
30	9/10	102.5/101.5	90/90	79/79
12	10/9	102.5/101.5	90/90	79/79
25R	6/19	2/88	N/A	N/A
25L	5/2	95/93	N/A	N/A
7R	2/5	95/92	N/A	N/A
7L	1/6	88/92	N/A	N/A

SOURCE: LGB, 2022

In addition to the noise ordinance, the airport also maintains a NOMS, which includes real-time flight tracking and noise monitoring data, as well as a total of 18 permanent noise monitors in communities nearby the airport. The airport also manages a pilot education program to inform aircraft operators and pilots of noise concerns and regulations. LGB does not have any recent (2019 or beyond) noise contours available.

7.0 Ontario International Airport

7.1 Airport Location and Physical Description

Ontario International Airport (ONT) is located in San Bernadino County, approximately two and one-half miles east of downtown Ontario, six miles northeast of downtown Chino, fifteen miles northwest of downtown Riverside, and eighteen miles southwest of downtown San Bernadino. Downtown Los Angeles is 36 miles west of the airport. Major roadways nearby the airport include the Interstate 10 Freeway, which runs directly north of the airfield, the Interstate 15 Freeway, which runs three miles to the east, State Highway 60, which runs two miles to the south, and State Highway 83, which runs three miles to the west. ONT is buffered by commercial land uses on most sides of the airfield with the exception of the northwest corner where residential neighborhoods lie within one mile of the airport. Densely populated residential neighborhoods lie approximately three miles to the west of the airport, while areas to the south and east of the airport are primarily

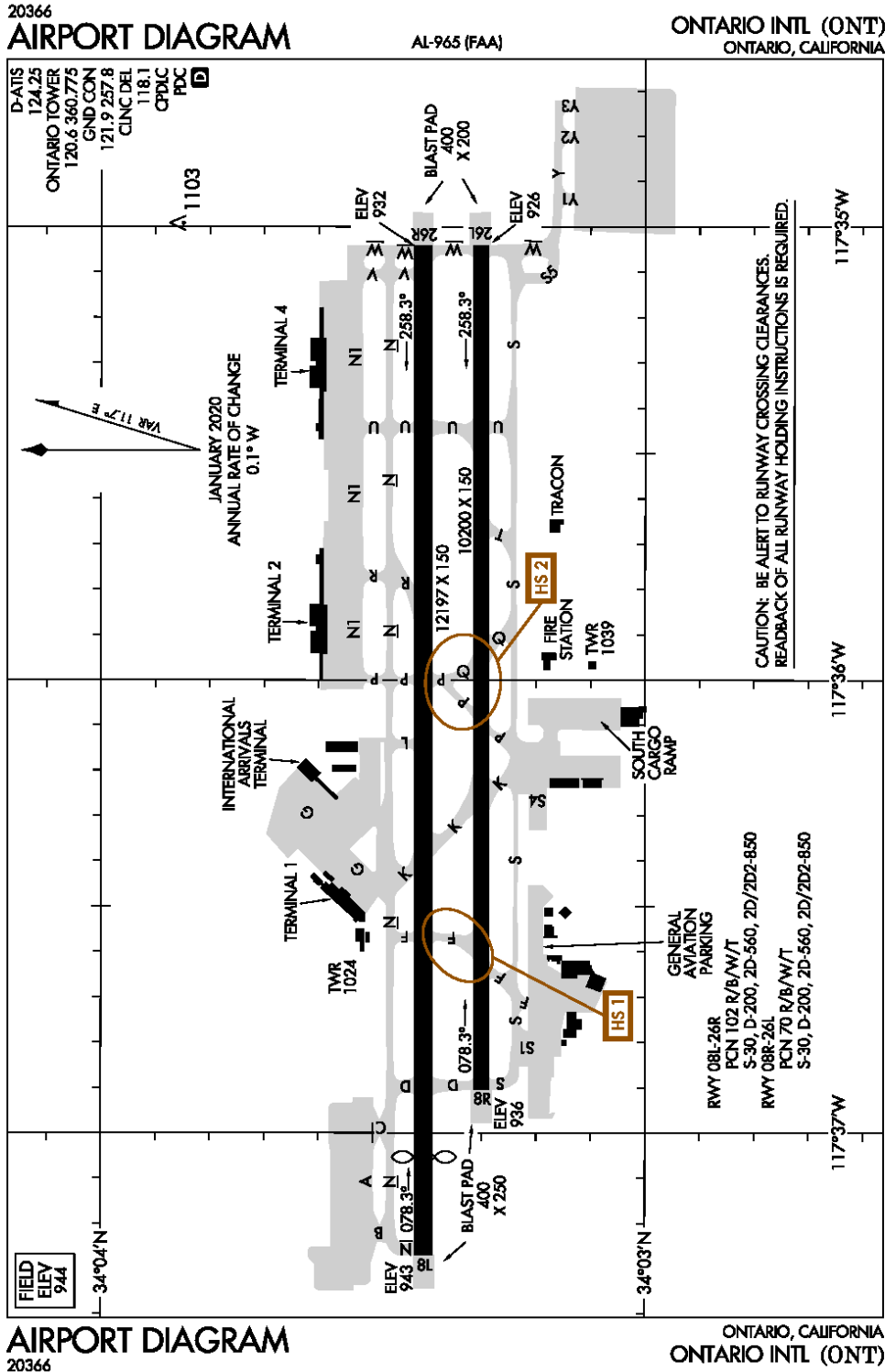
commercial. Most residential noise issues at ONT are related to neighborhoods west and northwest of the airport as these neighborhoods lie underneath arrival and departure flight paths. The location of ONT and the surrounding area are shown in **Figure 20**.

ONT is categorized as a primary commercial service facility. The airfield consists of two parallel runways oriented in an east to west direction with passenger terminals located along the northern portion of the airfield and cargo ramps located on the southern end of the airfield. Runway 8L/26R is 12,197 feet long by 150 feet wide while Runway 8R/26L is 10,200 feet long by 150 feet wide. Both runways are used by commercial air carrier and cargo operators as well as general aviation aircraft. The FAA ONT airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 21**.



SOURCE: Google, 2023

Figure 20
Location of ONT



SW-3, 06 OCT 2022 to 03 NOV 2022

SW-3, 06 OCT 2022 to 03 NOV 2022

SOURCE: FAA and Airmav.com, 2022

Figure 21
ONT Airport Diagram

7.2 Aircraft and Cargo Operations

Aircraft operations at ONT consist primarily of commercial air carrier, air taxi, and general aviation operations, with a small number of military operations annually. As ONT is a cargo hub, many commercial air carrier operations at ONT are cargo. The total number of 2019 aircraft operations for all operational categories was 101,135.³³ The number of aircraft operations by operational category is broken out in **Table 7**. The airport accommodated 5.58 MAP in 2019 and is forecast to accommodate 14.5 MAP in 2050. Approximately 770,289 tons of cargo passed through ONT in 2019.

TABLE 7
ONT AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
73,372	13,721	13,735	307	101,135

SOURCE: FAA OPSNET, 2023

Commercial passenger operations at ONT are primarily served by the Boeing 737 family, Airbus A320 family, and Embraer 175 aircraft. Cargo operations are primarily served by larger, noisier Boeing 767, 757, McDonnell Douglas MD11, and Airbus A300 aircraft. Commercial air carrier operations are nearly evenly split between passenger and cargo flights. Air taxi and general aviation operations are served by a wide variety of piston, turboprop, and small jet aircraft. The overall fleet mix at ONT has remained consistent over the past several years and looks to remain that way in the future. As seen at other airports with significant numbers of Boeing 737 and Airbus A320 operations, there is an increasing number of MAX and NEO variants in the fleet mix, but the current fleet mix remains dominated by older models of those aircraft. It is expected that the fleet will trend toward more usage of newer, quieter aircraft such as the Boeing 737 MAX and Airbus A320 NEO families in the future.

Currently, ONT, the San Bernardino County Transportation Authority and Omnitrans, the public transit agency serving the San Bernardino Valley, are collaborating to develop a transit tunnel that will connect the Metrolink commuter rail system to ONT.³⁴ Operated and maintained by Omnitrans, the Tunnel to Ontario Airport Project will feature a bi-directional system where passengers traveling to and from ONT will be transported in autonomous, zero-emission vehicles on an “on-demand” basis between the Cucamonga Metrolink Station and ONT terminals.

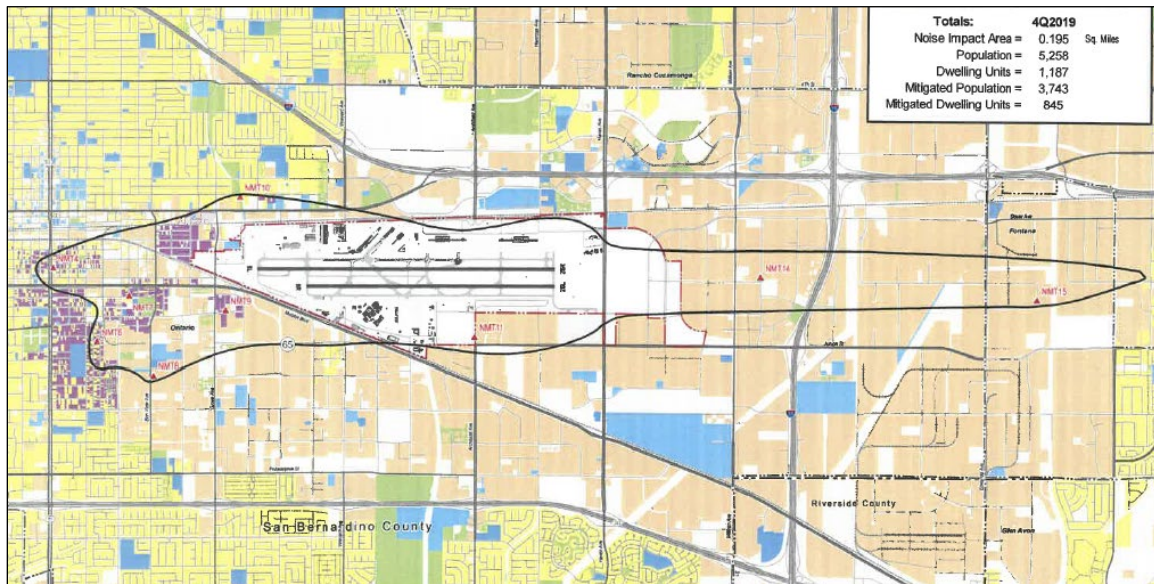
7.3 Airport Noise

As the majority of land use surrounding the airport is commercial, and the loudest segments of flights occur over commercial areas, ONT does not have as significant a noise issue as many other Southern California airports and therefore does not require an extensive noise abatement program. The airport has established some procedures to lessen noise at night, primarily instituting contra-

³³ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

³⁴ SCAG. Connect SoCal 2024 Aviation and Ground Access Technical Report, August 2023.

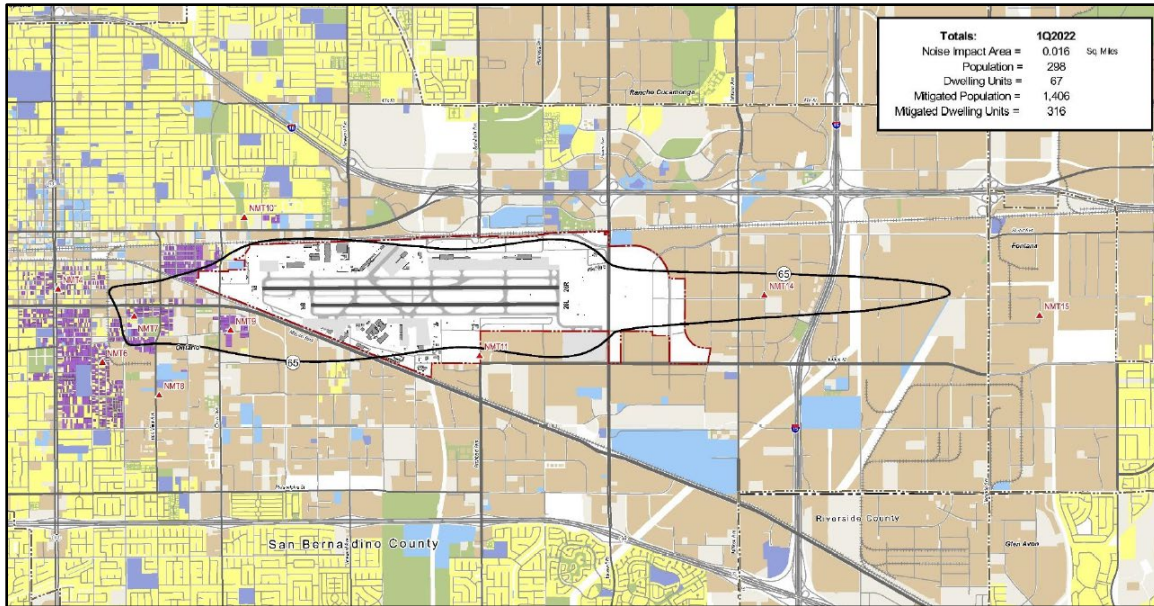
flow operations to allow aircraft to land to the west and depart to the east when weather conditions permit, as well as restricting maintenance run ups during the hours of 10 p.m. to 7 a.m.³⁵ Like many other Southern California airports, ONT maintains a NOMS, including real-time flight tracking, and has a total of nine active permanent noise monitors placed in locations near the airport. The airport also publishes a quarterly noise report and CNEL 65 noise contour. The Title 21 annual 2019 CNEL noise contours are shown in **Figure 22**. The first quarter 2022 65 CNEL noise contour is shown in **Figure 23**. As seen in these figures, the 2019 annual noise contour is larger than the second quarter 2022 contour. Similar to other area airports, this is primarily due to the effect of the COVID-19 pandemic on air carrier operations at ONT. As the number of air carrier operations continue to recover to pre-pandemic levels, it is anticipated that future noise contours will more closely resemble the 2019 annual contour.



SOURCE: ONT, 2023

Figure 22
ONT – 2019 Annual – 65 CNEL Contour

³⁵ Noise Management FAQs | Ontario International Airport (flyontario.com), accessed December 1, 2022.



SOURCE: ONT, 2022

Figure 23
ONT – 1st Quarter 2022 – 65 CNEL Contour

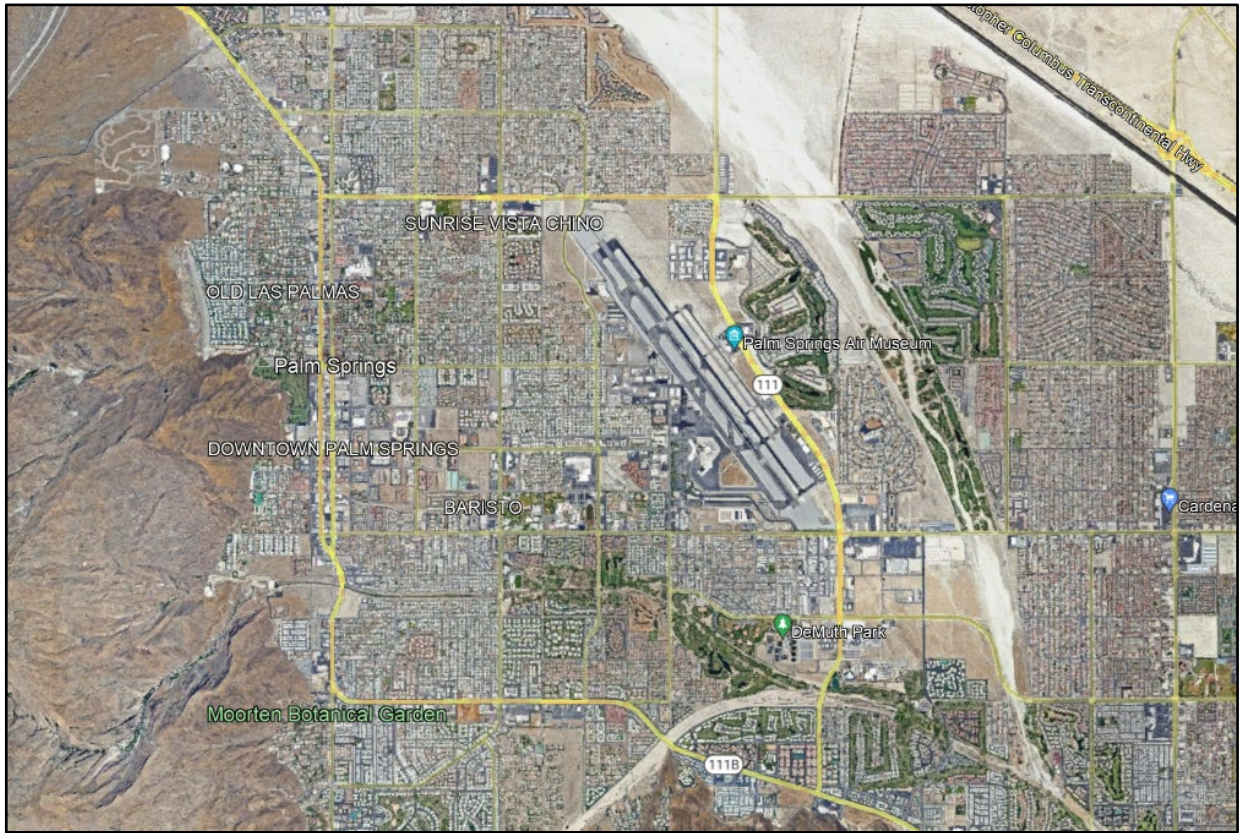
8.0 Palm Springs International Airport

8.1 Airport Location and Physical Description

Palm Springs International Airport (PSP) is located within Palm Springs in Riverside County. Downtown Palm Springs is located approximately two miles west of the airport. Major roadways near the airport include the Interstate 10 Freeway, which runs four miles to the north and east, State Highway 111, which runs directly to the north and east, and State Highway 111B, which runs two miles to the west and south. Land uses surrounding the airport consist primarily of a mix of residential, commercial, recreational, and uninhabited natural land. There are residential neighborhoods directly to the northwest, west, south, and east of the airfield, while residential areas to the northeast and southeast are buffered by golf courses and commercial land uses, respectively. Uninhabited desert and mountainous areas are located within three miles on each side of the airport. PSP and the surrounding area are shown in **Figure 24**.

PSP is categorized by the FAA as a primary commercial service facility. The airfield consists of two parallel runways, running northwest to southeast, and a passenger terminal on the southwest side. Runway 13R/31L is 10,000 feet long by 10,000 feet wide and is the primary runway used by commercial jet aircraft. Runway 13L/31R is 4,952 feet long by 75 feet wide and is used primarily by general aviation air traffic. The FAA PSP airport diagram, which maps airfield layout components such as runways, taxiways, and terminal areas, is shown in **Figure 25**.

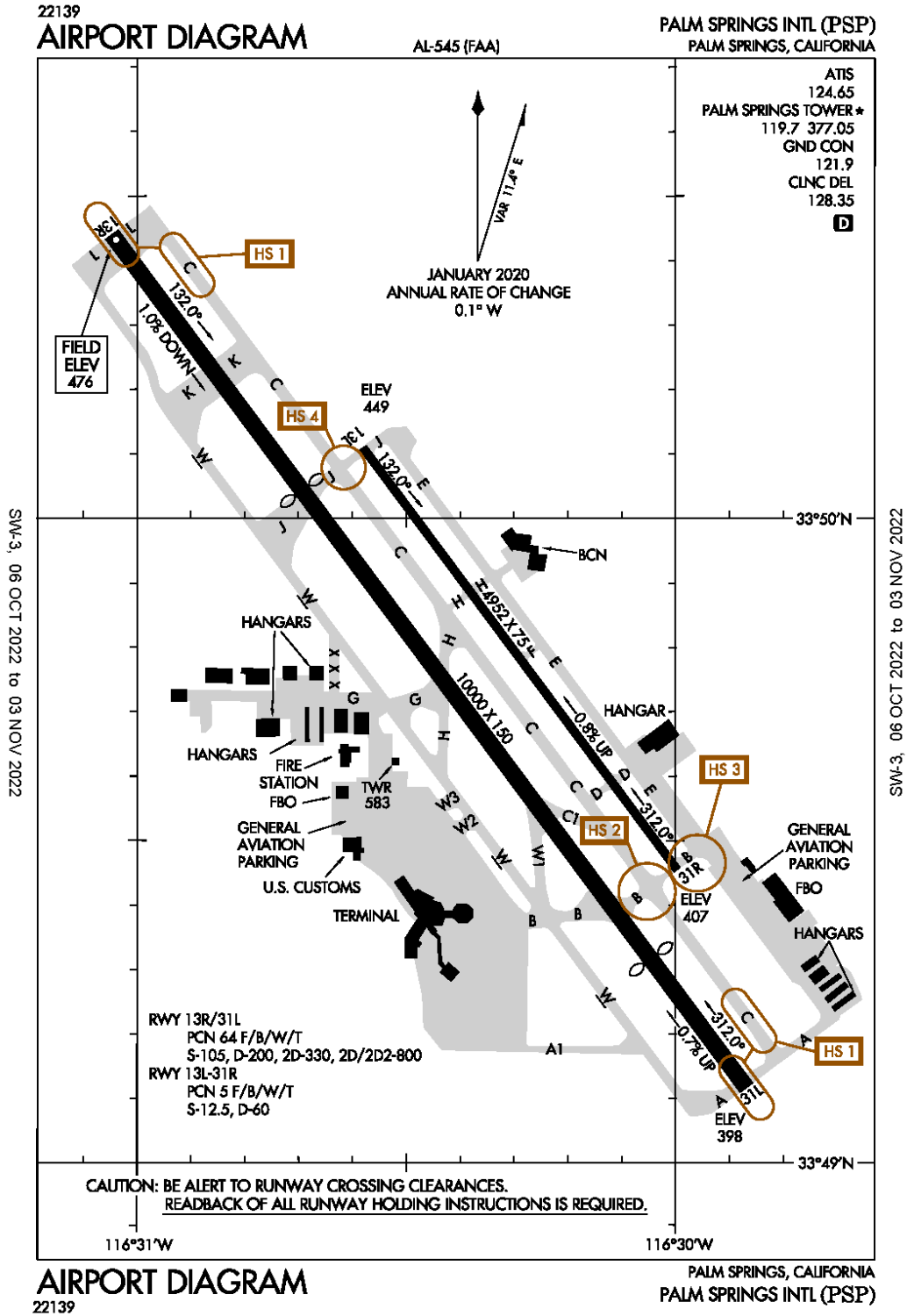
Ground access for PSP is generally limited to automobiles and shuttle services associated with rental car businesses and casinos in the area. There are currently no local public transit connections to PSP, though Amtrak Thruway Bus service is provided to the airport.³⁶



SOURCE: Google, 2023

Figure 24
Location of PSP

³⁶ Amtrak. 2023. Destinations: Palm Springs, California – Palm Springs Airport. <https://www.amtrak.com/stations/psp>, accessed August 30, 2023.



SOURCE: FAA and Airmav.com, 2022

Figure 25
PSP Airport Diagram

8.2 Aircraft and Cargo Operations

Aircraft operations at PSP consist primarily of commercial air carrier, air taxi, and general aviation operations, with a small number of military operations annually. The total number of 2019 aircraft operations for all operational categories was 58,706.³⁷ The number of aircraft operations by operational category is broken out in **Table 8**. The airport accommodated 2.56 MAP in 2019 and is forecast to accommodate 5.7 MAP in 2050. Approximately 217 tons of cargo passed through PSP in 2019.³⁸

TABLE 8
PSP AIRCRAFT OPERATIONS
2019 AIRCRAFT OPERATIONS BY OPERATIONAL CATEGORY

Air Carrier	Air Taxi	General Aviation	Military	Total Operations
24,120	11,605	21,802	1,179	58,706

SOURCE: FAA OPSNET, 2023

Commercial passenger operations at PSP are primarily served by smaller regional jets like the Embraer 175 and Bombardier CRJ-200/700/900, as well as the Boeing 737 and Airbus A320 families. General aviation and air taxi operations are served by a wide variety of piston, turboprop, and small jet aircraft. The overall fleet mix at PSP has remained similar over the last several years and should continue to remain similar in the future. As seen at other airports where the Boeing 737 and Airbus A320 families operate, some operations are moving to the quieter MAX and NEO variants of those aircraft, however older types are still most frequently used. It is expected that the fleet will trend toward newer, quieter aircraft such as the Boeing 737 MAX and Airbus A320 NEO families in the future.

8.3 Airport Noise

As PSP is relatively a small commercial airport and has only a few noise-sensitive areas underneath the loudest portions of the flight path, the airport does not maintain a robust noise abatement and mitigation program like many other Southern California airports. PSP maintains a noise section on their website with information for airport operators and the public, as well as a link to submit noise complaints to the airport.³⁹ The airport does not have a NOMS and has no published noise abatement procedures. PSP does not have any recent (2019 or beyond) noise contours available.

9.0 Conclusion

9.1 Passenger and Aircraft Operational Growth Forecast

As noted above, SCAG is a Joint Powers Authority collection of governments from six Southern California counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura)

³⁷ The Operations Network (OPSNET) (faa.gov), accessed October 10, 2022.

³⁸ OST_R | BTS | Transtats, accessed October 21, 2022.

³⁹ Noise - Palm Springs International Airport (PSP) (palmsspringsairport.com), accessed December 2, 2022

whose role includes preparation of regional transportation and community sustainability plans for their region of Southern California. As SCAG has no regulatory authority, their primary interest in current and forecasted airport activity is how airports integrate with other regional modes of surface transportation. One critical aspect of SCAG's role in aviation systems and transportation planning is the Aviation Element of the Connect SoCal 2024.

The Connect SoCal 2024 Aviation and Airport Ground Access Technical Report references a comprehensive review of various forecasts for aviation growth in the SCAG region, including the FAA Terminal Area Forecast (TAF), FAA Aerospace Forecast, and passenger and cargo forecasts provided to SCAG by the airports. This review concluded with the following forecasts for all eight commercial airports, and four reliever airports with the potential for future commercial service, in the SCAG region:

- Regional air passenger transportation is anticipated to grow by an average of 1.93% annually; from 116.53 MAP in 2019 to 182.44 MAP in 2050, according to the passenger forecasts provided to SCAG by the airports.
- Regional domestic and international cargo handled annually is expected to grow by 3.2% per year, from 3,527,681 total tons in 2019 to a forecast of 11,408,346 tons in 2050, according to the cargo forecasts provided to SCAG by the airports.
- Regional aircraft operations are anticipated to grow by an average of 0.47% annually, from 3.79 million operations in 2019 to 4.76 million operations in 2050, according to the FAA TAF.

As noted in the regional air passenger transportation forecast, commercial air passenger traffic is expected to grow by approximately 66 MAP by the year 2050 when compared to 2019. However, as noted in the Connect SoCal 2024 Aviation and Airport Ground Access Technical Report, the number of aircraft operations has not grown at the same rate as the number of air travel passengers through 2022. This trend is expected to continue as airlines retire portions of their regional fleet and operate larger mainline aircraft at a higher load factor. By operating larger aircraft at higher load factors, the total number of operations necessary to meet the rising demand for air travel will not need to grow at the same rate as total passengers.

As stated in the Connect SoCal 2024 Aviation and Airport Ground Access Technical Report, air passenger activity in the region has recovered from the low levels seen during the COVID-19 pandemic. As noted in the introduction, unlike passenger operations, the number of cargo operations at the region's airports increased during the pandemic and are forecast to continue increasing at a 3.2 percent annual rate from 2019 to 2050, outpacing the forecast 1.93 percent increase of commercial air passenger operations.

9.2 Effect of Growth in Airport Operations on Regional Aviation Noise

The two main factors that determine the total amount of aviation-related noise that airports and their surrounding environments experience are the number of aircraft operations and the type of aircraft that use the airport, or fleet. Should the aircraft fleet mix remain constant, the total number of aircraft operations would be the only factor to drive changes in cumulative aviation-related noise. As noise combines logarithmically, a doubling in the amount of noise sources, such as aircraft

operations, results in a 3-dB increase in the total amount of noise. The formula for determining the cumulative increase in aviation-related noise due to an increase in aircraft operations, should all other factors remain constant, is:

$$\Delta dB = 10 \times \text{Log} \left(\frac{AO_F}{AO_B} \right)$$

AO_F = Number of forecast aircraft operations

AO_B = Number of baseline aircraft operations

Assuming an increase in region-wide aircraft operations from 3.79 million in 2019 to 4.76 million in 2050, and assuming a constant fleet mix⁴⁰, it is expected that cumulative aviation-related noise within the region would increase by approximately 1.0 dB by 2050. However, this average increase in aircraft operations is not the same expected increase at all airports, as different airports will experience different changes and noise exposure may increase or decrease independently at each airport. Additionally, as noted above, it is very unlikely that the fleet utilizing the region's airports will remain constant through 2050.

There are currently two major airline industry trends that will affect the future fleet operated at the region's airports. The first is the phase out of some regional jet aircraft in favor of larger mainline narrowbody aircraft flying shorter routes at a higher load factor. The second is the transition from older, louder narrowbody aircraft such as the Boeing 737-700/800 family and Airbus A320 CEO family to quieter, more fuel-efficient aircraft like the Boeing 737 MAX family and the Airbus A320 NEO family. These aircraft are generally Stage 4 certified, quieter than their predecessors that are primarily certified as Stage 3. Stage 5 is the current FAA requirement for new jet and large turboprop aircraft, taking effect December 31, 2020⁴¹. Therefore, newly developed commercial aircraft entering service in future years will be generally quieter than aircraft currently in service today.

While passenger demand and the total number of aircraft operations are forecast to increase through 2050 when compared to today, the overall expected increase in aviation-related noise will be somewhat offset by a quieter fleet. The amount of offset is dependent on several unknown factors, such as the rate at which operators retire older, noisier aircraft, and emerging aircraft and engine technology.

It is anticipated that over the Connect SoCal 2024 planning horizon noise caused by individual aircraft operations will decrease due to the introduction of newer, quieter aircraft. However, future trends regarding region-wide cumulative aviation-related noise are less clear, due to the conflicting forces of increased aircraft operations but an overall quieter fleet. The cumulative increase in aviation-related noise will likely be airport-specific and not uniform across the region. For example, it is likely that cumulative noise will increase at LAX and ONT even with a quieter fleet, due to large forecasted increases in passenger and cargo demand through 2050. Smaller airports such as BUR and SNA may not see much future cumulative noise increase due to a much smaller forecast in increased passenger (and cargo) demand and a quieter fleet.

⁴⁰ A constant fleet mix is conservatively used as a basis for comparison for this analysis as it is not feasible to forecast the horizon year fleet mix at this time.

⁴¹ Aircraft Noise Levels & Stages | Federal Aviation Administration (faa.gov), accessed June 22, 2023.

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