DFW 19th Street Cargo Redevelopment Environmental Assessment

Draft Aircraft Emissions Technical Report

HMMH Project 03-13480.000

July 13, 2023

Prepared for:

Dallas-Fort Worth International Airport
DFW Airport, Texas 75261

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Acronyms

AAD ..... Average Annual Day
AEDT ..... Aviation Environmental Design Tool
AOA ..... Air Operations Area
APU ..... Aircraft Auxiliary Power Unit
ASPM ..... Aviation System Performance Metrics
CY ..... Calendar Year
DFW ..... Dallas Fort Worth International Airport
DNL ..... Day-Night Average Sound Level
EA ..... Environmental Assessment
EAD ..... Environmental Affairs Department
FAA ..... Federal Aviation Administration
FY ..... Fiscal Year
GHG ..... Greenhouse Gas
GSE ..... Ground Service Equipment
GWP ..... Global Warming Potential
IPCC ..... Intergovernmental Panel on Climate Change
LTO ..... Landing Takeoff Operation
NAA ..... No Action Alternative
NOMS ..... Noise and Operations Monitoring System
OPSNET ..... Operational Network
SWIM ..... System Wide Information Management
TAF ..... Terminal Area Forecast
TFMSC ..... Traffic Flow Management System

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1 Introduction

The cities of Dallas and Fort Worth, the owners of Dallas Fort Worth International Airport (DFW or Airport), propose the 19th Street Cargo Redevelopment Project (the project). The Proposed Action consists of the development of two new cargo buildings (Buildings 1 and 2) and associated landside surface parking and roadway modifications, new airside aircraft pavement, pavement and alignment modifications to various taxiways for aircraft ingress/egress, new Air Operations Area (AOA) fencing and access gates, a new fueling station, and all associated necessary utilities infrastructure, which includes demolition, relocation, and creation, as necessary for the project. One existing building would be demolished to enable development of Building 2. Additionally, the Proposed Action would generate five new widebody aircraft positions for Buildings 1 and 2 and improve the two existing hardstand positions. The proposed changes are expected to increase cargo operations at the airport. Since the proposed project would increase aircraft operations, an air quality and climate evaluation of aircraft operational emissions is required per Federal Aviation Administration (FAA) Orders 5050.4B and 1050.1F, which specify the procedures for evaluating aircraft and greenhouse gas emissions.

The purpose of this Aircraft Emissions Technical Report is to provide analyses and documentation to support the Environmental Affairs Department's (EAD) development of an Environmental Assessment (EA). The focus of this document is to present the findings of the Existing Conditions and any potential future impacts associated with the Proposed Action.

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2 Modeling Methodology

The following sections present the modeling methodology for the aircraft emissions analysis for the Existing, Future No Action, and Future Proposed Action Alternatives.

2.1 Aviation Environmental Design Tool

For an action occurring on, or in the vicinity of a single airport, or as part of an air traffic action, the FAA directs the use of the latest version of the Aviation Environmental Design Tool (AEDT) for aircraft emissions inventories and evaluations.

The aircraft emissions analysis for the EA uses AEDT Version 3e (released 9 May 2022). All AEDT modeling conducted for this study adheres to *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA.*[1] AEDT is a combined noise and emission model that uses a database of aircraft noise and performance characteristics. AEDT calculates air pollutant emissions from aircraft engines for air quality analyses, enables air quality calculations on a regional basis (as opposed to in the immediate airport environment only), and includes updated databases for newer aircraft models. The model also computes emissions from ground service equipment (GSE) associated with the aircraft movements.

The primary data input categories for the AEDT include the following:

- Airfield layout, which includes the coordinates of each runway centerline endpoint, runway widths, approach threshold crossing heights, and runway end elevations.
- Meteorological data, which refers to weather conditions affecting sound propagation and aircraft performance. AEDT's database of airports was accessed to obtain annual average daily DFW weather conditions. AEDT's airport database contains 10-year average meteorological data (from 2012 to 2021), which AEDT uses to adjust aircraft performance and sound propagation parameters from standard day conditions.
    - Temperature: 66.72° F
    - Station Pressure: 994.68 mbar
    - Sea Level Pressure: 1015.75 mbar
    - Dew point: 52.88° F
    - Relative humidity: 61.15%
    - Wind Speed: 9.31 knots
- Specific aircraft types in DFW's fleet mix, defined by airframe and engine type combinations. All aircraft types evaluated for the DFW modeling are either in the AEDT database or have approved substitutions within the model.
- Aircraft flight operations, which are numbers of Average Annual Day (AAD) aircraft operations by day-night average sound level (DNL) time periods and by aircraft type. Daytime is defined as 7:00 a.m. to 9:59 p.m., and nighttime is defined as 10:00 p.m. to 6:59 a.m. Departures and

[1] https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf

arrivals were the two types of flight operations modeled for the EA. Touch-and-go or circuit operations are not conducted at DFW.

- Aircraft noise and performance characteristics. The AEDT database contains noise and performance data for more than 300 different aircraft types. AEDT accesses the noise and performance data for takeoff, landing, and pattern operations by those aircraft. The database provides single-event noise levels for slant distances from 200 feet to 25,000 feet for several thrust or power settings for each aircraft type. Performance data includes thrust, speed, and altitude profiles for takeoffs and landings. For those aircraft types operating at DFW which are not directly represented in the AEDT database, the AEDT contains FAA-approved substitutions for noise modeling.
- Stage length, which is a surrogate for an aircraft's weight that varies according to its fuel load. Stage length is assigned according to each departure's trip distance to its destination, using city-pair information provided in the operations forecast. The assigned stage length then determines the appropriate flight performance profile from the AEDT database.
- Flight profiles, which are based on standard flight procedures for each aircraft type contained in the AEDT database. Information in the flight profiles describe the sequence of altitudes, thrust/power settings, and airspeeds for departure and arrival operations.
- Runway use, which is the allocation of flight operations to each runway, on an AAD basis, by DNL time periods, operation type, and aircraft type.
- Taxi Times, which define the average amount of time aircraft travel to or from the gate, travel across the taxiway system to or from the runway. These times also include the average amount of time aircraft wait for a departure or to arrive at a gate.
- Flight tracks and their usage. A flight track is the two-dimensional projection of the aircraft's three-dimensional flight path onto the ground. A modeled flight track represents one or more actual flight tracks. Modeled flight tracks for a given flight corridor typically consist of a backbone track and sub-tracks which represent the average location and dispersion of the actual flights in the corridor. Each backbone flight track typically represents a general heading for departures or originating point for arrivals. As each runway usually has multiple headings and originating points, the distribution of operations, or track use, on an AAD basis, must be specified. Operations are further spread on backbone tracks and sub-tracks via distribution percentages on an AAD basis.
- GSE, which supports each arrival and departure operation. The AEDT contains a database of GSE, fuel types, time in use, etc. AEDT default GSE equipment was used for all of the non-project specific aircraft operations.
- Aircraft Auxiliary Power Units (APUs) are smaller engines that many aircraft have, which are used when the aircraft are parked at the gate. The AEDT contains a database of these engines, and the default operating times (26 minutes) were used for each landing-takeoff operation (LTO).

3 Aircraft Operational Emissions

This section provides the description of aircraft operations at DFW used for the development of existing and future emission inventories. The modeled operational data for the Existing Condition and Future Alternatives is based on the Fiscal year (FY) and then adjusted to reflect the calendar year as required for reporting. The operational emissions data was prepared using existing and forecast operational data for DFW and AEDT Version 3e in compliance with FAA Order 1050.1F and FAA Order 5050.4B. Aircraft operational emissions estimated for this analysis include emissions below the default AEDT 3,000 feet mixing height and include:

- Start up
- Taxi out
- Climb below the mixing height
- Descend below the mixing height
- Taxi In
- GSE for landing and takeoff
- APUs

3.1 Existing Condition Operations

The existing aircraft emission inventory for DFW was evaluated based upon the Existing Condition aircraft operations and the associated airport operational characteristics. FY 2022, a 12-month period spanning October 1, 2021, through September 30, 2022, was identified as the baseline year and source of data to develop the Existing Condition dataset.

Radar data from DFW Noise and Operations Monitoring System (NOMS) and the FAA's Operational Network (OPSNET) operational data for FY 2022 were used to determine the Existing Condition. The radar data provided the aircraft fleet mix and runway use. The fleet mix developed from the DFW NOMS data was grouped into FAA operational categories (Air Carrier, Air Taxi, and General Aviation), and the totals were scaled to match the tower count for that period. During the Existing Condition period, 663,426 annual operations occurred at DFW. Due to the low numbers of military aircraft and the absence of dominant military aircraft types, the military operations were distributed into the Air Carrier and General Aviation categories based on an analysis of the sizes of military aircraft reported by the FAA's Traffic Flow Management System Counts (TFMSC) for the same period. Approximately 40 percent were distributed into Air Carrier operations, and the remaining 60 percent were distributed into General Aviation operations. **Table 1** presents the annual operations modeled in the AEDT for the Existing Condition, as well as the FAA OPSNET operations for comparison. **Table 2** provides the average daily operations, by aircraft type, that were used in AEDT for the Existing Condition. The average daily number of aircraft arrivals and departures for the Existing Condition Noise Contour are calculated by determining the total annual operations and dividing by 365 (days in a year).

Table 1. Existing Condition Operations

Source: FAA OPSNET, HMMH 2023

Category	Air Carrier	Air Taxi	General Aviation	Military	Total
FAA OPSNET (FY 2022)	585,862	71,205	6,189	170	663,426
Existing Condition (FY 2022)	585,963	71,205	6,258	0	663,426

Notes: Military data was split between Air Carrier and General Aviation.
Totals may not match exactly due to rounding.

Table 2. DFW Modeled AAD Aircraft Operations for the Existing Condition (FY2022)

Source: DFW NOMS, HMMH, 2023

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	**Jet**	737700	13	<1	14	10	4	14	28
		737800*	161	10	171	162	9	171	342
		7378MAX	3	<1	3	3	<1	3	6
		747400	2	1	3	2	1	3	6
		747400RN	<1	<1	<1	<1	<1	<1	<1
		7478	1	<1	2	1	<1	2	3
		757PW	<1	2	3	<1	2	3	5
		757RR	<1	3	4	<1	3	4	8
		7673ER	5	2	8	5	3	8	15
		777200	5	2	7	7	<1	7	14
		777300	3	1	4	2	2	4	8
		7773ER	4	<1	4	3	<1	4	8
		7878R	3	<1	4	3	<1	3	7
		7879	11	2	13	13	<1	13	26
		A300-622R	2	2	4	1	3	4	8
		A319-131	82	3	84	80	4	84	168
		A320-211	13	2	15	13	2	15	30
		A320-232	23	5	28	23	5	28	55
		A320-271N	11	3	14	12	2	14	27
		A321-232	160	18	178	163	15	178	356
		A350-941	<1	0	<1	<1	<1	<1	2
		A380-841	1	0	1	1	0	1	2
		DC1010	<1	<1	<1	<1	<1	<1	<1
		MD11GE	1	<1	2	1	<1	2	4
		MD11PW	2	<1	2	2	<1	2	5
	Regional Jet	CRJ9-ER	126	5	131	123	8	131	263
		EMB170	90	3	93	85	8	93	186
		EMB175	9	<1	10	9	<1	10	20
	Subtotal		**733**	**70**	**803**	**727**	**76**	**803**	**1,605**
Air Taxi	**Jet**	CNA680	<1	<1	<1	<1	<1	<1	2
		EMB14L	89	3	92	88	4	92	184
	Non-jet	1900D	1	<1	1	<1	<1	1	2
		CNA208	2	<1	2	2	<1	2	5
		DHC6	1	<1	1	<1	<1	1	3
	Subtotal		**93**	**4**	**98**	**92**	**6**	**98**	**195**
General Aviation	**Jet**	CL600	<1	<1	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	<1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	<1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	<1	<1	<1	<1	<1	<1	<1
		GV	<1	0	<1	<1	<1	<1	<1

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
		LEAR35	<1	<1	<1	<1	<1	<1	<1
	Non-jet	CNA208	6	<1	6	6	<1	6	12
	Subtotal		**8**	**<1**	**9**	**8**	**<1**	**9**	**17**
Grand Total			**835**	**74**	**909**	**827**	**82**	**909**	**1,818**

Notes: Totals may not match exactly due to rounding.
*ANP Type 737800 represents both B738 and B739 operations, which account for 97 percent and 3 percent, respectively.

3.1.1 Runway Utilization

DFW has two main runway complexes, the east side and west side, and are comprised of seven runways, four to the east and three to the west. Aircraft typically arrive on the outermost main north/south runways as well as some of the outboards and depart on the innermost runways main north/south runways (inboards). DFW typically uses its north/south runways for most arrivals and departures. Historic data shows that DFW is operated in one of two main operating configurations: south flow (departing to the south and arriving from the north) approximately 70 percent and north flow (departing to the north and arriving from the south) approximately 30 percent. Aircraft normally take off and land into the wind. However, runway end utilization can also be affected by aircraft type, type of activity, and if applicable any airport runway use plans.

FY 2022 runway utilization data was used to represent the Existing Condition. The 2022 usage was normalized to the historical north flow (30 percent), south flow (70 percent) split. **Table 3** summarizes the percentage developed from the DFW NOMS radar data that each runway was used for departures and arrivals. This data was used to model the Existing Condition and generate the Existing Conditions Noise Contour. For the runway use assignment, the outboard runways (Runways 17L/35R, 13R/31L and 13L/31R) were open until 11.00 p.m. The runway percentage use for day and night includes the assumption that the outboard runways (Runway 17L/35R, 13L/31R and 13R/31L) are not typically used after 10 p.m. or before 6 a.m. Nighttime operations[2] runway utilization includes the predominant use of the main runways for arrivals and departures. **Table 3** provides the breakdown by time of day for arrivals and departures.

Table 3. DFW Runway Utilization Summary – Existing Condition (FY2022)

Source: DFW NOMS, HMMH, 2023

Runway ID	Arrival Percent			Departure Percent		
	Day	Night	Total	Day	Night	Total
13L	<1%	0%	<1%	<1%	<1%	<1%
13R	4%	<1%	3%	<1%	0%	<1%
17C	27%	32%	27%	<1%	1%	<1%
17L	11%	1%	10%	<1%	0%	<1%
17R	<1%	7%	<1%	38%	32%	38%
18L	<1%	4%	<1%	31%	30%	31%
18R	28%	25%	28%	<1%	6%	<1%
31L	<1%	0%	<1%	<1%	<1%	<1%

[2] The FAA defines nighttime operations as 10:00 p.m. to 6:59 a.m.

Runway ID	Arrival Percent			Departure Percent		
	Day	Night	Total	Day	Night	Total
31R	1%	<1%	<1%	<1%	0%	<1%
35C	11%	14%	11%	<1%	<1%	<1%
35L	<1%	3%	<1%	16%	14%	16%
35R	5%	<1%	5%	<1%	0%	<1%
36L	12%	11%	12%	<1%	3%	<1%
36R	<1%	1%	<1%	14%	13%	14%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

3.1.2 Taxi-Time Data

Average taxi-time by runway end was obtained from the FAA Aviation System Performance Metrics (ASPM) database for FY 2022 and was used to represent the Existing Conditions and to supplement the No Action Alternative (NAA) taxi-times. As shown in **Table 4,** the taxi-times are shown in minutes and with an overall taxi-in time of 11.2 minutes and taxi-out time of 17.8 minutes per operation.

Table 4. DFW Taxi Time Summary – Existing Condition (FY2022)

Source: FAA ASPM, May 2023

Runway	Departure	Arrivals
	Average Taxi-Out Minutes	Average Taxi-In Minutes
Overall	**17.8**	**11.2**

3.2 Operational-Related Emissions

Aircraft-related emissions were generated in the model based on the FY year data; however, for reporting, calendar year (CY) data is required. The FY emission results were adjusted to CY by comparing the modeled operations to the total reported operations for CY2022 and applying an adjustment factor as shown in **Table 5**. The CY operations for 2022 were slightly less than the FY; therefore, the emission results are slightly lowered than modeled.

Table 5. Fiscal Year to Calendar Year Adjustment

Source: FAA OPSNET, HMMH, 2023

Year	FY2022	CY2022	Adjustment
2022	663,426	656,676	0.989826

Total operational emissions are from aircraft operations, GSE, and APUs. AEDT default data for APU and GSE equipment and duration was used in the modeling. The Existing Condition emission inventory provides aircraft emissions associated with taxi-in, taxi-out, and in-flight operations below the mixing height (AEDT default 3,000 feet). **Table 6** provides the operational emissions for all operations for the Existing Condition.

Table 6. Total Operational Emissions for Existing Condition (CY2022)

Source: HMMH, 2023

Calendar Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
2022	Aircraft	2,939.35	3,494.54	388.17	390.21	324.66	33.13	33.13	874,558.58	342,894.32
	GSE LTO	556.19	55.43	20.56	19.64	0.39	3.09	3.30	0.00	0.00
	APU	112.09	115.01	9.48	9.53	15.99	16.05	16.05	0.00	0.00
	Total	3,607.63	3,664.98	418.21	419.38	341.04	52.27	52.48	874,558.58	342,894.32

Note: These emissions are based on the aircraft operations in **Table 2**.

3.3 Forecast Operations

The proposed project would be complete and operational in 2025, which represents the project implementation year and 2030 is included as the year of implementation plus five years.

The FAA 2021 Terminal Area Forecast (TAF) released in March 2022 for DFW was used for the forecast. The FAA TAF includes the effects of the COVID-19 pandemic on the future forecast for the airport. Using the FAA 2021 TAF data, DFW developed a forecast to cover the two future years of the EA. Since the initial development of the forecast, which used the FAA's 2021 TAF, the FAA released its updated 2022 TAF. The 2022 TAF forecasted fewer operations than the 2021 forecast, with approximately 5 percent fewer operations in the near term (late 2020s) and 2 percent fewer in the out years (2030s). DFW has seen a consistent growth trend in its annual operations and enplaned passengers. It has also recovered from the pandemic more quickly than other large hub airports. Given DFW's recovery, as evidenced by robust operational rankings and a review of the 2022 TAF which reflects lower growth levels, DFW determined that the 2021 TAF is more relevant to the existing and anticipated operating environment. The growth rate within the 2021 TAF more accurately mirrors DFW's recovery from the COVID-19 pandemic and DFW's anticipated future growth. The FAA approved forecast[3] is based on the TAF therefore the future year operational levels are also based on the FY and will be adjusted to CY results for reporting.

Similar to the Existing Condition, approximately 40 percent of the military operations were distributed into Air Carrier operations, and the remaining 60 percent were distributed into General Aviation operations. This is shown in the AAD counts for each alternative in **Table 7**.

The proposed project would add 7,300 additional annual cargo operations in the proposed implementation year of 2025 and in the year of implementation plus five years (2030) as well. This resulted in the totals for each category and each future year listed in **Table 7**.

[3] The approved forecast is provided in EA Appendix K

Table 7. Forecast NAA and Proposed Action Alternative Operations

Source: FAA 2021 TAF, Centurion Planning and Design, HMMH, 2023

Alternative	Modeling Scenario	Air Carrier	Air Taxi	General Aviation	Military	Total
No Action	FY2025	753,559	40,796	6,343	213	800,911
	AAD FY2025	2,064.8	111.8	17.7	0.0	2,194.3
Proposed Action	FY2025	760,859	40,796	6,343	213	808,211
	AAD FY2025	2,084.8	111.8	17.7	0.0	2,214.3
No Action	FY2030	779,846	24,187	6,442	213	810,688
	AAD FY2030	2,136.8	66.3	18.0	0.0	2,221.1
Proposed Action	FY2030	787,146	24,187	6,442	213	817,988
	AAD FY2030	2,156.8	66.3	18.0	0.0	2,241.1

3.3.1 Future (2025) No Action Alternative

Under the 2025 No Action Alternative (NAA), there would be no changes to the use of the 19th facility at DFW. Cargo operations would be constrained due to lack of sufficient facilities, and overall operational levels would grow to almost 801,000 operations.

3.3.1.1 Aircraft Activity Levels and Fleet Mix

The 800,911 annual operations translate to 2,194 AAD operations to be modeled for the FY2025 NAA emission inventory. **Table 8** provides representative aircraft and engine combinations and the number of average daily operations that were modeled in AEDT for the Future (FY2025) NAA. The future fleet mix includes a reduction in Air Taxi fleet operations (reduction in 50 seat and smaller regional jets) and the phase out of DC10 operations compared to the Existing Condition.

Table 8. DFW Modeled AAD Aircraft Operations for FY2025 NAA

Source: FAA TAF, Centurion Planning and Design, HMMH, 2023

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	**Jet**	737700	63	3	66	57	9	66	132
		737800*	214	13	227	216	11	227	454
		7378MAX	19	1	21	19	1	21	41
		747400	3	<1	4	3	<1	4	8
		747400RN	<1	<1	<1	<1	<1	<1	<1
		7478	1	<1	2	2	<1	2	5
		757PW	<1	1	2	<1	2	2	4
		757RR	<1	2	3	<1	2	3	6
		7673ER	7	3	10	6	4	10	21
		777200	6	3	9	9	<1	9	19
		777300	4	2	6	4	2	6	12
		7773ER	5	<1	5	5	<1	5	11
		7878R	4	<1	5	4	<1	5	9
		7879	15	3	18	17	<1	18	36
		A300-622R	2	2	4	1	3	4	9
		A319-131	99	3	103	98	5	103	205
		A320-211	17	3	20	17	3	20	40
		A320-232	35	7	41	34	7	41	82
		A320-271N	36	4	41	37	3	41	81
		A321-232	206	24	230	210	20	230	459
		A350-941	1	0	1	1	<1	1	3
		A380-841	<1	0	<1	<1	0	<1	2
		MD11GE	<1	<1	<1	<1	<1	<1	2
		MD11PW	<1	<1	1	<1	<1	1	3
	Regional Jet	CRJ9-ER	100	4	104	98	7	104	208
		EMB170	91	3	94	87	8	94	189
		EMB175	9	<1	10	10	<1	10	20
		EMB190	2	<1	2	2	<1	2	4
	Subtotal		**946**	**86**	**1,032**	**941**	**92**	**1,032**	**2,065**
Air Taxi	**Jet**	CNA680	<1	<1	<1	<1	<1	<1	2
		EMB14L	50	1	51	49	2	51	102
	Non-jet	1900D	<1	<1	<1	<1	<1	<1	2
		CNA208	1	<1	2	2	<1	2	4
		DHC6	<1	<1	1	<1	<1	1	2
	Subtotal		**54**	**2**	**56**	**53**	**3**	**56**	**112**
General Aviation	**Jet**	CL600	<1	<1	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	<1	<1	<1	<1	<1	<1	<1
		GV	<1	0	<1	<1	<1	<1	<1
		LEAR35	<1	<1	<1	<1	<1	<1	<1
	Non-jet	CNA208	6	<1	6	6	<1	6	12
	Subtotal		**8**	**<1**	**9**	**8**	**<1**	**9**	**18**
Grand Total			**1,009**	**89**	**1,097**	**1,002**	**96**	**1,097**	**2,194**

Note: Totals may not match exactly due to rounding.

*ANP Type 737800 represents both B738 and B739 operations, which account for 97 percent and 3 percent, respectively.

3.3.1.2 Runway Utilization

Runway end utilization for all of the future alternatives is similar to the Existing Condition (see **Table 9**). Runway use data from the FAA System Wide Information Management (SWIM) system data was used to develop the future runway use percentages. The runway percentage use for day and night includes the assumption that the outboard runways (Runways 17L/35R, 13L/31R and 13R/31L) are not typically used after 10 p.m. or before 6 a.m.

When compared to the existing runway use, the runway use for future alternatives is as follows:

- Daytime south flow. There are slightly less arrivals (1 percent to 3 percent) to Runway 13R and 17C and slightly more arrivals (1 percent to 3 percent) on Runway 17L and 18R.
- Nighttime south flow. There are less arrivals (7 percent) to Runway 17C and more arrivals (3 percent to 5 percent) on Runway 17R and 18L.
- Daytime north flow. There are slightly less arrivals (3 percent) to Runway 35C and slightly more arrivals (1 percent to 3 percent) on Runway 35R and 36L.
- Nighttime north flow. There are slightly less arrivals (3 percent) to Runway 35L and slightly more arrivals (1 percent to 2 percent) on Runway 35L and 36R.
- South flow departures. There is very little difference (within 1 percent) except for a small reduction (2 percent) on Runway 17R at night.
- North flow departures. There is very little difference (within 1 percent).

Table 9 provides the breakdown by time of day for arrivals and departures.

Table 9. DFW Runway Utilization Summary for All Future Alternatives

Source: FAA SWIM, Centurion Planning and Design, 2023

Runway ID	Arrival Percent			Departure Percent		
	Day	Night	Total	Day	Night	Total
13L	0%	0%	0%	0%	0%	0%
13R	3%	<1%	3%	0%	0%	0%
17C	24%	25%	24%	<1%	2%	<1%
17L	13%	<1%	12%	0%	0%	0%
17R	<1%	12%	1%	39%	30%	38%
18L	<1%	7%	<1%	31%	31%	31%
18R	29%	25%	29%	<1%	6%	<1%
31L	0%	0%	0%	<1%	<1%	<1%
31R	1%	<1%	1%	0%	0%	0%
35C	8%	11%	8%	<1%	2%	<1%
35L	<1%	4%	<1%	15%	13%	15%
35R	8%	<1%	7%	0%	0%	0%
36L	13%	11%	13%	<1%	2%	<1%
36R	<1%	3%	<1%	14%	14%	14%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

3.3.1.3 Taxi-Time data

Average taxi-time by runway for the Existing Condition was used for the Future (2025) NAA (see **Section 3.1.2**). As shown in **Table 4**, the taxi-times are shown in minutes and with an overall taxi-in time of 11.2 minutes and taxi-out time of 17.8 minutes per operation.

3.3.1.4 Operational-Related Emissions

Aircraft-related emissions were generated in the model based on the FY year data; however, for reporting, CY data is required. The FY emission results were adjusted to CY by comparing the modeled operations to the total operations calculated for CY 2025 and applying an adjustment factor as shown in **Table 10**. The CY operations were developed by adding 3/4 of FY2025 operations to 1/4 of FY2026 operations.[4] The CY operations for 2025 were slightly higher than the FY; therefore, the emission results are slightly higher than modeled.

Table 10. Fiscal Year to Calendar Year Adjustment

Source: FAA 2021 TAF, Centurion Planning and Design Analysis, HMMH 2023

Year	FY2025	CY2025	Adjustment
2025	800,911	801,398	1.000607

Total operational emissions are from aircraft operations, GSE, and APUs. AEDT default data for APU and GSE equipment and duration was used in the modeling. The NAA emission inventory provides aircraft emissions associated with taxi-in, taxi-out, and in-flight operations below the mixing height (AEDT default 3,000 feet). **Table 11** provides the operational emissions for all 2025 NAA operations.

Table 11. Total Operational Emissions for the CY2025 NAA

Source: HMMH, 2023

Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
2025 (NAA)	Aircraft	3,667.00	4,628.53	462.42	464.84	418.12	43.03	43.03	1,126,340.11	441,607.83
	GSE LTO	622.59	59.37	23.89	22.80	0.49	3.55	3.81	0.00	0.00
	APU	122.40	145.86	10.64	10.69	19.59	19.13	19.13	0.00	0.00
	Total	4,411.99	4,833.75	496.95	498.33	438.20	65.72	65.97	1,126,340.11	441,607.83

Note: These emissions are based on the aircraft operations in **Table 8** adjusted to CY as shown in **Table 10**.

3.3.2 Future (2025) Proposed Action Alternative

The Proposed Action Alternative is comprised of the demolishment of one building and related infrastructure, reconstruction of two aircraft hardstand positions, and the construction of two new cargo buildings and aircraft parking positions. The proposed changes will increase cargo capacity at DFW. Both buildings are expected to open in early 2025 with an additional five aircraft parking spaces. Therefore, 2025 is included in the EA as the year of implementation.

[4] CY 2025 = (FY2025 ops / 12) *9 + (FY2026 ops / 12) *3

3.3.2.1 Aircraft Activity Levels and Fleet Mix

The project would add five new parking positions at two turns per day or 20 additional daily operations (7,300 additional annual operations). Therefore, eight additional 747400 daily operations and 12 additional 777300 daily operations were added to the number of operations and fleet mix for the Future FY2025 Proposed Action Alternative compared to the Future FY2025 NAA.

The 808,211 annual operations translate to 2,214 AAD operations to be modeled for the FY2025 Proposed Action Alternative noise analysis. **Table 12** provides representative aircraft and engine combinations and the number of average daily operations that were modeled in AEDT for the FY2025 Proposed Action Alternative. The FY2025 Proposed Action fleet mix includes the additional cargo operations in the Air Carrier category (an additional eight 747400 operations and an additional twelve 777300 operations) compared to the FY2025 NAA.

Table 12. DFW Modeled AAD Aircraft Operations for FY2025 Proposed Action Alternative

Source: FAA TAF, Centurion Planning and Design, HMMH, 2023

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	**Jet**	737700	63	3	66	57	9	66	132
		737800*	214	13	227	216	11	227	454
		7378MAX	19	1	21	19	1	21	41
		747400	7	<1	8	7	<1	8	16
		747400RN	<1	<1	<1	<1	<1	<1	<1
		7478	1	<1	2	2	<1	2	5
		757PW	<1	1	2	<1	2	2	4
		757RR	<1	2	3	<1	2	3	6
		7673ER	7	3	10	6	4	10	21
		777200	6	3	9	9	<1	9	19
		777300	10	2	12	10	3	12	24
		7773ER	5	<1	5	5	<1	5	11
		7878R	4	<1	5	4	<1	5	9
		7879	15	3	18	17	<1	18	36
		A300-622R	2	2	4	1	3	4	9
		A319-131	99	3	103	98	5	103	205
		A320-211	17	3	20	17	3	20	40
		A320-232	35	7	41	34	7	41	82
		A320-271N	36	4	41	37	3	41	81
		A321-232	206	24	230	210	20	230	459
		A350-941	1	0	1	1	<1	1	3
		A380-841	<1	0	<1	<1	0	<1	2
		MD11GE	<1	<1	<1	<1	<1	<1	2
		MD11PW	<1	<1	1	<1	<1	1	3
	Regional Jet	CRJ9-ER	100	4	104	98	7	104	208
		EMB170	91	3	94	87	8	94	189
		EMB175	9	<1	10	10	<1	10	20
		EMB190	2	<1	2	2	<1	2	4
	Subtotal		**956**	**87**	**1,042**	**950**	**93**	**1,042**	**2,085**
Air Taxi	**Jet**	CNA680	<1	<1	<1	<1	<1	<1	2
		EMB14L	50	1	51	49	2	51	102
	Non-jet	1900D	<1	<1	<1	<1	<1	<1	2
		CNA208	1	<1	2	2	<1	2	4

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
		DHC6	<1	<1	1	<1	<1	1	2
	Subtotal		**54**	**2**	**56**	**53**	**3**	**56**	**112**
General Aviation	**Jet**	CL600	<1	<1	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	<1	<1	<1	<1	<1	<1	<1
		GV	<1	0	<1	<1	<1	<1	<1
		LEAR35	<1	<1	<1	<1	<1	<1	<1
	Non-jet	CNA208	6	<1	6	6	<1	6	12
	Subtotal		**8**	**<1**	**9**	**8**	**<1**	**9**	**18**
Grand Total			**1,018**	**89**	**1,107**	**1,011**	**96**	**1,107**	**2,214**

Notes: Totals may not match exactly due to rounding.
*ANP Type 737800 represents both B738 and B739 operations, which account for 97 percent and 3 percent, respectively.

3.3.2.2 Runway Utilization

The Proposed Action will not alter future runway use. Runway end utilization for the Future (FY2025) Proposed Action Alternative is same as the FY2025 NAA (see **Table 9**).

3.3.2.3 Taxi-Time Data

Average taxi-time for the additional 19th Street Cargo operations was provided by DFW. A taxi-in time of 9.5 minutes, and taxi-out time of 15.3 minutes per operation was applied to the additional 19th Street Cargo Proposed Action operations. All other operations used the Existing Condition taxi times (see **Section 3.1.2**). As shown in **Table 4**, the taxi-times are shown in minutes and with an overall taxi-in time of 11.2 minutes and taxi-out time of 17.8 minutes per operation.

3.3.2.4 Operational-Related Emissions

Aircraft-related emissions were generated in the model based on the FY year data; however, for reporting, CY data is required. The FY emission results were adjusted to CY by comparing the modeled operations to the total operations calculated for CY 2025 and applying an adjustment factor as shown in **Table 13**. The CY operations were developed by adding 3/4 of FY2025 operations to 1/4 of FY2026 operations.[5] The CY operations for 2025 were slightly higher than the FY; therefore, the emission results are slightly higher than modeled.

Table 13. Fiscal Year to Calendar Year Adjustment

Source: FAA 2021 TAF, Centurion Planning and Design Analysis, HMMH 2023

Year	FY2025	CY2025	Adjustment
2025	808,211	808,698	1.000602

[5] CY 2025 = (FY2025 ops / 12) *9 + (FY2026 ops / 12) *3

Total operational emissions are from aircraft operations, GSE, and APUs. AEDT default data for APU and duration was used in the modeling. Due to missing default GSE equipment data for 747400 and 777300 cargo aircraft in AEDT, a list of GSE equipment and duration used for the additional 19th Street Cargo Proposed Action operations was provided by DFW. **Table 14** provides GSE equipment and duration applied to the additional 19th Street Cargo Proposed Action operations for 2025 Proposed Action Alternative. DFW has assumed that half of the new GSE equipment will be electric which is reflected in **Table 14** for types that have an electric alternative. All other operations used the AEDT default data for GSE equipment and duration.

Table 14. GSE and Total Time for 19th Street Cargo Aircraft

Equipment	Fuel Type (Given from DFW)	Fuel Type (Used in AEDT)	Assumed Half of the Usage is Electric?	Approx HP	Units Per Turn	Duration Provided by DFW in Hours	Duration Provided by DFW in Minutes	Total Minutes of Each GSE	Assumptions Made	New Time for GSE in AEDT if Assumptions Were Made		Electric Capability? (If yes, divide time in half)	TOTAL MINS to Input in AEDT if Not Electric	Total MINS To Input into AEDT (If Electric)	Total Minutes for each GSE in AEDT
Airstart	Diesel	Diesel	No	425	1		20	20	NONE	20	NO	20	20		20
Pushback Tractor	Diesel	Diesel	Yes	190	1		15	15	NONE	15	YES	7.5		7.5	7.5
Air Conditioner	Diesel	Diesel	No	325	1	4		240	NONE	240	NO	240	240		240
GPU	Diesel	Diesel	No	275	1	4		240	NONE	240	NO	240	240		240
Baggage Tractror	LPG	Diesel	Yes	107	6	6		2160	Is not continuously running for entire turn.	1080	YES	540		540	540
Belt Loader	LPG	Diesel	Yes	107	2	4		480	Not always continuously running	240	YES	120		120	120
Large Cargo Loader	Diesel	Diesel	No	120	1	4		240	NONE	240	NO	240	240		240
Small Cargo Loader	Diesel	Diesel	Yes	100	1	4		240	NONE	240	YES	120		120	120
Forklift	Diesel	Diesel	Yes	55	8	4		1920	NONE	1920	YES	960		960	960
Fuel Tanker Truck	Diesel	Diesel	No	350	3		32	96	Assumed traveling 15 mph, also assumed just making trips from the fuel farm to the airfield and back.	96	NO	96	96		96
Lavatory Truck	Diesel	Diesel	No	235	1		30	30	Assumed traveling 15 mph, also assumed just making trips to the airfield and back	30	NO	30	30		30
Service Pickup Truck	NA	Diesel	No	235	1	4		240	Is not continuously running for entire turn. Assumed 15 mph	120	NO	120	120		120

Notes: These inputs represent one turn or one LTO.
Assumed to represent either a 777 or 747 Cargo aircraft.

The 2025 Proposed Action Alternative emission inventory provides aircraft emissions associated with taxi-in, taxi-out, and in-flight operations below the mixing height (AEDT default 3,000 feet). **Table 15** provides the operational emissions for all operations for the 2025 Proposed Action Alternative.[6]

Table 15. Total Operational Emissions for CY2025 Proposed Action Alternative (NAA + Proposed Cargo)

Source: HMMH, 2023

Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
2025 (Proposed Action)	Aircraft	3,808.08	4,807.20	481.53	484.05	431.03	43.76	43.76	1,161,117.46	455,242.72
	GSE LTO	630.41	73.90	28.21	26.83	0.53	4.57	4.86	0.00	0.00
	APU	123.41	148.18	10.76	10.82	19.83	19.35	19.35	0.00	0.00
	Total	4,561.90	5,029.28	520.49	521.70	451.40	67.69	67.98	1,161,117.46	455,242.72

Note: These emissions are based on the aircraft operations in **Table 12** adjusted to CY as shown in **Table 13.**

3.3.3 Future (2030) No Action Alternative

Under the 2030 NAA, there would be no changes to the use of the 19th facility at DFW. Cargo operations would be constrained due to lack of sufficient facilities, and overall operational levels would grow to almost 811,000 operations.

3.3.3.1 Aircraft Activity Levels and Fleet Mix

The 810,688 annual operations translate to 2,221 AAD operations to be modeled for the FY2030 NAA emission inventory. **Table 16** provides representative aircraft and engine combinations and the number of average daily operations that were modeled in AEDT for the FY2030 NAA. The FY2030 NAA fleet mix includes changes in the Air Carrier fleet mix (the retirement of the older DC1010, DC1030, MD11GE, and MD11PW) and a reduction in Air Taxi fleet operations (reduction in 50 seat and smaller regional jets) compared to the Existing Condition and the FY2025 alternatives.

[6] These results are for all operations (2025 NAA + the proposed project cargo operations = 2025 PAA operations)

Table 16. DFW Modeled AAD Aircraft Operations for FY2030 NAA

Source: FAA TAF, Centurion Planning and Design, HMMH, 2023

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	**Jet**	737700	69	3	72	63	9	72	144
		737800*	216	14	230	218	12	230	460
		7378MAX	49	3	52	48	3	52	103
		747400	3	<1	4	3	<1	4	8
		747400RN	<1	<1	<1	<1	<1	<1	<1
		7478	1	<1	2	2	<1	2	5
		757PW	<1	2	2	<1	2	2	4
		757RR	<1	2	3	<1	2	3	6
		7673ER	8	3	11	6	4	11	21
		777200	9	5	13	12	2	13	27
		777300	5	<1	6	5	1	6	12
		7773ER	5	<1	6	5	<1	6	11
		7878R	4	<1	5	5	<1	5	9
		7879	16	3	18	18	<1	18	36
		A300-622R	2	2	4	1	3	4	9
		A319-131	92	3	95	91	4	95	190
		A320-211	17	3	20	17	3	20	40
		A320-232	35	7	42	35	7	42	83
		A320-271N	37	5	41	38	3	41	82
		A321-232	218	25	243	222	21	243	486
		A350-941	1	0	1	1	<1	1	3
		A380-841	1	0	1	1	0	1	2
		CRJ9-ER	96	4	100	94	6	100	200
		EMB170	83	3	86	79	7	86	172
	Regional Jet	EMB175	9	<1	9	9	<1	9	19
		EMB190	2	<1	2	2	<1	2	4
		737700	69	3	72	63	9	72	144
		737800	216	14	230	218	12	230	460
	Subtotal		**980**	**89**	**1,068**	**974**	**95**	**1,068**	**2,137**
Air Taxi	**Jet**	CNA680	<1	<1	<1	<1	<1	<1	2
		EMB14L	28	<1	28	28	<1	28	57
	Non-jet	1900D	<1	<1	<1	<1	<1	<1	2
		CNA208	1	<1	2	2	<1	2	4
		DHC6	<1	<1	1	<1	<1	1	2
	Subtotal		**32**	**1**	**33**	**31**	**2**	**33**	**66**
General Aviation	**Jet**	CL600	<1	<1	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	<1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	<1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	<1	<1	<1	<1	<1	<1	1
		GV	<1	0	<1	<1	<1	<1	<1
		LEAR35	<1	0	<1	<1	0	<1	<1
	Non-jet	CNA208	6	<1	7	6	<1	7	13
	Subtotal		**9**	**<1**	**9**	**9**	**<1**	**9**	**18**
Grand Total			**1,020**	**91**	**1,111**	**1,013**	**97**	**1,111**	**2,221**

Note: Totals may not match exactly due to rounding.

*ANP Type 737800 represents both B738 and B739 operations, which account for 97 percent and 3 percent, respectively.

3.3.3.2 Runway Utilization

The proposed action will not alter future runway use. Runway end utilization for the Future (FY2030) NAA is same as the Future (FY2025) NAA (see **Table 9**).

3.3.3.3 Taxi-Time data

The taxi-times for the Future (FY2030) NAA is same as the Existing Condition (see **Section 3.1.2**). As shown in **Table 4**, the taxi-times are shown in minutes and with an overall taxi-in time of 11.2 minutes and taxi-out time of 17.8 minutes per operation.

3.3.3.4 Operational-Related Emissions

Aircraft-related emissions were generated in the model based on the FY year data; however, for reporting, CY data is required. The FY emission results were adjusted to CY by comparing the modeled operations to the total operations calculated for CY 2030 and applying an adjustment factor as shown in **Table 17**. The CY operations were developed by adding 3/4 of FY2030 operations to 1/4 of FY2031 operations.[7] The CY operations for 2030 were slightly higher than the FY; therefore, the emission results are slightly higher than modeled.

Table 17. Fiscal Year to Calendar Year Adjustment

Source: FAA 2021 TAF, Centurion Planning and Design Analysis, HMMH 2023

Year	FY2030	CY2030	Adjustment
2030	810,688	811,200	1.000631

Total operational emissions are from aircraft operations, GSE, and APUs. AEDT default data for APU and GSE equipment and duration was used in the modeling. The NAA emission inventory provides aircraft emissions associated with taxi-in, taxi-out, and in-flight operations below the mixing height (AEDT default 3,000 feet). **Table 18** provides the operational emissions for all CY2030 NAA operations.

Table 18. Total Operational Emissions for the CY 2030 NAA

Source: HMMH, 2023

Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
2030 (NAA)	Aircraft	3,679.21	4,850.22	449.65	452.01	430.67	44.07	44.07	1,160,125.17	454,854.30
	GSE LTO	607.63	53.40	23.79	22.69	0.51	3.46	3.71	0.00	0.00
	APU	122.24	151.60	10.63	10.68	20.13	19.40	19.40	0.00	0.00
	Total	4,409.08	5,055.22	484.07	485.38	451.31	66.92	67.18	1,160,125.17	454,854.30

Note: These emissions are based on the aircraft operations in **Table 16** adjusted to CY as shown in **Table 17.**

[7] CY 2030 = (FY2030 ops / 12) *9 + (FY2031 ops / 12) *3

3.3.4 Future (2030) Proposed Action Alternative

The Future (2030) Proposed Action Alternative is the year of implementation (2025) plus five years. The proposed project will be completed in 2025. Therefore, there would be no additional cargo operations added for the Proposed Action Alternative (FY2030) as compared to the Proposed Action Alternative (FY2025).

3.3.4.1 Aircraft Activity Levels and Fleet Mix

Similar to Proposed Action Alternative (FY2025), eight additional 747400 daily operations and 12 additional 777300 daily operations were added to the number of operations and fleet mix for the Future FY2030 Proposed Action Alternative compared to the Future FY2030 NAA.

The 817,988 annual operations translate to 2,241 AAD operations to be modeled for the FY2030 Proposed Action Alternative emission inventory. **Table 19** provides representative aircraft and engine combinations and the number of average daily operations that were modeled in AEDT for the Future FY2030 Proposed Action Alternative. The Future FY2030 Proposed Action fleet mix includes the additional cargo operations in the Air Carrier category (an additional eight 747400 operations and an additional twelve 777300 operations) compared to the FY2030 NAA.

Table 19. DFW Modeled AAD Aircraft Operations for FY2030 Proposed Action Alternative

Source: FAA TAF, Centurion Planning and Design, HMMH, 2023

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	Jet	737700	69	3	72	63	9	72	144
		737800*	216	14	230	218	12	230	460
		7378MAX	49	3	52	48	3	52	103
		747400	7	<1	8	7	<1	8	16
		747400RN	<1	<1	<1	<1	<1	<1	<1
		7478	1	<1	2	2	<1	2	5
		757PW	<1	2	2	<1	2	2	4
		757RR	<1	2	3	<1	2	3	6
		7673ER	8	3	11	6	4	11	21
		777200	9	5	13	12	2	13	27
		777300	10	2	12	9	2	12	24
		7773ER	5	<1	6	5	<1	6	11
		7878R	4	<1	5	5	<1	5	9
		7879	16	3	18	18	<1	18	36
		A300-622R	2	2	4	1	3	4	9
		A319-131	92	3	95	91	4	95	190
		A320-211	17	3	20	17	3	20	40
		A320-232	35	7	42	35	7	42	83
		A320-271N	37	5	41	38	3	41	82
		A321-232	218	25	243	222	21	243	486
		A350-941	1	0	1	1	<1	1	3
		A380-841	1	0	1	1	0	1	2
		MD11GE	96	4	100	94	6	100	200
		MD11PW	83	3	86	79	7	86	172
	Regional Jet	CRJ9-ER	9	<1	9	9	<1	9	19
		EMB170	2	<1	2	2	<1	2	4

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
		EMB175	69	3	72	63	9	72	144
		EMB190	216	14	230	218	12	230	460
	Subtotal		**988**	**90**	**1,078**	**982**	**96**	**1,078**	**2,157**
Air Taxi	**Jet**	CNA680	<1	<1	<1	<1	<1	<1	2
		EMB14L	28	<1	28	28	<1	28	57
	Non-jet	1900D	<1	<1	<1	<1	<1	<1	2
		CNA208	1	<1	2	2	<1	2	4
		DHC6	<1	<1	1	<1	<1	1	2
	Subtotal		**32**	**1**	**33**	**31**	**2**	**33**	**66**
General Aviation	**Jet**	CL600	<1	<1	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	<1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	<1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	<1	<1	<1	<1	<1	<1	1
		GV	<1	0	<1	<1	<1	<1	<1
		LEAR35	<1	0	<1	<1	0	<1	<1
	Non-jet	CNA208	6	<1	7	6	<1	7	13
	Subtotal		**9**	**<1**	**9**	**9**	**<1**	**9**	**18**
Grand Total			**1,029**	**92**	**1,121**	**1,022**	**99**	**1,121**	**2,241**

Note: Totals may not match exactly due to rounding.
*ANP Type 737800 represents both B738 and B739 operations, which account for 97 percent and 3 percent, respectively.

3.3.4.2 Runway Utilization

The proposed action will not alter future runway use. Runway end utilization for the Future (FY2030) Proposed Action Alternative is same as the Future (FY2025) PAA (see **Table 9**).

3.3.4.3 Taxi-Time Data

Similar to Proposed Action Alternative (FY2025), average taxi-time for the additional 19th Street Cargo operations was provided by DFW. A taxi-in time of 9.5 minutes and taxi-out time of 15.3 minutes per operation was applied to the additional 19th Street Cargo Proposed Action operations. All other operations used the Existing Condition taxi times (see **Section 3.1.2**). As shown in **Table 4**, the taxi-times are shown in minutes and with an overall taxi-in time of 11.2 minutes and taxi-out time of 17.8 minutes per operation.

3.3.4.4 Operational-Related Emissions

Aircraft-related emissions were generated in the model based on the FY year data; however, for reporting, CY data is required. The FY emission results were adjusted to CY by comparing the modeled operations to the total operations calculated for CY 2030 and applying an adjustment factor as shown in **Table 20**. The CY operations were developed by adding 3/4 of FY2030 operations to 1/4 of FY2031

operations.[8] The CY operations for 2030 were slightly higher than the FY; therefore, the emission results are slightly higher than modeled.

Table 20. Fiscal Year to Calendar Year Adjustment

Source: FAA 2021 TAF, Centurion Planning and Design Analysis, HMMH 2023

Year	FY2030	CY2030	Adjustment
2030	817,988	818,500	1.000626

Total operational emissions are from aircraft operations, GSE, and APUs. AEDT default data for APU and duration was used in the modeling. Due to missing default GSE equipment data for 747400 and 777300 cargo aircraft in AEDT, a list of GSE equipment and duration used for the additional 19th Street Cargo Proposed Action Operations was provided by DFW (see **Table 14**). All other operations used the AEDT default data for GSE equipment and duration.

The 2030 Proposed Action Alternative emission inventory provides aircraft emissions associated with taxi-in, taxi-out, and in-flight operations below the mixing height (AEDT default 3,000 feet). **Table 21** provides the operational emissions for all operations for the 2030 Proposed Action Alternative.[9]

Table 21. Total Operational Emissions for the CY2030 Proposed Action Alternative (NAA + Proposed Cargo)

Source: HMMH, 2023

Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
2030 (Proposed Action)	Aircraft	3,820.34	5,029.16	468.77	471.23	443.59	44.80	44.80	1,194,954.12	468,511.28
	GSE LTO	615.38	67.91	28.10	26.72	0.55	4.47	4.76	0.00	0.00
	APU	123.25	153.93	10.75	10.81	20.37	19.62	19.62	0.00	0.00
	Total	4,558.97	5,250.99	507.62	508.76	464.51	68.89	69.18	1,194,954.12	468,511.28

Note: These emissions are based on the aircraft operations in **Table 19** adjusted to CY as shown in **Table 20.**

3.4 Change in Operational Emissions

Changes between the CY2025 Proposed Action Alternative emissions in **Table 15** and the CY2025 NAA in **Table 11** and changes between the CY2030 Proposed Action Alternative emissions in **Table 21** and the CY2030 NAA in **Table 18** are a result of the additional cargo operations due to the Proposed Action. While the total new cargo operations are the same, there are slight differences in the number of day and night operations between the two forecast years which results in small differences between the two future years. **Table 22** provides the comparison between the Future CY2025 and CY2030 NAA and the Proposed Action operational emissions.

[8] CY 2030 = (FY2030 ops / 12) *9 + (FY2031 ops / 12) *3

[9] These results are for all operations (2030 NAA + the proposed project cargo operations = 2030 PAA operations)

Table 22. Change in Operational Emissions due to the Proposed Action Alternative

Source: HMMH, 2023

Year	Operational Category	Pollutant (tpy)								
		CO	NO_x	VOC	NMHC	SO_x	$PM_{2.5}$	PM_{10}	CO_2	H_20
CY2025 (Proposed Action – No Action)	Aircraft	141.08	178.68	19.11	19.22	12.91	0.73	0.73	34,777.35	13,634.88
	GSE LTO	7.82	14.53	4.31	4.03	0.04	1.02	1.05	0.00	0.00
	APU	1.01	2.32	0.12	0.12	0.24	0.22	0.22	0.00	0.00
	Total	**149.91**	**195.53**	**23.54**	**23.37**	**13.20**	**1.97**	**2.00**	**34,777.35**	**13,634.88**
CY2030 (Proposed Action- No Action)	Aircraft	141.14	178.93	19.12	19.22	12.92	0.73	0.73	34,828.95	13,656.98
	GSE LTO	7.75	14.51	4.31	4.03	0.04	1.02	1.05	0.00	0.00
	APU	1.01	2.32	0.12	0.12	0.24	0.22	0.22	0.00	0.00
	Total	**149.89**	**195.77**	**23.55**	**23.37**	**13.20**	**1.97**	**2.00**	**34,828.95**	**13,656.98**

4 Climate

Climate change is a global phenomenon that can have local impacts.[10] Scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events. Increasing concentrations of greenhouse gas (GHG) emissions in the atmosphere affect global climate.[11,12] GHG emissions result from anthropogenic sources, including the combustion of fossil fuels. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and fluorinated gases.[13] CO_2 is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years. Anthropogenic sources of GHG emissions include the combustion of fossil fuels.

Researchers developed the Global Warming Potential (GWP) indicator as a way to compare the global warming impacts of different gases, by converting each gas amount to a carbon dioxide equivalent (CO2E). GWPs provide a common unit of measure, which allows for consistency when estimating emissions of these different gases. CO2 has a GWP of one because it is the gas used as the reference point. CH4 does not last as long in the atmosphere as CO2; however, it absorbs much more energy. In comparison, one ton of CH4 has 28 times more heat-capturing potential than does one ton of CO2. The amount of CH4 emissions would be multiplied by 28 to determine its CO2E value. NOX lasts in the atmosphere far longer than CO2. The amount of nitrous oxides emissions would be multiplied by 265 to determine its CO2E value. [14]

[10] As explained by the EPA, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." U.S. Environmental Protection Agency, Climate Change Division, Office of Atmospheric Programs, Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act 2-3, 2009, https://www.epa.gov/ghgemissions/technical-support-document-endangerment-and-cause-or-contribute-findings-greenhouse (accessed September 28, 2018).

[11] Intergovernmental Panel on Climate Change, Fifth Assessment Report, 2014, https://www.ipcc.ch/report/ar5/syr/ 9 (accessed September 28, 2018).

[12] U.S. Global Change Research Program, Global Climate Change Impacts in the United States, 2009, http://www.globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009 (accessed September 28, 2018).

[13] U.S. Environmental Protection Agency, Overview of Greenhouse Gases, http://www3.epa.gov/climatechange/ghgemissions/gases.html (accessed May 11, 2017).

[14] https://www.ipcc.ch/assessment-report/ar5/

4.1 Analysis Methodology

For this analysis, GHG emissions associated with the NAA and Proposed Action (NAA + Proposed Action Cargo) aircraft operations were prepared for carbon dioxide, methane, and nitrous oxide and presented as carbon dioxide equivalent (CO_2e) in metric tons per year relevant to their global warming potential. The carbon dioxide equivalent is estimated by taking the mass equivalent of each pollutant (TPY), multiplying by the global warming potential equivalent (GWP) of each pollutant, and then adding them together. For example, the GWP of CO_2 is 1, CH_4 is 28 GWP, and N_2O is 265 GWP, according to the IPCC Fifth Assessment Report[15].

4.2 Environmental Consequences of Proposed Action Alternative

Table 23 presents the annual greenhouse gas emissions for aircraft related operational emissions associated with the future Proposed Action and No Action for CY2025 and CY2030. The emissions presented in **Table 23** for aircraft emissions and fuel usage represent flight emissions up to 10,000 feet directly from AEDT along with APU and GSE.[16]

In summary, while there are no significance thresholds established for climate impacts, GHGs associated with the Proposed Action have been calculated in accordance with the latest FAA guidelines (1050.1F) for climate impacts in a NEPA document.[17]

Table 23. GHG Emissions Associated with Operations for the Proposed Action

Source: HMMH, 2023

		Yearly GHG Emissions (MTPY)			
AEDT Scenario	**AEDT Fuel Burn (ST)**	**CO_2**	**N_2O**	**CH_4**	**CO_2e**
Baseline	391,038	1,119,229	9,387	0	1,128,616
CY2025 No Action	504,397	1,443,673	12,108	0	1,455,781
CY2025 Proposed Action	520,497	1,489,726	12,495	0	1,502,220
CY2025 Difference	**16,100**	**46,052**	**386**	**0**	**46,439**
CY2030 No Action	519,690	1,487,433	12,475	0	1,499,909
CY2030 Proposed Action	535,805	1,533,556	12,862	0	1,546,418
CY2030 Difference	**16,115**	**46,123**	**387**	**0**	**46,509**

Note: Extent of AEDT flight profiles fuel burn and CO_2 reported by AEDT.
These results differ from the results in Section 3 Aircraft Operational Emissions because this table reports metric tons and emissions from the full AEDT profiles.
N_2O and CH_4 computed based on AEDT fuel use and FAA Aviation Emissions and AQ Handbook (V3), Appendix C Table C-1.
GWP is calculated based on the IPCC Fifth Assessment Report.

[15] https://www.ipcc.ch/assessment-report/ar5/

[16] This represents the extent of the standard flight profiles available in AEDT (Departures to 10,000' and Arrivals from 6,000')

[17] 1050.1F Desk Reference, https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref/media/3-climate.pdf