SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Aircraft Emissions Inventory Report

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TABLE OF CONTENTS

1. Introduction

In anticipation of the development of an Air Quality Management Plan (AQMP) to address 2024 annual PM2.5 National Ambient Air Quality Standard (NAAQS), the aircraft emissions inventory was evaluated and updated for the 2023 base year and 2032, 2036, and 2041 forecast years based on the latest available activity data and calculation methodologies. The updated inventory covers aircraft emissions from all commercial, general aviation, and military airports within the South Coast Air Quality Management District. Helicopter emissions are not included in this inventory since they are covered in CARB's emissions inventory. The aircraft emissions inventory is presented herein for each airport by pollutant, including VOC, CO, NOx, SO2, PM10, and PM2.5.

2. Emissions Inventory Methodology

The overall methodology for estimating aircraft emissions involved: 1) identification of airports operating in the region, 2) collection of aircraft activity data from airports, FlightAware and FAA's databases for the base year and future milestone years and 3) application of FAA's Aviation Environmental Design Tool (AEDT).

The latest AEDT version 3g was used in this inventory study which reflects a number of updates and improvements to the previous versions.[1] The AEDT generates the most accurate aircraft emissions for an airport based on the number of aircraft operations by specific airframe and engine models (and corresponding emission factors), stage length, taxi times, auxiliary power units (APU) usage, airport runways, and airport-specific mixing height. Detailed aircraft operations by aircraft and engine models were provided by most commercial airports. For other commercial airports and all general aviation airports, the aircraft activity and fleet mix data from FlightAware[2] was used in conjunction with FAA's Air Traffic Activity Data System (ATADS)[3] and Terminal Area Forecast (TAF)[4]. Military airports provided their own aircraft operations and emissions data.

The stage length is a parameter in AEDT that represents the flight distance from takeoff to landing and is a proxy for the aircraft weight. The weight associated with the stage

[1] AEDT Version 3g; https://aedt.faa.gov/3g_information.aspx
[2] FlightAware is a digital aviation company with flight tracking capabilities which uses data from air traffic control systems and data link sources.
[3] Federal Aviation Administration, Air Traffic Activity Data System (ATADS)
[4] Federal Aviation Administration, Terminal Area Forecast (TAF)

length is based on the assumed amount of fuel needed for the flight distance which affects the aircraft emissions. The commercial airports provided the average stage length for each airframe/engine combination. For GA airports, the stage length was assumed to be 1 for all operations unless specific information was provided by the airport. Table 1 summarizes the stage lengths available in AEDT.

Table 1. Stage Lengths and Corresponding Trip Lengths in AEDT

Stage Number	Trip Length (nm)
1	0-500
2	500-1,000
3	1,000-1,500
4	1,500-2,500
5	2,500-3,500
6	3,500-4,500
7	4,500-5,500
8	5,500-6,500
9	6,500-11,000
M	Maximum range/takeoff weight

Taxi times (taxi time before aircraft take-off and taxi time after aircraft landing) for the base and future years were provided by the commercial airports reflecting the anticipated increased aircraft operations and congestion in the future years. For other airports, AEDT's default taxi times were used. The APU operating time was assumed to be 21 minutes for arrivals and 21 minutes plus taxi-out time for departures based on CARB's latest aircraft emissions inventory[5] which incorporated the findings from recent studies. AEDT assigns a default APU model (with specific emissions characteristics) to each airframe/engine combination. A list of aircraft with corresponding APU models in the AEDT database is provided in CARB's aircraft emissions inventory documents[6]. The APU default models in AEDT were utilized for this inventory.

For this inventory update, South Coast AQMD staff conducted a new study[7] evaluating various datasets and methodologies to determine the mixing height for each airport considering temperature, wind speed, and other meteorological factors. The mixing height is defined as the maximum altitude of the mixed layer, a region of the lower troposphere where vigorous dispersion of pollutants occurs. For state implementation plans' emissions inventory, only aircraft emissions occurring within the mixing height

[5] California Aircraft Emissions Inventory (CAI2024) Technical Documentation, December 2024
[6] CAI024 Appendices; Appendix E – Aircraft with Corresponding APU, December 2024
[7] Planetary Boundary Layer Height for Aircraft Emissions Inventory, June 2025

are considered per U.S. EPA's guidance. However, emissions above the mixing height are still accounted for in air quality modeling, since pollutants emitted above the mixing height still affect ground level air quality, although less than those emitted within the mixing height.

Aircraft operational modes that occur below the mixing height include startup, taxi-out, takeoff, climb below mixing height, descend below mixing height, and taxi-in. Table 2 provides the taxi times and mixing height for the commercial airports.

Table 2. Taxi Times and Mixing Heights for Commercial Airports

Airport	Taxi time (min)		Mixing height (feet)
	In	Out	
LAX (2023)	10.16	17.37	1,893
LAX (2032)	14.73	22.57	1,893
LAX (2036)	15.21	23.30	1,893
LAX (2041)	15.39	23.56	1,893
LGB (2023)	3.64	11.93	2,428
LGB (2032)	3.98	13.05	2,428
LGB (2036)	4.09	13.42	2,428
LGB (2041)	4.29	14.07	2,428
BUR (2023)	3.15	13.23	2,978
BUR (2032)	4.61	19.40	2,978
BUR (2036)	4.90	20.58	2,978
BUR (2041)	5.31	22.27	2,978
SNA (2023)	5.79	9.63	2,146
SNA (2032)	7.69	12.79	2,146
SNA (2036)	7.93	13.19	2,146
SNA (2041)	8.42	14.00	2,146
ONT (2023)	5.98	13.07	3,414
ONT (2032)	5.76	14.02	3,414
ONT (2036)	5.87	14.38	3,414
ONT (2041)	6.01	14.85	3,414
PSP (All Years)	4.42	10.8	4,438
SBD (All Years)	6.1	12.3	4,149

Staff reviewed the aircraft operations and emissions data provided by the commercial airports and provided comments and recommended improvements where applicable. The operation data and emissions included in this report mostly reflect the recommended improvements. For commercial airports that provided aircraft operations data as well as airport taxi time and stage length, staff generated the estimated emissions for the airports' review.

2.1. List of Airports

The list of 41 airports identified in the previous aircraft inventory study[8] was used as the basis for this inventory update. The list includes 7 commercial airports including Los Angeles International, Burbank, Long Beach, John Wayne, Ontario International, Palm Springs, and San Bernardino International airports. The 3 military airports include March Air Force Reserve Base, Los Alamitos Joint Forces Training Base, and San Clemente Island Naval Air Station. The 41 airports are listed in Table 3 including 31 general aviation airports.

[8] South Coast Air Quality Management District, 2022 AQMP Aircraft Emissions Inventory Report, October 2021. Available at: https://www.aqmd.gov/docs/default-source/Agendas/aqmp/2022-aqmp-ag/revised-draft-2022-aqmp-aircraft-emissions-inventory-report.pdf

Table 3. Airports in South Coast Air Quality Management District

FAA ID	Facility Name	County	Owner[9]	Longitude	Latitude
L70	Agua Dulce	Los Angeles	PR/PU	-118.315	34.503
BNG	Banning Municipal	Riverside	PU	-116.851	33.923
UDD	Bermuda Dunes	Riverside	PR/PU	-116.275	33.748
L35	Big Bear City	San Bernardino	PU	-116.854	34.264
BUR	Burbank	Los Angeles	PU	-118.359	34.201
POC	Brackett Field	Los Angeles	PU	-117.782	34.092
CCB	Cable	San Bernardino	PR	-117.688	34.112
AVX	Catalina	Los Angeles	PR/PU	-118.416	33.405
CNO	Chino	San Bernardino	PU	-117.637	33.975
L77	Chiriaco Summit	Riverside	PU	-115.711	33.665
CPM	Compton/Woodley	Los Angeles	PU	-118.244	33.89
AJO	Corona Municipal	Riverside	PU	-117.602	33.898
63CA	Desert Air Sky Ranch	Riverside	PR	-115.874	33.481
L64	Desert Center	Riverside	PU	-115.323	33.749
EMT	El Monte	Los Angeles	PU	-118.035	34.086
86CL	Ernst Field	Riverside	PR	-116.883	33.597
RIR	Flabob	Riverside	PR	-117.411	33.99
F70	French Valley	Riverside	PU	-117.128	33.576
FUL	Fullerton Municipal	Orange	PU	-117.98	33.872
HMT	Hemet-Ryan	Riverside	PU	-117.023	33.734
HHR	Jack Northrop Field[10]	Los Angeles	PU	-118.335	33.923
TRM	Jacqueline Cochran Regional	Riverside	PU	-116.16	33.627
SNA	John Wayne	Orange	PU	-117.868	33.676
54CL	Lake Riverside Estates	Riverside	PR	-116.797	33.521
LGB	Long Beach	Los Angeles	PU	-118.152	33.818
SLI	Los Alamitos Army Air Base	Orange	MR	-118.052	33.79
LAX	Los Angeles International	Los Angeles	PU	-118.408	33.943
RIV	March Air Force Reserve Base	Riverside	MA	-117.26	33.881
ONT	Ontario International	San Bernardino	PU	-117.601	34.056
PSP	Palm Springs International	Riverside	PU	-116.507	33.83
L65	Perris Valley	Riverside	PR	-117.218	33.761
CL46	Quail Lake Sky Park	Los Angeles	PR	-118.732	34.768
REI	Redlands Municipal	San Bernardino	PU	-117.146	34.085
RAL	Riverside Municipal	Riverside	PU	-117.445	33.952
SBD	San Bernardino International	San Bernardino	PU	-117.235	34.095
NUC	San Clemente Island Naval Air Station	Orange	MN	-118.587	33.023
SMO	Santa Monica Municipal	Los Angeles	PU	-118.451	34.016
CA89	Skylark Field	Riverside	PR	-117.303	33.63
VNY	Van Nuys	Los Angeles	PU	-118.49	34.21
WHP	Whiteman	Los Angeles	PU	-118.413	34.259
TOA	Zamperini Field	Los Angeles	PU	-118.34	33.803

[9] PU = Public; PR = Private; MR = Military (Army); MA = Military (Air Force); MN = Military (Navy)

[10] Also known as Hawthorne Municipal Airport

2.2. 2023 Aircraft Activity Data

The commercial airports were contacted for detailed aircraft activity data (number of arrivals/departures by aircraft and engine models) and airport-specific data (i.e., stage length, taxi times) for 2023. Los Angeles and Long Beach airports provided 2023 aircraft operations and emissions data. Los Angeles World Airports (LAWA) also provided 2023 operations and emissions for Van Nuys airport. Burbank, John Wayne, and Ontario airports provided detailed aircraft activity data and airport-specific data for 2023 and requested South Coast AQMD to estimate the aircraft emissions using AEDT. Palm Springs and San Bernardino airports provided data from the latest aviation activity forecast report and for cargo operations, respectively, which were used in conjunction with FlightAware data and FAA's 2023 ATADS. FlightAware data included detailed number of operations by aircraft and engine models for the majority, but not all, of operations at airports. As such, these operations were scaled up based on the number of operations in FAA's latest ATADS[11]/TAF[12] by major aircraft type (i.e., air carrier, air taxi, general aviation, military) for 2023. For several small GA airports for which there was no ATADS/TAF data, the operations data from the last aircraft inventory in the 2022 AQMP were used. The three military airports provided detailed operations data and emissions for 2023. The civilian aircraft operations for March and Los Alamitos bases from FlightAware were also added to the military aircraft operations and emissions provided by the airports. The report for San Clemente Island base included both military and civilian aircraft operations and emissions.

Table 4 lists the total number of operations by major aircraft type and the corresponding data source(s) for each airport.

[11] FAA's ATADS; https://aspm.faa.gov/opsnet/sys/airport.asp
[12] FAA's 2024 TAF; https://www.faa.gov/data_research/aviation/taf

Table 4. Total Operations by Airport for 2023

Facility Name	Air Carrier	Air Taxi	GA	Military	Total	Data Source*
Agua Dulce	0	0	1418	2	1,420	FA/2022 AQMP
Banning Municipal	0	12	5,510	2	5,524	FA/TAF
Bermuda Dunes	0	4,094	13,990	32	18,116	FA/2022 AQMP
Big Bear City	0	294	28,016	2,000	30,310	FA/TAF
Burbank	63,734	25,548	40,130	391	129,803	Airport
Brackett Field	0	802	94,974	66	95,842	FA/ATADS
Cable	12	104	92,190	98	92,404	FA/TAF
Catalina	6	2,626	14,142	50	16,824	FA/2022AQMP
Chino	184	4,878	215,842	2,246	223,150	FA/ATADS
Chiriaco Summit	0	0	6,000	0	6,000	FA/2022 AQMP
Compton/Woodley	0	4	66,004	118	66,126	FA/TAF
Corona Municipal	2	56	36,940	18	37,016	FA/TAF
Desert Air Sky Ranch	0	0	14	0	14	FA
Desert Center	0	6	26	0	32	FA
El Monte	4	698	81,076	170	81,948	FA/ATADS
Ernst Field	2	0	24	0	26	FA/2022 AQMP
Flabob	30	88	11,104	40	11,262	FA/2022 AQMP
French Valley	2	2,624	89,734	60	92,420	FA/TAF
Fullerton Municipal	14	184	80,986	34	81,218	FA/ATADS
Hemet-Ryan	0	982	75,450	416	76,848	FA/TAF
Jack Northrop Field	42	6,054	94,992	66	101,154	FA/ATADS
Jacqueline Cochran Regional	24	14,866	108,474	1,448	124,812	FA/TAF
John Wayne	91,582	55,400	118,057	9	265,048	Airport
Lake Riverside Estates	0	0	1,100	0	1,100	FA
Long Beach	34,080	11,367	259,387	406	305,240	Airport
Los Alamitos Army Air Base	8	1,978	716	11,060	13,762	Airport/FA
Los Angeles International	540,974	15,012	25,384	450	581,820	Airport
March Air Force Reserve Base	2,976	458	1,014	3,536	7,984	Airport/FA
Ontario International	77,810	11,104	13,892	378	103,184	Airport
Palm Springs International	32,308	15,818	19,620	1,232	68,978	Airport
Perris Valley	2	8,628	658	0	9,288	FA
Quail Lake Sky Park	0	0	22	0	22	FA/2022 AQMP
Redlands Municipal	0	22	66,806	0	66,828	FA/TAF
Riverside Municipal	166	4,046	122,232	462	126,906	FA/ATADS
San Bernardino International	9,728	8,976	30,440	300	49,444	Airport/FA
San Clemente Island Naval Air Station	0	0	3,854	5,652	9,506	Airport
Santa Monica Municipal	18	4,842	53,570	122	58,552	FA/ATADS
Skylark Field	0	1,336	3,614	178	5,128	FA/2022 AQMP
Van Nuys	102	34,550	191,912	276	226,840	Airport
Whiteman	34	42	98,550	92	98,718	FA/ATADS
Zamperini Field	10	962	186,554	426	187,952	FA/ATADS
Total Operations	853,854	238,461	2,354,418	31,836	3,478,569	

*FA - FlightAware

2.3. 2032, 2036, and 2041 Activity Data

Los Angeles, Long Beach and Van Nuys airports provided the projected aircraft operations and emissions for 2032, 2036, and 2041. Burbank, John Wayne, and Ontario airports provided detailed aircraft operations forecasts for these years and requested South Coast AQMD to estimate the aircraft emissions. For Palm Springs airport, the airport's detailed commercial passenger operations forecast was used along with the total operations forecast for air taxi, general aviation, and military using FlightAware's fleet mix data. For San Bernardino International airport, the FlightAware data was scaled to the number of operations in TAF for these years.

Burbank and Long Beach airports developed their aircraft operations forecast based on the FAA's unconstrained 2024 TAF levels. The latest Los Angeles International airport's forecast developed in mid/late 2023 was used for this inventory update. The operations forecast for the Ontario International airport was based on their latest forecast developed in 2024.

John Wayne Airport (SNA) operates under a court-approved Settlement Agreement (agreement) with neighboring communities, originally established in 1985 and subsequently amended multiple times. The agreement imposes restrictions on SNA's annual passenger volume, the number of daily commercial departures, aircraft noise levels, and curfew hours for commercial operations. The agreement's amendments have allowed for continued growth in aeronautical operations at SNA while limiting long-term growth and maintaining other key limits such as the nighttime curfew. If the agreement is not amended or extended prior to its expiration on December 31, 2030, the market demand for commercial air service and operational growth at SNA will no longer be constrained by the terms of the agreement, and discretionary authority will return to the Orange County Board of Supervisors. For this aircraft emissions inventory update, SNA has made the assumption that the agreement will expire, and there will not be any constraints on future aircraft operations. As such, SNA has provided detailed aircraft operations data for future milestone years (2032, 2036, and 2041) assuming unconstrained growth beginning in 2031, consistent with the FAA's TAF.

The latest two AQMPs – the 2016, and 2022 plans – incorporated the terms of the Settlement Agreement and assumed no growth beyond the agreement's limits in future years. However, the latest aircraft operations forecast provided by the airport represent a departure from those limits after 2030 assuming the expiration of the agreement and unconstrained growth, which is reflected in the emissions inventory.

The aircraft operations and fleet mix forecast for Los Angeles, Long Beach, Burbank, John Wayne and Ontario airports were reviewed by staff and were also shared with Airlines for

America (A4A). Although FAA staff was not available to assist in reviewing these forecasts for this inventory update, a summary of FAA's recommendations regarding the anticipated transition toward newer aircraft (e.g., Airbus A320neo and Boeing 737-MAX8) and engines (e.g., TAPS II combustor LEAP models) from the last aircraft inventory update was provided to these airports for their consideration. A4A provided observations and suggestions on the future fleet mix based on information from several airlines operating at these airports regarding their planned aircraft replacements, retirements, and new purchases. The recommendations and suggestions from A4A and FAA were considered by these airports and incorporated into the future fleet mix to the extent applicable. The airports also provided detailed responses to these recommendations and suggestions.

For GA airports (other than Van Nuys airport), the aircraft operations forecast for the milestone years was developed by scaling up the 2023 FlightAware data based on the number of operations in FAA's 2024 TAF by major aircraft type (i.e., air carrier, air taxi, general aviation, military). All three military airports provided detailed operations data and emissions reports for military aircraft for the milestone years. The 2023 civilian aircraft operations for March and Los Alamitos military bases from FlightAware data were assumed to remain constant for future years and were added to the military aircraft operations and emissions provided by these airports. The report for San Clemente Island naval base included both military and civilian aircraft operations for the milestone years.

Table 5 to 7 provide the operations by major aircraft type for each airport in 2032, 2036, and 2041, respectively, along with the corresponding data source(s).

Table 5. Total Aircraft Operations by Airport for 2032

Facility Name	Air Carrier	Air Taxi	GA	Military	Total	Data Source*
Agua Dulce	0	0	1,418	2	1,420	FA/2022 AQMP
Banning Municipal	0	0	5,495	0	5,495	FA/TAF
Bermuda Dunes	0	4,094	13,990	32	18,116	FA/2022 AQMP
Big Bear City	0	0	28,000	2,000	30,000	FA/TAF
Burbank	88,454	27,033	50,476	399	166,362	Airport
Brackett Field	58	2,473	123,300	186	126,017	FA/TAF
Cable	0	0	73,751	0	73,751	FA/TAF
Catalina	0	2,622	14,157	50	16,829	FA/2022AQMP
Chino	67	3,825	255,250	2,422	261,564	FA/TAF
Chiriaco Summit	0	0	6,000	0	6,000	FA/2022 AQMP
Compton/Woodley	0	0	66,000	0	66,000	FA/TAF
Corona Municipal	0	0	35,000	0	35,000	FA/TAF
Desert Air Sky Ranch	0	0	14	0	14	FA
Desert Center	0	6	26	0	32	FA
El Monte	1	182	97,180	195	97,558	FA/TAF
Ernst Field	2	0	24	0	26	FA/2022 AQMP
Flabob	0	0	11,100	0	11100	FA/2022 AQMP
French Valley	0	0	89,734	56	89,790	FA/TAF
Fullerton Municipal	0	243	83,366	41	83,650	FA/TAF
Hemet-Ryan	0	0	75,444	0	75,444	FA/TAF
Jack Northrop Field	9	6,728	64,829	58	71,624	FA/TAF
Jacqueline Cochran Regional	0	11,504	45,589	0	57,093	FA/TAF
John Wayne	118,644	76,548	145,248	8	340,448	Airport
Lake Riverside Estates	0	0	1,100	0	1,100	FA
Long Beach	39,319	16,468	289,653	400	345,840	Airport
Los Alamitos Army Air Base	8	1,978	716	11,264	13,966	Airport/FA
Los Angeles International	775,200	17,134	29,056	450	821,840	Airport
March Air Force Reserve Base	2,976	458	1,014	3,261	7,709	Airport/FA
Ontario International	105,860	12,904	13,048	310	132,122	Airport
Palm Springs International	38,874	8,731	24,203	1173	72,981	Airport/FA
Perris Valley	2	8,628	658	0	9,288	FA
Quail Lake Sky Park	0	0	22	0	22	FA/2022 AQMP
Redlands Municipal	0	0	66,800	0	66,800	FA/TAF
Riverside Municipal	33	4,783	139,176	469	144,461	FA/TAF
San Bernardino International	25,821	22,512	43,463	240	92036	Airport/FA
San Clemente Island Naval Air Station	0	0	5,058	7,418	12,476	Airport
Santa Monica Municipal	5	3,058	70,194	100	73,357	FA/TAF
Skylark Field	0	1,336	3,614	178	5,128	FA/2022 AQMP
Van Nuys	128	51,216	196,677	300	248,321	Airport
Whiteman	0	0	95,445	242	95,687	FA/TAF
Zamperini Field	0	761	124,484	106	125,351	FA/TAF
Total Operations	1,195,461	285,225	2,389,772	31,360	3,901,818	

*FA - FlightAware

Table 6. Total Aircraft Operations by Airport for 2036

Facility Name	Air Carrier	Air Taxi	GA	Military	Total	Data Source*
Agua Dulce	0	0	1,418	2	1420	FA/2022 AQMP
Banning Municipal	0	0	5,495	0	5,495	FA/TAF
Bermuda Dunes	0	4,094	13,990	32	18,116	FA/2022 AQMP
Big Bear City	0	0	28,000	2,000	30,000	FA/TAF
Burbank	90,917	28,131	52,124	399	171,571	Airport
Brackett Field	66	2,473	124,941	186	127,666	FA/TAF
Cable	0	0	73,751	0	73,751	FA/TAF
Catalina	0	2,622	14,157	50	16,829	FA/2022AQMP
Chino	79	5,093	259,801	2,422	267,395	FA/TAF
Chiriaco Summit	0	0	6,000	0	6,000	FA/2022 AQMP
Compton/Woodley	0	0	66,000	0	66,000	FA/TAF
Corona Municipal	0	0	35,000	0	35,000	FA/TAF
Desert Air Sky Ranch	0	0	14	0	14	FA
Desert Center	0	6	26	0	32	FA
El Monte	1	182	98,683	195	99,061	FA/TAF
Ernst Field	2	0	24	0	26	FA/2022 AQMP
Flabob	0	0	11,100	0	11,100	FA/2022 AQMP
French Valley	0	0	89,734	56	89,790	FA/TAF
Fullerton Municipal	0	283	84,372	41	84,696	FA/TAF
Hemet-Ryan	0	0	75,444	0	75,444	FA/TAF
Jack Northrop Field	7	7,956	66,254	58	74,275	FA/TAF
Jacqueline Cochran Regional	0	11,504	45,589	0	57,093	FA/TAF
John Wayne	122,300	78,906	149,712	8	350,926	Airport
Lake Riverside Estates	0	0	1,100	0	1,100	FA
Long Beach	41,672	17,137	293,707	400	352,916	Airport
Los Alamitos Army Air Base	8	1,978	716	11,366	14,068	Airport/FA
Los Angeles International	797,148	17,152	29,110	450	843,860	Airport
March Air Force Reserve Base	2,976	458	1,014	3,383	7,831	Airport/FA
Ontario International	118,002	13,472	13,928	310	145,712	Airport
Palm Springs International	42,330	8,731	24,304	1173	76,538	Airport
Perris Valley	2	8,628	658	0	9,288	FA
Quail Lake Sky Park	0	0	22	0	22	FA/2022 AQMP
Redlands Municipal	0	0	66,800	0	66,800	FA/TAF
Riverside Municipal	37	5,599	140,842	469	146,947	FA/TAF
San Bernardino International	33,805	28,352	43,682	240	106,079	Airport/FA
San Clemente Island Naval Air Station	0	0	5,680	8,330	14,010	Airport
Santa Monica Municipal	5	3,058	70,483	100	73,646	FA/TAF
Skylark Field	0	1,336	3,614	178	5,128	FA/2022 AQMP
Van Nuys	132	58,904	197,242	300	256,578	Airport
Whiteman	0	0	95,489	242	95,731	FA/TAF
Zamperini Field	0	849	125,395	106	126,350	FA/TAF
Total Operations	1,249,489	306,904	2,415,415	32,496	4,004,304	

*FA - FlightAware

Table 7. Total Aircraft Operations by Airport for 2041

Facility Name	Air Carrier	Air Taxi	GA	Military	Total	Data Source*
Agua Dulce	0	0	1,418	2	1420	FA/2022 AQMP
Banning Municipal	0	0	5,495	0	5,495	FA/TAF
Bermuda Dunes	0	4,094	13,990	32	18,116	FA/2022 AQMP
Big Bear City	0	0	28,000	2,000	30,000	FA/TAF
Burbank	94,023	29,566	54,254	399	178,242	Airport
Brackett Field	76	2,473	127,024	186	129,759	FA/TAF
Cable	0	0	73,751	0	73,751	FA/TAF
Catalina	0	2,622	14,157	50	16,829	FA/2022AQMP
Chino	94	6,678	265,610	2,422	274,804	FA/TAF
Chiriaco Summit	0	0	6,000	0	6,000	FA/2022 AQMP
Compton/Woodley	0	0	66,000	0	66,000	FA/TAF
Corona Municipal	0	0	35,000	0	35,000	FA/TAF
Desert Air Sky Ranch	0	0	14	0	14	FA
Desert Center	0	6	26	0	32	FA
El Monte	2	182	100,597	195	100,976	FA/TAF
Ernst Field	2	0	24	0	26	FA/2022 AQMP
Flabob	0	0	11,100	0	11,100	FA/2022 AQMP
French Valley	0	0	89,734	56	89,790	FA/TAF
Fullerton Municipal	0	333	85,645	41	86,019	FA/TAF
Hemet-Ryan	0	0	75,444	0	75,444	FA/TAF
Jack Northrop Field	5	9,491	68,084	58	77,638	FA/TAF
Jacqueline Cochran Regional	0	11,504	45,589	0	57,093	FA/TAF
John Wayne	134,086	79,600	151,570	8	365,264	Airport
Lake Riverside Estates	0	0	1,100	0	1,100	FA
Long Beach	44,823	18,011	298,859	400	362093	Airport
Los Alamitos Army Air Base	8	1,978	716	11,511	14,213	Airport/FA
Los Angeles International	805,710	16,428	29,122	450	851,710	Airport
March Air Force Reserve Base	2,976	458	1,014	3,539	7,987	Airport/FA
Ontario International	133,926	14,322	15,146	310	163,704	Airport
Palm Springs International	46,548	8,731	24,449	1173	80,901	Airport
Perris Valley	2	8,628	658	0	9,288	FA
Quail Lake Sky Park	0	0	22	0	22	FA/2022 AQMP
Redlands Municipal	0	0	66,800	0	66,800	FA/TAF
Riverside Municipal	42	6,619	142,965	469	150,095	FA/TAF
San Bernardino International	43,785	35,652	43,957	240	123634	Airport/FA
San Clemente Island Naval Air Station	0	0	6,458	9,471	15,929	Airport
Santa Monica Municipal	5	3,058	70,846	100	74,009	FA/TAF
Skylark Field	0	1,336	3,614	178	5128	FA/2022 AQMP
Van Nuys	137	68,514	198,157	300	267,108	Airport
Whiteman	0	0	95,543	242	95,785	FA/TAF
Zamperini Field	0	959	126,549	106	127,614	FA/TAF
Total Operations	1,306,250	331,243	2,444,501	33,938	4,115,932	

*FA - FlightAware

3. Emissions Inventory

Table 8 to 11 present the 2023, 2032, 2036, and 2041 aircraft emissions by pollutant for all airports. AEDT runs were performed for Burbank, John Wayne, Ontario, Palm Springs, San Bernardino and all GA airports (excluding Van Nuys and four small GA airports) for the 2023 base year and future years. AEDT runs were also performed for the civilian aircraft operations for March and Los Alamitos military bases. Los Angeles, Long Beach, and Van Nuys airports provided their AEDT emissions results which were reviewed by staff. It should be noted that the PM10 and PM2.5 aircraft emissions generated through AEDT are the same because the aircraft engine exhaust particles are primarily much smaller in geometric diameter than 2.5 microns. For the four small GA airports (Desert Air Sky Ranch, Desert Center, Lake Riverside Estates, Perris Valley) without AEDT runway information, the FlightAware data was used in conjunction with EPA's average emission factors[13] by major aircraft type (i.e., commercial air carrier, air taxi, general aviation, and military) to estimate aircraft emissions.

This inventory update represents the most comprehensive and accurate aircraft emissions inventory for all airports operating within South Coast AQMD jurisdiction to date. In addition to using the latest aircraft operations data and airport parameters (i.e., taxi time, runway data, mixing height), the updated inventory reflects a number of improvements to the previous inventories including the use of the latest aircraft fleet mix and taxi time projections for commercial airports, detailed aircraft emissions inventories for all three military airports, the use of the latest version of AEDT for the vast majority of GA airports (instead of using EPA's average emission factors), and airport-specific mixing height for all airports based on staff's latest analysis.

Appendix A provides a comparison of the aircraft operations and emissions in this inventory update and the last aircraft inventory included in 2022 AQMP.

[13] U.S. EPA, 2020 Nation l Emissions Inventory: Aviation Component, May 2023, Table 4-1

Table 8. 2023 Aircraft Emissions (tons per year) by Airport

Facility Name	VOC	CO	NOx	SO2	PM10	PM2.5
Agua Dulce	0.18	11.89	0.02	0.01	0.01	0.01
Banning Municipal	0.84	51.98	0.07	0.05	0.03	0.03
Bermuda Dunes	13.11	176.13	3.53	0.87	0.20	0.20
Big Bear City	5.32	365.02	0.36	0.36	0.16	0.16
Burbank	79.62	421.28	331.91	40.53	6.47	6.47
Brackett Field	12.14	655.56	1.82	0.90	0.46	0.46
Cable	11.97	638.58	1.45	0.80	0.44	0.44
Catalina	2.75	60.81	0.60	0.23	0.05	0.05
Chino	40.52	1,546.47	7.78	2.99	1.21	1.21
Chiriaco Summit	0.89	58.74	0.27	0.11	0.03	0.03
Compton/Woodley	10.44	428.60	0.54	0.48	0.29	0.29
Corona Municipal	4.24	247.65	0.57	0.31	0.17	0.17
Desert Air Sky Ranch	0.00	0.04	0.00	0.00	0.00	0.00
Desert Center	0.00	0.08	0.00	0.00	0.00	0.00
El Monte	10.49	627.98	1.44	0.83	0.39	0.39
Ernst Field	0.00	0.21	0.01	0.00	0.00	0.00
Flabob	1.38	77.98	0.22	0.10	0.06	0.06
French Valley	13.37	645.88	2.55	1.06	0.48	0.48
Fullerton Municipal	7.31	432.88	1.17	0.56	0.35	0.35
Hemet-Ryan	12.96	634.85	1.83	0.86	0.37	0.37
Jack Northrop Field	20.56	572.12	6.04	1.89	0.55	0.55
Jacqueline Cochran Regional	55.16	1,098.73	18.25	4.81	1.15	1.15
John Wayne	115.81	1,030.80	405.21	46.59	8.14	8.14
Lake Riverside Estates	0.04	3.33	0.02	0.00	0.07	0.04
Long Beach	64.82	1,346.34	183.02	21.15	4.34	4.34
Los Alamitos Army Air Base	26.14	64.02	40.36	5.03	7.62	6.88
Los Angeles International	491.62	3,665.09	4,364.03	423.57	67.12	67.12
March Air Force Reserve Base	11.89	107.37	459.43	26.43	54.55	49.13
Ontario International	140.13	781.82	680.02	63.46	8.19	8.19
Palm Springs International	29.91	370.60	171.94	18.15	2.83	2.83
Perris Valley	1.00	44.89	0.82	0.15	1.33	1.06
Quail Lake Sky Park	0.01	0.28	0.00	0.00	0.00	0.00
Redlands Municipal	7.52	506.92	1.16	0.60	0.30	0.30
Riverside Municipal	16.66	868.76	5.86	1.70	0.67	0.67
San Bernardino International	37.14	360.22	109.80	11.24	1.81	1.81
San Clemente Island Naval Air Station	16.21	118.38	129.45	6.63	66.96	66.96
Santa Monica Municipal	18.37	294.79	1.79	0.82	0.29	0.29
Skylark Field	2.66	7.12	0.93	0.23	0.03	0.03
Van Nuys	126.90	3,554.88	120.73	21.67	5.89	5.89
Whiteman	9.17	671.90	1.40	0.79	0.41	0.41
Zamperini Field	32.44	1,219.45	1.78	1.45	0.85	0.85
Total	1,451.70	23,770.41	7,058.18	707.40	244.26	237.80

Table 9. 2032 Aircraft Emissions (tons per year) by Airport

Facility Name	VOC	CO	NOx	SO2	PM10	PM2.5
Agua Dulce	0.18	11.89	0.02	0.01	0.01	0.01
Banning Municipal	0.81	51.80	0.06	0.05	0.03	0.03
Bermuda Dunes	13.11	176.13	3.53	0.87	0.20	0.20
Big Bear City	4.92	363.91	0.28	0.33	0.16	0.16
Burbank	114.58	657.24	540.94	60.48	8.53	8.53
Brackett Field	19.22	858.98	2.76	1.29	0.63	0.63
Cable	9.50	509.89	1.13	0.63	0.35	0.35
Catalina	2.74	60.78	0.60	0.23	0.05	0.05
Chino	43.54	1,815.95	7.69	3.18	1.37	1.37
Chiriaco Summit	0.89	58.74	0.27	0.11	0.03	0.03
Compton/Woodley	10.22	426.74	0.53	0.47	0.28	0.28
Corona Municipal	3.97	234.47	0.52	0.29	0.16	0.16
Desert Air Sky Ranch	0.00	0.04	0.00	0.00	0.00	0.00
Desert Center	0.00	0.08	0.00	0.00	0.00	0.00
El Monte	11.25	749.69	1.44	0.92	0.45	0.45
Ernst Field	0.00	0.21	0.01	0.00	0.00	0.00
Flabob	1.38	77.98	0.22	0.10	0.06	0.06
French Valley	9.67	636.89	1.35	0.79	0.43	0.43
Fullerton Municipal	7.55	445.70	1.13	0.58	0.36	0.36
Hemet-Ryan	10.83	631.99	1.33	0.76	0.35	0.35
Jack Northrop Field	17.93	402.48	5.74	1.66	0.45	0.45
Jacqueline Cochran Regional	32.60	486.75	11.91	2.86	0.66	0.66
John Wayne	154.81	1,400.05	645.25	66.03	10.53	10.53
Lake Riverside Estates	0.04	3.33	0.02	0.00	0.07	0.04
Long Beach Airport	75.53	1,538.65	231.61	25.29	5.16	5.16
Los Alamitos Army Air Base	26.64	65.30	41.31	5.12	7.77	7.01
Los Angeles International	739.26	6,567.52	7079.62	708.89	111.88	111.88
March Air Force Base	15.84	81.95	496.72	24.00	50.05	45.08
Ontario International	165.96	970.80	947.47	84.25	11.02	11.02
Palm Springs International	25.26	398.94	229.64	18.82	2.86	2.86
Perris Valley	1.00	44.89	0.82	0.15	1.33	1.06
Quail Lake Sky Park	0.01	0.28	0.00	0.00	0.00	0.00
Redlands Municipal	7.51	506.85	1.14	0.59	0.30	0.30
Riverside Municipal	18.96	988.61	6.76	1.95	0.76	0.76
San Bernardino International	91.12	656.35	282.07	28.52	4.50	4.50
San Clemente Island Naval Air Station	18.42	135.42	141.77	6.99	76.66	76.65
Santa Monica Municipal	15.62	370.97	1.63	0.81	0.31	0.31
Skylark Field	2.66	7.12	0.93	0.23	0.03	0.03
Van Nuys	165.91	3,860.55	153.51	27.75	7.05	7.05
Whiteman	8.79	651.69	1.31	0.76	0.40	0.40
Zamperini Field	21.91	812.90	1.21	0.98	0.57	0.57
Total	1,870.16	27,720.52	10,844.27	1,076.74	305.80	299.76

Table 10. 2036 Aircraft Emissions (tons per year) by Airport

Facility Name	VOC	CO	NOx	SO2	PM10	PM2.5
Agua Dulce	0.18	11.89	0.02	0.01	0.01	0.01
Banning Municipal	0.81	51.80	0.06	0.05	0.03	0.03
Bermuda Dunes	13.11	176.13	3.53	0.87	0.20	0.20
Big Bear City	4.92	363.91	0.28	0.33	0.16	0.16
Burbank	107.29	643.74	619.35	63.60	8.69	8.69
Brackett Field	19.40	870.26	2.79	1.31	0.64	0.64
Cable	9.50	509.89	1.13	0.63	0.35	0.35
Catalina	2.74	60.78	0.60	0.23	0.05	0.05
Chino	46.68	1,853.77	8.55	3.41	1.43	1.43
Chiriaco Summit	0.89	58.74	0.27	0.11	0.03	0.03
Compton/Woodley	10.22	426.74	0.53	0.47	0.28	0.28
Corona Municipal	3.97	234.47	0.52	0.29	0.16	0.16
Desert Air Sky Ranch	0.00	0.04	0.00	0.00	0.00	0.00
Desert Center	0.00	0.08	0.00	0.00	0.00	0.00
El Monte	11.42	761.19	1.46	0.94	0.46	0.46
Ernst Field	0.00	0.21	0.01	0.00	0.00	0.00
Flabob	1.38	77.98	0.22	0.10	0.06	0.06
French Valley	9.67	636.89	1.35	0.79	0.43	0.43
Fullerton Municipal	7.66	451.10	1.16	0.59	0.36	0.36
Hemet-Ryan	10.83	631.99	1.33	0.76	0.35	0.35
Jack Northrop Field	19.95	416.24	6.56	1.85	0.49	0.49
Jacqueline Cochran Regional	32.60	486.75	11.91	2.86	0.66	0.66
John Wayne	156.16	1,433.51	697.48	67.92	10.78	10.78
Lake Riverside Estates	0.04	3.33	0.02	0.00	0.07	0.04
Long Beach	74.38	1,555.43	263.90	26.17	5.25	5.25
Los Alamitos Army Air Base	26.84	65.73	41.53	5.15	7.82	7.05
Los Angeles International	770.64	7,109.46	7,502.80	745.50	112.33	112.33
March Air Force Reserve Base	16.29	83.93	514.47	24.77	51.92	46.76
Ontario International	189.32	1,078.92	1,093.28	94.78	12.36	12.36
Palm Springs International	25.98	404.04	256.15	20.03	2.99	2.99
Perris Valley	1.00	44.89	0.82	0.15	1.33	1.06
Quail Lake Sky Park	0.01	0.28	0.00	0.00	0.00	0.00
Redlands Municipal	7.51	506.85	1.14	0.59	0.30	0.30
Riverside Municipal	20.18	1,003.41	7.53	2.10	0.79	0.79
San Bernardino International	115.94	752.06	366.70	36.89	5.78	5.78
San Clemente Island Naval Air Station	19.50	143.88	148.14	7.14	81.85	81.85
Santa Monica Municipal	15.65	372.54	1.63	0.81	0.32	0.32
Skylark Field	2.66	7.12	0.93	0.23	0.03	0.03
Van Nuys	186.68	3,931.60	172.09	31.14	7.65	7.65
Whiteman	8.80	651.91	1.31	0.76	0.40	0.40
Zamperini Field	22.29	819.37	1.24	0.99	0.58	0.58
Total	1,973.08	28,692.85	11,732.80	1,144.30	317.36	311.13

Table 11. 2041 Aircraft Emissions (tons per year) by Airport

Facility Name	VOC	CO	NOx	SO2	PM10	PM2.5
Agua Dulce	0.18	11.89	0.02	0.01	0.01	0.01
Banning Municipal	0.81	51.80	0.06	0.05	0.03	0.03
Bermuda Dunes	13.11	176.13	3.53	0.87	0.20	0.20
Big Bear City	4.92	363.91	0.28	0.33	0.16	0.16
Bob Hope	117.20	709.83	643.92	68.04	9.23	9.23
Brackett Field	19.61	884.36	2.82	1.33	0.65	0.65
Cable	9.50	509.89	1.13	0.63	0.35	0.35
Catalina	2.74	60.78	0.60	0.23	0.05	0.05
Chino	50.56	1,902.20	9.63	3.69	1.50	1.50
Chiriaco Summit	0.89	58.74	0.27	0.11	0.03	0.03
Compton/Woodley	10.22	426.74	0.53	0.47	0.28	0.28
Corona Municipal	3.97	234.47	0.52	0.29	0.16	0.16
Desert Air Sky Ranch	0.00	0.04	0.00	0.00	0.00	0.00
Desert Center	0.00	0.08	0.00	0.00	0.00	0.00
El Monte	11.63	775.99	1.49	0.96	0.47	0.47
Ernst Field	0.00	0.21	0.01	0.00	0.00	0.00
Flabob	1.38	77.98	0.22	0.10	0.06	0.06
French Valley	9.67	636.89	1.35	0.79	0.43	0.43
Fullerton Municipal	7.80	457.98	1.18	0.60	0.37	0.37
Hemet-Ryan	10.83	631.99	1.33	0.76	0.35	0.35
Jack Northrop Field	22.52	433.93	7.57	2.09	0.54	0.54
Jacqueline Cochran Regional	32.60	486.75	11.91	2.86	0.66	0.66
John Wayne	162.77	1,509.68	793.01	75.13	11.63	11.63
Lake Riverside Estates	0.04	3.33	0.02	0.00	0.07	0.04
Long Beach	78.96	1,610.34	284.11	28.33	5.59	5.59
Los Alamitos Army Air Base	27.21	66.58	42.22	5.22	7.92	7.14
Los Angeles International	746.81	7,177.34	7,704.73	759.94	113.45	113.45
March Air Force Reserve Base	16.83	86.45	536.37	25.82	54.22	48.83
Ontario International	221.65	1,225.35	1,300.58	109.28	14.13	14.13
Palm Springs International	26.95	411.77	285.09	21.58	3.19	3.19
Perris Valley	1.00	44.89	0.82	0.15	1.33	1.06
Quail Lake Sky Park	0.01	0.28	0.00	0.00	0.00	0.00
Redlands Municipal	7.51	506.85	1.14	0.59	0.30	0.30
Riverside Municipal	21.69	1,022.07	8.46	2.28	0.83	0.83
San Bernardino International	147.08	872.00	473.05	47.41	7.38	7.38
San Clemente Island Naval Air Station	20.84	154.46	156.10	7.34	88.35	88.35
Santa Monica Municipal	15.70	374.44	1.64	0.81	0.32	0.32
Skylark Field	2.66	7.12	0.93	0.23	0.03	0.03
Van Nuys	213.44	4,032.93	194.69	35.38	8.40	8.40
Whiteman	8.80	652.24	1.31	0.76	0.40	0.40
Zamperini Field	22.76	827.36	1.28	1.01	0.58	0.58
Total	2,072.85	29,478.06	12,473.91	1,205.47	333.63	327.16

Appendix A

Aircraft Operations and Emissions Compared with the Previous Inventory in 2022 AQMP

The following graphs provide a comparison of the aircraft operations and emissions for the milestone years between this aircraft inventory update and the last aircraft inventory included in 2022 AQMP. Please note that the milestone years for this inventory update are slightly different than the last inventory. For this inventory update, the milestone years include the 2023 base year and the 2032, 2036, and 2041 forecast years. For the 2022 AQMP aircraft inventory, the milestone years included the 2018 base year and the 2023, 2031, and 2037 forecast years. Due to the difference in forecast years, linear interpolation was used to estimate operations and emissions for comparison.

Figure A-1 shows the total aircraft operations by commercial, general aviation, and military airports for this inventory update compared to the 2022 AQMP aircraft operations. As shown, the overall number of aircraft operations are projected to continue to increase in future years based on the latest forecasts. The number of aircraft operations from military airports (about 31,000 in 2023 to 38,000 in 2041 in this update) represent a very small fraction of total operations.

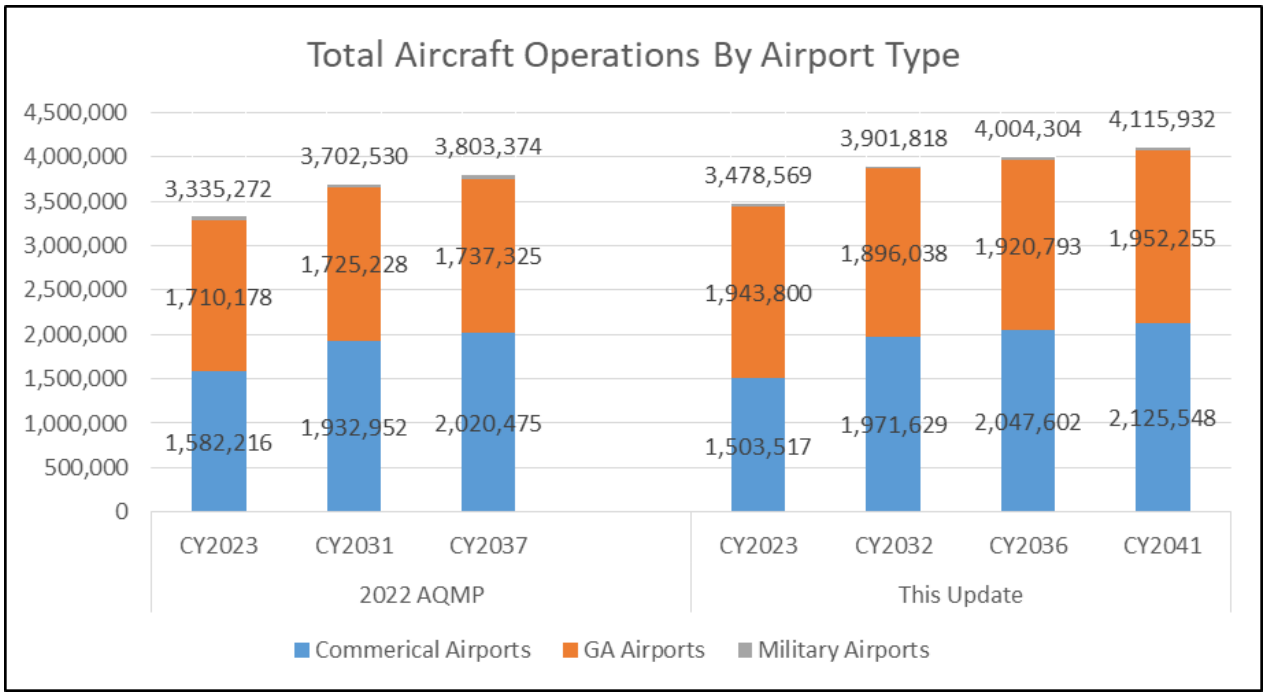

Figure A-1 – Total Aircraft Operations by Airport Type

Figures A-2 and A-3 show the 2023 total NOx and PM2.5 aircraft emissions for by airport type in this inventory update compared to the 2022 AQMP aircraft inventory. It should be noted that the 2023 emissions in this inventory update are based on the actual number of operations whereas the 2023 emissions in the 2022 AQMP inventory were based on the projected number of operations in 2023.

Figures A-4 and A-5 compare the 2023 NOx and PM2.5 emissions from the commercial airports in this inventory update with the 2022 AQMP aircraft inventory. For commercial airports, in addition to the difference in the actual and projected number of operations, other factors contributing to the differences in the 2023 commercial airports emissions include the actual vs. projected aircraft fleet mix, taxi times, mixing height based on latest analysis, and the higher APU operating times used this inventory update. Commercial airports and emissions are presented in more detail in Figures A-6 to A-19. Military airports operations and emissions are presented in more detail in Figures A-20 to A-28. GA airports operations and emissions are also presented in more detail in Figures A-29 to A-32.

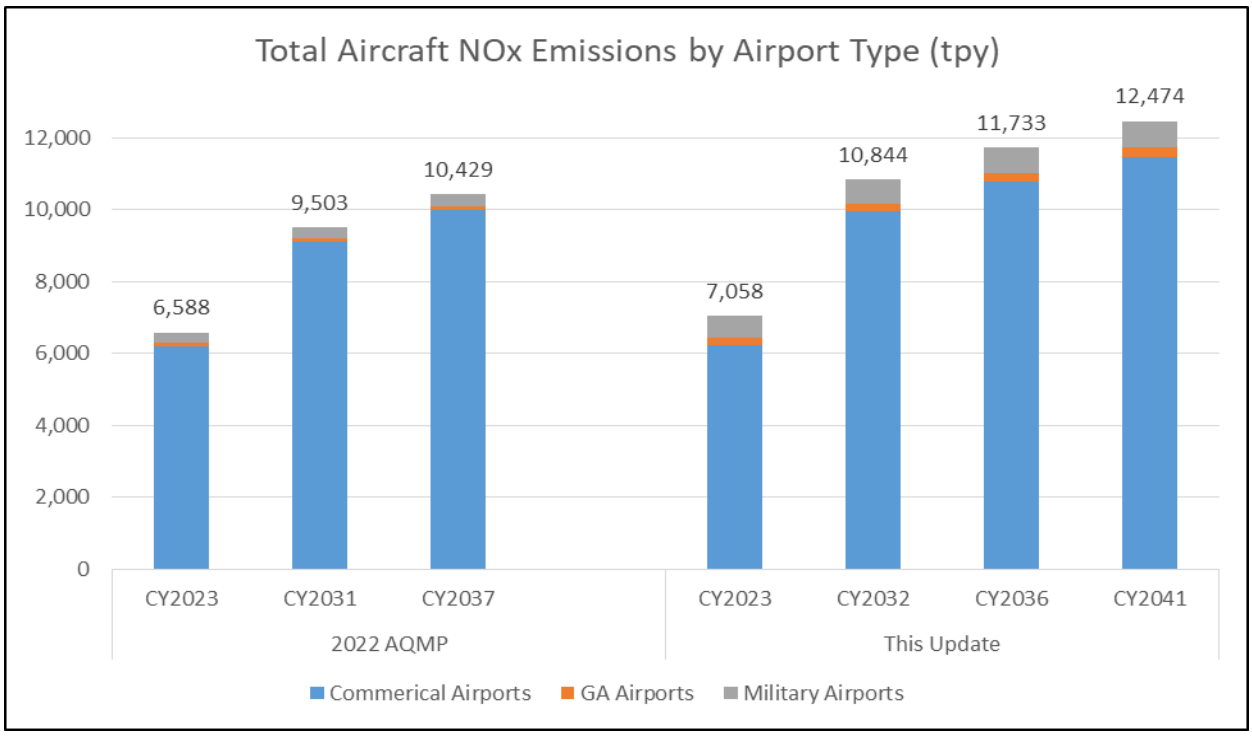

Figure A-2 – Total Aircraft NOx Emissions by Airport Type

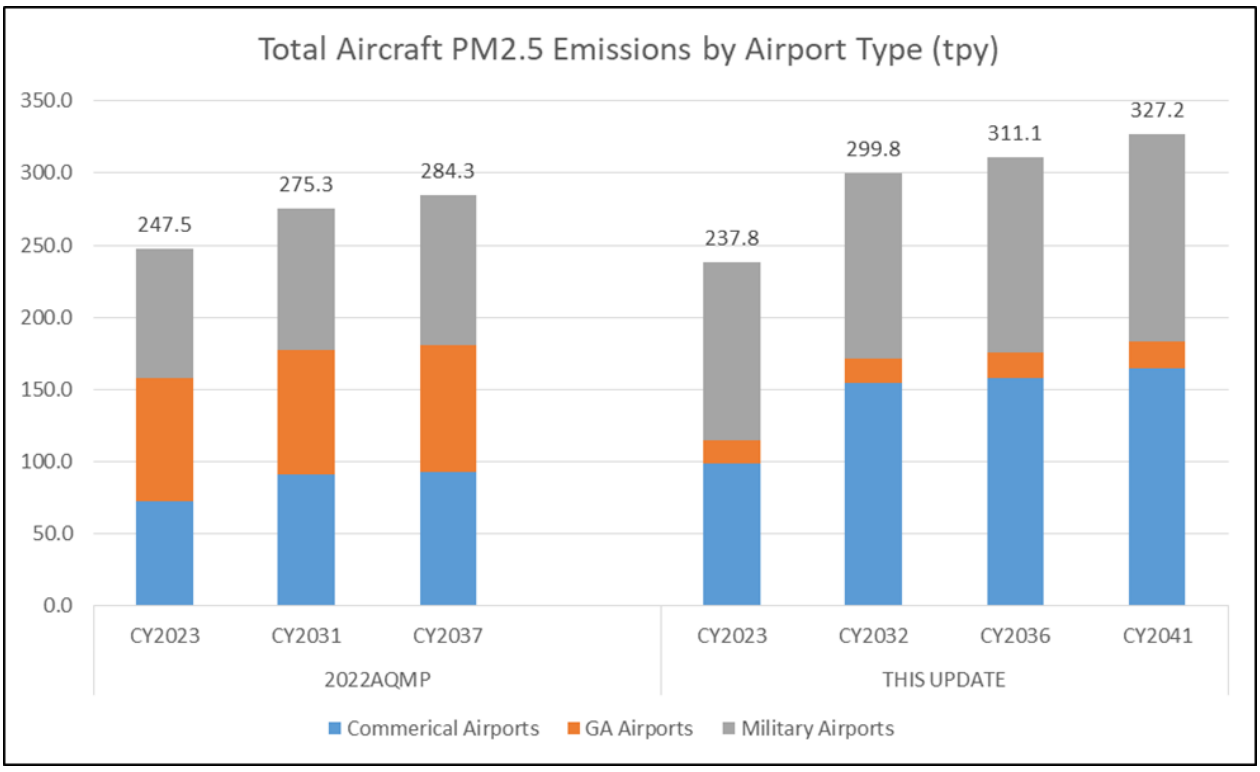

Figure A-3 – Total Aircraft PM2.5 Emissions by Airport Type

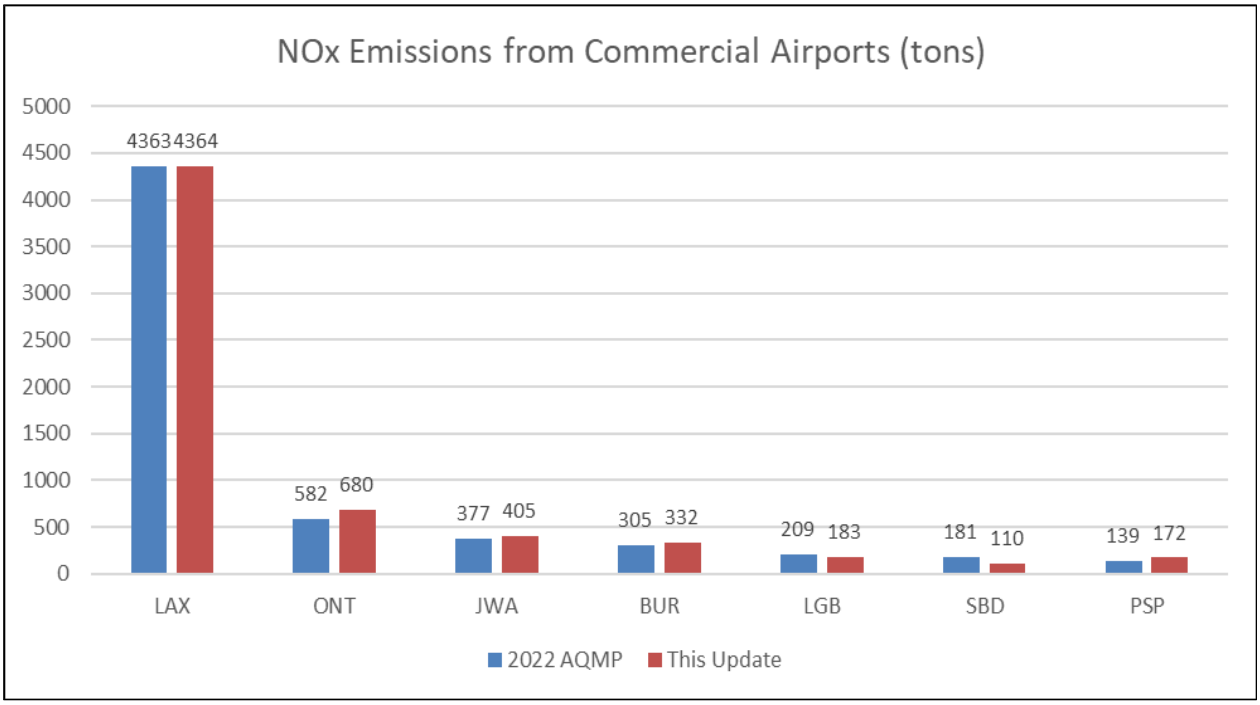

Figure A-4 – 2023 NOx Emissions from Commercial Airports

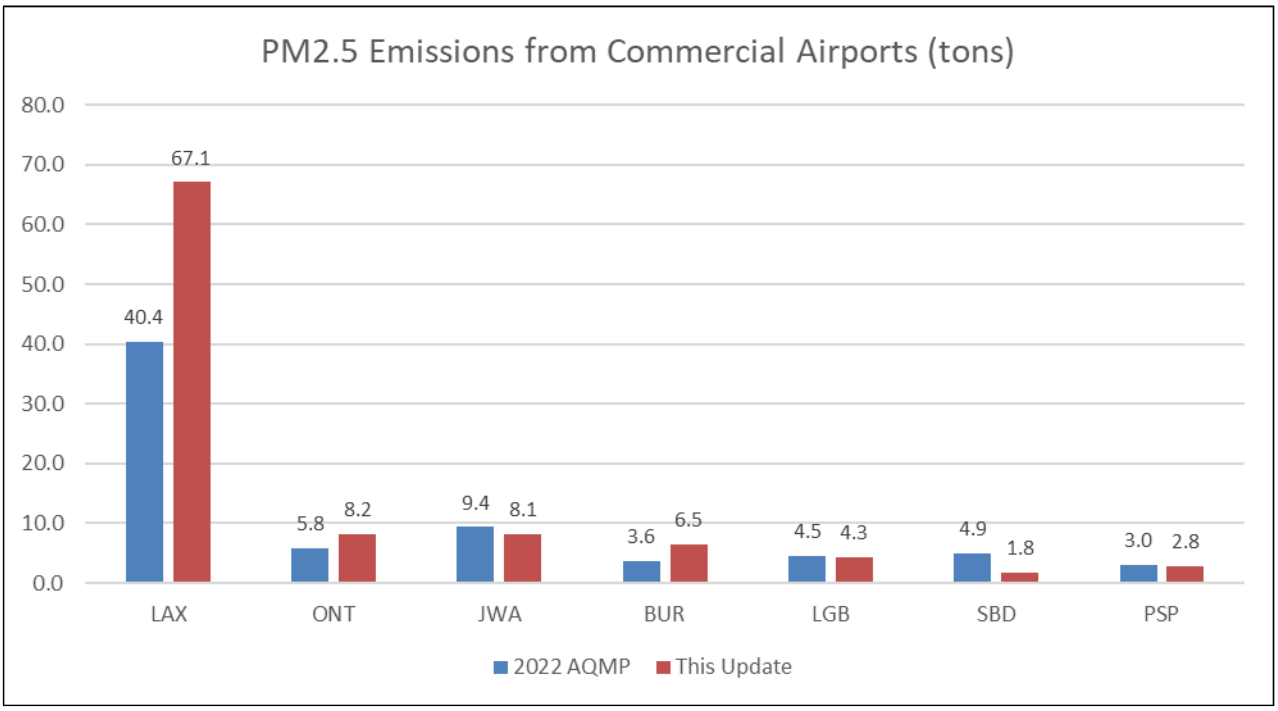

Figure A-5 – 2023 PM2.5 Emissions from Commercial Airports

Figures A-6 to A-19 present the NOx and PM2.5 emissions for the seven commercial airports from 2023 to 2041 in this inventory update compared to the 2022 AQMP aircraft inventory.

Some of the notable changes in the operations forecast for the commercial airports in this inventory update which would impact NOx and PM2.5 emissions include: a) updated detailed aircraft fleet mix (aircraft/engine combinations) and operations forecasts for LAX and ONT which were higher than FAA's TAF, b) updated forecast for PSP which was slightly below FAA's TAF including detailed fleet mix forecast for commercial operations, and c) updated detailed fleet mix forecast with operations forecasts based on FAA's TAF for BUR, LGB, SNA and SBD.

In addition to the changes in the operations forecast, the changes in NOx and PM2.5 emissions for each commercial airport in this inventory update are also attributed to the changes in taxi times, mixing height and APU times. The higher APU time assumption in this inventory update (21 minutes for arrivals and 21 minutes plus taxi-out times for departures) had a notably significant impact on PM2.5 emissions for LAX and BUR because of the projected higher taxi times (especially taxi-out times) for these airports.

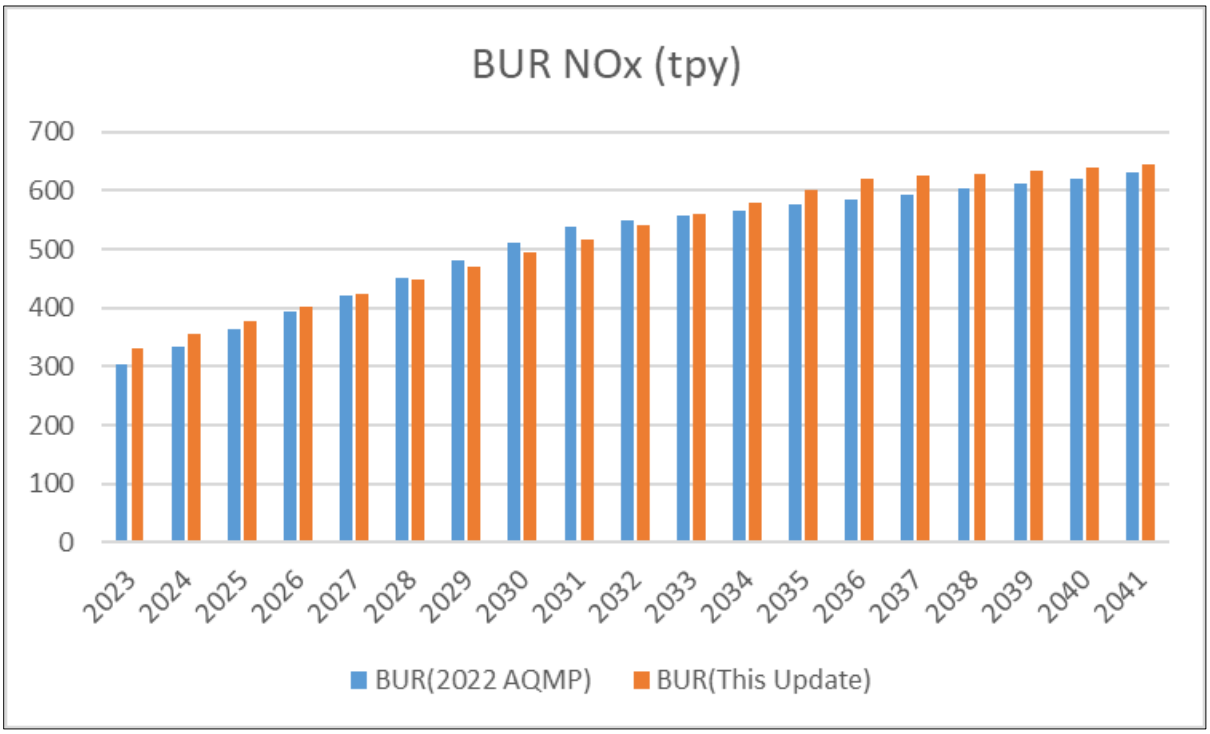

Fig A-6 – NOx Emissions for Burbank Airport

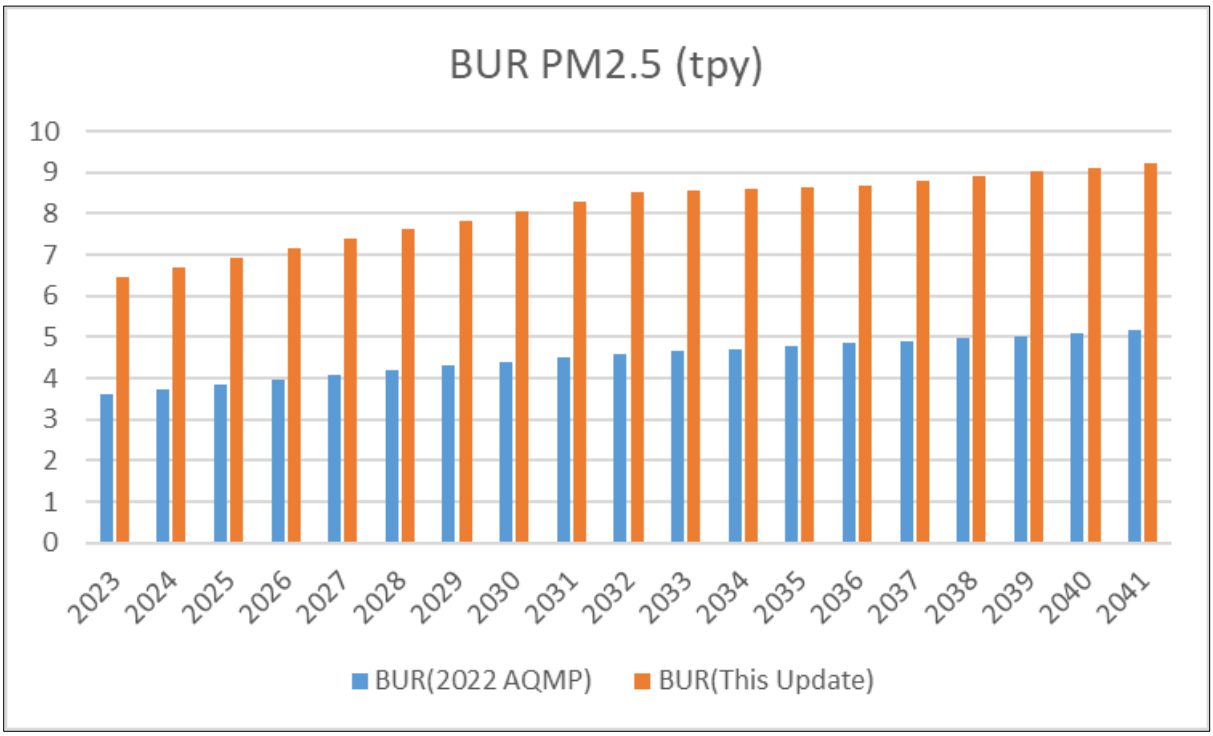

Fig A-7 – PM2.5 Emissions for Burbank Airport

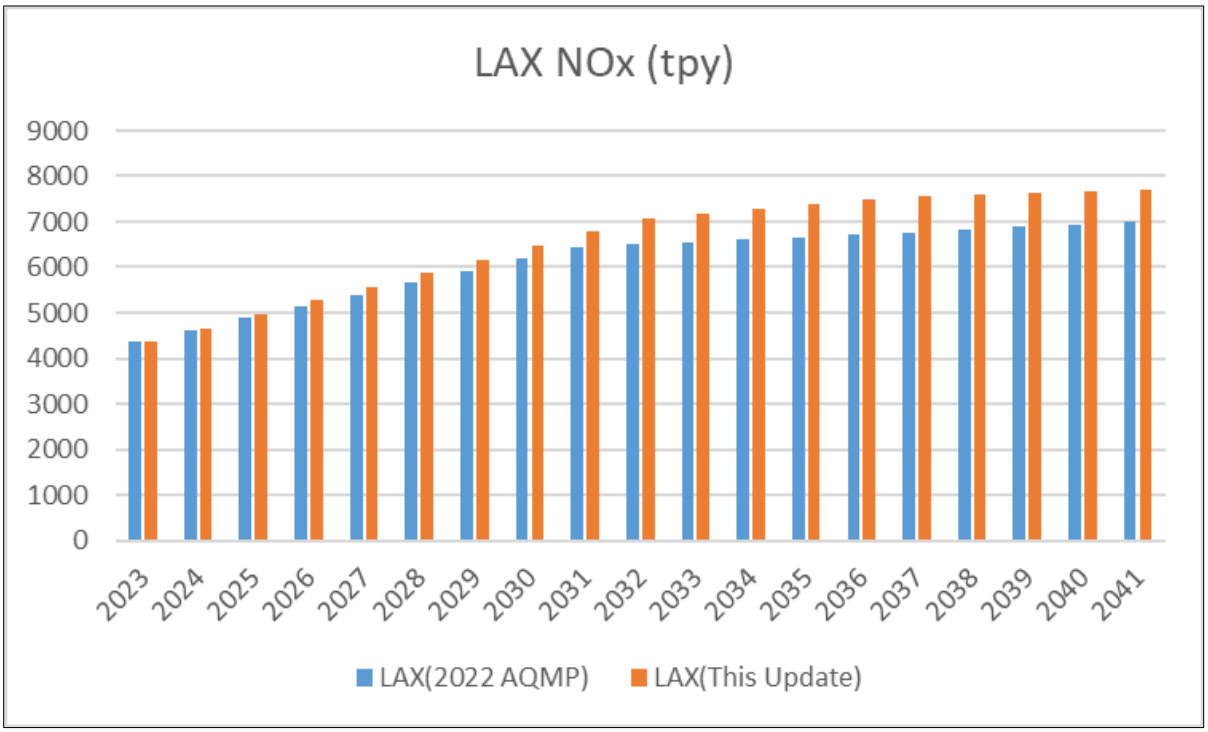

Fig A-8 – NOx Emissions for Los Angeles International Airport

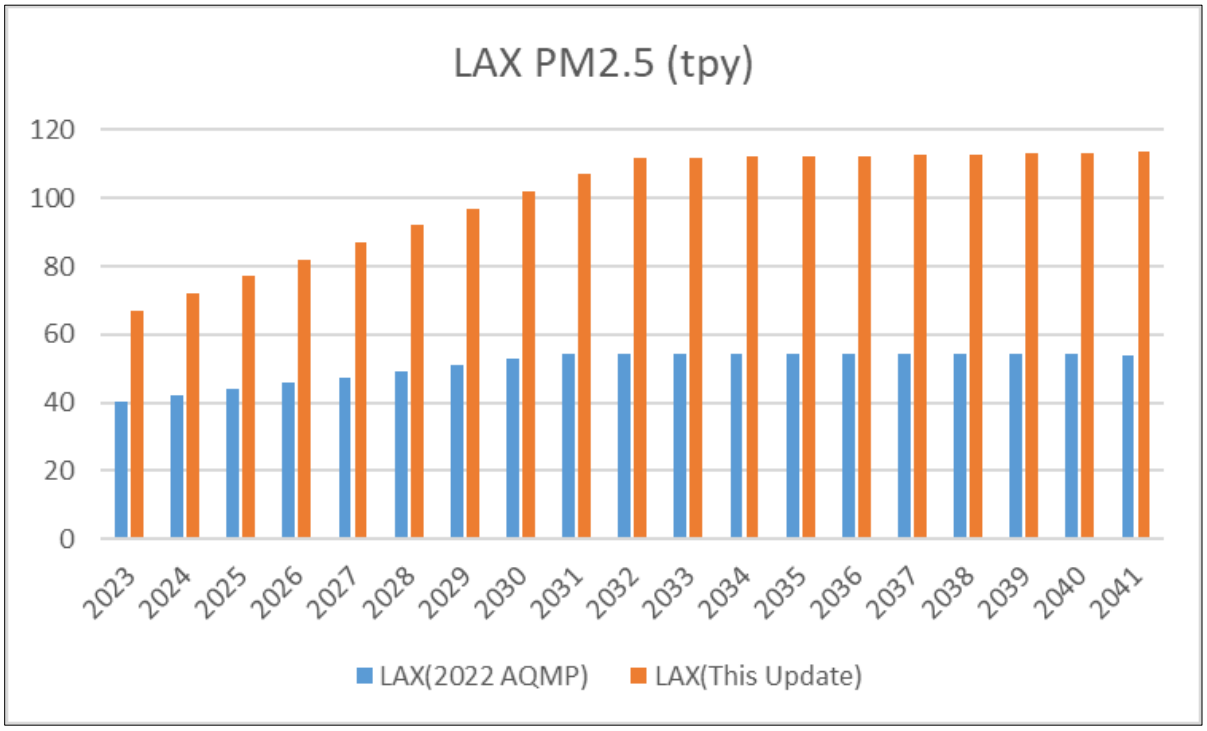

Fig A-9 – PM2.5 Emissions for Los Angeles International Airport

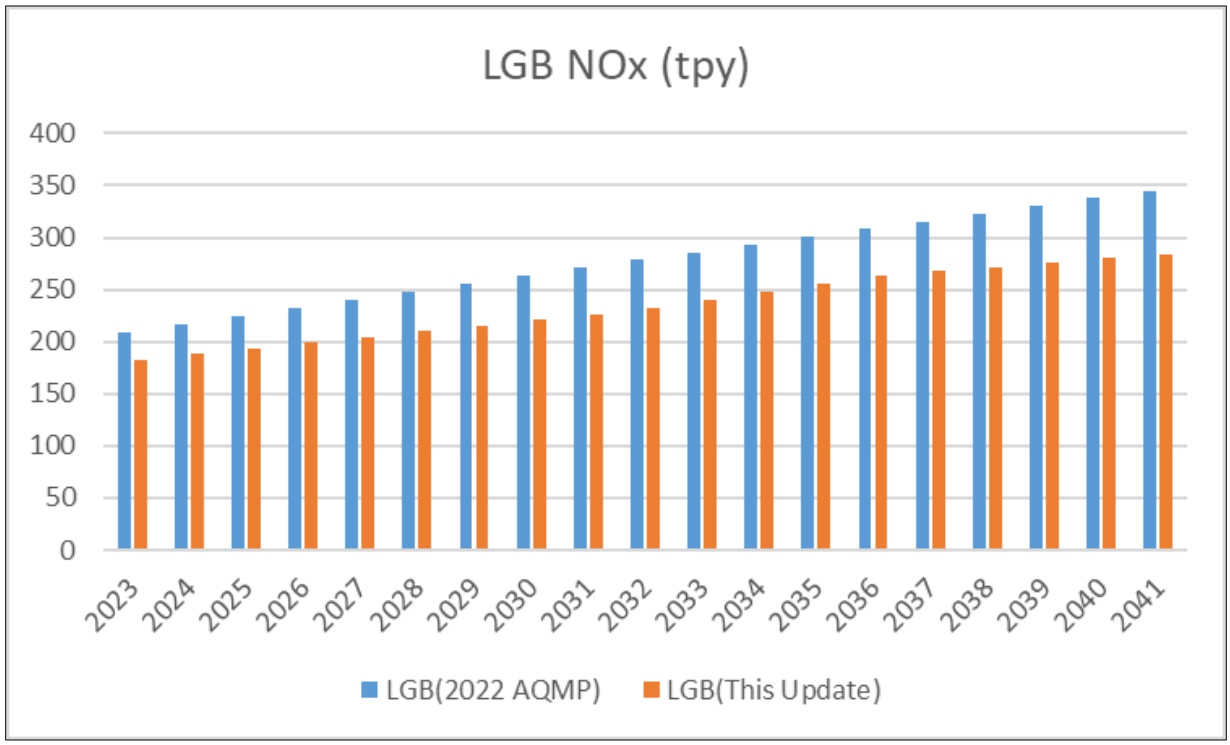

Fig A-10 – NOx Emissions for Long Beach Airport

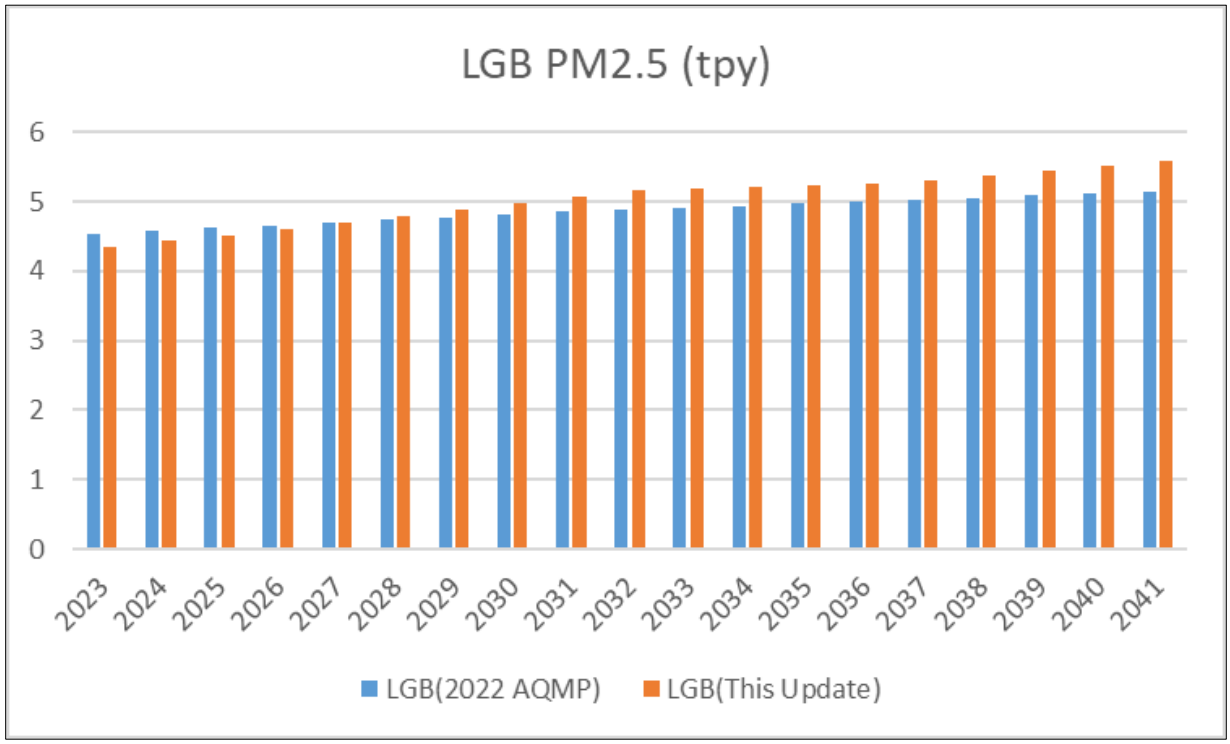

Fig A-11 – PM2.5 Emissions for Long Beach Airport

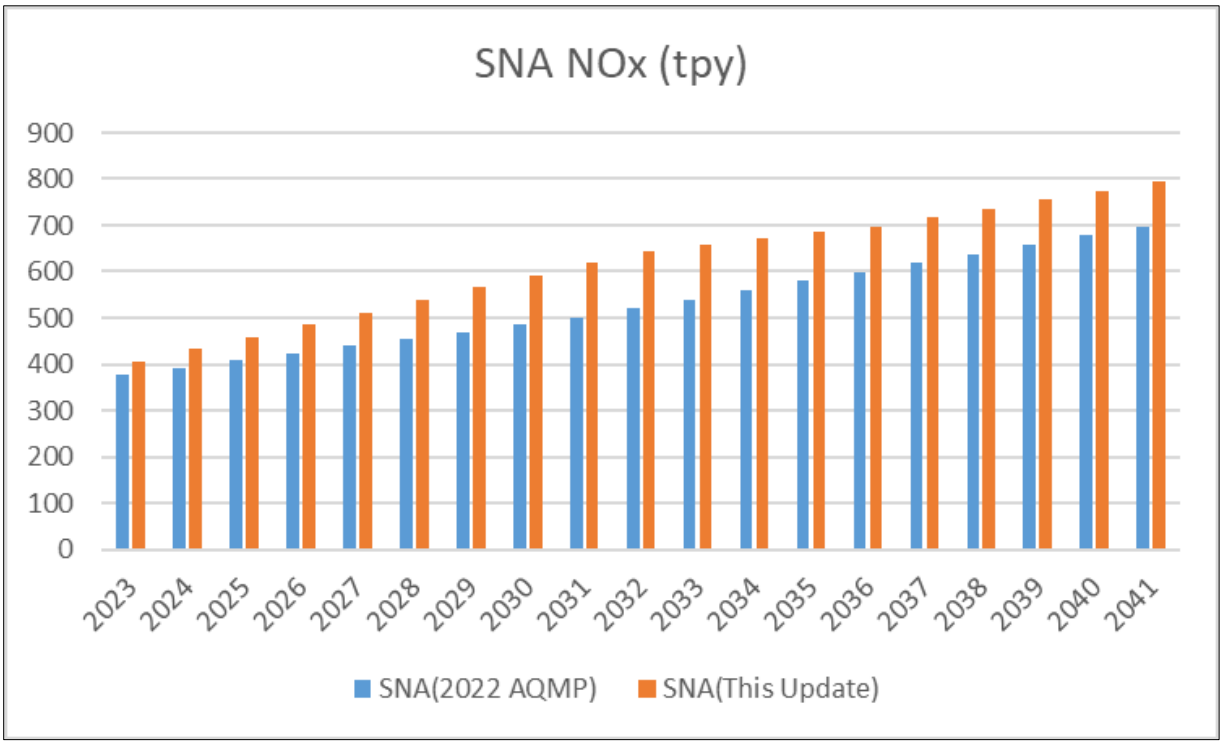

Fig A-12 – NOx Emissions for John Wane Airport

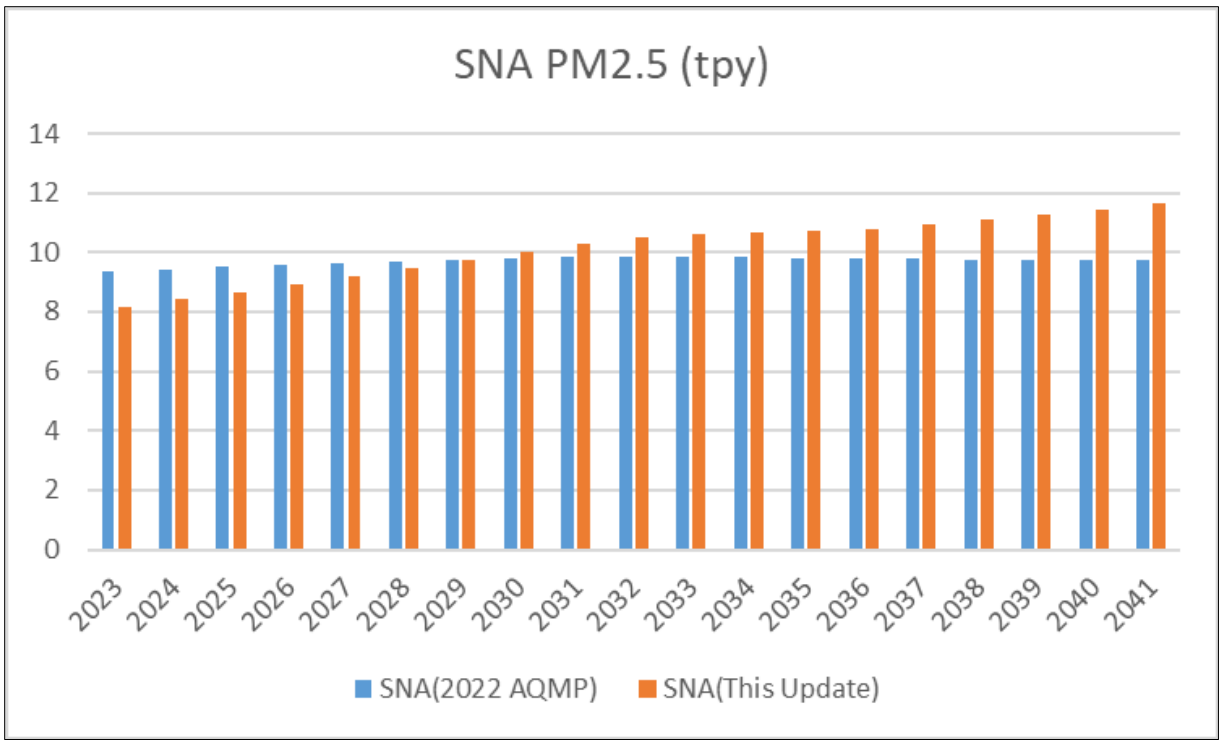

Fig A-13 – PM2.5 Emissions for John Wayne Airport

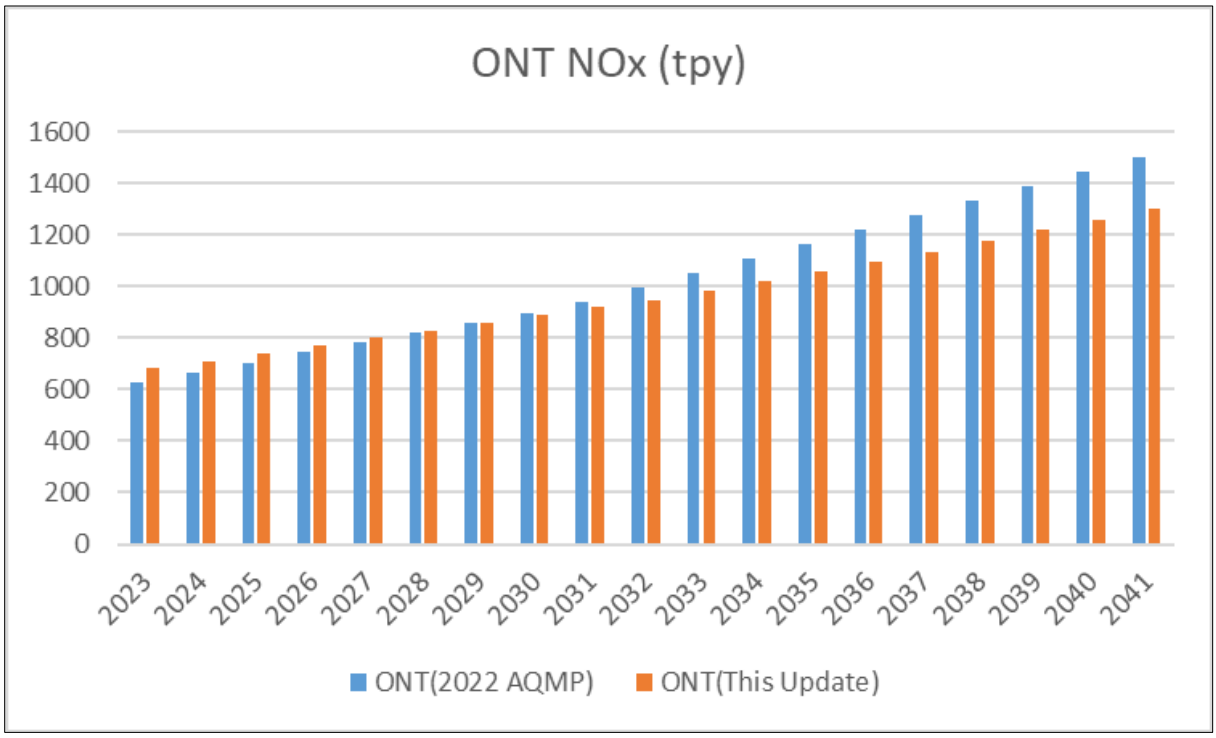

Fig A-14 – NOx Emissions for Ontario Airport

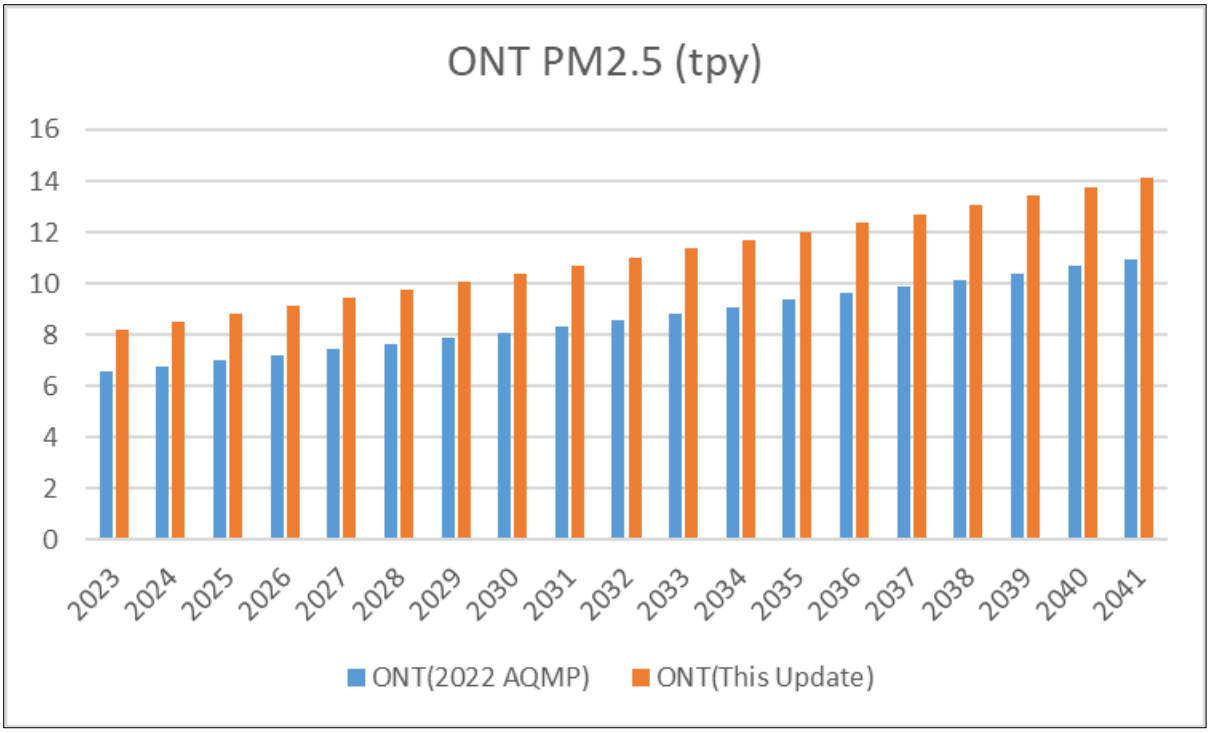

Fig A-15 – PM2.5 Emissions for Ontario Airport

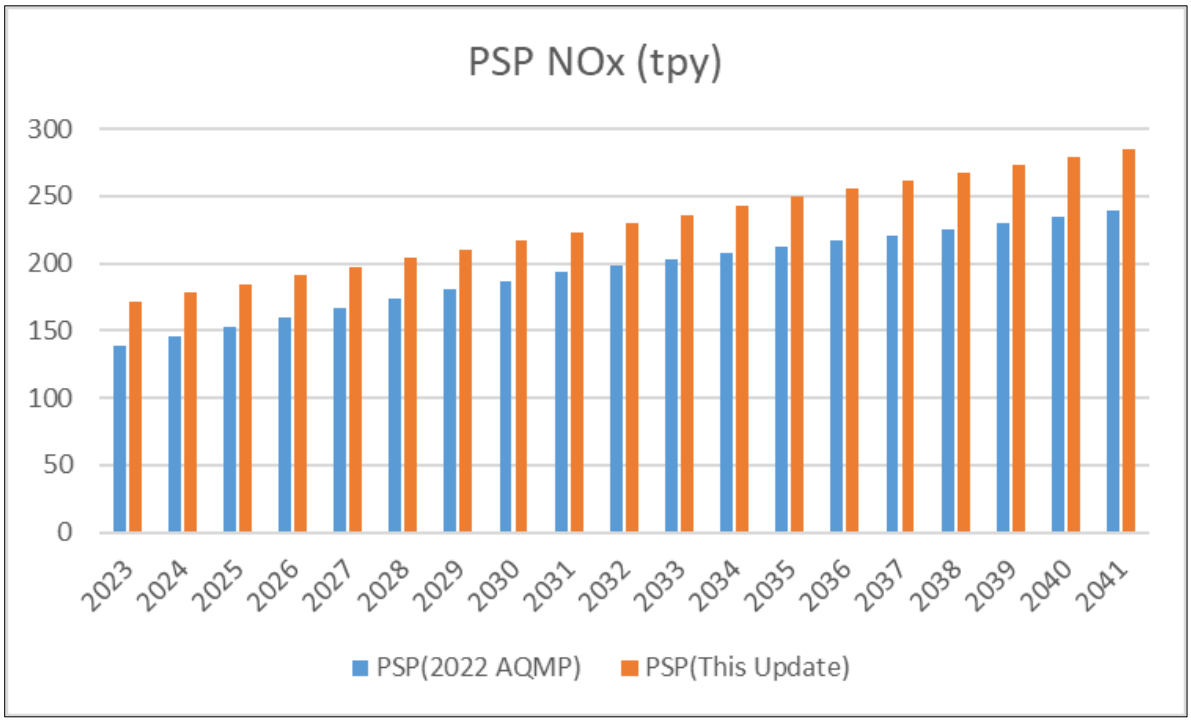

Fig A-16 – NOx Emissions for Palm Springs Airport

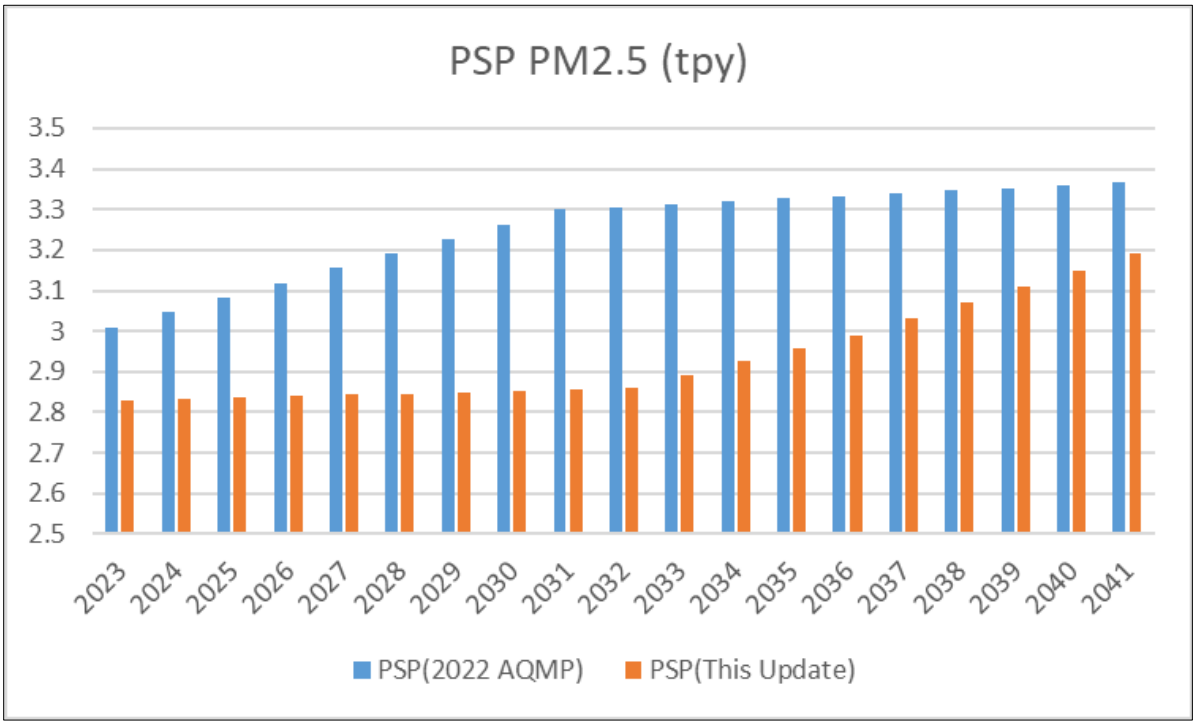

Fig A-17 – NOx Emissions for Palm Springs Airport

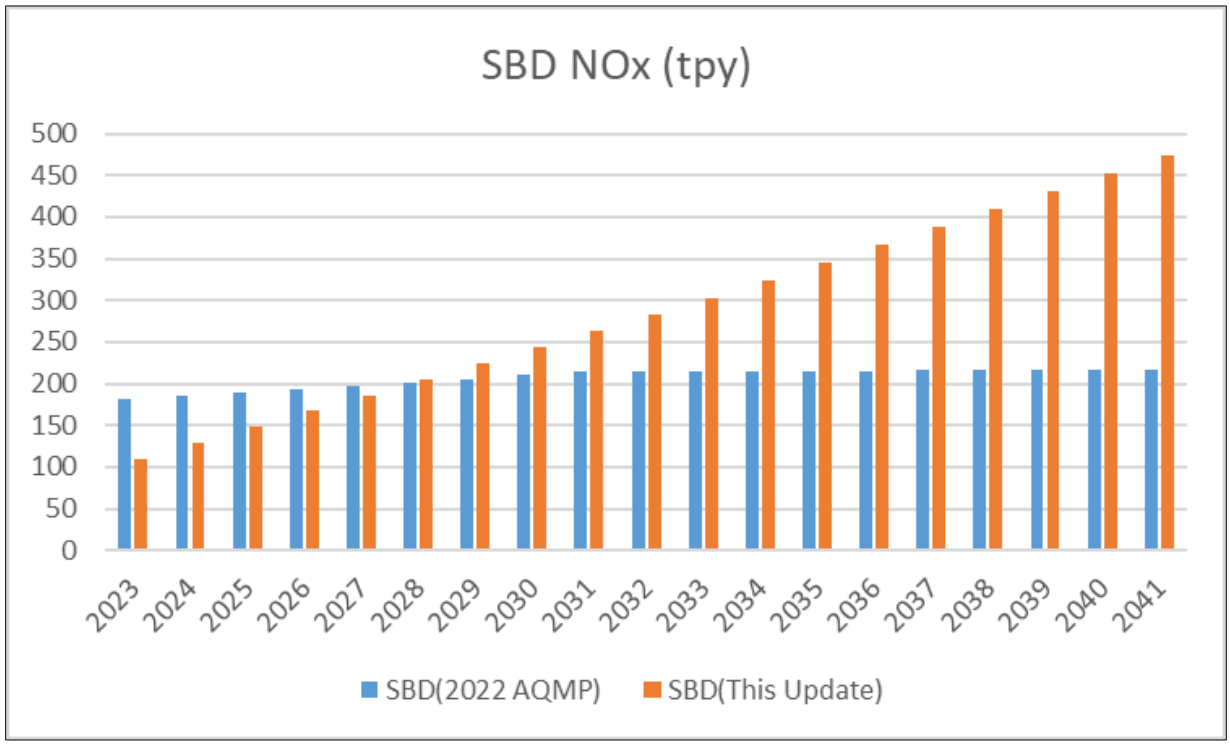

Fig A-18 – NOx Emissions for San Bernardino Airport

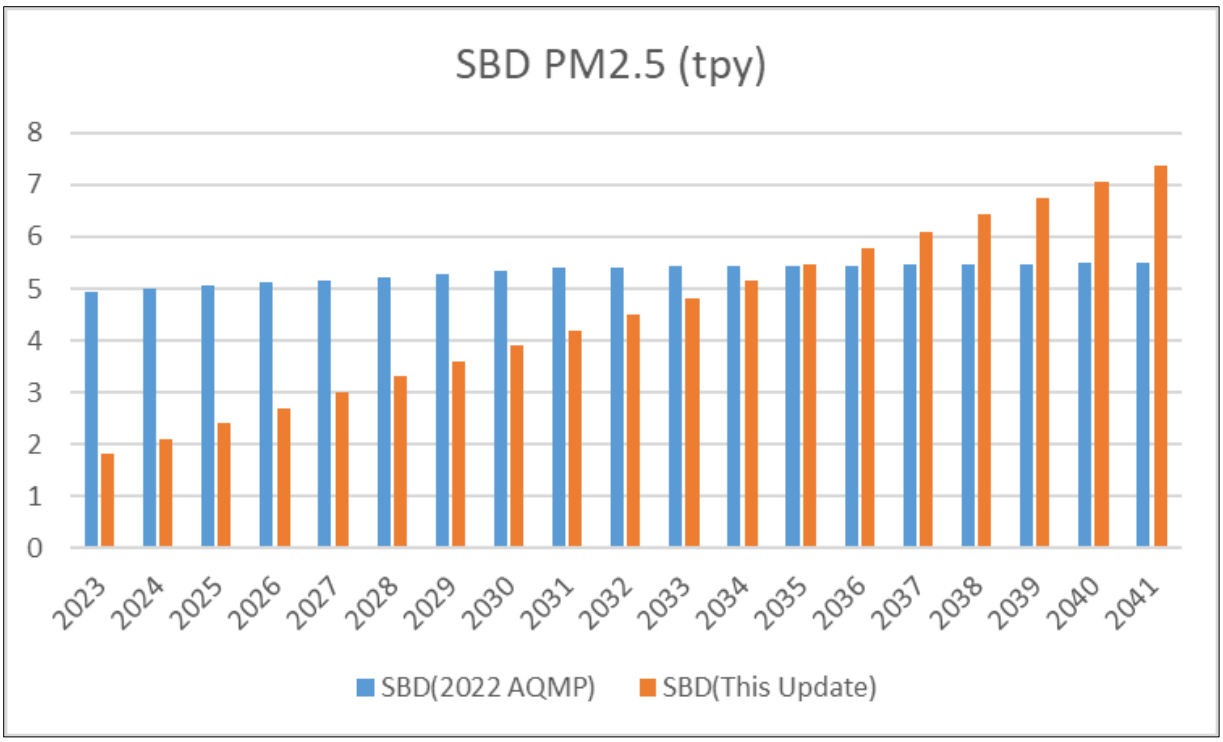

Fig A-19 – PM2.5 Emissions for San Bernardino Airport

Figures A-20 and A-22 provide a comparison of the military airports' operations as well as NOx and PM2.5 emissions between this inventory update and the 2022 AQMP inventory. Figures A-23 to A-28 present the NOx and PM2.5 emissions for each of the three military airports in this inventory update compared to the 2022 AQMP inventory.

This inventory update reflects the latest aircraft operations forecast for all three military airports which are lower than the 2022 AQMP Inventory for March Air Force Base (RIV) and Los Alamitos Army Air Base (SLI), as shown in Figure A-18. For San Clemente Island Naval Air Station (NUC), the operations forecasts are about the same. The latest detailed emissions calculations for all three military airports are also included in this inventory update which showed significantly higher NOx and PM2.5 emissions for March Air Force Base, lower NOx and higher PM2.5 emissions for Los Alamitos Army Air Base and slightly lower NOx and PM2.5 emissions for San Clemente Island Naval Air Station compared to the 2022 AQMP inventory. The main reason for the significantly higher emissions for March Air Force Base in this inventory update is the inclusion of all military aircraft operations and maneuvers below the mixing height. Also, the lower NOx and higher PM2.5 emissions for Los Alamitos Army Air Base in this inventory update are based on the detailed emissions calculations in this inventory update compared to the use of EPA's generic emission factors in the 2022 AQMP inventory.

It should be noted that the military aircraft emissions cover both landing and take-off cycles as well as flight operations cycles which account for all military aircraft maneuvers below the mixing height around the base. In addition, the civilian aircraft operations and emissions at these military airports represent a very small fraction of total aircraft operations and emissions.

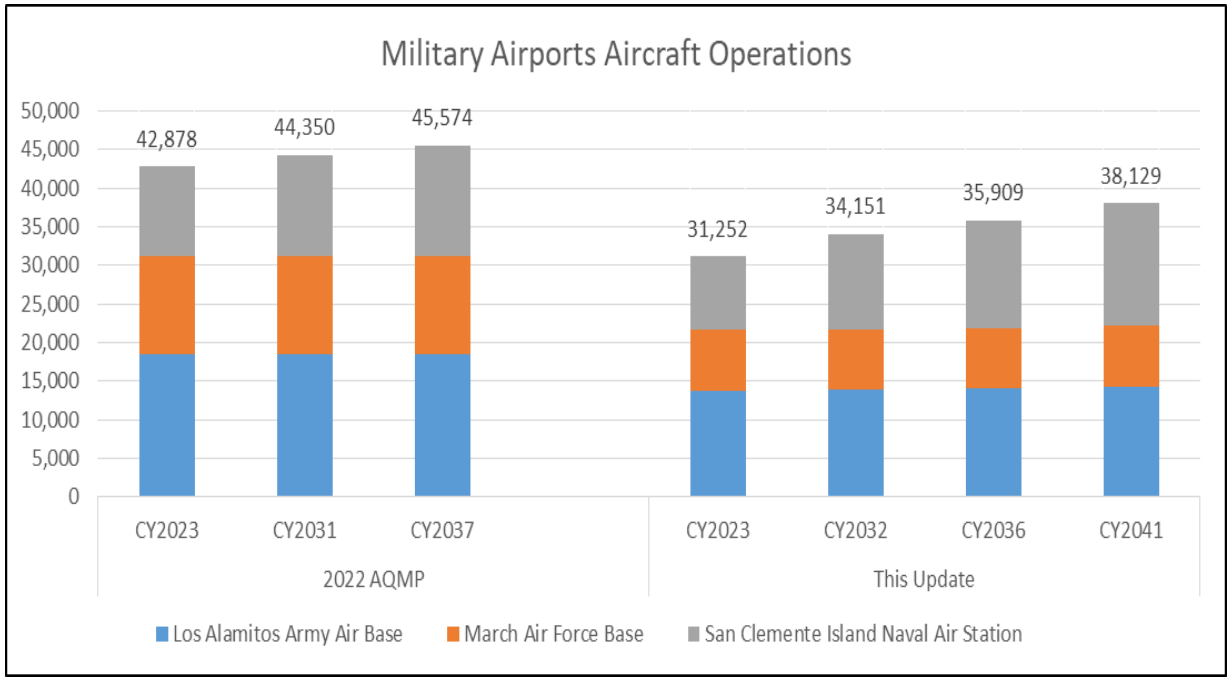

Figure A-20 – Total Aircraft Operations for Military Airports

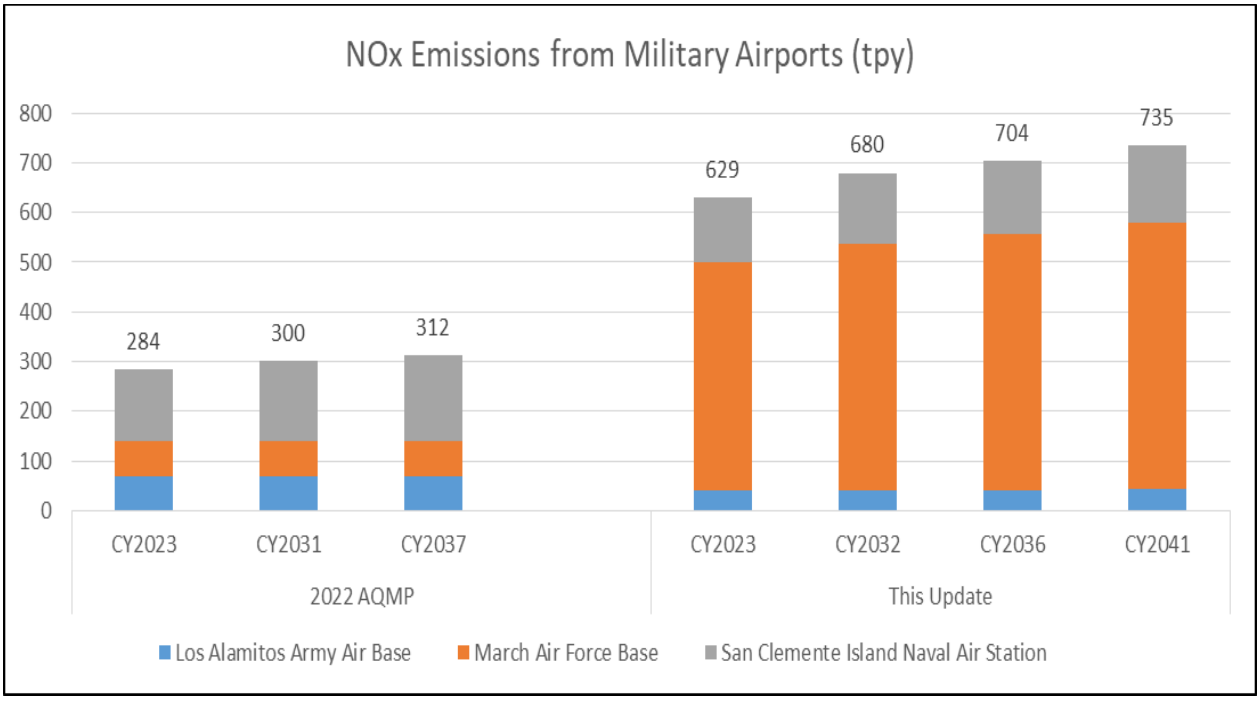

Figure A-21 – NOx Emissions from Military Airports

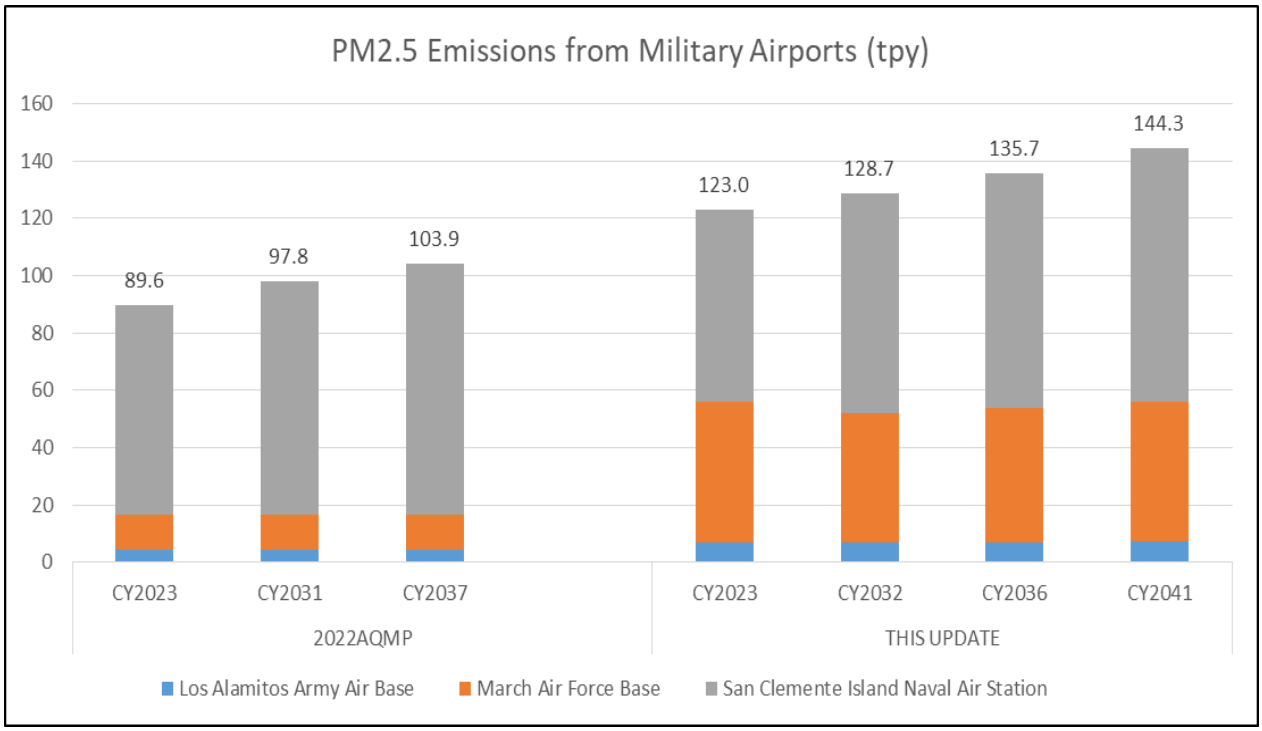

Figure A-22 – PM2.5 Emissions from Military Airports

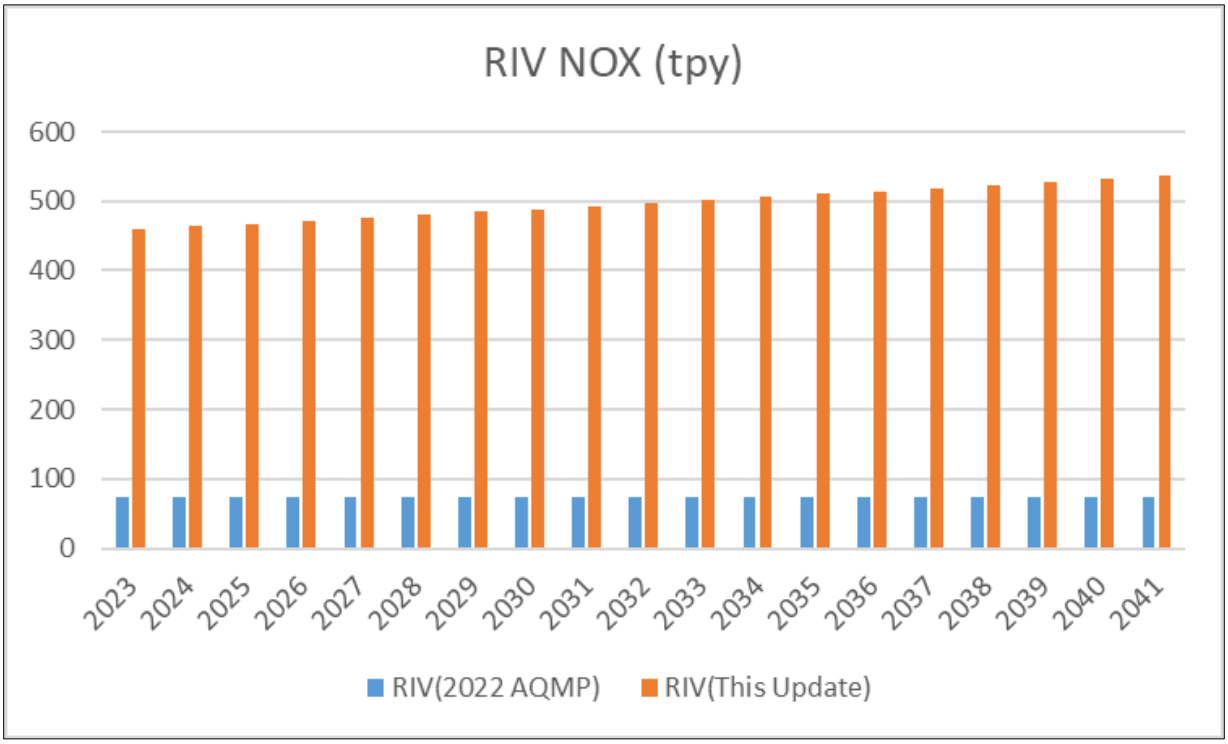

Fig A-23 – NOx Emissions for March Air Force Base

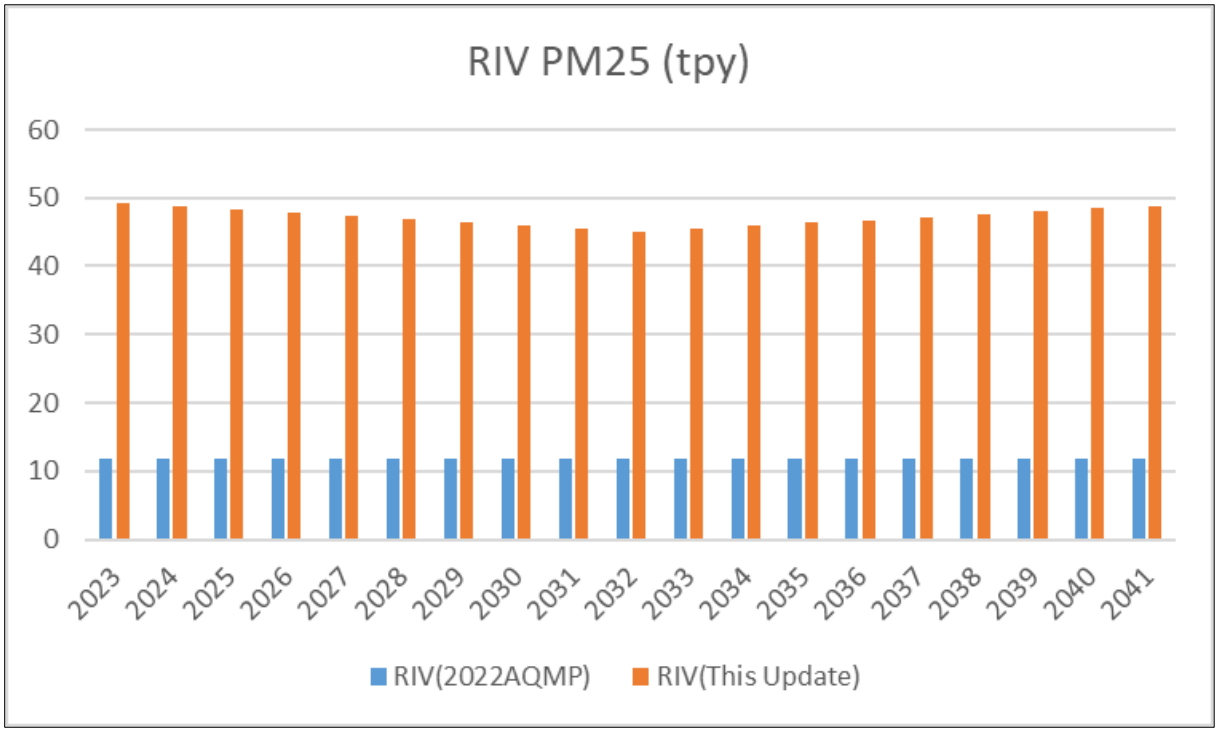

Fig A-24 – PM2.5 Emissions for March Air Force Base

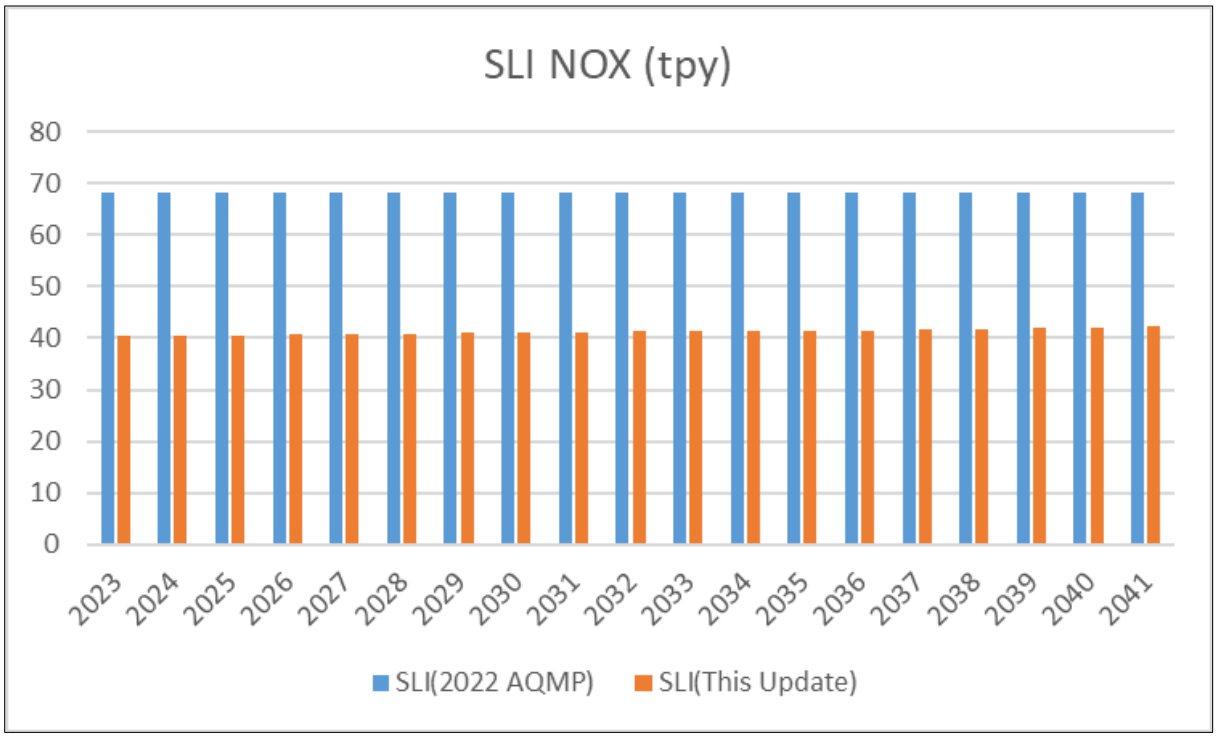

Fig A-25 – NOx Emissions for Los Alamitos Army Air Base

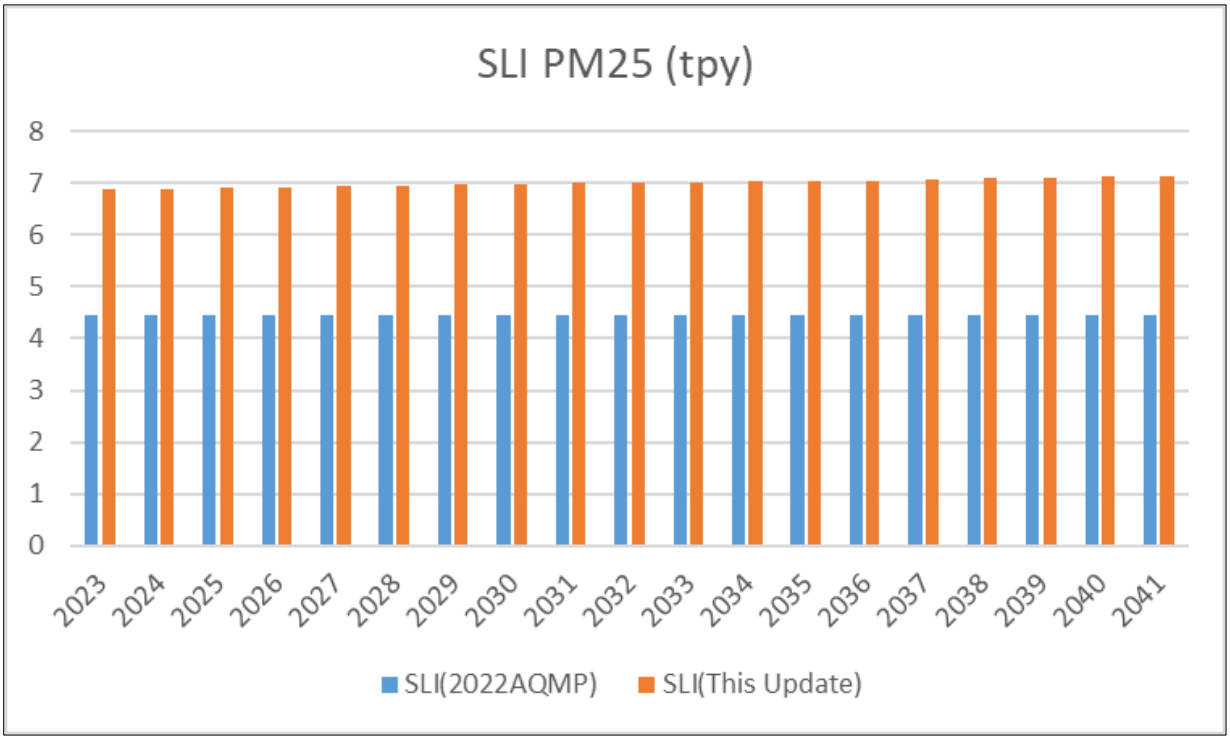

Fig A-26 – PM2.5 Emissions for Los Alamitos Army Air Base

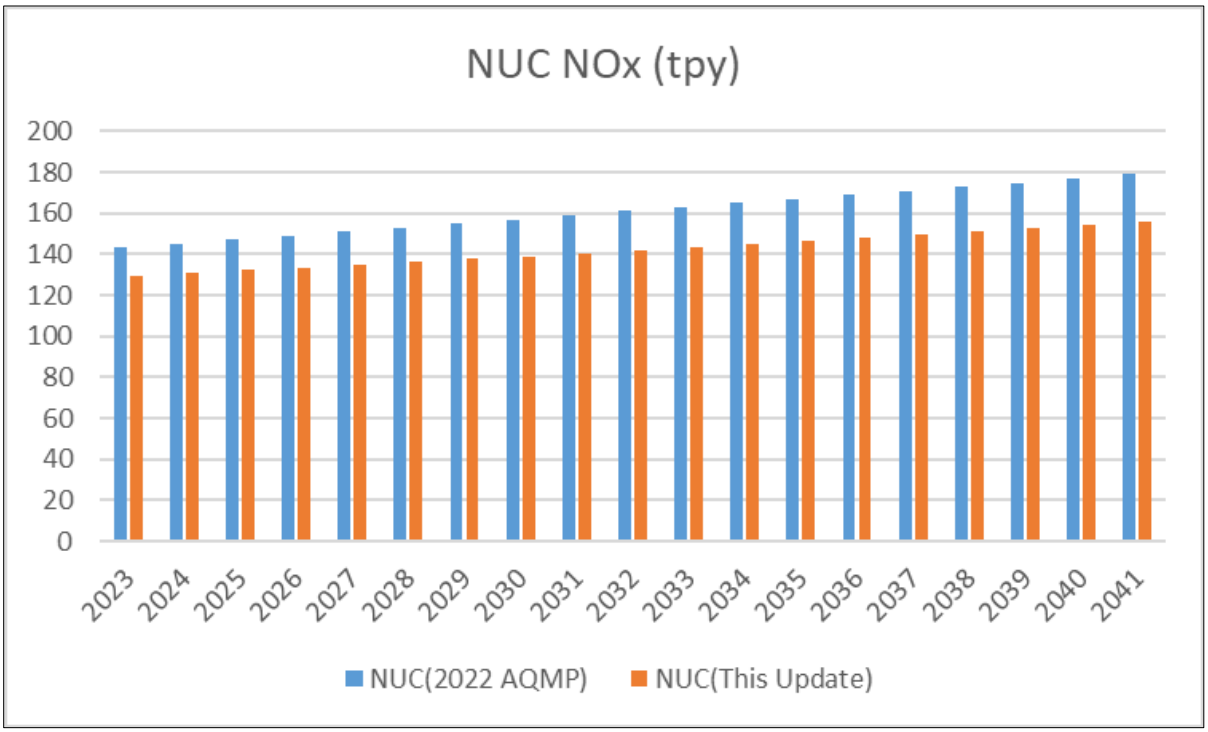

Fig A-27 – NOx Emissions for San Clemente Island Naval Air Station

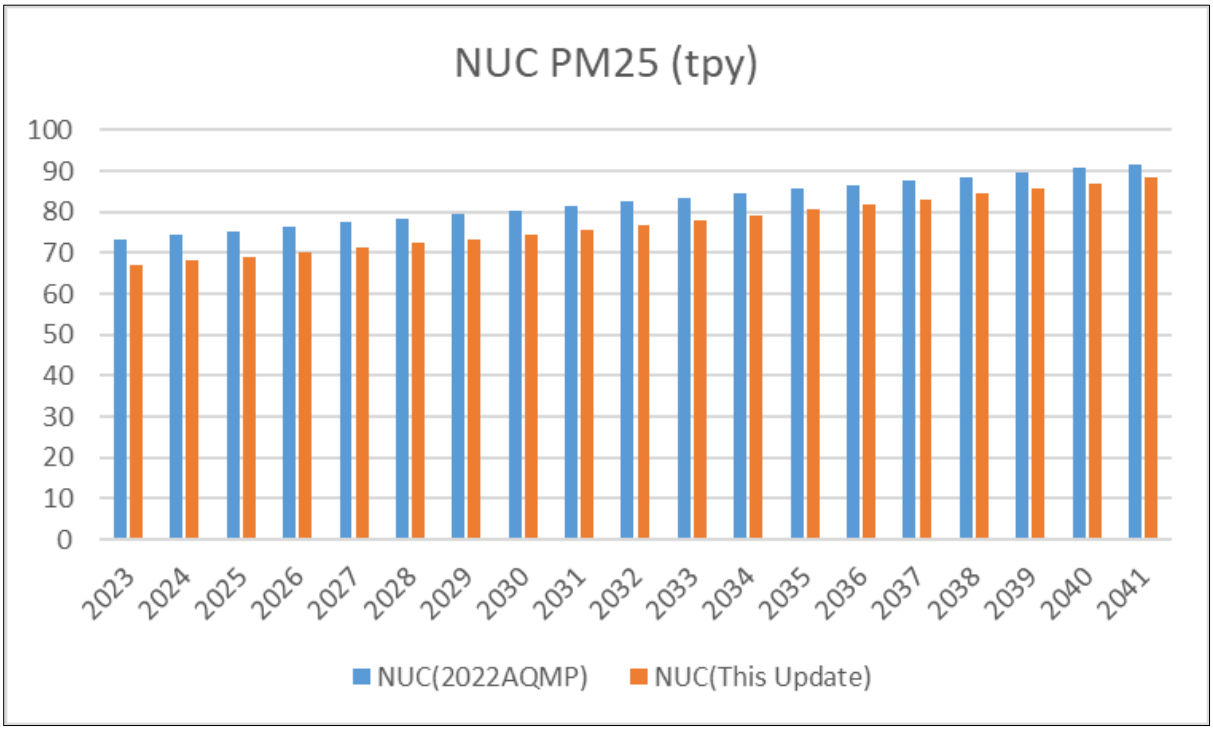

Fig A-28 – PM2.5 Emissions for San Clemente Island Naval Air Station

Figures A-29 and A-30 present the total NOx and PM emissions for 31 GA airports in this inventory update compared to the 2022 AQMP inventory. The major improvements for the majority of GA airports (27 GA airports) in this inventory update were the use of detailed aircraft operations data from the airport or the FlightAware (in conjunction with FAA's ATADS and TAF) and FAA's AEDT to estimate aircraft emissions compared to the use of EPA's generic emission factors. These improvements are reflected in Figures A-29 and A-30. For 4 very small GA airports without runway information in AEDT (63CA, L64, 54CL, L65), EPA's generic emission factors were still used in this inventory update. Van Nuys airport represents the vast majority of emissions from GA airports primarily because of the high number of air taxi and GA operations with jet engines (which have higher emission factors compared to piston engines). Figures A-31 to A-32 present the NOx and PM2.5 emissions for Van Nuys airport (VNY) in this inventory update compared to the 2022 AQMP inventory. The main reason for the significant difference in Van Nuys airport's emissions are the use of detailed aircraft operations and fleet mix data and AEDT in this inventory update and the use of EPA's generic average emission factors in the 2022 AQMP inventory.

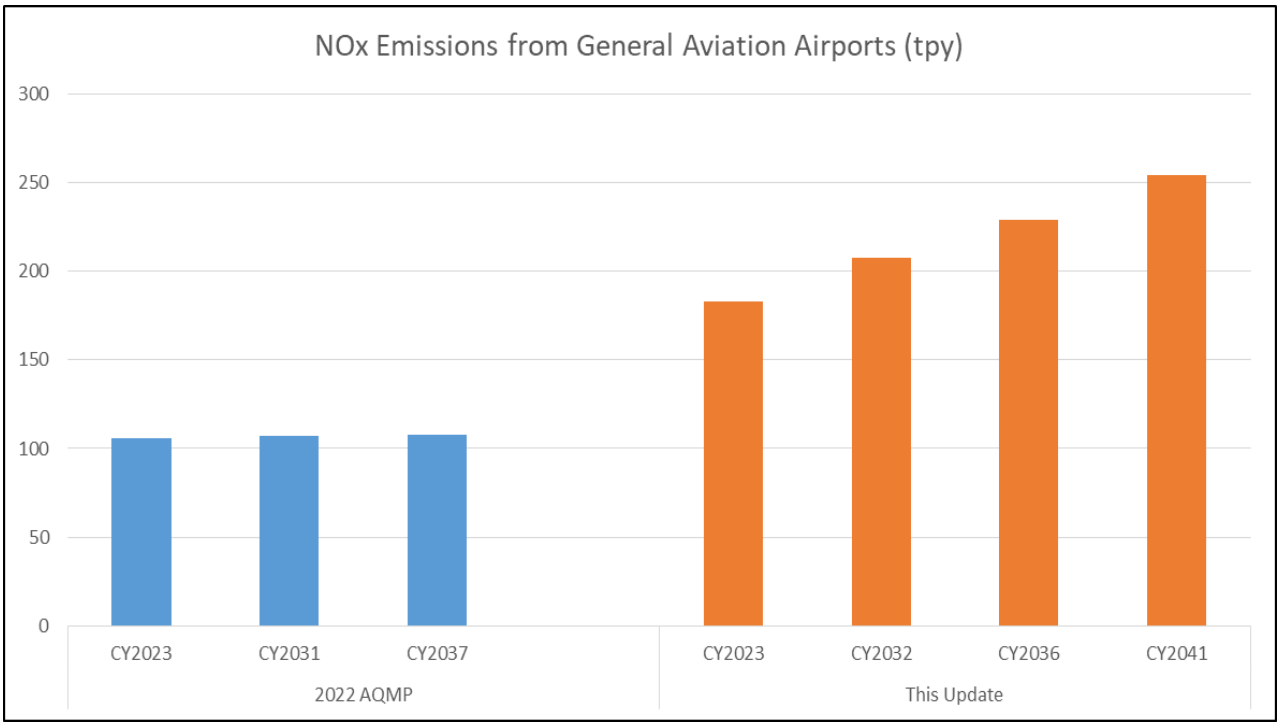

Fig A-29 – NOx Emissions from GA Airports

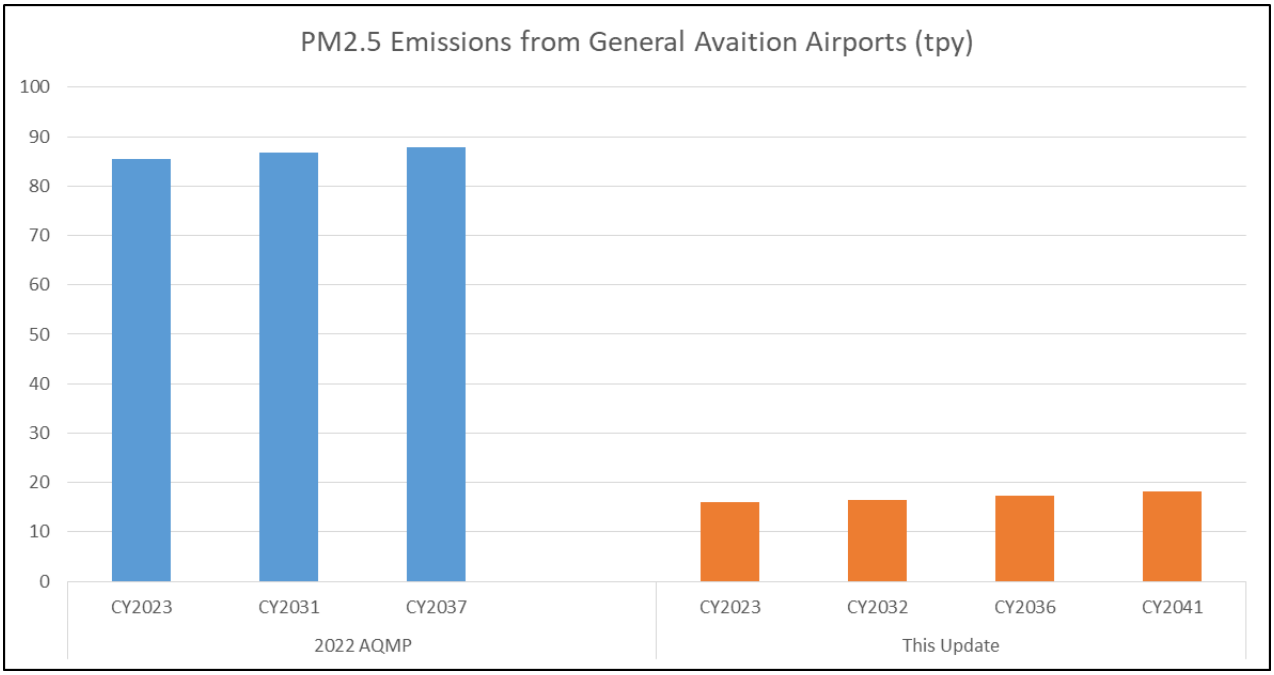

Fig A-30 – PM2.5 Emissions from GA Airports

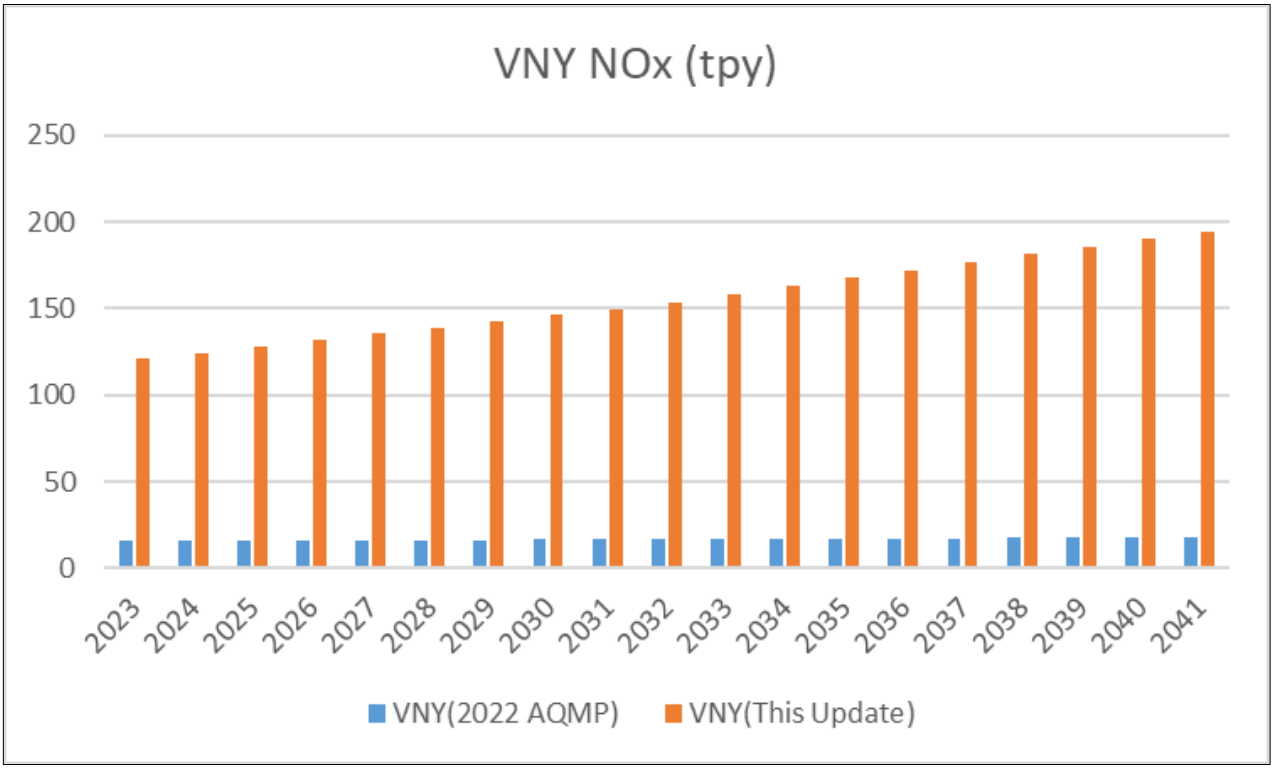

Fig A-31 – NOx Emissions for Van Nuys Airport

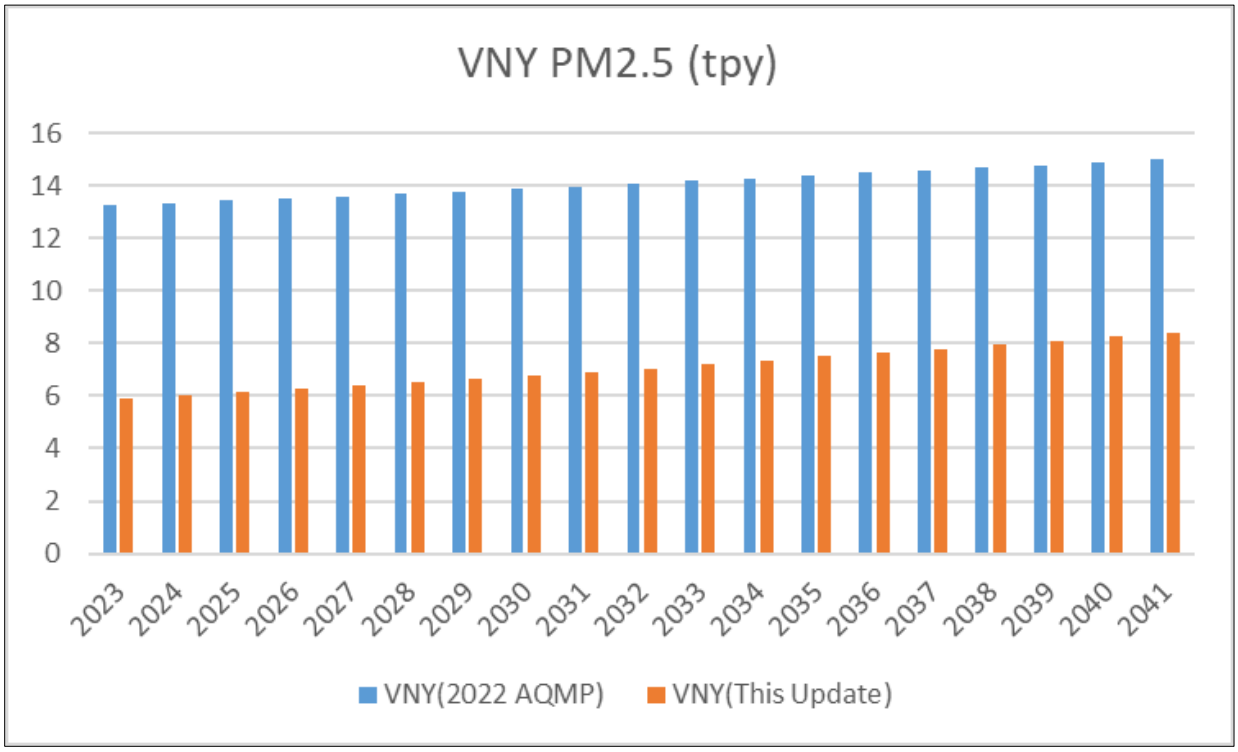

Fig A-32 – PM2.5 Emissions for Van Nuys Airport