Final Environmental Assessment for Phase II Air Cargo Facility Development

Volume 2: Appendix C

Lakeland Linder International Airport
Polk County, Florida

October 2021

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APPENDIX C Air Quality Documentation

Appendix C.1 Air Monitoring Data Summary

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APPENDIX C.1

Air Monitoring Data Summary

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Air Monitoring Data Summary (2017-2019)

Pollutant	Averaging Time	Level	Form	Concentration (Monitor ID, Distance from LAL)				
				12-105-6006 3.2 Miles	12-105-6005 3.3 Miles	12-057-3002 12 Miles	12-057-1073 21 Miles	12-057-0113 26 Miles
Carbon monoxide [76 FR 54294, Aug 31, 2011]	8-hour	9 ppm	Not to be exceeded more than once per year	--	--	--	--	Not Exceeded
	1-hour	35 ppm		--	--	--	--	Not Exceeded
Lead [81 FR 71906, October 18, 2016]	Rolling 3 month average	0.15 μg/m³	Not to be exceeded	--	--	--	Not Exceeded	--
Nitrogen dioxide [75 FR 6474, Feb 9, 2010] [77 FR 20218, April 3, 2012]	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	--	--	--	--	37.000
	Annual	53 ppb	Annual mean	--	--	--	--	9.013
Ozone [80 FR 65292, Oct 26, 2015]	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	0.068	0.0677	0.066	--	--
Particle Pollution [78 FR 3085, Jan 15, 2013]	$PM_{2.5}$ Annual (primary)	12 μg/m³	Annual mean, averaged over 3 years	7.665	--	8.291	--	8.359
	$PM_{2.5}$ Annual (secondary)	15 μg/m³	Annual mean, averaged over 3 years					
	$PM_{2.5}$ 24-hour	35 μg/m³	98th percentile, averaged over 3 years	15.067	--	18.867	--	21.100
	PM_{10} 24-hour	150 μg/m³	Not to be exceeded more than once per year on average over 3 years	--	--	Not Exceeded	--	--
Sulfur dioxide	1-hour	75 ppb	99th percentile of 1-hour daily maximum	--	22.267	9.000	--	--

Pollutant	Averaging Time	Level	Form	Concentration (Monitor ID, Distance from LAL)				
				12-105-6006 3.2 Miles	12-105-6005 3.3 Miles	12-057-3002 12 Miles	12-057-1073 21 Miles	12-057-0113 26 Miles
[77 FR 20218, April 3, 2012]			concentrations, averaged over 3 years					
[75 FR 35520, Jun 22, 2010]	3-hour	0.5 ppm	Not to be exceeded more than once per year	--	Not Exceeded	Not Exceeded	--	--

-- = not monitored; FR = Federal Register; ppb = parts per billion; ppm = parts per million; μg/m^3 = micrograms per cubic meter of air

Sources: FR, as above; and EPA AirData (https://www.epa.gov/outdoor-air-quality-data), accessed January 28, 2020

APPENDIX C.2

Air Quality Technical Report

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Phase II Air Cargo Facility Development at Lakeland Linder International Airport (LAL) Environmental Assessment

Air Quality Technical Report

Prepared for:

City of Lakeland, Florida
and
Federal Aviation Administration

Prepared by:

AECOM

September 2021

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ACRONYMS AND ABBREVIATIONS

ACEIT	Airport Construction Emissions Inventory Tool
AEDT	Aviation Environmental Design Tool
APU	Auxiliary Power Unit
AVMT	Annual Vehicle Miles of Travel
BMP	Best Management Practice
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalent
EA	Environmental Assessment
EF	Emissions Rate
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GSE	Ground Support Equipment
HP	Horsepower
I-4	Interstate 4
LAL	Lakeland Linder International Airport
MOVES	Motor Vehicle Emissions Simulator
mph	miles-per-hour
NO_x	Nitrogen Oxides
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter equal to or less than 2.5 micrometers in diameter
PM_{10}	Particulate Matter equal to or less than 10 micrometers in diameter
SO_2	Sulfur Dioxide
SSA	Socioeconomic Study Area
TGO	Touch and Go
TPY	Tons Per Year
TSP	Total Suspended Particulate
VOC	Volatile Organic Compounds

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CHAPTER 1 INTRODUCTION

This *Air Quality Technical Report* details the assessment scope, calculation methodology, input data and other technical information used in the analysis of air quality impacts associated with Environmental Assessment (EA) for the proposed Phase II Air Cargo Facility Development at the Lakeland Linder International Airport (i.e., LAL, or the Airport), hereinafter referred to as the Proposed Project.

1.1. ANALYSIS METHODOLOGY

1.1.1. CONSTRUCTION EMISSIONS

Construction period emission inventories of the following criteria pollutants and their precursors were prepared for the Proposed Project: carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter (PM), and volatile organic compounds (VOC). Greenhouse gas (GHG) emissions, expressed in metric tons of carbon dioxide equivalent (CO_2e) emissions, were also computed. The inventories include annual emissions from the following construction emissions sources: off-road equipment, on-road vehicles, and fugitive sources including asphalt paving and dust generation from site-wide construction activities. Off-road equipment and on-road vehicle emissions were computed using **Equations 1** and **2**, respectively.

Annual hours of off-road equipment operation and on-road annual vehicle miles of travel (AVMT) were derived using an engineering estimate of probable materials quantities and construction cost developed for the proposed expanded air cargo sort building, air cargo aircraft ramp, ground support equipment (GSE) ramp, taxilane, employee parking, truck yard, and stormwater retention pond. This information was input to the Airport Cooperative Research Program Airport Construction Emissions Inventory Tool (ACEIT), which then estimates the number and types of equipment to be used on the project and the deployment schedule (monthly and annually). Annual construction equipment and vehicle activity is summarized on **Table 1.1-1.**

Equation 1:

$$\text{Emissions}_{(tpy)} = \sum_{v=i}^{n} EF_v \times HP_v \times \frac{\text{hours}}{\text{day}} \times \frac{\text{days}}{\text{year}} \div 2{,}000 \div 453.59$$

Where:

$\text{Emissions}_{(tpy)}$= annual emissions (tons per year)

EF_v= emissions rate for equipment v(i)…v(n) (grams per horsepower-hour of operation)

HP_v= rated horsepower for equipment v(i)…v(n)

2,000 = pounds per ton

453.59 = grams per pound

Equation 2:

$$\text{Emissions}_{(tpy)} = \sum_{v=i}^{n} EF_v \times \frac{\text{miles}}{\text{day}} \times \frac{\text{days}}{\text{year}} \div 2{,}000 \div 453.59$$

Where:

$\text{Emissions}_{(tpy)}$ = annual emissions (tons per year)

EF_v = emissions rate for vehicle v(i)…v(n) (grams per mile)

2,000 = pounds per ton

453.59 = grams per pound

Table 1.1-1 Estimated Annual Construction Activity

Off-road Equipment	Fuel	Annual Operating Hours
40 Ton Rough Terrain	Diesel	321.6
40 Ton Rough Terrain Crane	Diesel	240.0
90 Ton Crane	Diesel	960.0
90 Ton Crane Supplemental Hoisting	Diesel	240.0
Air Compressor	Gasoline	229.1
Asphalt Paver	Diesel	259.9
Backhoe	Diesel	4,120.2
Caisson Drilling Rig	Gasoline	400.0
Chain Saw	Gasoline	281.2
Chipper/Stump Grinder	Diesel	281.2
Concrete Boom Pump	Gasoline	720.0
Concrete Pump	Gasoline	324.0
Concrete Ready Mix Trucks	Gasoline	1,800.0
Concrete Saws	Gasoline	194.8
Concrete Truck	Diesel	2,095.8
Concrete Truck Pump	Gasoline	1,140.0
Crane	Diesel	30.0
Curb/Gutter Paver	Diesel	32.9
Distributing Tanker	Diesel	129.4
Dozer	Diesel	3,500.8
Dump Truck	Diesel	1,196.9
Dump Truck (12 cy)	Diesel	5,720.5
Excavator	Diesel	1,791.7
Flatbed Truck	Diesel	1,673.2
Fork Truck	Diesel	7,502.5
Forklift	Diesel	2,372.4
Front Loader	Diesel	556.8
Front Loader for Subgrade Materials	Diesel	158.4
Generator	Gasoline	240.0
Grader	Diesel	86.8
Grout Mixer	Gasoline	1,600.0
Grout Wheel Truck	Diesel	240.0
High Lift	Diesel	3,361.6
Hydroseeder	Gasoline	460.3
Loader	Diesel	318.2
Man Lift	Diesel	6,400.0

Off-road Equipment	Fuel	Annual Operating Hours
Man Lift (Fascia Construction)	Diesel	40.0
Material Deliveries	Diesel	120.0
Off-Road Truck	Diesel	81.8
Other General Equipment	Gasoline	3,102.5
Pickup Truck	Diesel	5,972.2
Pile Driver	Gasoline	160.0
Pumps	Gasoline	93.7
Roller	Diesel	2,908.8
Rubber Tired Loader	Diesel	194.8
Scraper	Diesel	1,451.8
Skid Steer Loader	Diesel	392.5
Slip Form Paver	Diesel	194.8
Surfacing Equipment (Grooving)	Gasoline	324.7
Survey Crew Trucks	Diesel	39.2
Ten Wheelers- Material Delivery	Diesel	120.0
Tool Truck	Diesel	7,843.2
Tower Crane	Diesel	1,960.0
Tractor Trailer- Material Delivery	Diesel	8,600.4
Tractor Trailer- Steel Deliveries	Diesel	480.0
Tractor Trailer- Stone Delivery	Diesel	398.4
Tractor Trailer with Boom Hoist- Curbs Del & Place	Diesel	81.6
Tractor Trailers- Rebar Deliveries	Diesel	760.0
Tractor Trailers Temp Fac.	Diesel	17.6
Tractors/Loader/Backhoe	Diesel	511.6
Trencher	Diesel	240.0
Trencher for U/G Piping	Diesel	398.4
Trenchers	Diesel	34.3
Trowel Machine	Gasoline	760.0
Trowel Machines (4) machines	Gasoline	480.0
Truck for Topsoil & Seed Del&Spread	Diesel	81.6
Vibratory Compactor	Gasoline	633.5
Water Truck	Diesel	1,800.0

Source: ACEIT, 2020

Because construction equipment and vehicle emissions rates contained in ACEIT are not sufficiently representative of local conditions, equipment and vehicle emissions rates were instead generated using the current version of the U.S. Environmental Protection Agency Motor Vehicle Emissions Simulator (EPA MOVES2014b). MOVES2014b was invoked at the project-level using input databases specific to Polk County, Florida. Input databases were adapted from EPA's most recent National Emissions Inventory, which incorporates Polk County-specific information to the extent it was submitted to the EPA by state and local air quality and transportation agencies.

Vehicle age distributions, inspection and maintenance programs (to the extent applied), fuel supply and other data were held constant for future years; that is, projections or adjustments were not applied unless available from locally-developed data. A summer design hour representative of a July weekday in Polk County from 1600 to 1700 was selected for emissions rate modeling based on the worst-case temperature/humidity hourly condition, according to the MOVES

'ZoneMonthHour' input database. Emissions rates for on-road vehicles were generated for five mile-per-hour (mph) increments ranging from 5 to 65 mph. For the purposes of emissions calculations, it was assumed that all on-road vehicles would travel at an average speed of 35 miles per hour. **Tables 1.1-2a** and **1.1-2b** specify the annual off-road equipment and on-road vehicle emissions rates applied in the analysis.

Equation 3 was used to estimate dust emissions from site-wide construction activities, adapted from EPA's AP-42 methodology.[1] EPA studies have concluded that ten percent of the dust emissions in the PM_{10} or less size fractions are $PM_{2.5}$.[2] Therefore, uncontrolled PM_{10} dust emissions were factored by 0.10 to derive the $PM_{2.5}$ component. Further, dust suppression and erosion control Best Management Practices (BMPs) during construction, such as site watering and track-out prevention measures, will ensure that PM impacts from construction activities are minimized. According to EPA, adherence to these BMPs can result in a dust control efficiency of 75 percent, which was applied to the calculation to represent controlled PM emissions.[3]

Estimation of annual evaporative VOC emissions from asphalt curing is based upon the EPA methods outlined in AP-42[4] as well as the Emissions Inventory Improvement Program.[5] **Equation 4** outlines this method. Because the asphalt characterization is not known, assuming that 35 percent of liquefied asphalt is diluent that can evaporate as VOC, 95 percent of this diluent would evaporate during asphalt curing, and that the density of the diluent is 1.98 pounds per liter of diluent applied.

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[1] U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emissions Factors (AP-42). Fifth Edition, Volume I Chapter 13: Miscellaneous Sources*. 1995.

[2] Pace, Thompson G. *Examination of the Multiplier Used to Estimate PM2.5 Fugitive Dust Emissions From PM10.* Presented at the Environmental Protection Agency 14th International Emission Inventory Conference. Las Vegas, NV, 2005

[3] U.S. Environmental Protection Agency. *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures*. OAQPS, EPA-450/2-92-004. 1992.

[4] U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors (AP-42). Fifth Edition Volume I Chapter 4.5: Asphalt Paving Operations*. 1995.

[5] U.S. Environmental Protection Agency. *Emissions Inventory Improvement Program (EIIP), Volume III: Chapter 17, "Asphalt Paving".* 2001.

Table 1.1-2a Off-Road Equipment Emissions Rates

Equipment	Fuel Type	Load	Horsepower	Emission Rate (grams per horsepower-hour at operating load)						
				CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Cranes	Diesel	0.43	237.70	0.181	0.788	0.034	0.033	0.004	0.050	530.991
Air Compressors	Gasoline	0.56	5.19	208.961	2.116	0.378	0.348	0.007	9.954	1,247.391
Pavers	Diesel	0.59	134.60	0.274	1.028	0.068	0.066	0.004	0.044	536.789
Tractors/Loaders/Backhoes	Diesel	0.21	87.17	3.079	3.233	0.518	0.502	0.005	0.593	694.627
Bore/Drill Rigs	Gasoline	0.79	2.21	205.168	1.984	0.318	0.293	0.007	9.606	1,247.879
Chain Saws < 6 HP (com)	Gasoline	0.7	3.92	266.029	1.528	9.748	8.968	0.004	73.339	710.950
Chippers/Stump Grinders (com)	Diesel	0.43	84.47	1.756	3.637	0.319	0.310	0.005	0.350	589.629
Pumps	Gasoline	0.69	4.63	207.004	2.048	0.347	0.320	0.007	10.529	1,247.644
Cement & Mortar Mixers	Gasoline	0.59	8.37	275.340	1.688	0.109	0.100	0.006	9.774	1,061.043
Concrete/Industrial Saws	Gasoline	0.78	4.53	266.029	1.528	9.748	8.968	0.004	63.532	710.949
Off-highway Trucks	Diesel	0.59	419.90	0.142	0.376	0.027	0.026	0.004	0.024	536.802
Crawler Tractor/Dozers	Diesel	0.59	136.10	0.211	0.801	0.053	0.052	0.004	0.032	536.802
Excavators	Diesel	0.59	137.60	0.175	0.589	0.045	0.043	0.004	0.026	536.805
Forklifts	Diesel	0.59	85.48	0.158	0.948	0.029	0.029	0.004	0.014	596.142
Generator Sets	Gasoline	0.68	8.82	275.368	1.634	0.113	0.104	0.006	8.503	1,060.742
Graders	Diesel	0.59	231.20	0.162	0.493	0.032	0.031	0.004	0.030	536.802
Aerial Lifts	Diesel	0.21	60.46	3.613	4.546	0.488	0.473	0.005	0.761	694.387
Commercial Turf Equipment (com)	Gasoline	0.6	5.22	205.057	1.981	0.316	0.291	0.007	7.604	1,247.892
Other General Industrial Eqp	Gasoline	0.54	4.29	211.553	2.207	0.420	0.386	0.007	10.070	1,247.056
Rollers	Diesel	0.59	84.76	0.806	1.697	0.134	0.130	0.004	0.067	596.082
Rubber Tire Loaders	Diesel	0.59	136.30	0.304	1.118	0.075	0.073	0.004	0.051	536.778
Scrapers	Diesel	0.59	422.50	0.335	0.918	0.051	0.049	0.004	0.048	536.780
Skid Steer Loaders	Diesel	0.21	57.67	4.328	4.811	0.720	0.698	0.006	0.946	693.699
Surfacing Equipment	Gasoline	0.49	8.92	278.743	1.694	0.124	0.114	0.006	6.560	1,060.494
Trenchers	Diesel	0.59	61.02	0.922	2.979	0.120	0.116	0.004	0.146	596.005
Plate Compactors	Gasoline	0.55	4.41	205.471	1.995	0.323	0.297	0.007	8.704	1,247.840

Source: EPA MOVES2014b

Table 1.1-2b On-Road Vehicle Emissions Rates

Vehicle Type	Fuel Type	Emission Rate (grams per vehicle mile traveled)						
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Light commercial truck	Diesel	3.055	1.032	0.088	0.044	0.005	0.171	620.833
Single unit short-haul truck	Diesel	1.679	3.477	0.404	0.250	0.010	0.512	1,174.359
Passenger car	Gasoline	3.698	0.183	0.044	0.009	0.006	0.165	327.538
Passenger truck	Gasoline	6.649	0.461	0.049	0.011	0.009	0.269	447.292

Source: EPA MOVES2014b

Equation 3: **

$$PM_{10(tpy)} = EF_{TSP} \times \frac{days}{year} \times \frac{acres}{day} \times 0.45 \div 2,000$$

Where:

$PM_{10(tpy)}$= annual PM_{10} dust emissions (tons per year)

EF_{TSP}= total suspended particulate (TSP) emissions rate (80 pounds per acre-day)

0.45 = estimated ratio of PM_{10} to TSP

2,000 = pounds per ton

**Represents uncontrolled emissions of PM_{10}. Controlled emissions are derived by applying a 75% control factor.

$PM_{2.5} = PM_{10} \times 0.10$

Equation 4:

$$VOC_{(tpy)} = A \times AR \times VD \times EF \times D \div 2,000$$

Where:

$VOC_{(tpy)}$= annual VOC paving emissions (tons per year)

A = area of pavement in square meters(m^2)

AR = asphalt application rate (0.679 liter/m^2)

VD = volume fraction of diluent (0.35)

AF = mass fraction of diluent which evaporates as VOC (0.95)

D = solvent density (1.98 pounds/liter)

2,000 = pounds per ton

1.1.2. OPERATIONAL EMISSIONS

Operations of aircraft (Boeing 767-300 and 737-800), aircraft Auxiliary Power Unit (APU), and Ground Support Equipment (GSE), would change as a result of the expanded air cargo facilities described by the EA Proposed Project. Additionally, an increase in truck traffic and employee commute trips would result from increased cargo handling activities. Operations of stationary combustion sources and on-airport motor vehicles would not be expected to increase substantially as a result of the Proposed Project. Therefore, operational emissions estimates for the future year conditions in the EA with the Proposed Project Alternatives, include emissions from aircraft, APUs, GSE, cargo truck traffic, and air cargo facility employee vehicles. Emissions from aircraft, APUs, and GSE were estimated using Federal Aviation Administration’s Aviation Environmental Design Tool (AEDT). Air emission analyses for airports are required to use AEDT for these sources. Emissions from cargo trucks and employee commutes were estimated using **Equation 2**, using emission rates obtained from MOVES.

Noise modeling performed for the EA using AEDT was used as a basis for the air quality analysis. The noise modeling accounted for air cargo aircraft operations derived from the expected rates of use at the cargo facility under the No-Action and Proposed Project Alternatives. APU and GSE operations were derived using default values for the Boeing 767 and Boeing 737 in AEDT.

Criteria pollutant emission rates for air cargo aircraft, APUs, and associated GSE are built into AEDT, using Boeing 767 aircraft with the GE 2GE054 engine and Boeing 737 with the CFM International 4CM039 engine (representative of proponent in-use aircraft fleet), and using default rates for APU and GSE. The aircraft fleet mix, associated engines, and number of operations used to develop the operations emissions inventory are provided in **Tables 1.1-3a** through **1.1-3c**.

Default GHG emission rates for air cargo aircraft are built into AEDT and were used for this analysis. GHG emissions from APUs and GSE are not built into AEDT. GHG emissions from these sources were calculated using AEDT default operating times and fuel flow rates for specific equipment, pounds per gallon for each assigned fuel type, and the GHG emission rate per gallon of each fuel. Fuel based emission rates applied to the AEDT-derived fuel consumption for GSE and APU correspond to 21.095 pounds/gallon for CO_2, 0.000595248 pounds/gallon for CH_4 and 0.000683433 pounds/gallon for N_2O for Jet A; 22.5091702 pounds/gallon for CO_2, 0.001256633 pounds/gallon for CH_4 and 0.000573201 pounds/gallon for N_2O for diesel; and 19.3565636 pounds/gallon for CO_2, 0.00110231 pounds/gallon for CH_4 and 0.000485016 pounds/gallon for N_2O for gasoline. Global warming potentials used to convert individual GHG emissions of CO_2, CH_4 and N_2O to carbon dioxide equivalent (CO_2e) emissions are 1, 21 and 310, respectively.

Additional cargo truck and cargo facility employee vehicle commute operations were derived for travel within the EA Socioeconomic Study Area (SSA), using roadway segment distances and total vehicle trip data derived from the traffic study completed for the EA. A traffic analysis was performed to assess the number of cargo truck and passenger vehicles trips that would result from operation of the Proposed Project, as detailed in **Appendix F** of the EA. AVMT were derived for travel between the air cargo facility and the SSA boundary, assuming that 35 percent of vehicles would use Drane Field Road and County Line Road north to Interstate 4 (I-4); 15 percent of vehicles would use Drane Field Road and County Line Road to locations south of the SSA; 25 percent of vehicles would use Drane Field Road, Airport Road north to Polk Parkway, and Polk Parkway to I-4; and 25 percent would use Drane Field Road east to Polk Parkway and Polk Parkway to areas outside the SSA (see **Figure 1.1-1**). A weighted average speed of 60 mph for motor vehicles was derived from road segment speed limits, segment distances, and the percentage of traffic expected to use each road segment within the SSA. **Table 1.1.-4** details the total number of motor vehicle trips and AVMT used in the emissions analysis.

Table 1.1-3a 2019 Aircraft Fleet Mix and Activity

Aircraft Model	Engine	2019 Existing Condition			
		Arrival	Departure	TGO*	Total
Aerospatiale SA-350D Astar (AS-350) TPE3	TPE331-3	106	106	-	212
Agusta A-109 250B17	250B17B	40	40	-	80
Airbus A320-200 Series 2CM018	CFM56-5B4/2 DAC	2	2	-	4
BEC58P	TIO-540-J2B2	5,012	5,012	1,089	11,113
Bell 206L-4T Long Ranger 250B17	250B17B	13	13	-	26
Boeing 727-200 Series 1PW004	JT8D-7 series Smoke Fix	1	1	-	2
Boeing 737-800 Series 4CM039	CFM56-7B20/2	5	5	-	10
Boeing 757-200 Series 4PW073	PW2040	2	2	-	4
Boeing CH-46 Sea Knight T588F	T58-GE-8F	17	17	-	34
Boeing DC-10-10 Series 3GE076	CF6-50E1 Low emissions fuel nozzle	1	1	-	2
Boeing F/A-18 Hornet F4044	F404-GE-400	24	24	-	48
Bombardier Challenger 600 5GE084	CF34-3B	443	443	-	886
Bombardier Global 5000 Business 4BR009	BR700-710A2-20	69	69	-	138
Bombardier Learjet 35 1AS002	TFE731-3	1,476	1,476	-	2,952
CASA CN-235-100 CT79B	CT7-9B	60	60	83	203
Cessna 150 Series O200	O-200	6,993	6,993	11,045	25,031
Cessna 172 Skyhawk IO360	IO-360-B	493	493	-	986
Cessna 182 IO360	IO-360-B	695	695	-	1,390
Cessna 206 TIO540 IO-540-AC	TIO-540-J2B2	490	490	-	980
Cessna 208 Caravan PT6A14	PT6A-114	808	808	-	1,616
Cessna 441 Conquest II TPE10A	TPE331-10A	648	648	-	1,296
Cessna 500 Citation I 1PW038	JT15D-5C	563	563	-	1,126
Cessna 550 Citation II 1PW036	JT15D-4series	498	498	-	996
Cessna 650 Citation III 1AS001	TFE731-2-2B	44	44	-	88
Cessna 680 Citation Sovereign 7PW078	PW306B Annular	194	194	-	388
Cessna 750 Citation X 6AL024	AE3007C1 Type 2	78	78	-	156
COMSEP	TIO-540-J2B2	2,040	2,040	692	4,772
DeHavilland DHC-6-100 Twin Otter PT6A20	PT6A-20	3,984	3,984	-	7,968
Eclipse 500 / PW610F	PW610F Annular	50	50	-	100
Embraer ERJ145 6AL008	AE3007A1/1 Type 1	1	1	-	2
Gulfstream G400 6RR042	TAY 611-8C Transply IIJ	262	262	-	524
Gulfstream G500 4BR003	BR700-715B1-30	69	69	-	138
Hughes 500D 250B17	250B17B	66	66	-	132

Aircraft Model	Engine	2019 Existing Condition			
		Arrival	Departure	TGO*	Total
Israel IAI-1125 Astra 1AS002	TFE731-3	76	76	-	152
Lockheed C-130 Hercules T56A14	T56-A-14	347	347	960	1,654
Lockheed P-3 Orion ANP:P3A T56A14 T56-A-14	T56-A-14	360	360	-	720
McDonnell Douglas A-4 Skyhawk J52P4	J52-P-408	30	30	-	60
Mitsubishi MU-300 Diamond 1PW037	JT15D-5, -5A, -5B	123	123	-	246
Piper PA-24 Comanche TIO540	TIO-540-J2B2	11,723	11,723	20,615	44,061
Piper PA-30 Twin Comanche IO320	IO-320-D1AD	636	636	-	1,272
Piper PA-42 Cheyenne Series PT6A41	PT6A-41	164	164	-	328
Robinson R44 Raven / Lycoming O-540-F1B5 TIO540	TIO-540-J2B2	159	159	-	318
Rockwell T-2 Buckeye J852	J85-GE-2	34	34	-	68
7Saab 340-A CT7-5	CT7-5	272	272	-	544
Sikorsky SH-60 Sea Hawk T70041	T700-GE-401 -401C	246	246	-	492
T-38 Talon J855HA	J85-GE-5H (w/AB)	40	40	-	80
	Total	**39,457**	**39,457**	**34,484**	**113,398**

Sources: AECOM, 2020; AEDT.
Notes: *TGO = Touch and go operation;
Values may reflect rounding.

Table 1.1-3b 2022 Aircraft Fleet Mix and Activity

Aircraft Model	Engine	2022 No Action				2022 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
1985 1-ENG COMP	TIO-540-J2B2	2,714	2,714	697	6,125	2,714	2,714	697	6,125
Aerospatiale SA-350D Astar (AS-350)	TPE331-3	385	385	-	770	385	385	-	770
Agusta A-109	250B17B	144	144	-	288	144	144	-	288
Airbus A319-100 Series	CFM56-5B9/2P DAC	210	210	-	420	210	210	-	420
Airbus A320-200 Series	CFM56-5B4/2 DAC	90	90	-	180	90	90	-	180
Bell 206L-4T Long Ranger	250B17B	48	48	-	96	48	48	-	96
Boeing 737-800 Series	CFM56-7B20/2	373	373	-	746	373	373	-	746
Boeing 737-800 Series (Cargo)	CFM56-7B20/2	2,190	2,190	-	4,380	4,928	4,928	-	9,856
Boeing 757-200 Series	PW2040	184	184	-	368	184	184	-	368
Boeing 767-300 ER Freighter	CF6-80C2B7F	1,460	1,460	-	2,920	1,643	1,643	-	3,286
Boeing F/A-18 Hornet	F404-GE-400	26	26	-	52	26	26	-	52
Bombardier Challenger 600	CF34-3B	625	625	-	1,250	625	625	-	1,250
Bombardier Global 5000 Business	BR700-710A2-20	97	97	-	194	97	97	-	194
Bombardier Learjet 35	TFE731-3	2,084	2,084	-	4,168	2,084	2,084	-	4,168

Aircraft Model	Engine	2022 No Action				2022 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
CASA CN-235-100	CT7-9B	67	67	48	182	67	67	48	182
Cessna 150 Series	O-200	9,290	9,290	11,133	29,713	9,290	9,290	11,133	29,713
Cessna 172 Skyhawk	IO-360-B	656	656	-	1,312	656	656	-	1,312
Cessna 182	IO-360-B	925	925	-	1,850	925	925	-	1,850
Cessna 206	TIO-540-J2B2	651	651	-	1,302	651	651	-	1,302
Cessna 208 Caravan	PT6A-114	471	471	-	942	471	471	-	942
Cessna 441 Conquest II	TPE331-10A	377	377	1,148	1,902	377	377	1,148	1,902
Cessna 500 Citation I	JT15D-5C	796	796	-	1,592	796	796	-	1,592
Cessna 550 Citation II	JT15D-4series	704	704	-	1,408	704	704	-	1,408
Cessna 650 Citation III	TFE731-2-2B	62	62	-	124	62	62	-	124
Cessna 680 Citation Sovereign	PW306B Annular	274	274	-	548	274	274	-	548
Cessna 750 Citation X	AE3007C1 Type 2	110	110	-	220	110	110	-	220
DeHavilland DHC-6-100 Twin Otter	PT6A-20	2,320	2,320	-	4,640	2,320	2,320	-	4,640
Eclipse 500 / PW610F	PW610F Annular	70	70	-	140	70	70	-	140
Gulfstream G400	TAY 611-8C Transply IIJ	369	369	-	738	369	369	-	738
Gulfstream G500	BR700-715B1-30	97	97	-	194	97	97	-	194
Hughes 500D	250B17B	241	241	-	482	241	241	-	482
Israel IAI-1125 Astra	TFE731-3	107	107	-	214	107	107	-	214

Aircraft Model	Engine	2022 No Action				2022 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
Lockheed C-130 Hercules	T56-A-14	381	381	556	1,318	381	381	556	1,318
Lockheed P-3 Orion ANP:P3A	T56-A-14	396	396	-	792	396	396	-	792
Mitsubishi MU-300 Diamond	JT15D-5, -5A, -5B	174	174	-	348	174	174	-	348
Piper PA-24 Comanche	TIO-540-J2B2	15,583	15,583	20,780	51,946	15,583	15,583	20,780	51,946
Piper PA-30 Twin Comanche	IO-320-D1AD	370	370	-	740	370	370	-	740
Piper PA-42 Cheyenne Series	PT6A-41	95	95	-	190	95	95	-	190
Raytheon Beech Baron 58	TIO-540-J2B2	2,912	2,912	6,503	12,327	2,912	2,912	6,503	12,327
Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	1,649	1,649	-	3,298	1,649	1,649	-	3,298
Saab 340-A	CT7-5	158	158	-	316	158	158	-	316
Sikorsky SH-60 Sea Hawk	T700-GE-401 -401C	692	692	-	1,384	692	692	-	1,384
	Total	**50,629**	**50,629**	**40,865**	**142,123**	**53,549**	**53,549**	**40,865**	**147,963**

Sources: AECOM, 2020; AEDT.
Notes: *TGO = Touch and go operation;
Values may reflect rounding.

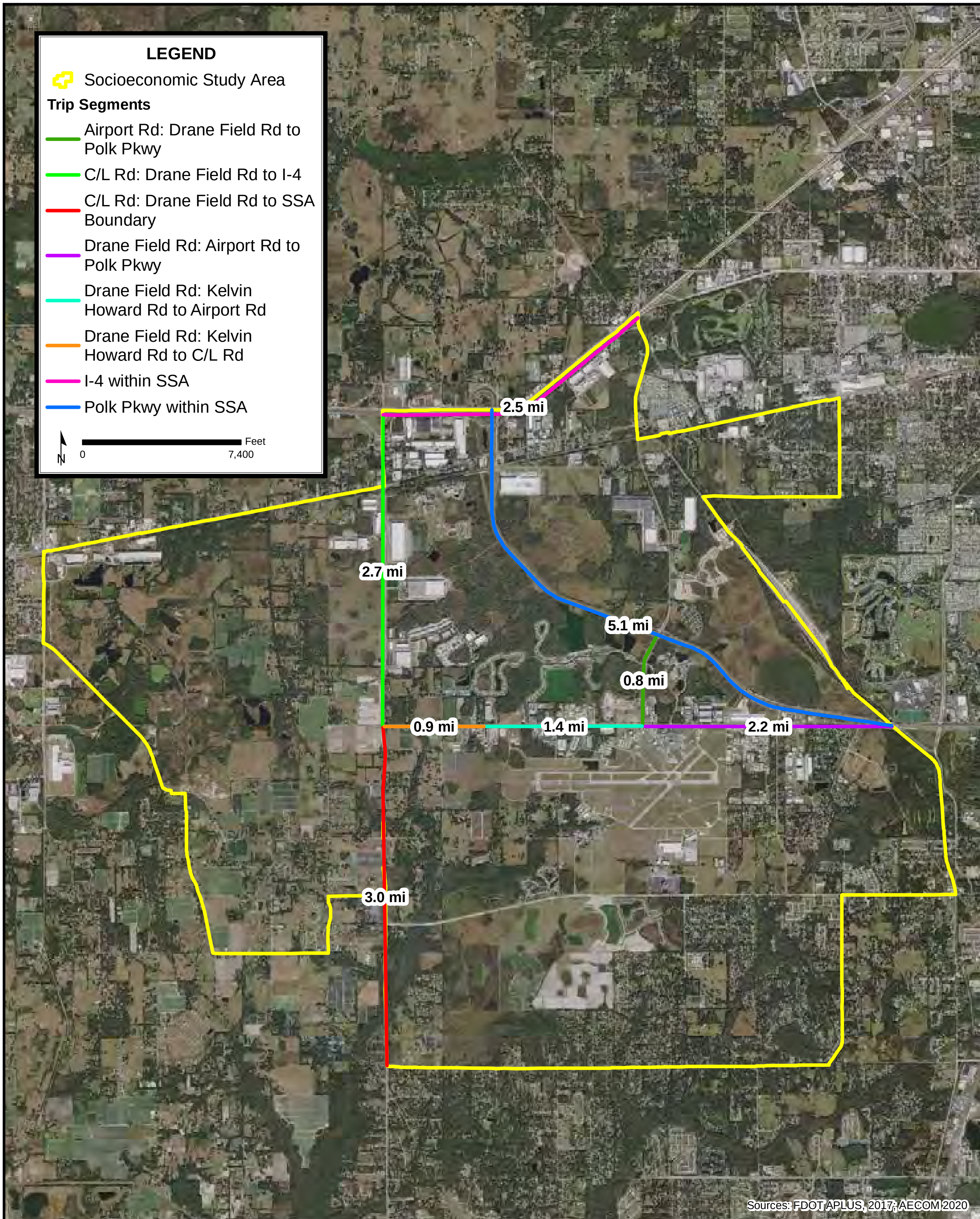
Table 1.1-3c 2027 Aircraft Fleet Mix and Activity

Aircraft Model	Engine	2027 No Action				2027 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
1985 1-ENG COMP	TIO-540-J2B2	3,071	3,071	893	7,035	3,071	3,071	893	7,035
Aerospatiale SA-350D Astar (AS-350)	TPE331-3	788	788	-	1,576	788	788	-	1,576
Agusta A-109	250B17B	295	295	-	590	295	295	-	590
Airbus A319-100 Series	CFM56-5B9/2P DAC	244	244	-	488	244	244	-	488
Airbus A320-200 Series	CFM56-5B4/2 DAC	104	104	-	208	104	104	-	208
Bell 206L-4T Long Ranger	250B17B	98	98	-	196	98	98	-	196
Boeing 737-800 Series	CFM56-7B20/2	431	431	-	862	431	431	-	862
Boeing 737-800 Series (Cargo)	CFM56-7B20/2	2,190	2,190	-	4,380	6,023	6,023	-	12,046
Boeing 757-200 Series	PW2040	212	212	-	424	212	212	-	424
Boeing 767-300 ER Freighter	CF6-80C2B7F	1,460	1,460	-	2,920	2,008	2,008	-	4,015
Boeing F/A-18 Hornet	F404-GE-400	26	26	-	52	26	26	-	52
Bombardier Challenger 600	CF34-3B	953	953	-	1,906	953	953	-	1,906
Bombardier Global 5000 Business	BR700-710A2-20	148	148	-	296	148	148	-	296
Bombardier Learjet 35	TFE731-3	3,176	3,176	-	6,352	3,176	3,176	-	6,352

Aircraft Model	Engine	2027 No Action				2027 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
CASA CN-235-100	CT7-9B	68	68	106	242	68	68	106	242
Cessna 150 Series	O-200	10,526	10,526	14,271	35,323	10,526	10,526	14,271	35,323
Cessna 172 Skyhawk	IO-360-B	742	742	-	1,484	742	742	-	1,484
Cessna 182	IO-360-B	1,047	1,047	-	2,094	1,047	1,047	-	2,094
Cessna 206	TIO-540-J2B2	737	737	-	1,474	737	737	-	1,474
Cessna 208 Caravan	PT6A-114	538	538	-	1,076	538	538	-	1,076
Cessna 441 Conquest II	TPE331-10A	431	431	1,200	2,062	431	431	1,200	2,062
Cessna 500 Citation I	JT15D-5C	1,212	1,212	-	2,424	1,212	1,212	-	2,424
Cessna 550 Citation II	JT15D-4series	1,072	1,072	-	2,144	1,072	1,072	-	2,144
Cessna 650 Citation III	TFE731-2-2B	94	94	-	188	94	94	-	188
Cessna 680 Citation Sovereign	PW306B Annular	418	418	-	836	418	418	-	836
Cessna 750 Citation X	AE3007C1 Type 2	168	168	-	336	168	168	-	336
DeHavilland DHC-6-100 Twin Otter	PT6A-20	2,652	2,652	-	5,304	2,652	2,652	-	5,304
Eclipse 500 / PW610F	PW610F Annular	107	107	-	214	107	107	-	214
Gulfstream G400	TAY 611-8C Transply IIJ	563	563	-	1,126	563	563	-	1,126
Gulfstream G500	BR700-715B1-30	148	148	-	296	148	148	-	296
Hughes 500D	250B17B	492	492	-	984	492	492	-	984
Israel IAI-1125 Astra	TFE731-3	163	163	-	326	163	163	-	326

Aircraft Model	Engine	2027 No Action				2027 Proposed Project			
		Arrival	Departure	TGO*	Total	Arrival	Departure	TGO*	Total
Lockheed C-130 Hercules	T56-A-14	388	388	1,228	2,004	388	388	1,228	2,004
Lockheed P-3 Orion ANP:P3A	T56-A-14	403	403	-	806	403	403	-	806
Mitsubishi MU-300 Diamond	JT15D-5, -5A, -5B	265	265	-	530	265	265	-	530
Piper PA-24 Comanche	TIO-540-J2B2	17,644	17,644	26,636	61,924	17,644	17,644	26,636	61,924
Piper PA-30 Twin Comanche	IO-320-D1AD	423	423	-	846	423	423	-	846
Piper PA-42 Cheyenne Series	PT6A-41	109	109	-	218	109	109	-	218
Raytheon Beech Baron 58	TIO-540-J2B2	3,595	3,595	7,040	14,230	3,595	3,595	7,040	14,230
Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	2,456	2,456	-	4,912	2,456	2,456	-	4,912
Saab 340-A	CT7-5	181	181	-	362	181	181	-	362
Sikorsky SH-60 Sea Hawk	T700-GE-401 -401C	803	803	-	1,606	803	803	-	1,606
Total		**60,643**	**60,643**	**51,374**	**172,660**	**65,023**	**65,023**	**51,374**	**181,420**

Sources: AECOM, 2020; AEDT.
Notes: *TGO = Touch and go operation;
Values may reflect rounding.



LAKELAND LINDER INTERNATIONAL AIRPORT

PHASE II AIR CARGO DEVELOPMENT ENVIRONMENTAL ASSESSMENT

ROADWAY SEGMENTS INCLUDED IN AIR QUALITY ANALYSIS

FIGURE 1.1-1

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Table 1.1-4 Estimated Annual Motor Vehicle Operations Activity

Description	2019	
	Existing Conditions	
Passenger Vehicle VMT	283,004,537	
Heavy Truck VMT	14,894,976	
Total	**297,899,513**	
Description	**2022**	
	No-Action	**Proposed Project**
Passenger Vehicle VMT	285,161,025	296,537,163
Heavy Truck VMT	66,071,561	71,864,569
Total	**351,232,586**	**368,401,732**
Description	**2027**	
	No-Action	**Proposed Project**
Passenger Vehicle VMT	306,797,060	324,925,101
Heavy Truck VMT	75,866,582	89,252,580
Total	**382,663,642**	**414,177,681**

Sources: AECOM, 2020
Note: 2022 and 2027 No-Action includes traffic increases resulting from Phase I Cargo Facility Development

Emission rates, (including vehicle age distributions, inspection and maintenance programs, to the extent applied, fuel supply and other data) for cargo trucks and employee vehicles were derived using MOVES, as described in **Section 1.1.1** above. Cargo trucks were assumed to be single utility short-haul diesel trucks. Private passenger vehicles, including employee vehicles, were assumed to be gasoline passenger cars. Emission rates used for the analysis of motor vehicle emissions are shown in **Table 1.1-5**.

Table 1.1-5 On-road Vehicle Emission Rates

Vehicle Type	Fuel Type	Average Speed (mph)	2019 Emission Rates (Grams per VMT)						
			CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Cargo Trucks	Diesel	60	1.460	2.827	0.210	0.270	0.007	0.431	782.731
Passenger Vehicles	Gasoline	60	3.458	0.247	0.005	0.016	0.006	0.177	303.303
Vehicle Type	**Fuel Type**	**Average Speed (mph)**	**2022 Emission Rates (Grams per VMT)**						
			CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	**VOC**	CO_2e
Cargo Trucks	Diesel	60	1.124	2.053	0.148	0.203	0.007	0.312	775.843
Passenger Vehicles	Gasoline	60	2.971	0.175	0.005	0.016	0.006	0.142	281.268
Vehicle Type	**Fuel Type**	**Average Speed (mph)**	**2027 Emission Rates (Grams per VMT)**						
			CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	**VOC**	CO_2e
Cargo Trucks	Diesel	60	0.672	1.307	0.082	0.131	0.006	0.167	759.664
Passenger Vehicles	Gasoline	60	2.311	0.102	0.005	0.015	0.005	0.108	239.603

Source: EPA MOVES2014b

Operations emissions for cargo truck and passenger vehicle traffic were further refined to account for increased idling emissions resulting from potential intersection delays associated with the Proposed Project. As discussed in the EA, a traffic analysis was conducted for the Proposed Project, in which estimated significant delays could result at the intersection of Kidron Road and Drane Field Road. Two traffic mitigation options are presented in the EA for this intersection: 1) add dedicated turning lanes at the intersection and retain the existing stop sign, and 2) add dedicated turn lanes and replace the existing stop sign with a traffic signal. Idle times were calculated for the Proposed Project without intersection delay mitigation, and with each of the proposed mitigation strategies, as described in **Appendix F** of the EA. Idle emissions were calculated for each study year using average idle times for the No-Action Alternative and for the Proposed Project with no traffic mitigation, with mitigation option 1, and with mitigation option 2, using **Equation 5**. Idle emission rates derived from MOVES2014b are presented in **Table 1.1-6**. Total passenger vehicle and cargo truck emissions presented in the EA include in-transit emissions and idle emissions at this intersection, for each scenario described above.

Equation 5:

$$\text{Emissions}_{(tpy)} = \sum_{v=i}^{n} EF_v \times \frac{\text{hours}}{\text{trip}} \times \frac{\text{trips}}{\text{year}} \div 2{,}000 \div 453.59$$

Where:

$\text{Emissions}_{(tpy)}$= annual emissions (tons per year)

EF_v= emissions rate for vehicle type v(i)…v(n) (grams per hour of idling)

2,000 = pounds per ton

453.59 = grams per pound

Table 1.1-6 On-road Vehicle Idling Emission Rates

Vehicle Type	Fuel Type	2019 Emission Rates (Grams per Idle Hour)						
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Cargo Trucks	Diesel	12.421	29.406	2.801	3.044	0.057	6.345	6,673.072
Passenger Vehicles	Gasoline	7.362	1.970	0.045	0.051	0.070	1.406	3,551.162
Vehicle Type	**Fuel Type**	**2022 Emission Rates (Grams per Idle Hour)**						
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Cargo Trucks	Diesel	9.929	19.971	2.097	2.279	0.056	4.537	6,595.336
Passenger Vehicles	Gasoline	4.534	1.151	0.042	0.047	0.064	1.068	3,268.623
Vehicle Type	**Fuel Type**	**2027 Emission Rates (Grams per Idle Hour)**						
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Cargo Trucks	Diesel	6.047	12.232	1.127	1.225	0.054	2.423	6,457.424
Passenger Vehicles	Gasoline	1.709	0.478	0.037	0.042	0.055	0.797	2,774.403

Source: EPA MOVES2014b

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