APPENDIX A

AIR QUALITY AND CLIMATE ANALYSIS

Construction Emission Inventory

This construction emission inventory (CEI) assessment was prepared for informational purposes to disclose the potential construction-related emissions generated by the Proposed Project.

The U.S. Environmental Protection Agency (USEPA) sets National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The USEPA has identified the following seven criteria air pollutants for which NAAQS are applicable: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). The USEPA describes these pollutants as "criteria" air pollutants because the agency regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels (EPA, 2023).

According to the USEPA, lead (2008 standard), for a portion of Hillsborough County, is classified as “maintenance” (i.e., about 10 miles east of the Airport) (EPA, 2022). Also, sulfur dioxide 1-hour (2010 standard) for a portion of Hillsborough County is classified as “maintenance” (i.e., Gibsonton and Riverview areas, over 10 miles southeast of the Airport) (EPA, 2022).

The EA’s Direct and Indirect Study areas are located entirely within Hillsborough County. All construction activity would occur in the Direct Study Area. The Direct Study Area is an “attainment” area for all National Ambient Air Quality Standards (NAAQS) (EPA Greenbook, 2022).[1]

Construction Emissions Inventory Approach

Construction requirements for the Proposed Project include a variety of construction emissions sources: off-road, on-road, and fugitive dust. The emissions from these sources are most commonly associated with the following types of activities: earthwork, grading and leveling, and construction equipment storage and movement. Construction of the Proposed Project is anticipated to begin in 2025 and end in 2026. Construction emissions are estimated based on these factors: construction schedule; the number of construction vehicles and/or equipment; the types of construction vehicles and/or equipment; types of fuel used to power the equipment and vehicles; vehicle and equipment hourly activity/vehicle miles traveled; construction materials used and their quantities; and the duration of construction.

<u>Non-road Emission Sources</u>

Non-road sources associated with the Proposed Project's construction include exhaust from heavy construction equipment (e.g., graders, excavators, rollers, dump trucks) and fugitive dust emissions). The CEI assessment was based on the factors described in the above paragraph.

<u>On-road Emission Sources</u>

On-road emission sources associated with the Proposed Project's construction include material delivery vehicles (e.g., dump trucks, 18-wheelers carrying asphalt) and passenger vehicles transporting construction personnel to and from the job site.

[1] NAAQS are six criteria pollutants: carbon monoxide, lead, ozone, sulfur dioxide, nitrogen dioxide, and ozone.

Fugitive Emissions

Paving or dust emission sources associated with the Proposed Project's construction include asphalt storage, material movement on both paved and unpaved roads, soil handling, and un-stabilized land and wind erosion. Paving or dust emissions were based on the number of months for construction.

MOVES3

The CEI used the EPA's MOtor Vehicle Emissions Simulator 3 (MOVES3.1) to analyze the Proposed Project's potential construction emissions.

Inputs

The Proposed Project's cost estimates and typical construction practices were used to develop the CEI inputs displayed in ***Table 1***, ***Table 2***, ***Table 3***, and ***Table 4***. Construction equipment type and hours for the Proposed Project are based on engineering judgment and past experience with airport construction projects. These equipment types and hours were used in MOVES3.1 to develop Non-Road and On-Road engine emission and load factors to determine if the Proposed Project would exceed the *de minimis* levels established in the FAA's Aviation Emissions and Air Quality Handbook (FAA, 2023).

Table 1 2025 Non-Road Construction Emissions Inventory Inputs

Equipment Type	Fuel Type	Operating Hours
90 Ton Crane	Diesel	2,104.5
Backhoe	Diesel	2,104.5
Concrete Pump	Diesel	78.9
Concrete Ready Mix Trucks	Diesel	394.5
Concrete Truck	Diesel	157.8
Fork Truck	Diesel	22,354.3
Generator	Diesel	1,972.3
High Lift	Diesel	6,049.1
Man Lift	Diesel	19,723.2
Man Lift (Fascia Construction)	Diesel	157.8
Material Deliveries	Diesel	394.5
Survey Crew Trucks	Diesel	65.1
Tool Truck	Diesel	4,879.5
Tractor Trailer- Material Delivery	Diesel	5,429.8
Tractor Trailer- Steel Deliveries	Diesel	262.3
Tractor Trailers Temp Fac.	Diesel	25.6
Trowel Machine	Diesel	78.9

Source: RS&H 2023

Table 2 2026 Non-Road Construction Emissions Inventory Inputs

	Equipment Type	Fuel Type	Operating Hours
	90 Ton Crane	Diesel	3,908.3
	Backhoe	Diesel	3,908.3
	Concrete Pump	Diesel	146.5
	Concrete Ready Mix Trucks	Diesel	732.6
	Concrete Truck	Diesel	293.0
	Fork Truck	Diesel	41,515.1
	Generator	Diesel	3,662.9
	High Lift	Diesel	11,234.1
	Man Lift	Diesel	36,628.8
	Man Lift (Fascia Construction)	Diesel	293.0
	Material Deliveries	Diesel	732.6
	Survey Crew Trucks	Diesel	120.9
	Tool Truck	Diesel	9,062.0
	Tractor Trailer- Material Delivery	Diesel	10,083.9
	Tractor Trailer- Steel Deliveries	Diesel	487.2
	Tractor Trailers Temp Fac.	Diesel	47.6
	Trowel Machine	Diesel	146.5

Source: RS&H 2023

Vehicle Miles Traveled (VMT) are based on the distance traveled by employees and material deliveries for the Proposed Project. MOVES3.1 uses a 30-mile round trip per passenger car and a 40-mile trip per material delivery.

Table 3 2025 On-Road Construction Emissions Inventory Inputs

Equipment	Fuel Type	VMT*
Single Unit Short-haul Truck	Diesel	3,469
Single Unit Short-haul Truck	Diesel	1,850
Combination Short-haul Truck	Diesel	79.5
Passenger Car	Gasoline	851,400

Note – VMT = vehicle miles traveled
Source: MOVES3.1, RS&H 2023

Table 4: 2026 On-Road Construction Emissions Inventory Inputs

Equipment	Fuel Type	VMT*
Single Unit Short-haul Truck	Diesel	10,407
Single Unit Short-haul Truck	Diesel	5,550
Combination Short-haul Truck	Diesel	238.5
Passenger Car	Gasoline	2,554,200

Note – VMT = vehicle miles traveled
Source: MOVES3.1, RS&H 2023

Construction Emissions Inventory Results

For informational purposes, ***Table 5*** shows the criteria pollutants in tons per year during the Proposed Project's construction.

Table 5: Proposed Project Totals MOVES3 Results (Tons Per Year or TPY)

	NAAQS						GHGs		
2025-2026	**CO**	**VOC**	**NOx**	**PM_{10}**	**$PM_{2.5}$**	**SOx**	**CO_2**	**CH_4**	**N_2O**
NONROAD	4.24	0.60	16.69	0.67	0.65	0.03	12,431.19	0.00	0.00
ONROAD	13.71	0.10	0.36	0.01	0.01	0.01	1,025.47	0.03	0.00
FUGITIVE	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00
TOTAL (TPY)	17.95	0.70	17.05	0.68	0.67	0.04	13,456.66	0.03	0.00
HILLSBOROUGH COUNTY TOTAL	149,296	46,505	24,761	26,365	6,911	8,244	N/A	N/A	N/A
% OF COUNTY	0.012%	0.001%	0.068%	0.025%	0.009%	0.0005%	N/A	N/A	N/A

Note – N/A = not applicable
Source: MOVES3.1, RS&H 2023.

Opera ional Avia ion Emissions

When compared to the No Action Alternative, the Proposed Project would result in an increase in aircraft operations in 2027 and 2032. As the 2032 study year has the larger increase in aircraft operations (i.e., 2,000), the aircraft emissions due to the 2032 Proposed Project were compared to the Hillsborough County total emissions. The Direct Study Area is "attainment" for all NAAQS. Therefore, air quality *de minimis* thresholds do not apply.

For informational purposes, operational aviation emissions were calculated for the opening year 2027 and five years after the opening year in 2032 for the Proposed Project. Operational aviation emissions were calculated using the FAA's Aviation Environmental Design Tool (AEDT) up to the 10,000-foot mixing height. See ***Table 6*** for emissions that would be generated from the Proposed Project.

Table 6 Operational Aviation Emissions in Tons Per Year (Up to 10,000-foot Mixing Height)

Year	CO	VOC	NOx	SOx	PM 2.5	PM 10
2027	2.05	0.25	3.35	0.25	0.04	0.04
2032	8.87	1.08	14.52	1.11	0.16	0.16

Note: Calculated up to the 10,000-foot mixing height for social cost calculations.
Source: AEDT, 2023, RS&H, 2023.

Climate

In January 2023, the Council on Environmental Quality (CEQ) issued interim guidance, *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change,*[2] to assist agencies in analyzing greenhouse gas emissions (GHG) and climate change effects of a proposed project under NEPA. The CEQ identified Social Cost-Greenhouse Gases (SC-GHG) as the metric for assessing potential climate impacts and represents the monetary estimate of the effect associated with each additional metric ton of carbon dioxide released into the air (Interagency Working Group, 2021). The three GHGs[3] that are analyzed are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which represent more than 97% of U.S. GHG emissions.

To calculate SC-GHG, the carbon dioxide equivalent CO_2e[4] must be calculated first. CO_2e is calculated using the Global Warming Potential (GWP) metric to compare the impact a gas has on the global climate concerning CO_2. GWP values are based on the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) (IPCC, 2023). For example, CH_4 has 28 times the GWP of CO_2 and absorbs 28 times more energy in the atmosphere when compared to CO_2 (IPCC, 2023). ***Table 7*** shows the CO_2e values for the construction years of 2025 and 2026 using the CEI results from ***Table 5***. Operational aviation emissions from the Proposed Project are represented in 2027[5] and 2032[6] (see ***Table 6***). The associated CO_2e emissions from the operation of the Proposed Project are included in ***Table 7***.

The Interagency Working Group (IWG) developed average discount rates to assess climate impacts over time. The higher the discount rate, the lower the social climate cost (SCC) for future generations. The IWG average discount rates are 5 percent, 3 percent, 2.5 percent, and the 95th percentile estimate at the 3 percent discount rate, which represents the potential for low-probability catastrophic climate impacts. The IWG determined the social cost of CO_2 (SC-CO_2) through 2050 and assigned a monetary value[7] for each additional metric ton of CO_2 produced. SC-CO_2 is equivalent to SC-GHGs and represents the social costs of the total greenhouse gases converted to the CO_2e equivalent. The SC-CO_2 helps weigh the benefits of climate mitigation against its costs.

Table 8 shows the monetary value of each additional metric ton of CO_2 for 2025, 2026, 2027, and 2032. The SC-CO_2 models projects the future cost of each additional ton of CO_2 in the future (Institute for Policy Integrity, 2017).

Table 9 shows the Social Cost of Carbon Dioxide (SC-CO_2) for the Proposed Project. The construction emissions inventory's CO_2e (see ***Table 7***) was multiplied by the average discount rates (see ***Table 8***) to determine the monetary impact for 2025 and 2026. The Proposed Project's CO_2e operational aviation emissions data was multiplied by the average discount rate (see ***Table 8****)* to determine the monetary impact for 2027 and 2032.

---

[2] 88 FR 1196, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate; Accessed November, 2023

[3] These three GHGs are identified in the CEQ's National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change.

[4] CO_2e: Number of metric tons of CO2 emissions with the same global warming potential as one metric ton of another greenhouse gas.

[5] 2027 represents the opening year of the Proposed Project.

[6] 2032 represents five years after the opening year of the Proposed Project.

[7] These monetary values are based on the results from three economic models used by the IWG: William Nordhaus' DICE model (Yale University), Richard Tol's FUND model (Sussex University), and Chris Hope's PAGE model (Cambridge University).

Table 7 Proposed Project CO_2e

Year	Pollutant	Emissions Quantity (Tons)	AR6 GWP	CO_2e
Construction Emissions				
2025	CO_2	4611.58	1	4,611.58
	CH_4	0.01	28	0.2381
	N_20	0.00104	265	0.2767
			Total	***4,612.0985***
2026	CO_2	8845.08	1	8,845.077
	CH_4	0.02255	28	0.631449
	N_20	0.00	265	0.776564
			Total	***8,846.484627***
Operational Emissions				
2027	CO_2	2.05	1	2.05
	CH_4	0	28	0.00
	N_20	3.35	265	887.75
			Total	***889.80***
2032	CO_2	8.87	1	8.87
	CH_4	0	28	0.00
	N_20	14.52	265	3,847.80
			Total	***3,856.67***

Sources: MOVES 3.1; Interagency Working Group, 2021[8], IPCC Sixth Assessment 2023[9]

The calculated social costs are estimates only and subject to change depending on various factors (i.e. flooding, energy supply)[10]. These calculations are for information purposes only. This range in costs represents the potential social costs associated with adding GHGs to the atmosphere in a given year. It includes the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. It is important to note that this climate analysis does not include positive impacts from the Proposed Project (e.g., economic development, meeting projected passenger and airline (domestic and international) demand, proactively preventing near-future congestion, improving passenger experience, and technological advancements).

---

[8] https://www.whitehouse.gov/wpcontent/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf; Accessed November 2023

[9] https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf; Accessed November 2023

[10] https://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf; Accessed November 2023

Table 8 Annual SC-CO_2 Per Metric Ton of CO_2 (in 2020 dollars)

Emissions year	Average Estimate at 5% Discount Rate	Average Estimate at 3% Discount Rate	Average Estimate at 2.5% Discount Rate	95th Percentile Estimate at 3.0% Discount Rate
Construction Emissions				
2025	$17	$56	$83	$169
2026	$17	$57	$84	$173
Operational Emissions				
2027	$18	$59	$86	$176
2032	$21	$64	$92	$194

Note: Discount Rates from IWG 2021 represent the monetary value of each additional metric ton of CO_2 produced for 2025, 2026, 2027, and 2032. 2027 represents the opening year of the Proposed Project, and 2032 represents five years after the opening year of the Proposed Project. These monetary values are based on the results from three economic models used by the IWG: William Nordhaus' DICE model (Yale University), Richard Tol's FUND model (Sussex University), and Chris Hope's PAGE model (Cambridge University). The models projects the future cost of each additional metric ton of CO_2 in the future.

Sources: Interagency Working Group, 2021, IPCC Sixth Assessment 2023, RS&H, 2023.

Table 9 Social Cost - Carbon Dioxide for the Proposed Project

Year	Proposed Project CO_2e	Average Estimate at 5% Discount Rate	Average Estimate at 3% Discount Rate	Average Estimate at 2.5% Discount Rate	95th Percentile Estimate at 3.0% Discount Rate
Construction Emissions					
2025	4,612.09	$78,405.53	$258,277.04	$382,803.47	$779,443.21
2026	8,844.57	$150,390.16	$504,249.36	$743,104.32	$1,530,441.04
Operational Emissions					
2027	889.8	$16,016.40	$52,498.20	$76,522.80	$156,604.80
2032	3,856.67	$80,990.07	$246,826.88	$354,813.64	$748,193.98

Note: Per the 2023 IPCC Sixth Assessment Report, CO_2e equivalent for SC-GHG were calculated using the Interagency Working Group[11] average discount rates: 5 percent, 3 percent, 2.5 percent, and the 95th percentile estimate applying the 3 percent discount rate. CO_2e Values are multiplied by the discount rate to calculate SC-CO_2.

Per the 2023 IPCC[12] Sixth Assessment Report, the CO_2 equivalent for N_2O is calculated by multiplying the N_2O emissions by the GWP of 265. The CO_2 equivalent for CH_4 is calculated by multiplying the CH_4 emissions by the GWP of 28. For example, the 2025 Average Estimate at 5% Discount Rate was calculated using the 2025 CO_2e value of 6,737.994 multiplied by 2025's $17 determined value for the 5% Discount Rate.

Sources: Interagency Working Group, 2021, IPCC Sixth Assessment 2023, RS&H, 2023.

[11] https://www.whitehouse.gov/wpcontent/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf; Accessed November, 2023

[12] https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf; Accessed November, 2023