Chapter 3 Baseline Noise Exposure Development

This chapter presents the noise analysis to develop the Existing (2023) Noise Exposure Contour and Future (2028) Noise Exposure Contour without the implementation of any new noise abatement measures recommended in Chapter 4 of this Part 150 Study Update. Aircraft-related noise exposure is defined through noise contours prepared using the FAA Aviation Environmental Design Tool (AEDT) Version 3e.[5] This noise exposure is presented using the Day-Night Average Sound Level (DNL) metric. A DNL noise contour does not represent the noise levels present on any specific day, but represents the average sound energy level of all 365 days of operation during the year. Noise contour patterns extend from an airport along each extended runway centerline, reflective of the combination of average-annual runway use patterns, direction of flow, and flight tracks to and from the runways. The relative distance of a contour from an airport along each route is a function of the frequency of use of each runway end for total arrivals and departures, as well as use at night,[6] and the type of aircraft assigned to each runway end.

For the purpose of this Study, the noise patterns are presented on exhibits, and the number of housing units and estimated population that fall within them are quantified and presented in tables. An explanation of the AEDT and the DNL metric, along with a review of the physics of noise, noise impacts on humans, social impacts of noise, and the data required to develop noise exposure contours, is summarized in **Appendix C, *Noise Methodology***.

3.1 Existing (2023) Baseline Noise Exposure Contour

3.1.1 Overview

The Existing (2023) Baseline Noise Exposure Contour depicts the existing average-annual noise exposure pattern in the area surrounding the Airport. The Existing (2023) Baseline Noise Exposure Contour is based on a review of FAA's Operations Network (OPSNET) data for April 2021 through March 2022, which was the most recent 12 months of data available at the time the noise modeling began for the purpose of this analysis. The total of annual aircraft operations during this period was 526,454, which converts to 1,442.3 average-annual day operations.[7] For more information, see Appendix C.

3.1.2 Noise Exposure Contour

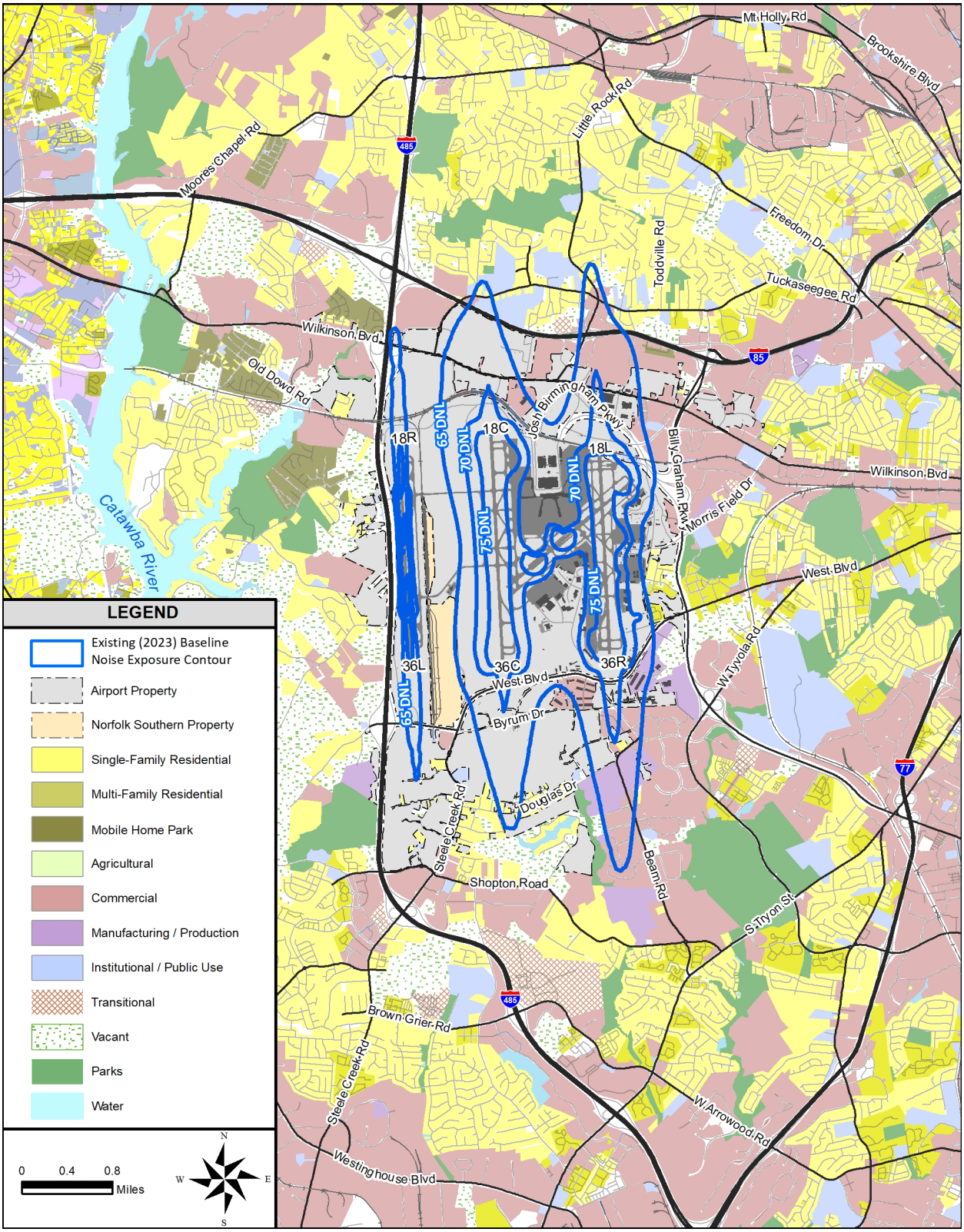
Exhibit 3-1, *Existing (2023) Baseline Noise Exposure Contour,* depicts existing aircraft noise exposure superimposed on land uses in the vicinity of the Airport and represents the Existing (2023) NEM. Note, the official NEMs are located at the front of this document with the NEM and NCP checklist. **Table 3-1, *Areas Within Existing (2023) Baseline Noise Exposure Contour (in Square Miles)*** summarizes the area within the DNL 65, 70, and 75 dB noise contours.

5 AEDT Version 3e was the most recent version of AEDT when the noise modeling began.

6 Nighttime refers to the hours between 10:00 p.m. and 7:00 a.m.

7 The FAA's Terminal Area Forecast (TAF) issued January 2024 reported a total of 541,560 operations for the most recent 12 months for which data was available at the time of this writing (March 2023 to February 2024). The difference between the annual operations used to model the Existing (2023) Baseline condition and those for the FAA's TAF for March 2023 to February 2024 is less than three percent. As such, the Existing (2023) Baseline condition is representative of the operating conditions for the last 12 months (March 2023 to February 2024). See Appendix C, Section C.5.6 for more information.

Exhibit 3-1 Existing (2023) Baseline Noise Exposure Contour



Source: Landrum & Brown, 2023

Table 3-1 Areas Within Existing (2023) Baseline Noise Exposure Contour (in Square Miles)

Contour Range	Existing (2023) Baseline
DNL 65-70 dB	4.42
DNL 70-75 dB	1.36
DNL 75+ dB	1.01
Total	6.79

Note: In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise levels below DNL 65 dB.
Source: Landrum & Brown, 2023.

The DNL 65 dB of the Existing (2023) Baseline Noise Exposure Contour encompasses approximately 6.79 square miles and its shape reflects the runway use, flight tracks, and the balance of time the Airport operates in north and south flow. Runway 18R/36L is an arrival runway which is indicative of the long, thinner noise contour. Runway 18C/36C and Runway 18L/36R are mixed use runways and are used by both arrivals and departures, resulting in a wider contour due to the wider distribution of flight corridors and higher engine thrust settings on departure compared to arrivals. A majority of the lands within the DNL 65 dB of the Existing (2023) Noise Exposure Contour to the north consist of Airport property, and commercial and institutional land uses. Residential land uses are located to the north of Runway 18C/36C and Runway 18L/36R, north of I-85. To the south, the land uses are also Airport property, commercial and manufacturing/production land uses, and residential land uses south of Runway 18C/36C and Runway 18R/36L. The DNL 70 dB of the Existing (2023) Baseline Noise Exposure Contour remains primarily on Airport property, with the north and south end of the DNL 70 dB contour containing commercial land uses. The DNL 75 dB of the Existing (2023) Baseline Noise Exposure Contour remains completely over Airport property.

3.1.3 Land Use Compatibility

A summary of the number of housing units (households), population (residents), and other noise-sensitive sites within the DNL 65 dB noise exposure contour for the Existing (2023) Baseline is provided in **Table 3-2*, Housing, Population, and Noise-Sensitive Sites Within DNL 65+ dB of the Existing (2023) Baseline Noise Exposure Contour.*** The table shows the number of housing units within each noise contour range (e.g., DNL 65-70 dB, DNL 70-75 dB) and the current mitigation status of each housing unit. Some housing units have been previously sound insulated and are considered mitigated. Unmitigated housing units include those that were determined to be ineligible for sound insulation or were potentially eligible but not sound insulated because the owners declined or did not respond to an offer to sound insulate the housing unit.

There are 140 housing units and an estimated 421 residents located within the DNL 65 dB noise exposure contour of the Existing (2023) Baseline condition. There are three schools/educational facilities, the West Mecklenburg High School, East Voyager Academy of Charlotte, and the Beginning Years Day Care, within the DNL 65 dB noise exposure contour of the Existing (2023) Baseline condition. There are four places of worship, the Covenant United Methodist Church, Every Nation Church, Harvest Church, and the Montagnard Alliance Church, within the DNL 65 dB noise exposure contour of the Existing (2023) Baseline condition. There are no libraries, hospitals, or nursing homes located within the DNL 65 dB noise exposure contour of the Existing (2023) Baseline condition.

Table 3-2 Housing, Population, and Noise-Sensitive Sites Within DNL 65+ dB of the Existing (2023) Baseline Noise Exposure Contour

	DNL 65-70 dB	DNL 70-75 dB	DNL 75+ dB	Total
Residential Housing Units				
Housing Type				
Single-Family Residential	**51**	**0**	**0**	**51**
Mitigated	15	0	0	15
Unmitigated	36	0	0	36
Multi-Family Residential	**88**	**0**	**0**	**88**
Mitigated	0	0	0	0
Unmitigated	88	0	0	88
Manufactured Home	**1**	**0**	**0**	**1**
Unmitigated	1	0	0	1
Total Housing Units	**140**	**0**	**0**	**140**
Residential Population				
Total Population[1]	**421**	**0**	**0**	**421**
Noise-Sensitive Sites				
Schools / Educational Facilities	3	0	0	3
Churches / Places of Worship	4	0	0	4
Libraries	0	0	0	0
Hospitals	0	0	0	0
Nursing Homes	0	0	0	0
Outdoor Music / Amphitheater	0	0	0	0
Other Uses[2]	n/a	0	0	0

Notes: 1. Total population estimated based upon the housing counts multiplied by the 2010 Census average household size for each Census Block Group.
2. Other uses that are considered noise-sensitive at or above DNL 70 dB includes sports arenas, zoos, nature exhibits, amusement parks, camps, resorts, golf courses, stables, and office or publicly accessible portions of commercial or manufacturing facilities.

Source: Landrum & Brown, 2024.

3.2 Future (2028) Baseline Noise Exposure Contour

3.2.1 Overview

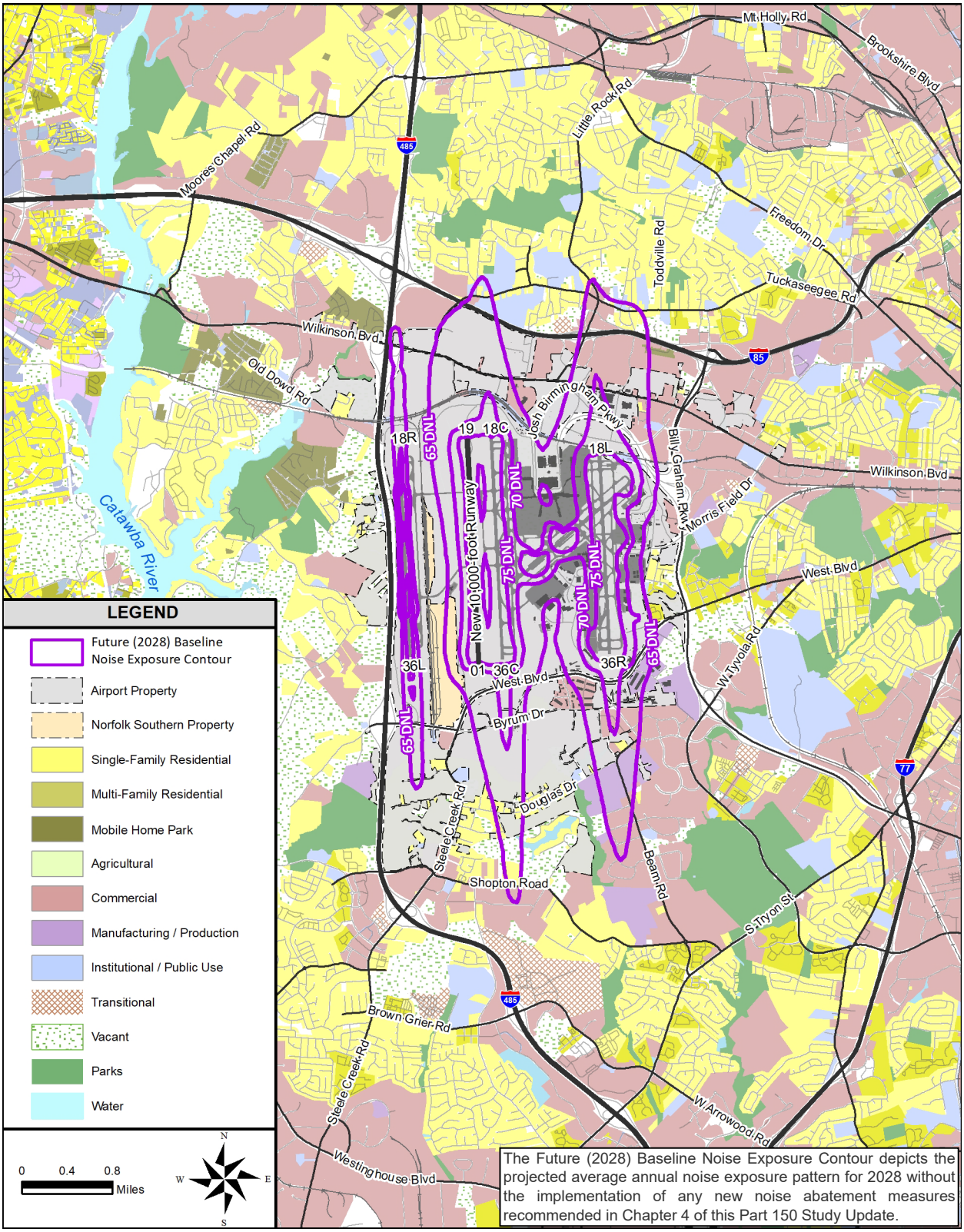
The Future (2028) Baseline Noise Exposure Contour depicts the projected average-annual noise exposure pattern for 2028 without the implementation of any new noise abatement measures recommended in Chapter 4 of this Part 150 Study Update. The Future (2028) Baseline condition assumes the use of a new 10,000-foot runway (referred to as Runway 01/19) in the midfield with 3,200 feet of separation to Runway 18R/36L and 1,100 feet of separation to Runway 18C/36C and other airfield improvement projects which are currently in design or construction. The number of annual operations for the Future (2028) Baseline was based on the forecast of aviation activity developed for the Capacity EA, which estimated 639,783 total annual operations, or 1,752.8 average-annual day operations, in 2028.[8] The runway use patterns for the Future (2028) Baseline are based on data from the Capacity EA that was developed in consultation with FAA ATC personnel and review of airfield simulation modeling.

3.2.2 Noise Exposure Contour

The Future (2028) Baseline Noise Exposure Contour superimposed on the existing land use is shown in **Exhibit 3-2, *Future (2028) Baseline Noise Exposure Contour***. **Table 3-3, *Comparison of Areas Within Existing (2023) Baseline and Future (2028) Baseline Noise Exposure Contour (in Square Miles)*** provides a comparison of the areas within the Existing (2023) Baseline and Future (2028) Baseline Noise Exposure Contours.

[8] Forecast Technical Memorandum, Technical Memorandum – Final, Charlotte Douglas International Airport Environmental Impact Statement, VHB in association with InterVISTAS, April 18, 2018. The FAA's TAF issued January 2024 projected a total of 594,664 operations for CLT in 2028. The difference between the annual operations used to model the Future (2028) Baseline condition and those for the FAA's TAF for 2028 is less than eight percent. As such, the CLT forecast is consistent with the FAA's TAF. See Appendix H for more information.

Exhibit 3-2 Future (2028) Baseline Noise Exposure Contour



Source: Landrum & Brown, 2023

Table 3-3 Comparison of Areas Within Existing (2023) Baseline and Future (2028) Baseline Noise Exposure Contour (in Square Miles)

Contour Range	Existing (2023) Baseline	Future (2028) Baseline	Difference
DNL 65-70 dB	4.42	4.48	0.06
DNL 70-75 dB	1.36	1.38	0.02
DNL 75+ dB	1.01	1.24	0.23
Total	6.79	7.11	0.32

*Note: In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise levels below DNL 65 dB.

Source: Landrum & Brown, 2023.

The Future (2028) Baseline Noise Exposure Contour increases in size compared to the Existing (2023) Baseline Noise Exposure Contour due to the increase in operations projected for 2028. The shape of the Future (2028) Baseline Noise Exposure Contour remains similar to the Existing (2023) Baseline Noise Exposure Contour because runway use, flight tracks, and the balance of time the Airport operates in north and south flow would be expected to remain similar to Existing (2023) conditions with variations in runway use based on long-term wind and weather patterns and consideration of the new fourth parallel runway, Runway 01/19.

The Future (2028) Baseline Noise Exposure Contour widens along the Runway 18C/36C centerline compared to the Existing (2023) Baseline Noise Exposure Contour due to the addition of Runway 01/19. Due to the close spacing of Runway 18C/36C and Runway 01/19, the noise contour lines surrounding these runways appears as one single shape, similar to the noise contour lines surrounding Runway 18L/36R. Runway 01/19 would be primarily a departure runway; therefore, the noise contour extends farther west from that runway over Airport property.

The Future (2028) Baseline Noise Exposure Contour, along the Runway 18L/36R centerline, shrinks slightly to the north and south as compared to the Existing (2023) Baseline Noise Exposure Contour. This is attributed to the offloading of arrivals onto Runway 18C/36C. As a result, Runway 18L/36R is not as heavily used in the Future (2028) Baseline Noise Exposure Contour for arrivals. The slight bump out on the northeast side of the contour is due to the offloading of northeast bound departures from Runway 36C in the Existing (2023) Baseline Noise Exposure Contour to Runway 36R in the Future (2028) Baseline Noise Exposure Contour. In addition, the Future (2028) Baseline Noise Exposure Contour along Runway 18R/36L extends farther to the north due to the runway being used a small percentage more for arrivals in south flow in order to balance the use of Runway 18L/36R, Runway 18C/36C, and Runway 18R/36L.

The DNL 65 dB of the Future (2028) Baseline Noise Exposure Contour extends approximately 0.5 miles to the east of Runway 18R/36L, 0.1 miles west from Runway 18L/36R, 1.4 miles north of Runway 18C/36C, and 1.1 miles south Runway 18C/36C. A majority of the lands to the north consist of Airport property, and commercial and institutional land uses. Residential lands uses are located to the north of Runway 18C/36C and Runway 18L/36R, north of I-85. To the south, the land uses are also Airport property, commercial and manufacturing/production land uses, and residential land uses south of Runway 18C/36C and Runway 18R/36L. The DNL 70 dB noise exposure contour for the Future (2028) Baseline remains primarily on Airport property, with the north and south end of the contour containing commercial land uses. The DNL 75 dB for the Future (2028) Baseline remains completely over Airport property.

3.2.3 Land Use Compatibility

A summary of the number of housing units (households), population (residents), and other noise-sensitive sites within the DNL 65 dB noise exposure contour for the Future (2028) Baseline Noise Exposure Contours is provided in **Table 3-4*, Housing, Population, and Noise-Sensitive Sites Within DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour.*** There are 243 housing units and an estimated 687 residents that would be located within the DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour. There are four schools / educational facilities, the West Mecklenburg High School, East Voyager Academy of Charlotte, Beginning Years Day Care, and the Mulberry Head Start Day Care, within the DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour. There are four places of worship, the Every Nation Church, Harvest Church, Montagnard Alliance Church, and the Mulberry Baptist Church, within the DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour. There are no libraries, hospitals, or nursing homes located within the DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour.

Table 3-4 Housing, Population, and Noise-Sensitive Sites Within DNL 65+ dB of the Future (2028) Baseline Noise Exposure Contour

	DNL 65-70 dB	DNL 70-75 dB	DNL 75+ dB	Total
Residential Housing Units				
Housing Type				
Single-Family Residential	**86**	**0**	**0**	**86**
Mitigated	48	0	0	48
Unmitigated	38	0	0	38
Multi-Family Residential	**94**	**0**	**0**	**94**
Mitigated	0	0	0	0
Unmitigated	94	0	0	94
Manufactured Home	**63**	**0**	**0**	**63**
Unmitigated	63	0	0	63
Total Housing Units	**243**	**0**	**0**	**243**
Residential Population				
Total Population[1]	**687**	**~~0~~**	**0**	**687**
Noise-Sensitive Sites				
Schools / Educational Facilities	4	0	0	4
Churches / Places of Worship	4	0	0	4
Libraries	0	0	0	0
Hospitals	0	0	0	0
Nursing Homes	0	0	0	0
Outdoor Music / Amphitheater	0	0	0	0
Other Uses[2]	n/a	0	0	0

Notes: 1. Total population estimated based upon the housing counts multiplied by the 2010 Census average household size for each Census Block Group.
2. Other uses that are considered noise-sensitive at or above DNL 70 dB includes sports arenas, zoos, nature exhibits, amusement parks, camps, resorts, golf courses, stables, and office or publicly accessible portions of commercial or manufacturing facilities.

Source: Landrum & Brown, 2024.

A summary comparison of the housing units (households), population (residents), and other noise-sensitive sites within the Existing (2023) Baseline and Future (2028) Baseline Noise Exposure Contours is provided in **Table 3-5*, Existing (2023) Baseline versus Future (2028) Baseline Housing, Population, and Noise-Sensitive Sites.***

Table 3-5 Comparison of Housing, Population, and Noise-Sensitive Sites Within the DNL 65+ dB of the Existing (2023) Baseline and Future (2028) Baseline Noise Exposure Contours

Category	Existing (2023) Baseline	Future (2028) Baseline
Residential Housing Units		
DNL 65-70 dB	140	243
DNL 70-75 dB	0	0
DNL 75+ dB	0	0
Total	140	243
Residential Population		
DNL 65-70 dB	421	687
DNL 70-75 dB	0	0
DNL 75+ dB	0	0
Total	421	687
Noise-Sensitive Sites (Churches, Schools, Libraries, and Nursing Homes)		
DNL 65-70 dB	7	8
DNL 70-75 dB	0	0
DNL 75+ dB	0	0
Total	7	8

Notes: 1. Total population estimated based upon the housing counts multiplied by the 2010 Census average household size for each Census Block Group.

Source: Landrum & Brown, 2023.