DRAFT

Runway Use Program Environmental Assessment

APPENDICES

Cincinnati / Northern Kentucky International Airport

Boone County, Kentucky

PREPARED FOR

Kenton County Airport Board

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
As lead Federal Agency pursuant to the National Environmental Policy Act of 1969

PREPARED BY

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A.1 Regulatory Setting

A.1.1 National Ambient Air Quality Standards

The U.S. Environmental Protection Agency (USEPA) is the primary Federal agency responsible for regulating air quality. The USEPA implements the provisions of the Federal Clean Air Act (CAA). The CAA, including the 1990 Amendments, provides for the establishment of standards and programs to evaluate, achieve, and maintain acceptable air quality in the U.S. Under the CAA, the USEPA established a set of standards, or criteria, for six pollutants determined to be potentially harmful to human health and welfare.[1] The USEPA considers the presence of the following six criteria pollutants to be indicators of air quality:

- Ozone (O_3);
- Carbon monoxide (CO);
- Nitrogen dioxide (NO_2);
- Particulate matter (PM_{10} and $PM_{2.5}$);[2]
- Sulfur dioxide (SO_2); and,
- Lead (Pb).

The National Ambient Air Quality Standards for the criteria pollutants, known as the NAAQS, are summarized in **Table A-1**. For each of the criteria pollutants, the USEPA established primary standards intended to protect public health, and secondary standards for the protection of other aspects of public welfare, such as preventing materials damage, preventing crop and vegetation damage, and assuring good visibility. Areas of the country where air pollution levels consistently exceed these standards may be designated nonattainment by the USEPA.

1 USEPA, Code of Federal Regulations, Title 40, Part 50 (40 CFR Part 50) *National Primary and Secondary Ambient Air Quality Standards (*NAAQS), July 2011.

2 PM_{10} and $PM_{2.5}$ are airborne inhalable particles that are less than ten micrometers (coarse particles) and less than 2.5 micrometers (fine particles) in diameter, respectively.

Table A-1, National Ambient Air Quality Standards

POLLUTANT		PRIMARY/ SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide		primary	8 hour	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead		primary and secondary	Rolling 3-month average	0.15 μg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone		primary and secondary	8 hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	primary	1 year	12.0 μg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 μg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hour	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O3 standards.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Notes: ppm is parts per million; ppb is parts per billion, and μg/m^3 is micrograms per cubic meter.

Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table Accessed January 2023

A.1.2 General Conformity

The General Conformity Rule under the CAA is conducted in three phases: (1) applicability, (2) evaluation, and (3) determination. The General Conformity Rule establishes minimum values, referred to as the *de minimis* thresholds, for the criteria and precursor pollutants[3] for the purpose of:

- Identifying Federal actions with project-related emissions that are clearly negligible (*de minimis*);
- Avoiding unreasonable administrative burdens on the sponsoring agency, and;
- Focusing efforts on key actions that would have potential for significant air quality impacts.

The *de minimis* rates vary depending on the severity of the nonattainment area and further depend on whether the general Federal action is located inside an ozone transport region.[4] An evaluation relative to the General Conformity Rule (the Rule), published under 40 CFR Part 93,[5] is applicable to general Federal actions that would cause emissions of the criteria or precursor pollutants, and are:

- Federally-funded or Federally-approved;
- Not a highway or transit project[6];
- Not identified as an exempt project[7] under the CAA;
- Not a project identified on the approving Federal agency's Presumed to Conform list;[8] and,
- Located within a nonattainment or maintenance area.

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3 Precursor pollutants are pollutants that are involved in the chemical reactions that form the resultant pollutant. Ozone precursor pollutants are NO_x and VOC, whereas $PM_{2.5}$ precursor pollutants include NO_x, VOC, SO_x, and ammonia (NH_3).

4 The ozone transport region is a single transport region for ozone (within the meaning of Section 176A(a) of the CAA), comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia, as given at Section 184 of the CAA.

5 USEPA, 40 CFR Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, July 1, 2006.

6 Highway and transit projects are defined under Title 23 U.S. Code and the Federal Transit Act.

7 The Proposed Action is not listed as an action exempt from a conformity determination pursuant to 40 CFR Part 93.153(c). An exempt project is one that the USEPA has determined would clearly have no impact on air quality at the facility, and any net increase in emissions would be so small as to be considered negligible.

8 The provisions of the CAA allow a Federal agency to submit a list of actions demonstrated to have low emissions that would have no potential to cause an exceedance of the NAAQS and are presumed to conform to the CAA conformity regulations. This list would be referred to as the "Presumed to Conform" list. The FAA Presumed to Conform list was published in the Federal Register on February 12, 2007 (72 FR 6641-6656) and includes airport projects that would not require evaluation under the General Conformity regulations.

As discussed in Section 4.2.1, Affected Environment, CVG is located in Boone County, Kentucky, which has been designated as marginal non-attainment for ozone.[9] Therefore, General Conformity regulations apply. The General Conformity Rule under the Clean Air Act of 1970 (CAA) establishes minimum values, referred to as the *de minimis* thresholds, for the criteria and precursor pollutants[10] for the purpose of:

- Identifying federal actions with project-related emissions that are clearly negligible (*de minimis*);
- Avoiding unreasonable administrative burdens on the sponsoring agency; and
- Focusing efforts on key actions that would have potential for significant air quality impacts.

The *de minimis* rates vary depending on the severity of the nonattainment area and further depend on whether the general federal action is located inside an ozone transport region.[11] The U.S. Environmental Protection Agency (EPA) defines *de minimis* as emissions that are so low as to be considered insignificant and negligible. An evaluation relative to the General Conformity Rule (the Rule), published under 40 Code of Federal Regulations (C.F.R.) Part 93,[12] is required only for general federal actions that would cause emissions of the criteria or precursor pollutants, and are:

- Federally-funded or federally-approved;
- Not a highway or transit project[13];
- Not identified as an exempt project[14] under the CAA;
- Not a project identified on the approving federal agency's Presumed to Conform List;[15] and
- Located within a nonattainment or maintenance area.

9 U.S. Environmental Protection Agency, Kentucky Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants Data is current as of January 31, 2021, Online at https://www3.epa.gov/airquality/greenbook/anayo_ky.html.

10 Precursor pollutants are pollutants that are involved in the chemical reactions that form the resultant pollutant. Ozone precursor pollutants are NO_x, VOC, SO_2, and ammonia (NH_3).

11 The ozone transport region is a single transport region for ozone (within the meaning of Section 176A(a) of the CAA), comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia, as given at Section 184 of the CAA.

12 EPA, 40 C.F.R. Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans,* July 1, 2006.

13 Highway and transit projects are defined under Title 23 United States Code and the Federal Transit Act.

14 40 C.F.R. §93.153(c). An exempt project is one that the EPA has determined would clearly have no impact on air quality at the facility, and any net increase in emissions would be so small as to be considered negligible.

15 The provisions of the CAA allow a federal agency to submit a list of actions demonstrated to have low emissions that would have no potential to cause an exceedance of the NAAQS and are presumed to conform to the CAA conformity regulations. This list would be referred to as the "Presumed to Conform" list. The FAA Presumed to Conform list was published in the Federal Register on February 12, 2007 (72 FR 6641-6656) and includes airport projects that would not require evaluation under the General Conformity regulations.

When the action requires evaluation under the General Conformity regulations, the net total direct and indirect emissions due to the federal action may not equal or exceed the relevant *de minimis* thresholds unless:

- An analytical demonstration is provided that shows the emissions would not exceed the National Ambient Air Quality Standards (NAAQS); or
- Net emissions are accounted for in the State Implementation Plan (SIP) planning emissions budget; or
- Net emissions are otherwise accounted for by applying a solution prescribed under 40 C.F.R. §93.158.

The federal *de minimis* thresholds established under the CAA are provided in **Table A-2**. Conformity to the *de minimis* thresholds is relevant only with regard to those pollutants and the precursor pollutants for which the area is nonattainment or maintenance. Notably, there are no *de minimis* thresholds to which a federal agency would compare ozone emissions. This is because ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO_x and VOC. The Airport is located within Boone County, Kentucky, which has been designated as marginal nonattainment for ozone. As a result, conformity to the *de minimis* threshold is relevant only with regard to the ozone precursor pollutants, NO_x and VOC.

If the General Conformity evaluation for this air quality assessment were to show that any of the applicable thresholds were equaled or exceeded due to the Proposed Action, more detailed analysis to demonstrate conformity would be required. This is referred to as a General Conformity Determination.[16] Conversely, if the General Conformity evaluation were to show that none of the relevant threshold were equaled or exceeded, the Proposed Action would be presumed to conform to the applicable SIPs and no further analysis would be required under the CAA.

[16] 40 C.F.R. §93.153

Table A-2, Federal De Minimis Thresholds

Criteria and Precursor Pollutants	Type and Severity of Nonattainment Area	Tons Per Year Threshold
Ozone (VOC or NO_x)[1]	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)[1]	Marginal and moderate nonattainment inside an ozone transport region (OTR)[2]	100
	Maintenance	100
Ozone (VOC)[1]	Marginal and moderate nonattainment inside an OTR[2]	50
	Maintenance within an OTR[2]	50
	Maintenance outside an OTR[2]	100
Carbon monoxide (CO)	All nonattainment and maintenance	100
Sulfur dioxide (SO_2)	All nonattainment and maintenance	100
Nitrogen dioxide (NO_2)	All nonattainment and maintenance	100
Coarse particulate matter (PM_{10})	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Fine particulate matter ($PM_{2.5}$) (VOC, NO_x, NH_3, and SO_x)[3]	All nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

Notes:

1 The rate of increase of ozone emissions is not evaluated for a project-level environmental review because the formation of ozone occurs on a regional level and is the result of the photochemical reaction of NO_x and VOC in the presence of abundant sunlight and heat. Therefore, EPA considers the increasing rates of NO_x and VOC emissions to reflect the likelihood of ozone formation on a project level.

2 An OTR is a single transport region for ozone, comprised of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia.

3 For the purposes of General Conformity applicability, VOC and NH_3 emissions are only considered $PM_{2.5}$ precursors in nonattainment areas where either a State or EPA has made a finding that the pollutants significantly contribute to the $PM_{2.5}$ problem in the area. In addition, NO_x emissions are always considered a $PM_{2.5}$ precursor unless the State and EPA make a finding that NO_x emissions from sources in the State do not significantly contribute to $PM_{2.5}$ in the area. Refer to 74 FR 17003, April 5, 2006.

Sources: 40 C.F.R. §93.153(b)(1) & (2).

A.1.3 Air Quality Assessment Methodology

The primary sources of air emissions for airports include:

- Construction activity (e.g. construction equipment and vehicles),
- Stationary sources (e.g. boilers), and
- Operational activities (e.g. emissions from aircraft, ground service equipment (GSE), and surface vehicles).

A description of potential emissions from these sources is included in the following sections.

A.1.4 No Action

Under the No Action Alternative, physical conditions at CVG, including airfield runway and taxiway layout, would be unchanged from the existing conditions. Therefore, there would be no construction activity that would cause emissions from construction equipment.

Under the No Action Alternative, no new stationary sources would be constructed and no modification to existing stationary sources would occur. Therefore, there would be no change in emissions from stationary sources.

Under the No Action Alternative, there would be no change in the number or types of aircraft operating at the Airport and no change in runway use patterns, taxi times or delay times would occur. No changes in surface vehicles or GSE would occur. Therefore, there would be no change in operational aircraft emissions, GSE emissions, or surface vehicle emissions.

A.1.5 Proposed Action

Under the Proposed Action, there would be no construction or physical modifications to the airfield or airport facilities. Therefore, there would be no emissions from construction equipment.

Under the Proposed Action, no new stationary sources would be constructed and no modification to existing stationary sources would occur. Therefore, there would be no change in emissions from stationary sources.

The Proposed Action would not cause unforecasted growth in aircraft activity, nor would it cause a change in fleet mix at CVG; therefore, there would be no change in the number or types of aircraft operating at the airport and no change. Operational efficiencies would be achieved with the Proposed Action because it would improve the flexibility by which air traffic controllers assign runways for aircraft to arrive and depart during the nighttime, which would reduce aircraft taxi times and idle time. No change in GSE or surface vehicle operations would occur. Therefore, no increase in operational emissions would occur.

As a result, no adverse impact on local or regional air quality is anticipated due to implementation of the Proposed Action.

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Appendix B - Noise

B.1 Characteristics of Sound

Sound is created by a source that induces vibrations in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source like ripples on a pond. Sound waves dissipate with increasing distance from the source. Sound waves can also be reflected, diffracted, refracted, or scattered. When the source stops vibrating, the sound waves disappear almost instantly and the sound ceases.

Sound conveys information to listeners. It can be instructional, alarming, pleasant, relaxing, or annoying. Identical sounds can be characterized by different people or even by the same person at different times, as desirable or unwanted. Unwanted sound is commonly referred to as “noise.”

Sound can be defined in terms of three components:

1) Level (amplitude)
2) Pitch (frequency)
3) Duration (time pattern)

B.1.1 Sound Level

The level or amplitude of sound is measured by the difference between atmospheric pressure (without the sound) and the total pressure (with the sound). Amplitude of sound is like the relative height of the ripples caused by the stone thrown into the water. Although physicists typically measure pressure using the linear Pascal scale, sound is measured using the logarithmic decibel (dB) scale. This is because the range of sound pressures detectable by the human ear can vary from 1 to 100 trillion units. A logarithmic scale allows us to discuss and analyze noise using more manageable numbers. The range of audible sound ranges from approximately 1 to 140 dB, although everyday sounds rarely rise above approximately 120 dB. The human ear is extremely sensitive to sound pressure fluctuations. A sound of 140 dB, which is sharply painful to humans, contains 100 trillion (10^{14}) times more sound pressure than the least audible sound.

By definition, a 10 dB increase in sound is equal to a tenfold (10^1) increase in the mean square sound pressure of the reference sound. A 20 dB increase is a 100 fold (10^2) increase in the mean square sound pressure of the reference sound. A 30 dB increase is a 1,000-fold (10^3) increase in mean square sound pressure.

A logarithmic scale requires different mathematics than used with linear scales. The sound pressures of two separate sounds, expressed in dB, are not arithmetically additive. For example, if a sound of 80 dB is added to another sound of 74 dB, the total is a 1 dB increase in the louder sound (81 dB), not the arithmetic sum of 154 dB. If two equally loud noise events occur simultaneously, the sound pressure level from the combined events is 3 dB higher than the level produced by either event alone.

B.1.2 Sound Frequency

The pitch (or frequency) of sound can vary greatly from a low-pitched rumble to a shrill whistle. If we consider the analogy of ripples in a pond, high frequency sounds are vibrations with tightly spaced ripples, while low rumbles are vibrations with widely spaced ripples. The rate at which a source vibrates determines the frequency. The rate of vibration is measured in units called “Hertz” -- the number of cycles, or waves, per second. One’s ability to hear a sound depends greatly on the frequency composition. Humans hear sounds best at frequencies between 1,000 and 6,000 Hertz. Sound at frequencies above 10,000 Hertz (high-pitched hissing) and below 100 Hertz (low rumble) are much more difficult to hear.

If we are attempting to measure sound in a way that approximates what our ears hear, we must give more weight to sounds at the frequencies we hear well and less weight to sounds at frequencies we do not hear well. Acousticians have developed several weighting scales for measuring sound. The A-weighted scale was developed to correlate with the judgments people make about the loudness of sounds. The A-weighted decibel scale (dBA) is used in studies where audible sound is the focus of inquiry. The U.S. Environmental Protection Agency (USEPA) has recommended the use of the A-weighted decibel scale in studies of environmental noise.[17] Its use is required by the FAA in airport noise studies.[18] For the purposes of this analysis, dBA was used as the noise metric and dB and dBA are used interchangeably.

B.1.3 Duration of Sounds

The duration of sounds – their patterns of loudness and pitch over time – can vary greatly. Sounds can be classified as continuous like a waterfall, impulsive like a firecracker, or intermittent like aircraft overflights. Intermittent sounds are produced for relatively short periods, with the instantaneous sound level during the event roughly appearing as a bell-shaped curve. An aircraft event is characterized by the period during which it rises above the background sound level, reaches its peak, and then recedes below the background level.

[17] Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.
[18] “Airport Noise Compatibility Planning.” 14 CFR Part 150, Sec. A150.3, September 24, 2004.

B.2 Standard Noise Descriptors

Given the multiple dimensions of sound, a variety of descriptors, or metrics, have been developed for describing sound and noise. Some of the most commonly used metrics are discussed in this section. They include:

1) Maximum Level (**Lmax**)
2) Time Above Level (**TA**)
3) Sound Exposure Level (**SEL**)
4) Equivalent Sound Level (**Leq**)
5) Day-Night Average Sound Level (**DNL**)

B.2.1 Maximum Level (Lmax)

Lmax is simply the highest sound level recorded during an event or over a given period of time. It provides a simple and understandable way to describe a sound event and compare it with other events. In addition to describing the peak sound level, Lmax can be reported on an appropriate weighted decibel scale (A-weighted, for example) so that it can disclose information about the frequency range of the sound event in addition to the loudness.

Lmax, however, fails to provide any information about the duration of the sound event. This can be a critical shortcoming when comparing different sounds. Even if they have identical Lmax values, sounds of greater duration contain more sound energy than sounds of shorter duration. Research has demonstrated that for many kinds of sound effects, the total sound energy, not just the peak sound level, is a critical consideration.

B.2.2 Time Above Level (TA)

The “time above,” or TA, metric indicates the amount of time that sound at a particular location exceeds a given sound level threshold. TA is often expressed in terms of the total time per day that the threshold is exceeded. The TA metric explicitly provides information about the duration of sound events, although it conveys no information about the peak levels during the period of observation.

B.2.3 Number of Events Above Level (NA)

Similar to TA, the Number of Events Above (NA) metric indicates the total number of aircraft events at particular location that exceed a given sound level threshold in dB. The NA metric explicitly provides information about the number of sound events, although it conveys no information about the duration of the event(s).

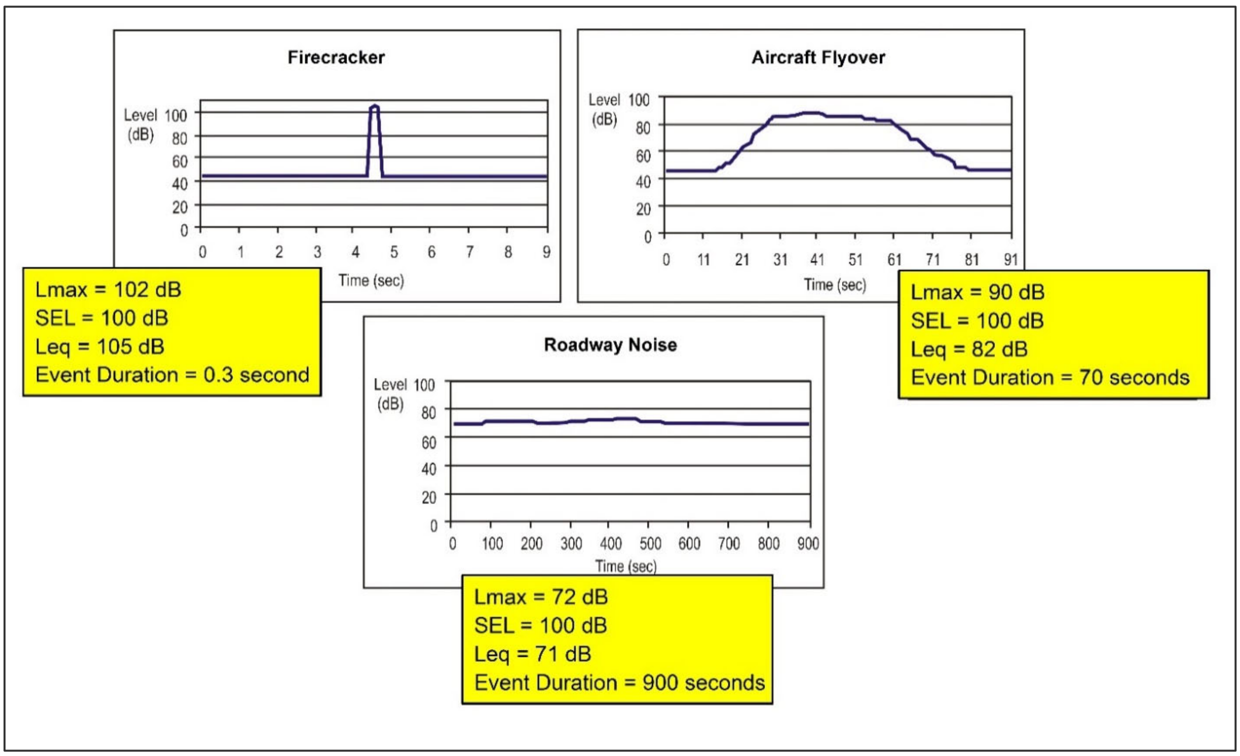
B.2.4 Sound Exposure Level (SEL)

The sound exposure level, or SEL metric, provides a way of describing the total sound energy of a single event. In computing the SEL value, all sound energy occurring during the event, within 10 dB of the peak level (Lmax), is mathematically integrated over one second. (Very little information is lost by discarding the sound below the 10 dB cut-off, since the highest sound levels completely dominate the integration calculation.) Consequently, the SEL is always greater than the Lmax for events with a duration greater than one second. SELs for aircraft overflights typically range from five to 10 dB higher than the Lmax for the event.

Exhibit B-1 shows graphs of instantaneous sound levels for three different events: an aircraft flyover, steady roadway noise, and a firecracker.

The Lmax and the duration of each event differ greatly. The pop of the firecracker is quite loud, 102 dB but lasts less than a second. The aircraft flyover has a considerably lower Lmax at 90 dB, but the event lasts for over a minute. The Lmax from the roadway noise is even quieter at only 72 dB, but it lasts for 15 minutes. By considering the loudness and the duration of these very different events simultaneously, the SEL metric reveals that the total sound energy of all three is identical. This can be a critical finding for studies where total noise dosage is the focus of study. As it happens, research has shown conclusively that noise dosage is crucial in understanding the effects of noise on animals and humans.

Exhibit B-1, Measurement of Different Types of Sound



Source: Landrum & Brown, 2023

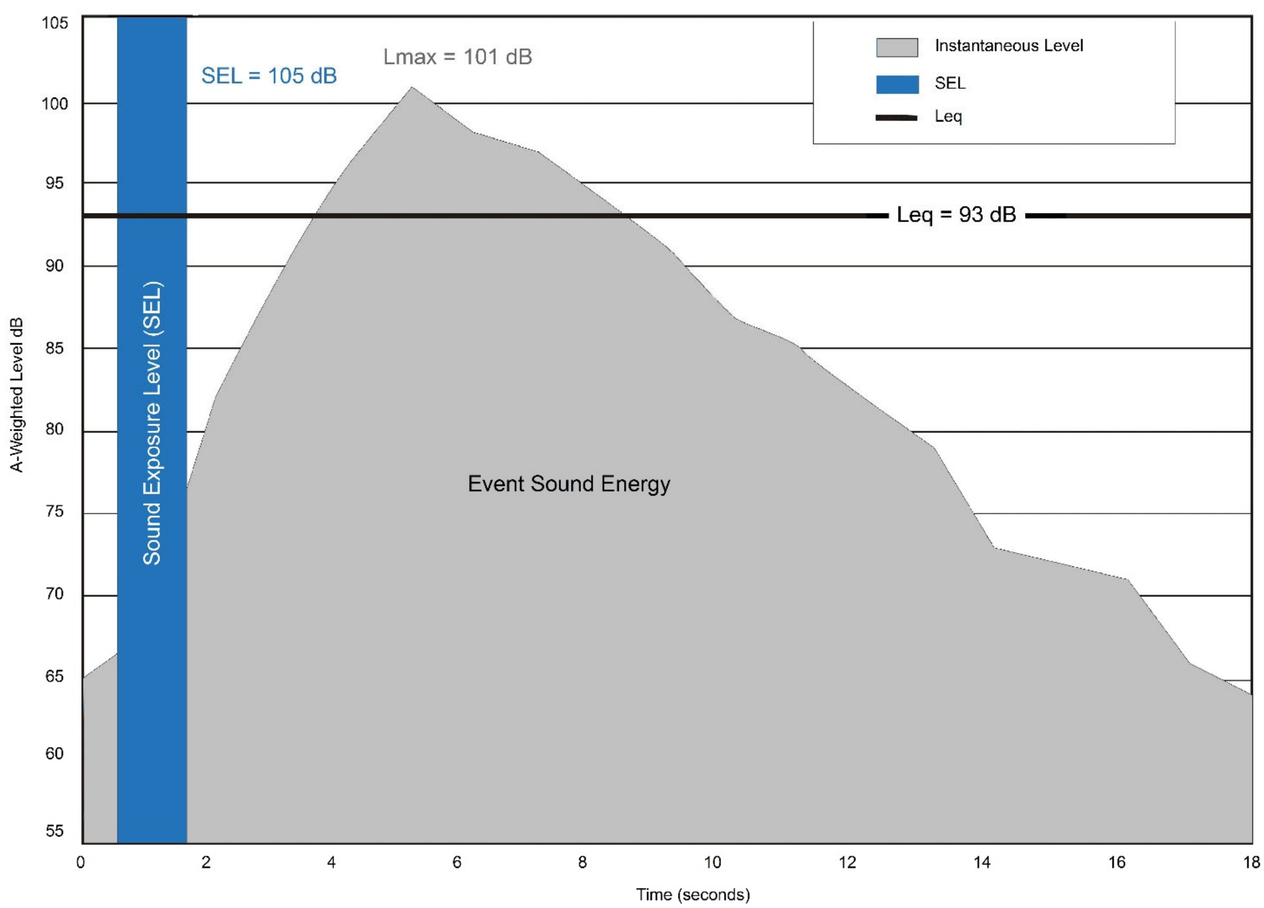
B.2.5 Equivalent Sound Level (Leq)

The equivalent sound level (Leq) metric may be used to define cumulative noise dosage, or noise exposure, over a period of time. In computing Leq, the total noise energy over a given period of time, during which numerous events may have occurred, is logarithmically averaged over the time period. The Leq represents the steady sound level that is equivalent to the varying sound levels actually occurring during the period of observation. For example, an 8-hour Leq of 67 dB indicates that the amount of sound energy in all the peaks and valleys that occurred in the 8-hour period is equivalent to the energy in a continuous sound level of 67 dB. Leq is typically computed for measurement periods of 1 hour, 8 hours, or 24 hours, although any time period can be specified.

Exhibit B-2 shows the relationship of Leq to Lmax and SEL. In this example, a single aircraft event lasting 18 seconds is represented. The instantaneous noise levels for the event range from 64 to an Lmax of 101 dBA. The area under the curve represents the sound energy accumulated during the entire event. The compression of this energy into a single second results in an SEL of 105 dBA. The Leq average of the sound energy for each second during the event would be 93 dB. If this event were the only event to occur during an hour, the aircraft sound energy for the other 3,582 seconds would be considered to be zero. When converted to an hourly Leq, the level would be nearly 70 dB of Leq. This again indicates the dominance of loud events in noise summation and averaging computations.

Leq is a critical noise metric for many kinds of analysis where total noise dosage, or noise exposure, is under investigation. As already noted, noise dosage is important in understanding the effects of noise on both animals and people. Indeed, research has led to the formulation of the "equal energy rule." This rule states that it is the total acoustical energy to which people are exposed that explains the effects the noise will have on them. That is, a very loud noise with a short duration will have the same effect as a lesser noise with a longer duration if they have the same total sound energy.

Exhibit B-2, Relationship Among Sound Metrics



Source: Landrum & Brown, 2023

B.2.6 Day-Night Average Sound Level (DNL)

The Day-Night Average Sound Level (DNL) metric is really a variation of the 24-hour Leq metric. Like Leq, the DNL metric describes the total noise exposure during a given period. Unlike Leq, however, DNL, by definition, can only be applied to a 24-hour period. In computing DNL, an extra weight of 10 dB is assigned to any sound levels occurring between the hours of 10:00 p.m. and 7:00 a.m. This is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Due to the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as equivalent to 10 daytime events of the same magnitude.

As with Leq, DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, it would yield a DNL of 75 dB.

This example can be roughly equated to an airport noise environment. Recall that an SEL is the mathematical compression of a noise event into one second. Thus, 30 SELs of 100 dB during a 24-hour period would equal DNL 65 dB, or DNL 75 dB if they occurred at night.

This situation could actually occur in places around a real airport. If the area experienced 30 overflights during the day, each of which produced an SEL of 100 dB, it would be exposed to DNL 65 dB. Recalling the relationship of SEL to the peak noise level (Lmax) of an aircraft overflight, the Lmax recorded for each of those overflights (the peak level a person would actually hear) would typically range from 90 to 95 dB.

B.3 Regulatory Setting

This section presents information regarding noise and land use criteria that may be useful in the evaluation of noise impacts. The FAA has a long history of publishing noise and use assessment criteria. A summary of some of the more pertinent regulations and guidelines is presented in the following paragraphs.

B.3.1 Noise Control Act

Congress passed the Noise Control Act (42 U.S.C. §4901 et seq.) in 1972, which established a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The act set forth the foundation for conducting research and setting guidelines to restrict noise pollution.

B.3.2 Federal Aviation Noise Abatement Policy

On November 18, 1976, the U.S. Department of Transportation and FAA jointly issued the Federal Aviation Noise Abatement Policy. This policy recognized aircraft noise as a major constraint on the further development of the commercial aviation established key responsibilities for addressing aircraft noise. The policy stated that the Federal Government has the authority and responsibility to regulate noise at the source by designing and managing flight procedures to limit the impact of aircraft noise on local communities; and by providing funding to airports for noise abatement planning.

B.3.3 Aviation Safety and Noise Abatement Act of 1979

The Aviation Safety and Noise Abatement Act of 1979 (ASNA), which is codified as 49 U.S.C. 47501-47510, set forth the foundation for the airport noise compatibility planning program outlined in 14 Code of Federal Regulations (CFR) Part 150. The act established the requirements for conducting noise compatibility planning and provided assistance to, and funding for which airport operators could apply to undertake such planning.

B.3.4 Airport Noise and Capacity Act of 1990

The Airport Noise and Capacity Act (ANCA) of 1990 established two broad directives for the FAA: 1) to establish a method by which to review airport noise and access/use restrictions imposed by airport proprietors, and 2) to institute a program to phase out Stage 2 aircraft over 75,000 lbs. by December 31, 1999.[19] To implement ANCA, the FAA amended 14 CFR Part 91 and issued 14 CFR Part 161 which sets forth noise levels that are permitted for aircraft of various weights, engine number.

[19] Title 14, Part 36 of the CFR sets forth noise levels that are permitted for aircraft of various weights, engine number, and date of certification. Aircraft were divided into three classes according to noise level, Stage 1, Stage 2, and Stage 3, with Stage three being the quietest. Per 14 CFR Part 36, to be designated as Stage 3, aircraft must meet noise levels defined by the FAA at takeoff, sideline, and approach measurement locations.

B.3.5 Federal Requirements to Use DNL in Environmental Noise Studies

DNL is the standard metric used for environmental noise analysis in the U.S. This practice originated with the USEPA's effort to comply with the Noise Control Act of 1972. The USEPA designated a task group to "consider the characterization of the impact of airport community noise and develop a community noise exposure measure."[20] The task group recommended using the DNL metric. The USEPA accepted the recommendation in 1974, based on the following considerations:

The measure is applicable to the evaluation of pervasive, long-term noise in various defined areas and under various conditions over long periods of time.

- The measure correlates well with known effects of the noise environment on individuals and the public.
- The measure is simple, practical, and accurate.
- Measurement equipment is commercially available.
- The metric at a given location is predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.[21]

Soon thereafter, the Department of Housing and Urban Development (HUD), Department of Defense, and the Veterans Administration adopted the use of DNL.

At about the same time, the Acoustical Society of America developed a standard (ANSI S3.23-1980) which established DNL as the preferred metric for outdoor environments. This standard was reevaluated in 1990 and they reached the same conclusions regarding the use of DNL (ANSI S12.40-1990).

In 1980, the Federal Interagency Committee on Urban Noise (FICUN) met to consolidate Federal guidance on incorporating noise considerations in local land use planning. The committee selected DNL as the best noise metric for the purpose, thus endorsing the USEPA's earlier work and making it applicable to all Federal agencies.[22]

In response to the requirements of the ASNA Act of 1979 and the recommendations of FICUN and USEPA, the FAA established DNL in 1981 as the single metric for use in airport noise and land use compatibility planning. This decision was incorporated into the final rule implementing ASNA, 14 CFR Part 150, in 1985. Part 150 established the DNL as the noise metric for determining the exposure of individuals to aircraft noise and identified residential land uses as being normally compatible with noise levels below DNL 65 dB.

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[20] Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.

[21] Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, Pp. A-1–A-23.

[22] Guidelines for Considering Noise in Land Use Planning and Control. Federal Interagency Committee on Urban Noise (FICUN). 1980.

B.4 Noise Modeling Methodology

This section summarizes the methodology and data input for the noise contour modeling for this Environmental Assessment (EA). The analysis of noise exposure around CVG was prepared using the latest version of the FAA's Aviation Environmental Design Tool (AEDT) Version 3e.[23] Inputs to the AEDT include runway definition, number of aircraft operations during the time period evaluated, the types of aircraft flown, the time of day when they are flown, how frequently each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, and aircraft departure weights. The AEDT calculates noise exposure for the area around the airport and outputs contours of equal noise exposure using the Day-Night Average Sound Level (DNL) metric. For this EA, equal noise exposure contours for the levels of 65, 70, and 75 DNL were calculated and represent average-annual day conditions.

B.4.1 2023 No Action Noise Exposure Contour

Runway Definition

The Airport has four runways: three parallel runways (18L/36R, 18C/36C, and 18R/36L), and a crosswind runway (09/27). This runway configuration would remain under the 2023 No Action Alternative. The airfield layout for the 2023 No Action Alternative at CVG is shown on **Exhibit B-3**. The runways and lengths at CVG for the 2023 No Action Alternative are listed below:

Runway	Length (feet)
09/27	12,000
18L/36R	10,000
18C/36C	11,000
18R/36L	8,000

Number of Operations and Fleet Mix

The number of annual operations and aircraft fleet mix modeled for the 2023 No Action Alternative was based on the latest forecast of aviation activity prepared for CVG.[24] That forecast included 205,703 total annual operations in 2023, or 563.6 average-annual day operations. Specific times of operation for aircraft were developed from a review of historic radar data from the CVG Flight Tracking System for the period from 2019 to 2021. **Table B-1** shows the number of aircraft operations during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.) that was used to model the 2023 No Action Alternative noise exposure contour.

23 AEDT Version 3e was the most recent version of AEDT when the noise modeling began.
24 CVG Master Plan 2050, Aviation Activity Forecast, March 2021.

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Exhibit B-3, Airport Layout

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Table B-1, Distribution of Average Daily Operations by Aircraft Category 2023 No Action Alternative

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Widebody Jets						
Airbus A300F4-600 Series	2GE039	0.7	0.9	0.6	0.9	3.1
Airbus A330-200 Series Freighter	4GE081	5.7	7.6	9.5	3.8	26.6
Boeing 747-400 Series Freighter	1GE024	2.5	2.0	3.1	1.5	9.1
Boeing 747-8	8GENX1	0.9	1.7	1.2	1.5	5.3
Boeing 767-200 Series Freighter	1GE010	3.9	4.4	4.5	3.8	16.6
Boeing 767-200 Series Freighter	1GE012	3.6	4.1	5.3	2.4	15.4
Boeing 767-300 ER	1PW043	0.4	0.5	0.5	0.4	1.8
Boeing 767-300 ER Freighter	1GE030	4.0	4.3	4.6	3.8	16.7
Boeing 767-300 ER Freighter	2GE054	5.8	6.1	6.2	5.6	23.7
Boeing 767-300 Series	1GE029	2.3	2.4	2.6	2.1	9.4
Boeing 777 Freighter	01P21GE217	2.1	2.2	2.2	2.1	8.6
Boeing 787-8 Dreamliner	9GENX3	1.0	0.0	0.0	1.0	2.0
Subtotal		*32.9*	*36.2*	*40.3*	*28.9*	*138.3*
Narrowbody Cargo Jets						
Boeing 727-200 Series Freighter	1PW010	0.1	0.5	0.4	0.2	1.2
Boeing 737-400 Series Freighter	1CM007	2.0	11.7	5.0	8.7	27.4
Boeing 737-800BCF	8CM051	3.4	6.8	7.7	2.6	20.5
Boeing 757-200 Series Freighter	3RR028	1.8	1.3	2.4	0.7	6.2
Boeing 757-200 Series Freighter	4PW072	0.1	0.1	0.1	0.0	0.3
Subtotal		*7.4*	*20.4*	*15.6*	*12.2*	*55.6*
Narrowbody Passenger Jets						
Airbus A319-100 Series	2CM019	4.1	1.9	5.5	0.4	11.9
Airbus A319-100 Series	4CM036	0.4	0.2	0.6	0.0	1.2
Airbus A319-NEO	01P20CM129	0.6	0.3	0.8	0.1	1.8
Airbus A320-200 Series	1CM009	1.2	0.4	1.4	0.2	3.2
Airbus A320-200 Series	1IA003	0.5	0.2	0.6	0.1	1.4
Airbus A320-200 Series	2CM014	9.2	3.1	11.1	1.2	24.6
Airbus A320-NEO	01P20CM128	5.1	1.1	3.7	2.5	12.4
Airbus A321-200 Series	01P08CM104	0.5	0.5	0.8	0.2	2.0
Airbus A321-200 Series	3IA008	0.0	0.0	0.0	0.0	0.0
Boeing 717-200 Series	4BR002	0.8	0.1	0.9	0.0	1.8
Boeing 737-700 Series	3CM032	0.0	0.0	0.0	0.0	0.0
Boeing 737-700 Series	8CM051	11.8	3.9	12.5	3.2	31.4
Boeing 737-8	01P20CM136	0.5	0.0	0.5	0.0	1.0
Boeing 737-800 Series	3CM032	1.3	0.3	1.5	0.1	3.2

Table B-1, Distribution of Average Daily Operations by Aircraft Category 2023 No Action Alternative, *(Continued)*

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Narrowbody Passenger Jets (continued from previous page)						
Boeing 737-800 Series	3CM034	0.9	0.2	1.1	0.1	2.3
Boeing 737-800 Series	8CM051	10.0	2.3	11.5	0.7	24.5
Boeing 737-9	01P20CM136	0.3	0.0	0.3	0.0	0.6
Boeing 737-900-ER	8CM051	1.7	3.8	4.7	0.8	11.0
Boeing 737-900 Series	8CM066	0.1	0.3	0.3	0.1	0.8
Boeing MD-88	1PW019	0.4	0.1	0.4	0.1	1.0
Bombardier CRJ-700-ER	5GE083	8.0	0.4	7.5	0.9	16.8
Bombardier CRJ-700-LR	01P08GE190	15.8	0.8	14.7	1.8	33.1
Bombardier CRJ-900-ER	01P08GE190	27.9	5.7	31.0	2.6	67.2
Bombardier CS100	01P20PW183	1.4	0.0	1.3	0.2	2.9
Embraer ERJ170	01P08GE197	4.9	0.6	4.6	0.9	11.0
Embraer ERJ175	01P08GE197	14.1	1.8	13.3	2.7	31.9
Embraer ERJ175-LR	01P08GE197	2.9	0.4	2.7	0.6	6.6
Embraer ERJ190	8GE116	4.8	0.6	4.5	0.9	10.8
Subtotal		*129.2*	*29.0*	*137.8*	*20.4*	*316.4*
Regional / General Aviation Jets						
Bombardier Challenger 300	6AL006	0.5	0.0	0.5	0.0	1.0
Bombardier CRJ-200-ER	01P05GE189	0.3	0.0	0.3	0.0	0.6
Bombardier CRJ-200-LR	01P05GE189	4.0	0.5	4.3	0.2	9.0
Bombardier Global Express	01P04BR013	0.2	0.0	0.2	0.0	0.4
Bombardier Learjet 60	TFE731	1.6	0.1	1.6	0.2	3.5
Cessna 550 Citation II	1PW036	0.4	0.1	0.4	0.1	1.0
Cessna 560 Citation Excel	PW530	0.8	0.0	0.8	0.0	1.6
Cessna 560 Citation V	1PW037	0.5	0.1	0.5	0.2	1.3
Dassault Falcon 900	1AS002	0.1	0.0	0.1	0.0	0.2
Embraer ERJ135	01P06AL032	0.0	0.0	0.0	0.0	0.0
Embraer ERJ145-EP	6AL005	0.6	0.2	0.7	0.1	1.6
Embraer ERJ145-LR	6AL005	1.0	0.3	1.1	0.2	2.6
Falcon 7X	03P16PW192	0.0	0.0	0.0	0.0	0.0
Gulfstream G-5 Gulfstream 5 / G-5SP Gulfstream G500	3BR001	0.4	0.0	0.4	0.0	0.8
Gulfstream IV-SP	11RR048	0.3	0.0	0.3	0.0	0.6
Gulfstream V-SP	11RR048	0.4	0.0	0.4	0.0	0.8
Hawker Beechcraft Corp Beechjet 400A	1PW038	1.3	0.1	1.2	0.2	2.8
Raytheon Beechjet 400	1PW035	0.7	0.0	0.6	0.1	1.4
Raytheon Hawker 800	TFE731	3.1	0.0	2.5	0.6	6.2

Table B-1, Distribution of Average Daily Operations by Aircraft Category 2023 No Action Alternative, *(Continued)*

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Regional /General Aviation Jets (continued from previous page)						
Embraer Legacy 500 (EMB-550)	01P14HN015	0.9	0.2	1.0	0.1	2.2
Embraer Phenom 300 (EMB-505)	PW530	0.5	0.0	0.5	0.0	1.0
Cessna CitationJet CJ4 (Cessna 525C)	1PW038	1.3	0.1	1.2	0.1	2.7
Subtotal		*18.9*	*1.7*	*18.6*	*2.1*	*41.3*
Commuter / Cargo / General Aviation Props						
Cessna 172 Skyhawk	IO360	0.3	0.0	0.3	0.1	0.7
Cessna 182	IO360	0.0	0.0	0.0	0.0	0.0
Cessna 208 Caravan	PT6A14	0.1	0.0	0.1	0.0	0.2
Cessna 310	TIO540	0.0	0.0	0.0	0.0	0.0
Cessna 441 Conquest II	TPE10A	0.0	0.0	0.0	0.0	0.0
Cirrus SR20	IO360	0.1	0.0	0.1	0.0	0.2
Diamond DA40	IO360	0.0	0.0	0.0	0.0	0.0
Embraer EMB120 Brasilia	PW118	0.7	0.1	0.6	0.2	1.6
Fairchild SA-227-AT Expeditor	TPE11U	1.4	0.3	1.3	0.4	3.4
Pilatus PC-12	PT67B	0.1	0.0	0.1	0.0	0.2
Piper PA-28 Cherokee Series	IO360	0.1	0.0	0.1	0.0	0.2
Raytheon Beech 1900-D	PT67D	0.1	1.2	0.1	1.2	2.6
Raytheon Beech Baron 58	TIO540	0.1	0.0	0.1	0.0	0.2
Raytheon King Air 90	PT6A28	0.1	0.0	0.1	0.0	0.2
Raytheon Super King Air 200	PT6A42	0.1	0.0	0.1	0.0	0.2
Raytheon Super King Air 300	PT6A60	0.1	0.0	0.1	0.0	0.2
Shorts 330-200 Series	PT6A4R	0.0	1.0	0.1	1.0	2.1
Subtotal		*3.3*	*2.6*	*3.2*	*2.9*	*12.0*
Grand Total		**191.7**	**89.9**	**215.5**	**66.5**	**563.6**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m. Totals may not equal sum due to rounding.
Source: CVG Flight Tracking System Data, CVG Master Plan 2050, Landrum & Brown analysis, 2023.

Runway End Utilization

The distribution of landings and take-offs from each runway is determined by airport traffic controllers to maintain airfield and airspace safety and efficiency. During the daytime, the Airport operates in one of two operating configurations - south/west flow or north/west flow. When the Airport operates in the south/west flow configuration, aircraft arrive from the north to Runways 18L and 18C. Departures to the south/west occur from Runways 18L, 18C, and 27. The primary departure runway is Runway 27 followed by Runways 18L and 18C. When the Airport operates in the north/west flow, aircraft arrive from the south to Runways 36R and 36C. Departures to the north/west occur from Runways 27, 36R, and 36C.

Additionally, a preferential nighttime runway use program is employed. Under this nighttime program, Runway 27 is the primary runway for departures and Runway 9 for arrivals due to the compatible land use corridor that has been created as a result of a land acquisition program to the west of CVG. The contra-flow operation (departures from Runway 27 and arrivals to Runway 9) was the preferred nighttime runway use plan at CVG until the FAA eliminated the use of contra-flow or head-to-head operations in 2015. As a result of this change, both nighttime departures and arrivals, are typically assigned Runway 27. If Runway 27 is unavailable, the step-down procedure is implemented which calls for operations to use Runway 18C/36C based on wind, weather, and operational factors. The preference after Runway 27 for departures is Runway 36C, then Runway 9, then Runway 18C. For arrivals after Runway 9, it is Runway 27, 18C then Runway 36C.

Average-annual day runway end utilization for input into the AEDT model was derived primarily from analysis of radar data and a review of previous noise analysis at CVG. **Table B-2** summarizes the percentage of use by each aircraft category on each of the runways at CVG during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.) for the 2023 No Action Alternative noise modeling.

Table B-2, Average Annual Day Runway Use – 2023 No Action Alternative

Aircraft Category	Runway End								
	18C	18L	18R	27	36C	36L	36R	09	Total
Daytime Arrivals									
Widebody Jet	11.8%	58.5%	0.3%	3.8%	2.7%	0.0%	22.3%	0.6%	100.0%
Narrowbody Cargo Jet	27.1%	36.8%	0.6%	3.6%	6.6%	0.0%	23.5%	1.8%	100.0%
Narrowbody Passenger Jet	23.6%	43.6%	0.5%	3.8%	8.5%	0.0%	19.6%	0.4%	100.0%
Regional / GA Jet	23.1%	43.1%	0.4%	4.3%	9.5%	0.0%	19.3%	0.3%	100.0%
Commuter / Cargo / GA Prop	22.6%	40.5%	3.1%	5.8%	9.6%	0.7%	17.1%	0.6%	100.0%
Nighttime Arrivals									
Widebody Jet	1.8%	0.8%	0.0%	30.0%	1.5%	0.0%	6.8%	59.1%	100.0%
Narrowbody Cargo Jet	1.6%	0.7%	0.0%	27.9%	1.3%	0.0%	2.1%	66.4%	100.0%
Narrowbody Passenger Jet	3.1%	3.8%	0.2%	29.5%	1.7%	0.0%	18.9%	42.8%	100.0%
Regional / GA Jet	3.1%	12.1%	1.0%	23.1%	1.1%	0.0%	39.6%	20.0%	100.0%
Commuter / Cargo / GA Prop	0.9%	9.9%	2.0%	28.4%	1.3%	0.0%	52.5%	5.0%	100.0%
Daytime Departures									
Widebody Jet	4.4%	18.3%	0.0%	64.4%	1.9%	0.0%	11.0%	0.0%	100.0%
Narrowbody Cargo Jet	4.0%	5.2%	0.0%	86.8%	2.4%	0.0%	1.6%	0.0%	100.0%
Narrowbody Passenger Jet	3.5%	26.5%	0.0%	56.6%	2.0%	0.1%	11.3%	0.0%	100.0%
Regional / GA Jet	3.1%	23.6%	0.0%	58.2%	1.7%	0.1%	13.3%	0.0%	100.0%
Commuter / Cargo / GA Prop	5.5%	20.4%	6.9%	51.6%	3.4%	3.3%	8.8%	0.1%	100.0%
Nighttime Departures									
Widebody Jet	2.3%	0.2%	0.0%	70.6%	11.6%	0.0%	15.3%	0.0%	100.0%
Narrowbody Cargo Jet	1.2%	0.2%	0.0%	95.1%	3.3%	0.0%	0.2%	0.0%	100.0%
Narrowbody Passenger Jet	1.3%	3.3%	0.0%	70.9%	6.7%	0.0%	17.8%	0.0%	100.0%
Regional / GA Jet	0.9%	4.5%	0.0%	65.1%	8.2%	0.0%	21.3%	0.0%	100.0%
Commuter / Cargo / GA Prop	2.0%	7.0%	1.4%	25.8%	7.4%	0.0%	56.4%	0.0%	100.0%

Source: CVG Flight Tracking System Data, Landrum & Brown analysis, 2023.

Flight Tracks

Flight tracks are built in the AEDT to model the noise levels of aircraft along each flight path to and from the runway ends. There are two components to modeling flight tracks, location and percent distribution. Flight track locations were developed based on a review of radar data from the CVG Flight Tracking System. The percent use of each track was based on a review of radar data and previous studies. The AEDT flight tracks modeled for the 2023 No Action Alternative noise exposure contour are shown on **Exhibit B-4** and **Exhibit B-5**. **Table B-3** shows arrival flight track utilization percentages and **Table B-4** shows departure flight track utilization percentages for the 2023 No Action Alternative noise exposure contour. Each flight track is identified by a track ID that corresponds to the label in the flight track exhibits.

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Exhibit B-4, Arrival Flight Tracks – 2023 No Action Alternative

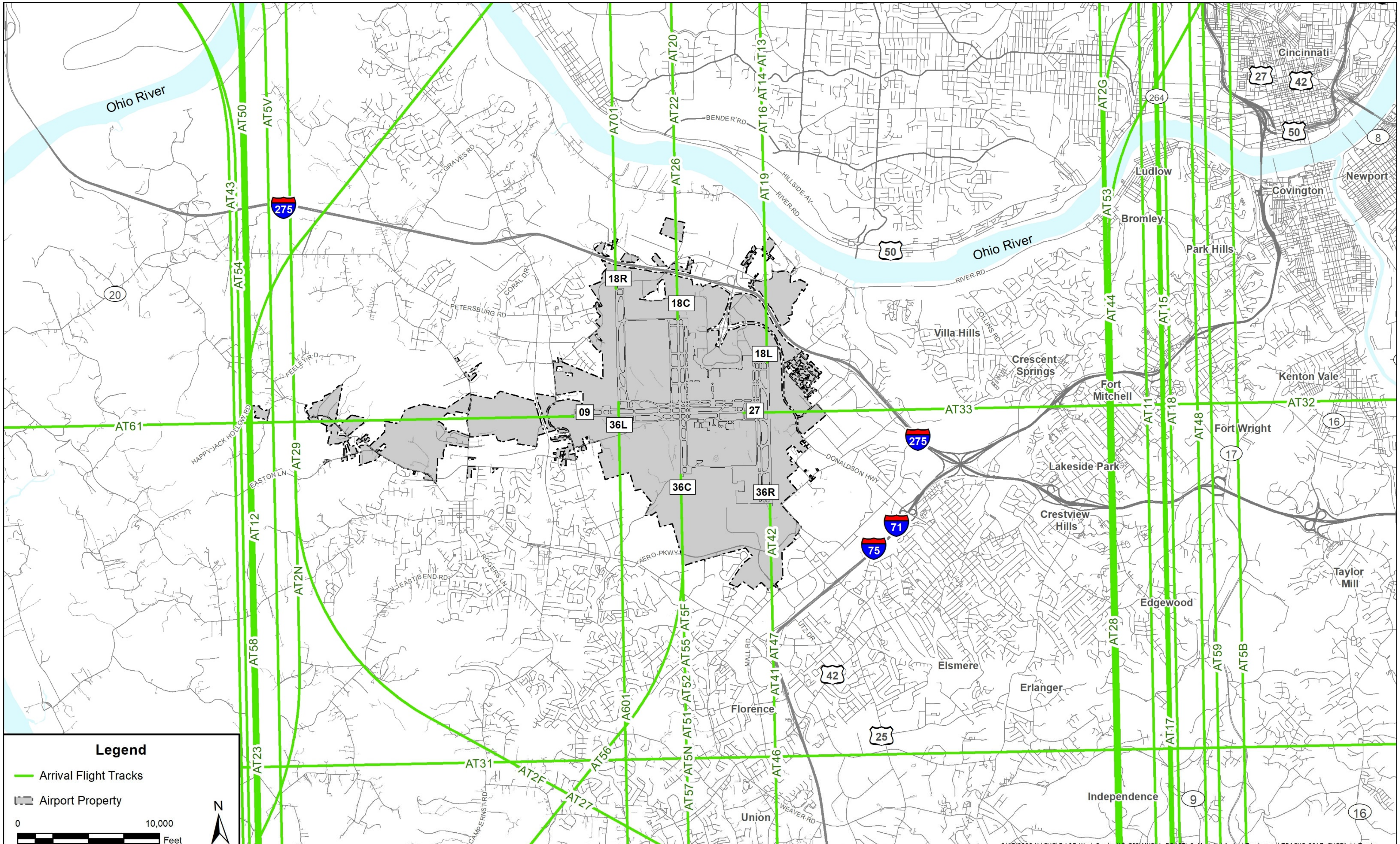

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Exhibit B-5, Departure Flight Tracks – 2023 No Action Alternative

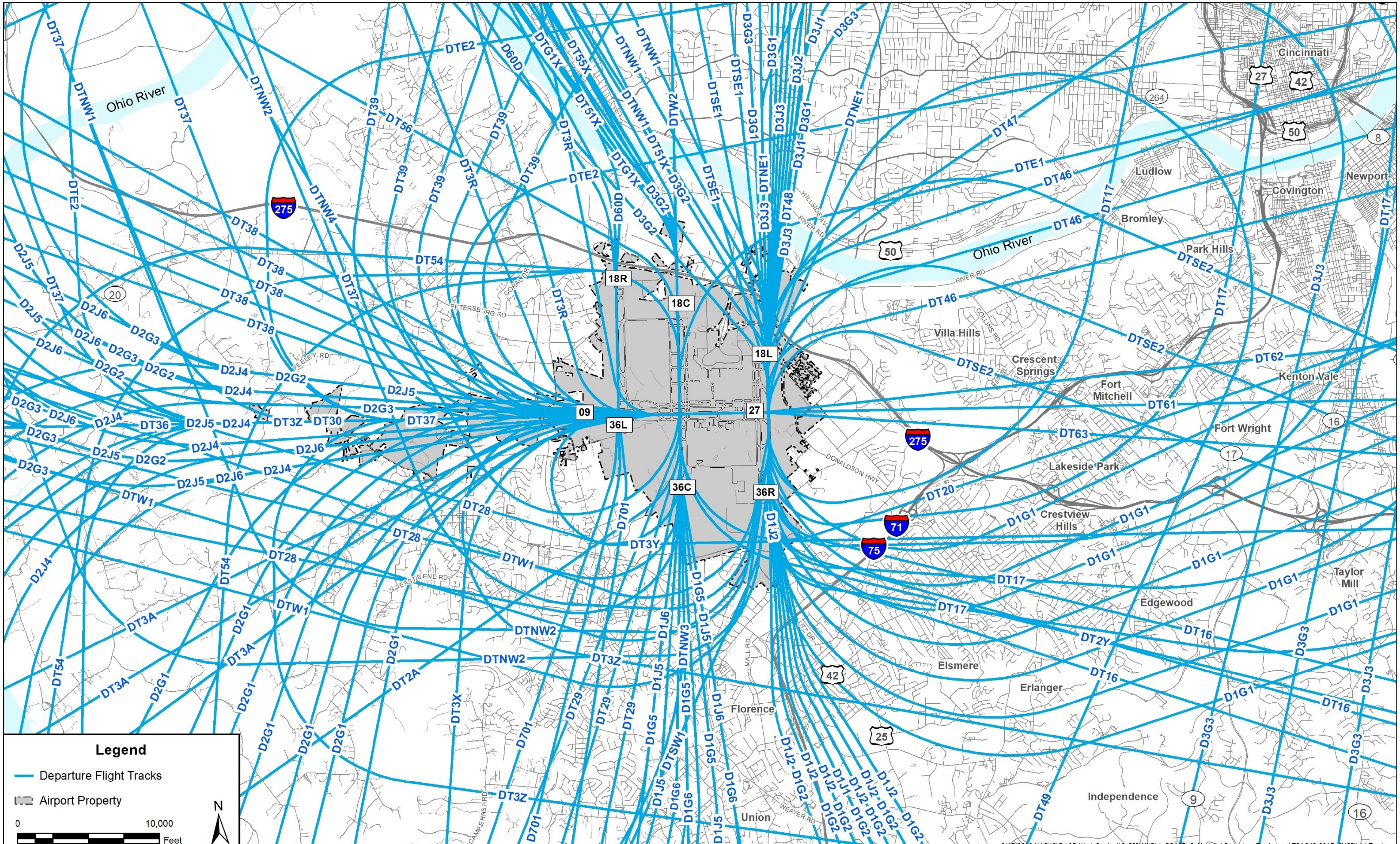

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Table B-3, Arrival Flight Track Distribution – 2023 No Action Alternative

Runway End	Track ID	Heavy Jets	Narrowbody Cargo Jets	Narrowbody Passenger Jets	Regional / GA Jets	Commuter / Cargo / GA Props
18L	AT11	6.3%	0.0%	12.5%	0.0%	0.0%
	AT12	44.8%	85.7%	44.0%	0.0%	0.0%
	AT13	31.7%	0.0%	18.0%	0.0%	0.0%
	AT14	10.9%	14.3%	13.0%	0.0%	0.0%
	AT15	6.3%	0.0%	12.5%	0.0%	0.0%
	AT16	0.0%	0.0%	0.0%	23.3%	21.0%
	AT17	0.0%	0.0%	0.0%	15.5%	16.0%
	AT18	0.0%	0.0%	0.0%	36.2%	31.0%
	AT19	0.0%	0.0%	0.0%	25.0%	32.0%
18L Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
18C	AT20	0.0%	0.0%	0.0%	12.5%	16.0%
	AT22	31.7%	0.0%	17.7%	0.0%	0.0%
	AT23	44.7%	85.7%	44.2%	0.0%	0.0%
	AT24	10.9%	14.3%	13.0%	0.0%	0.0%
	AT25	12.7%	0.0%	25.1%	0.0%	0.0%
	AT26	0.0%	0.0%	0.0%	11.6%	10.5%
	AT27	0.0%	0.0%	0.0%	3.9%	4.0%
	AT28	0.0%	0.0%	0.0%	3.9%	4.0%
	AT29	0.0%	0.0%	0.0%	18.1%	15.5%
	AT2B	0.0%	0.0%	0.0%	11.6%	10.5%
	AT2F	0.0%	0.0%	0.0%	3.9%	4.0%
	AT2G	0.0%	0.0%	0.0%	3.9%	4.0%
	AT2N	0.0%	0.0%	0.0%	18.1%	15.5%
	AT2V	0.0%	0.0%	0.0%	12.5%	16.0%
18C Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
18R	A701	100.0%	100.0%	100.0%	100.0%	100.0%
18R Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
36L	A601	100.0%	0.0%	100.0%	100.0%	100.0%
36L Subtotal		100.0%	0.0%	100.0%	100.0%	100.0%

Table B-3, Arrival Flight Track Distribution – 2023 No Action Alternative, *(Continued)*

Runway End	Track ID	Heavy Jets	Narrowbody Cargo Jets	Narrowbody Passenger Jets	Regional / GA Jets	Commuter / Cargo / GA Props
36C	AT50	0.0%	0.0%	0.0%	12.5%	16.0%
	AT51	12.7%	0.0%	25.1%	0.0%	0.0%
	AT52	44.7%	85.7%	44.2%	0.0%	0.0%
	AT53	10.9%	14.3%	13.0%	0.0%	0.0%
	AT54	31.7%	0.0%	17.7%	0.0%	0.0%
	AT55	0.0%	0.0%	0.0%	7.8%	5.0%
	AT56	0.0%	0.0%	0.0%	14.0%	12.0%
	AT57	0.0%	0.0%	0.0%	7.8%	13.0%
	AT58	0.0%	0.0%	0.0%	7.8%	7.0%
	AT59	0.0%	0.0%	0.0%	7.8%	7.0%
	AT5B	0.0%	0.0%	0.0%	7.8%	7.0%
	AT5F	0.0%	0.0%	0.0%	7.8%	5.0%
	AT5N	0.0%	0.0%	0.0%	14.2%	12.0%
	AT5V	0.0%	0.0%	0.0%	12.5%	16.0%
36C Subtotal		100.0%	0.0%	100.0%	100.0%	100.0%
36R	AT41	44.7%	85.7%	44.2%	0.0%	0.0%
	AT42	12.7%	0.0%	25.1%	0.0%	0.0%
	AT43	31.7%	0.0%	17.7%	0.0%	0.0%
	AT44	10.9%	14.3%	13.0%	0.0%	0.0%
	AT46	0.0%	0.0%	0.0%	48.3%	61.0%
	AT47	0.0%	0.0%	0.0%	15.5%	10.0%
	AT48	0.0%	0.0%	0.0%	36.2%	29.0%
36R Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
09	AT61	100.0%	100.0%	100.0%	100.0%	100.0%
09 Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
27	AT31	58.4%	52.0%	50.0%	38.0%	60.0%
	AT32	26.7%	39.0%	23.0%	26.0%	26.0%
	AT33	14.9%	9.0%	27.0%	36.0%	14.0%
27 Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%

Source: Landrum & Brown, 2023

Table B-4, Departure Flight Track Distribution – 2023 No Action Alternative

Runway End	Track ID	Heavy Jets	Narrowbody Cargo Jets	Narrowbody Passenger Jets	Regional / GA Jet	Commuter / Cargo / GA Prop
18L	D1G1	20.4%	0.0%	16.0%	0.0%	0.0%
	D1G2	79.6%	0.0%	84.0%	0.0%	0.0%
	D1J1	0.0%	14.0%	0.0%	28.5%	0.0%
	D1J2	0.0%	86.0%	0.0%	40.5%	0.0%
	DT16	0.0%	0.0%	0.0%	15.0%	63.0%
	DT17	0.0%	0.0%	0.0%	10.0%	37.0%
	DTSW1	0.0%	0.0%	0.0%	3.0%	0.0%
	DTW1	0.0%	0.0%	0.0%	3.0%	0.0%
18L Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
18C	D1G5	100.0%	0.0%	74.0%	0.0%	0.0%
	D1G6	0.0%	0.0%	2.0%	0.0%	0.0%
	D1J5	0.0%	94.2%	0.0%	0.0%	0.0%
	D1J6	0.0%	5.8%	0.0%	45.0%	0.0%
	DT20	0.0%	0.0%	0.0%	11.0%	16.0%
	DT28	0.0%	0.0%	0.0%	18.0%	47.2%
	DT29	0.0%	0.0%	0.0%	4.0%	13.0%
	DT2A	0.0%	0.0%	0.0%	9.0%	13.0%
	DT2Y	0.0%	0.0%	0.0%	8.0%	10.0%
	DTNW3	0.0%	0.0%	24.0%	5.0%	0.0%
	DTNW4	0.0%	0.0%	0.0%	0.0%	0.8%
18C Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
18R	D701	0.0%	0.0%	100.0%	100.0%	100.0%
18R Subtotal		0.0%	0.0%	100.0%	100.0%	100.0%
36L	D60D	0.0%	0.0%	100.0%	100.0%	100.0%
36L Subtotal		0.0%	0.0%	100.0%	100.0%	100.0%
36C	DT51X	0.0%	100.0%	0.0%	0.0%	0.0%
	DT54	0.0%	0.0%	0.0%	45.7%	39.0%
	DT55X	0.0%	0.0%	0.0%	14.0%	13.0%
	DT56	0.0%	0.0%	0.0%	40.0%	47.5%
	DTE1	0.0%	0.0%	0.0%	0.3%	0.0%
	DTG1X	100.0%	0.0%	100.0%	0.0%	0.0%
	DTW2	0.0%	0.0%	0.0%	0.0%	0.5%
36C Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%

Table B-4, Departure Flight Track Distribution – 2023 No Action Alternative, *(Continued)*

Runway End	Track ID	Heavy Jets	Narrowbody Cargo Jets	Narrowbody Passenger Jets	Regional / GA Jet	Commuter / Cargo / GA Prop
36R	D3G1	18.5%	29.2%	0.0%	0.0%	0.0%
	D3G2	1.6%	0.8%	1.0%	0.0%	0.0%
	D3G3	18.5%	63.2%	0.0%	0.0%	0.0%
	D3J1	0.0%	0.0%	29.0%	0.0%	0.0%
	D3J2	2.6%	4.9%	4.8%	0.8%	0.0%
	D3J3	0.0%	0.0%	62.9%	0.0%	0.0%
	DT46	0.0%	0.0%	0.0%	31.5%	33.0%
	DT47	0.0%	0.0%	0.0%	12.3%	12.0%
	DT48	0.0%	0.0%	0.0%	6.6%	12.0%
	DT49	0.0%	0.0%	0.0%	35.5%	43.0%
	DTNE1	42.6%	0.0%	0.0%	6.6%	0.0%
	DTNW1	14.6%	0.1%	0.2%	0.1%	0.0%
	DTSE1	1.6%	1.8%	2.1%	0.0%	0.0%
	DTSE2	0.0%	0.0%	0.0%	6.6%	0.0%
36R Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%
09	DT61	0.0%	0.0%	0.0%	0.0%	100.0%
09 Subtotal		0.0%	0.0%	0.0%	0.0%	100.0%
27	D2G1	1.0%	0.0%	5.0%	0.0%	0.0%
	D2G2	98.0%	0.0%	80.0%	0.0%	0.0%
	D2G3	1.0%	0.0%	5.0%	0.0%	0.0%
	D2J4	0.0%	39.0%	0.0%	0.0%	0.0%
	D2J5	0.0%	47.0%	0.0%	0.0%	0.0%
	D2J6	0.0%	14.0%	0.0%	0.0%	0.0%
	DT30	0.0%	0.0%	0.0%	9.0%	6.5%
	DT36	0.0%	0.0%	0.0%	12.0%	10.5%
	DT37	0.0%	0.0%	0.0%	18.0%	21.5%
	DT38	0.0%	0.0%	0.0%	11.0%	17.5%
	DT39	0.0%	0.0%	0.0%	9.0%	10.0%
	DT3A	0.0%	0.0%	0.0%	9.0%	7.0%
	DT3R	0.0%	0.0%	0.0%	6.0%	4.0%
	DT3X	0.0%	0.0%	0.0%	8.0%	13.0%
	DT3Y	0.0%	0.0%	0.0%	8.0%	5.0%
	DT3Z	0.0%	0.0%	5.0%	4.0%	2.5%
	DTE2	0.0%	0.0%	5.0%	6.0%	2.5%
27 Subtotal		100.0%	100.0%	100.0%	100.0%	100.0%

Source: Landrum & Brown, 2023

Aircraft Weight and Trip Length

Aircraft weight upon departure is a factor in the dispersion of noise because it impacts the rate at which an aircraft is able to climb. Generally, heavier aircraft have a slower rate of climb and a wider dispersion of noise along their flight routes. Where specific aircraft weights are unknown, the AEDT uses the distance flown to the first stop as a surrogate for the weight, by assuming that the weight has a direct relationship with the fuel load necessary to reach the first destination. The AEDT groups trip lengths into eleven stage categories and assigns standard aircraft weights to each stage category. These categories are:

Stage Category	Stage Length
1	0-500 nautical miles
2	501-1000 nautical miles
3	1001-1500 nautical miles
4	1501-2500 nautical miles
5	2501-3500 nautical miles
6	3501-4500 nautical miles
7	4501-5500 nautical miles
8	5501-6500 nautical miles
9	6501-7500 nautical miles
10	7501-8500 nautical miles
11	8501+ nautical miles

The trip lengths modeled for the 2023 No Action Alternative noise exposure contour are based upon a review of departure destinations from airline schedule data and flight tracking data.[25] **Table B-5** indicates the proportion of the operations that fell within each of the nine trip length categories during this time period.

Table B-5, Departure Stage Length – 2023 No Action Alternative

Aircraft Category	Departure Stage Length										
	1	2	3	4	5	6	7	8	9	10	11
Widebody Jet	14%	29%	6%	12%	5%	26%	8%	0%	0%	0%	0%
Narrowbody Cargo Jet	50%	31%	9%	10%	0%	0%	0%	0%	0%	0%	0%
Narrowbody Passenger Jet	43%	52%	4%	1%	0%	0%	0%	0%	0%	0%	0%
Regional / GA Jet	97%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Commuter / Cargo / GA Prop	92%	6%	2%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Landrum & Brown, 2023

[25] CVG Master Plan 2050, Aviation Activity Forecast, March 2021.

B.4.2 2023 Proposed Action Noise Exposure Contour

This section presents the input data used to model the 2023 Proposed Action noise exposure contour.

Runway Definition

No changes to the airfield layout would occur under the 2023 Proposed Action. Therefore, the airfield layout would remain the same as described for the 2023 No Action Alternative and shown on Exhibit B-3.

Number of Operations and Fleet Mix

No change to the number of aircraft operations, fleet mix, or operating times are expected as a result of implementing the Proposed Action. Therefore, the number of annual operations modeled for the 2023 Proposed Action are the same as discussed for the 2023 No Action Alternative and presented in Table B-1.

Runway End Utilization

The percent use of each runway end for the 2023 Proposed Action condition was based historic runway use with adjustments made to account for proposed modifications to the preferential nighttime runway use program. No changes to daytime runway use patterns are expected as a result of implementing the Proposed Action. **Table B-6** summarizes the percentage of use by each aircraft category on each of the runways at CVG for the 2023 Proposed Action noise modeling.

Flight Tracks

The 2023 Proposed Action would not cause changes to the existing flight corridors at CVG. Aircraft would continue to utilize existing flight corridors. Therefore, the flight tracks used to model the 2023 Proposed Action are the same as those used for the 2023 No Action Alternative as shown on Exhibit B-4 and Exhibit B-5. The flight track utilization percentages modeled for the 2023 Proposed Action remain the same as the 2023 No Action as shown in Table B-3 and Table B-4.

Aircraft Weight and Trip Length

The Proposed Action would not cause changes to aircraft origins/destinations that would cause changes to average aircraft stage lengths. Therefore, the stage length percentages presented for the 2023 No Action Alternative in Table B-5 were modeled for the 2023 Proposed Action noise exposure contour.

Table B-6, Average Annual Day Runway Use – 2023 Proposed Action

Aircraft Category	Runway End								
	18C	18L	18R	27	36C	36L	36R	09	Total
Daytime Arrivals									
Widebody Jet	11.8%	58.5%	0.3%	3.8%	2.7%	0.0%	22.3%	0.6%	100.0%
Narrowbody Cargo Jet	27.1%	36.8%	0.6%	3.6%	6.6%	0.0%	23.5%	1.8%	100.0%
Narrowbody Passenger Jet	23.6%	43.6%	0.5%	3.8%	8.5%	0.0%	19.6%	0.4%	100.0%
Regional / GA Jet	23.1%	43.1%	0.4%	4.3%	9.5%	0.0%	19.3%	0.3%	100.0%
Commuter / Cargo / GA Prop	22.6%	40.5%	3.1%	5.8%	9.6%	0.7%	17.1%	0.6%	100.0%
Nighttime Arrivals									
Widebody Jet	6.5%	0.8%	0.0%	6.4%	6.2%	0.0%	20.9%	59.2%	100.0%
Narrowbody Cargo Jet	6.6%	0.8%	0.0%	2.9%	6.3%	0.0%	17.1%	66.3%	100.0%
Narrowbody Passenger Jet	8.1%	3.8%	0.2%	4.5%	6.7%	0.0%	33.9%	42.8%	100.0%
Regional / GA Jet	3.1%	12.1%	1.0%	23.1%	1.1%	0.0%	39.6%	20.0%	100.0%
Commuter / Cargo / GA Prop	0.9%	9.9%	2.0%	28.4%	1.3%	0.0%	52.5%	5.0%	100.0%
Daytime Departures									
Widebody Jet	4.4%	18.3%	0.0%	64.4%	1.9%	0.0%	11.0%	0.0%	100.0%
Narrowbody Cargo Jet	4.0%	5.2%	0.0%	86.8%	2.4%	0.0%	1.6%	0.0%	100.0%
Narrowbody Passenger Jet	3.5%	26.5%	0.0%	56.6%	2.0%	0.1%	11.3%	0.0%	100.0%
Regional / GA Jet	3.1%	23.6%	0.0%	58.2%	1.7%	0.1%	13.3%	0.0%	100.0%
Commuter / Cargo / GA Prop	5.5%	20.4%	6.9%	51.6%	3.4%	3.3%	8.8%	0.1%	100.0%
Nighttime Departures									
Widebody Jet	1.4%	3.1%	0.0%	63.7%	3.6%	0.0%	28.2%	0.0%	100.0%
Narrowbody Cargo Jet	1.2%	3.2%	0.0%	87.1%	1.3%	0.0%	7.2%	0.0%	100.0%
Narrowbody Passenger Jet	1.3%	6.3%	0.0%	62.8%	4.6%	0.0%	25.0%	0.0%	100.0%
Regional / GA Jet	0.9%	4.5%	0.0%	65.1%	8.2%	0.0%	21.3%	0.0%	100.0%
Commuter / Cargo / GA Prop	2.0%	7.0%	1.4%	25.8%	7.4%	0.0%	56.4%	0.0%	100.0%

XX% = Increase compared to No Action

XX% = Decrease compared to No Action

Source: CVG Flight Tracking System Data, Landrum & Brown analysis, 2023.

B.4.3 2028 No Action Noise Exposure Contour

This section presents the input data used to model the 2028 No Action noise exposure contour.

Runway Definition

No changes to the airfield layout would occur under the 2028 No Action Alternative. Therefore, the airfield layout would remain the same as described for the 2023 No Action Alternative and shown on Exhibit B-3.

Number of Operations and Fleet Mix

The number of annual operations and aircraft fleet mix modeled for the 2028 No Action Alternative was based on the latest forecast of aviation activity prepared for CVG.[26] That forecast included 255,943 total annual operations in 2028, or 701.2 average-annual day operations. The ratio of daytime (7:00 a.m. – 9:59 p.m.) to nighttime (10:00 p.m. – 6:59 a.m.) operations is expected to remain similar to current conditions and is based on data from the CVG Flight Tracking System for the period from 2019 to 2021. **Table B-7** shows the number of aircraft operations during the daytime and nighttime that was used to model the 2028 No Action Alternative noise exposure contour.

Table B-7, Distribution of Average Daily Operations by Aircraft Category 2028 No Action Alternative

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Widebody Jets						
Airbus A300F4-600 Series	2GE039	1.0	1.3	0.9	1.4	4.6
Airbus A330-200 Series Freighter	4GE081	8.5	11.4	14.2	5.7	39.8
Boeing 747-400 Series Freighter	1GE024	3.8	3.0	4.6	2.2	13.6
Boeing 747-8	8GENX1	1.4	2.6	1.8	2.2	8.0
Boeing 767-200 Series Freighter	1GE010	5.8	6.6	6.7	5.7	24.8
Boeing 767-200 Series Freighter	1GE012	5.5	6.2	8.4	3.3	23.4
Boeing 767-300 ER	1PW043	0.5	0.5	0.5	0.4	1.9
Boeing 767-300 ER Freighter	1GE030	6.1	6.4	6.9	5.6	25.0
Boeing 767-300 ER Freighter	2GE054	8.6	9.1	10.3	7.4	35.4
Boeing 767-300 Series	1GE029	3.4	3.6	3.8	3.2	14.0
Boeing 777 Freighter	01P21GE217	3.2	3.3	3.3	3.1	12.9
Boeing 787-8 Dreamliner	9GENX3	1.1	0.0	0.0	1.1	2.2
Subtotal		*48.9*	*54.0*	*61.4*	*41.3*	*205.6*

[26] CVG Master Plan 2050, Aviation Activity Forecast, March 2021.

Table B-7, Distribution of Average Daily Operations by Aircraft Category 2028 No Action Alternative, *(Continued)*

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Narrowbody Cargo Jets						
Boeing 727-200 Series Freighter	1PW010	0.2	0.8	0.6	0.4	2.0
Boeing 737-400 Series Freighter	1CM007	3.1	17.4	7.5	12.9	40.9
Boeing 737-800BCF	8CM051	5.1	10.3	11.5	3.8	30.7
Boeing 757-200 Series Freighter	3RR028	2.6	2.0	3.5	1.1	9.2
Boeing 757-200 Series Freighter	4PW072	0.1	0.1	0.2	0.1	0.5
Subtotal		11.1	30.6	23.3	18.3	83.3
Narrowbody Passenger Jets						
Airbus A319-100 Series	2CM019	4.5	2.1	6.1	0.5	13.2
Airbus A319-100 Series	4CM036	0.5	0.2	0.7	0.1	1.5
Airbus A319-NEO	01P20CM129	0.6	0.3	0.9	0.1	1.9
Airbus A320-200 Series	1CM009	1.3	0.5	1.6	0.2	3.6
Airbus A320-200 Series	1IA003	0.5	0.2	0.7	0.0	1.4
Airbus A320-200 Series	2CM014	10.1	3.5	12.3	1.3	27.2
Airbus A320-NEO	01P20CM128	5.6	1.3	4.2	2.7	13.8
Airbus A321-200 Series	01P08CM104	0.4	0.4	0.7	0.1	1.6
Airbus A321-200 Series	3IA008	0.2	0.2	0.3	0.1	0.8
Boeing 717-200 Series	4BR002	0.9	0.2	1.1	0.0	2.2
Boeing 737-700 Series	3CM032	0.2	0.1	0.2	0.1	0.6
Boeing 737-700 Series	8CM051	12.8	4.3	13.6	3.5	34.2
Boeing 737-8	01P20CM136	0.5	0.0	0.5	0.0	1.0
Boeing 737-800 Series	3CM032	0.0	0.0	0.0	0.0	0.0
Boeing 737-800 Series	3CM034	1.1	0.2	1.2	0.1	2.6
Boeing 737-800 Series	8CM051	12.5	2.8	14.4	0.9	30.6
Boeing 737-9	01P20CM136	0.3	0.0	0.3	0.0	0.6
Boeing 737-900-ER	8CM051	1.9	4.2	5.2	0.9	12.2
Boeing 737-900 Series	8CM066	0.2	0.3	0.4	0.1	1.0
Boeing MD-88	1PW019	0.4	0.2	0.4	0.1	1.1
Bombardier CRJ-700-ER	5GE083	8.9	0.4	8.3	1.0	18.6
Bombardier CRJ-700-LR	01P08GE190	17.5	0.8	16.3	2.0	36.6
Bombardier CRJ-900-ER	01P08GE190	30.9	6.3	34.3	2.9	74.4
Bombardier CS100	01P20PW183	1.6	0.0	1.4	0.2	3.2
Embraer ERJ170	01P08GE197	5.4	0.7	5.1	1.0	12.2
Embraer ERJ175	01P08GE197	15.7	2.0	14.7	3.0	35.4
Embraer ERJ175-LR	01P08GE197	3.2	0.4	3.0	0.6	7.2
Embraer ERJ190	8GE116	5.3	0.7	4.9	1.0	11.9
Subtotal		143.0	32.3	152.8	22.5	350.6

Table B-7, Distribution of Average Daily Operations by Aircraft Category 2028 No Action Alternative, *(Continued)*

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Regional Jets						
Bombardier Challenger 300	6AL006	0.5	0.0	0.5	0.0	1.0
Bombardier CRJ-200-ER	01P05GE189	0.3	0.0	0.3	0.0	0.6
Bombardier CRJ-200-LR	01P05GE189	4.4	0.5	4.7	0.2	9.8
Bombardier Global Express	01P04BR013	0.2	0.0	0.2	0.0	0.4
Bombardier Learjet 60	TFE731	1.7	0.3	1.7	0.3	4.0
Cessna 550 Citation II	1PW036	0.4	0.1	0.4	0.1	1.0
Cessna 560 Citation Excel	PW530	0.8	0.0	0.8	0.0	1.6
Cessna 560 Citation V	1PW037	0.6	0.1	0.5	0.2	1.4
Dassault Falcon 900	1AS002	0.1	0.0	0.1	0.0	0.2
Embraer ERJ135	01P06AL032	0.0	0.0	0.0	0.0	0.0
Embraer ERJ145-EP	6AL005	0.7	0.2	0.8	0.1	1.8
Embraer ERJ145-LR	6AL005	1.1	0.3	1.2	0.2	2.8
Falcon 7X	03P16PW192	0.0	0.0	0.0	0.0	0.0
Gulfstream G-5 Gulfstream 5 / G-5SP Gulfstream G500	3BR001	0.4	0.0	0.4	0.0	0.8
Gulfstream IV-SP	11RR048	0.3	0.0	0.3	0.0	0.6
Gulfstream V-SP	11RR048	0.4	0.0	0.4	0.0	0.8
Hawker Beechcraft Corp Beechjet 400A	1PW038	1.5	0.1	1.4	0.2	3.2
Raytheon Beechjet 400	1PW035	0.8	0.0	0.7	0.1	1.6
Raytheon Hawker 800	TFE731	3.2	0.0	2.6	0.6	6.4
Embraer Legacy 500 (EMB-550)	01P14HN015	1.0	0.2	1.1	0.1	2.4
Embraer Phenom 300 (EMB-505)	PW530	0.5	0.0	0.5	0.0	1.0
Cessna CitationJet CJ4 (Cessna 525C)	1PW038	1.3	0.1	1.3	0.1	2.8
Subtotal		20.2	1.9	19.9	2.2	44.2

Table B-7, Distribution of Average Daily Operations by Aircraft Category 2028 No Action Alternative, *(Continued)*

AEDT Airframe Type	AEDT Engine Code	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Commuter/Cargo/GA Props						
Cessna 172 Skyhawk	IO360	0.3	0.0	0.3	0.1	0.7
Cessna 182	IO360	0.0	0.0	0.0	0.0	0.0
Cessna 208 Caravan	PT6A14	0.1	0.0	0.1	0.0	0.2
Cessna 310	TIO540	0.0	0.0	0.0	0.0	0.0
Cessna 441 Conquest II	TPE10A	0.0	0.0	0.0	0.0	0.0
Cirrus SR20	IO360	0.1	0.0	0.1	0.0	0.2
Diamond DA40	IO360	0.1	0.0	0.1	0.0	0.2
Embraer EMB120 Brasilia	PW118	1.1	0.2	0.9	0.3	2.5
Fairchild SA-227-AT Expeditor	TPE11U	2.1	0.5	1.9	0.7	5.2
Pilatus PC-12	PT67B	0.1	0.0	0.1	0.0	0.2
Piper PA-28 Cherokee Series	IO360	0.1	0.0	0.1	0.0	0.2
Raytheon Beech 1900-D	PT67D	0.1	1.9	0.2	1.8	4.0
Raytheon Beech Baron 58	TIO540	0.1	0.0	0.1	0.0	0.2
Raytheon King Air 90	PT6A28	0.1	0.0	0.1	0.0	0.2
Raytheon Super King Air 200	PT6A42	0.1	0.0	0.1	0.0	0.2
Raytheon Super King Air 300	PT6A60	0.1	0.0	0.1	0.0	0.2
Shorts 330-200 Series	PT6A4R	0.0	1.6	0.1	1.6	3.3
Subtotal		*4.5*	*4.2*	*4.3*	*4.5*	*17.5*
Grand Total		**227.7**	**123.0**	**261.7**	**88.8**	**701.2**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m. Totals may not equal sum due to rounding.
Source: CVG Flight Tracking System Data, CVG Master Plan 2050, Landrum & Brown analysis, 2023.

Runway End Utilization

The percent use of each runway end for the 2028 No Action Alternative would be expected to be the same as runway use for the 2023 No Action Alternative. Therefore, the same runway use percentages shown in Table B-2 were used to model the 2028 No Action noise exposure contour.

Flight Tracks

No changes to flight track locations or percent distribution are expected to occur for the 2028 No Action Alternative. Therefore, the AEDT flight tracks modeled for the 2028 No Action Alternative noise exposure contour are the same as those modeled for the 2023 No Action Alternative shown on Exhibit B-4 and Exhibit B-5. Flight track distribution modeled for the 2028 No Action Alternative noise exposure contour are the same as those modeled for the 2023 No Action Alternative shown in Table B-3 and Table B-4.

Aircraft Weight and Trip Length

No notable changes to aircraft origins/destinations are expected in 2028 that would cause changes to average aircraft stage lengths. Therefore, the stage length percentages presented for the 2023 No Action Alternative in Table B-5 were modeled for the 2028 No Action Alternative noise exposure contour.

B.4.4 2028 Proposed Action Noise Exposure Contour

This section presents the input data used to model the 2028 Proposed Action noise exposure contour.

Runway Definition

No changes to the airfield layout would occur under the 2028 Proposed Action. Therefore, the airfield layout would remain the same as described for the 2023 No Action Alternative and shown on Exhibit B-3.

Number of Operations and Fleet Mix

No change to the number of aircraft operations, fleet mix, or operating times are expected as a result of implementing the Proposed Action. Therefore, the number of annual operations modeled for the 2028 Proposed Action are the same as discussed for the 2028 No Action Alternative and presented in Table B-7.

Runway End Utilization

The percent use of each runway end for the 2028 Proposed Action would be expected to be the same as runway use for the 2023 Proposed Action. Therefore, the same runway use percentages shown in Table B-6 were used to model the 2028 Proposed Action noise exposure contour.

Flight Tracks

The 2028 Proposed Action would not cause changes to the existing flight corridors at CVG. Aircraft would continue to utilize existing flight corridors. Therefore, the flight tracks used to model the 2028 Proposed Action are the same as those used for the 2023 No Action Alternative as shown on Exhibit B-4 and Exhibit B-5. The flight track utilization percentages modeled for the 2028 Proposed Action are the same as those modeled for the 2023 No Action and 2023 Proposed Action as shown in Table B-3 and Table B-4.

Aircraft Weight and Trip Length

No changes to aircraft origins/destinations would occur that would cause changes to the aircraft stage lengths. Therefore, the stage length percentages modeled for the 2028 Proposed Action noise exposure contour are the same as those presented for the 2023 No Action Alternative in Table B-5.

Appendix C - Agency and Public Involvement

To satisfy requirements for public involvement, an advertisement announcing the availability of the Draft Environmental Assessment (EA) was published in the *Cincinnati Enquirer.* The advertisement provided the public meeting date, time, and location, informed the public on how to obtain a copy of the Draft EIS, and initiated the public comment period. The Draft EA is available at the following location during normal business hours.

CVG Centre
77 Comair Boulevard
Erlanger, KY 41018

The Draft EA will be available online at https://www.airportprojects.net/CVG-Runway-EA.

In addition, the following agencies listed were sent a notice of the Draft EA availability for review via email or letter.

Mr. Lee Andrews
Kentucky Ecological Services Field Office
U.S. Fish and Wildlife Service
JC Watts Federal Building – Room 265
330 West Broadway
Frankfort, KY 40601

Mr. Craig Potts
Director and State Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601-1824

Ms. Louanna Aldridge
Kentucky Department for Environmental Protection
Office of the Commissioner
300 Sower Boulevard
Frankfort, KY 40601

Ntale Kajumba
Chief, NEPA Program Office
U.S. Environmental Protection Agency
Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

This appendix contains copies of the coordination materials for this EA. Copies of the following documentation are included:

- Agency distribution of the Draft EA (to be included in the Final EA)
- Agency comments on the Draft EA (to be included in the Final EA)
- Reponses to agency comments (to be included in the Final EA)
- Copy of the Public Notice of Availability of the Draft EA (to be included in the Final EA)
- Public Comments on the Draft EA (to be included in the Final EA)
- Responses to Public Comments on the Draft EA (to be included in the Final EA)