LOUISVILLE
MUHAMMAD ALI
INTERNATIONAL AIRPORT

Noise Exposure Map Update

Pursuant to Title 14 of the
Code of Federal Regulations Part 150

October 11, 2024 - **DRAFT**

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Noise Exposure Map Update

Pursuant to Title 14 of the Code of Federal Regulations Part 150

Louisville Muhammad Ali International Airport

HMMH Report No. 22-0185

October 11, 2024 - **DRAFT**

Prepared for:

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

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Executive Summary

The Louisville Regional Airport Authority (LRAA) operates Louisville Muhammad Ali International Airport (SDF or "the Airport") which is located in Jefferson County, Kentucky, approximately 5 miles south of downtown Louisville. United Parcel Service's (UPS) Worldport, a global logistics hub and package processing facility located at SDF, contributes to the airport's ranking as the third busiest airport in terms of cargo tonnage in the United States.[1] SDF serves the city of Louisville and the surrounding region providing commercial air service.

LRAA is committed to being a good neighbor and a responsible operator of SDF. As the Airport proprietor, LRAA is updating the Noise Exposure Map in accordance with the Federal Aviation Administration's (FAA's) process codified under Title 14 of the Code of Federal Regulations Part 150 (14 CFR Part 150 or Part 150). A Part 150 Study is a voluntary, federally funded and federally supervised formal process for airport operators to quantify noise exposure from aircraft operations and assess compatibility of land uses around the airport. A Part 150 Study includes the following two principal elements:

- The **Noise Exposure Map** (NEM) element describes the airport layout and operation, aircraft-related noise exposure, land uses in the airport environs, and the resulting noise/land use compatibility. Part 150 requires that the documentation address aircraft operations during two time periods: the year of submission and a forecast year at least five years following the year of submission.
- The **Noise Compatibility Program** (NCP) element describes the actions the airport proprietor recommends to address existing and future land use incompatibilities with aircraft operations.

The Part 150 Study is similarly divided into two phases:

- **Phase 1** focuses on the development and submittal of the NEM to the FAA for acceptance as being completed in accordance with 14 CFR Part 150, and
- **Phase 2** determines the Authority-recommended measures to minimize incompatible land uses from aircraft operations with the development and submittal of the NCP. The FAA approves or disapproves each Authority-recommended measure through a Record of Approval.

LRAA's history of planning for land use compatibility at SDF spans over 30 years. LRAA completed its first NEM in 1993, including noise exposure maps for the existing and future conditions of 1991 and 1997, respectively. The FAA found the NEMs in compliance with 14 CFR Part 150 requirements and accepted the NEMs on October 13, 1993. The FAA approved the associated NCP in 1994 and a supplemental NCP in 1995.

[1] Federal Aviation Administration. CY 2022 Qualifying Cargo Airports, Rank Order, and Percent Change from 2021. August 24, 2023. https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/cy22_cargo_airports

The LRAA updated the NEMs subsequently in 2003, 2011, and 2016, prior to this current update. The NCP was revised in 2003 and reviewed with each later NEM update. **LRAA is updating only the NEM at this time; an NCP review is included with the NEM update to determine whether an update to the NCP is necessary.** The NCP review is summarized in Chapter 4 of this report.

This report includes all NEM documentation required for acceptance by the FAA. This NEM document assesses aircraft noise exposure resulting from the Existing Condition (2024) and a five-year Forecast Condition (2029); it covers a study area that includes SDF and adjacent communities in Jefferson County. This document also presents the results of the NEM Update, including:

- Quantifying noise exposure from aircraft operations,
- Assessing compatibility of land uses near the Airport, and
- Evaluating the existing NCP measures to determine their continued effectiveness in reducing incompatible land uses.

Noise Exposure Maps

The 2024 and 2029 noise exposure contours are presented in **Figure ES-1** and **Figure ES-2** and in Chapter 6 of this document.[2] The FAA considers all land uses compatible with aircraft noise less than 65 decibels (dB) in terms of the Day-Night Average Sound Level (DNL) metric. The resulting land use compatibility analysis is summarized in **Table ES-1** and **Table ES-2**, quantifying the population, housing units, and noise-sensitive sites exposed to 65 dB DNL or greater. The land use analysis shows that 2,148 residential units and 225 noise-sensitive parcels are potentially incompatible with noise from SDF aircraft operations in the 2029 Forecast Condition.

Table ES-1. Existing (2024) and Forecast (2029) Land Use Compatibility

Sources: US Census 2020 and HMMH analysis, 2024

Contour Interval	Estimated Population	Estimated Single Family Units	Estimated Multi-Family Units	Estimated Total Housing Units	Sound Insulated Housing Units	Estimated Incompatible Housing Units
2024 Existing Condition						
65-70 DNL	4,166	761	1,236	1,997	436	1,561
70-75 DNL	35	0	24	24	0	24
> 75 DNL	0	0	0	0	0	0
Total	**4,201**	**761**	**1,260**	**2,021**	**436**	**1,585**
2029 Forecast Condition						
65-70 DNL	5,286	1,075	1,565	2,640	529	2,111
70-75 DNL	54	0	37	37	0	37
> 75 DNL	0	0	0	0	0	0
Total	**5,340**	**1,075**	**1,602**	**2,677**	**529**	**2,148**

Note: Population and housing units estimated using 2020 US Census data

[2] Large-scale versions of these figures showing the Official Noise Exposure Maps can be found in the back pocket of this document in print.

Table ES-2. Existing (2024) and Forecast (2029) Noise-Sensitive Sites

Contour Interval	Schools		Places of Worship		Historic Districts		Historic Properties	
	2024	2029	2024	2029	2024	2029	2024	2029
65-70 DNL	5	7	4	6	4	4	94	198
70-75 DNL	--	1	--	--	--	--	1	2
> 75 DNL	--	--	--	--	--	--	--	--
Total	**5**	**8**	**4**	**6**	**8**	**11**	**95**	**200**

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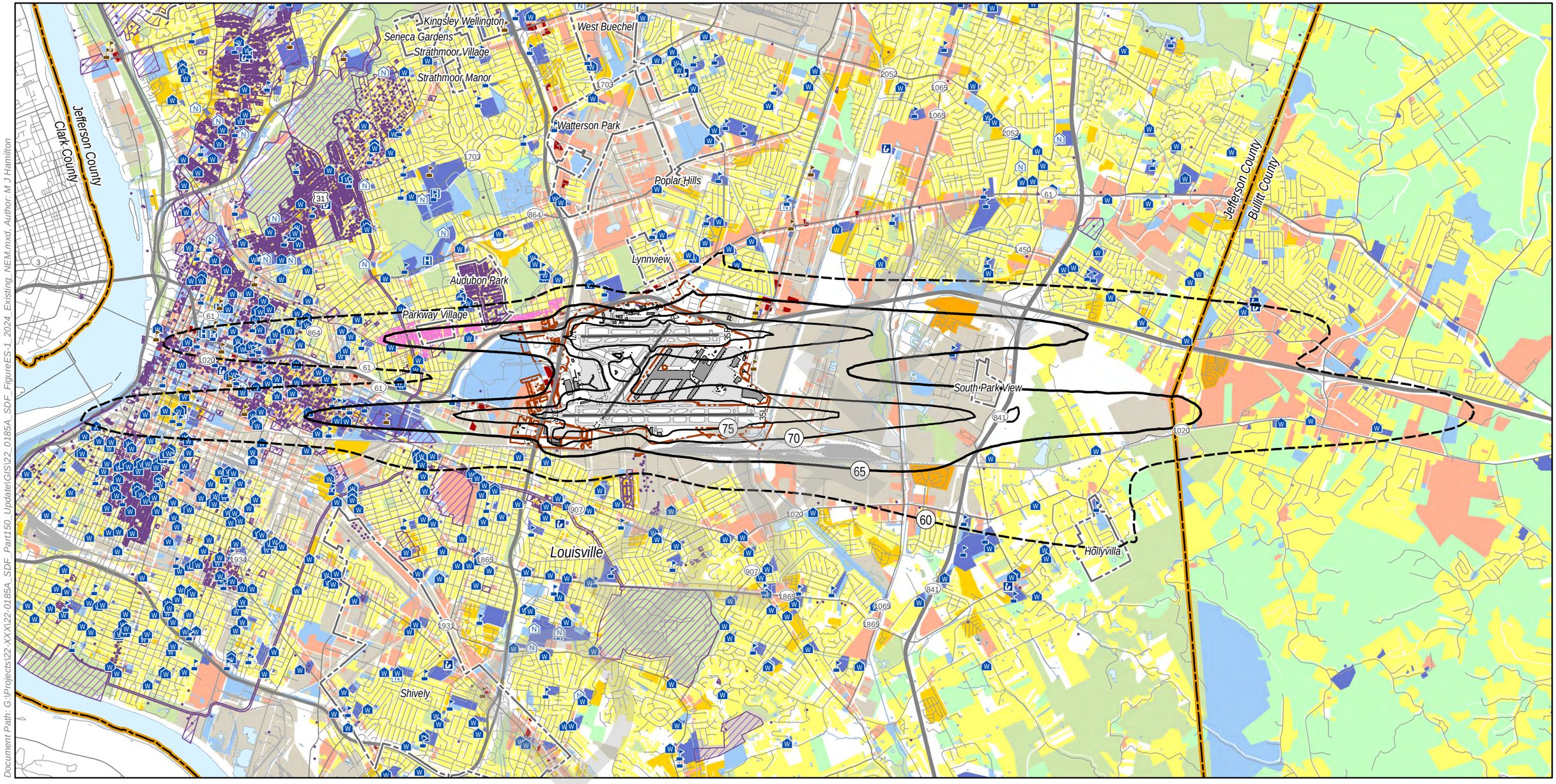

Document Path: G:\Projects\22-XXX\22-0185A_SDF_Part150_Update\GIS\22_0185A_SDF_FigureES-1_2024_Existing_NEM.mxd, Author: M J Hamilton

Legend

- 2024 Existing DNL Contour (60 dB)
- 2024 Existing DNL Contour (65-75 dB)
- Sound Insulation Completed
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 6,000 12,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: ES-1

Existing Condition (2024) Noise Exposure Map

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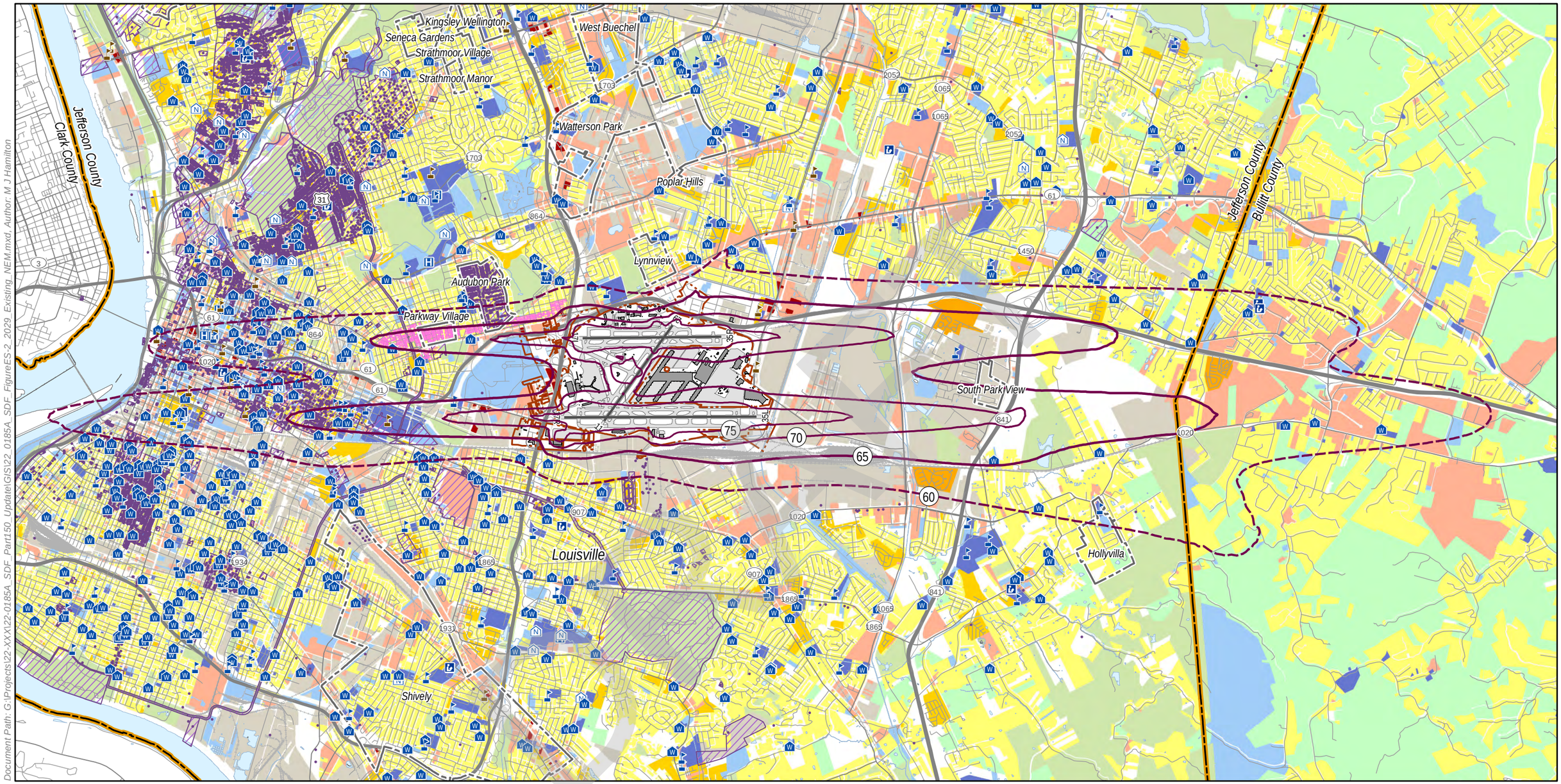

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Legend

- 2029 Forecast DNL Contour (60 dB)
- 2029 Forecast DNL Contour (65-75 dB)
- Sound Insulation Completed
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: ES-2

Forecast Condition (2029) Noise Exposure Map

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Sponsor's Certification

The Louisville Regional Airport Authority (LRAA) has completed a comprehensive *Noise Exposure Map Update* in accordance with Title 14 of the Code of Federal Regulations Part 150 for Louisville Muhammad Ali International Airport. ***LRAA certifies the following:***

1. The 2024 and 2029 Noise Exposure Maps for the Louisville Muhammad Ali International Airport and the associated documentation that the LRAA submitted in this volume to the Federal Aviation Administration under Title 14 CFR Part 150, Subpart B, Section 150.21, are true and complete, under penalty of 18 U.S.C. 1001.
2. The "2024 Existing Condition Noise Exposure Map" (Figure 6-1 from Chapter 6) accurately represents conditions for calendar year 2024.
3. The "2029 Five-Year Forecast Condition Noise Exposure Map" (Figure 6-2 from Chapter 6) accurately represents forecast conditions for calendar year 2029 in conformance with the Federal Aviation Administration Terminal Area Forecast.
4. Pursuant to Title 14 CFR Part 150, Subpart B, Section 150.21(b), all interested parties have been afforded adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure maps, the descriptions of forecast aircraft operations, and the proposed NCP amendments.

The operations at Louisville Muhammad Ali International Airport are hereby certified to be consistent with the fleet mix, forecast operational levels, and flight procedures depicted for 2024 and 2029 within this document. Further information regarding development of the fleet mix, forecast, and procedures can be found in Chapter 5, "Development of Noise Exposure Contours," and Appendix C.

LOUISVILLE REGIONAL AIRPORT AUTHORITY

_____

By:	Dan Mann, A.A.E.
Title:	Executive Director
Date:	TBD
Airport Name:	Louisville Muhammad Ali International Airport
Airport Owner/Operator:	Louisville Regional Airport Authority
Address:	700 Administration Drive, Louisville, KY 40209

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FAA Checklist

The FAA's Advisory Circular 150/5020, "Airport Noise and Land Use Compatibility Planning," includes a checklist for FAA's use in reviewing NEM submissions. The FAA prefers that the Part 150 documentation include a copy of the checklist with appropriate page numbers or other references and pertinent notes and comments to assist in the document's review; this is presented in the table below.

Part 150 Noise Exposure Map Checklist

Source: FAA/APP, Washington, DC, March 1989; revised June 2005; reviewed for currency 12/2007, verified, 2024

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
I. Submitting and Identifying The NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	X		NEM Update
2. NEM and NCP together?		X	This document is an NEM Update only
3. Revision to NEMs FAA previously determined to be in compliance with Part 150	X		Cover Letter, Sponsor Certification on page xiii., and Chapter 6.
B. Airport and Airport Operator's name are identified?	X		Sponsor Certification on page xiii and Chapter 1
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?	X		Cover letter will be included as part of the official FAA submittal.
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	X		Chapter 8, page8-1. Appendix D – Stakeholder Engagement.
B. Identification of consulted parties:			
1. Are the consulted parties identified?	X		Chapter 1, Section 1.2, Section 8.1, Appendix D - Stakeholder Engagement.
2. Do they include all those required by 150.21(b) and A150.105(a)?	X		Chapter 1, Section 1.2, Section 8, and Appendix D – Stakeholder Engagement.
3. Agencies in 2., above, correspond to those indicated on the NEM?	X		Agencies identified on the NEM participated as part of the Community Noise Forum (CNF), Section 8.1.
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	X		Certification language is provided on page xiii. Information on the consultation process is provided in Chapter 8 and Appendix D – Stakeholder Engagement.
D. Does the document indicate whether written comments were received during consultation and, if there were comments, that they are on file with the FAA regional airports division manager?	X		The Final NEM will provide copies of all comments received, in Appendix E.
III. General Requirements: [150.21]			

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	X		Figure 6-1 (page 6-3) presents the 2024 Map with existing conditions. Figure 6-2 (page 6-5) presents the 2029 Map with 5-year conditions. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?	X		See cover letter and Figures 6-1 (page 6-3) and 6-2 (page 6-5) in the back pocket of this document in print. The official submittal to the FAA will be made under a cover letter that meets Part 150 requirements. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3).
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	X		See cover letter and certification language on page xiii. Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?	N/A		
C. If the NEM and NCP are submitted together:	N/A		
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?	N/A		
2. If the forecast year map is based on program implementation:	N/A		Prior Program Measures as currently implemented have been included.
a. Are the specific program measures that are reflected on the map identified?	N/A		Prior Program Measures as currently implemented have been included.
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	N/A		
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))	N/A		The 2029 Forecast map includes the NCP as currently implemented. See Chapter 4.
IV. Map Scale, Graphics, And Data Requirements: [A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps? (*Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEMs.*) (*Note (2) supplemental graphics that are not*	X		The "Existing Condition (2024) Noise Exposure Map" (Figure 6-1) and "Future Condition (2029) Noise Exposure Map" (Figure 6-2) are provided at the scale of 1" to 2,000' in pockets near the rear of this document, as permitted by FAA.

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
required by the regulation do not need to be at the 1" to 2,000' scale)			
B. Is the quality of the graphics such that required information is clear and readable? (Refer to C. through G., below, for specific graphic depictions that must be clear and readable)	X		The "Existing Condition (2024) Noise Exposure Map" (Figure 6-1) and "Future Condition (2029) Noise Exposure Map" (Figure 6-2) are provided at the scale of 1" to 2,000' in pockets near the rear of this document, as permitted by FAA.
C. Depiction of the airport and its environs:			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?			
a. Airport boundaries	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
b. Runway configurations with runway end numbers	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	X		Land uses on the NEMs, streets and other features are shown over the entire mapped area. Land use coverage is shown in Figure 3-1. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
b. The area within the DNL 65 dB (or beyond, at local discretion)	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB (or beyond, at local discretion)	X		As noted directly on the map portion of the NEM figures (which extends in both cases well beyond 65 dB DNL contour), the mapped area is within the jurisdictional boundaries of Jefferson County, the City of Louisville, and the Townships of Audobon Park, Watterson Park, Lynnview, and South Park View. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
D. 1. Continuous contours for at least the DNL 65, 70, and 75 dB?	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?		X	
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast	X		Section 5.5 (page 5-16), and see Figure 5-3 (page 5-19, Figure 5-4 (page 5-20, Figure 5-5 (page 5-21), and Figure 5-8 (page 5-24).

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
year NEM), which are numbered to correspond to accompanying narrative?			
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEMs)		X	There are no permanent noise monitoring sites at SDF.
G. Non-compatible land use identification:			
1. Are non-compatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
2. Are noise sensitive public buildings and historic properties identified? (Note: If none are within the depicted NEM noise contours, this should be stated in the accompanying narrative text.)	X		Section 6.2, page 6-1. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
3. Are the non-compatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	X		Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3), Future Condition (2029) Noise Exposure Map (Figure 6-2, page 6-5).
4. Are compatible land uses, which would normally be considered non-compatible, explained in the accompanying narrative?	N/A		There are no compatible land uses, which would normally be considered non-compatible, within the DNL 65 contours
V. Narrative Support of Map Data: [150.21(a), A150.1, A150.101, A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	X		See Chapter 5, page 5-1.
2. Are the underlying technical data and planning assumptions reasonable?	X		The Community Noise Forum (including FAA) carefully vetted all assumptions. Section 8.1, page 8-1, and Appendix C – Modeling.
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	X		As discussed in Chapter 5, the DNL contours contained in these NEMs were prepared using the most recent release of the FAA's AEDT available at the time the NEMs were prepared, i.e., "Version 3f."
a. Is it FAA approved?	X		
b. Was the same model used for both maps? (Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent version at the time the update was started.)	X		
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?	X		Non-Standard Modeling request was submitted to the FAA and approved on August 15, 2024.
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included	X		Appendix C - Modeling

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
on the FAA's pre-approved list of aircraft substitutions?			
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	X		Appendix B – Records of Approval (ROA)
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?		X	
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons? (Note: A narrative explanation, including evidence the local jurisdiction(s) have adopted a noise level less than DNL 65 dB as sensitive for the local community(ies), and including a table or other depiction of the differences from the Federal table, is highly desirable but not specifically required by the rule. However, if the airport sponsor submits NCP measures within the locally significant noise contour, an explanation must be included if it wants the FAA to consider the measure(s) for approval for purposes of eligibility for Federal aid.)		X	
C. Non-compatible Land Use Information:			
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	X		Table 6-1 (page 6-9) and Table 6-2 (page 6-10).
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	X		Section 3.1 (page 3-1), see Table 3-1 (page 3-2).
a. If a local variation to table 1 was used:			
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?		X	Not applicable; no local variation was used.
(2) Does the narrative include the airport operator's complete substitution for table 1?		X	Not applicable; no local variation was used.
3. Does the narrative include information on self-generated or ambient noise where compatible or non-compatible land use identifications consider non-airport and non-aircraft noise sources?		X	The text narrative in the NEM does not include information on self-generated or ambient noise.
4. Where normally non-compatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?		X	Section 6.1, page 6-1. Existing Condition (2024) Noise Exposure Map (Figure 6-1, page 6-3).
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect land use compatibility in the future?	X		Section 5.3, page 5-6.
VI. Map Certifications: [150.21(b), 150.21(e)]			
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to	X		Sponsor Certification, page xiii.

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?			
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?	X		Sponsor Certification, page xiii.

Acronyms

AC ..... Advisory Circular
ADO ..... Airports District Office
AEDT ..... Aviation Environmental Design Tool
AEE ..... Office of Environment and Energy
ASNA ..... Aviation Safety and Noise Abatement Act of 1979
ATCT ..... Airport Traffic Control Tower
CFR ..... Code of Federal Regulations
CNF ..... Community Noise Forum
dB ..... Decibel (A-weighted unless otherwise stated)
DNL ..... Day-Night Average Sound Level
EIS ..... Environmental Impact Study
FAA ..... Federal Aviation Administration
HMMH ..... Harris Miller Miller & Hanson Inc.
ICAO ..... International Civil Aviation Organization
KYANG ..... Kentucky Air National Guard
LAIP ..... Louisville International Airport Improvement Program
LRAA ..... Louisville Regional Airport Authority
ML ..... Military
MSL ..... Mean Sea Level
NA ..... Noise Abatement
NCP ..... Noise Compatibility Program
NEM ..... Noise Exposure Map
NEPA ..... National Environmental Policy Act of 1969
NLR ..... Noise Level Reduction
NOMS ..... Noise and Operations Monitoring System
NPIAS ..... National Plan of Integrated Airport Systems
OPSNET ..... Operations Network
Part 150 ..... Title 14 of the Code of Federal Regulations Part 150 “Airport Noise Compatibility Planning”
PM ..... Program Management
SDF ..... Louisville Muhammad Ali International Airport
SEL ..... Sound Exposure Level
SLUCM ..... Standard Land Use Coding Manual
TAF ..... Terminal Area Forecast
UPS ..... United Parcel Service

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Contents

Figures

Tables

Appendices

1 Introduction to Noise Compatibility Planning

As the Airport Proprietor, the Louisville Regional Airport Authority (LRAA) is undertaking a Noise Compatibility Planning Study for Louisville Muhammad Ali International Airport (SDF or "the Airport") in accordance with Title 14 of the Code of Federal Regulation Part 150 (14 CFR Part 150, or Part 150; herein referred to as "Part 150 Study"). This Part 150 Study intends to:

- Develop an accurate Noise Exposure Map (NEM) that reflects current and future airport operations.
- Communicate noise exposure levels and land use compatibility associated with SDF aircraft operations to the surrounding communities.

A Part 150 Study represents a voluntary, federally funded and federally supervised formal process for airport operators to quantify noise exposure from aircraft operations and assess compatibility of land uses around the airport. The regulation establishes thresholds for aircraft noise exposure for specific land use categories. The NEM prepared under this study will be subject to FAA acceptance and approval.

This chapter describes the Part 150 process, identifies stakeholder roles and responsibilities, introduces noise terminology, and provides a guide to navigating this document.

1.1 Part 150 Process

In 1968, Congress responded to widespread community concern with aircraft noise resulting from the dawn of the jet age by passing the Aircraft Noise and Sonic Boom Act. The Act set standards for measurement of aircraft noise and established noise abatement regulations associated with the certification of aircraft. The FAA's emphasis on the relationship between aircraft noise and land use compatibility planning began with the passage of the Aviation Safety and Noise Abatement Act of 1979 (ASNA). This act gives the FAA the authority to issue regulations on noise compatibility planning. In response to ASNA, the FAA developed implementing regulations as currently codified in Title 14 of the Code of Federal Regulations (14 CFR Part 150), "Airport Noise Compatibility Planning."[3] The Airport and Airway Improvement Act of 1982 provides a means for federal funding of projects to improve land use compatibility around airports.

These voluntary Part 150 regulations set forth standards for airport operators to use when documenting noise exposure around airports and for establishing programs to minimize aircraft noise-related land use incompatibilities. By regulation, a Part 150 Study includes the following two principal elements (described in Sections 1.1.1 and 1.1.2):

1. Noise Exposure Map (NEM)
2. Noise Compatibility Program (NCP)

[3] U.S. Government Publishing Office. Electronic Code of Federal Regulations, Title 14 CFR Part 150 – Airport Noise Compatibility Planning. https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl

Acceptance of an NEM by the FAA is a prerequisite to their subsequent review and approval of measures recommended in an NCP**. Figure 1-1** provides an overview of the FAA Part 150 process.

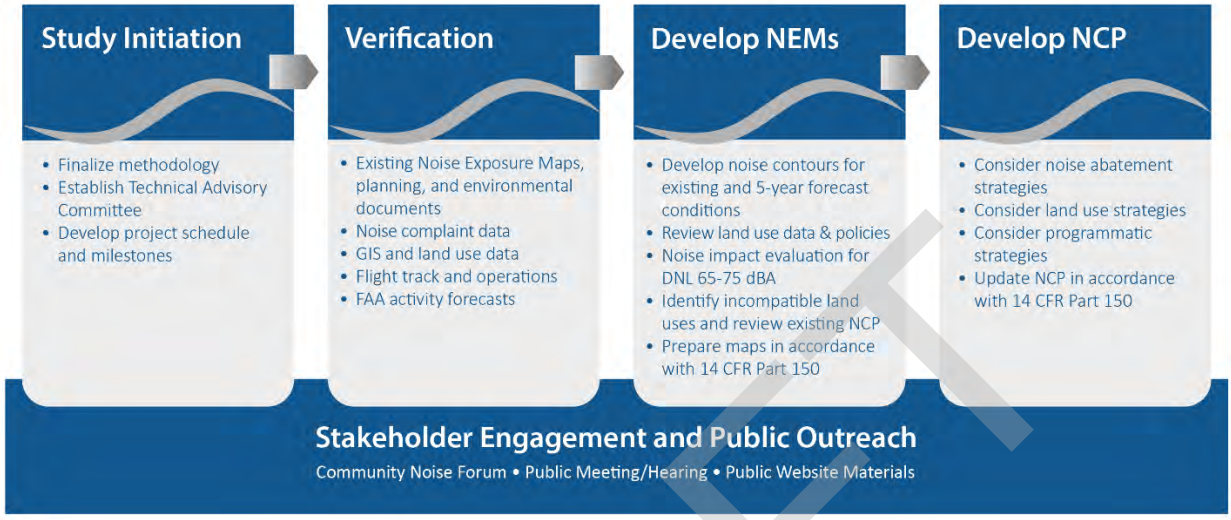

Figure 1-1. Overview of the FAA Part 150 Process

Source: HMMH

1.1.1 Noise Exposure Map

The NEM document describes the airport layout and operation, aircraft-related noise exposure, land uses in the airport environs, and the land-use compatibility. Part 150 requires that NEM documentation address aircraft operations during two time periods:

1. The year of submission (the "Existing Condition") and
2. A forecast year that is at least five years following the year of submission (the "Forecast Condition").

The NEM document presents the two maps representing aircraft noise exposure and land use compatibility for each condition. The FAA maintains an NEM document checklist (see page xv) to ensure the documents include all the requirements contained in the Part 150 regulation, including tabulated data and results, and clear descriptions of the data collection and analysis undertaken in the development of the NEM.

1.1.2 Noise Compatibility Program

An NCP is a list of actions an airport proprietor recommends for addressing existing and future land use incompatibilities resulting from the noise of aircraft operations. The FAA also maintains an NCP checklist to ensure that the documentation includes all the requirements of Part 150, such as:

- The development of the program.
- Each measure the airport sponsor considered.

- The reasons the airport sponsor elected to recommend or exclude each measure.
- The entities responsible for implementing each recommended measure.
- Implementation and funding mechanisms.
- The predicted effectiveness of both the individual measures and the overall program.

The FAA reviews and approves specific measures based on information contained in the NCP. Airports may apply for grant funding for implementation of FAA-approved measures. An airport-recommended and FAA-approved measure does not require implementation of the measure but merely demonstrates that the measure is in compliance with Part 150. Additionally, if a measure requires subsequent FAA action, its implementation may require environmental study under the National Environmental Policy Act of 1969 (NEPA).

A history of Part 150 Studies at SDF is provided in section 2.1.

1.2 Roles and Responsibilities

Multiple stakeholder groups contributed to the development of the SDF Part 150 Study, providing important information that is incorporated into this NEM document. The stakeholders include:

- The LRAA, including its staff and consultant team
- The Community Noise Forum (CNF), including:
  - Louisville Air Traffic Control staff
  - the Louisville Airport Affairs Committee,
  - the Kentucky Air National Guard
  - UPS
  - University of Louisville
  - Louisville Metro Government
  - Representatives from the General aviation community at SDF, Southern Indiana communities, the Airport Neighbors' Alliance (ANA), and general citizenry of each quadrant bounding the airport
- The FAA
- The Public

This section introduces the stakeholders and their roles and responsibilities during the Part 150 Study.

1.2.1 Louisville Regional Airport Authority

The Louisville Regional Airport Authority (LRAA), also referred to as “the Authority,” is the governing organization responsible for the operation and management of SDF and, as such, is the “sponsor” of the Part 150 Study. LRAA representatives have final decision-making authority regarding all aspects of the Part 150 Study, including but not limited to the conduct of the Study and stakeholder engagement and outreach. The Authority is responsible for submitting the final NEM document to the FAA and certifying

that the information contained in the document is accurate. The LRAA retained a team of consultants, the "Study Team," to conduct the technical work required to fulfill the NEM analysis and documentation requirements, and to assist in public outreach and consultation. The LRAA utilized the existing Community Noise Forum to ensure that external stakeholders were represented and involved throughout the NEM update process.

1.2.2 Community Noise Forum

The LRAA first convened the Community Noise Forum (CNF) in 2003 to monitor the implementation of the NCP. The CNF charter was adopted March 7, 2003.[4] The CNF is comprised of designated representatives from a broad spectrum of entities, including the LRAA's Board of Directors, the LRAA Management, FAA Louisville Air Traffic Control staff, Louisville Airport Affairs Committee, Kentucky Air National Guard, United Parcel Service (UPS), the General Aviation community at SDF, University of Louisville, Louisville Metro Government, Airport Neighbors' Alliance, Southern Indiana, and community representatives from each quadrant bounding the airport. All CNF meetings are open to the public.

The CNF represents the core advisory group consulted throughout this NEM update process. The members review and provide input on Study content and materials, representing their constituents' interests. The CNF also provides a forum for discussion of complex topics, allowing members to share their differing perspectives on aircraft noise concerns. Chapter 8 discusses the public participation process, including the CNF's role, during the development of the NEM Update for SDF.

1.2.3 The Federal Aviation Administration

For the NEM update, the FAA reviews the operational forecast for consistency with their Terminal Area Forecast (TAF) and approves any non-standard noise modeling requests. The FAA reviews the Part 150 submission to determine whether the technical work, consultation, and documentation comply with Part 150 requirements. The FAA provides acceptance of the NEM if the review indicates compliance. The FAA also provides federal funding to complete the NEM update.

For the NCP, the FAA evaluates airport-sponsor recommended NCP measures individually with respect to a criteria framework and determines whether each measure merits approval, disapproval, or further review for the purposes of Part 150. In addition, the FAA reviews the details of the technical documentation for broader issues of safety and ensures consistency of recommended noise abatement measures with applicable federal law. Finally, the FAA issues the Record of Approval (ROA) for the recommended measures in the NCP.

FAA involvement includes participation by staff from at least three parts of the agency:

- The Office of Environment and Energy
- The Air Traffic Organization
- The Office of Airports

[4] https://www.flylouisville.com/corporate/noise-compatibility-program

The **Office of Environment and Energy** (AEE), located in FAA headquarters, reviews complex technical, regulatory, and legal matters of national environmental policy. The Office of Environment and Energy Noise Division (AEE-100) reviews and approves (or disapproves) of non-standard data inputs to the FAA's Aviation Environmental Design Tool (AEDT).

The **Air Traffic Organization** includes the Air Traffic Controllers and support staff. SDF's Air Traffic Control Staff participate on the CNF and provide input on operational data, airspace changes, and implementation requirements.

Three groups in the **Office of Airports** are involved:

1. The Memphis Airports District Office (ADO) is the main point of contact for reviews, compliance, and direction as the Part 150 Update study progresses.
2. The Southern Region Office is responsible for determining if the documentation satisfies all Part 150 requirements and it is responsible for final review of the NCP for adequacy in satisfying technical and legal requirements.
3. Headquarters ensures consistency with Part 150 regulations and reviews of national importance.

Prior to acceptance of the NEM/NCP documentation and approval of the airport-recommended NCP measures, the FAA conducts a Lines-of-Business review, which includes Air Traffic, Flight Standards, Legal, Special Programs, Planning and Requirements, Flight Procedures, and Regional Review.

1.2.4 The Public

Members of the public were given opportunities to follow the Study's progress and provide input. The public could stay abreast of progress by visiting the Airport's Noise Compatibility Program website[5], participating in the public workshop, and submitting comments on the draft NEM document. Chapter 8 contains more information regarding stakeholder engagement.

1.3 Introduction to Noise Terminology

Information presented in this NEM document relies upon a reader's understanding of the characteristics of noise (unwanted sound), the effects noise has on persons and communities, and the metrics or descriptors commonly used to quantify noise. The properties, measurement, and presentation of noise involve specialized terminology. This section presents an overview, and **Appendix A** contains more information on noise metrics.

Sound is a physical phenomenon consisting of minute vibrations (waveforms) that travel through a medium such as air or water. **Noise** is sound that is unwelcome.

Noise metrics may be thought of as measures of noise 'dose'. There are two main types of noise metrics, describing (1) single noise events (single-event noise metrics) and (2) total noise experienced over

[5] https://www.flylouisville.com/corporate/noise-compatibility-program/

longer time periods (cumulative noise metrics). Single-event metrics indicate the intrusiveness, loudness, or noisiness of individual aircraft events. Cumulative metrics consider the frequency of noise events as well as the time of day in which they occur. Unless otherwise noted, all noise metrics presented in Part 150 documentation are reported in terms of the A-weighted decibel or dB.

Noise sensitivity is greater at night because background (ambient) sound levels tend to be lower at night and people tend to be sleeping. Day-Night Average Sound Level (DNL) represents noise as it occurs over a 24-hour period, treating noise events occurring at night (10 p.m. to 7 a.m.) with a 10 dB weighting.[6] This 10 dB weighting is applied to account for greater sensitivity to nighttime noise because events at night are often perceived to be more intrusive than daytime. **Figure 1-2** illustrates the weighting concept. An alternative way of describing this adjustment is that each event occurring during the nighttime period is calculated as if it were equivalent to ten daytime events. For purposes of Part 150, DNL is normally calculated through use of aircraft operations data averaged over a longer period, such as a year, to account for fluctuations occurring in day-to-day operations. The DNL depicted by an NEM is often referred to as the annual average daily DNL.

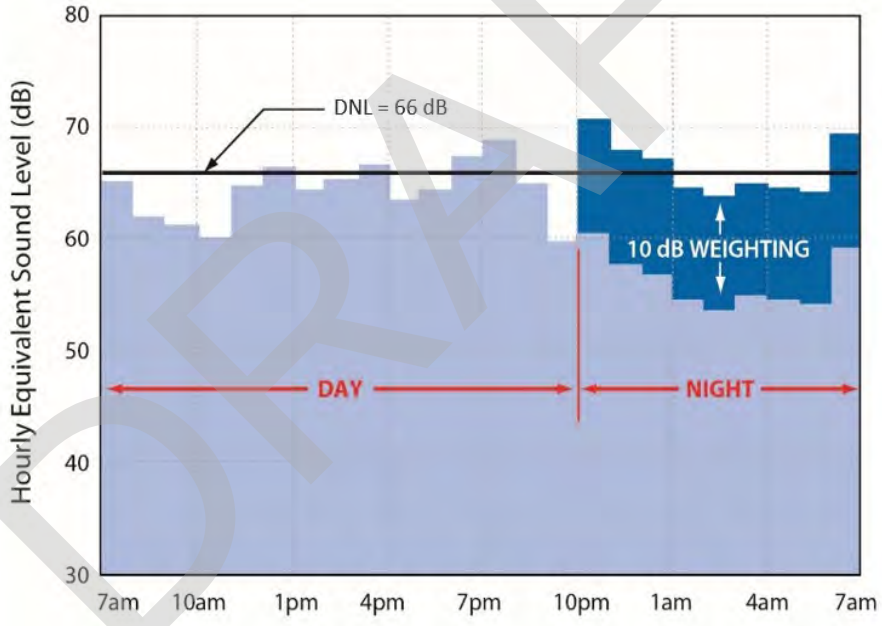

Figure 1-2. Example of a Day-Night Average Sound Level Calculation

Source: HMMH

[6] For the regulatory definition of DNL see 14CFR Part 150 §150.7 Definitions. http://www.ecfr.gov/cgi-bin/text-idx?SID=f8e6df268e3dad2edb848f61b9a0fb51&mc=true&node=pt14.3.150&rgn=div5.

1.4 Navigating this Document

This document and the Part 150 Study it represents were undertaken in accordance with the requirements of the Part 150 regulation in Title 14 of the Code of Federal Regulations. The FAA-maintained NEM checklist provided at the beginning of this document enumerates specific FAA requirements and identifies the associated location of the supporting text in this document and its appendices.

This document is organized as follows:

- Chapter 1 introduces Part 150 and describes the roles and responsibilities of groups involved in the Study.
- Chapter 2 provides a foundational inventory for SDF, including the history of noise compatibility planning at SDF. It also presents information on the airport background, location, and facilities.
- Chapter 3 presents FAA's land use compatibility guidelines and discusses land use in the SDF Part 150 Study area.
- Chapter 4 describes the existing SDF Noise Compatibility Program and reports the implementation status for each measure.
- Chapter 5 describes the development of the aircraft noise exposure contours, including the noise modeling methodology and inputs.
- Chapter 6 presents the official 2024 and 2029 NEMs and resulting land use compatibility.
- Chapter 7 presents supplemental noise analyses beyond the requirements of the Part 150 study.
- Chapter 8 reports stakeholder engagement efforts undertaken during the Part 150 process to date.

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2 Inventory

This chapter provides context for the Part 150 Study by presenting an inventory of the Airport and its environs.

2.1 Airport History

Standiford Field was originally built in the 1940s by the U.S. Army Corps of Engineers. The Airport remained under federal control until 1947 when it was turned over to the Louisville Air Board and opened to commercial passengers. Commercial flights originally operated out of World War II barracks on the east side of the airfield. A new terminal and facilities were built in the 1950s to accommodate 150,000 annual passengers. Multiple terminal and parking expansions occurred over the following four decades to accommodate a sustained increase in passenger activity.[7]

In 1981, United Parcel Service (UPS) began to utilize Standiford Field as a hub for a new overnight delivery service and built a 35-acre apron to accommodate aircraft parking. In 1985, a modern landside terminal opened to replace the original terminal accommodating almost 2 million annual passengers. By the late 1980s, the airport was again in need of expansion.

2.1.1 Initiation of Land Use Compatibility at SDF

The existing aircraft noise and land use compatibility programs at SDF began with the 1990 Environmental Impact Statement (EIS) completed by the FAA for the Louisville Airport Improvement Program (LAIP). The LAIP EIS addressed the potential environmental impacts of (1) the construction and use of parallel Runways 17L-35R and 17R-35L, (2) related airfield development projects, and (3) the acquisition and relocation of businesses and residential properties.

As part of the LAIP EIS, noise analyses were performed for an Existing Condition and future years (1995 and 2010) with and without the proposed project. The analyses concluded that overall noise exposure in the community would be substantially reduced with the LAIP in 1995 and 2010 as a result of (1) construction of the new parallel runways, (2) United Parcel Service's (UPS's) commitment to operate only 14 CFR Part 36 Stage 3 aircraft at the Airport, (3) acquisition of residential properties near the Airport, and (4) implementation of the following mitigation measures:

- Preferential daytime runway use program—maximum use of Runways 17L and 17R for departures (south flow)
- Contraflow aircraft operations (arrivals from the south and departures to the south) beginning no earlier than 10:00 p.m. and ending no later than 7:00 a.m.
- Straight-out, extended departure flight track procedures on Runways 17L, 17R, 35L, and 35R

[7] LRAA. "SDF History". https://www.flylouisville.com/corporate/sdf-history/

In 1991, the FAA approved the expansion of the Airport as part of the LAIP, which included the relocation of more than 4,000 people and 150 businesses. The LAIP EIS acknowledged that noise exposure would increase in some areas with the implementation of the proposed new runways and associated flight tracks. Noise exposure levels were predicted to be significantly higher south of the Airport in Minor Lane Heights and South Park View by 2010. As part of the LAIP EIS, the LRAA[8] committed to (1) soundproofing Minor Lane Heights Elementary School, the University of Louisville, and the historic residence at 2111 South Park Road; (2) undertaking other preventive and corrective land use measures; and (3) completing a 14 CFR Part 150 Airport Noise Compatibility Study. Since that time, the University of Louisville has been treated with sound insulation.

2.1.2 Airport Noise Compatibility Planning at SDF

As recommended by the LAIP EIS, the LRAA completed its first Airport Noise Compatibility Planning study in accordance with Part 150 in 1993. The official NEM document provided maps for the Existing and Future Conditions of 1991 and 1997, respectively. The FAA found the NEMs in compliance with Part 150 requirements and accepted the NEMs on October 13, 1993. The FAA approved the associated NCP in 1994 and a supplemental NCP in 1995.

The NCP included a voluntary residential relocation program which facilitated the relocation of 673 families who lived within the Airport's DNL 65 contour. Expansion of the program led to the relocation of more than 1,000 additional families in the 1990s. LRAA and FAA developed an innovative housing reimbursement program, known as the Heritage Creek Program, to address the need to develop comparable housing options due to housing shortages associated with the increase in incompatible land. The LRAA also reused land for airport-compatible commercial redevelopment, known as the Louisville Renaissance Zone Corporation.

In the 1990s, commercial service continued to expand and passenger boardings increased at the airport. The Airport was renamed to Louisville International Airport in 1991 due to its international cargo ranking and expanded commercial service. In 1998, renovation of the airfield was completed, including new east and west parallel runways and other expanded facilities.[9]

In 2003, the LRAA submitted an updated NEM and an updated NCP. The FAA found the NEM in compliance with 14 CFR Part 150 requirements effective on November 18, 2003. On May 14, 2004, the FAA approved in full 20 of the 42 measures proposed in the NCP Update. Of the remaining 22 measures, eight were approved in part, three were disapproved, and four were disapproved for 14 CFR Part 150 purposes. The remaining seven measures were categorized as "no action" because additional technical and environmental analyses were required to determine feasibility and environmental impacts. On August 4, 2009, the FAA provided a Record of Approval (ROA) for three of the seven measures

[8] The Louisville Regional Airport Authority (LRAA) was originally established in 1928 by the Commonwealth of Kentucky's General Assembly as the Regional Airport Authority (RAA), which was the first authority-type governed airport in the United States. The authority may be identified as "RAA" in some of the earlier documents referenced herein such as the LAIP EIS.
[9] https://www.flylouisville.com/corporate/sdf-history/

previously categorized as "no action." Many of the noise abatement recommendations have been successfully implemented by the LRAA. Chapter 4 provides a full review of the Airport's NCP.

In the early 2000s, UPS expanded its presence at Louisville International Airport making it a major global hub for their business. UPS opened its Worldport package-sorting center, identified the airport as its heavy air freight hub, and further expanded its footprint and sorting capacity.

In 2011, the LRAA submitted its second updated NEM. The FAA found the NEM to be in compliance on April 7, 2011. The most recent prior NEM update occurred in 2016, containing Noise Exposure Maps for 2016 and 2021. The FAA determined the document to be in compliance with requirements, as of August 10, 2017[10].

The Airport was renamed again in 2019 to Louisville Muhammad Ali International Airport to honor the legacy of Muhammad Ali in his hometown of Louisville.[11]

Figure 2-1 depicts the history of Part 150 studies at SDF. This current study represents the fourth NEM update since the initial Part 150 study at SDF. LRAA began this Part 150 Update in 2023 and is updating only the NEM documentation for SDF at this time. This document includes all NEM documentation required for acceptance by the FAA.

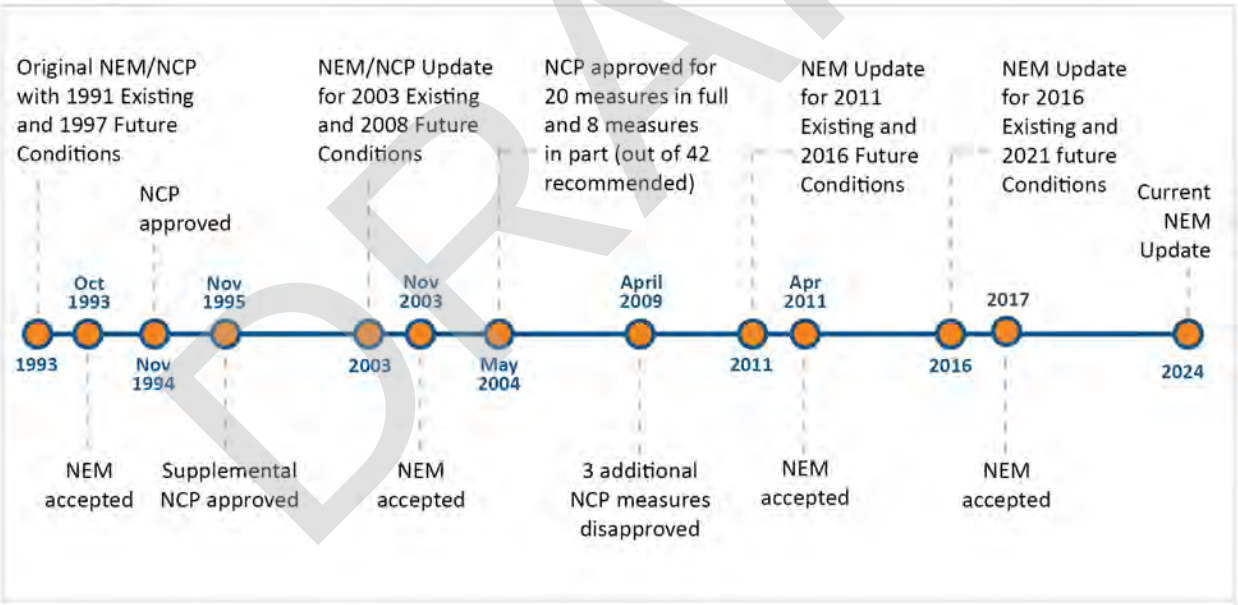

Figure 2-1. Part 150 History at SDF

Source: LRAA and HMMH, 2023

[10] https://www.federalregister.gov/documents/2017/12/13/2017-26773/noise-exposure-map-notice-louisville-international-airport-louisville-ky

[11] LRAA. "Mayor Fischer celebrates decision to rename Louisville airport to honor Muhammad Ali." January 16, 2019. https://www.flylouisville.com/mayor-fischer-celebrates-decision-to-rename-louisville-airport-to-honor-muhammad-ali/

LRAA expects to submit the final NEM report to the FAA in December 2024 for their acceptance of the document in accordance with 14 CFR Part 150 requirements. Chapter 6 provides the official Noise Exposure Maps for the Existing Condition (2024) and the five-year Forecast Condition (2029). As noted in Chapter 8, LRAA will hold a 30-day public comment period and a public workshop in November 2024 to share the results of the NEM Study with the community, to answer questions from the public, and to collect comments for inclusion with this documentation.

2.2 Airport Location

SDF is located within a predominantly urban area in Jefferson County, Kentucky, approximately 5 miles south of downtown Louisville. The University of Louisville and the Kentucky Fair and Exposition Center (the Fairgrounds) are north of the Airport. Warehouses and industrial facilities, such as Ford Motor Company and the Jefferson County Landfill, are located to the south. The east side of the Airport is bordered by Interstate 65 and the Edgewood neighborhood. The west side of the Airport is bordered by the CSX Railroad tracks, the Beechmont Neighborhood, and a large industrial tract. The South Park View neighborhood is south of the Airport near the intersection of Interstates 265 and 65.

Primary access to the Airport is provided via Interstate 264 (Henry Watterson Expressway), an east-west corridor on the north side of the Airport. Interstate 264 intersects with Interstate 65 northeast of the Airport. Interstate 65 parallels the Airport to the east and provides access to downtown Louisville and Interstate 265 (the Gene Snyder Freeway), located approximately 3 miles south of the Airport.

2.3 Airport Classification

SDF is classified as a commercial service primary small hub airport within the FAA's National Plan of Integrated Airport Systems. SDF serves the state of Kentucky and the Southern Indiana region. Airport operations include commercial, cargo, military, air taxi, and general aviation. The facility houses one fixed-base operator (Atlantic Aviation) and one cargo carrier (UPS). SDF does not have regularly scheduled international commercial flights but does handle international cargo flights. As home to the UPS Worldport, SDF ranks third in North America and sixth in the world in total amount of cargo handled. The Airport handled more than 6.01 billion pounds (2,727,820 metric tons) of cargo in 2023.[12]

2.4 Airport Facilities

The airfield occupies about 75 percent of the total Airport land area and includes three runways (two north-south parallel runways and one east-west crosswind runway), associated taxiways, aprons, hold pads, and other safety-related protection zones. UPS Worldport encompasses 5.2 million-square-feet and occupies the majority of the area between Runways 17L/35R and 17R/35L south of Runway 11/29.

[12] Airports Council International World. 14 April 2024. Top 10 Busiest Airports in the World Shift with the Rise of International Air Travel Demand. https://aci.aero/2024/04/14/top-10-busiest-airports-in-the-world-shift-with-the-rise-of-international-air-travel-demand/

One fixed-base operator, Atlantic Aviation, is located on the east side of the Airport and provides a range of services for general aviation users, including fueling and maintenance.

The Kentucky Air National Guard (KYANG) 123rd Airlift Wing operates at the Airport. The KYANG base occupies approximately 82 acres of the Airport site and is located east of the airfield, adjacent to Runway 17L/35R. The current base was constructed in 1995 and is located on the eastern side of the Airport adjacent to I-65 and Grade Lane. Base facilities include a 696,000-square-foot apron that can be accessed via Taxiways E and G for the parking of 10 C-130 aircraft, a maintenance hangar, Aircraft Rescue and Firefighting facility, motor pools, and other support buildings used for functions such as engineering and administration.

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3 Land Use

Part 150 requires the review of land uses located in the airport environs to determine land use compatibility associated with aircraft activity at the Airport. This includes delineation of land uses and identification of noise-sensitive uses within the DNL 65 and higher aircraft noise exposure contours. Identification of a noise sensitive use within the DNL 65 contour indicates that the use may be considered incompatible and requires further investigation.

This chapter provides a description of recommended land uses that are deemed generally compatible under Appendix A of Part 150, an overview of the municipal jurisdictions with authority to regulate land use in the vicinity of SDF, an explanation of the land use data collection and verification process, and an outline of existing land use classifications in the vicinity of the Airport.

3.1 Land Use Compatibility Guidelines

The objective of airport noise compatibility planning is to maintain and promote compatible land use in communities surrounding airports. The FAA has published land use compatibility designations, as set forth in Part 150, Appendix A, Table 1 (reproduced here as **Table 3-1**). As the table indicates, the FAA generally considers all land uses to be compatible with aircraft-related noise exposure below DNL 65 dB. At higher noise levels, certain land uses, including residential parcels, hotels, retirement homes, intermediate care facilities, hospitals, nursing homes, schools, preschools, and libraries are categorized as incompatible under given circumstances. These land use categories will be referenced throughout the Part 150 Study.

Table 3-1. Part 150 Airport Noise / Land Use Compatibility Guidelines

Source: Part 150, Appendix A, Table 1, 2007

Land Use	Yearly Day-Night Average Sound Level [DNL] in Decibels					
	<65	65-70	70-75	75-80	80-85	>85
Residential Use						
Residential other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home park	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail--building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Key to Table 3-1

SLUCM: Standard Land Use Coding Manual
Y(Yes): Land use and related structures compatible without restrictions.
N(No): Land use and related structures are not compatible and should be prohibited.
NLR: Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35: Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 A-weighted decibels (dB) must be incorporated into design and construction of structure.

Notes for Table 3-1

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often started as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
5) Land use compatible provided special sound reinforcement systems are installed.
6) Residential buildings require an NLR of 25.
7) Residential buildings require an NLR of 30.
8) Residential buildings not permitted.

3.2 Land Use Data Collection and Verification

The Study Team defined a study area that meets the regulatory requirements[13] of Part 150 and collected detailed land use information from municipalities throughout the study area. Land use data collection and verification focused on the area expected to be within the DNL 65 contour, based on prior NEMs. Land use and zoning information was summarized and color-coded according to the Part 150 land use categories. The Study Team conducted a field visit to perform a "windshield survey" to verify land use categories by parcel within the study area. **Figure 3-1** presents the existing land use. Representatives from local jurisdictions participating on the CNF were asked to review the land use map and notify the Study Team of necessary corrections.

[13] The land use data collection study area extends at least 30,000' (approximately 5 nautical miles) from each runway end.

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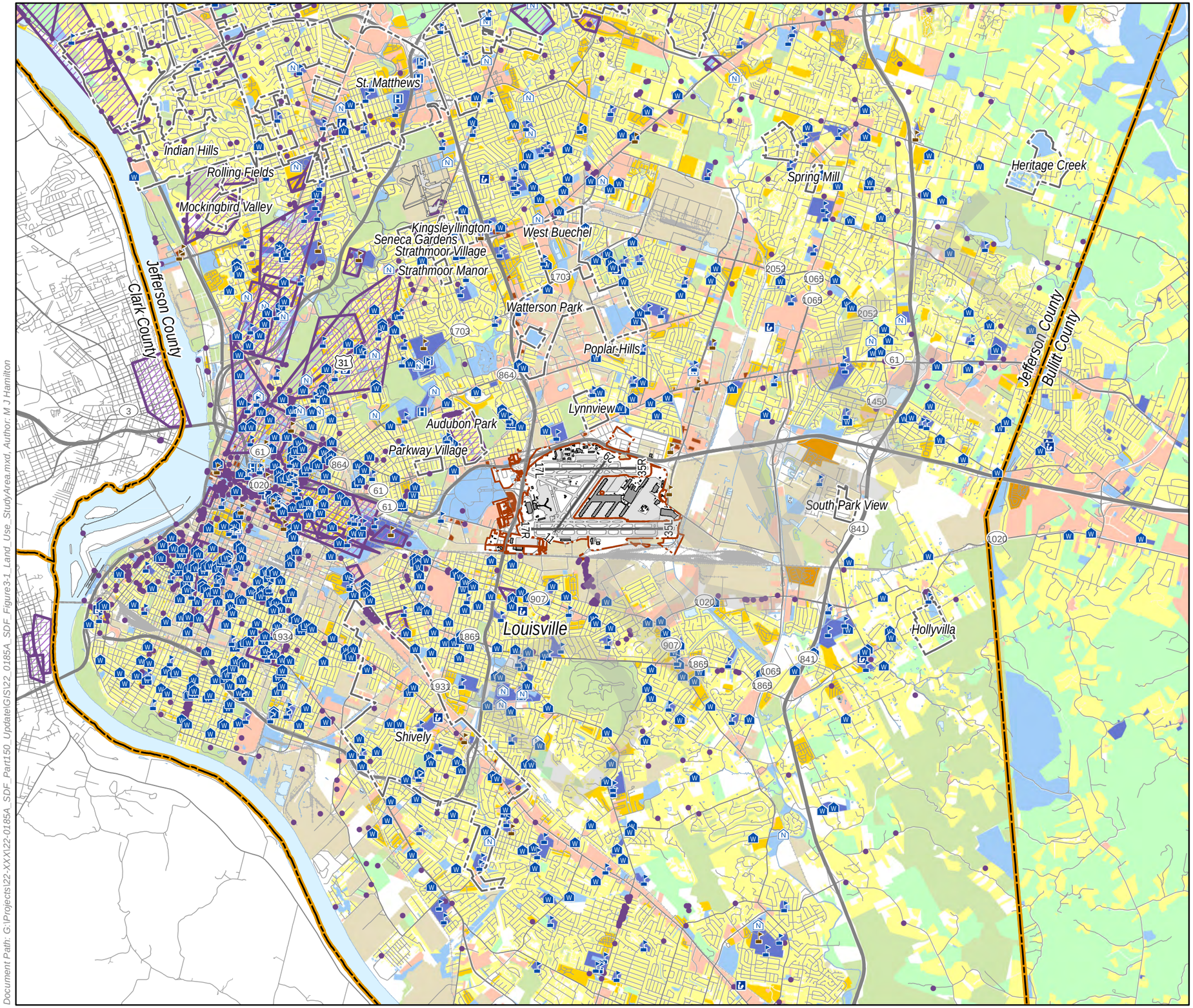
LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 3-1

SDF Part 150 Base Map with Land Use



Legend

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined
- Water / Wetland
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site

0 8,000 16,000 Feet

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4 Existing Noise Compatibility Program

As noted in Chapter 2, the LRAA developed the first Noise Compatibility Program at SDF in 1993. A revised NCP was submitted to the FAA in 2003 which included noise abatement, program management, and land use elements. The FAA's Record of Approval (ROA) for the 2003 NCP was issued on May 14, 2004 and listed the NCP elements in the order presented below. Italicized text is taken directly from the 2004 FAA ROA.

The FAA approved 20 of the 42 measures proposed. The approvals indicate that the actions would, if implemented, be consistent with the purposes of Part 150. Of the 22 measures that were not fully approved, eight were approved in part, three were disapproved, four were disapproved for Part 150 purposes, and seven were categorized as "no action[14]." On August 4, 2009, the FAA released another ROA to address the seven previously deferred "no action" measures, disapproving three of them. Copies of the 2004 and 2009 ROAs are included in **Appendix B**.

The SDF NCP measures focus on the following three strategies to reduce or prevent incompatible land use within the study area:

1. Noise abatement (NA)
2. Noise Mitigation (M), including land use strategies
3. Program management (PM)

This chapter summarizes the measures in the 2003 Study and evaluates their current implementation status. For each measure that has either been implemented by LRAA or approved by FAA, a subsection describes the measure and its current status. If possible, the Study Team assessed aircraft compliance with the measure and provided a brief analysis.

4.1 Noise Abatement Measures

Noise abatement measures are those that control noise at the source; such measures include airport layout modifications, noise barriers, flight path changes, preferential runway use, and arrival and departure procedures. The intention of noise abatement measures in the NCP is to reduce the number of people and noise-sensitive properties exposed to aircraft noise of DNL 65 or greater.

Table 4-1 lists the LRAA-recommended noise abatement measures, and the FAA response. Measure descriptions and implementation status of each measure follow the table.

[14] The FAA took no action because the data provided for those seven measures were insufficient to allow an approval/disapproval determination.

Table 4-1. Status of SDF Noise Abatement Measures

Source: LRAA, 2024

Number	Measure	FAA Response[1]	Status
NA-1	Maintain South Flow Runway Preference	Approved as Voluntary	Implemented
NA-2	Reverse East-West Preference (Day and Night)	No action/Disapproved	Not Implemented
NA-3	Morning North Flow Preference	No action/Disapproved	Implemented Locally
NA-4	South Divergence According to Destination	Approved as Voluntary	Implemented
NA-5	Maintain Contraflow Program	Approved as Voluntary	Implemented
NA-6	Reduce Exceptions to Contraflow	Disapproved	Implemented
NA-7	Use an Offset Departure from Runway 35L and Offset Approach to Runway 17R	No action/Disapproved	Not Implemented
NA-8	Designate Departure and Arrival Flight Tracks to be Used by All Turboprop Aircraft Weighing Over 12,500 lbs.	Approved In Part, As Voluntary	Partially Implemented
NA-9	Assign GPS/FMS or RNAV Equipped Aircraft to Defined FMS/GPS Departure and Arrival Flight Tracks for Turbojet and Military Aircraft	Approved in Part, As Voluntary	Partially Implemented
NA-10	FMS/GPS Departure and Arrival Flight Tracks for Turboprop Aircraft Over 12,500 lbs.	Approved In Part, As Voluntary	Partially Implemented
NA-11	Request FAA ATCT to Require All Aircraft to Intercept the Runway Centerline at or Beyond the Initial Approach Fix	No Action	Implemented Locally
NA-12	Request FAA to Publish a Standard Instrument Departure (SID) Procedure for Each Runway to be Used in All Weather Conditions Including VFR Conditions	No Action	Implemented
NA-13	Request FAA to publish a Standard Terminal Arrival Route (STAR) for each runway to be used in all weather conditions including VFR conditions – No action	No Action	Implemented
NA-14	As Part of an Ongoing Noise Management Program, Extend Noise Abatement Flight Tracks Beyond Those Identified in Measure NA-8 through NA-11	No Action	In Progress Locally
NA-15	Elimination of Early Descent	Disapproved	Not Implemented
NA-16	Request the Airlines Serving the Airport to Use the FAA Distant Noise Abatement Departure Procedure in Advisory Circular (AC) 91-53A, Noise Abatement Departure Procedure	Approved as Voluntary	Implemented
NA-17	Continue Airport Regulation Restricting Aircraft Engine Run-Ups to Certain Hours and Locations	Approved	Implemented
NA-18	Limit the Use of North Runway Extension to Aircraft Needing Full Runway Length and South Extension for Departures to the North	Disapproved	Not Implemented

[1] NA-2, NA-3, and NA-7 were categorized as "no action" in FAA's ROA on May 14, 2004 and were re-addressed in the ROA dated August 4, 2009. FAA's responses for the two ROAs are listed in chronological order and are separated by a forward slash.

4.1.1 NA-1: Maintain South Flow Runway Preference

The statement of the measure is as follows: *Maintain South flow runway preference. This measure would continue the current daytime preference for south flow when wind conditions permit except as revised in measure NA-3 below.*

FAA Action (May 14, 2004): *Approved as voluntary. This measure continues a previously approved measure that places flights over areas to the south that are less densely populated.*

Measure Status: Implemented

4.1.2 NA-2: Reverse East-West Preference (Day and Night)

The statement of the measure is as follows: *Reverse East-West preference (Day and Night). Reverse the current runway use program to prefer the west runway. The trigger of 3 aircraft in the landing or departure queue currently used to direct air traffic to both runways would be retained. This measure would reduce the noise impacts within the DNL 65 contour to about 2,175 residents and 1,079 dwelling units but would increase noise over the University of Louisville, Old Louisville and neighborhoods to the northwest. Because students at U of L were not included in the impact analysis the number of students experiencing noise impacts are not known. The measure, if combined with Measure NA-7, would take advantage of a corridor of compatible land uses immediately north of the airport.*

FAA Action (May 14, 2004): *No action required at this time. This measure relates to flight procedures under 49 U.S.C. section 47504(b). A technical analysis of this measure in concert with Measures NA-3 and NA-7, and an environmental analysis, are required to determine its feasibility and environmental impacts. The FAA also will determine during any follow-on analysis whether the measure provides an overall net benefit to populations impacted, including the U of L, a requirement for approval under Part 150.*

FAA Action (August 4, 2009): *Disapproved. This measure is disapproved because it is dependent/relational to NA-7 which is disapproved. Because the measure was disapproved operationally, no additional environmental study or analysis is necessary.*

Measure Status: Not Implemented

4.1.3 NA-3: Morning North Flow Preference

The statement of the measure is as follows: *Morning North flow Preference; Revision of Existing Measure NA-1. In conjunction with the offset approach and departure recommendation (NA-7), reverse the normal daytime runway use preference from south flow to north flow during morning hours 9:30 a.m. to 12:30 p.m. to minimize overflights of the University of Louisville and residential areas to the north of the airport. There are more aircraft arrivals than departures during this period at SDF.*

Implementation of this measure has changed over time. Currently, the 9:00 a.m. to 2:00 p.m. window is predominantly arrivals and thus that is the time frame for preferred north flow, on weekdays only.

FAA Action (May 14, 2004): *No action required at this time. This measure relates to flight procedures under 49 U.S.C. section 47504(b). A technical analysis of this measure in concert with Measures NA-2 and NA-7, and an environmental analysis, are required to determine its feasibility and environmental impacts. Implementation of this measure would be in conjunction with NA-2 and NA-7 if approved. (This measure would modify measure NAA 7.1 in the 1995 ROA.)*

FAA Action (August 4, 2009): *Disapproved. This measure is disapproved because it is dependent/relational to NA-7 and NA-2 which were disapproved. Because the measure was disapproved operationally, no additional environmental study or analysis is necessary.*

Measure Status: Implemented Locally; to the extent possible, the airport operates in north flow on weekdays from 9:00 a.m. to 2:00 p.m.

4.1.4 NA-4: Southbound Divergence According to Destination

The statement of the measure is as follows: *Southbound Divergence According to Destination; Continuation of Existing Air Traffic Control procedure. Continue the current practice of obtaining necessary divergence between aircraft departing to the south by assigning aircraft to departure tracks based on their route of flight.*

FAA Action (May 14, 2004): *Approved as voluntary. This is a continuation of a previously approved measure. The NCP states that no other tracks to the south would provide a greater noise benefit.*

Measure Status: Implemented

4.1.5 NA-5: Maintain Contraflow Program

The statement of the measure is as follows: *Maintain Contraflow Program; Continuation of Existing ATC Procedure. Contraflow at SDF means that arrivals between 10:00 p.m. and 7:00 a.m. are to the north and departures are to the south (subject to weather, wind and operational demand). This directs air traffic south of the airport over southern Jefferson and Bullitt counties which are less densely populated and where mitigation (relocation) measures have been and continue to be implemented.*

Note that the relocation program is no longer active.

FAA Action (May 14, 2004): *Approved as voluntary. This measure is a combination of previously approved measures 7.1, 7.3 and 7.5 in the 1995 ROA and would help reduce the DNL 65 dB noise contour to the north over noise-sensitive areas.*

Measure Status: Implemented

4.1.6 NA-6: Reduce Exceptions to Contraflow

The statement of the measure is as follows: *Reduce exceptions to contraflow; Enhancement of existing measure. Airport owner would work with airlines to adjust arrival and departure times for scheduled flights to more closely conform to normal peak arrival and departure periods.*

FAA Action (May 14, 2004): *Disapproved for purposes of Part 150. The FAA disapproves reducing exceptions to contraflow. Contraflow requires departing aircraft to be "aimed" directly at arriving aircraft, and greater use increases the potential for loss of separation between arriving and departing aircraft. This could cause substantial delay. This disapproval under Part 150 does not prohibit airport management from seeking cooperation from the airlines to adjust schedules on a voluntary basis to more closely conform to normal peak periods. Scheduling changes that reduce exceptions to contraflow will require consultation with FAA's Air Traffic office to determine whether they impact aircraft operational safety.*

Measure Status: Implemented

4.1.7 NA-7: Use an Offset Departure from Runway 35L and Offset Approach to Runway 17R

The statement of the measure is as follows: *Use an Offset Departure from Runway 35L and Offset Approach to Runway 17R. This measure is to take advantage of an industrial corridor to the northwest of the runway to reduce the adverse effects of the recommended change in preferential use of the east and west runways (Measure NA-2). Aircraft not equipped with GPS/FMS would require installation of a Localizer type directional aid (LDA). It is assumed that a Local Area Augmentation System (LAAS) would be required for a Global Positioning System (GPS) approach. This measure would remove about 423 homes north of the airport from the DNL 65 contour.*

FAA Action (May 14, 2004): *No action required at this time. This measure relates to flight procedures under 49 U.S.C. section 47504(b). A technical analysis of this measure in concert with Measures NA-2 and NA-3, and an environmental analysis, are required to determine its feasibility and environmental impacts. FAA is concerned that adoption of the arrival portion of this measure would reduce runway arrival capacity by approximately one-third when the offset approach is in use. While we do not object in principle to the departure procedure as a voluntary measure, the NCP does not provide separate analysis for the departure procedure alone. The FAA will review the study results to determine whether this measure is feasible. At present, when parallel approaches are being conducted, current procedures allow for lateral separation of 2 miles between two aircraft landing on the parallel runways. Using an offset approach to RWY 17R, this separation standard would increase to 3 miles.*

FAA Action (August 4, 2009): *Disapproved. Operational procedures necessary to implement this measure were detailed in the supplemental supporting information provided by LRAA requesting FAA approval for implementation of an Offset Approach to Runway 17R outside of the Part 150 process. The result of the FAA's technical evaluation concluded the procedures were unacceptable and the request was disapproved. This measure cannot be implemented without reducing the level of aviation safety provided*

and adversely affecting the efficient use and management of the navigable airspace and air traffic control systems. Because the measure was disapproved operationally, no additional environmental study or analysis is necessary.

Measure Status: Not Implemented

4.1.8 NA-8: Designate Departure and Arrival Flight Tracks to be Used by all Turbojet and Applicable Turboprop Aircraft Weighing Over 12,500 Pounds

The statement of the measure is as follows: *Designate flight tracks to be used by all turbojet and applicable turboprop aircraft weighing over 12,500 pounds. These measures have the effect of reducing the width of noise contours and noise exposure as measured in grid point analyses by reducing aircraft dispersion around the existing flight tracks (New Measure). Conformance to recommended noise abatement flight tracks by non-GPS/FMS or RNAV equipped aircraft[15] would require the installation of navigational aids to define each course segment.*

FAA Action (May 14, 2004): *Approved in part, as voluntary. Airport management may work with SDF ATCT to designate flight tracks within existing approved corridors. FAA's Flight Standard's office (ESO-31) must review these procedures before they may take effect.*

This measure is disapproved for new noise abatement flight tracks outside of existing corridors. It is noted that there is no request in this NCP for FAA approval, or a commitment by FAA, to install NAVAIDS to be used as departure navigational aids. At this time, FAA has suspended RNAV departure procedure development.

Measure Status: Partially Implemented

4.1.9 NA-9: Assign GPS/FMS or RNAV Equipped Aircraft to Defined FMS/GPS Departure and Arrival Tracks for Turbojet and Military Aircraft

The statement of the measure is as follows: *Assign GPS/FMS or RNAV equipped aircraft to defined FMS/GPS Departure and Arrival Flight Tracks for Turbojet and Military Aircraft (New Measure). The tracks recommended for this measure are generally consistent with those defined in Measure NA-8 above but are defined using area navigation (RNAV) capabilities, either satellite or ground based to reduce or eliminate the need for additional ground based facilities to define tracks.*

FAA Action (May 14, 2004): *Approved in part, as voluntary. Flight tracks may be defined within existing or approved flight corridors. There are a number of actions necessary to implement the recommended ANAV procedures. Most of the required actions are the responsibility of FAA, primarily its Air Traffic Division.*

Measure Status: Partially Implemented

[15] The GPS/FMS or RNAV equipment allows an aircraft to perform precision instrument navigation.

4.1.10 NA-10: FMS/GPS Departure and Arrival Flight Tracks for Turboprop Aircraft Weighing Over 12,500 Pounds

The statement of the measure is as follows: *FMS/GPS Departure and Arrival Flight Tracks for Turboprop Aircraft weighing over 12,500 pounds (New Measure). Place FMS/GPS equipped turboprop aircraft on different departure tracks from those defined for turbojet aircraft in Measure NA-9 to minimize impact on departure capacity. This is to reduce aircraft dispersion around the existing flight tracks. Direct routes or earlier turns would be provided consistent with noise abatement goals to enhance conformance.*

FAA Action (May 14, 2004): *Approved in part, as voluntary. Flight tracks may be defined within existing or approved flight corridors. This measure is disapproved for new noise abatement flight tracks outside of existing corridors.*

Measure Status: Partially Implemented

4.1.11 NA-11: Request FAA ATCT to Require all Aircraft to Intercept the Runway Centerline at or Beyond the Initial Approach Fix

The statement of the measure is as follows: *Request FAA ATCT to require all aircraft to intercept the runway centerline at or beyond the initial approach fix. Compliance with this measure would require limiting use of visual approaches that do not conform to the approach paths defined by the instrument approaches and result in arriving aircraft intercepting the glide slope at higher altitudes.*

The understanding of this measure is that the aircraft intercept the runway centerline by the final approach fix.

FAA Action (May 14, 2004): *No action required at this time. This measure relates to flight procedures under 49 U.S.C section 47504(b). A technical evaluation on feasibility and environmental impacts should examine the measure's effects on aircraft safety, capacity, and efficiency.*

Measure Status: Implemented Locally

4.1.12 NA-12: Request FAA to Publish a Standard Instrument Departure (SID) Procedure for Each Runway to be Used in all Weather Conditions, Including VFR Conditions

The statement of the measure is as follows: *Request FAA to publish a Standard Instrument Departure (SID) Procedure for each runway to be used in all weather conditions, including VFR conditions (New Measure). SIDs would be developed to enhance conformance to the recommended noise abatement departure procedures. These procedures would include instructions for following each segment of proposed departure flight tracks based on navigational equipment available. Inclusion of the ANAV would reduce dispersion of aircraft over non-compatible land uses.*

FAA Action (May 14, 2004): *No action required at this time under 49 U.S.C. section 47504(b). This measure is to publish SIDs for flight procedures proposed in the NCP. The FAA has deferred action on those flight procedures because they require additional technical and other analyses.*

Implementation of this measure would be subject to: FAA approval of the proposed equipment to be used; development of the procedures in conjunction with airlines operating at SDF (primary carriers); and development of special charting and flight-testing. The FAA notes that there is no request in this NCP for FAA approval, or a commitment by FAA, to install NAVAIDS to be used as departure navigational aids. Not all air carrier aircraft would be equipped with devices that would allow them to utilize these procedures.

Measure Status: Implemented

4.1.13 NA-13: Request FAA to Publish a Standard Terminal Arrival Route (STAR) for Each Runway to be Used in all Weather Conditions, Including VFR Conditions

The statement of the measure is as follows: *Request FAA to publish a Standard Terminal Arrival Route (STAR) for each runway to be used in all weather conditions including VFR conditions (New Measure). These procedures would include instructions for following each segment of proposed arrival flight tracks based on navigational equipment available.*

FAA Action (May 14, 2004): *No action required at this time. This measure relates to flight procedures under 49 U.S.C. section 47504(b). The FAA has deferred action on noise abatement approach procedures that would use the recommended STARs (NA-7, NA-11). The FAA notes that STAR guidance typically terminates 15-20 miles from the airport, and may be of little value in reducing noise. The results of the required studies for the deferred measures should specify changes to impacts and benefits so that FAA can make an informed determination under Part 150.*

Measure Status: Implemented

4.1.14 NA-14: Extend Noise Abatement Flight Tracks Beyond Those Identified in Measure NA-8 Through NA-11

The statement of the measure is as follows: As part of an ongoing noise management program, extend noise abatement flight tracks beyond those identified in Measures NA-8 through NA-11 (New Measure). This would enable aircraft operators to conform more closely to recommended flight tracks over noise sensitive areas that are beyond the noise contours. Implementation would require more detailed information on the land uses affected and the effects on airspace and air traffic control than is possible in this [part 150] study. Development of flight procedures should be conducted in consultation with FAA, aircraft operators, and members of potentially affected communities.

FAA Action (May 14, 2004): No action required at this time. This measure relates to flight procedures under 49 U.S.C. section 47504(b). There is insufficient information to determine whether the noise benefits or operational impacts of extending the flight tracks. Environmental analysis would be required.

This measure attempts to address impacts outside of the DNL 65 dB noise contour. Because it could introduce operational delay, analysis should show how any additional aircraft operational delay is offset by the expected benefits in those areas.

Measure Status: In Progress Locally

4.1.15 NA-15: Elimination of Early Descent

The statement of the measure is as follows: *Elimination of early descent (New Measure). (No analysis found in NCP) Current approach procedures allow aircraft to descend to the initial approach altitude prior to the initial approach point if directed by ATC. Under this measure, RAA would discourage ATC from directing descents earlier than required to maintain a constant rate of descent to the initial approach while maintaining adequate safety margins.*

FAA Action (May 14, 2004): *Disapproved. This measure, if changed as described, would have the effect of "prohibiting descents" rather than "discourage descents" below the minimum, published altitude at those fixes. Any aircraft, including smaller fixed-wing and helicopters operating from any nearby base of operations would be required to climb to a minimum of the published altitude for any given fix until reaching that fix. The existing 2500' authorization for reduced altitudes was added at ATC's request for operational efficiency.*

Requiring aircraft to remain at or above 5000 feet would remove two IFR altitudes (3000 and 4000 feet) from ATC use, effectively reducing airspace by 25%. Implementing this proposal would restrict the ability of ATC to perform functions in a safe efficient manner. The NCP acknowledges, at page 8-10, that "In practice, modification to approach procedures are likely to entail unacceptable reductions in safety margins."

Measure Status: Not Implemented

4.1.16 NA-16: Request the Airlines Serving the Airport to use the FAA Distant Noise Abatement Departure Procedure in Advisory Circular (AC) 91-53A, Noise Abatement Departure Procedure

The statement of the measure is as follows: *Request the airlines serving the Airport to use the FAA Distant Noise Abatement Departure Procedure in Advisory Circular (AC) 91-53A, Noise Abatement Departure Procedure. This measure would benefit areas exposed to a departure noise of DNL 65+ from Runways 35R, 35L, and 17L.*

FAA Action (May 14, 2004): *Approved as voluntary. RAA can request the airlines follow the Distant Noise Abatement Procedure.*

Measure Status: Implemented

4.1.17 NA-17: Continue Airport Regulation Restricting Aircraft Engine Run-Ups to Certain Hours and Locations

The statement of the measure is as follows: *Continue Airport regulation restricting aircraft engine run-ups to certain hours and locations.*

FAA Action (May 14, 2004): *Approved. FAA approved as noise beneficial in 1994 the following run-up measures in the RAA's previous Part 150 submittal:*

- Require RAA pre-approval to conduct static runups between 9:00 p.m. and 7:00 a.m.
- Require run-ups lasting more than 1 minute to be conducted on the south end of Runway 1/19
- Require run-ups lasting more than 1 minute to be conducted on the east parallel taxiway at the south end of Runway 17R/35L

Measure Status: Implemented

4.1.18 NA-18: Limit Use of North Runway Extension

The statement of the measure is as follows: *Limit use of North runway extension to aircraft needing full runway length and use south extension for departures to the north.*

FAA Action (May 14, 2004): *Disapproved pending submission of additional information to make an informed analysis. FAA's 2003 Finding of No Significant Impact for the proposed north runway extension included a mitigation commitment that only aircraft requiring the full runway length for departures would use either runway extension. The ATCT has granted a waiver allowing some procedures based on the runway being declared departure only between the hours of 3:30 AM to 6:00 AM local time. The NCP speculates, but does not show, how this measure is more noise beneficial than that included in the 2003 FONSI. Changes to operational procedures also would require environmental analysis.*

Measure Status: Not Implemented

4.2 Land Use Measures

Land use measures address compatibility with aircraft noise in areas of high exposure that cannot be eliminated through the implementation of noise abatement measures. Corrective land use measures, which are typically implemented by an airport operator, include land acquisition and sound insulation treatments of structures. In contrast, preventive land use measures prevent the introduction of new incompatible land uses and/or notify potential buyers of properties affected by aircraft noise; such measures are typically implemented by the local planning and zoning jurisdictions. Neither the FAA nor the LRAA has regulatory authority to control land uses around airports; state and local governments are responsible for land use planning, zoning, and regulation.

Table 4-2 lists the LRAA-recommended land use measures, the FAA response for each measure, and the implementation status of each measure. Measure descriptions follow the table.

Table 4-2. Status of SDF Land Use Measures

Source: LRAA, 2024

Number	Measure	FAA Response	Status
M-1	Continue the Current Voluntary Residential Acquisition Program Including the Innovative Housing Program	Approved	Implemented
M-2	Expanded Voluntary Residential Acquisition Program Within the DNL 65 dB Contour to the South of the Airport That Will Continue to be Exposed to Significant Noise levels in 2008	Approved	Implemented
M-3	Provide Soundproofing in Residential Areas Within the DNL 65 dB Contour to the North of the Airport	Approved	Implemented
M-4	Offer Sound Insulation for Non-Compatible Institutional Areas Within DNL 65 dB	Approved	In Progress
M-5	Residential Sales Assistance Program Within DNL 65 dB	Approved	Not Implemented
M-6	Construct an Earth Berm Along the Northwest Side of the Airfield to Reduce Ground Noise Associated with Aircraft Takeoffs on Runway 17R	Approved	Implemented
M-7	Study Potential Noise Barrier for Preston Park Neighborhood	Approved	Not Implemented
M-8	Construct Ground Run-Up Enclosure if Required to Reduce Noise from Maintenance Run-Up Activity	Disapproved	Not Implemented
M-9	Residential Sound Insulation for Areas Between DNL 60 dB and DNL 65 dB that Would Experience a 3 dB increase in Noise Levels as a Result of Recommended Noise Abatement Measures	Disapproved	Not Implemented
M-10	Offer Sound Insulation to Non-Compatible Institutional Land Uses Between DNL 60 dB to DNL 65 dB that Would Experience a 3 dB increase in Noise levels from the Noise Abatement Measures	Disapproved	Not Implemented
M-11	Compatible Land Use Planning	Approved In Part	Partially Implemented
M-12	LRAA Would Coordinate with the Planning Commission to Adopt a Policy Concerning Rezoning from Compatible to Non-Compatible Uses in the Airport Environs	Approved	Not Implemented
M-13	Subdivision Regulations	Approved In Part	Not Implemented
M-14	LRAA Would Consider Participation in a Redevelopment Program Initiative	Approved In Part	Implemented
M-15	LRAA Would Work with the Planning Commission to Develop an Overlay Zone, to Supplement Other Land Use Planning Techniques	Approved In Part	Not Implemented
M-16	Building Code Revision	Approved In Part	Not Implemented
M-17	Consider Disclosure Ordinances	Approved	Not Implemented
M-18	Avigation Easement Purchase Within DNL 65 dB	Approved	Not Implemented
M-19	Avigation Easement Purchase Within DNL 60 dB to DNL 65 dB	Disapproved	Not Implemented

4.2.1 M-1: Continue the Current Voluntary Residential Acquisition Program Including the Innovative Housing Program

The statement of the measure is as follows: *Continue the current Voluntary Residential Acquisition Program including the Innovative Housing Program.*

FAA Action (May 14, 2004): *Approved. Voluntary acquisition must comply with the Uniform Relocation and Real Property Acquisition Policies Act in order to be eligible for Federal Funding.*

Measure Status: Implemented

4.2.2 M-2: Expand Voluntary Residential Acquisition Within the DNL 65 dB to the South of the Airport that will Continue to be Exposed to Significant Noise Levels in 2008

The statement of the measure is as follows: *Expanded Voluntary Residential Acquisition within the DNL 65 dB contour to the south of the airport that will continue to be exposed to significant noise levels in 2008.*

FAA Action (May 14, 2004): *Approved. Voluntary acquisition must comply with the Uniform Relocation and Real Property Acquisition Policies Act in order to be eligible for Federal funding.*

Measure Status: Implemented

4.2.3 M-3: Provide Soundproofing in Residential Areas Within the DNL 65 dB contour to the North of the Airport

The statement of the measure is as follows: *Provide soundproofing in residential areas within the DNL 65 dB contour to the north of the airport. Eligibility of individual structures would depend on the feasibility of achieving at least a 5.0 dB noise level reduction as required by FAA.*

FAA Action (May 14, 2004): *Approved*

Measure Status: Implemented

4.2.4 M-4: Offer Sound Insulation for Non-Compatible Institutional Areas Within DNL 65 (Potentially University of Louisville & Additional Churches)

The statement of the measure is as follows: *Offer sound insulation for non-compatible institutional areas within DNL 65 (Potentially University of Louisville & additional churches).*

FAA Action (May 14, 2004): *Approved. The airport sponsor made a commitment to soundproof the University of Louisville in the FAA's 1991 EIS. The sponsor has not yet fulfilled that commitment (see LAIP EIS page 1-30, FEIS, Addendum I, page 8 and FAA Record of Decision, January 7, 1991, p.18). This approval under Part 150 acknowledges that the measure would be noise beneficial.*

Measure Status: The University of Louisville sound insulation has been completed.

4.2.5 M-5: Residential Sales Assistance Program within DNL 65

The statement of the measure is as follows: *Residential Sales Assistance Program within DNL 65. Concurrently with the residential soundproofing program for areas within the DNL 65 contour, offer sales assistance to homeowners declining to participate in the soundproofing program.*

FAA Action (May 14, 2004): *Approved. Implementation of this measure must comply with the Uniform Relocation and Real Property Acquisition Policies Act to be eligible for Federal funding.*

Measure Status: Not Implemented

4.2.6 M-6: Construct an Earth Berm Along the Northwest Side of the Airfield to Reduce Ground Noise Associated with Aircraft Takeoffs on Runway 17R

The statement of the measure is as follows: *Construct an earth berm along the northwest side of the airfield to reduce ground noise associated with aircraft takeoffs on Runway 17R.*

FAA Action (May 14, 2004): *Approved. The RAA estimates that over 200 homes could receive a 5-7 dBA reduction in departure noise. This measure also was included in the November 21, 2003, FONSI for the runway extensions.*

Measure Status: Implemented

4.2.7 M-7: Study Potential Noise Barrier for Preston Park Neighborhood

The statement of the measure is as follows: *Study potential noise barrier for Preston Park neighborhood. New airport facilities are anticipated in the southeast portion of the airport. The RAA would fund a study to determine whether such facilities could be constructed and oriented to shield areas to the east of the airport from ground noise originating in the immediate vicinity of the structures.*

FAA Action (May 14, 2004): *Approved for study.*

Measure Status: Not Implemented

4.2.8 M-11: Compatible Land Use Planning

The statement of the measure is as follows: *Compatible Land Use Planning - The RAA would coordinate with the Planning Commission to adopt policies in its Cornerstone 2020 Plan[16] to discourage new non-compatible development and disclose noise levels for new residential development. Measures to provide*

[16] **Cornerstone 2020** was adopted in 2000, with an intended 20-year horizon. https://metropolitanhousing.org/wp-content/uploads/2020/10/Cornerstone-2020-Comprehensive-Plan.pdf

notification for new development would apply to DNL 60 dB and to areas within DNL 65 dB that are already substantially developed.

FAA Action (May 14, 2004): *The portion of this measure that permits new incompatible development within the DNL 65 dB, even with sound attenuation and/or disclosure, is inconsistent with the FAA's guidelines and 1998 policy and is disapproved for the purposes of Part 150.*

Other portions of this compatible land use planning measure that do not permit incompatible development within the DNL 65 dB noise contour are approved for the purposes of Part 150.

This decision relates to the measure's consistency with the purposes of Part 150. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no control over local land use planning.

Measure Status*:* Partially Implemented

4.2.9 M-12: RAA Would Coordinate with the Planning Commission to Adopt a Policy Concerning Rezoning from Compatible to Non-compatible Uses in the Airport Environs

The statement of the measure is as follows: *RAA would coordinate with the Planning Commission to adopt a policy concerning rezoning from compatible to non-compatible uses in the Airport environs.*

FAA Action (May 14, 2004): *Approved. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no control over local land use planning.*

Measure Status: Not Implemented

4.2.10 M-13: Subdivision Regulations

The statement of the measure is as follows: *Subdivision Regulations-The RAA would coordinate with the Planning Commission to include a noise disclosure statement for new subdivisions in Policy Areas 1 & 2, Cornerstone 2020 Plan. This would allow future residents to make informed land purchase decisions.*

FAA Action (May 14, 2004): *The portion of this measure that permits new incompatible development within the DNL 65 dB, even with sound attenuation and/or disclosure, is inconsistent with the FAA's guidelines and 1998 policy and is disapproved for the purposes of Part 150.*

Measure Status: Not Implemented

4.2.11 M-14: RAA Would Consider Participation in a Redevelopment Program

The statement of the measure is as follows: *RAA would consider participation in a Redevelopment Program (Renaissance Zone Program) initiative that would redevelop areas in the Airport environs as part of a joint effort with the Fairgrounds, UPS, and Ford Motor Company. In conjunction with other*

participants, the RAA will work with the City of Louisville and Jefferson County to develop incentives for compatible development.

FAA Action (May 14, 2004): *The portion of this measure that permits new incompatible development within the DNL 65 dB, even with sound attenuation and/or disclosure, is inconsistent with the FAA's guidelines and 1998 policy and is disapproved for the purposes of Part 150.*

Other portions of this compatible land use planning measure that do not permit incompatible development within the DNL 65 dB noise contour are approved for the purposes of Part 150.

This decision relates to the measure's consistency with the purposes of Part 150. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no control over local land use planning.

Release of land under control of the RAA must comply with FAA grant agreements, be consistent with FAA's Eligibility Handbook to preserve compatible land uses, and is subject to environmental review.

Measure Status: Implemented

4.2.12 M-15: RAA Would Work with the Planning Commission to Develop an Overlay Zone, to Supplement other Land Use Planning Techniques

The statement of the measure is as follows: *RAA would work with the Planning Commission to develop an overlay zone, to supplement other land use planning techniques. This would be based on the 2007 NEM to be reflected in the Core Graphics section of the Cornerstone 2000 Plan.*

FAA Action (May 14, 2004): *The portion of this measure that permits new incompatible development within the DNL 65 dB, even with sound attenuation and/or disclosure, is inconsistent with the FAA's guidelines and 1998 policy and is disapproved for the purposes of Part 150.*

Other portions of this compatible land use planning measure that do not permit incompatible development within the DNL 65 dB noise contour are approved for the purposes of Part 150.

This decision relates to the measure's consistency with the purposes of Part 150. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no control over local land use planning.

We note that the official NEMs are for the years 2003 and 2008. The document states that the 2008 NEM was based on a review of forecasts for the year 2007. The FAA assumes the reference to the "2007 NEM" in this measure is a reference to the official 2008 NEM.

Measure Status: Not Implemented

4.2.13 M-16: Building Code Revision

The statement of the measure is as follows: *Building Code Revision-The RAA would work with the Commonwealth of Kentucky to develop and adopt enabling legislation either permitting local building code provisions or incorporating sound insulation provisions in the statewide building code.*

FAA Action (May 14, 2004): *The portion of this measure that permits new incompatible development within the DNL 65 dB, even with sound attenuation and/or disclosure, is inconsistent with the FAA's guidelines and 1998 policy and is disapproved for the purposes of Part 150.*

Other portions of this compatible land use planning measure that do not permit incompatible development within the DNL 65 dB noise contour are approved for the purposes of Part 150.

This decision relates to the measure's consistency with the purposes of Part 150. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no control over local land use planning.

Measure Status: Not Implemented

4.2.14 M-17: Consider Disclosure Ordinances

The statement of the measure is as follows: *Consider Disclosure Ordinances. Work with local governmental bodies to examine the feasibility of ordinances to require disclosure of airport noise exposure within designated distances from the airport and/or documented levels of exposure. Disclosure would be for vacant and residentially developed properties within the DNL 65+ dB and DNL 60-65 dB noise contours.*

FAA Action (May 14, 2004): *Approved. This measure is within the authority of the RAA and local planning jurisdiction. The Federal Government has no authority over local land use planning decisions.*

Compensatory Measures-These measures would provide an alternative to remedial measures for homeowners that would not benefit from either sound insulation or sales assistance measures.

Measure Status: Not Implemented

4.2.15 M-18: Avigation Easement Purchase Within DNL 65

The statement of the measure is as follows: *Avigation easement purchase within DNL 65-The RAA would purchase avigation easements from homeowners in areas eligible for residential soundproofing and sales assistance who do not believe they would benefit from either program. Program implementation would be contingent upon FAA grant funding.*

FAA Action (May 14, 2004): *Approved.*

Measure Status: Not Implemented

4.3 Program Management Measures

Program management measures enable the LRAA to monitor the implementation and compliance of the recommended noise abatement and land use management measures, as well as enhance stakeholders' understanding of aircraft noise. Program management measures are critical to the success of the NCP implementation. **Table 4-3** lists the LRAA-recommended program management measures, the FAA response for each measure, and the implementation status of each measure. Measure descriptions follow the table.

Table 4-3. Status of SDF Program Management Measures

Number	Measure	FAA Response	Status
PM-1	Establish New LRAA Staff Position Dedicated to Management of Noise Compatibility Program	Approved	Implemented
PM-2	Establish Advisory Committee	Approved	Implemented
PM-3	Acquire Portable Noise Monitoring Equipment	Approved	Implemented
PM-4	Acquire Equipment to Monitor Aircraft Operations	Approved	Implemented
PM-5	Airport Noise Office to Collect and Disseminate Information	Approved	Implemented

Source: SDF, 2024

4.3.1 PM-1: Establish New RAA Staff Position Dedicated to Management of Noise Compatibility Program

The statement of the measure is as follows: *Establish new RAA staff position dedicated to management of noise compatibility program. Incumbent performs duties associated with data collection and analysis, implementation, liaison and further study. (This position has been established.)*

FAA Action (May 14, 2004): *Approved.*

Measure Status: Implemented

4.3.2 PM-2: Establish Advisory Committee

The statement of the measure is as follows: *Establish advisory committee composed of community, user and air traffic control interests to maintain coordination among the stakeholders in the noise compatibility program.*

FAA Action (May 14, 2004): *Approved.*

Measure Status: Implemented

4.3.3 PM-3: Acquire Portable Noise Monitoring Equipment

The statement of the measure is as follows: *Acquire portable noise monitoring equipment to enable the Authority's Noise/Environmental Programs Coordinator to monitor actual noise and provide accurate information to community members.*

FAA Action (May 14, 2004): *Approved. For reasons of aviation safety, this approval does not extend to use of the monitoring equipment for enforcement purposes by in situ measurement of any present noise thresholds.*

Measure Status: Implemented

4.3.4 PM-4: Acquire Equipment to Monitor Aircraft Operations

The statement of the measure is as follows: *Acquire equipment to monitor aircraft operations and establish a regular program of monitoring and reporting conformance with recommended noise abatement procedures.*

FAA Action (May 14, 2004): *Approved. For reasons of aviation safety, this approval does not extend to use of the monitoring equipment for enforcement purposes by in situ measurement of any present noise thresholds.*

Measure Status: Implemented

4.3.5 PM-5: Airport Noise Office to Collect and Disseminate Information

The statement of the measure is as follows: *The RAA would use the Airport Noise Office as a central point to collect and disseminate information.*

FAA Action (May 14, 2004): *Approved*

Measure Status: Implemented

5 Development of Noise Exposure Contours

Part 150 specifies a uniform methodology for developing and preparing noise exposure contour maps to ensure consistency. FAA's Aviation Environmental Design Tool (AEDT) software models aircraft performance in space and time and can be used to estimate fuel consumption, emissions, noise and air quality consequences.[17] AEDT is the FAA-approved modeling tool for determining the cumulative effect of aircraft noise exposure around airports. Part 150 requires the use of AEDT to develop noise exposure maps.

All noise modeling conducted for this study adheres to "Guidance on Using the AEDT to Conduct Environmental Modeling for FAA Actions Subject to NEPA."[18] The Noise Exposure Maps portray two noise modeling scenarios:

- Existing Condition, representing 2024, and
- Five-year Forecast Condition, representing 2029.

Consistent with Part 150 requirements, the noise exposure maps for this study were prepared using the most recent release of the FAA's AEDT that was available at the outset of the study, Version 3f.[19] AEDT includes databases containing aircraft noise and emissions profiles as well as airport-specific data, which are used in conjunction with various user inputs to develop accurate noise contours. Sections 5.1 through 5.8 describe the required AEDT inputs, which include:

- Physical Description of the Airport Layout (Section 5.1)
- Aircraft Noise and Performance Characteristics (Section 0)
- Annual aircraft flight operations (Section 5.3)
- Runway use (Section 0)
- Aircraft flight tracks (Section 5.5)
- Aircraft engine runup operations (Section 5.6)
- Meteorological Data (Section 5.7)
- Terrain Data (Section 5.8)

A key data source for noise model inputs is the aircraft identification and flight track data from the Airport's Noise and Operations Monitoring System (NOMS). The study team analyzed a full year of SDF NOMS data (September 1, 2022, through August 31, 2023) to determine various aspects of the Airport's baseline operations.

[17] FAA Office of Environment and Energy. Aviation Environmental Design Tool (AEDT). https://aedt.faa.gov

[18] Published October 27, 2017

[19] Released December 13, 2023, https://aedt.faa.gov/3f_information.aspx

5.1 Physical Description of the Airport Layout

The SDF airfield, located approximately 5 miles south of downtown Louisville, Kentucky, consists of three 150-foot wide runways two of which are parallel, and one "crosswind" runway that is roughly perpendicular to the set of parallel runways. Runway length, runway width, instrumentation and declared distances affect which aircraft might use a particular runway and under what conditions, and therefore how often a runway would be used relative to the other runways at the Airport. The two parallel runways provide SDF with the capacity to accommodate commercial aircraft operations while the "crosswind" runway is occasionally used during strong crosswind conditions and by smaller general aviation aircraft. **Figure 5-1** presents the existing SDF airport layout.

Each runway end is designated by a number that, with the addition of a trailing "0," reflects the magnetic heading of the runway to the nearest 10 degrees, as seen by the pilot. Thus, the crosswind Runway 11/29 has the designation "11" at the west end of the pavement looking eastward, indicating that it is aligned on a magnetic heading of approximately 110 degrees (actually 116 degrees), while the opposite end of the same piece of pavement has the designation "29" indicating its orientation on an approximate heading of 290 degrees (actually 296 degrees). Runway 11/29 is 7,250 feet long. The two parallel runways, 17L/35R and 17R/35L, are oriented on approximate magnetic headings of 170 degrees and 350 degrees and are 8,578 feet and 11,890 feet long, respectively. The parallel runways are distinguished from each other with letter endings "L", meaning left, and "R", meaning right, as seen by the pilot.

The two parallel runways provide SDF with the greatest capacity to accommodate aircraft operations while Runway 11/29 is occasionally used during strong crosswinds and by smaller general aviation aircraft. Runway length, runway width, instrumentation and declared distances may affect which aircraft might use a particular runway and under what conditions, and therefore how often a runway would be used relative to the other runways at the Airport. Runway use noise model inputs are presented in section 0.

While the full length of Runway 17R/35L is available, most departures start their take-off roll at the intersections with Taxiway B at either end, which are also the locations of the respective displaced arrival thresholds. Similarly, some departures from Runway 17L/35R begin at taxiway intersections, but the majority use the actual runway end. The locations of the intersection departures of Runway 17R/35L and Runway 17L/35R are indicated by green arrows in **Figure 5-1** and specified in **Table 5-1**.

Helicopter operations were modeled from one helipad location (HE4, marked with a red dot on **Figure 5-1**) on Taxiway E4. This represents the primary departure and arrival location as indicated by discussions with the LRAA staff, FAA Air Traffic Control and the fixed-base operator.

Runups are modeled at five locations on the airfield (marked with blue dots on **Figure 5-1**. Low-power cargo aircraft runups (R-CGO on **Figure 5-1**) are represented at a location on the northwest side of the airfield adjacent to the end of Runway 17R and high-power cargo aircraft runups are represented at a midfield location along Taxiway N (labeled R-HP). Republic Airways maintenance runups (R-MBO) are modeled at a location on Taxiway A, between A4 and A5. KYANG runups (R-MIL) are modeled at two locations on the KYANG ramp: one near the intersection of Taxiway E and Taxiway G and the other on Taxiway G near the south end of the ramp.

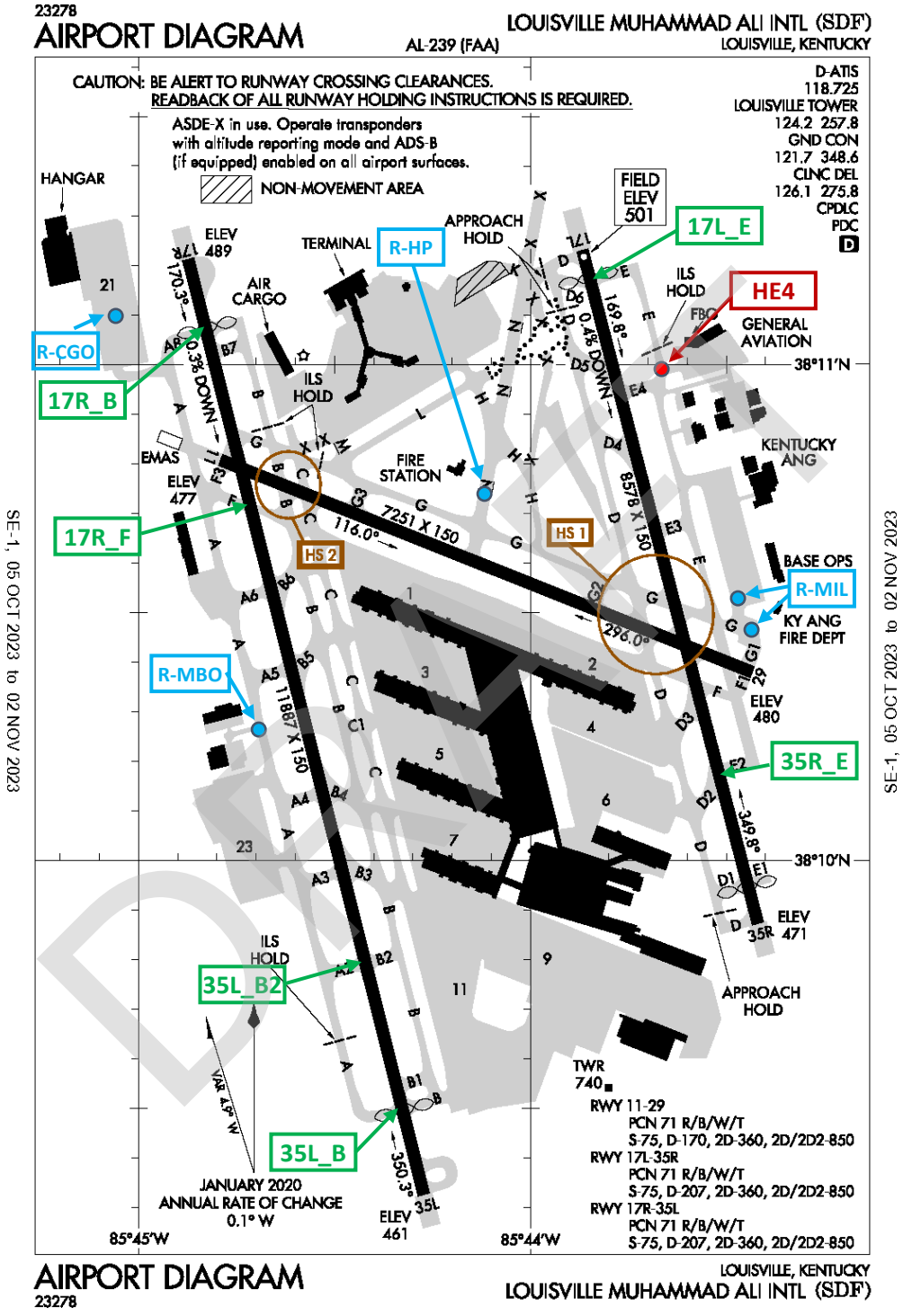

Figure 5-1. SDF Airport Diagram

Source: https://www.faa.gov/airports/runway_safety/diagrams, accessed October 12, 2023

Only one change is expected within the 5-year time frame between the Existing Condition and the Forecast Condition that would affect runway layout inputs to the noise modeling. A planned extension to the east end of Runway 11/29 would move the start-of-takeoff roll point back 546 feet for aircraft departing Runway 29 (which would be renamed Runway 30). A displaced threshold for arrivals would retain the landing threshold for aircraft arriving to Runway 29 (Runway 30) in its current location. **Table 5-1** lists the physical runway parameters, including geographic coordinates and parameters for each runway end, engine runup locations, and helipad information that the AEDT requires as inputs.

Table 5-1. SDF Airfield Layout Details

Runway End or Labeled Point	Latitude (degrees)	Longitude (degrees)	Elevation (ft. MSL)	Landing Displaced Threshold	Take Off Displaced Threshold	Glide Slope	Threshold Crossing Height	Magnetic Orientation (degrees)*
11	38.180227	-85.747349	476	-	-	3	65	116
12**	38.180227	-85.747349	476	-	-	3	65	116
17L	38.187299	-85.731342	501	328	-	3.32	71	170
17L_E	38.186106	-85.730939	499	-	450			170
17R	38.186988	-85.748779	489	846	-	3	64	170
17R_B	38.184642	-85.748011	485	-	880			170
17R_F	38.178611	-85.746022	475	-	3150			170
29	38.173053	-85.723824	480	-	-	3	56	296
30**	38.172511	-85.722053	480	546	-	3	56	296
35L	38.155403	-85.738358	461	1040	-	3	75	350
35L_B	38.158272	-85.739311	461	-	1080			350
35L_B2	38.163214	-85.740942	462	-	2940			350
35R	38.164556	-85.723575	471	449	-	3	72	350
35R_E2	38.169725	-85.725339	476	-	1950			350
HE4	38.183219	-85.727836	501	-	-	-	-	-
R-CGO	38.186918	-85.752932	470	-	-	-	-	169
R-HP	38.179194	-85.735644	479	-	-	-	-	240
R-MBO	38.170560	-85.745400	471	-	-	-	-	170 or 350
R-MIL (north)	38.175630	-85.724680	476	-	-	-	-	350
R-MIL (south)	38.174660	-85.723800	476	-	-	-	-	285

Notes:
Runway ends labeled with "_[X]" suffix are the intersection of taxiway [X] and the named runway.
*Magnetic Orientation from the FAA's Airport Diagram, current 10/05/2023 to 11/02/2023.
** Runway 11/29 will be renumbered to Runway 12/30 in the Forecast Condition due to magnetic declination.
"Helipad" HE4 is on Taxiway E4, defined for noise modeling of helicopter operations; it is not indicated as a helipad on FAA Form 5010.
Runup Locations R-MIL, R-CGO, R-HP, and R-MBO are representations of typical ground runup locations for noise modeling purposes; not indicated on FAA Form 5010.
Sources: FAA's Airport Master Record Forms 5010 November 3, 2023, SDF NOMS, and SDF staff, 2023

5.2 Aircraft Noise and Performance Characteristics

AEDT requires the use of specific noise and performance data for each aircraft type operating at the Airport. Noise data for each AEDT type are included in the form of Sound Exposure Level (SEL) at a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a specific thrust level. Flight performance data includes thrust, speed and altitude profiles for takeoff and landing operations. The AEDT database contains standard noise and performance data for about 300 different aircraft types, most of which are civilian fixed-wing aircraft (the rest are military aircraft or helicopters).

The AEDT automatically accesses the noise and performance data for takeoff and landing operations by aircraft type and calculates the noise energy resulting from each flight.

5.2.1 Noise and Performance Profile Assignment

The Study Team developed the baseline aircraft fleet mix for SDF from the NOMS data and then matched each International Civil Aviation Organization (ICAO) aircraft type designator with aircraft types in the AEDT database[20]. The Study Team then considered the available flight performance profile options for each AEDT type. Aircraft types which use SDF infrequently are combined with similar types (unless the type is among the loudest using the Airport). **Table C-1** in **Appendix C** of this NEM document lists the ICAO aircraft types identified in the SDF NOMS data and the corresponding AEDT type for modeling.

Within the AEDT database, it is standard for aircraft takeoff or departure profiles to be defined by a range of trip distances called "stage lengths." AEDT uses departure stage lengths (the flight distance between the departure and arrival airport) as a surrogate for aircraft departure weight, since fuel load is the largest factor affecting variation in aircraft weight and therefore climb performance. AEDT includes performance profiles for most commercial aircraft types for a range of stage length values; however, smaller aircraft types have only a single representative weight used for all operations, identified as Stage Length 1.

For this Part 150 Study, city pair distances were determined for each departure flight track in the SDF NOMS data. For passenger and general aviation aircraft, the distances were used to define the specific stage length using the AEDT standard definitions. Consistent with the methodology for previous NEM updates at SDF and because cargo flights typically take off with an increased average takeoff weight, the Study Team used operator-provided takeoff weight data for the majority of the cargo flights (instead of city pair distances) to select the appropriate departure profiles.[21]

The performance profile selections for the five-year forecast were also developed from the operator-provided forecasted weight estimates where available. Otherwise, the city-pair and stage length relationships found in the existing AEDT data were applied proportionally to the forecast operations.

5.2.2 Non-Standard Modeling Elements

In cases where flight profiles differ from the standard profiles within the AEDT database, additions or modifications to the AEDT database for "non-standard" modeling is considered. FAA approval is required for the use of non-standard aircraft noise and performance modeling in four areas:

- Substitutions - when modeling aircraft types that are not present in the AEDT database as standard aircraft types and for which the FAA has not identified pre-approved substitutes.
- User-defined flight parameters - when modeling aircraft for which no standard AEDT aircraft would be an appropriate substitute.

[20] Where needed, supplemental information from published airline fleet composition assisted in the matching.

[21] AEDT standard stage length weight tables are acknowledged to be broad estimates. The use of project-specific takeoff weight estimates, if available, provides a higher degree of accuracy.

- User-defined flight profiles - to address non-standard air traffic control procedures affecting departure or approach profiles.
- User-defined flight profiles - to address non-standard departure weight.

This study includes many different aircraft types, all of which could be modeled by direct assignments from the standard AEDT database. Therefore, no substitution approvals or user-defined flight parameters were needed.

In the previous NEM updates in 2016 and 2011, user-defined profiles were developed for several cargo aircraft types (in cooperation with the aircraft manufacturer, Boeing Aircraft Company) because their flight profiles differed from the standard profiles within the FAA's database. The Study Team investigated the current profiles being flown by those aircraft (Boeing 757-200, Boeing 767-300, and MD-11) to determine the most appropriate modeling approach. Flight profiles for the other common cargo aircraft types (the Boeing 747-400/747-800 and the Airbus 300) were also investigated with input from the aircraft operators. The recommended model profiles were verified by comparison to actual climb performance data at SDF from the NOMS data.

HMMH provided documentation of the user-defined profiles and requested FAA approval for their use in development of the NEM update via a memorandum. A copy of the memorandum with the aircraft operator's concurrence and FAA's written approval, is included in Appendix C.

5.3 Annual Aircraft Flight Operations

The FAA annually releases a forecast of operations for airports in the National Plan of Integrated Airport Systems (NPIAS) known as the Terminal Area Forecast (TAF).[22] . FAA requires that airport sponsors' locally generated forecasts be consistent with the TAF for the Airport unless exceptions are granted. Specific FAA guidance for approval of forecasts states: "For all classes of airports, forecasts for total enplanements, based aircraft, and total operations are considered consistent with the TAF if they meet the following criterion: forecasts differ by less than 10 percent in the 5-year forecast period, and by less than 15 percent in the 10-year forecast period."

The Study Team compared data from the recent FAA TAF publications (released February 2023 and January 2024) to the 2021 SDF Airport Master Plan[23] forecast and to recent SDF operations counts[24]. In addition, the team collected information from LRAA and aircraft operators at SDF to examine recent trends and expected schedule changes. The Study Team concluded that the growth realized at the Airport over the past five years, taken together with new activity in cargo operations, parallels the FAA TAF projections. Therefore, the TAF serves as the basis for aircraft operations in 2024 and 2029 for the

[22] The TAF is the official FAA forecast of aviation activity for U.S. airports. It contains active airports in the National Plan of Integrated Airport Systems (NPIAS) including FAA-towered airports, Federal contract-towered airports, non-federal towered airports, and non-towered airports. Forecasts are prepared for major users of the National Airspace System including air carrier, air taxi/commuter, general aviation, and military." Source: https://www.faa.gov/data_research/aviation/tafa

[23] *Table 2.26 Baseline Forecast Summary (Master Plan 2021*): AAGR Commercial Operations 0.13%, AAGR Air Cargo Operations 1.15%, AAGR GA Operations 1.44%, AAGR Military operations 0.0%.

[24] Operations counts data sources for this study include the 12-month sample of NOMS data and FAA OPSNET data for the same time period. The Operations Network (OPSNET) is the official source of FAA air traffic operations and delay data.

NEM Update. The Study Team provided a memorandum to FAA outlining the forecast analysis process and conclusions. The memorandum and FAA's concurrence are included in **Appendix C**.

The FAA classifies aircraft operations into the following four categories:

- Air Carrier: Operations by aircraft capable of holding 60 seats or more and flying using a three-letter company designator.
- Air Taxi/Commuter: Operations by aircraft of fewer than 60 seats, flying under three–letter company designators or the prefixes "T" (TANGO) or "L" (MEDEVAC).
- General Aviation: Civil operations not classified as air carrier or air taxi/commuter.
- Military: All classes of military operations.

Table 5-2 presents the annual operations summary and the associated average annual day operations for 2024 and 2029. The expected total for calendar year 2024 is 193,065 total operations. The five-year forecast projects 211,526 total operations in 2029, with expected growth in AC, AT, and general aviation categories. Discussions with the KYANG and the fixed-base operator indicated that there are no expected changes in military operations during the five-year period.

Table 5-2. 2024 and 2029 Operations Summary

Category	2024 Forecast Annual Operations	2024 Forecast Daily Average Operations	2029 Forecast Annual Operations	2029 Forecast Daily Average Operations
Air Carrier	165,761	452.9	182,465	499.9
Air Taxi	15,502	42.4	16,569	45.4
General Aviation	10,031	27.4	10,721	29.4
Military	1,771	4.8	1,771	4.9
Total[1]	193,065	527.5	211,526	579.5

Note: Totals may not be exact due to rounding.
Sources: HMMH, C&S, LRAA, FAA ATADS, 2024

The 12-month NOMS data provided aircraft flight tracks from SDF's flight tracking system. The data was used directly in the modeling process with the FAA's AEDT as individual operations by category, aircraft type, and time of day (daytime or nighttime) for both departures and arrivals. The Study Team supplemented the NOMS fleet mix data with data from the FAA Traffic Flow Management System Counts (TFMSC),[25] the FAA's Aircraft Registration Database,[26] and data collection interviews with LRAA Air Services staff and air carrier representatives. To assist in the proration of this data to the forecast totals, the Study Team associated each operation to one of four civilian categories: Air Carrier Cargo, Air Carrier Passenger, Air Taxi, or General Aviation. Operations were also scaled such that the modeled arrival operations balance with the modeled departure operations by aircraft type. The resultant detailed set of operations for noise model input is referred to as the derivative forecast.

[25] http://aspm.faa.gov/

[26] http://www.faa.gov/licenses_certificates/aircraft_certification/aircraft_registry/

For military flight operations, the KYANG and the Atlantic Aviation fixed-base operator provided information on quantity and aircraft types. Of the 1,771 military operations listed in the derivative forecasts for both 2024 and 2029, 1,100 are attributed to the KYANG leaving 671 operations conducted by transient military aircraft. The transient military fleet mix was obtained using refueling records from the fixed-base operator, which handles all military aircraft except for the KYANG C-130s. Each refueling record is counted as one arrival and one departure for that aircraft. The vast majority (estimated at 96 percent) of the military operations occur during daytime hours. Of those, 91 percent are fixed-wing aircraft, and the remaining 9 percent are helicopters.

Table 5-3 shows the number of average annual daily aircraft arrivals and departures by aircraft type for the 2024 Existing Condition. The table breaks the operations into the day and nighttime periods required for DNL calculation (7 a.m. to 10 p.m. and 10 p.m. to 7 a.m., respectively). The day/night breakdown is critical because the calculation of DNL weights night operations by a factor of 10 (mathematically equivalent to adding 10 decibels to the noise level produced by aircraft operating at night).

Table 5-4 shows the number of average annual daily aircraft arrivals and departures for the 2029 forecast, again listed by the day or nighttime period. Detailed aircraft assignments were based on several sources, including discussions with operators. In the absence of operator information, growth in operations was assumed to be applied uniformly across the current aircraft fleet mix. The split between day/night operations was assumed to be the same as the existing operations, except where additional operator information was available.

The air carrier aircraft in **Table 5-3** and **Table 5-4** are designated by the AEDT type with which they were modeled. For the other categories, the aircraft are grouped by engine types. Specific AEDT types applied in modeling air taxi, general aviation, and military flights are listed in **Tables C-2 through C-6** in **Appendix C** of this NEM document**.**

Table 5-3. Modeled Average Daily Aircraft Operations for 2024

Sources: HMMH, C&S, LRAA, 2024

Category	Propulsion	AEDT Type	Arrivals		Departures		Total
			Day	Night	Day	Night	
Air Carrier – Cargo	Jet	A300-622R	10.03	22.92	10.71	22.24	65.89
		7478	2.14	3.62	1.73	4.03	11.51
		747400	4.39	4.88	4.63	4.63	18.53
		757PW	2.35	5.23	2.74	4.84	15.15
		757RR	3.47	8.22	4.08	7.61	23.38
		7673ER	19.09	34.91	21.36	32.64	107.99
		MD11GE	2.73	5.28	3.10	4.91	16.01
		MD11PW	5.34	11.90	6.12	11.12	34.48
Air Carrier - Cargo Total			49.53	96.94	54.47	92.00	292.95
Air Carrier – Passenger	Jet	717200	3.79	0.18	3.88	0.10	7.96
		737700	7.68	1.77	7.63	1.82	18.89
		737800	7.51	3.39	7.70	3.20	21.80
		7378MAX	1.52	0.31	1.40	0.43	3.65
		A319-131	3.67	1.80	4.40	1.07	10.93
		A320-211	2.37	0.05	2.31	0.11	4.84
		A320-232	2.28	1.48	3.04	0.71	7.52
		A320-270N	0.53	0.10	0.61	0.02	1.26
		A321-232	1.02	1.04	1.23	0.82	4.11
		CRJ9-ER	7.77	2.59	9.40	0.96	20.71
		EMB170	2.86	0.76	2.72	0.89	7.23
		EMB175	20.88	4.65	19.56	5.96	51.04
Air Carrier - Passenger Total			61.86	18.11	63.88	16.09	159.95
Air Taxi	Jet	See Appendix C for detailed breakdown	11.29	1.86	11.56	1.59	26.30
	Turboprop		1.53	6.50	1.94	6.09	16.06
Air Taxi Total			12.82	8.36	13.50	7.68	42.36
General Aviation	Jet	See Appendix C for detailed breakdown	9.96	0.69	9.96	0.69	21.30
	Turboprop		1.15	0.09	1.12	0.12	2.47
	Piston		1.45	0.10	1.41	0.14	3.10
	Helicopter		0.11	0.16	0.13	0.14	0.53
General Aviation Total			12.67	1.04	12.61	1.09	27.41
Based Military	Turboprop	C130AD	1.50	0.00	1.50	0.00	3.01
Transient Military	Jet	See Appendix C for detailed breakdown	0.37	0.00	0.37	0.00	0.75
	Turboprop		0.32	0.00	0.32	0.00	0.64
	Piston		0.01	0.00	0.01	0.00	0.01
	Helicopter		0.22	0.00	0.11	0.11	0.44
Military Total			2.42	0.00	2.31	0.11	4.84
Grand Total			139.30	124.45	146.78	116.97	527.50

Table 5-4. Modeled Average Daily Aircraft Operations for 2029

Sources: HMMH, C&S, LRAA, 2024

Category	Propulsion	AEDT Type	Arrivals		Departures		Total
			Day	Night	Day	Night	
Air Carrier - Cargo	Jet	A300-622R	9.69	22.00	10.34	21.35	63.37
		7478	2.12	3.59	1.72	3.99	11.42
		747400	5.08	5.66	5.33	5.41	21.48
		757PW	2.73	6.09	3.19	5.64	17.65
		757RR	4.04	9.57	4.75	8.86	27.22
		7673ER	27.39	50.09	30.65	46.84	154.96
		MD11GE	1.26	2.43	1.43	2.26	7.38
		MD11PW	2.46	5.48	2.82	5.12	15.88
Air Carrier - Cargo Total			54.78	104.90	60.22	99.47	319.37
Air Carrier - Passenger	Jet	717200	4.28	0.21	4.37	0.12	8.98
		737700	8.67	1.99	8.61	2.05	21.33
		737800	8.48	3.82	8.69	3.62	24.61
		7378MAX	1.71	0.35	1.58	0.49	4.12
		A319-131	4.14	2.03	4.97	1.21	12.34
		A320-211	2.67	0.06	2.61	0.12	5.46
		A320-232	2.57	1.67	3.44	0.81	8.49
		A320-270N	0.59	0.12	0.69	0.02	1.43
		A321-232	1.15	1.17	1.39	0.93	4.64
		CRJ9-ER	8.77	2.92	10.60	1.08	23.37
		EMB170	3.22	0.85	3.07	1.01	8.15
		EMB175	23.56	5.25	22.08	6.73	57.61
Air Carrier - Passenger Total			69.82	20.45	72.10	18.17	180.53
Air Taxi	Jet	See Appendix C for detailed breakdown	12.10	1.99	12.39	1.70	28.18
	Turboprop		1.64	6.96	2.08	6.53	17.21
Air Taxi Total			13.74	8.96	14.47	8.23	45.40
General Aviation	Jet	See Appendix C for detailed breakdown	10.68	0.74	10.67	0.74	22.83
	Turboprop		1.23	0.09	1.20	0.12	2.65
	Piston		1.55	0.11	1.51	0.15	3.33
	Helicopter		0.12	0.17	0.13	0.15	0.57
General Aviation Total			13.58	1.11	13.52	1.17	29.37
Based Military	Turboprop	C130AD	1.51	0.00	1.51	0.00	3.01
Transient Military	Jet	See Appendix C for detailed breakdown	0.38	0.00	0.38	0.00	0.75
	Turboprop		0.32	0.00	0.32	0.00	0.64
	Piston		0.01	0.00	0.01	0.00	0.01
	Helicopter		0.22	0.00	0.11	0.11	0.43
Military Total			2.43	0.00	2.32	0.11	4.85
Grand Total			154.35	135.41	162.62	127.14	579.52

5.4 Runway Use

Weather, in particular wind direction and wind speed, is the primary factor affecting runway use at airports. Additional factors that may affect runway use include the proximity of a facility relative to the runway ends and temporary runway closures, generally for airfield maintenance or construction. The flight tracks within the radar data reviewed for the NEM Update include the use of all six directions on the three runways at SDF, although the use of Runway 11 is minimal.

Due to a lack of military operations in the flight track data from NOMS (these operations are typically filtered out by design), military runway use estimates were developed through discussions with the KYANG. The KYANG base is located on the east side of the airfield; therefore, it is convenient for the KYANG aircraft to use Runway 17L and Runway 35R. The north/south directional flow is accounted for in the military runway use by assuming the military aircraft would approximately follow the percentages of air carrier passenger directional use, as dictated by winds. Transient military aircraft were assumed to have the same runway use as KYANG since those aircraft taxi to and from the fixed-base operator facility, which is just north of and adjacent to the KYANG base.

The summarized runway use percentages, as presented in **Table 5-5**, are based on the actual annual-average runway use for arrivals and departures from September 1, 2022 through August 31, 2023 provided by the SDF NOMS flight track data. The table summarizes the overall runway use percentages by time of day (daytime and nighttime). **Figure 5-2** shows the same information graphically.

As noted in section 5.3, the twelve-month NOMS data was used directly in the noise modeling process; a scaling factor was applied to all flight operations by category to reach the operations projected for calendar year 2024 and 2029 as listed in **Table 5-3** and **Table 5-4**. The resulting modeled runway use percentages by time of day and aircraft group are provided in **Table 5-6** for 2024 and 2029. The groupings and time periods in **Table 5-6** correspond to the aircraft operations presented in the operations tables in Section 5.3.

Table 5-5. NOMS Data Overall Runway Use Percentages by Daytime/Nighttime

Source: SDF NOMS data, HMMH 2024

Runway	11	17L	17R	29	35L	35R	Total
Daytime							
Departure	0.0%	24.3%	32.5%	3.1%	15.8%	24.3%	100.0%
Arrival	<0.1%	26.9%	20.4%	2.8%	26.4%	23.5%	100.0%
Nighttime							
Departure	0.0%	32.6%	47.9%	0.2%	10.8%	8.5%	100.0%
Arrival	<0.1%	13.3%	17.7%	0.5%	42.1%	26.4%	100.0%
Overall							
Departure	0.0%	28.2%	39.6%	1.8%	13.5%	17.0%	100.0%
Arrival	<0.1%	20.4%	19.1%	1.7%	33.9%	24.9%	100.0%

Note: Totals may not match exactly due to rounding.

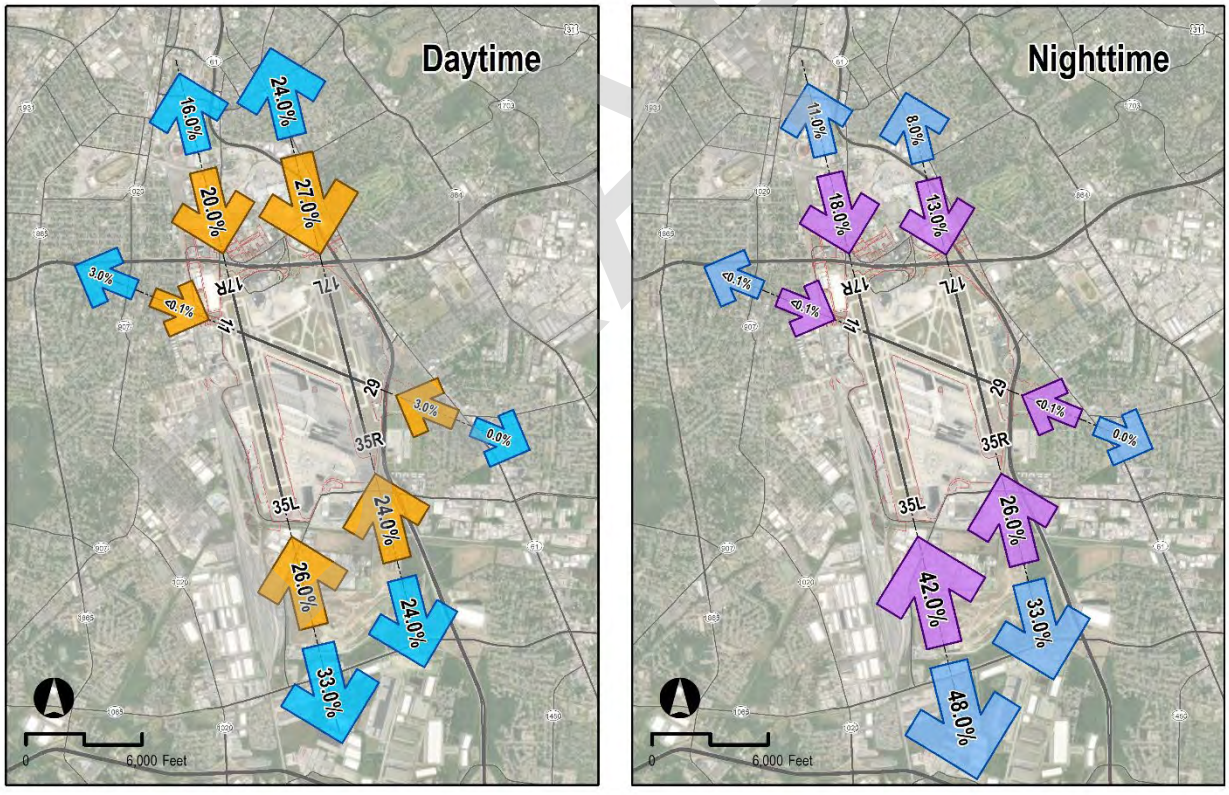

Figure 5-2. Existing Condition Overall Runway Use

Source: SDF NOMS data, HMMH 2024

Table 5-6. Modeled Average Daily Runway Use

Source: SDF NOMS data, HMMH 2024

Runway	2024 Existing Condition				2029 Forecast Condition			
	Arrivals		Departures		Arrivals		Departures	
Air Carrier Passenger								
11 (12)	---	---	---	---	---	---	---	---
17L	34.0%	24.9%	26.3%	36.3%	34.0%	24.9%	28.8%	39.9%
17R	16.2%	14.2%	27.5%	41.6%	16.2%	14.2%	26.8%	39.8%
29 (30)	3.5%	1.7%	2.9%	0.7%	3.5%	1.7%	3.1%	0.9%
35L	21.0%	29.6%	10.2%	2.8%	21.0%	29.6%	10.1%	2.6%
35R	25.3%	29.7%	33.1%	18.6%	25.3%	29.6%	31.2%	16.8%
Air Carrier Cargo								
11 (12)	---	---	---	---	---	---	---	---
17L	12.6%	10.5%	15.6%	30.2%	13.1%	10.3%	15.5%	30.1%
17R	30.4%	18.7%	47.7%	51.8%	30.2%	18.9%	47.4%	51.1%
29 (30)	1.9%	0.4%	3.1%	0.1%	1.9%	0.4%	3.0%	0.1%
35L	39.3%	46.7%	24.6%	12.3%	38.7%	47.3%	24.7%	12.9%
35R	15.8%	23.7%	9.0%	5.6%	16.1%	23.2%	9.4%	5.8%
Air Taxi								
11 (12)	<0.1%	<0.1%	---	---	<0.1%	<0.1%	---	---
17L	41.1%	22.3%	37.2%	54.6%	41.1%	22.3%	40.0%	55.2%
17R	9.5%	7.4%	12.6%	21.6%	9.5%	7.4%	14.0%	21.6%
29 (30)	3.4%	0.1%	3.5%	0.2%	3.4%	0.1%	4.2%	0.2%
35L	12.5%	11.8%	8.1%	4.2%	12.5%	11.8%	7.9%	4.4%
35R	33.5%	58.4%	38.6%	19.4%	33.5%	58.4%	33.9%	18.6%
General Aviation								
11 (12)	<0.0%	---	---	---	<0.1%	---	---	---
17L	43.6%	35.1%	41.8%	53.5%	43.6%	35.1%	43.4%	54.1%
17R	7.4%	2.1%	7.4%	4.1%	7.4%	2.1%	7.7%	5.4%
29 (30)	3.7%	0.2%	3.8%	0.3%	3.7%	0.2%	4.1%	0.5%
35L	7.4%	2.1%	8.1%	0.2%	7.4%	2.1%	8.3%	0.2%
35R	37.8%	60.5%	38.8%	41.9%	37.8%	60.5%	36.5%	39.8%

Notes:
Percentages may not appear to total exactly 100.0% due to rounding.
Military runway use is addressed separately.
Runway 11/29 is renumbered to Runway 12/30 in the Forecast Condition due to magnetic declination

The Airport's informal preferential runway use agreement for turbojet aircraft lists the preferred runway combinations for arrivals and departures for four time periods as presented below. The agreement includes the most preferred arrival and departure runway combination, followed by the preferred list of alternatives, with the least preferred arrival and departure runway combination at the end of the list for the respective time period. In some cases, pilots, at their discretion, may request a different runway. The agreement describes the following four time periods and associated first-preference runway combinations.

- Operations from 7:00 a.m. to 9:30 a.m.
  - Depart on Runways 17L and 17R
  - Arrive on Runway 17L
- Operations from 9:30 a.m. to 12:30 p.m.
  - Depart on Runway 35R
  - Arrive on Runway 35L and 35R
- Operations from 12:30 p.m. to 10:00 p.m.
  - Depart on Runways 17L and 17R
  - Arrive on Runway 17L
- Operations from 10:00 p.m. to 7:00 a.m. (documented in contraflow reports)
  - Depart on Runways 17L and 17R
  - Arrive on Runways 35L and 35R

Table 5-7 provides the civilian turbojet runway use percentages[27] for the four time periods defined in the informal preferential runway use agreement. The percentages associated with the first-preference runways are the most used runways during the respective time period. The single exception is the arrival operations during the 7:00 a.m. to 9:30 a.m. time period, in which the first- preference arrival runway is Runway 17R.

Between the hours of 10:00 p.m. and 7:00 a.m., the Airport operates from the south and to the south (contraflow) whenever wind, weather, and demand allow. Contraflow procedures require aircraft to arrive on Runways 35R and 35L and depart on Runways 17R and 17L in order to direct aircraft operations south of the Airport, over areas which are less densely populated than areas north of the Airport. Regular contraflow reports track monthly nighttime operations, calculate the respective arrival percentage from the south and departure percentage to the south, and compare the results to the published contraflow goals. **Appendix C** provides the contraflow report dated January 2024.

The contraflow report shows that nighttime arrivals used Runways 35R and 35L between 66 and 74 percent of the time on an average annual basis from 2017 through 2023. As provided by **Table 5-5**, for the twelve-month period from September 2022 through August 2023 (corresponding to the baseline data used in the development of this NEM), 68.5 percent of nighttime arrival flights occurred in that preferred flow direction. For departures, the contraflow report indicates that Runways 17L and 17R were used between 74 and 79 percent of the time on an average annual basis from 2017 through 2023. **Table 5-5** shows a sum of 80.5 percent on those runways.

The Airport's runway usage under the five-year Forecast Condition is assumed to be the same as for the Existing Condition.

[27] Calculated from the NOMS data, September 2022 – August 2023

Table 5-7. Average Daily Civilian Turbojet Runway Use by Time of Day

Runway	11	17L	17R	29	35L	35R	Total
Operation: 7:00 a.m.– 9:30 a.m.							
Departure	0.0%	36.4%	30.1%	1.4%	8.4%	23.8%	100.0%
Arrival	0.0%	24.4%	34.2%	0.9%	23.2%	17.3%	100.0%
Operation: 9:30 a.m. – 12:30 p.m.							
Departure	0.0%	20.2%	14.0%	2.7%	15.9%	47.2%	100.0%
Arrival	<0.1%	16.7%	17.6%	1.8%	36.7%	27.3%	100.0%
Operation: 12:30 p.m. – 10:00 p.m.							
Departure	0.0%	22.4%	37.6%	3.5%	17.4%	19.1%	100.0%
Arrival	<0.1%	33.3%	20.0%	3.9%	21.3%	21.6%	100.0%
Operation: 10:00 p.m. – 7:00 a.m.							
Departure	0.0%	31.7%	49.1%	0.2%	11.1%	7.9%	100.0%
Arrival	<0.1%	12.9%	18.1%	0.6%	43.6%	24.8%	100.0%

Notes:
Totals may not match exactly due to rounding.
Numbers in bold and in green shaded cells indicated preferred runways during the respective period.
Military operations are not included.
Source: NOMS data analysis, HMMH, 2024

According to discussions with KYANG, military aircraft operate Tuesday through Thursday, typically departing around 12:00 p.m. and arriving around 3:00 p.m. They also typically depart around 7:00 p.m. and arrive around 9:00 p.m. Military aircraft are assumed to use the active runway at the time of operation; therefore, overall runway use percentages observed in the NOMS data for those time periods are presented in **Table 5-8**. The percentages were applied to the number of operations occurring in each time period to arrive at the modeled military runway use percentages shown at the bottom of **Table 5-8.**

Table 5-8. Average Military Runway Use by Time of Day

Runway	11	17L	17R	29	35L	35R	Total
Operation: Tuesday-Thursday 12:00 PM – 3:00 PM							
Departure	0.0%	15.1%	31.1%	2.4%	21.8%	29.6%	100.0%
Arrival	0.0%	11.9%	24.6%	1.6%	43.6%	18.1%	100.0%
Operation: Tuesday-Thursday 7:00 PM – 9:00 PM							
Departure	0.0%	20.9%	43.0%	2.3%	9.6%	24.1%	100.0%
Arrival	0.0%	41.7%	22.6%	2.3%	17.7%	15.7%	100.0%
Modeled Military Runway Use							
Departure	0.0%	16.5%	33.9%	2.4%	18.9%	28.3%	100.0%
Arrival	0.0%	19.5%	24.1%	1.8%	37.0%	17.5%	100.0%

Note: Totals may not match exactly due to rounding.
Sources: KYANG and NOMS data analysis, HMMH, 2024

Table 5-9 provides the percentage split of departures at each taxiway intersection, derived from ground tracks in the SDF NOMS data.

Table 5-9. Existing Condition Intersection Departure Percentages

Intersection	Percentage	Intersection	Percentage
Runway 17L		**Runway 35R**	
17L (Full Length)	87.3%	35R (Full Length)	83.8%
17L_E	12.7%	35R_E2	16.2%
Total	100.0%	Total	100.0%
Runway 17R		**Runway 35L**	
17R (Full Length)	<0.1%	35L (Full Length)	<0.1%
17R_B	99.8%	35L_B	99.8%
17R_F	0.2%	35L_B2	0.2%
Total	100.0%	Total	100.0%

Source: NOMS data analysis, HMMH, 2024

5.5 Aircraft Flight Tracks

AEDT requires identification of aircraft flight tracks for modeling. Consistent with the methodology followed for previous SDF NEM updates, a proprietary pre-processing software was used to increase the precision of modeled flight tracks for civilian operations. The software uses individual flight tracks taken directly from the NOMS data rather than relying on consolidated, representative flight tracks data. This provides the additional advantage of modeling each aircraft operation on the specific runway it actually used and at the actual time of day of the arrival or departure. The software is used to process the radar flight tracks into a format that is easily imported into AEDT. The software is used for track processing only; all noise modeling is done in AEDT. Section 5.5.1 describes model flight track development for civilian aircraft.

Military operations are not available in the SDF NOMS flight track data, so the military flight tracks were modeled using a standard method, as described in Section 5.5.2. The nominal military fixed-wing flight tracks developed in the previous two Noise Exposure Map updates are also used for this NEM update. The same flight tracks are used for both 2024 and 2029 military operations.

In July 2024, FAA implemented airspace changes and new Performance Based Navigation (PBN) procedures at SDF. Since these new procedures were not implemented until 2024, they were not captured in the NOMS data set (from September 2022 through August 2023). Therefore, nominal flight tracks were also used to represent the new FAA procedures for the 2029 Forecast Condition, as described in Section 5.5.3.

5.5.1 Flight Tracks for All Civilian Aircraft – Existing Condition

Flight tracks in North Flow (Runways 35L/R and 29) and South Flow (Runways 17L/R and 11) are provided in **Figure 5-3** and **Figure 5-4**, respectively, for the 2024 Existing Condition. Because plotting the full number of flight tracks would overwhelm the base map, a random ten percent sample of tracks is

shown on those figures. Flight tracks for helicopters are provided in **Figure 5-5**. A total of 142,067 individual flight tracks were modeled for the 2024 Existing Condition.

To supplement the north and south flow flight track graphics, flight track density plots show the geographic concentrations of arrivals and departures. Rather than presenting individual tracks, density plots use color gradations to depict the frequency of aircraft operations over extended time periods using thousands of actual aircraft flight tracks. These graphics summarize the flight track geometry, dispersion, and the frequency of aircraft operations by using a uniform color gradient scheme based on the relative density of traffic. The "warm" colors (reds) indicate the areas where the most aircraft operations occurred and the "cool" colors (blues) indicate the areas where the fewest aircraft operations occurred, given the full 12 months of NOMS flight track data.

Figure 5-6 and **Figure 5-7** illustrate the density (i.e., frequency) of jet arrivals and jet departure flight tracks, respectively. The plots are each based on over 70,000 actual flight tracks. These figures provide a visual summary of where aircraft predominantly fly throughout the year and represent a sample of the flight tracks that were used to develop the noise contours in this NEM Update. Note that aircraft densities appear to drop suddenly over the airfield due to the flight tracks beginning and ending near the airfield within the data set.

5.5.2 Flight Tracks for Military Aircraft

Since military operations are not included in the flight track data obtained from the SDF NOMS, the traditional modeling approach, in which representative model flight tracks are populated with aircraft operations, is used to represent the military aircraft flights. The eleven model flight tracks used to represent military aircraft for this NEM update were also applied in the previous two NEM updates for SDF.

Figure 5-8 displays the military arrival and departure modeled flight tracks. **Table 5-10** shows the military flight track names, which are consistent with the naming in the 2016 and 2011 NEM update documents. The modeled military flight tracks and usage remain unchanged between the 2024 Existing Condition and 2029 Forecast Condition.

Table 5-10. Military Fixed-Wing Aircraft Flight Tracks

Runway	Arrival Flight Track	Departure Flight Track
11	A11ML01	-
17L	A17LML01	D17LML01
17R	A17RML01	D17RML04
29	A29ML01	D29ML01
35L	A35LML01	D35LML04
35R	A35RML01	D35RML01

Source: HMMH, LRAA, KYANG, 2024

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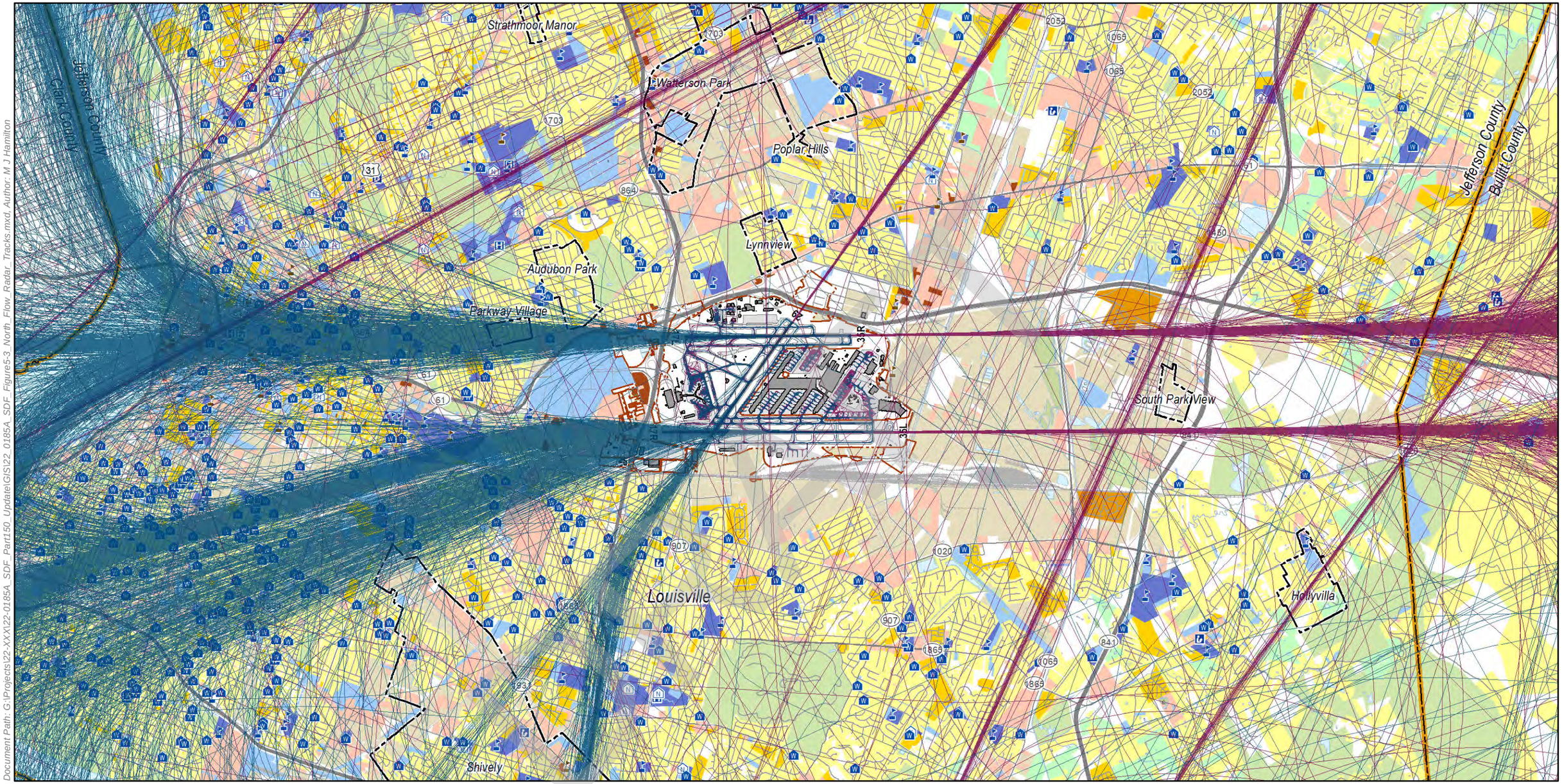

Legend

- North Flow Arrival Tracks
- North Flow Departure Tracks
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 4,000 8,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-3

North Flow Arrival and Departure Flight Tracks (10% Sample)

hmmh

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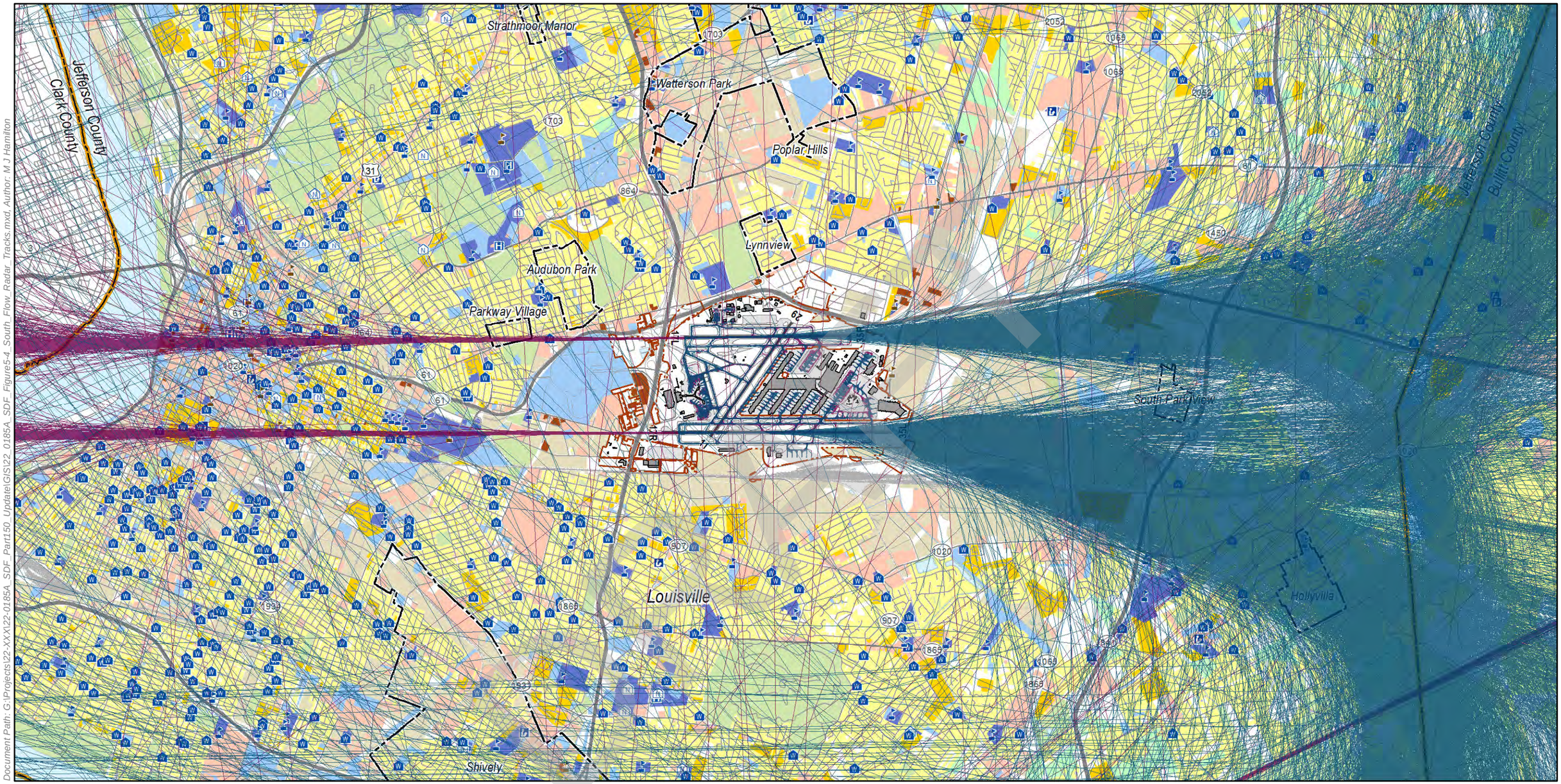

Legend

- South Flow Arrival Tracks
- South Flow Departure Tracks
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 4,000 8,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-4

South Flow Arrival and Departure Flight Tracks (10% Sample)

hmmh

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Legend

- Helicopter Arrival Tracks
- Helicopter Departure Tracks
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

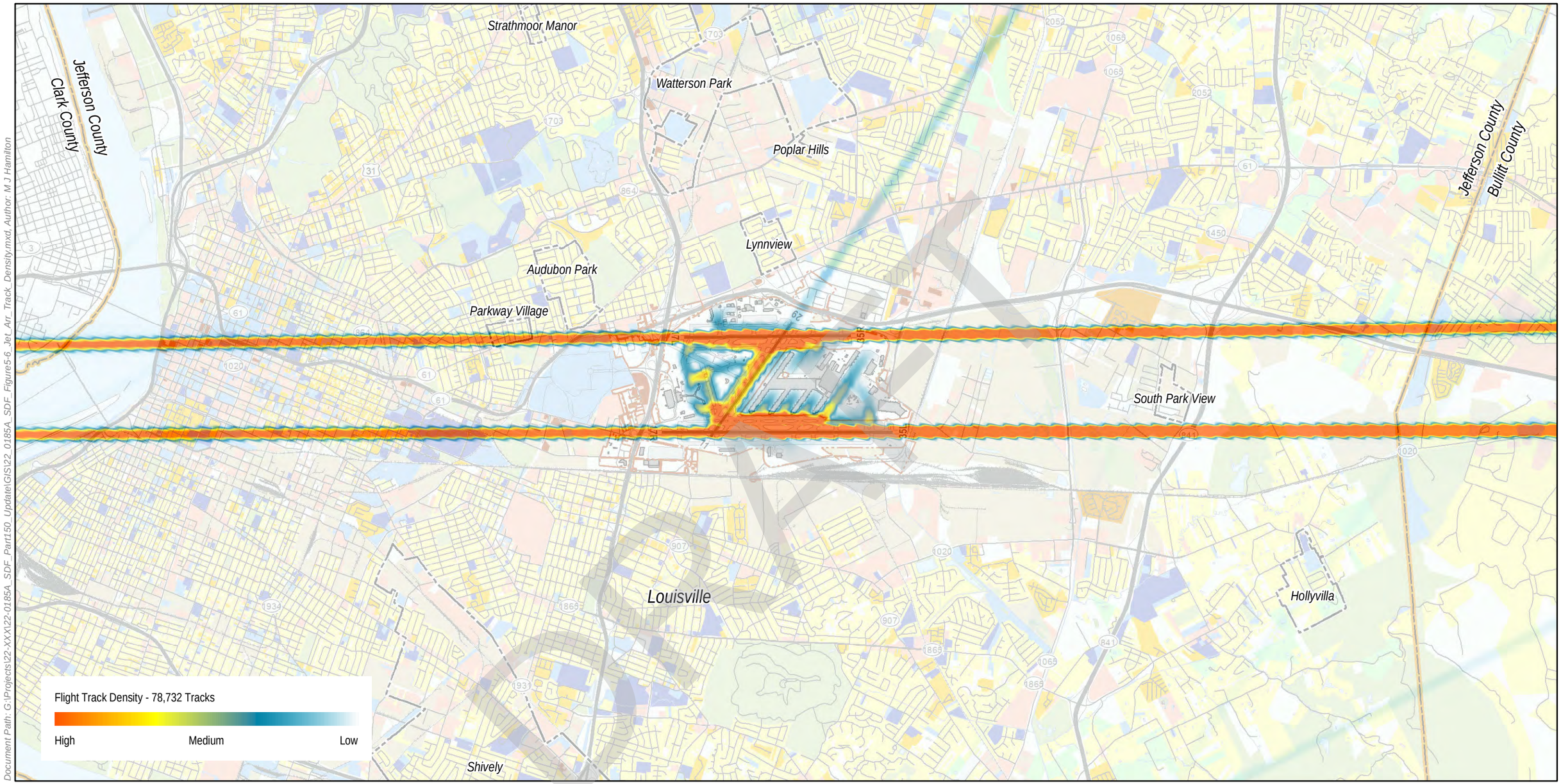
0 4,000 8,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-5

Helicopter Arrival and Departure Flight Tracks

hmmh



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Legend

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
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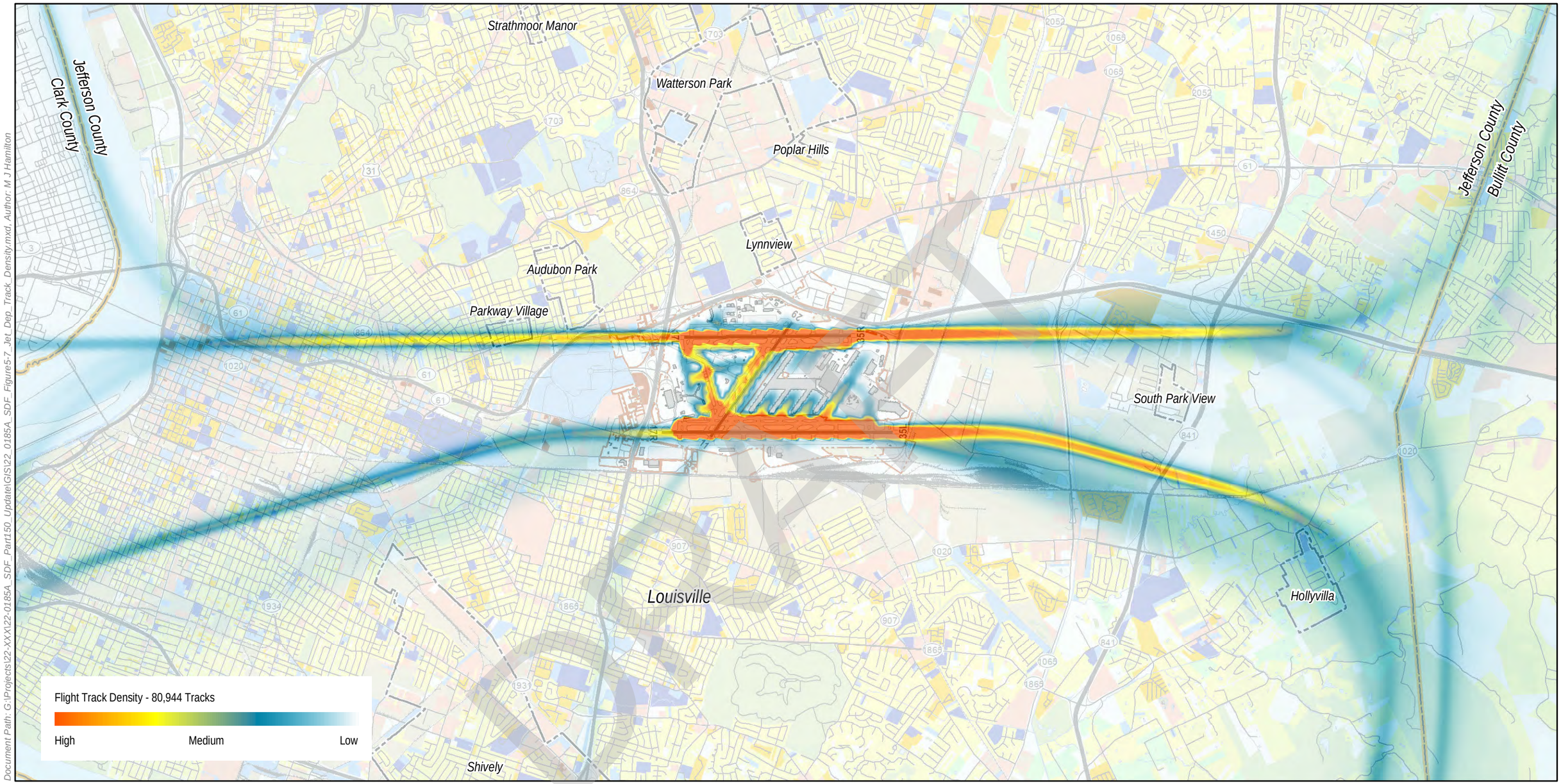
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 4,000 8,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-6

Jet Arrival Flight Track Density Plot



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Legend

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
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- Single Family Residential
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- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 4,000 8,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-7

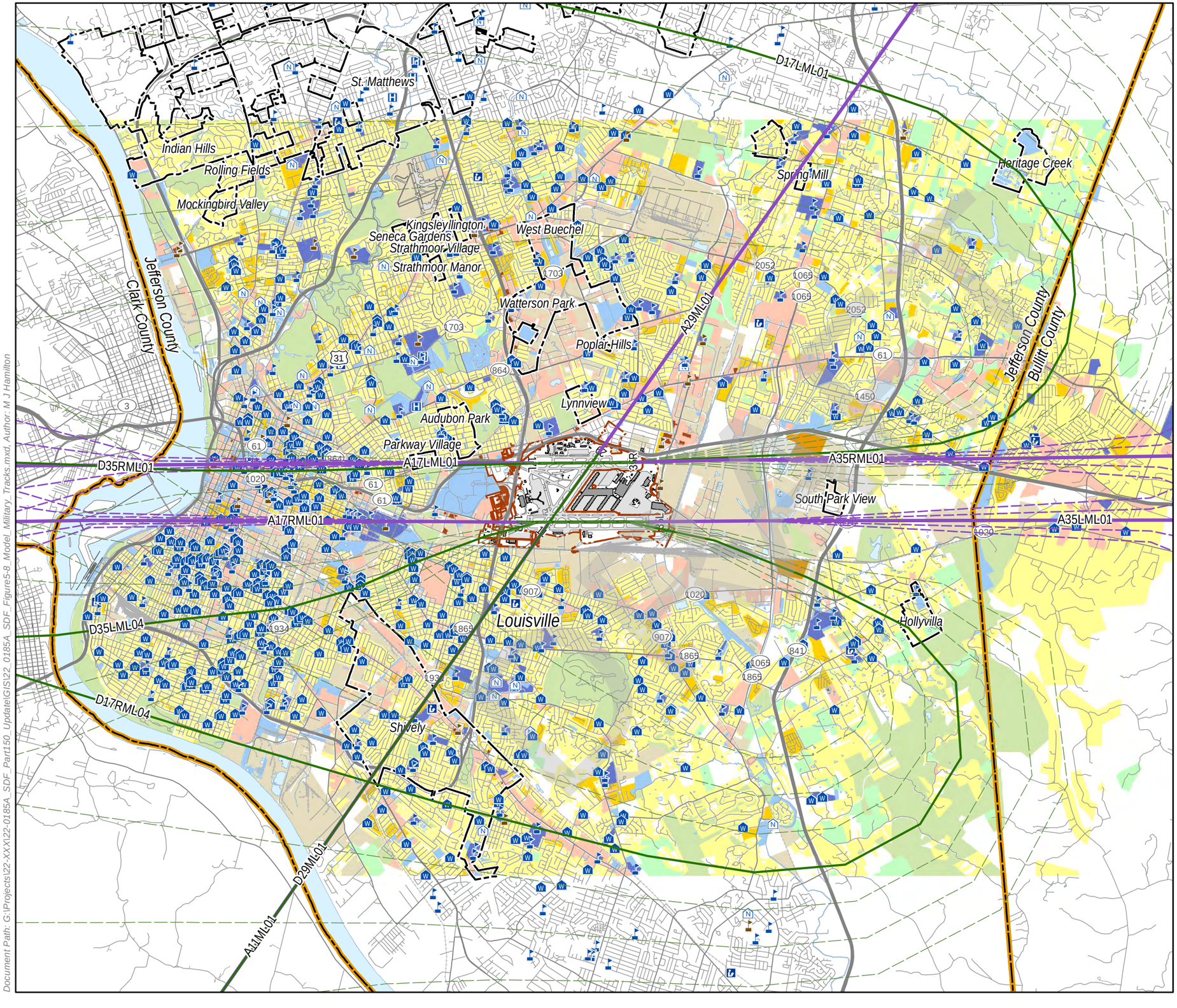
Jet Departure Flight Track Density Plot

hmmh

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-8

Military Arrival and Departure Flight Tracks



Legend

- Military Arrival Backbone Track
- Military Arrival Dispersed Track
- Military Departure Backbone Track
- Military Departure Dispersed Track
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 8,000 16,000 Feet

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5.5.3 Flight Tracks for New PBN Procedures

Using FAA Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS) data, the Study Team built departure model tracks for each of the new FAA procedures implemented in 2024. All existing departure flights which follow existing PBN procedures, and all UPS nighttime departure flights were assigned to one of the sets of flight tracks representing the new PBN procedures. The remaining departure flights were modeled for the 2029 Forecast Condition using the same actual tracks as the Existing Condition.

Under the modeled Existing Conditions, there are four FAA departure procedures at SDF. In the NOMS data analysis, the study team grouped the departure flight tracks which followed one of those four procedures and tagged them with the procedure name. There are seven new FAA departure procedures at SDF which, for noise modeling purposes, formed four model track bundles due to geometric similarity within the study area. Each of the four model track bundles corresponds to an existing FAA departure procedure based on the direction of the final destination. Track usage for the forecast conditions modeling was then calculated according to the proportions of flight tracks using the existing procedures.

- Eastbound SDF departures use track bundle 'EEVAA'
- Westbound SDF departures use track bundle 'GTGON/LLIZY'
- Southbound SDF departures use track bundle 'HIDEY/LOKRD'
- Northbound SDF departures use track bundle 'RDHSE/SPILR'

Table 5-11 presents the departure model track use summarized by category, time of day, and model track bundle. **Figure 5-9**, **Figure 5-10,** and **Figure 5-11** show the departure tracks modeled for the Forecast Condition in north, south, and crosswind directional flows, respectively. The solid and dashed blue tracks indicate backbone and dispersed model tracks built to represent the new PBN procedures for the Forecast Condition. The new model tracks replace the Existing Condition flight tracks which follow existing PBN procedures; all operations which would have been applied to the replaced NOMS tracks have been assigned proportionally to the new model PBN tracks. All modeled UPS nighttime departure flights are also assigned to the new PBN procedure tracks. The green and purple tracks indicate remaining departure flights which were modeled for the Forecast Condition using the same flight tracks as in the Existing Condition.

The FAA's changes to SDF arrival procedures occur outside of the study area, so the same arrival flight tracks modeled for the Existing Condition also represent the arrivals in the Forecast Condition. **Figure 5-12** shows the modeled arrival flight tracks.

Table 5-11. Forecast Condition Departure Model Track Use

Source: FAA TARGETS data, SDF NOMS data, HMMH 2024

Category	Flight Track Group	Daytime Usage						Nighttime Usage					
		Runway						Runway					
		11	17L	17R	29	35L	35R	11	17L	17R	29	35L	35R
Air Carrier - Cargo	EEVAA	--	72.1%	13.0%	21.2%	16.4%	38.0%	--	43.2%	6.7%	16.2%	7.8%	17.8%
	RDHSE/ SPILR	--	7.6%	19.3%	25.1%	37.2%	39.6%	--	29.9%	28.5%	51.4%	35.3%	51.1%
	HIDEY/ LOKRD	--	4.3%	8.7%	19.1%	10.0%	10.2%	--	25.6%	30.6%	29.7%	29.1%	23.3%
	GTGON /LLIZY	--	16.0%	59.0%	34.6%	36.3%	12.2%	--	1.3%	34.2%	2.7%	27.8%	7.8%
	Total	**--**	**100%**	**100%**	**100%**	**100%**	**100%**	**--**	**100%**	**100%**	**100%**	**100%**	**100%**
Air Carrier - Passenger	EEVAA	--	40.5%	30.8%	28.9%	26.6%	31.8%	--	47.2%	43.8%	22.1%	30.2%	46.6%
	RDHSE/ SPILR	--	19.6%	21.0%	19.1%	33.4%	37.0%	--	20.2%	0.0%	38.4%	43.5%	24.8%
	HIDEY/ LOKRD	--	15.7%	10.2%	31.4%	12.3%	13.0%	--	9.2%	50.0%	14.0%	14.1%	14.0%
	GTGON /LLIZY	--	24.2%	38.1%	20.6%	27.7%	18.2%	--	23.3%	6.3%	25.6%	12.2%	14.6%
	Total	**--**	**100%**	**100%**	**100%**	**100%**	**100%**	**--**	**100%**	**100%**	**100%**	**100%**	**100%**
Air Taxi	EEVAA	--	38.2%	23.6%	30.8%	17.1%	24.4%	--	21.1%	0.0%	8.3%	6.3%	48.0%
	RDHSE/ SPILR	--	29.4%	53.2%	25.6%	61.7%	56.2%	--	42.1%	33.3%	33.3%	77.5%	26.0%
	HIDEY/ LOKRD	--	11.3%	13.2%	25.6%	10.9%	8.6%	--	5.3%	33.3%	25.0%	12.5%	8.0%
	GTGON /LLIZY	--	21.1%	10.0%	17.9%	10.4%	10.7%	--	31.6%	33.3%	33.3%	3.8%	18.0%
	Total	**--**	**100%**	**100%**	**100%**	**100%**	**100%**	**--**	**100%**	**100%**	**100%**	**100%**	**100%**
General Aviation	EEVAA	--	43.4%	34.3%	28.6%	27.2%	30.6%	--	50.0%	0.0%	0.0%	22.0%	62.2%
	RDHSE/ SPILR	--	11.9%	25.9%	26.5%	35.9%	33.7%	--	0.0%	33.3%	100.0%	46.3%	15.6%
	HIDEY/ LOKRD	--	16.1%	12.0%	30.6%	13.0%	19.0%	--	0.0%	33.3%	0.0%	17.1%	4.4%
	GTGON /LLIZY	--	28.5%	27.8%	14.3%	23.9%	16.7%	--	50.0%	33.3%	0.0%	14.6%	17.8%
	Total	**--**	**100%**	**100%**	**100%**	**100%**	**100%**	**--**	**100%**	**100%**	**100%**	**100%**	**100%**

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-9

2029 Future Conditions North Flow Departure Flight Tracks (10% Sample)

Legend

- Backbone Model Track
- Dispersed Model Track
- Other North Flow Departure Tracks (35L)
- Other North Flow Departure Tracks (35R)
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 8,000 16,000 Feet

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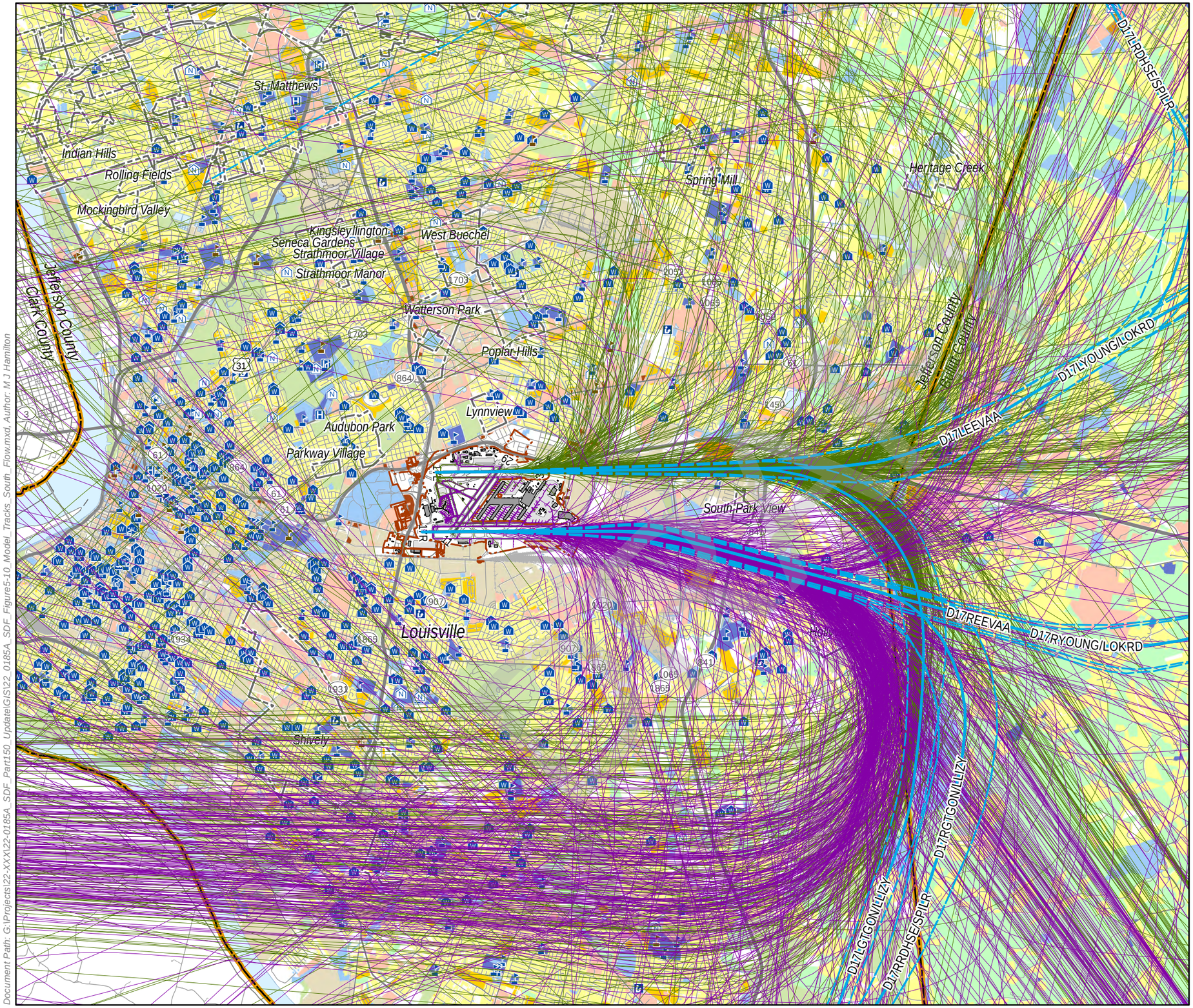

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Figure: 5-10

2029 Future Conditions South Flow Departure Flight Tracks (10% Sample)

Legend

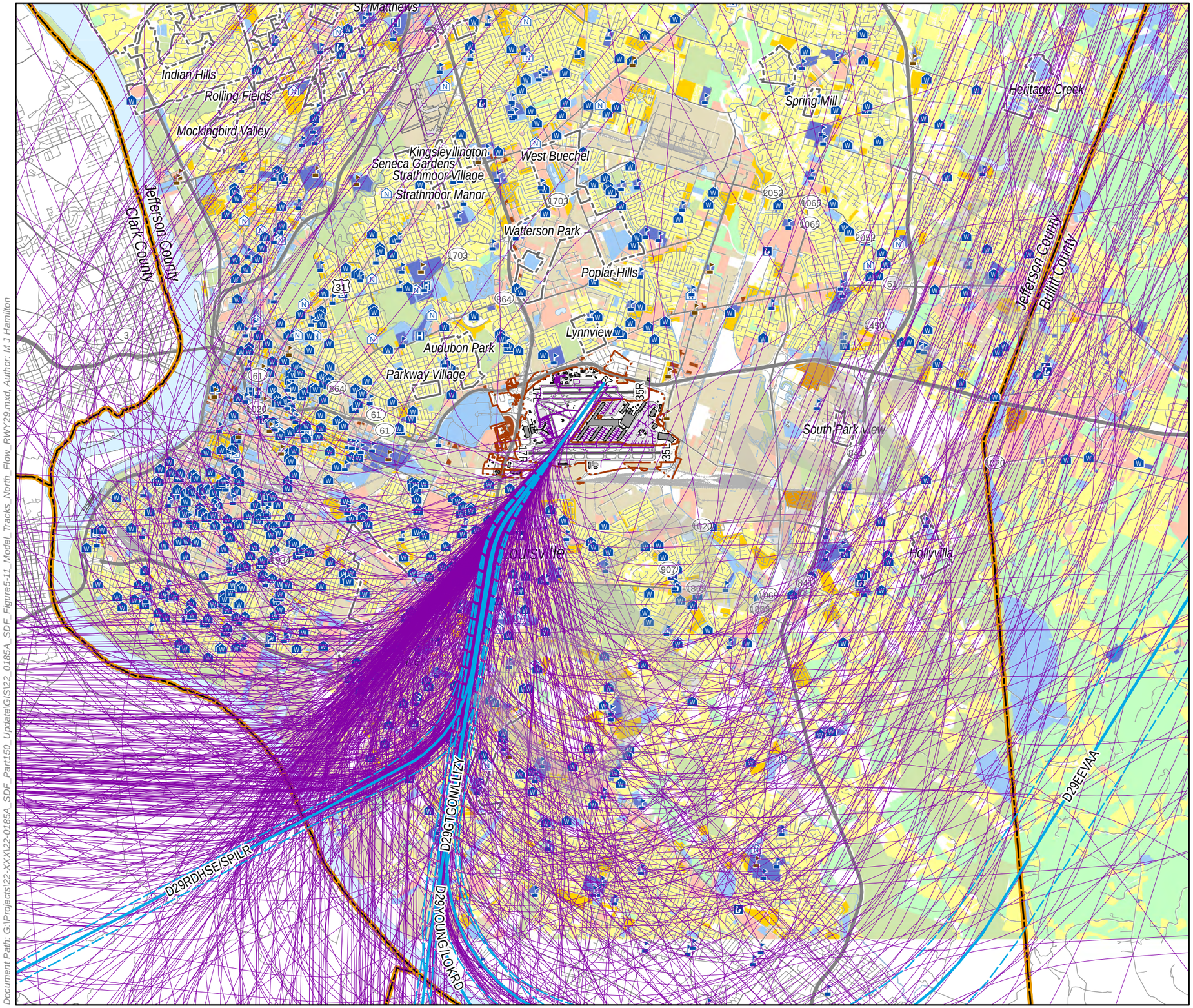
- Backbone Model Track
- Dispersed Model Track
- Other South Flow Departure Tracks (35L)
- Other South Flow Departure Tracks (35R)
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 8,000 16,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-11

2029 Future Conditions Crosswind Runway Flight Tracks



Legend

- Backbone Model Track
- Dispersed Model Track
- Other North Flow Departure Tracks
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
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- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 8,000 16,000 Feet

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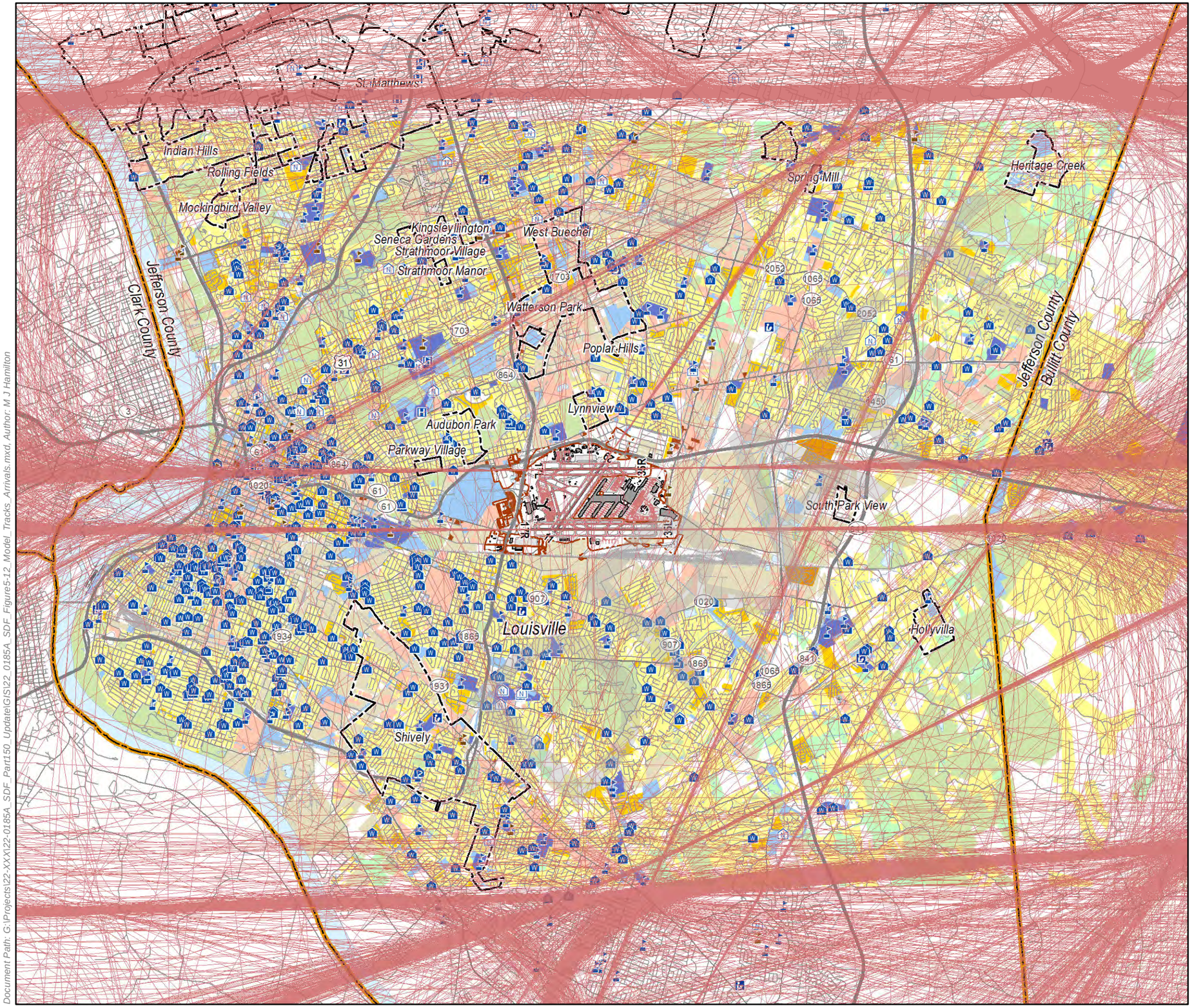
LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 5-12

2029 Future Conditions Arrival Flight Tracks (10% Sample)



Legend

- Arrival Flight Tracks
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
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- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 8,000 16,000 Feet

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5.6 Aircraft Engine Runup Operations

The Study Team collected preflight and maintenance engine runup information from SDF staff which were used to develop ground noise modeling inputs, including:

- Number of daily operations
- Aircraft type
- Location
- Heading
- Power setting
- Duration
- Time, classified as daytime 7:00 a.m. – 10:00 p.m.) or nighttime (10:00 p.m. – 7:00 a.m.)

Modeled runup operations are based on previous NEM runup modeling and input from the KYANG, Republic Airways, UPS, and LRAA. The KYANG runups are solely performed by C130 aircraft, while Republic Airways runups represent a combination of Embraer 170 and Embraer 175 aircraft. Various UPS cargo jets make up the remainder of the modeled runups. **Table 5-12** presents a summary of all modeled runup operations. The same total number of runups were assumed to occur for the 2029 Forecast Condition as for the 2024 Existing Condition, but with changes based on expected cargo fleet composition.

The majority of the KYANG runups (95 percent) are performed on the KYANG ramp to the east of Runway 17L/35R near the intersection of Taxiway E and Taxiway G. The remaining 5 percent of runups are performed on Taxiway G near the south end of the KYANG ramp. Runups performed directly on the KYANG ramp were modeled at a heading of 350 degrees while those performed on Taxiway G on the south end of the ramp were modeled at a heading of 285 degrees. Runups at both locations (marked as R-MIL on **Figure 5-1**) were split into high power (100 percent of thrust) and low power (10 percent of thrust) operations with high power runups being 10 minutes in duration and low power runups being 30 minutes in duration. No nighttime C130 runups were modeled. This data corresponds to approximately 104 KYANG runups per year (one roughly every three days, on average).

Republic Airways maintenance runups were modeled at a location on Taxiway A directly in front of their hangar between exits A4 and A5 (marked as R-MBO on **Figure 5-1**). The runups were modeled at two headings (70 percent at a heading of 170 degrees and 30 percent at a heading of 350 degrees) using 95 percent thrust for a duration of 10 minutes. An average of one daily runup is modeled, with 40 percent during daytime hours and 60 percent during nighttime hours.

Table 5-12. Modeled Engine Runup Operations, 2024 and 2029

Source: HMMH, LRAA, Republic Airways, UPS, KYANG, 2024

Aircraft	Runup Location	Heading (degrees)	Engine Thrust	Duration (seconds)	2024 Existing Condition			2029 Forecast Condition		
					Average Day Ops	Average Night Ops	Annual Total	Average Day Ops	Average Night Ops	Annual Total
C130	R-MIL (north)	350	100%	600	0.271	0	104	0.271	0	104
	R-MIL (north)	350	10%	1800						
	R-MIL (south)	285	100%	600	0.014	0		0.014	0	
	R-MIL (south)	285	10%	1800						
EMB170	R-MBO	170	95%	600	0.054	0.081	365	0.054	0.081	365
	R-MBO	350	95%	600	0.023	0.035		0.023	0.035	
EMB175	R-MBO	170	95%	600	0.226	0.339		0.226	0.339	
	R-MBO	350	95%	600	0.097	0.145		0.097	0.145	
MD11GE	R-CGO	169	73.2%	1,200	0.048	0	469	0.048	0	469
	R-HP	240	100%	1,800	0.046	0		0.019	0	
MD11PW	R-CGO	169	70%	1,200	0.048	0		0.048	0	
	R-HP	240	100%	1,800	0.056	0		0.023	0	
747400	R-CGO	169	73.2%	1,200	0.286	0		0.286	0	
	R-HP	240	100%	1,800	0.026	0		0.029	0	
7478	R-CGO	169	70%	1,200	0.286	0		0.286	0	
	R-HP	240	100%	1,800	0.023	0		0.021	0	
7673ER	R-CGO	169	70%	1,200	0.048	0		0.048	0	
	R-HP	240	100%	1,800	0.217	0		0.286	0	
757RR	R-HP	240	100%	1,800	0.077	0		0.083	0	
A300-62RR	R-HP	240	100%	1,800	0.126	0		0.110	0	

Cargo jet runups were modeled at two locations: one on the northwest side of the airfield adjacent to the end of Runway 17R (labeled R-CGO on **Figure 5-1**), and the other at a midfield location on Taxiway N (labeled R-HP on **Figure 5-1**). Aircraft performing low-power runups on the northwest side of the airfield were modeled at a heading of 169 degrees, such that the engines are facing a blast fence. Runups at this spot were modeled for five aircraft: two MD11 aircraft at 73.2 and 70 percent thrust, two Boeing 747 aircraft at 73.2 and 70-percent thrust, and one Boeing 767 aircraft at 70 percent thrust. Five low-power runup operations per week were modeled at the northwest airfield location, all of which occur during the daytime. Four high-power runups per week were modeled at the midfield location at full thrust for 30 minutes.

5.7 Meteorological Data

AEDT uses meteorological data to adjust aircraft performance and sound propagation based on average weather conditions at SDF. The meteorological parameters include temperature, barometric pressure, relative humidity, and wind speed. The AEDT database includes 10-year average weather (2012 to 2021) from NOAA Integrated Surface Data. These data for SDF are:

- Temperature: 58.6° Fahrenheit (F)
- Station Pressure: 999.66 millibar (mbar)
- Sea Level Pressure: 1017.83 mbar
- Dew point: 46.9° F
- Relative humidity: 65.01%
- Wind speed: 6.94 knots

5.8 Terrain Data

AEDT uses terrain data to adjust the aircraft-to-ground path length. This allows the model to take terrain variation into account at locations where hills or valleys make the ground closer to or farther from the aircraft than they would be under flat-earth conditions. Terrain data were obtained from the United States Geological Survey (USGS)[28] National Elevation Dataset with 1/3 arc second (approximately 33 feet) resolution covering the Study Area.

[28] Terrain data downloaded from USGS website on 12/05/2023 in GeoTIFF format. https://apps.nationalmap.gov/downloader/

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6 2024 and 2029 Noise Exposure Maps

Modeled noise exposure contours represent the fundamental element and outcome of an NEM Update process. Noise contours represent 5-decibel-increments using the DNL metric for both Existing and Forecast conditions. The contours are presented over land use maps depicting the airport layout, local land-use control jurisdictions, major land-use categories, discrete non-residential noise-sensitive sites, and other information as required by Part 150.

This chapter presents the SDF modeled aircraft noise exposure contours for calendar year 2024 (the Existing Condition) and 2029 (the five-year Forecast Condition) and the associated land use compatibility.

6.1 Noise Exposure Map Figures

Figure 6-1 and **Figure 6-2** represent the formal NEMs as submitted herein for FAA acceptance as compliant with Part 150 pursuant to §150.21.[29] As noted in item IV.D of the Part 150 Noise Exposure Maps Checklist, the regulation requires that NEMs depict the 65, 70, and 75 DNL noise contours. **Figure 6-1** and **Figure 6-2** contain all graphical elements that Part 150 requires on NEMs, with the exception of flight tracks, which Part 150 permits airports to submit in supplemental graphics.[30] Consistent with the previous NEM updates at SDF, LRAA has also chosen to calculate and display the DNL 60 dB contours, for informational purposes.

6.2 Comparison of 2024 Existing Condition to 2029 Forecast Condition

Figure 6-3 depicts the existing and forecast conditions contours together for ease of visual comparison. The modeling assumptions for each of the contour sets are documented in Chapter 5 of this document. The main differences contributing to changes in the contours from the 2024 to the 2029 conditions are the level and mix of aircraft operations and the introduction of the FAA's new departure PBN procedures. The comparison shows noise increases at the northern and southern extents of the contours attributable to the additional operations expected in the Forecast Condition and changes in the contour shape along the western side, particularly to the southwest, attributable to the airspace changes.

[29] Large-scale printed versions of these figures showing the Official Noise Exposure Maps, Figures 6-1 and 6-2, are provided in the back pocket of the printed copies of this document. The scale on those figures is 1 inch to 2,000 feet, which is the minimum scale as required by §A150.103(b)(1) of Part 150.

[30] Large-scale flight track figures (printed at 1 inch to 2,000 feet) will also be provided in the back pocket of the printed copies of the final draft of this document.

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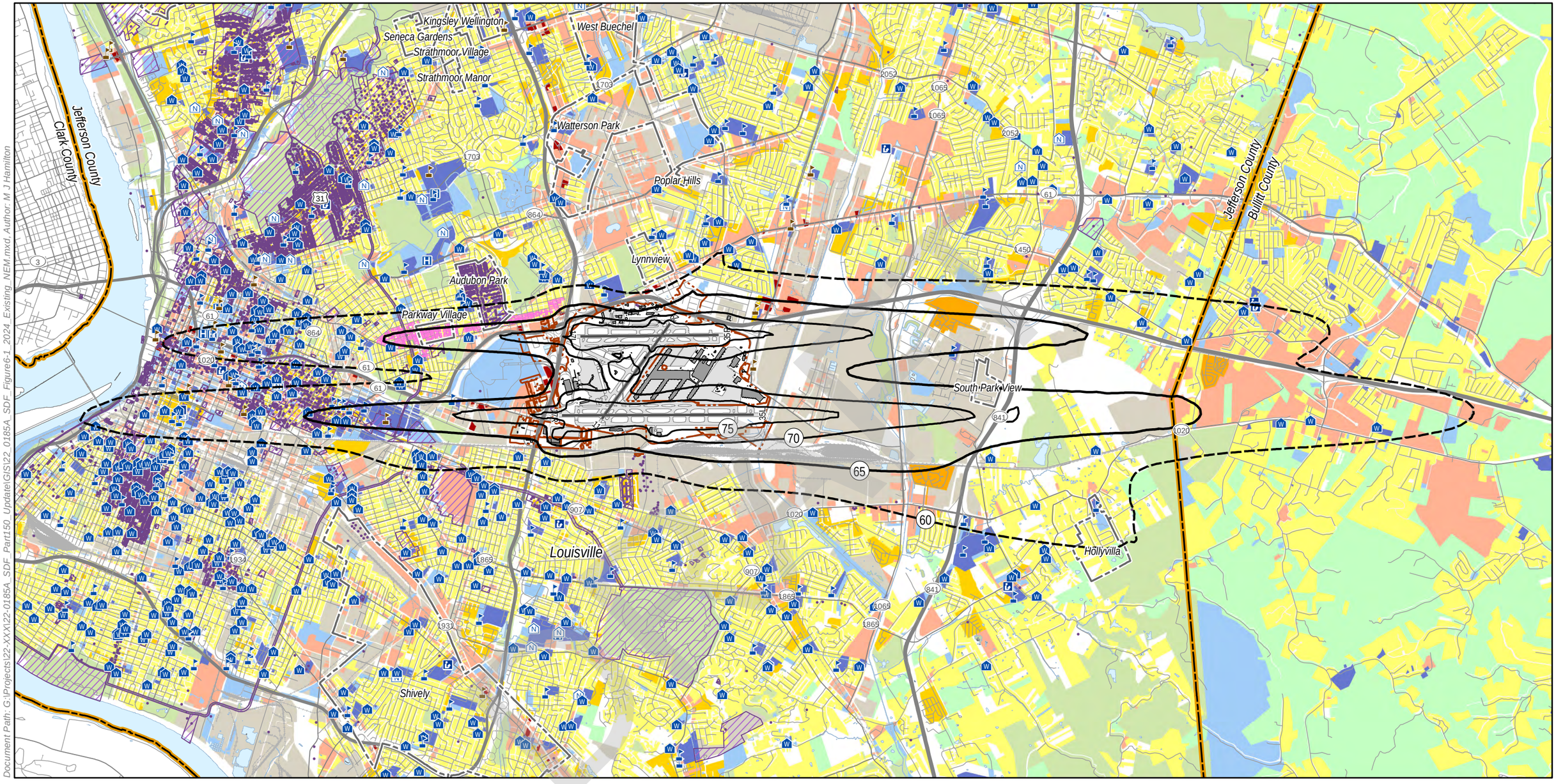

Legend

- 2024 Existing DNL Contour (60 dB)
- 2024 Existing DNL Contour (65-75 dB)
- Sound Insulation Completed
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
- Historic District
- Non-District Historic Site
- Water / Wetland
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 6,000 12,000 Feet

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Figure: 6-1

Existing Condition (2024) Noise Exposure Map

hmmh

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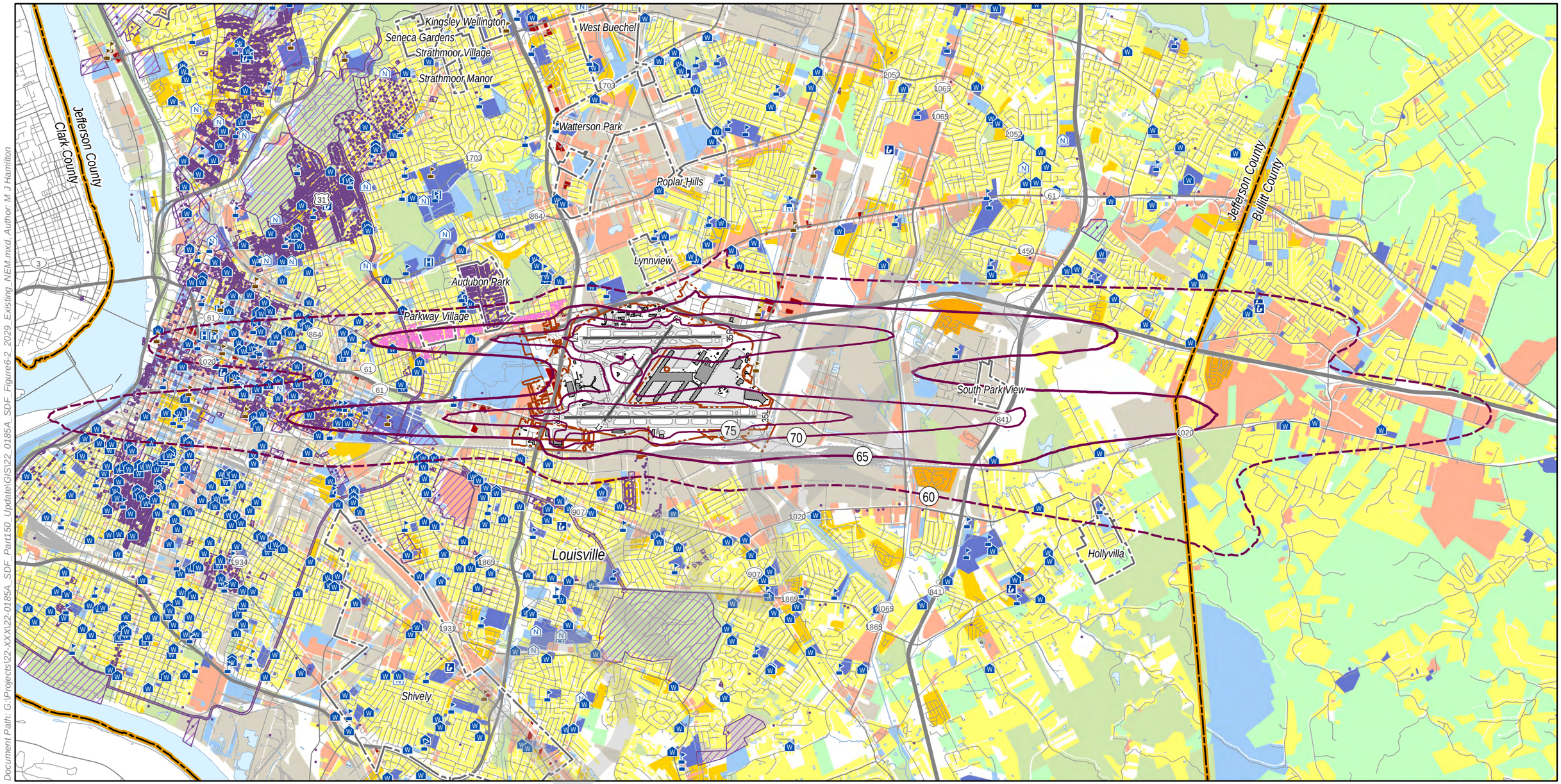

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Legend

- 2029 Forecast DNL Contour (60 dB)
- 2029 Forecast DNL Contour (65-75 dB)
- Sound Insulation Completed
- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad
- College/University
- Schools
- Hospital
- Nursing Home
- Library
- Place of Worship
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- Non-District Historic Site
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- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Agriculture
- Open Space / Cemeteries / Recreation
- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 6,000 12,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 6-2

Forecast Condition (2029) Noise Exposure Map

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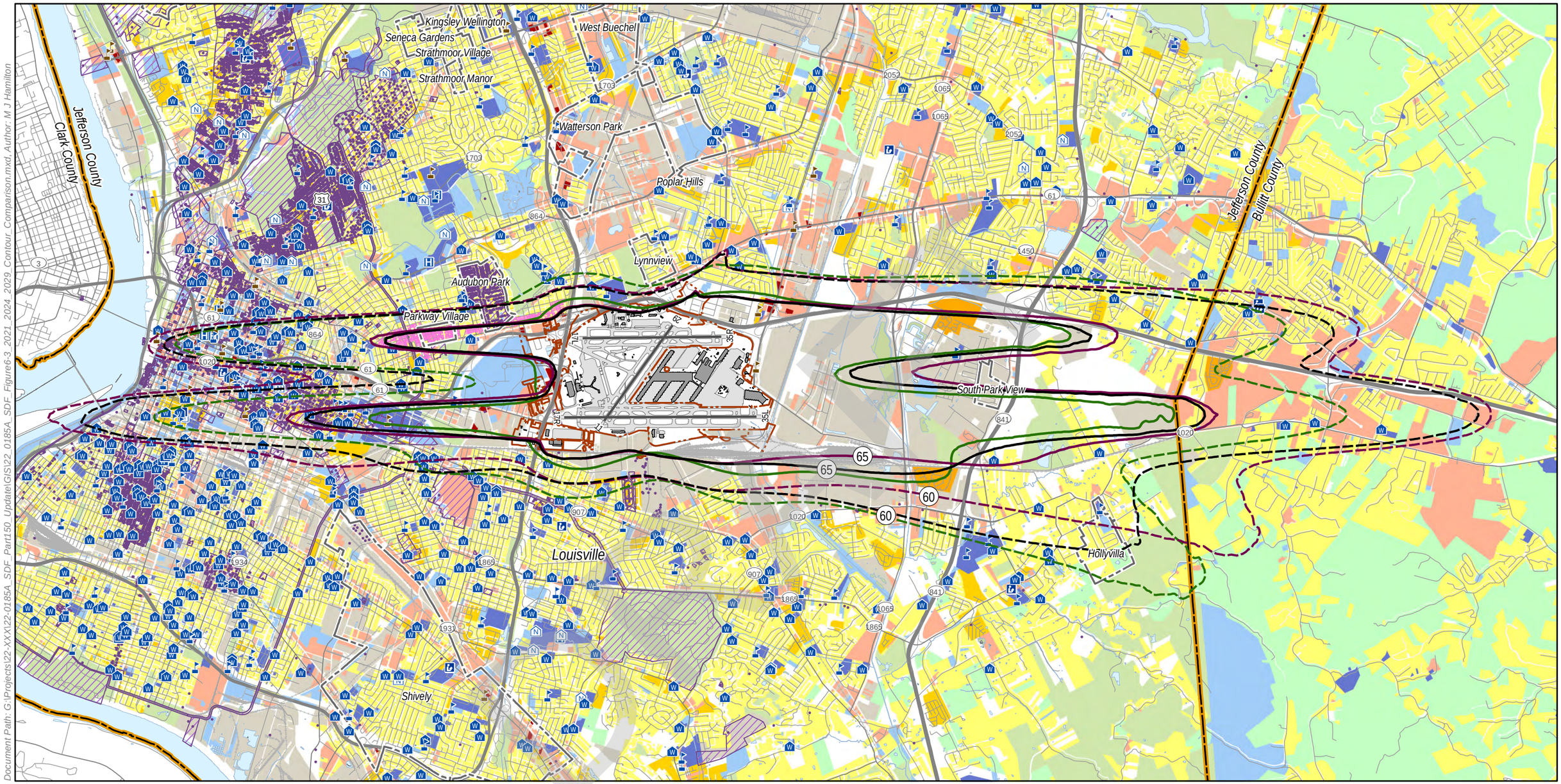

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Legend

- Existing Condition (2024) DNL Contour (60 dB)
- Existing Condition (2024) DNL Contour (65 dB)
- Forecast Condition (2029) DNL Contour (60 dB)
- Forecast Condition (2029) DNL Contour (65 dB)
- Sound Insulation Completed
- Previous NEM Forecast Condition (2021) Contour (60 dB)
- Previous NEM Forecast Condition (2021) Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Expressway
- Arterial
- Collector
- Local
- Railroad

- College/University
- Schools
- Hospital
- Nursing Home
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- Non-District Historic Site
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- Single Family Residential
- Multi-Family Residential
- Mobile Home
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- Public Use 2 (Compatible)
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- Commercial Use
- Manufacturing, Production and Utility
- Vacant / Undefined

0 6,000 12,000 Feet

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 6-3

Comparison of DNL Contours

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Table 6-1 provides a comparison of the acreage enclosed within each 5-decibel contour interval for the 2024 Existing Condition and the five-year Forecast (2029). The bottom two lines of the table sum the areas within the DNL 60 dB contours and within the DNL 65 dB contours, respectively.

Table 6-1. Comparison of Land Area within the 2024 and 2029 DNL Contours

Source: HMMH, 2024

Contour Interval	Area (Acres)		Percent Change
	2024 Existing Condition	2029 Forecast Condition	
60-65 DNL	11,683.35	12,277.80	5.1%
65-70 DNL	4,997.70	5,413.00	8.3%
70-75 DNL	1,685.87	1,868.04	10.8%
> 75 DNL	959.38	1,003.30	4.6%
Total 60+	**19,326.30**	**20,562.14**	**8.4%**
Total 65+	**7,642.95**	**8,284.34**	**6.4%**

6.3 Comparison of 2024 Existing Condition DNL Contours to Forecast Contours from the 2016 NEM Update

The previous Part 150 Noise Exposure Map Update for SDF was submitted in 2016 and included a 2016 Existing Condition contour and a 2021 Forecast contour. The now-outdated 2021 Forecast NEM, shown on **Figure 6-3** differs in several ways from the 2024 Existing Condition NEM. Along the sidelines of the parallel runways, the 2024 Existing Condition DNL 65 contour is slightly narrower than the corresponding 2021 Forecast contour. This narrowing is due to the departure flight profiles used to model cargo jet aircraft.

The differences between the 2024 NEM Existing contour and 2021 NEM Forecast contour are greatest along both extended runway centerlines to the south of the airport and along the extended centerline of Runway 17R/35L on the north side of the airport. The increased contour size in those three areas is primarily due to increases in the number of aircraft operations, particularly cargo jet operations which predominantly use Runway 17R/35L.

There is also a change in the contour shape to the southwest, relating to Runway 17R departures turning to the west. Actual NOMS flight tracks formed the basis of the noise modeling for the 2021 Forecast in the 2016 NEM Update as they do for the 2024 Existing Condition. The flight track data indicate that fewer departing aircraft made the early right turn in the year-long data sample (2022-23) used for the current NEM update than did in calendar year 2015. The increase in aircraft equipped with RNAV and flying the RNAV procedure, particularly during nighttime hours are the likely reason.

6.4 Land Use Compatibility within the 2024 and 2029 Noise Exposure Maps

As required under Part 150, **Table 6-2** provides a land use compatibility analysis, including estimations of the population and housing units and identification of noise sensitive parcels exposed to DNL greater

than 65 dB. The FAA considers all land uses to be compatible with aircraft-related DNL Levels below 65 dB (i.e., outside the DNL 65 contour). **Table 6-2** shows that 2,677 residential units (1,075 single-family houses and 1,602 multi-family units) are potentially incompatible with noise from SDF aircraft operations under the 2029 Forecast Condition. The increase in the estimated number of housing units within the contours is a result of the growth of the noise contours from existing conditions to forecast conditions. In the area to the southwest side of the airport where the shape of the DNL 65 contour changes, some homes are removed from the tally while others are newly included.

Table 6-2. Estimated Residential Population within Existing (2024) and Forecast (2029) DNL Contours

Sources: US Census 2020 and HMMH analysis, 2024

Contour Interval	Estimated Population	Estimated Single Family Units	Estimated Multi-Family Units	Estimated Total Housing Units	Sound Insulated Housing Units	Estimated Incompatible Housing Units
2024 Existing Condition						
65-70 DNL	4,166	761	1,236	1,997	436	1,561
70-75 DNL	35	0	24	24	0	24
> 75 DNL	0	0	0	0	0	0
Total	**4,201**	**761**	**1,260**	**2,021**	**436**	**1,585**
2029 Forecast Condition						
65-70 DNL	5,286	1,075	1,565	2,640	529	2,111
70-75 DNL	54	0	37	37	0	37
> 75 DNL	0	0	0	0	0	0
Total	**5,340**	**1,075**	**1,602**	**2,677**	**529**	**2,148**

Note: Population and housing units estimated using 2020 US Census data

Residential population and housing unit count estimates were calculated using Louisville parcel data and 2020 U.S. Census data. The process estimated the population and housing units within the contours by:

- Overlaying existing parcel boundary land use maps onto the 2020 US Census Blocks[31] mapping.
- Integrating Census blocks outlines and residential land use data, developing polygons within each block with higher population and housing unit values. This method ensures that population estimates accurately reflect actual residential areas rather than sparsely populated or undeveloped regions. For example, in some areas, the population may be concentrated along roads rather than spread across large tracts of open land.
- Determining a "population factor" (number of people per household) based on the 2020 US Census Blocks for the affected area. For the census blocks within or intersecting the updated SDF DNL 65 contours, the calculated population factor is 1.92 people per household.
- Using Geographic Information Systems (GIS) tools, intersecting the noise contour intervals (65-70, 70-75, >75) with the "Residential/Census" data polygons. The GIS tools calculated the proportion of each polygon within each contour level which allows the analyst to estimate the residential population and housing unit counts for each noise interval.

[31] Census blocks are the smallest counting unit in the census data

- Using GIS mapping of the homes treated in SDF's residential sound insulation program, estimating the number of residences to be counted as compatible or incompatible with aircraft noise.

As described in Section 4.2, the existing Noise Compatibility Program at SDF includes multiple land use measures which address compatibility in areas of high noise exposure. Noise sensitive land uses which have received noise abatement treatment (such as sound insulation) are then considered compatible. **Table 6-2** indicates the number of residential properties which have been treated in each contour interval of the updated NEMs. As of August 30, 2024, there have been 764 total residential units mitigated through sound insulation.

Table 6-3 summarizes the non-residential noise-sensitive parcels[32] which are potentially incompatible under the 2029 Forecast Condition. Compatibility for schools and places of worship are often assessed under additional analysis which considers their hours of operation and the noise from flights which typically occur during those time frames, as opposed to using DNL. Any residential properties listed in **Table 6-3** that are included on the National Register of Historic Places are also counted in the associated housing units and population estimates shown in **Table 6-2**.

Table 6-4 and **Table 6-5** provide a detailed listing of the properties counted in **Table 6-3**. **Table 6-4** lists educational facilities, places of worship, and historic districts. **Table 6-5** provides names and locations for each of the historic properties identified as being exposed to DNL 65 or greater for the 2024 Existing Condition or the 2029 Forecast Condition.

Table 6-3. Summary of Noise-Sensitive Sites Exposed to DNL 65 or greater

Sources: LOJIC Data and HMMH Analysis, 2024

Contour Interval	Schools		Places of Worship		Historic Districts		Historic Properties	
	2024	2029	2024	2029	2024	2029	2024	2029
65-70 DNL	5	7	4	6	4	4	94	198
70-75 DNL	--	1	--	--	--	--	1	2
> 75 DNL	--	--	--	--	--	--	--	--
Total	**5**	**8**	**4**	**6**	**8**	**11**	**95**	**200**

[32] Data sources for Schools and Historic properties is the Louisville/Jefferson County Information Consortium (LOJIC)
Historic properties: https://data.lojic.org/datasets/02b
Historic Districts, National Register of Historic Places: https://data.lojic.org/datasets/1ad
Schools: https://data.lojic.org/datasets/dd1
Places of Worship were updated from the 2016 NEM using Google Search

Table 6-4. Educational Facilities and Places of Worship Exposed to DNL 65 or greater

Source: LOJIC Data and HMMH Analysis, 2024

Noise Sensitive Facility	DNL Contour Interval	
	2024	2029
Schools/Educational Facilities		
Minors Lane Elementary School, 8510 Minor Lane, Louisville	65-70 DNL	65-70 DNL
Noe Middle School, 121 W Lee Street, Louisville	65-70 DNL	65-70 DNL
*Dupont Manual High School, 120 W Lee Street, Louisville	65-70 DNL	65-70 DNL
Embry-Riddle Aeronautical University, 300 High Rise Dr #392, Louisville	65-70 DNL	70-75 DNL
*University of Louisville - Belknap Campus, 2301 S 3rd Street, Louisville	65-70 DNL	65-70 DNL
Cochran Elementary School, 500 W Gaulbert Avenue, Louisville		65-70 DNL
Churchill Park School, 435 Boxley Avenue, Louisville		65-70 DNL
Youth Performing Arts School (Sam Meyers Hall), 1517 S 2nd Street, Louisville		65-70 DNL
Places of Worship		
West End Baptist Church, 1400 S 4th Street, Louisville	65-70 DNL	65-70 DNL
Family Worship Center, 1621-23 S 4th Street, Louisville	65-70 DNL	65-70 DNL
Third Avenue Baptist Church, 1726 S 3rd Street, Louisville	65-70 DNL	65-70 DNL
Fourth Presbyterian Church, 3016 Preston Highway, Louisville	65-70 DNL	65-70 DNL
Central Church of Christ, 2101 S Shelby Street, Louisville		65-70 DNL
Bethel Missionary Baptist Church, 1403 S Park Rd, Fairdale		65-70 DNL
Historic Districts		
Audubon Park Historic District	65-70 DNL	65-70 DNL
Olmsted Parks Easter Parkway	65-70 DNL	65-70 DNL
Old Louisville Residential District & Expansion	65-70 DNL	65-70 DNL
St. James-Belgravia Historic District	65-70 DNL	65-70 DNL
*Property is also listed on the National Register of Historic Places		

Table 6-5. Historic Properties Exposed to DNL 65 or greater

Source: LOJIC Data and HMMH Analysis, 2024

Property Name and Location	DNL Contour Interval		Property Name and Location	DNL Contour Interval	
	2024	2029		2024	2029
Rose Court Cottages (11), Rose Court	65-70 DNL	65-70 DNL	John W Buchanan House, 414 Belgravia Ct	65-70 DNL	65-70 DNL
Apartments, 414-418 Fountain Ct (3)	65-70 DNL	65-70 DNL	Joseph Werne House, 1468S Fourth St	65-70 DNL	65-70 DNL
House (65) - addresses in end notes	65-70 DNL	65-70 DNL	Joshua B J Breed House, 1432 St James Ct		65-70 DNL
House (29) - addresses in end notes		65-70 DNL	Juliet B Brown House, 513 Belgravia Ct		65-70 DNL
Adath Israel Cemetery, 2716 Preston Hwy	65-70 DNL	65-70 DNL	KY ANG Arch. Site, Thoroughbred Express Blvd		65-70 DNL
Alexis I Dupont, 1419 S Fourth St		65-70 DNL	Kentucky Wagon Works, 2601 S Third St	65-70 DNL	65-70 DNL
Alhoa Apts., 424 Kensington Ct	65-70 DNL	65-70 DNL	Kenneth McDonald Sr House, 1428 St James Ct	70-75 DNL	70-75 DNL
Armory, 3001 Crittenden Dr	65-70 DNL	65-70 DNL	Landward House, 1385 S 4th St		65-70 DNL
Augustus E Willson House, 1423 S 4th St		65-70 DNL	Lenis S McMurtry House, 1431 St James Ct	65-70 DNL	65-70 DNL
Barker, Henry S, 1468 St James Ct		65-70 DNL	Levy, Henry House, 1456 St James Ct		65-70 DNL
Belknap Playhouse, 1911 S 3rd St	65-70 DNL	65-70 DNL	Logan C Murray House, 417 Belgravia Ct	65-70 DNL	65-70 DNL
Benjamin S Weller House, 410 Belgravia Ct	65-70 DNL	65-70 DNL	Louis K Ferguson House, 514 Belgravia Ct		65-70 DNL
Bennet H Young House, 1362 S Sixth St		65-70 DNL	Louisville Fire Brick Co Cmplx, 4500 Louisville Rd	65-70 DNL	65-70 DNL
Casino, The, 1473 St James Ct	65-70 DNL	65-70 DNL	Mary A Cotell House, 1432 S Fourth St	65-70 DNL	65-70 DNL
Charles Shreve Residence, 1422 S 3rd		65-70 DNL	Mary A Park House, 1419 S Sixth St		65-70 DNL
Charles W Buck House, 1466 St James Ct		65-70 DNL	Milton Apartments, The, 1415 St James Ct	65-70 DNL	65-70 DNL
Commercial Building, 3000 Crittenden Dr	65-70 DNL	70-75 DNL	Navarre Apartments, 1524 S Second St	65-70 DNL	65-70 DNL
Compton-Cawein House, 1436 St James Ct		65-70 DNL	Ormond H Irvine House, 508 Belgravia Ct		65-70 DNL
Delozier Moxley House, 409 Belgravia Ct	65-70 DNL	65-70 DNL	Parfett Apartments, 1478 St James Ct		65-70 DNL
Dupont Cottage House, 1418 St James Ct		65-70 DNL	Plaza Apartments, The, 1481 St James Ct	65-70 DNL	65-70 DNL
Dupont Manual High School, 120 W Lee St	65-70 DNL	65-70 DNL	Reedmer Apartments, 417 Kensington Ct	65-70 DNL	65-70 DNL
Edmund F Trabue House, 1419 St James Ct	65-70 DNL	65-70 DNL	Ridgely-Eaches House, 510 Belgravia Ct		65-70 DNL
Elizabeth Sutfield House, 1452 St James Ct		65-70 DNL	Ridgely-Eaches House, 512 Belgravia Ct		65-70 DNL
Emil S Tachau House, 1453 St James Ct	65-70 DNL	65-70 DNL	Robert Tucker House, 507 Belgravia Ct		65-70 DNL
Emma Wintersmith House, 411 Belgravia Ct	65-70 DNL	65-70 DNL	Royal Apartments, 1530 S Fourth St	65-70 DNL	65-70 DNL
Everson-Clark House, 1614 S Third St	65-70 DNL	65-70 DNL	Russell M Hughes Duplex, 1439 St James Ct	65-70 DNL	65-70 DNL
Fink, Herbert House, 1701 S Third St	65-70 DNL	65-70 DNL	Southern K Danie House, 504 Belgravia Ct		65-70 DNL
Fountain Apartment, 1441 S Fourth St	65-70 DNL	65-70 DNL	Speed, J B Art Museum, 2035 S Third St	65-70 DNL	65-70 DNL
Frank M Lampton House, 1440 St James Ct		65-70 DNL	St James Apartments, 1433 St James Ct	65-70 DNL	65-70 DNL
Gale Young Rice House, 1444 St James Ct		65-70 DNL	St Paul Episcopal Church, 1400 S Fourth St	65-70 DNL	65-70 DNL
George R Washburne House, 1430 S 4th St	65-70 DNL	65-70 DNL	Straus House, 1464 S Third St	65-70 DNL	65-70 DNL
George Todd House, 1459 St James Ct	65-70 DNL	65-70 DNL	Theophilus Conrad House, 1402 St James Ct		65-70 DNL
Goodwin, E F House, 420 Belgravia Ct	65-70 DNL	65-70 DNL	Third Avenue Baptist Church, 1726 S Third St	65-70 DNL	65-70 DNL
Graham Vreeland House, 1424 S Fourth St	65-70 DNL	65-70 DNL	Thomas H Slaughter House, 1445 St James Ct	65-70 DNL	65-70 DNL
Grauman Oppenheimer Hse, 1411 St James Ct	65-70 DNL	65-70 DNL	University of Louisville Library, 2300 E 1st St	65-70 DNL	65-70 DNL
Gray, Henry O House, 1460 St James Ct		65-70 DNL	W Irving McNair House, 1449 St James Ct	65-70 DNL	65-70 DNL
Harriet Bijur House, 405 Belgravia Ct	65-70 DNL	65-70 DNL	Walden Place (Apartments), 1726 S Second St	65-70 DNL	65-70 DNL
Harry S Gilmore House, 416 Belgravia Ct	65-70 DNL	65-70 DNL	Werne House, 1470 S Fourth St	65-70 DNL	65-70 DNL
Harry V Lucas, 1464 St James Ct		65-70 DNL	Werne House, 1472 S Fourth St	65-70 DNL	65-70 DNL
Hindman Biscoe House, 1424 St James Ct		65-70 DNL	Werne House, 1476 S Fourth St	65-70 DNL	65-70 DNL
Holmhurst Apartments, 409 Kensington Ct	65-70 DNL	65-70 DNL	William A Eubank House, 419 Belgravia Ct	65-70 DNL	65-70 DNL
J Balfour Holloway House, 511 Belgravia Ct		65-70 DNL	William C Garland House, 1425 St James Ct	65-70 DNL	65-70 DNL
John B Wintersmith Hse, 1407 St James Ct	65-70 DNL	65-70 DNL	William C Garland House, 415 Belgravia Ct	65-70 DNL	65-70 DNL
John C Cecil House, 1401 St James Ct	65-70 DNL	65-70 DNL	William H Wathen House, 402 Belgravia Ct	65-70 DNL	65-70 DNL
John C Hughes House, 1463 St James Ct	65-70 DNL	65-70 DNL	William J Dodd Residence, 1448 St James Ct		65-70 DNL
John D Otter House, 1421 St James Ct	65-70 DNL	65-70 DNL	William J Dodd House, 1467 St James Ct	65-70 DNL	65-70 DNL
John H Pearson House, 422 Belgravia Ct	65-70 DNL	65-70 DNL	William Maize House, 406 Belgravia Ct	65-70 DNL	65-70 DNL
John P Starks House, 1412 St James Ct		65-70 DNL	Wyoming Apartments, 1530 S Second St	65-70 DNL	65-70 DNL

Notes: All historic properties listed are in Louisville. 65 properties listed as "House" are in the 65 – 70 DNL interval for both 2024 and 2029: 900 Audobon Pkwy, 907 Audobon Pkwy, 908 Audobon Pkwy, 911 Audobon Pkwy, 915 Audobon Pkwy, 416 Belgravia Ct, 420 Belgravia Ct, 406 Belgravia Ct, 411 Belgravia Ct, 405 Belgravia Ct, 4 Eutropia Ct, 1 Eutropia Ct, 6 Eutropia Ct, 10 Eutropia Ct, 2 Eutropia Ct, 8 Eutropia Ct, 407 Fountain Ct, 408 Fountain Ct, 410 Fountain Ct, 411 Fountain Ct, 409 Fountain Ct, 406 Fountain Ct, 407 Kensington Ct, 408 Kensington Ct, 431 Kensington Ct, 3209 Robin Rd, 3211 Robin Rd, 3213 Robin Rd, 3215 Robin Rd, 3300 Robin Rd, 3302 Robin Rd, 3304 Robin Rd, 3306 Robin Rd, 3308 Robin Rd, 3310 Robin Rd, 3312 Robin Rd, 3314 Robin Rd, 3316 Robin Rd, 1414 S Fourth St, 1416 S Fourth St, 1420 S Fourth St, 1435 S Fourth St, 1436 S Fourth St, 1440 S Fourth St, 1449 S Fourth St, 1451 S Fourth St, 1454 S Fourth St, 1461 S Fourth St, 1629 S Fourth St, 1704 S Second St, 1446 S Third St, 1452 S Third St, 1470 S Third St, 1472 S Third St, 1507 S Third St, 1510 S Third St, 1514 S Third St, 1520 S Third St, 1608 S Third St, 1613 S Third St, 1619 S Third St, 1806 S Third St, 1809 S Third St, 317 W Hill, 319 W Hill
29 properties listed as "House" are in the 65 – 70 DNL interval for 2029 (but not 2024): 912 Audobon Pkwy, 919 Audobon Pkwy, 3217 Robin Rd, 3219 Robin Rd, 3223 Robin Rd, 3318 Robin Rd, 502 Belgravia Ct, 509 Belgravia Ct, 511 Belgravia Ct, 513 Belgravia Ct, 514 Belgravia Ct, 510 Belgravia Ct, 512 Belgravia Ct, 432 Kensington Ct, 501 Park Ave, 1407 S Fourth St, 1411 S Fourth St, 1427 S Fourth St, 1516 S Second St, 1520 S Second St, 1340 S Sixth St, 1429 S Sixth St, 1416 S Third St, 1426 S Third St, 1432 S Third St, 1436 S Third St, 1463 S Third St, 1465 S Third St, 511 W Hill

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7 Supplemental Noise Analyses

The CNF requested supplemental noise analyses beyond the Day-Night Average Sound Level (DNL) metric required under Part 150. The supplemental analysis includes determining the Sound Exposure Level (SEL), which is the noise "dose" from an individual aircraft overflight that takes both the magnitude (loudness) and the duration of the noise event into account. Nationally recognized research correlates SEL to the probability of awakening from noise, as shown in **Figure 7-1**. SEL reflects how the community experiences noise in their environment.

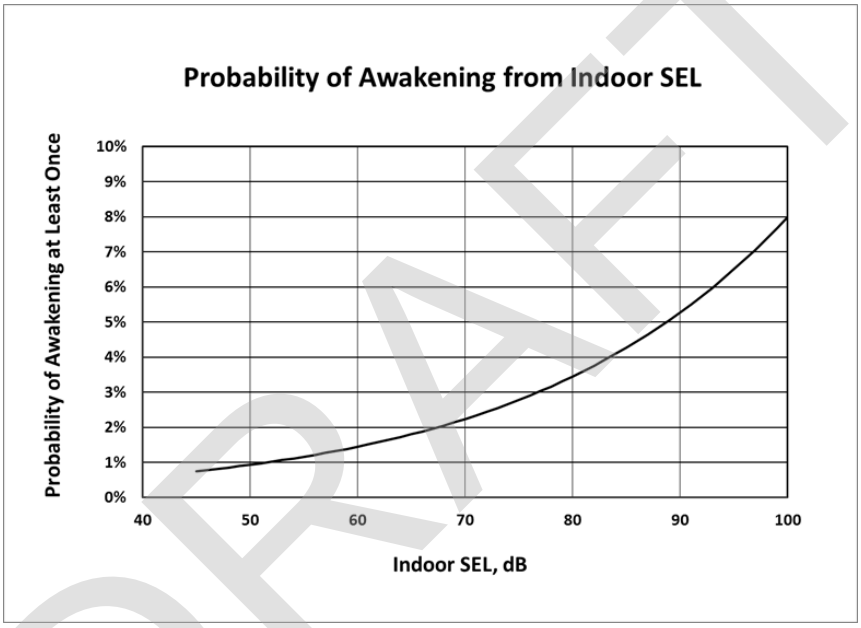

Figure 7-1. Probability of Awakening at Least Once from Indoor Noise Event

Source: American National Standards Institute (ANSI) S12.9-2008/Part 6, Quantities and Procedures for Description and Measurement of Environmental Sound — Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes; Equation 1.

The AEDT noise model inputs for the 2024 Existing Condition NEM were used to calculate the number of aircraft noise events that exceed a given SEL decibel threshold value in a defined timeframe, known as the Number Above (NA). The NA results are displayed using color-coded grid points on a map of the area surrounding the airport. The decibel threshold of 75 dB SEL was selected for this NA analysis. The calculations sum the number of aircraft noise events occurring on the average annual day within the specified time frame that have an outdoor SEL value of 75 dB or greater. Assuming a 15-dB outdoor-to-indoor sound level reduction[33], a 75 dB outdoor event translates to an approximate indoor noise level of 60 dB SEL.

[33] The actual outdoor-to-indoor sound level reduction varies and is influenced by several factors, including whether windows are open or closed and the sound-attenuating qualities of the home's construction.

The Study Team used AEDT to determine the NA results for the following time frames, using the 2024 Existing Condition model inputs that were based on 12 months of data obtained from SDF's Flight Track Monitoring System.

- An average annual 24-hour day
- An average annual night (defined as the 9-hour period from 10:00 p.m. to 7:00 a.m.)
- Each individual 1-hour period during an average annual night
    - 10:00 p.m. – 11:00 p.m.
    - 11:00 p.m. – midnight
    - Midnight – 1:00 a.m.
    - 1:00 a.m. – 2:00 a.m.
    - 2:00 a.m. – 3:00 a.m.
    - 3:00 a.m. – 4:00 a.m.
    - 4:00 a.m. – 5:00 a.m.
    - 5:00 a.m. – 6:00 a.m.
    - 6:00 a.m. – 7:00 a.m.

Figures 7-2 through 7-12 represent the analysis results for each one of these time periods. The first three nighttime hours (10:00 to 1:00) each have more arrivals than departures. Accordingly, the grid points north and south of airport show darker colors along the extended runway centerlines where aircraft align themselves for final approach. The next three hours, from 1:00 to 4:00, have increasing numbers of departures and decreasing numbers of arrivals. As a result, the colored grid points spread out more and darker colors appear. This is more pronounced south of the airport, which is the preferred departure direction in Contraflow. The 4:00 a.m. hour has the most departures (and the most hourly total operations) so it shows the most area covered by grid points with higher-value colors.

The more events over 75 dB experienced during a night, perhaps the higher the chance for at least one awakening from those operations. However, people tend to become accustomed to their noise environment and only awaken when there is an unexpected sound, regardless how loud or quiet the sound.

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Figure: 7-2

Number of Events over 75 dB SEL: Average Annual 24-hour day

Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-3

Number of Events over 75 dB SEL: Average Annual Night
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

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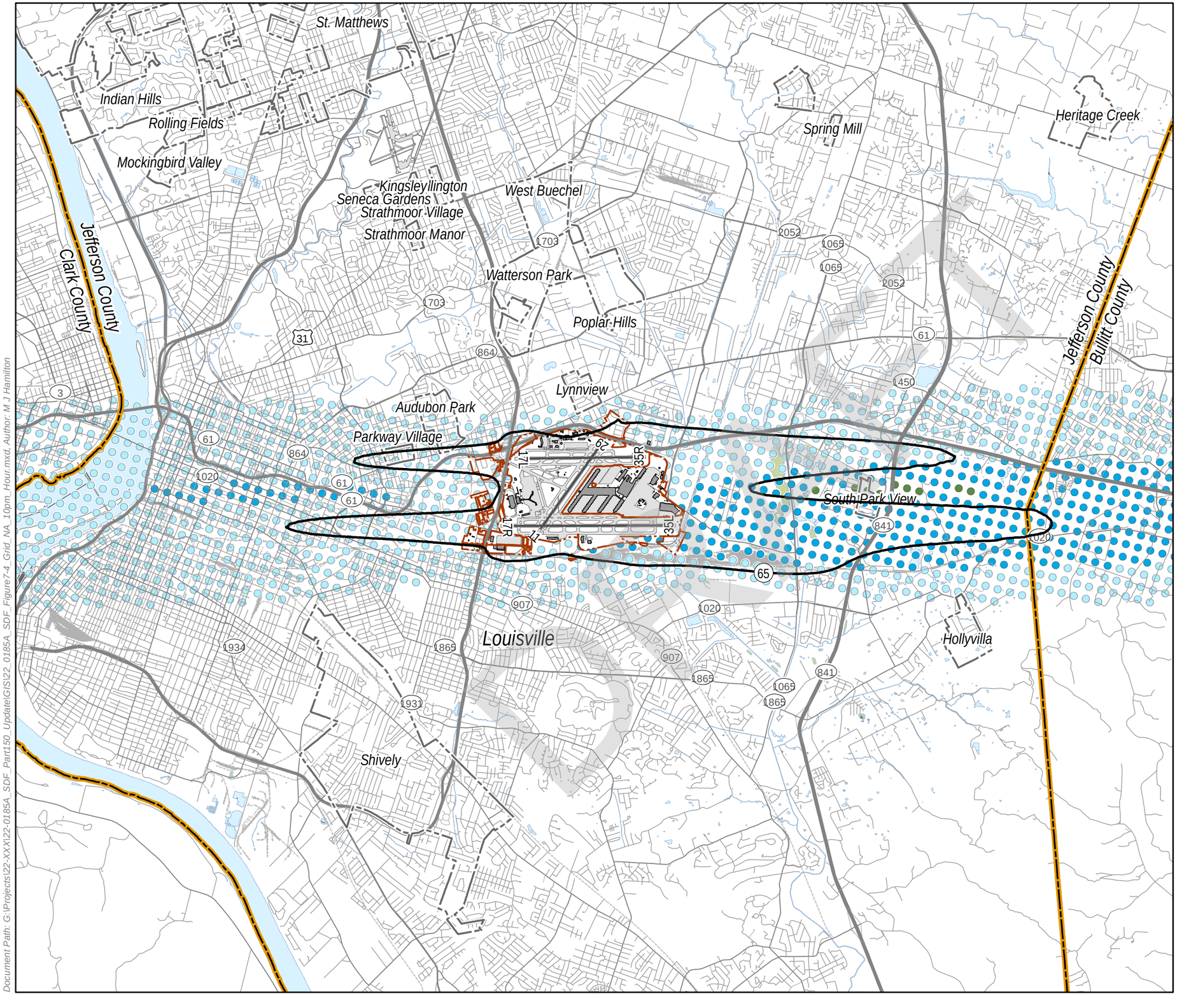

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-4

Number of Events over 75 dB SEL: 10:00 p.m. hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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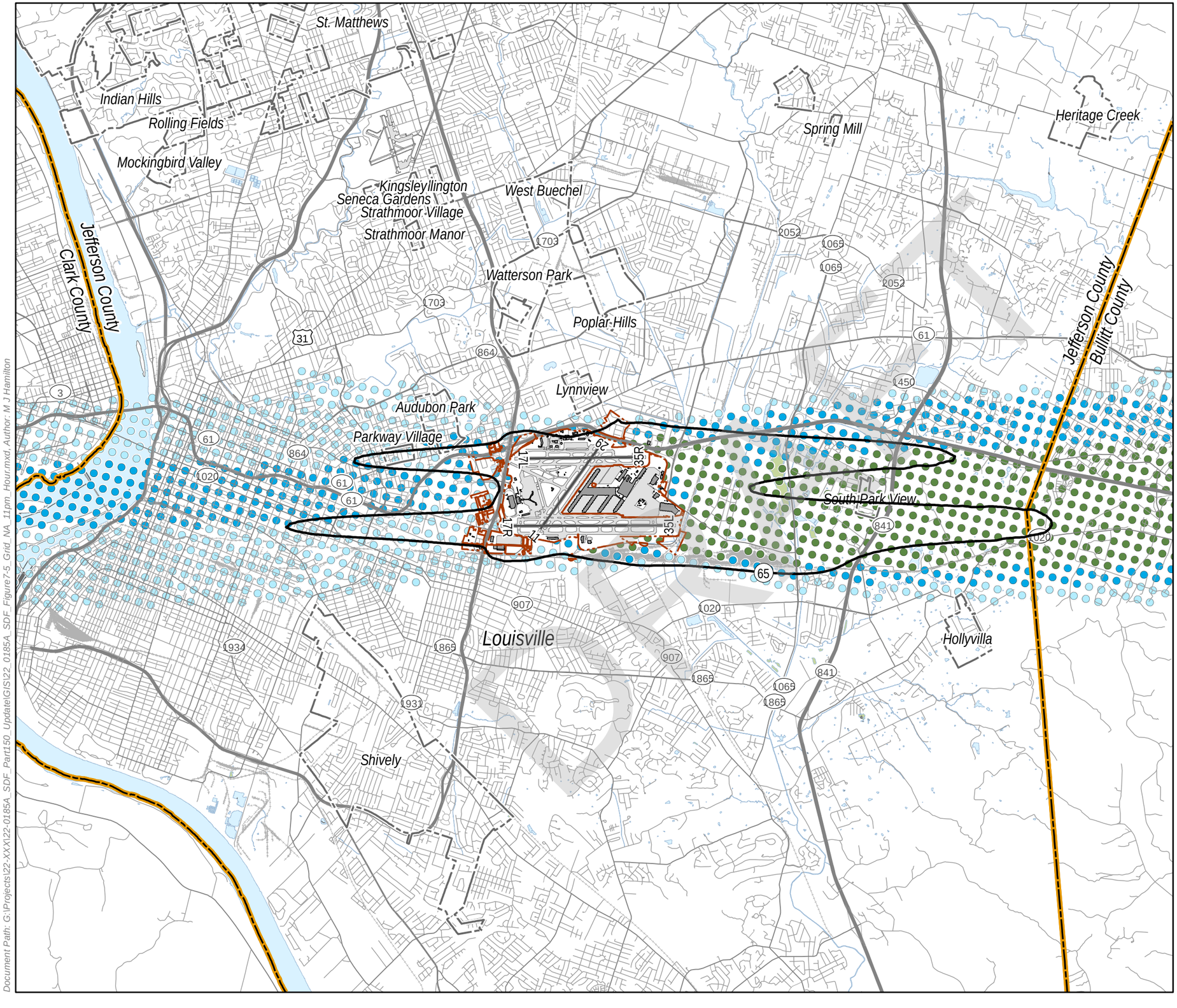

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-5

Number of Events over 75 dB SEL: 11:00 p.m. hour

Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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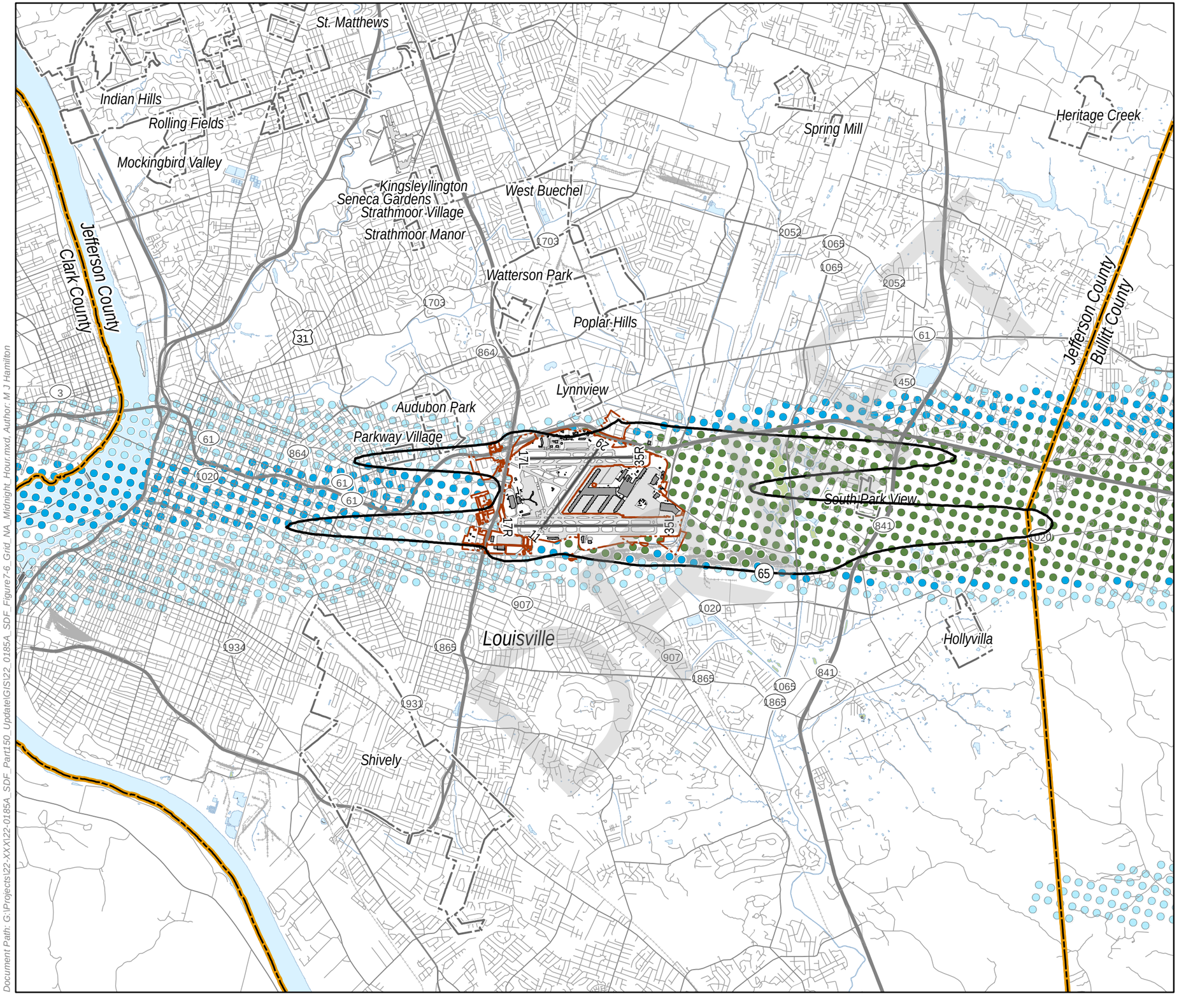

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-6

Number of Events over 75 dB SEL: Midnight hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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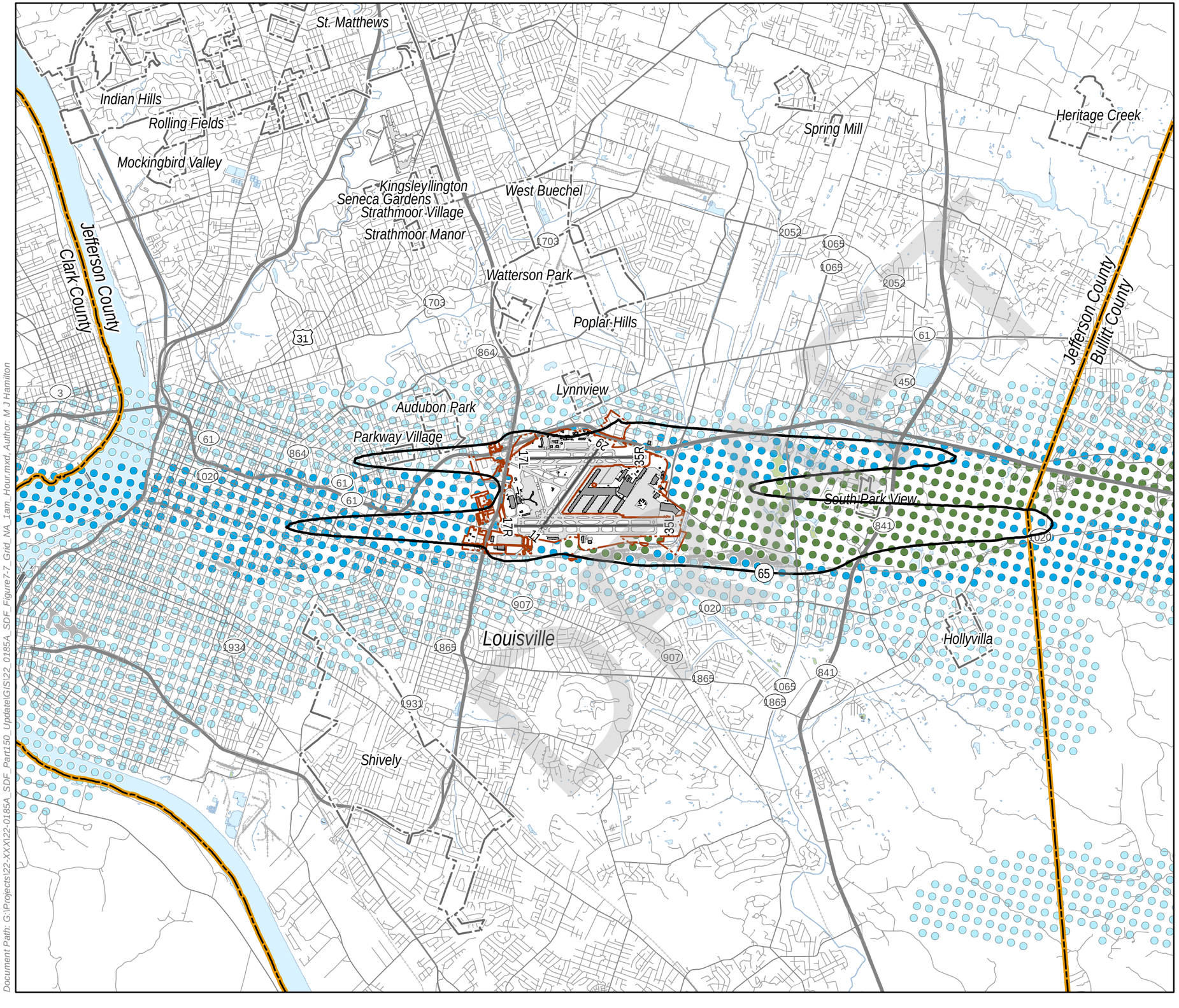

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-7

Number of Events over 75 dB SEL:
1:00 a.m. hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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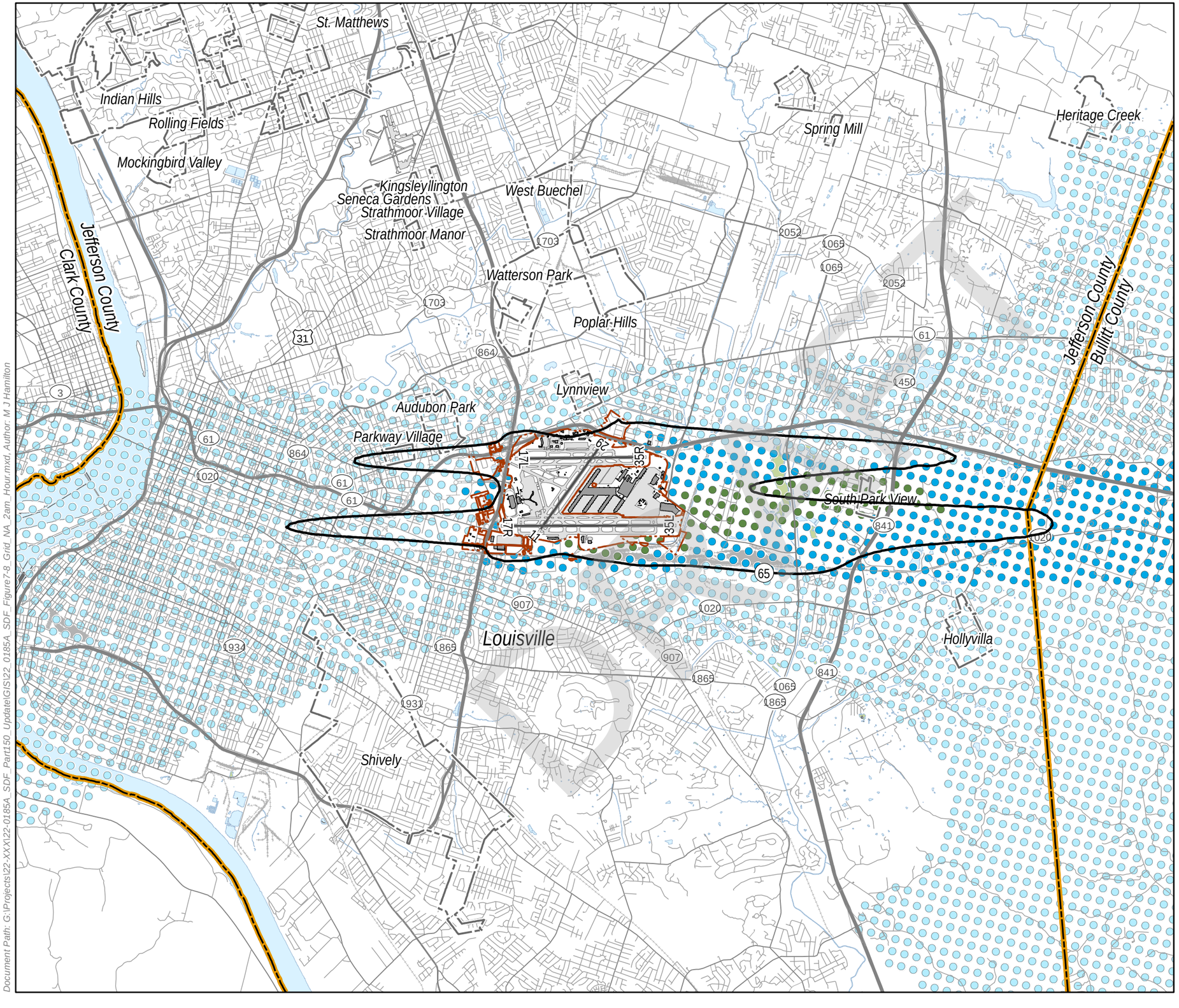
LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-8

Number of Events over 75 dB SEL:
2:00 a.m. hour
Existing Condition



NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

hmmh

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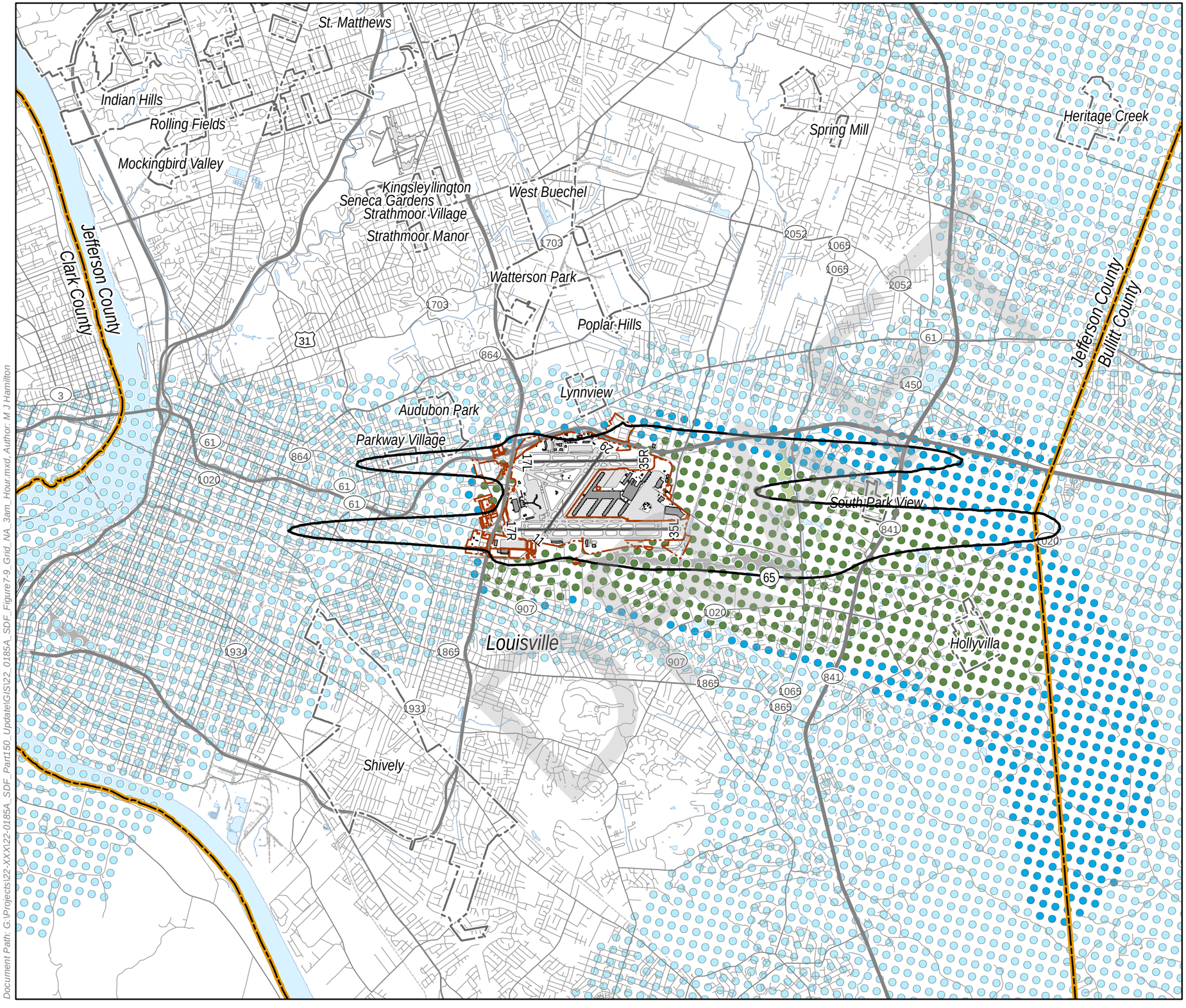

LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-9

Number of Events over 75 dB SEL: 3:00 a.m. hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

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LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-10

Number of Events over 75 dB SEL: 4:00 a.m. hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

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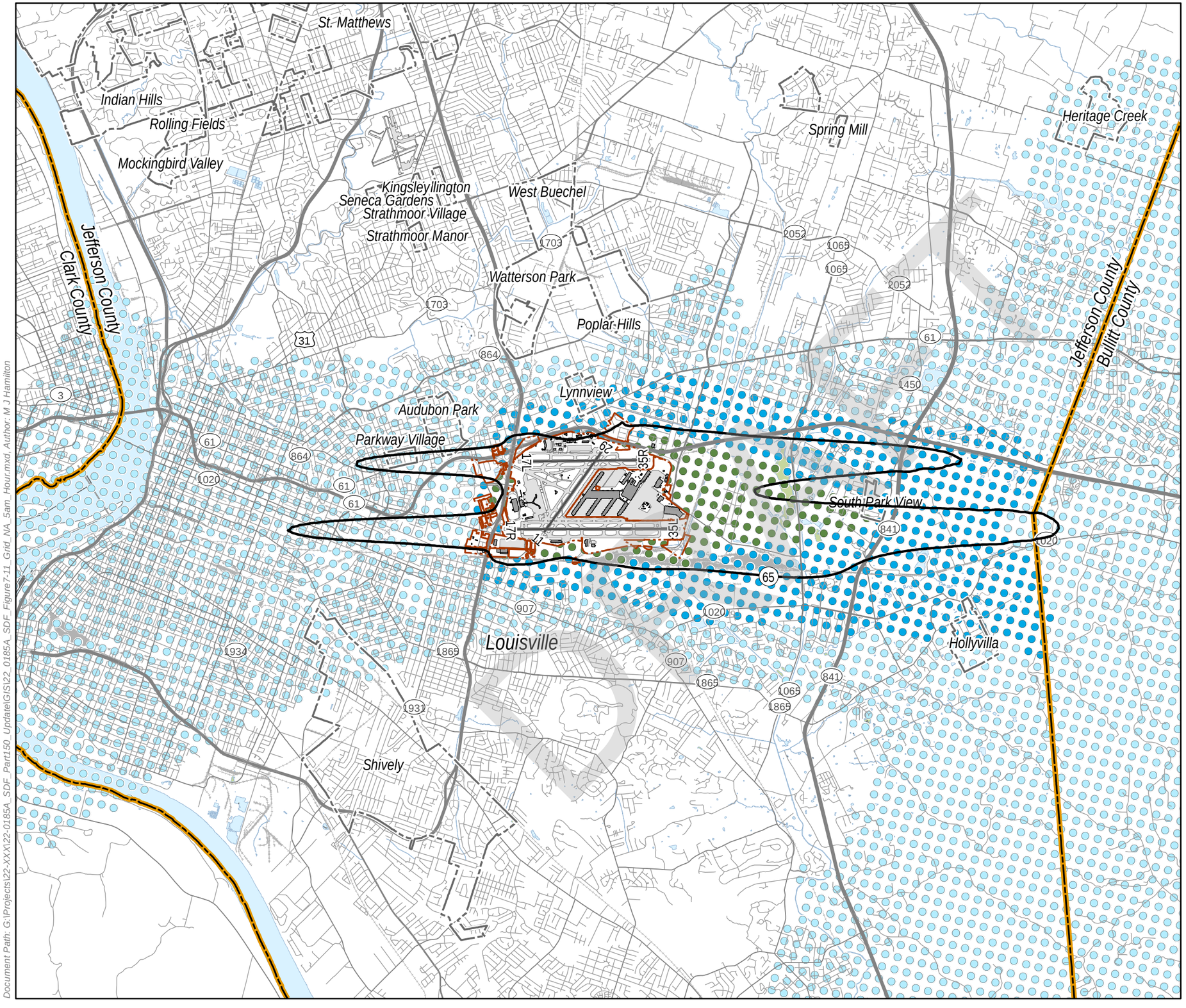

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LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-11

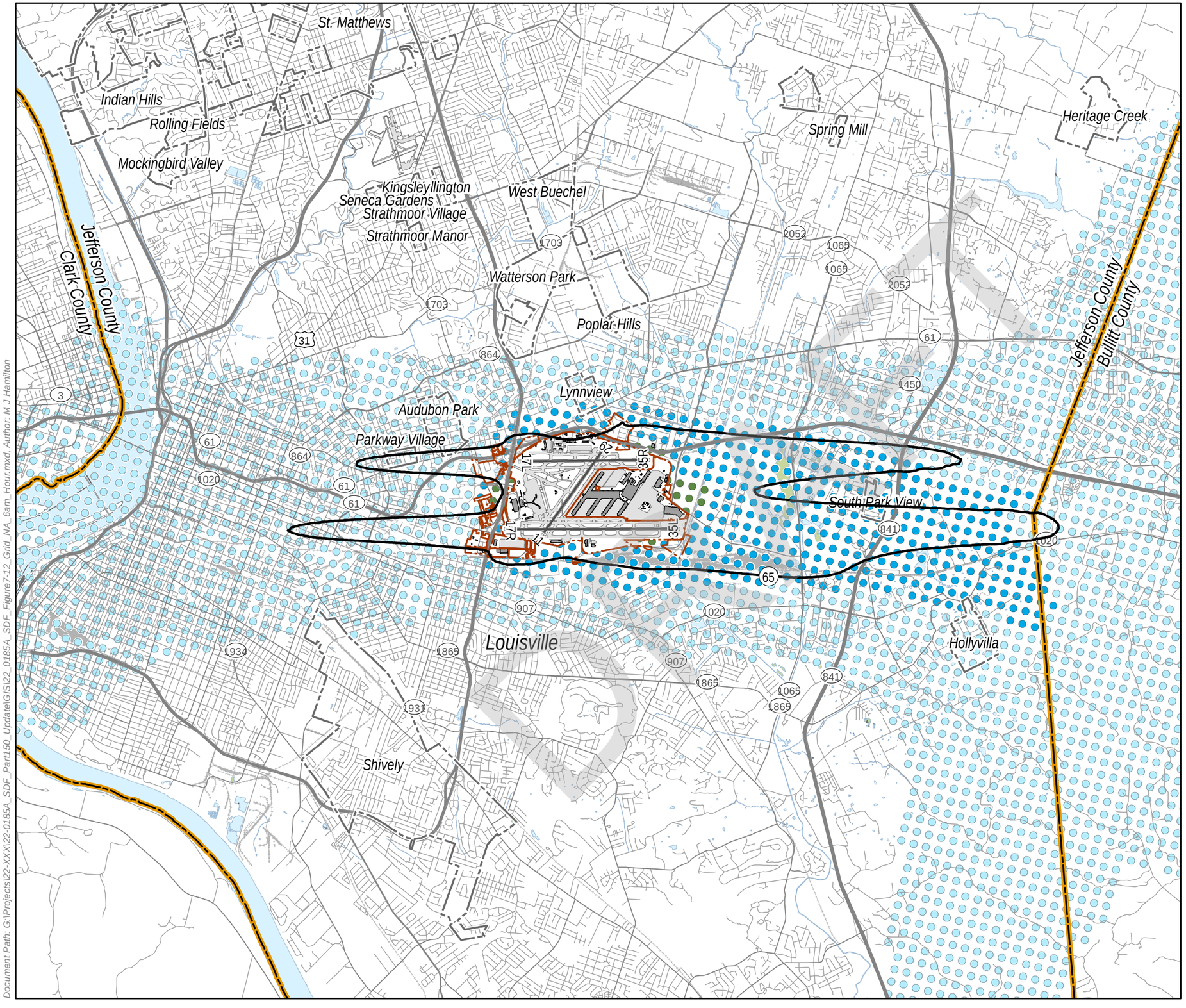
Number of Events over 75 dB SEL:
5:00 a.m. hour
Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet



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LOUISVILLE MUHAMMAD ALI INTERNATIONAL AIRPORT

Figure: 7-12

Number of Events over 75 dB SEL: 6:00 a.m. hour

Existing Condition

NA 75 SEL Grid
- 1-5
- 6-10
- 11-25
- 26-50
- 51-75
- 76-100
- 101-200
- > 200

2024 Existing DNL Contour (65 dB)

- Airport Boundary
- Runway / Pavement
- Buildings
- Municipal Boundary
- County Boundary
- Water / Wetland
- Expressway
- Arterial
- Collector
- Local
- Railroad

0 8,000 16,000 Feet

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8 Stakeholder Engagement

A Part 150 study represents a unique opportunity for the study sponsor to engage with stakeholders on aircraft noise and to share information related to land use compatibility around the airport. This chapter describes outreach efforts conducted throughout the development of the NEM to engage airport stakeholders. Stakeholders and those interested in airport noise compatibility planning were provided opportunities to learn about the Study and provide input. This occurred through various mechanisms as described in the subsections below.

8.1 Community Noise Forum

The Community Noise Forum (CNF) is the core advisory group consulted throughout this NEM update process. The members reviewed and provided input on study content and materials, representing their constituents' interests. Seven CNF meetings took place over the course of the study; the committee was kept apprised of study progress throughout. At key points in the study process, the Study Team presented information related to the NEM update and solicited input from members. In November 2023, the FAA held a special virtual meeting, open to the public, to discuss their proposed airspace changes and new Performance Based Navigation (PBN) procedures at SDF.

Major topics discussed at each of the CNF meetings are presented in **Table 8-1**. Slides from the CNF meeting presentations and meeting summary notes are provided in **Appendix D**.

The CNF reviewed technical inputs to the NEM noise modeling. A memorandum documenting the proposed noise model input data was shared with the CNF members in March 2024, for their input and feedback, based on their experience of airport operations as stakeholders. The information in the final version of that memorandum comprises Chapter 5 of this document.

The CNF requested supplemental noise analyses which would provide the public with a better understanding of the noise environment than DNL alone. The Study Team provided options of supplemental noise metrics for CNF consideration, and, from the committee's feedback, developed the methodology described in Chapter 7 of this document.

Table 8-1. Community Noise Forum Meetings

Source: HMMH, 2024

Date	Topics Covered
9/25/2023	Overview of Part 150 program Summary of roles and responsibilities of the Part 150 Study History of Part 150 at SDF Aircraft noise terminology NEM update process overview Project schedule
11/9/2023	FAA proposed airspace changes
1/22/2024	Overview of noise modeling process Aviation forecast and fleet mix DNL and supplemental noise metrics Remaining project schedule
3/25/2024	Noise model inputs memo available for review Supplemental noise analyses to be included with the NEM documentation
6/3/2024	Part 150 study status report
7/22/2024	Part 150 study status report
9/23/2024	Noise Exposure Map draft contours review Public comment process Remaining project schedule

8.2 Public Workshop

Members of the public were encouraged to participate in the public workshop and submit comments on the Study. The public workshop will be held on October 17, 2024.

Study Team members, along with SDF and LRAA staff, will serve as facilitators at various stations with boards at the public workshop to discuss the project and answer questions from the public. The public workshop will be held during the 30-day public comment period for the NEM document. The workshop stations will present information on the Part 150 process, noise metrics, roles and responsibilities of stakeholders, the aviation forecast, noise modeling process and inputs, resulting noise exposure contours, and land use compatibility. All workshop materials will be provided in **Appendix D**.

To publicize the public workshop, LRAA posted notices to the Study website[34] and submitted notices in local newspapers. These will be included in **Appendix D**.

[34] www.flylouisville.com/NEM

8.3 Public Review and Comment Period

SDF provided the draft NEM document for public review and comment from October 23 through November 24, 2024. An electronic version of the full draft NEM document was posted on the Study website throughout the public review period.[35] Printed copies of the draft NEM document will be available for public review at the following locations:

- Louisville Main Library, 301 York St, Louisville, KY 40203
- Airport office at LRAA Maintenance Facility, 4320 Old Park Blvd, Louisville, KY 40209

Public comments were accepted in writing at the public workshop via comment sheets, via email to LRAA staff, and through the project email address (Engineering@flylouisville.com). The final NEM will include all public comments received prior to the close of the public comment period for the NEM document.

8.4 Project Website

Part 150 Study information is located on the existing LRAA Noise Compatibility Program website:

- https://www.flylouisville.com/corporate/noise-compatibility-program

All Study-related information and resources are posted on this site.

[35] https://www.flylouisville.com/NEM