Akron-Canton Airport (CAK) Part 150 Update Study

PROJECT MEMORANDUM

AKRON-CANTON AIRPORT — a better way to go.

CHA design/construction solutions

HARRIS MILLER MILLER & HANSON INC.

To:	Part 150 Advisory Committee
From:	Ted Baldwin and Justin Divens, HMMH
Subject:	Background for the Fifth Advisory Committee Meeting – May 29, 2014
Date:	April 25, 2014
Reference:	HMMH Project Number 305231.004

1. INTRODUCTION

This memorandum presents material for discussion at the fifth meeting of the Akron-Canton Airport (CAK) Part 150 Advisory Committee, planned for May 29, 2014. The fourth meeting (on March 5) represented the transition between the Noise Exposure Map and Noise Compatibility Program phases of the Part 150 Update.

At the upcoming meeting, we will continue discussion of noise abatement and compatible land use alternatives, following the scope of work[1] for this study, which identifies four major work elements under which the Noise Compatibility Program will be developed:

- Element 4. Identify, analyze, and evaluate abatement alternatives
- Element 5. Identify, analyze, and evaluate compatible land use strategies
- Element 6. Select preferred noise compatibility program measures
- Element 7. Develop implementation systems

This memorandum presents the second round of noise abatement analyses under Element 4, building on initial analyses presented in the January 9, 2014 project memorandum titled "Background for the Fourth Advisory Committee Meeting," and the associated discussion at that meeting.[2]

CHA is preparing a companion memorandum to address land use strategies under Element 5, a second topic for the fifth committee meeting.

Elements 6 and 7 will be the topics of the sixth (final) committee meeting.

The eighth (final) study element will cover preparation and presentation of the Part 150 submittal to the Akron-Canton Airport Authority and then the FAA.

2. SCOPE OF NOISE ABATEMENT ANALYSIS

The scope of the noise abatement analysis covered in this memorandum is based on four primary considerations

- Land uses identified in the draft 2014 and 2019 Noise Exposure Maps
- Advisory Committee input
- Implementation and effectiveness of existing noise abatement measures
- Part 150 noise abatement alternative analysis requirements

These considerations are summarized below.

[1] The scope is available for review on the study website at http://www.akroncantonairport.com/files/noise/cakpart150updatescope.pdf.

[2] That material is on the study website at http://www.akroncantonairport.com/files/noise/first-roundnoiseanalyses.pdf

2.1 Land Uses Identified in the Draft 2014 and 2019 Noise Exposure Maps

The Noise Exposure Map materials discussed at the last committee meeting identified the land use compatibility situation associated with noise exposure projected for CAK operations in 2014 and 2019. *In simple terms, the draft Noise Exposure Map identifies noise "problems" for the Noise Compatibility Program to address.*

Under FAA's Part 150 guidelines, which CAK and local land use control jurisdictions have adopted in prior Part 150 processes, all land uses are compatible outside of the 65 decibel (dB) Day-Night Average Sound Level (DNL) contour. As discussed at the last meeting, there are no potentially noncompatible land uses within that contour line for either 2014 or 2019 operations at CAK, including consideration of actual current land use and zoning for undeveloped land use. There also are no discrete "sensitive receptors" within those contours (e.g., schools, health care places of worship, facilities, etc.).

However, the committee has requested that the consulting team consider abating potential impacts on land uses within the 60 dB DNL contours, and to approach local jurisdictions to determine if they would reciprocate by considering adoption of some sort of "overlay district" to prevent introduction of new noncompatible or sensitive land uses within the same area. In response to that request, this memorandum depicts land uses and identifies noise benefits within the 60 to 65 dB DNL contour interval.

As an initial basis for comparison, the potentially noncompatible and sensitive land uses within that contour interval for the 2014 and 2019 existing and forecast conditions contours are as follow:

- 2014: 38 dwelling units, 65 residents, no discrete sensitive land uses
- 2019: 27 dwelling units, 62 residents, no discrete sensitive land uses

The dwelling unit and population estimates are based on 2010 census data, including consideration of the average number of residents per single and multifamily dwelling unit in each wholly or partially encompassed census tract, with the population in each census tract assigned only to residentially developed areas, based on field verification of actual land uses.[3]

To further assist in identification of noise issues, the following table breaks residential land uses down by runway end.

Table 1 Residential Land Uses within 2014 and 2019 60-65 dB DNL Contours by Runway End
Source: HMMH, 2014

Year	Metric	North – off Runway 19 approach / Runway 1 departure end	Northeast – off Runway 23 approach / Runway 5 departure end	South – off Runway 1 approach / Runway 19 departure end	Southwest – off Runway 5 approach / Runway 23 departure end
2014	Residents	0	2	4	56
	Dwelling Units	0	1	2	24
2019	Residents	0	3	4	31
	Dwelling Units	0	1	2	15

This breakdown suggests that the primary area of interest is to the southwest of the airport, in the area affected by Runway 5 arrivals and Runway 23 departures. This information is consistent with input from Advisory Committee meetings and the first public workshop.

[3] The simpler approach; i.e., evenly distribution the population over the entire census tract, would lead to highly inaccurate results, because residential uses tend to be clustered in relatively small portions of each census tract.

2.2 Advisory Committee Input

The project scope states that the Advisory Committee and CAK staff will provide input into identification and evaluation of noise abatement alternatives, with the consulting team providing guidance to ensure all Part 150-mandated categories are considered. The committee and staff have provided input on a continuing manner in the preceding Advisory Committee meetings. At the fourth meeting, the committee requested that this memorandum address the following additional items:

- Preferential use of Runway 1-19 over 5-23 for jets – general aviation jets in particular – and for nighttime operations. Section 3.1 of this memorandum addresses this request.
- Additional arrival-departure contours for a broader range of aircraft types, including the Boeing 737-300. Section 3.2 of this memorandum addresses this request.
- A figure that compares the DNL contours for: (1) the 2014 existing conditions from this study, (2) the 1999 forecast case from the 1997 Part 150, and (3) and (4) the 2015 no-action and proposed-action alternatives from the 2004 runway extension environmental assessment. Section 3.3 addresses this request.

2.3 Implementation and Effectiveness of Existing Noise Abatement Measures

Appendix A of the September 2013 "Project Introduction and Inventory Report" reproduces the FAA's Record of Approval (ROA) for the 1998 Noise Compatibility Program submission.[4] The ROA lists seven approved and one disapproved[5] noise abatement measures, nine approved land use management measures, and seven program management measures.

Section 4 of this memorandum reviews the implementation and effectiveness of the noise abatement measures.

As discussed in Section 1 of this memorandum, CHA will provide a separate memorandum to address land use strategies under Element 5 as background for the fifth Advisory Committee meeting. The program management measures will be addressed at the sixth and final Advisory Committee meeting.

2.4 Part 150 Noise Abatement Alternative Analysis Requirements

Part 150 Sec. B150.7, "Analysis of program alternatives," identifies three categories of "noise control alternatives" that "must be considered and presented," and identifies seven specific alternatives, "subject to the constraints that the strategies are appropriate to the specific airport." Section 5 of this memorandum addresses these requirements.

3. ADDRESSING ADVISORY COMMITTEE INPUT

3.1 Preferential Runway Use

The population impacts by runway end presented in Section 2.1 support Advisory Committee interest in preferential runway use. This section presents the results of a runway use "sensitivity analysis."

While the FAA Airport Traffic Control Tower (ATCT) personnel identify the active runway at any point in time, the pilot-in-command of each aircraft retains the ultimate decision-making authority regarding which runway will be used for any given operation (chosen from among all open runways).

Table 8 of the September 2013 "Project Introduction and Inventory Report" presents existing fixed-wing runway use by major aircraft type categories. That table is reproduced on the following page.

[4] The report is on the study website at http://www.akroncantonairport.com/files/noise/september172013draftprojectintroductionandinventoryreport.pdf. The ROA is presented separately at http://www.akroncantonairport.com/files/noise/april41998cakncproa.pdf.

[5] The disapproved measure proposed an amendment to an existing measure that the FAA had approved at the conclusion of the first Part 150 study. The FAA approved continuation of the existing measure. See Section 4.5.

Table 2 Existing Condition Fixed-Wing Runway Use by Major Aircraft Type Category
Source: Reproduced from Table 8 of HMMH September 2013 "Project Introduction and Inventory Report"

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	24%	23%	24%	Not applicable			19%	19%	19%
Runway 5	15%	32%	19%	4%	2%	3%				8%	18%	10%
Runway 19	26%	21%	25%	11%	9%	11%				17%	15%	17%
Runway 23	48%	32%	44%	62%	67%	62%				56%	48%	54%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	25%	25%	25%	Not applicable			21%	25%	22%
Runway 5	12%	23%	14%	3%	1%	3%				7%	9%	7%
Runway 19	29%	17%	27%	13%	11%	12%				19%	13%	18%
Runway 23	42%	36%	41%	60%	63%	60%				52%	54%	53%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	25%	25%	25%	Not applicable			21%	22%	21%
Runway 5	16%	17%	16%	1%	0%	1%				7%	5%	7%
Runway 19	26%	28%	26%	17%	11%	16%				20%	16%	20%
Runway 23	45%	41%	44%	57%	63%	58%				52%	57%	53%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	4%	8%	19%	16%	19%	Not applicable			16%	6%	14%
Runway 5	14%	2%	8%	4%	3%	4%				7%	3%	6%
Runway 19	28%	22%	25%	19%	13%	19%				22%	20%	21%
Runway 23	47%	72%	59%	58%	68%	59%				55%	72%	59%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	23%	4%	20%	0%	0%	0%	16%	5%	14%
Runway 5	15%	38%	18%	5%	4%	5%	0%	0%	0%	10%	14%	10%
Runway 19	49%	29%	47%	20%	21%	20%	75%	0%	75%	33%	24%	32%
Runway 23	29%	25%	28%	52%	71%	55%	25%	0%	25%	42%	57%	44%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

The preceding table shows that for any given aircraft type category, arrival and departure runway use differ from each other during both the day and night, and on a 24-hour basis. The differences may arise from a variety of factors, such as selection of runway to reduce taxi time, to avoid take-off queues, to operate on and off runways that minimize flight distances, etc.

These differences reflect the flexibility that pilots have to safely operate aircraft on differing runways under identical operating conditions, and offer a basis for considering the potential benefits that might result from requesting that pilots voluntarily comply with a recommended runway selection priority.

Based on this observation, eight preferential runway use alternatives ("1 – 6," and "1A" and "5A") were developed to test the potential benefits of varying nighttime, daytime, and 24-hour runway use priorities.

- Alternative 1: Night Departure Runway Use Changed to Match Night Arrival Use
- Alternative 1A: South-Flow Night Runway Use Changed to Shift Departures from Runway 23 to 19
- Alternative 2: Night Arrival Runway Use Changed to Match Night Departure Use
- Alternative 3: Day Departure Runway Use Changed to Match Day Arrival Use
- Alternative 4: Day Arrival Runway Use Changed to Match Day Departure Use
- Alternative 5: All Departure Runway Use Changed to Match All Arrival Use
- Alternative 5A: All South-Flow Runway Use Changed to Shift Departures from Runway 23 to 19
- Alternative 6: All Arrival Runway Use Changed to Match All Departure Use

For each alternative, the following pages provide a brief description of the adjusted runway use, a copy of the runway use table with the changes highlighted, a comparative contour figure, and changes in encompassed dwelling units and residents. The 2014 contour is used in these analyses, since it has higher impacts than the more speculative 2019 forecast.

Section 3.1.9 summarizes the noise benefits of each runway use alternative considered, and compares the benefits to the numbers of operations affected.

3.1.1 Alternative 1: Night Departure Runway Use Changed to Match Night Arrival Use

This alternative addresses interest in reducing night departures on Runway 23 which overfly the most affected area southwest of the airport. Under existing conditions, night departure use of Runway 23 is substantially higher than other runways, whereas night arrival use is more even. This alternative tests the effect of adjusting night departure use to equal night arrival use as shown below, *reducing night departures to the southwest.*

Table 3 Alternative 1: Night Departure Runway Use Changed to Match Night Arrival Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	24%	**15%**	22%	Not applicable			19%	**15%**	18%
Runway 5	15%	32%	19%	4%	**32%**	8%				8%	**32%**	13%
Runway 19	26%	21%	25%	11%	**21%**	13%				17%	**21%**	18%
Runway 23	48%	32%	44%	62%	**32%**	57%				56%	**32%**	51%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	25%	**24%**	25%	Not applicable			21%	**24%**	22%
Runway 5	12%	23%	14%	3%	**23%**	6%				7%	**23%**	9%
Runway 19	29%	17%	27%	13%	**17%**	13%				19%	**17%**	19%
Runway 23	42%	36%	41%	60%	**36%**	56%				52%	**36%**	50%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	25%	**14%**	24%	Not applicable			21%	**14%**	20%
Runway 5	16%	17%	16%	1%	**17%**	3%				7%	**17%**	8%
Runway 19	26%	28%	26%	17%	**28%**	17%				20%	**28%**	21%
Runway 23	45%	41%	44%	57%	**41%**	56%				52%	**41%**	51%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	4%	8%	19%	**4%**	18%	Not applicable			16%	**4%**	13%
Runway 5	14%	2%	8%	4%	**2%**	4%				7%	**2%**	6%
Runway 19	28%	22%	25%	19%	**22%**	19%				22%	**22%**	22%
Runway 23	47%	72%	59%	58%	**72%**	59%				55%	**72%**	59%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	23%	**8%**	21%	0%	0%	0%	16%	**8%**	15%
Runway 5	15%	38%	18%	5%	**38%**	10%	0%	0%	0%	10%	**38%**	13%
Runway 19	49%	29%	47%	20%	**29%**	21%	75%	0%	75%	33%	**29%**	33%
Runway 23	29%	25%	28%	52%	**25%**	48%	25%	0%	25%	42%	**25%**	40%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

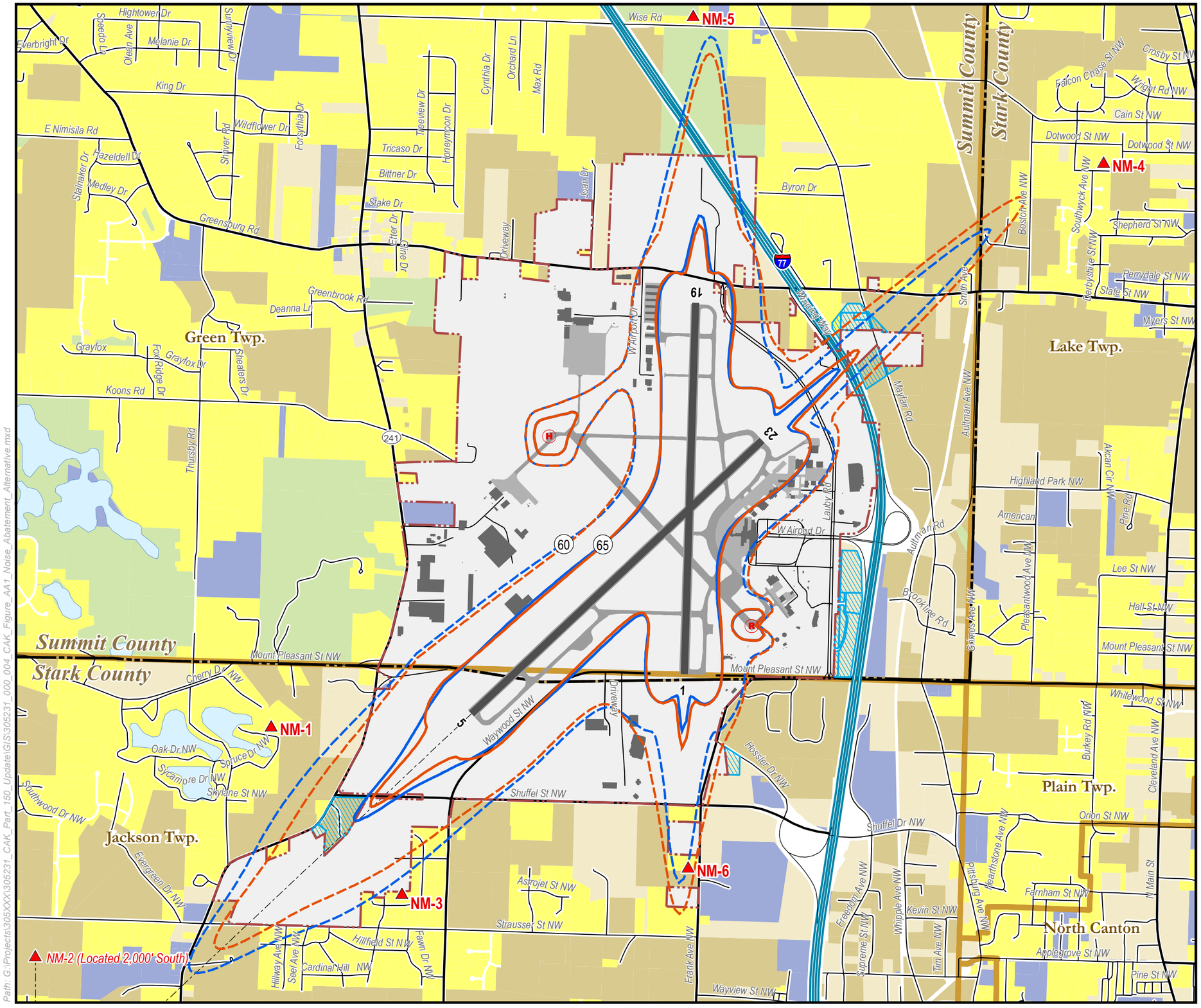
- It is based on actual runway use. The night departure use of each aircraft type category is adjusted to match the night arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 23 rather than Runway 19 when operating in the south flow is often related to the shorter taxi times, not aircraft operational considerations.
- While night hours (10 p.m. – 7 a.m.) represent approximately 38% of the 24-hour day, only approximately 16% of all departures – 17 to 18 per night on average – occur during that time period.
- There are approximately two departures per hour at night on the average, compared to approximately seven per hour during daytime hours.
- The lower overall activity levels at night and the lower hourly rate of operations minimize potential effects on aircraft operators associated with slightly longer taxi distances and times associated with using Runway 19 rather than Runway 23 for departure.
- The lower overall activity levels and the lower hourly rate of operations at night mitigate potential effects on air traffic control staff workload.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 4 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 1
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 1	Residents	0	10	5	17	32
	Dwelling Units	0	4	3	9	16
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative nearly cuts the population within the 60 dB DNL contour by 50%, while affecting only approximately eight percent of all operations (17 to 18 out of 236 per day). However, as shown in the figure and Table 4, the benefit of this alternative is diluted slightly by the increased use of Runway 5 for departures, which extends the noise contour off the northeast end of Runway 5-23. To address this issue, the following section presents a variant of the alternative ("Alternative 1A") that only adjusts nighttime departure runway use in the south flow; i.e., shifting departures from 23 to 19.



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Alternative 1: 2014 DNL with Night Departure Runway Use Changed to Match Night Arrival Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.2 Alternative 1A: South-Flow Night Runway Use Changed to Shift Departures from Runway 23 to 19

This alternative is a slightly less aggressive variant of Alternative 1, in which only south-flow nighttime departure runway use is changed, to shift departures from Runway 23 to 19, without increasing departures on either Runway 1 or 5, as indicated in the following table. *It focusses on public interest in minimizing night departures on Runway 23 which overfly the most affected area southwest of the airport.*

Table 5 Alternative 1A: South-Flow Night Runway Use Changed to Shift Departures from Runway 23 to 19
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	24%	23%	24%	Not applicable			19%	19%	19%
Runway 5	15%	32%	19%	4%	2%	3%				8%	18%	10%
Runway 19	26%	21%	25%	11%	**30%**	14%				17%	**25%**	19%
Runway 23	48%	32%	44%	62%	**46%**	59%				56%	**38%**	52%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	25%	25%	25%	Not applicable			21%	25%	22%
Runway 5	12%	23%	14%	3%	1%	3%				7%	9%	7%
Runway 19	29%	17%	27%	13%	**24%**	15%				19%	**21%**	20%
Runway 23	42%	36%	41%	60%	**51%**	58%				52%	**45%**	51%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	25%	25%	25%	Not applicable			21%	22%	21%
Runway 5	16%	17%	16%	1%	0%	1%				7%	5%	7%
Runway 19	26%	28%	26%	17%	**30%**	18%				20%	**29%**	21%
Runway 23	45%	41%	44%	57%	**45%**	56%				52%	**44%**	52%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	4%	8%	19%	16%	19%	Not applicable			16%	6%	14%
Runway 5	14%	2%	8%	4%	3%	4%				7%	3%	6%
Runway 19	28%	22%	25%	19%	**19%**	19%				22%	**21%**	22%
Runway 23	47%	72%	59%	58%	**62%**	59%				55%	**71%**	59%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	23%	4%	20%	0%	0%	0%	16%	5%	14%
Runway 5	15%	38%	18%	5%	4%	5%	0%	0%	0%	10%	14%	10%
Runway 19	49%	29%	47%	20%	**50%**	24%	75%	0%	75%	33%	**43%**	34%
Runway 23	29%	25%	28%	52%	**43%**	51%	25%	0%	25%	42%	**37%**	41%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

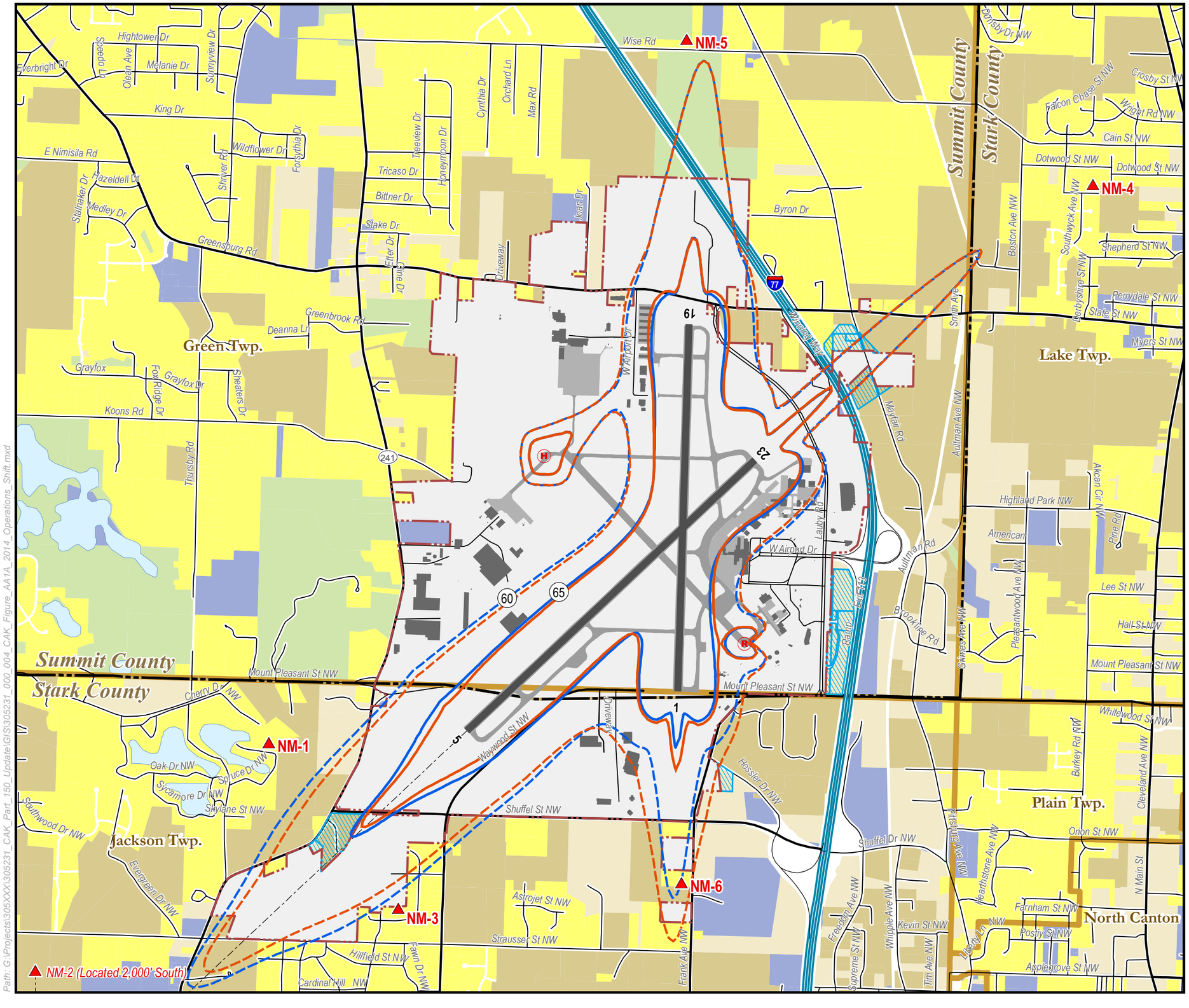
- It is based on actual runway use. The night departure use of each aircraft type category is adjusted to match the night arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 23 rather than Runway 19 when operating in the south flow is often related to the shorter taxi times, not aircraft operational considerations.
- While night hours (10 p.m. – 7 a.m.) represent approximately 38% of the 24-hour day, only approximately 16% of all departures – 17 to 18 per night on average – occur during that time period. Moreover, only night departures on Runway 23 would be affected.
- There are approximately two departures per hour at night on the average, compared to approximately seven per hour during daytime hours.
- The lower overall activity levels at night and the lower hourly rate of operations minimize potential effects on aircraft operators associated with slightly longer taxi distances and times associated with using Runway 19 rather than Runway 23 for departure.
- The lower overall activity levels and the lower hourly rate of operations at night mitigate potential effects on air traffic control staff workload.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions and also to Alternative 1, because of its close relationship.

Table 6 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 1A
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 1A	Residents	0	2	5	25	32
	Dwelling Units	0	1	2	12	15
Alternative 1	Residents	0	10	5	17	32
	Dwelling Units	0	4	3	9	16
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative affects far fewer operations than Alternative 1, but results in the same number of residents within the 60 dB DNL contour, although in different quadrants. It does not reduce exposure to the southwest as significantly, but avoids increasing exposure to the northeast and minimizes the increase to the south.



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AKRON-CANTON AIRPORT

Alternative 1A: 2014 DNL with South-Flow Night Runway Use Changed to Shift Departures from Runway 23 to 19, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- 2014 Noise Abatement DNL Contour (65 dB)
- 2014 Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65-75 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- OANG Helipad
- Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

HARRIS MILLER MILLER & HANSON INC.

3.1.3 Alternative 2: Night Arrival Runway Use Changed to Match Night Departure Use

This alternative reverses the approach taken in Alternative 1 to reduce night operations over the most affected area to the southwest, by adjusting night arrival use to equal night departure use. Since under existing conditions, night use of Runway 5 for departures is the lowest of any runway end, *this case minimizes night arrivals over the most affected area southwest of the airport*, rather than departures, as in Alternative 1.

Table 7 Alternative 2: Night Arrival Runway Use Changed to Match Night Departure Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	**23%**	14%	24%	23%	24%				19%	**23%**	19%
Runway 5	15%	**2%**	12%	4%	2%	3%				8%	**2%**	7%
Runway 19	26%	**9%**	22%	11%	9%	11%	Not applicable			17%	**9%**	15%
Runway 23	48%	**67%**	52%	62%	67%	62%				56%	**67%**	58%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	**25%**	18%	25%	25%	25%				21%	**25%**	22%
Runway 5	12%	**1%**	11%	3%	1%	3%				7%	**1%**	6%
Runway 19	29%	**11%**	26%	13%	11%	12%	Not applicable			19%	**11%**	18%
Runway 23	42%	**63%**	45%	60%	63%	60%				52%	**63%**	54%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	**25%**	14%	25%	25%	25%				21%	**25%**	21%
Runway 5	16%	**0%**	15%	1%	0%	1%				7%	**0%**	6%
Runway 19	26%	**11%**	25%	17%	11%	16%	Not applicable			20%	**11%**	20%
Runway 23	45%	**63%**	45%	57%	63%	58%				52%	**63%**	53%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	**16%**	14%	19%	16%	19%				16%	**16%**	16%
Runway 5	14%	**3%**	9%	4%	3%	4%				7%	**3%**	6%
Runway 19	28%	**13%**	21%	19%	13%	19%	Not applicable			22%	**13%**	20%
Runway 23	47%	**68%**	57%	58%	68%	59%				55%	**68%**	58%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	**4%**	7%	23%	4%	20%	0%	0%	0%	16%	**4%**	14%
Runway 5	15%	**4%**	14%	5%	4%	5%	0%	0%	0%	10%	**4%**	9%
Runway 19	49%	**21%**	46%	20%	21%	20%	75%	0%	75%	33%	**21%**	32%
Runway 23	29%	**71%**	33%	52%	71%	55%	25%	0%	25%	42%	**71%**	45%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by considerations similar to those for Alternative 1:

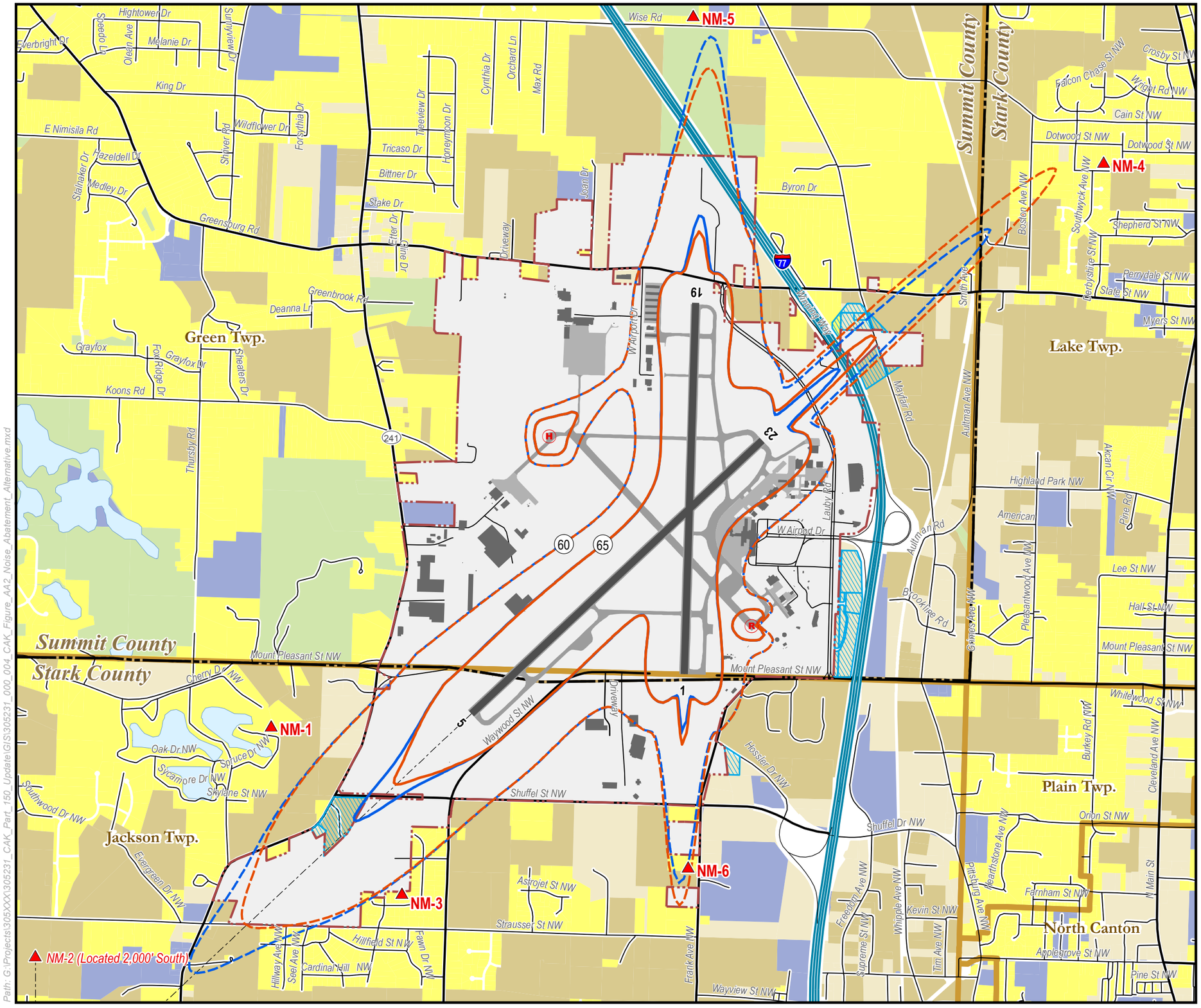
- It is based on actual runway use. The night arrival use of each aircraft type category is adjusted to match the night departure use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 1 and arriving on Runway 5 when operating in the north flow is often related to the shorter taxi times, not aircraft operational considerations.
- The lower overall activity levels at night and the lower hourly rate of operations minimize potential effects on aircraft operators associated with slightly longer taxi distances and associated with slightly longer arrival taxi distances and times associated with arriving on Runway 1 and 23, rather than 5 and 19.
- The lower overall activity levels and the lower hourly rate of operations at night also mitigate potential effects on air traffic control staff workload.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 8 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 2
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 2	Residents	0	38	5	37	80
	Dwelling Units	0	14	3	15	32
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative *increases* population within the 60 dB DNL contour by approximately 35%, by increasing arrival use on Runway 23 and extending the associated contour off the northeast end of Runway 5-23 into a relatively densely developed subdivision under the Runway 23 final approach. It reduces the population to the southwest of the airport affected by Runway 5 arrivals, but not enough to offset this increase. The Alternative 1 focus on minimizing night departures over that area is clearly more effective.



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AKRON-CANTON AIRPORT

Alternative 2: 2014 DNL with Night Arrival Runway Use Changed to Match Night Departure Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

HARRIS MILLER MILLER & HANSON INC.

3.1.4 Alternative 3: Day Departure Runway Use Changed to Match Day Arrival Use

This alternative addresses overflights of the most affected area southwest of the airport by *reducing daytime departures on Runway 23*. Under existing conditions, day departure use of Runway 23 is substantially higher than other runways, whereas arrival use is more even. This alternative tests the effect of adjusting day departure use to equal arrival use as shown below, reducing day departures to the southwest.

Table 9 Alternative 3: Day Departure Runway Use Changed to Match Day Arrival Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	**11%**	23%	13%	Not applicable			**11%**	19%	13%
Runway 5	15%	32%	19%	**15%**	2%	13%				**15%**	18%	16%
Runway 19	26%	21%	25%	**26%**	9%	23%				**26%**	15%	24%
Runway 23	48%	32%	44%	**48%**	67%	51%				**48%**	48%	48%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	**16%**	25%	18%	Not applicable			**16%**	25%	18%
Runway 5	12%	23%	14%	**12%**	1%	10%				**12%**	9%	12%
Runway 19	29%	17%	27%	**29%**	11%	26%				**29%**	13%	26%
Runway 23	42%	36%	41%	**42%**	63%	46%				**42%**	54%	44%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	**14%**	25%	15%	Not applicable			**14%**	22%	14%
Runway 5	16%	17%	16%	**16%**	0%	14%				**16%**	5%	15%
Runway 19	26%	28%	26%	**26%**	11%	25%				**26%**	16%	25%
Runway 23	45%	41%	44%	**45%**	63%	46%				**45%**	57%	45%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	4%	8%	**11%**	16%	11%	Not applicable			**11%**	6%	10%
Runway 5	14%	2%	8%	**14%**	3%	13%				**14%**	3%	11%
Runway 19	28%	22%	25%	**28%**	13%	27%				**28%**	20%	26%
Runway 23	47%	72%	59%	**47%**	68%	48%				**47%**	72%	53%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	**7%**	4%	6%	0%	0%	0%	**7%**	5%	7%
Runway 5	15%	38%	18%	**15%**	4%	14%	0%	0%	0%	**15%**	14%	15%
Runway 19	49%	29%	47%	**49%**	21%	45%	75%	0%	75%	**49%**	24%	46%
Runway 23	29%	25%	28%	**29%**	71%	35%	25%	0%	25%	**29%**	57%	32%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

- It is based on actual runway use. The day departure use of each aircraft type category is adjusted to match the day arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 23 and arriving on Runway 19 when operating in the south flow is often related to the shorter taxi times, not aircraft operational considerations.

On the other hand, it is worth noting that this alternative has operational *drawbacks* compared to Alternatives 1 and 2, which only affect night operations:

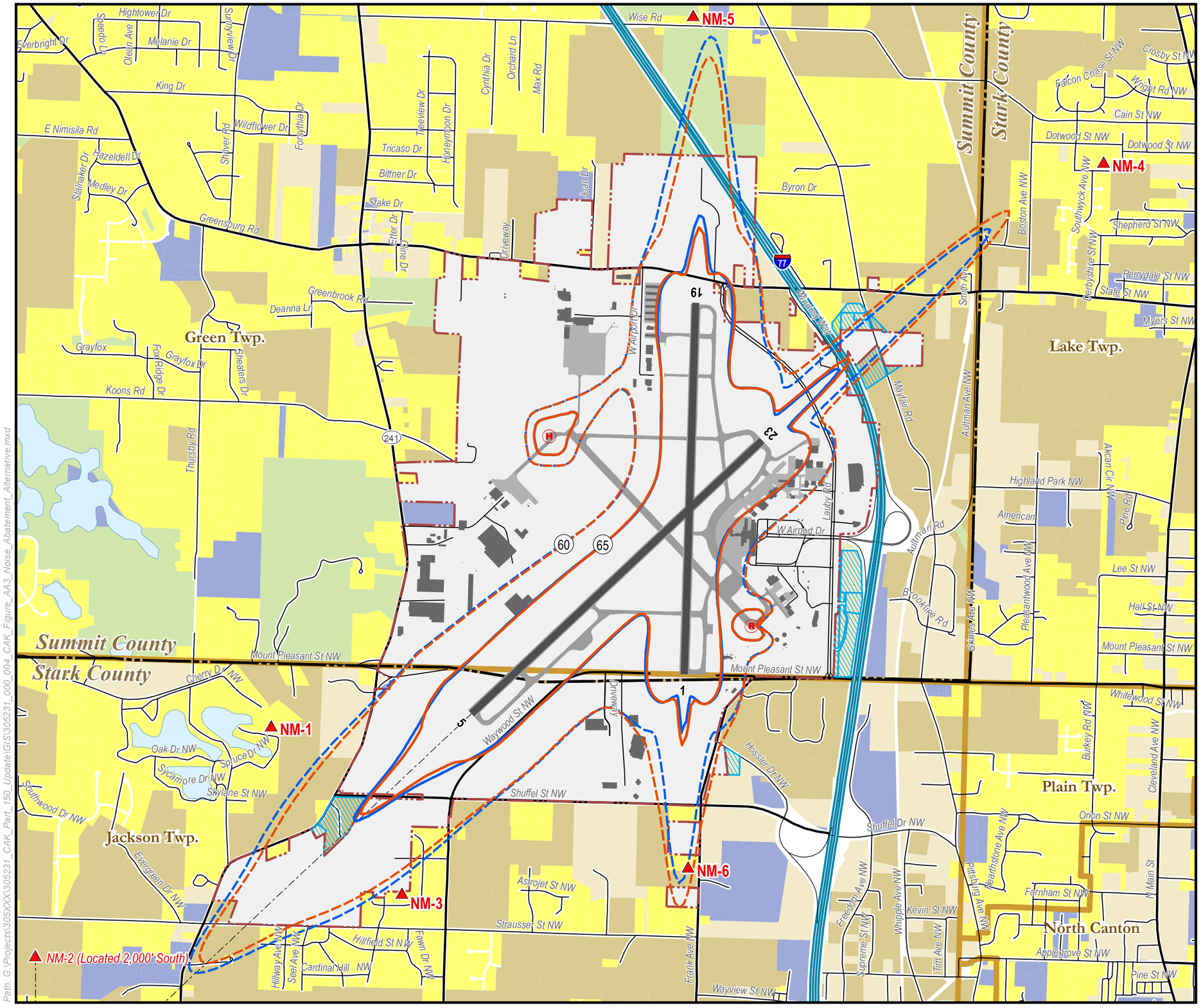
- Overall activity levels and the average rate of operations per hour are significantly higher during the day than during the night, so effects on air traffic control staff workload could be increased.
- Higher day activity levels will increase potential effects on aircraft operators associated with slightly longer taxi distances and times.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 10 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 3
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 3	Residents	0	2	5	34	41
	Dwelling Units	0	1	3	15	19
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative cuts the population within the 60 dB DNL contour by approximately 30%. However, this benefit requires affecting approximately 84% of all departures. Alternative 1 achieved a far greater 50% reduction in the encompassed population, while potentially affecting only approximately 16% of total daily departures (approximately 18 at night versus 96 during the day).



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AKRON-CANTON AIRPORT

Alternative 3: 2014 DNL with Day Departure Runway Use Changed to Match Day Arrival Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.5 Alternative 4: Day Arrival Runway Use Changed to Match Day Departure Use

This alternative addresses interest in reducing overflights of the most affected area southwest of the airport by reducing *daytime arrivals on Runway 5*. Under existing conditions, day departure use of Runway 5 is the lowest of all runways and less than one-third as high as day arrival use. This alternative tests the effect of adjusting day arrival use to equal day departure use to take advantage of that situation, as shown below.

Table 11 Alternative 4: Day Arrival Runway Use Changed to Match Day Departure Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**24%**	15%	22%	24%	23%	24%				**24%**	19%	23%
Runway 5	**4%**	32%	11%	4%	2%	3%				**4%**	18%	6%
Runway 19	**11%**	21%	13%	11%	9%	11%	Not applicable			**11%**	15%	12%
Runway 23	**62%**	32%	54%	62%	67%	62%				**62%**	48%	59%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**25%**	24%	25%	25%	25%	25%				**25%**	25%	25%
Runway 5	**3%**	23%	6%	3%	1%	3%				**3%**	9%	4%
Runway 19	**13%**	17%	13%	13%	11%	12%	Not applicable			**13%**	13%	13%
Runway 23	**60%**	36%	56%	60%	63%	60%				**60%**	54%	59%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**25%**	14%	24%	25%	25%	25%				**25%**	22%	25%
Runway 5	**1%**	17%	2%	1%	0%	1%				**1%**	5%	2%
Runway 19	**17%**	28%	17%	17%	11%	16%	Not applicable			**17%**	16%	17%
Runway 23	**57%**	41%	56%	57%	63%	58%				**57%**	57%	57%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**19%**	4%	11%	19%	16%	19%				**19%**	6%	15%
Runway 5	**4%**	2%	3%	4%	3%	4%				**4%**	3%	3%
Runway 19	**19%**	22%	20%	19%	13%	19%	Not applicable			**19%**	20%	19%
Runway 23	**58%**	72%	65%	58%	68%	59%				**58%**	72%	62%
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**23%**	8%	21%	23%	4%	20%	0%	0%	0%	**23%**	5%	20%
Runway 5	**5%**	38%	8%	5%	4%	5%	0%	0%	0%	**5%**	14%	6%
Runway 19	**20%**	29%	21%	20%	21%	20%	75%	0%	75%	**20%**	24%	21%
Runway 23	**52%**	25%	50%	52%	71%	55%	25%	0%	25%	**52%**	57%	53%
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

- It is based on actual runway use. The day arrival use of each aircraft type category is adjusted to match the day departure use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 1 and arriving on Runway 5 when operating in the north flow is often related to the shorter taxi times, not aircraft operational considerations.

On the other hand, it is worth noting that – like Alternative 3 – this alternative has operational drawbacks compared to Alternatives 1 and 2, which only affect night operations:

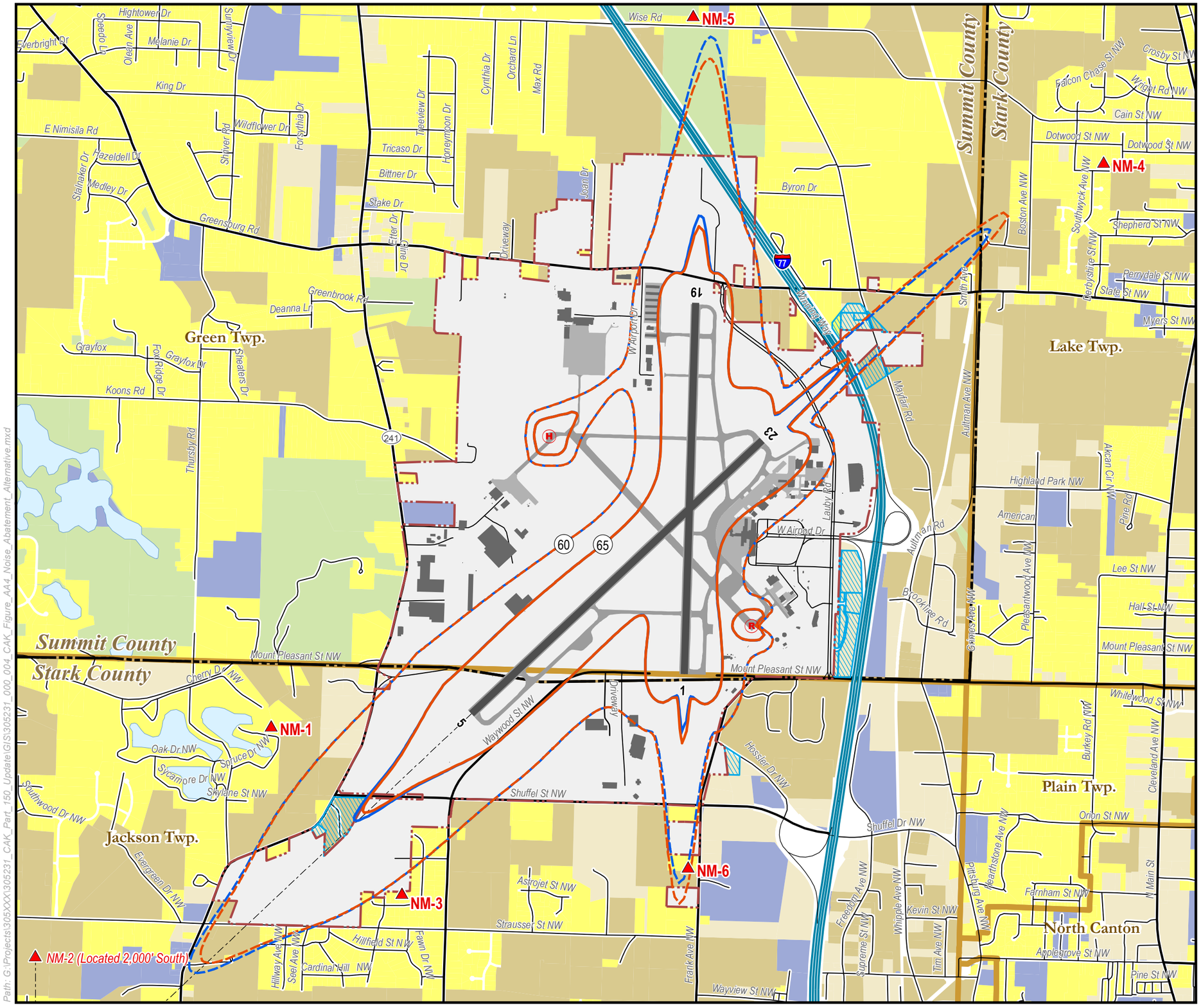
- Overall activity levels and the average rate of operations per hour are significantly higher during the day than during the night, so effects on air traffic control staff workload could be increased.
- Higher day activity levels will increase potential effects on aircraft operators associated with slightly longer taxi distances and times.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 12 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 4
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 4	Residents	0	2	4	51	57
	Dwelling Units	0	1	3	23	27
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative reduces population within the 60 dB DNL contour by less than 10%. Achieving that very modest improvement requires affecting approximately 84% of all arrivals. Once again, the 50% reduction in population achieved by Alternative 1 significantly exceeds the benefit of this alternative, while potentially affecting only approximately 16% of total daily departures.



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AKRON-CANTON AIRPORT

Alternative 4: 2014 DNL with Day Arrival Runway Use Changed to Match Day Departure Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.6 Alternative 5: All Departure Runway Use Changed to Match All Arrival Use

This alternative *reduces Runway 23 departures over the area southwest of the airport on a 24-hour basis*, by combining the runway use changes assessed in Alternatives 1 and 3; i.e., changing night departure use to match night arrival use and changing day departure use to match day arrival use, as shown in the following table.

Table 13 Alternative 5: All Departure Runway Use Changed to Match All Arrival Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	**11%**	**15%**	**12%**				**11%**	**15%**	**12%**
Runway 5	15%	32%	19%	**15%**	**32%**	**18%**				**15%**	**32%**	**19%**
Runway 19	26%	21%	25%	**26%**	**21%**	**25%**	Not applicable			**26%**	**21%**	**25%**
Runway 23	48%	32%	44%	**48%**	**32%**	**45%**				**48%**	**32%**	**45%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	**16%**	**24%**	**18%**				**16%**	**24%**	**18%**
Runway 5	12%	23%	14%	**12%**	**23%**	**14%**				**12%**	**23%**	**14%**
Runway 19	29%	17%	27%	**29%**	**17%**	**27%**	Not applicable			**29%**	**17%**	**27%**
Runway 23	42%	36%	41%	**42%**	**36%**	**41%**				**42%**	**36%**	**41%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	**14%**	**14%**	**14%**				**14%**	**14%**	**14%**
Runway 5	16%	17%	16%	**16%**	**17%**	**16%**				**16%**	**17%**	**16%**
Runway 19	26%	28%	26%	**26%**	**28%**	**26%**	Not applicable			**26%**	**28%**	**26%**
Runway 23	45%	41%	44%	**45%**	**41%**	**44%**				**45%**	**41%**	**44%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Day	Night
Runway 1	11%	4%	8%	**11%**	**4%**	**11%**				**11%**	**4%**	**9%**
Runway 5	14%	2%	8%	**14%**	**2%**	**13%**				**14%**	**2%**	**11%**
Runway 19	28%	22%	25%	**28%**	**22%**	**28%**	Not applicable			**28%**	**22%**	**26%**
Runway 23	47%	72%	59%	**47%**	**72%**	**49%**				**47%**	**72%**	**53%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	**7%**	**8%**	**7%**	0%	0%	0%	**7%**	**8%**	**7%**
Runway 5	15%	38%	18%	**15%**	**38%**	**19%**	0%	0%	0%	**15%**	**38%**	**18%**
Runway 19	49%	29%	47%	**49%**	**29%**	**46%**	75%	0%	75%	**49%**	**29%**	**47%**
Runway 23	29%	25%	28%	**29%**	**25%**	**28%**	25%	0%	25%	**29%**	**25%**	**28%**
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

- It is based on actual runway use. The day and night departure use of each aircraft type category is adjusted to match the day and night arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preferences for departing on Runway 23 and arriving on Runway 19 when operating in the south flow, and for departing on Runway 1 and arriving on Runway 5 when operating in the north flow are often related to the shorter taxi times, not aircraft operational considerations.

On the other hand, this alternative shares the daytime operational drawbacks of Alternative 3 and 4, compared to Alternatives 1 and 2, which only affect night operations:

- Overall activity levels and the average rate of operations per hour are significantly higher during the day than during the night, so effects on air traffic control staff workload could be increased.
- Higher day activity levels will increase potential effects on aircraft operators associated with slightly longer taxi distances and times.

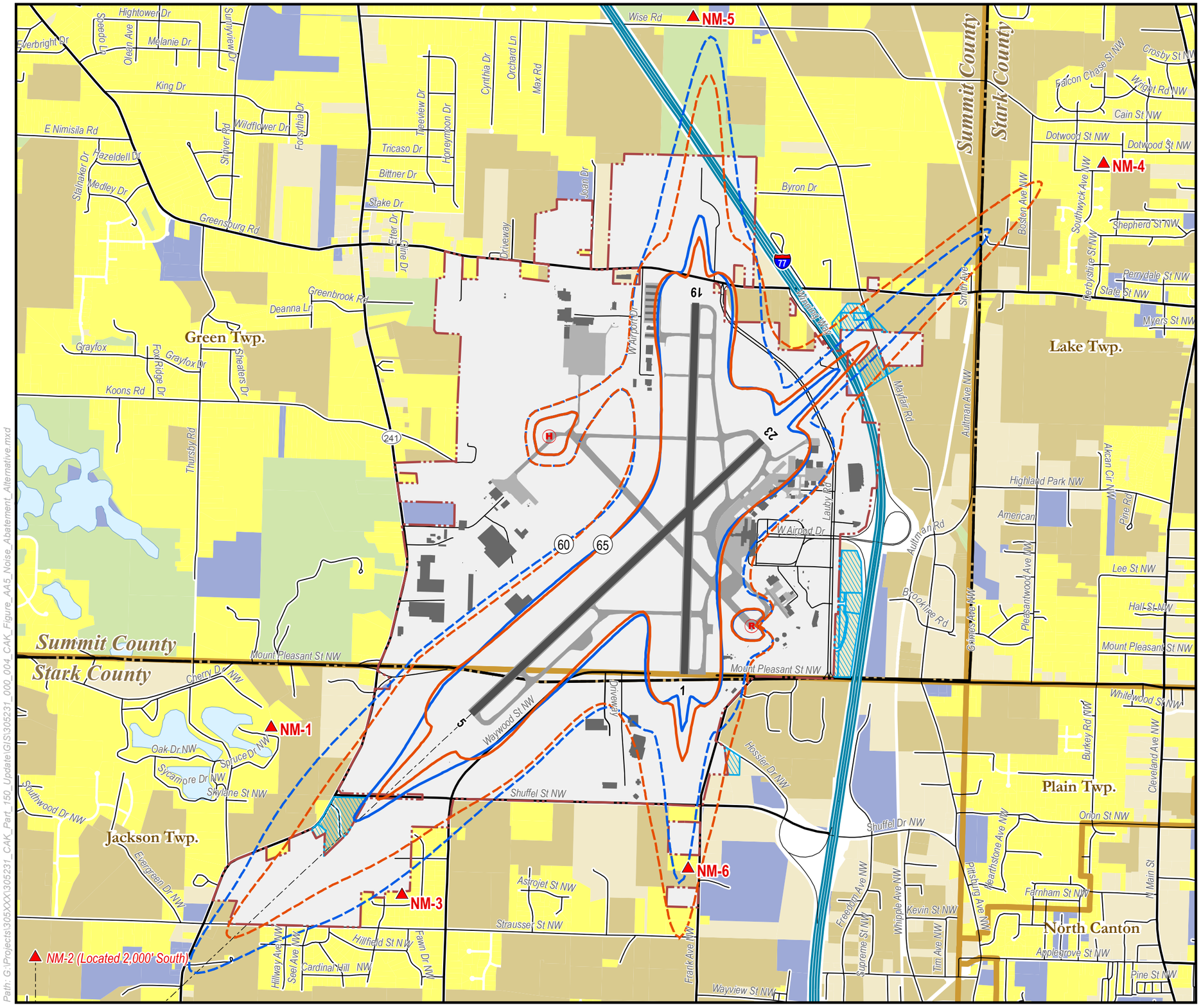
The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 14 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 5
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 5	Residents	0	29	7	9	45
	Dwelling Units	0	14	4	4	22
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative reduces the population within the 60 dB DNL contour by approximately 25%. This benefit is only half as much as Alternative 1, despite the fact that Alternative 1 affected only 16% of all operations, whereas this alternative might affect as many as 50% of all operations. The reduced benefit is associated with increased departure use on Runway 5, which extends the associated contour off the northeast end of Runway 5-23 into a relatively densely developed subdivision. This result is a clear illustration of the higher benefit-cost ratio achieved when a noise abatement measure is directed at nighttime operations alone.

To address this issue, the following section presents a variant of the alternative ("Alternative 5A") that only adjusts departure runway use in the south flow; i.e., shifting departures from 23 to 19. This variant is similar to the Alternative 1A, which was a less-aggressive version of Alternative 1.



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AKRON-CANTON AIRPORT

Alternative 5: 2014 DNL with All Departure Runway Use Changed to Match All Arrival Runway Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.7 Alternative 5A: All South-Flow Runway Use Changed to Shift Departures from Runway 23 to 19

This alternative is a slightly less aggressive variant of Alternative 5. It adjusts only south-flow departure runway use, to reduce departures on Runway 23, which overfly the most affected area southwest of the airport. It shifts departures from Runway 23 to 19 on a 24-hour basis, without increasing departures on either Runway 1 or 5, as indicated in the following table. It essentially is a 24-hour version of Alternative 1A.

Table 15 Alternative 5A: All South-Flow Departure Runway Use Changed to Shift Departures from Runways 23 to 19
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	15%	12%	24%	23%	24%				19%	19%	19%
Runway 5	15%	32%	19%	4%	2%	3%				8%	18%	10%
Runway 19	26%	21%	25%	**25%**	**30%**	**26%**	Not applicable			**26%**	**25%**	**25%**
Runway 23	48%	32%	44%	**47%**	**46%**	**47%**				**47%**	**38%**	**45%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	16%	24%	18%	25%	25%	25%				21%	25%	22%
Runway 5	12%	23%	14%	3%	1%	3%				7%	9%	7%
Runway 19	29%	17%	27%	**29%**	**24%**	**28%**	Not applicable			**29%**	**21%**	**28%**
Runway 23	42%	36%	41%	**43%**	**51%**	**44%**				**43%**	**45%**	**43%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	14%	14%	14%	25%	25%	25%				21%	22%	21%
Runway 5	16%	17%	16%	1%	0%	1%				7%	5%	7%
Runway 19	26%	28%	26%	**27%**	**30%**	**27%**	Not applicable			**27%**	**29%**	**27%**
Runway 23	45%	41%	44%	**46%**	**45%**	**46%**				**46%**	**44%**	**46%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	11%	4%	8%	19%	16%	19%				16%	6%	14%
Runway 5	14%	2%	8%	4%	3%	4%				7%	3%	6%
Runway 19	28%	22%	25%	**29%**	**19%**	**28%**	Not applicable			**29%**	**21%**	**27%**
Runway 23	47%	72%	59%	**49%**	**62%**	**50%**				**48%**	**71%**	**54%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	7%	8%	7%	23%	4%	20%	0%	0%	0%	16%	5%	14%
Runway 5	15%	38%	18%	5%	4%	5%	0%	0%	0%	10%	14%	10%
Runway 19	49%	29%	47%	**45%**	**50%**	**46%**	75%	0%	75%	**47%**	**43%**	**47%**
Runway 23	29%	25%	28%	**27%**	**43%**	**29%**	25%	0%	25%	**28%**	**37%**	**29%**
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

- It is based on actual runway use. The day and night departure use of each aircraft type category is adjusted to match the day and night arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preferences for departing on Runway 23 and arriving on Runway 19 when operating in the south flow, and for departing on Runway 1 and arriving on Runway 5 when operating in the north flow are often related to the shorter taxi times, not aircraft operational considerations.

This alternative shares the daytime operational drawbacks of Alternative 3, 4, and 5, compared to Alternatives 1 and 2, which only affect night operations:

- Overall activity levels and the average rate of operations per hour are significantly higher during the day than during the night, so effects on air traffic control staff workload could be increased.
- Higher day activity levels will increase potential effects on aircraft operators associated with slightly longer taxi distances and times.

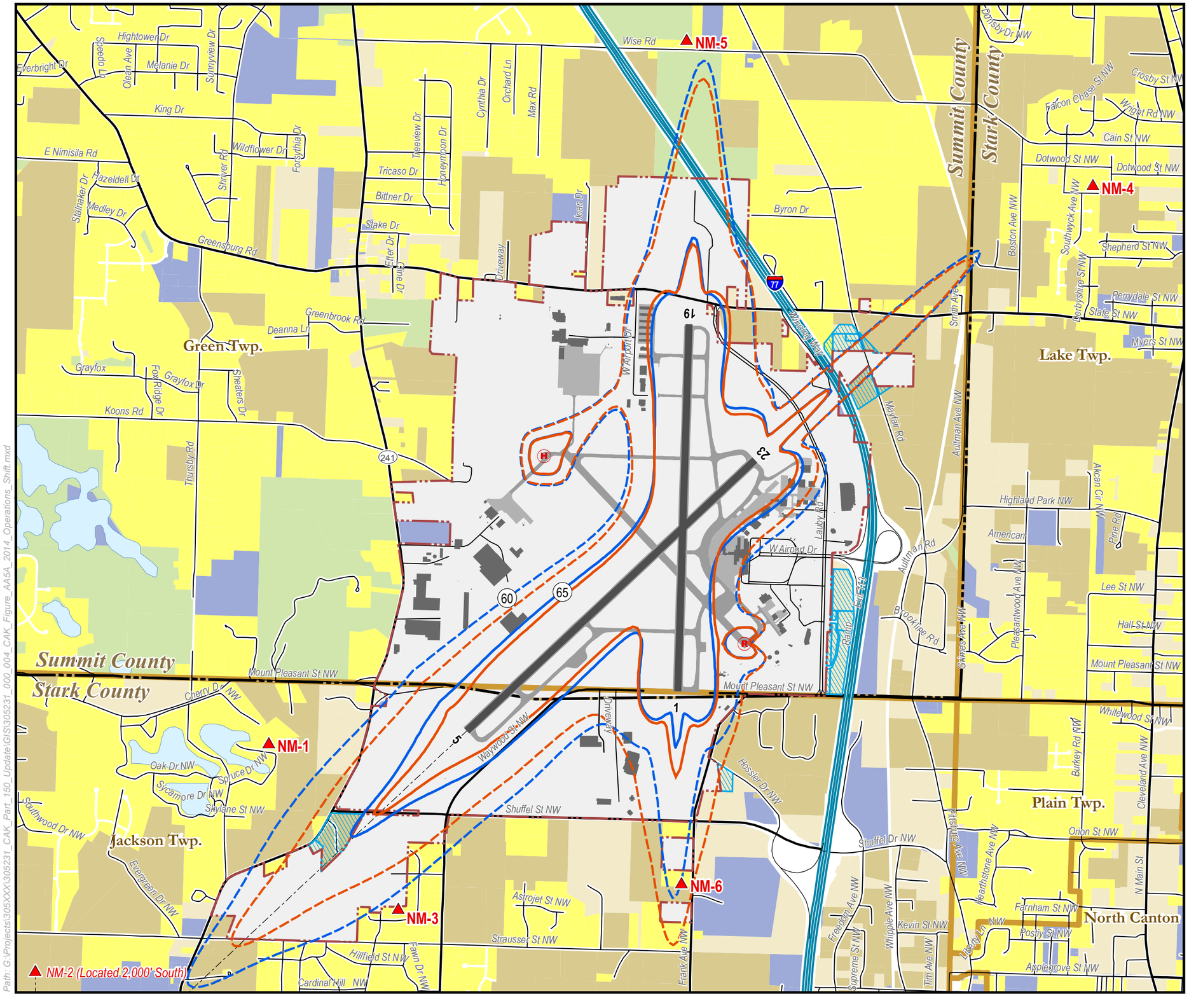
On the other hand, this alternative affects fewer operations than Alternative 5, because it only applies to south-flow departures.

The following table compares the residential land uses within the 60-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions and also to Alternative 5, because of its close relationship.

Table 16 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 5A
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 5A	Residents	0	2	7	8	17
	Dwelling Units	0	1	3	4	8
Alternative 5	Residents	0	29	7	9	45
	Dwelling Units	0	14	4	4	22
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

This alternative reduces the population within the 60 dB DNL contour by approximately 75% over 2014 baseline conditions. Despite affecting fewer operations than Alternative 5, it represents approximately a 60% improvement in benefits. Moreover, it makes this improvement with only a modest increase in exposure in one quadrant – to the south. By only addressing operations in the south flow, it limits the number of operations potentially affected – although the number affected are still relatively high compared to Alternatives 1, 1A, and 2, which only affect night operations.



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AKRON-CANTON AIRPORT

Alternative 5A: 2014 DNL with All South-Flow Runway Use Changed to Shift Departures from Runways 23 to 19, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- 2014 Noise Abatement DNL Contour (65 dB)
- 2014 Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65-75 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- OANG Helipad
- Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.8 Alternative 6: All Arrival Runway Use Changed to Match All Departure Use

This alternative *maximizes the reduction in Runway 5 arrivals over the area southwest of the airport*, by combining the runway use changes assessed in Alternatives 2 and 4; i.e., changing night arrival use to match night departure use and changing day arrival use to match day departure use, as shown in the following table.

Table 17 Alternative 6: All Arrival Runway Use Changed to Match All Departure Use
Runway use revised from existing condition runway use highlighted in bold.

Air Carrier Jets (≥ 90 seats) and All Military Fixed-Wing	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**24%**	**23%**	**24%**	24%	23%	24%				**24%**	**23%**	**24%**
Runway 5	**4%**	**2%**	**3%**	4%	2%	3%				**4%**	**2%**	**3%**
Runway 19	**11%**	**9%**	**10%**	11%	9%	11%	Not applicable			**11%**	**9%**	**10%**
Runway 23	**62%**	**67%**	**63%**	62%	67%	62%				**62%**	**67%**	**63%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Regional Jets (< 90 seats)	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**25%**	**25%**	**25%**	25%	25%	25%				**25%**	**25%**	**25%**
Runway 5	**3%**	**1%**	**3%**	3%	1%	3%				**3%**	**1%**	**3%**
Runway 19	**13%**	**11%**	**12%**	13%	11%	12%	Not applicable			**13%**	**11%**	**12%**
Runway 23	**60%**	**63%**	**60%**	60%	63%	60%				**60%**	**63%**	**60%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

General Aviation Jets	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**25%**	**25%**	**25%**	25%	25%	25%				**25%**	**25%**	**25%**
Runway 5	**1%**	**0%**	**1%**	1%	0%	1%				**1%**	**0%**	**1%**
Runway 19	**17%**	**11%**	**16%**	17%	11%	16%	Not applicable			**17%**	**11%**	**16%**
Runway 23	**57%**	**63%**	**57%**	57%	63%	58%				**57%**	**63%**	**57%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Turbo-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**19%**	**16%**	**17%**	19%	16%	19%				**19%**	**16%**	**18%**
Runway 5	**4%**	**3%**	**3%**	4%	3%	4%				**4%**	**3%**	**3%**
Runway 19	**19%**	**13%**	**16%**	19%	13%	19%	Not applicable			**19%**	**13%**	**18%**
Runway 23	**58%**	**68%**	**63%**	58%	68%	59%				**58%**	**68%**	**61%**
Total	100%	100%	100%	100%	100%	100%				100%	100%	100%

Piston-Propeller Aircraft	Arrival			Departure			Touch-and-Go			Total		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Runway 1	**23%**	**4%**	**21%**	23%	4%	20%	0%	0%	0%	**23%**	**4%**	**20%**
Runway 5	**5%**	**4%**	**5%**	5%	4%	5%	0%	0%	0%	**5%**	**4%**	**5%**
Runway 19	**20%**	**21%**	**20%**	20%	21%	20%	75%	0%	75%	**20%**	**21%**	**21%**
Runway 23	**52%**	**71%**	**54%**	52%	71%	55%	25%	0%	25%	**52%**	**71%**	**54%**
Total	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%

From an operational standpoint, the feasibility of this alternative is supported by several considerations:

- It is based on actual runway use. The night departure use of each aircraft type category is adjusted to match the night arrival use for that same aircraft type. The matching operational conditions strongly support the feasibility of the change.
- Information provided by FAA tower personnel and aircraft operators indicates that the preference for departing on Runway 23 and arriving on Runway 19 when operating in the south flow is often related to the shorter taxi times, not aircraft operational considerations.

On the other hand, this alternative shares the daytime operational drawbacks of Alternative 3 and 4, compared to Alternatives 1 and 2, which only affect night operations:

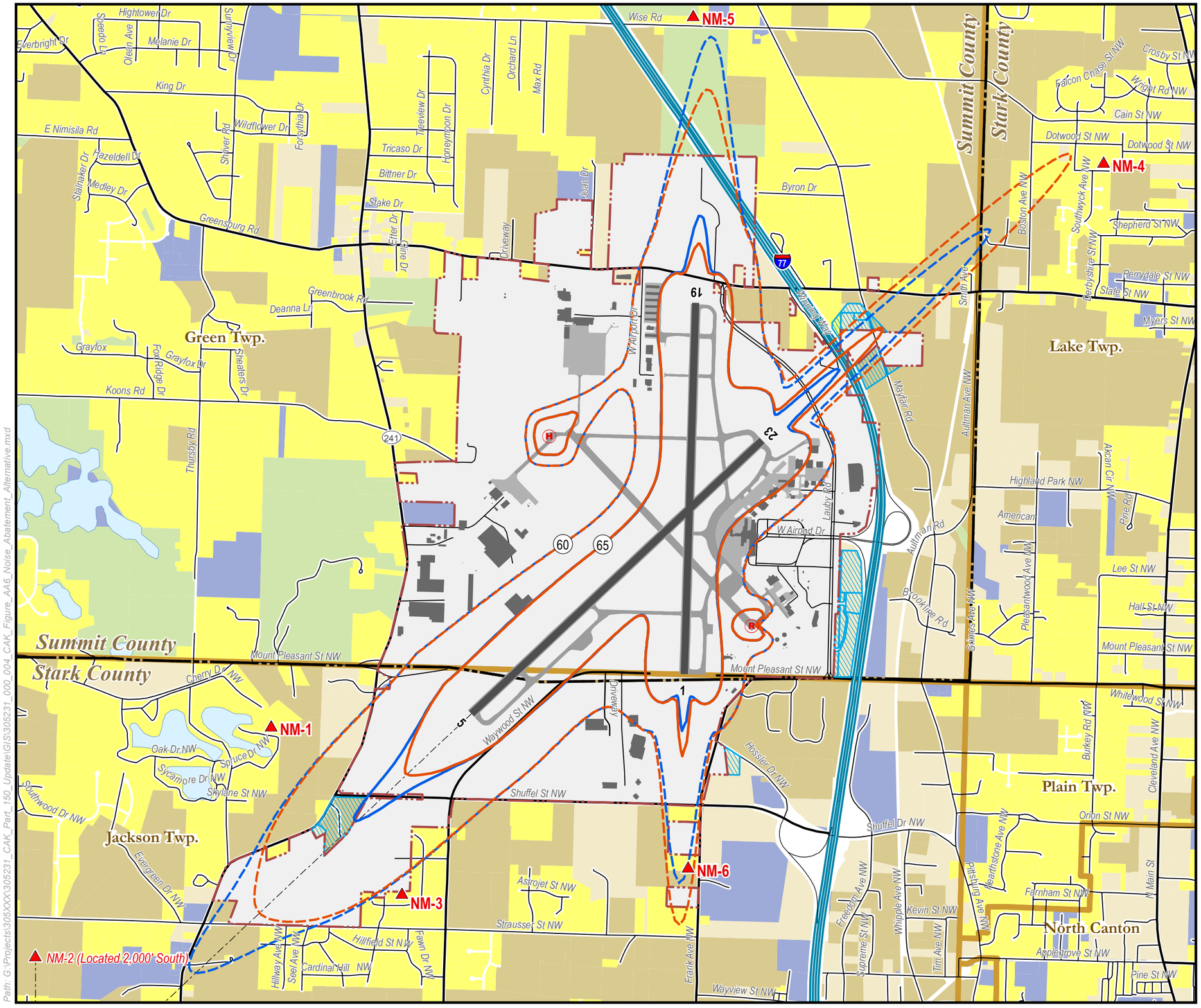
- Overall activity levels and the average rate of operations per hour are significantly higher during the day than during the night, so effects on air traffic control staff workload could be increased.
- Higher day activity levels will increase potential effects on aircraft operators associated with slightly longer taxi distances and times.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case.

Table 18 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 6
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 6	Residents	0	58	5	35	98
	Dwelling Units	0	22	3	15	40
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

Similar to Alternative 2, this alternative *increases* the population within 60 dB DNL, in this case by nearly 60%, by increasing arrival use on Runway 23 and extending the associated contour off the northeast end of Runway 5-23 into a relatively densely developed subdivision under the Runway 23 final approach. It reduces the population to the southwest of the airport affected by Runway 5 arrivals, but not enough to offset this increase. As in the case of Alternative 5, this result illustrates how focusing a noise abatement measure on nighttime operations increases its benefit-cost ratio.



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Alternative 6: 2014 DNL with All Arrival Runway Use Changed to Match All Departure Runway Use, Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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3.1.9 Summary of Preferential Runway Use Analyses

The preceding subsections compare eight different preferential runway use alternatives. Table 19 summarizes the "benefits;" i.e. the number of residents and dwelling units removed from the 2014 60 dB DNL contour, and compares them to the number of fixed-wing operations potentially affected, based on the average annual day number of arrivals and departures by all aircraft types, weighted for changes in runway use. Note that the (negative) changes in residents shown for Alternatives 2 and 6 represent ***increases*** in noise exposure.

Table 19 Summary of the Benefits and Costs of Eight Preferential Runway Use Alternatives Considered
Source: HMMH, 2014

Case	Residents within 60 dB DNL					Population Reduction (Increase)	Operations Affected	Population Reduction (Increase) Per Operation
	North	Northeast	South	Southwest	Total			
2014 Existing	0	2	4	56	62	n.a.	n.a.	n.a.
Alternative 1	0	10	5	17	32	30	6	5.0
Alternative 1A	0	2	5	25	32	30	3	10.0
Alternative 2	0	38	5	37	80	(18)	6	(3.0)
Alternative 3	0	2	5	34	41	21	24	0.9
Alternative 4	0	2	4	51	57	5	24	0.2
Alternative 5	0	29	7	9	45	17	30	0.6
Alternative 5A	0	2	7	8	17	45	17	2.6
Alternative 6	0	58	5	35	98	(36)	30	(1.2)

These analyses strongly support considering promotion of Alternative 1A, which affects a very small number of operations, but provides a relatively large benefit. However, since the measure does not reduce population within the 65 dB DNL contour, which FAA considers the outer limit of land use compatibility concerns, this measure could only be proposed on a "voluntary" basis, as an "informal runway use program" in FAA terminology, as defined under FAA Order 8400.9, "National Safety and Operational Criteria for Runway Use Programs," (issued November 09, 1981).[6]

3.2 Additional Arrival-Departure Contours for a Broader Range of Aircraft Types

Section 4.2 of the January 9, 2014 project memorandum titled "Background for the Fourth Advisory Committee Meeting"[7] presents "single event contours" that compare landing-takeoff cycles, following straight-in and straight-out flight tracks, for a range of jet types operating at CAK (in the recent past and currently). At its fourth meeting, the committee requested a broader range of arrival-departure contours, specifically including the Boeing 737-300. In response to this request, the following two figures present comparisons of the relative "noisiness" of seven representative commercial airliners and six general aviation aircraft types, respectively.

3.2.1 Seven Representative Commercial Jets

- **McDonnell-Douglas DC-9-50:** This aircraft type is the noisiest airliner operated at CAK in recent years. Airlines stopped using these aircraft at CAK in 2013. They are unlikely to be reintroduced for service in the future, because airlines have been disposing of them. The DC-9-50 is an example of an airliner that was originally manufactured to meet the earliest – and most lenient – "Stage 2" noise standards that the FAA adopted in 1969. Many of these aircraft were later modified ("retrofitted" or "hushkitted") to meet the more

[6] A copy of that order is provided in Appendix A of this document.

[7] That material is on the study website at http://www.akroncantonairport.com/files/noise/first-roundnoiseanalyses.pdf

stringent "Stage 3" standards, which all aircraft with maximum gross takeoff weights over 75,000 pounds must meet to operating in the U.S.[8] Its maximum gross takeoff weight is on the order of 120,000 pounds.

- **Boeing 737-700:** This aircraft type is the second most common air carrier aircraft forecast to operate at CAK in 2014 and 2019. Overall, the Boeing 737 is the best-selling series of jet airliners in the history of aviation. The -700 model is representative of the most modern generation of 737s, and meets at least Stage 3 noise standards (). Its maximum gross takeoff weight typically ranges from 145,000 to 185,000 pounds.
- **Boeing 737-300:** This aircraft is the fourth most common air carrier aircraft type forecast to operate at CAK in 2014 and 2019. The -300 is representative of what Boeing terms the "737-classic" models and meets at least Stage 3 noise standards. Its maximum gross takeoff weight typically ranges from 135,000 to 155,000 pounds.
- **Boeing 717-200:** This aircraft is the most common air carrier model forecast to operate at CAK in 2014 and 2015. It is the most modern derivative of the DC-9 series of airliners. Boeing took over production of the DC-9 series when it purchased McDonnell-Douglas in the late 1990s. The 717-200 is representative of the most modern generation of the series, and meets at least Stage 3 noise standards. Like the DC-9-50, its maximum gross takeoff weight is on the order of 120,000 pounds. The difference in the noise contours produced by these two similarly sized and configured aircraft show how much noise reduction has been achieved in aircraft and powerplant design over the past three or four decades.
- **Bombardier Regional Jet 701:** The Bombardier Regional Jet 701 is sometimes referred to as the CRJ701, since it is a derivative of the Canadair Regional Jet, stretched to seat ±70 passengers**.** It is the second most common regional jet model forecast to operate at CAK in 2014 and 2019. Its maximum gross takeoff weight typically ranges from 75,000 to 85,000 pounds.
- **Canadair Regional Jet 200:** The CRJ-200 is the most common regional jet model forecast to operate at CAK in 2014 and 2019. It typically seats 45-50 passengers. Its maximum gross takeoff weight is typically on the order of 53,000 pounds.
- **Embraer 145:** The EMB 145 is the fourth most common regional jet model forecast to operate at CAK in 2014 and 2019. (The second and third most common models are other Canadair variants, so they were not included to provide more diversity.) It typically seats 45-50 passengers. Its maximum gross takeoff weight is typically on the order of 45,000 pounds.

Third, four "corporate jet" types:

- **Gates / Bombardier Lear 35:** The Lear 35 is one of the highest-selling corporate jets in history. It was one of the first corporate jets designed to meet Stage 3 noise standards. Its maximum gross takeoff weight typically ranges from 15,000 to 18,000 pounds. It is the most common INM corporate jet type forecast to operate at CAK in 2014 (including similar aircraft for which this INM type is used as a modeling surrogate).
- **Cessna Model 560:** The Cessna 560 "Citation V" is representative of a modern lightweight corporate jet. Its maximum gross takeoff weight is on the order of 16,000 pounds. It meets at least Part 36 Stage 3 noise standards. It is the second most common INM corporate jet type forecast to operate at CAK in 2014.
- **Cessna CitationJet/CJ Model 525:** The CJ525 is representative of a modern light-weight corporate jet. Its maximum gross takeoff weight is on the order of 11,000 pounds. It meets at least Part 36 Stage 3 noise standards. It is the third most common INM corporate jet type forecast to operate at CAK in 2014.

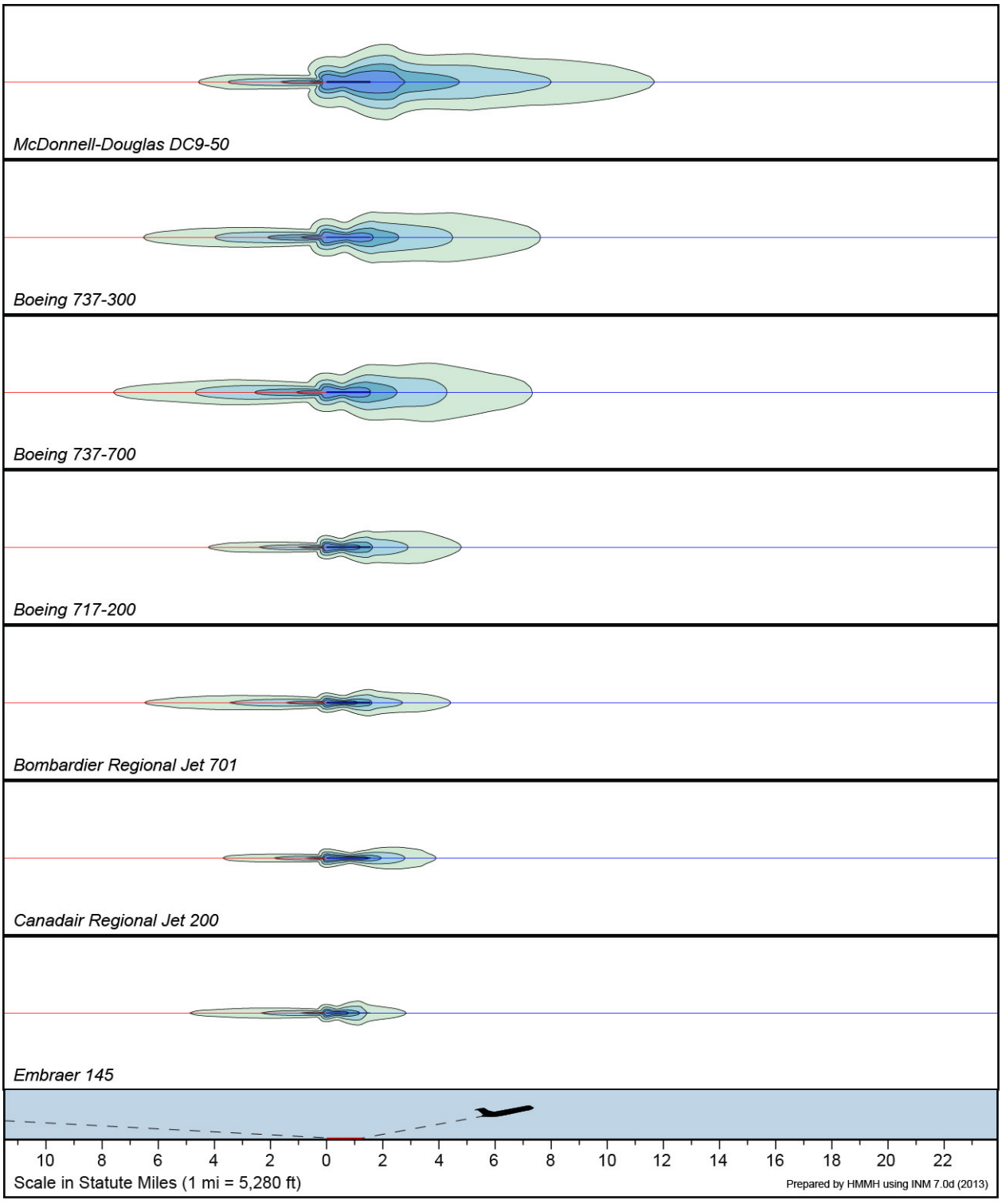
[8] 14 CFR Part 36, "Noise Standards: Aircraft Type and Airworthiness Certification." Appendix A to the memorandum cited in the preceding footnote provides an overview of Part 36 certification standards, for readers who seek more background.

- **Cessna Model 680:** The Cessna 680 "Sovereign" is representative of a modern medium-weight corporate jet. Its maximum gross takeoff weight is on the order of 30,000 pounds. It meets at least Part 36 Stage 3 noise standards. It is the fourth most common INM corporate jet type forecast to operate at CAK in 2014.

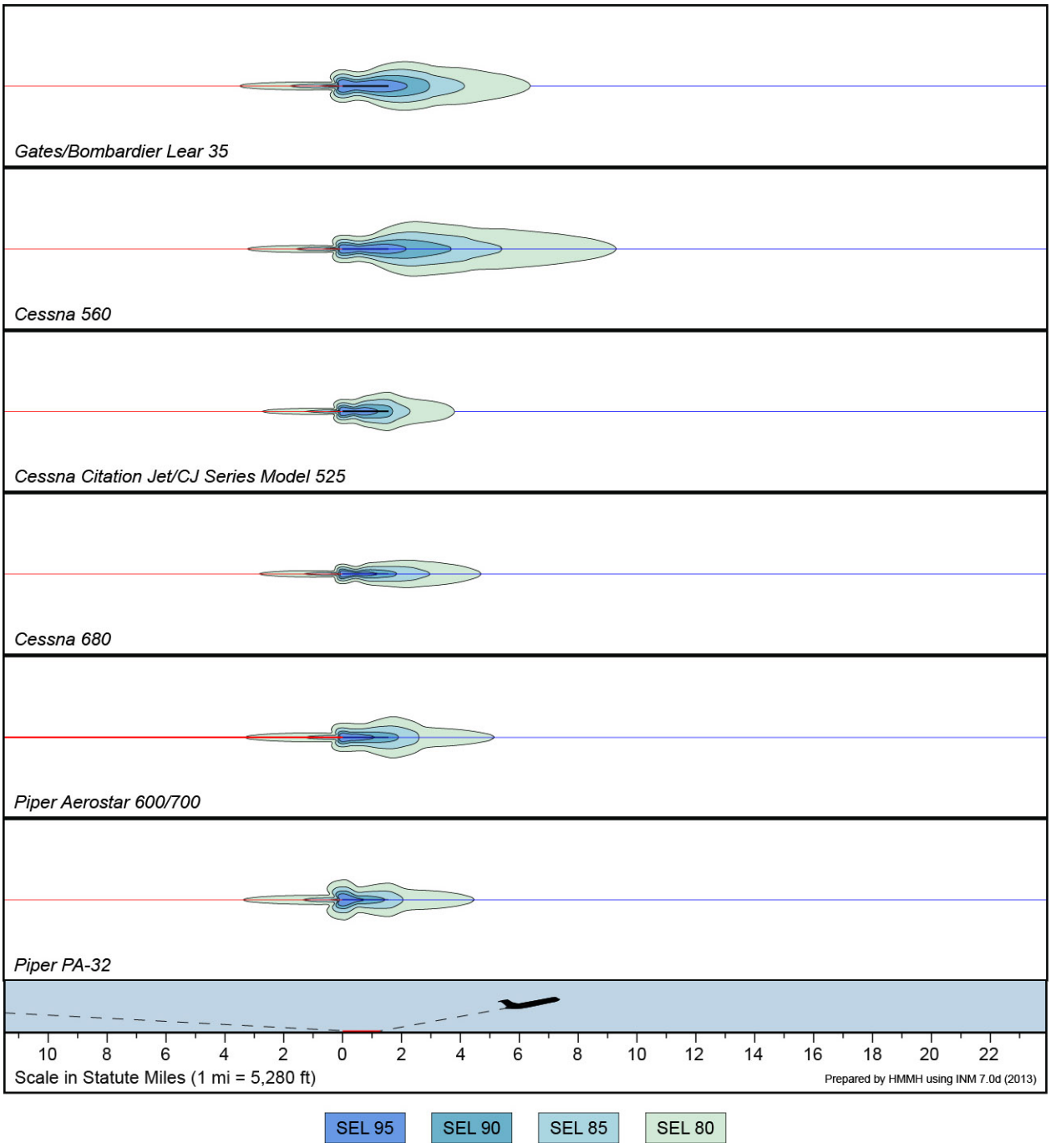
Fourth, two propeller-driven general aviation types:

- **Piper Aerostar 600/700:** The Aerostar is the most common twin-engine propeller INM type ("PA60") forecast to operate at CAK in 2014. Its maximum gross takeoff weight is on the order of 6,000 pounds.
- **Piper PA-32:** The "Cherokee 6" is the most common single-engine propeller INM type ("PA32C6") forecast to operate at CAK in 2014. Its maximum gross takeoff weight is on the order of 3,500 pounds.

Sound Exposure Level Contours for Arrival-Departure "Cycles" of Representative Commercial Jet Aircraft Types
Source: HMMH, 2014



Sound Exposure Level Contours for Arrival-Departure "Cycles" of Representative General Aviation Aircraft Types
Source: HMMH, 2014



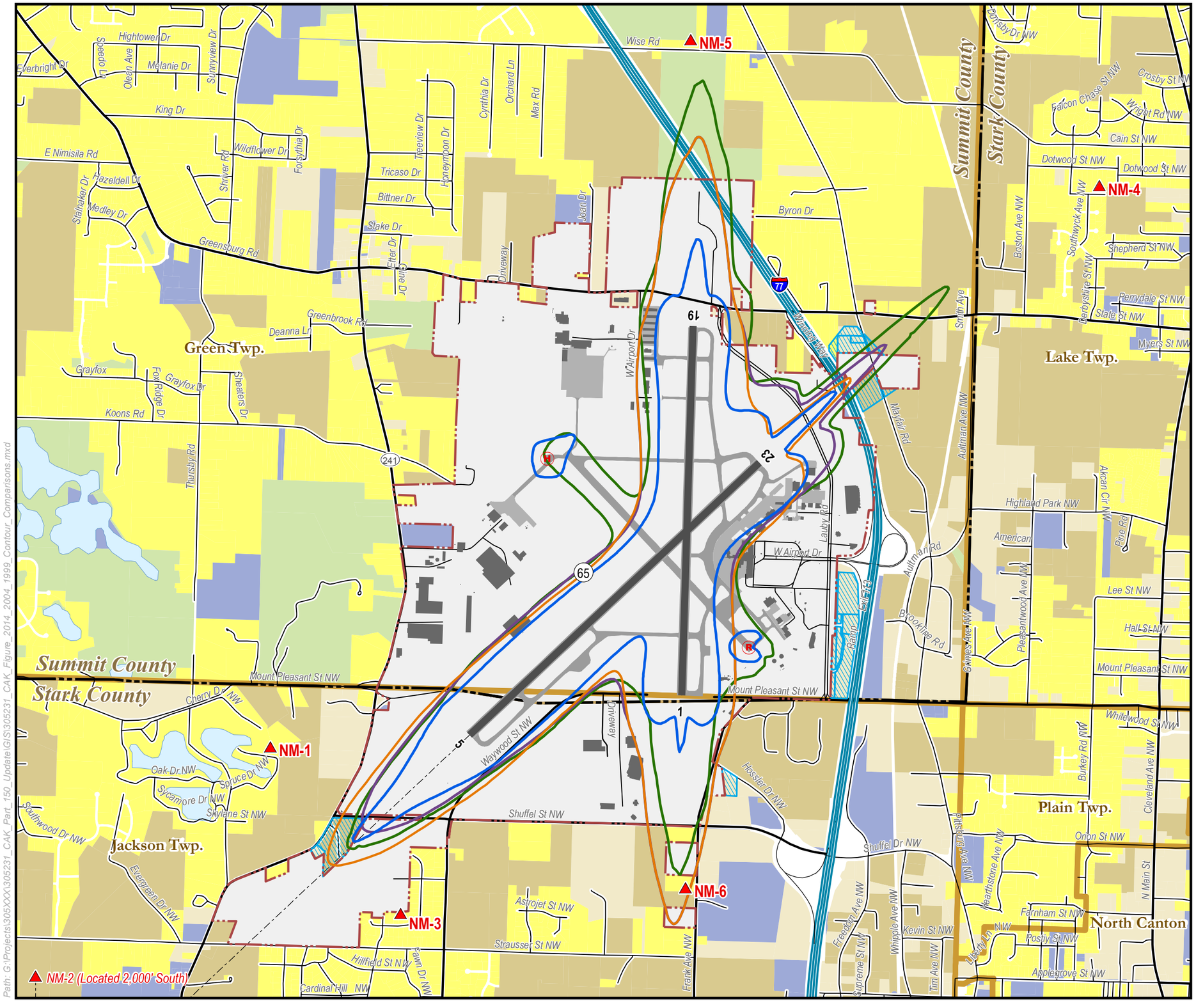
3.3 Comparison of 2014 Contours to Forecast Contours from Prior Part 150 and 2004 EA

Attendees at the fourth Advisory Committee meeting requested a figure comparing DNL contours for four cases: (1) the 2014 existing conditions from this study, (2) the 1999 forecast case from the 1997 Part 150, and (3) and (4) the 2015 no-action and proposed-action alternatives from the 2004 runway extension environmental assessment. While this request does not relate to the topic of "noise abatement" that is the primary focus of this memorandum, the following figure provides the requested comparison. Only the 65 dB DNL contours are presented to reduce clutter and because this is the outermost contour that is common to all four cases.

The differences in the contours can be attributed to a large number of factors. The most important factors are differences in the modeling inputs associated with airport layout and operations; e.g., the runway configuration, level and mix of aircraft activity, runway use, flight track geometry and use, etc. The 2014 existing conditions contour includes the effect of OANG helicopter operations on the west side of the airport and maintenance runup activity on the east, which do not appear to have ben modeled in the other studies, at least to the current study's level of precision.

There also are technical factors affecting the contour comparisons. The current study reflects the most extensive use of actual radar data to develop these modeling inputs. It also reflects the use of the most up-to-date version of the INM and its most extensive database.

Advisory Committee discussion of the runway extension led to questions regarding to the effect of relocating the Runway 5 start-of-takeoff-roll point closer to neighborhoods southwest of the airport. Section 5.3 presents an analysis of this matter, which reveals there is no significant effect on either the 60 or 65 dB DNL contours.



AKRON-CANTON AIRPORT

Contour Comparison of 2014 Existing Conditions, 1999 NEM from 1997 Part 150, and 2015 No-Action and Proposed Action from 2004 EA

14 CFR Part 150 Update

- 2014 DNL Contour (65 dB)
- 2004 Proposed Action DNL Contour (65 dB)
- 2004 No Action DNL Contour (65 dB)
- 1999 DNL Contour (65 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- OANG Helipad
- Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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4. IMPLEMENTATION AND EFFECTIVENESS OF EXISTING NOISE ABATEMENT MEASURES

In its ROA for the 1998 Noise Compatibility Program, the FAA fully or partially approved eight noise abatement measures. This section discusses each of those measures, to determine whether they continue to merit inclusion in the program, and if so, whether any revisions are warranted to enhance their effectiveness. To the extent feasible, their implementation status and noise-related benefits are quantified.

4.1 Existing Noise Abatement Measure 1: Noise Abatement Departure Profiles / Procedures

The ROA approved voluntary implementation of a procedure described as follows:[9]

> NA-1 CAK recommends that pilots of all turbojet aircraft voluntarily use noise abatement departure profiles / procedures (NAPDs) described in FAA Advisory Circular (AC) 91-53A "Noise Abatement Departure Profiles" and National Business Aviation Association (NBAA) publication "Noise Abatement Procedures for Turbojet Business Aircraft." The NADPs would apply to all turbojet departures.
>
> The NCP recommends that the "standard" NBAA procedure be used at CAK, since it is designed for airports where most jet departures are on runways where the first residences are at least 10,000 feet from the brake release point. This is the case at CAK. For civil turbojet aircraft over 75,000 pounds, FAA AC 91-53A defines a "close-in" NADP to provide noise reduction for noise sensitive land uses in close proximity to the departure end of an airport runway, and a "distant" NADP to provide noise reduction for all other noise-sensitive areas. Since most residential areas around the airport are located within one or two miles of the runway ends, the NCP recommends the use of the "close-in" procedure.
>
> The intent of the above procedures is to reduce the single event noise levels from turbojet departures.

The land use conditions described in the FAA summary, on which it based its approval of this voluntary measure, have not changed. Citizen input at Advisory Committee meetings and the first public workshop has indicated that the greatest noise concerns are single event takeoff levels in the same residential areas that the recommended NADPs are designed to address. Continued voluntary use of these procedures is warranted. Since decisions regarding use of these procedures is within the operating authority of individual pilots and does not affect air traffic control or any other FAA duties or responsibilities, airports have the authority to request voluntary implementation outside of a Part 150 process and without obtaining FAA approval. Nevertheless, it is valuable to continue to include the measure in the Noise Compatibility Program, to make the program as comprehensive as possible, and to enhance communication.

Based on these considerations, this measure merits continued implementation on a voluntary basis, to reduce single event noise levels.

4.2 Existing Noise Abatement Measure 2: Maximum Climb Departures for Helicopters

The ROA approved voluntary implementation of a procedure described as follows:

> NA-2 CAK recommends that helicopters from the Ohio Army Air National Guard (OANG) be cleared to 4,000 feet MSL (2,800 feet AGL) or the requested altitude, whichever is lower (usually 2,500 feet MSL or 1,300 feet AGL) immediately after takeoff.
>
> The original Part 150 NCP recommended that helicopters be cleared to 2,500 feet MSL (1,300 feet AGL) immediately after takeoff. The FAA approved this measure. The local air traffic control tower implemented the measure by clearing helicopters to 4,000 feet MSL, or the requested altitude, whichever is lower,

[9] The wording this noise abatement measure has been edited slightly from the ROA to adjust terminology to reflect current conditions (e.g., the NBAA was formerly the "National Business Aircraft Association," whereas the current name is the "National Business Aviation Association"), to correct typographical errors, and to shorten the descriptions by eliminating lengthy references to sections of the Noise Compatibility Program document. The full original ROA wording is available at the location cited in footnote 4.

immediately after takeoff. Since the implementation of this measure, single event noise levels from helicopter overflights have been reduced.

CAK requested that this measure be reapproved for implementation on a voluntary, cooperative, departure-by-departure basis. This measure benefits residents by reducing single event noise levels on local residents.

Given that the noise analysis reveals that the noise contours associated with helicopter operations do not leave the airport property, there is no basis for requesting any change to this existing approved measure from its current implementation on a voluntary, cooperative, departure-by-departure basis.

4.3 Existing Noise Abatement Measure 3: Voluntary Turbojet Restriction of Reverse Thrust at Night

The ROA approved voluntary implementation of a procedure described as follows:

NA-3 Pilots of all turbojet aircraft may voluntarily restrict the use of reverse thrust activity at night (10:00 p.m. - 7:00 a.m.). (NCP Table 3.2, Page 20; Section 3.2.3, Page 22; Table 3.5, Page 36; Section 5.7.6, Pages 57-58).

The Akron-Canton Regional Airport Authority recommends that pilots of all turbojet aircraft voluntarily restrict the use of reverse thrust activity at night (between the hours of 10:00 p.m. - 7:00 a.m.).The procedure would only apply to dry runway conditions. With wet or snow covered runways, full use of reverse thrust would be encouraged at all times.

The intent of this procedure is to minimize the use of reverse thrust at night. Several residents in close proximity to the airport have expressed concern regarding the noise associated with the use of reverse thrust from turbojet aircraft at night. Any policy that would reduce the use of reverse thrust could have a significant noise benefit. Use of reverse thrust is dependent upon aircraft type, aircraft weight, runway length, and runway surface condition.

This voluntary procedure may be communicated to pilots through the use of informational handouts or signs in the local FBO offices for local pilots. Itinerant pilots may be notified through use of a Letter to Airmen.

This measure would benefit residents by reducing single event noise levels on local residents during nighttime periods. This is a new measure.

Once again, given that the noise analysis reveals that the noise contours associated with thrust reverse (which would be along the mid-section of the runways) do not leave the airport property, there is no basis for requesting any change to this existing approved measure from its current implementation on a voluntary, cooperative, departure-by-departure basis.

4.4 Existing Noise Abatement Measure 4: Runway 23 Turbojet Departures Maintain Runway Heading

The ROA approved voluntary implementation of a procedure described as follows:

NA-4 All eastbound turbojet aircraft departing on Runway 23 maintain runway heading until 3 nautical miles from the radar, or until the aircraft is at 2,500 feet MSL (1,300 feet AGL). (NCP Table 3.2, Page 20; Section 3.2.4, Pages 22-23; Table 3.5, Page 36; Section 5.8.1, Page 59).

The Akron-Canton Regional Airport Authority recommends that all eastbound turbojet aircraft departing on Runway 23 maintain runway heading until 3 nautical miles from the radar, or until the aircraft is at 2,500 feet MSL (1,300 feet AGL).

The original NCP called for the implementation of a noise abatement procedure for turbojet aircraft departing on Runway 23. The measure was implemented in a modified form following the approval of the original NCP. The procedure as originally proposed, requires all turbojet aircraft departing on Runway 23 to maintain runway heading until 4 nautical miles from the radar. As implemented, the procedure requires all

eastbound turbojet aircraft departing on Runway 23 to maintain runway heading until 3 nautical miles from the radar, or until the aircraft is at 2,500 feet MSL (1,300 feet AGL).

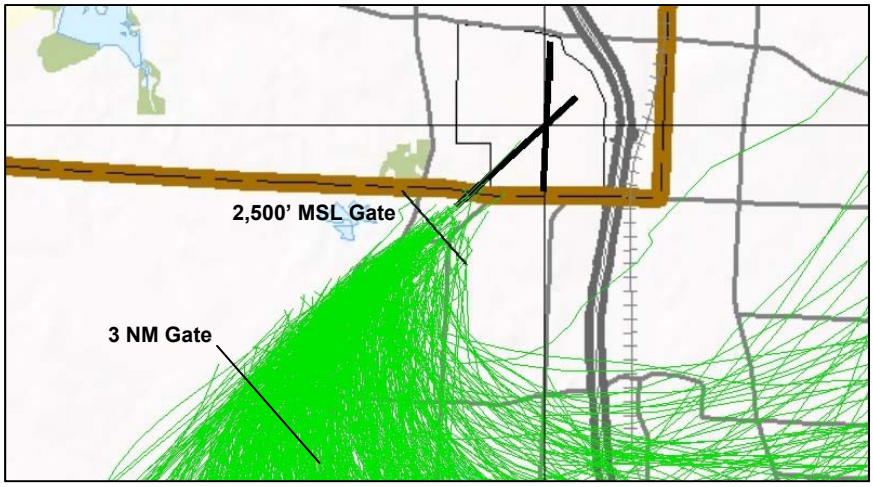
This straight-out procedure for eastbound turbojet aircraft would avoid overflights of the residential area that straddles Strausser Street, just south of the extended centerline of Runway 23. Continued implementation would reduce noise levels from single event overflights on this residential area.

Radar analyses of Runway 23 departures conducted for development of the 2014 existing conditions contours provide a detailed objective basis for assessing the current implementation of this alternative. The assessment requires considering a two–part question: Are Runway 23 departures either (1) maintaining runway heading until at least three nautical miles from the radar or (2) until they are at 2,500 feet MSL (1,300 feet AGL)?

The following figure considers the first part of this question. It is a plot of all Runway 23 turbojet departures obtained in the radar data sample obtained for the months of January, April, July, and October 2012 for use in developing modeling inputs, as discussed in the September 2013 "Project Introduction and Inventory Report".

Plot of All Runway 23 Turbojet Departures January, April, July, and October 2012 Relative to a Line Perpendicular to the Extended Runway Centerline Three Nautical Miles from the Radar

Source: 20144 HMMH Analysis of 2012 PASSUR Aerospace Data

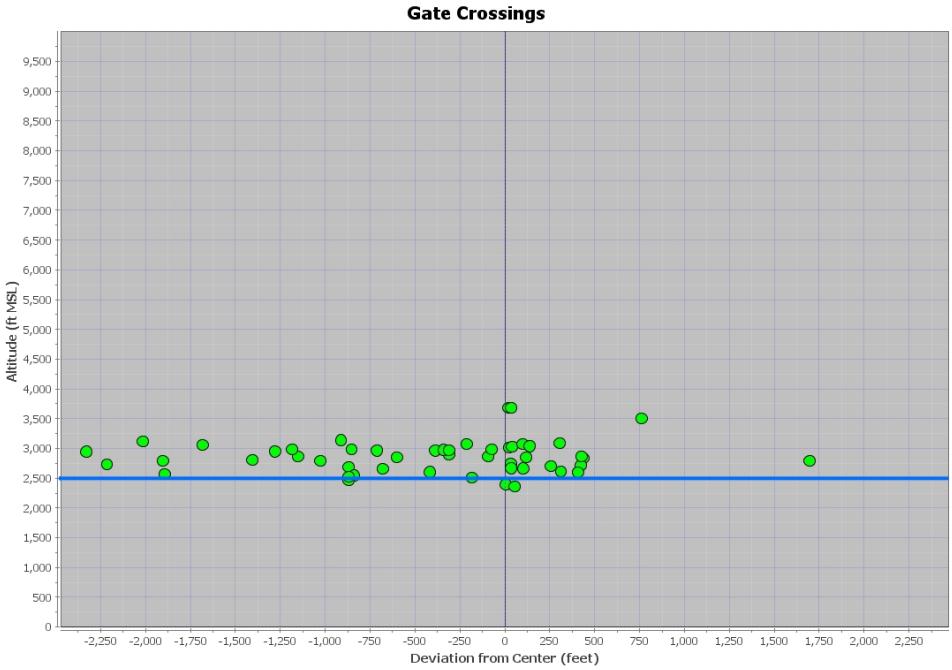


The plot includes two lines perpendicular to the extended runway centerline. The outermost line ("3 NM Gate") is drawn to intersect the extended runway approximately three nautical miles from the radar. Clearly many turbojet departures are initiating turns prior to the three nautical mile limit. However, this observation does not necessarily mean that the aircraft are out of compliance with the preferred procedure, since the approved procedure permits aircraft to turn at any point along their track if they are above 2,500 feet MSL.

To investigate this second turn criterion, the inner line, (labeled "2,500' MSL gate") is drawn perpendicular to the runway centerline at the point where the radar data indicate most aircraft have reached 2,500' MSL. To illustrate this conclusion, the following figure is a vertical plot of the points at which turbojet departures on Runway 23 cross the 2,500' MSL gate (looking out from the airport toward the southwest). The plot shows fewer operations than the preceding figure, because most of the tracks begin past it. However, this figure shows that the great majority of the departures are above 2,500 MSL, and that most of those below that altitude are on runway centerline, as requested.

Vertical Plot of Points at Which Runway 23 Turbojet Departures in January, April, July, and October 2012 Cross a Line Perpendicular to the Extended Runway Centerline Three Nautical Miles from the Radar (Looking Out from the Airport)

Source: 20144 HMMH Analysis of 2012 PASSUR Aerospace Data

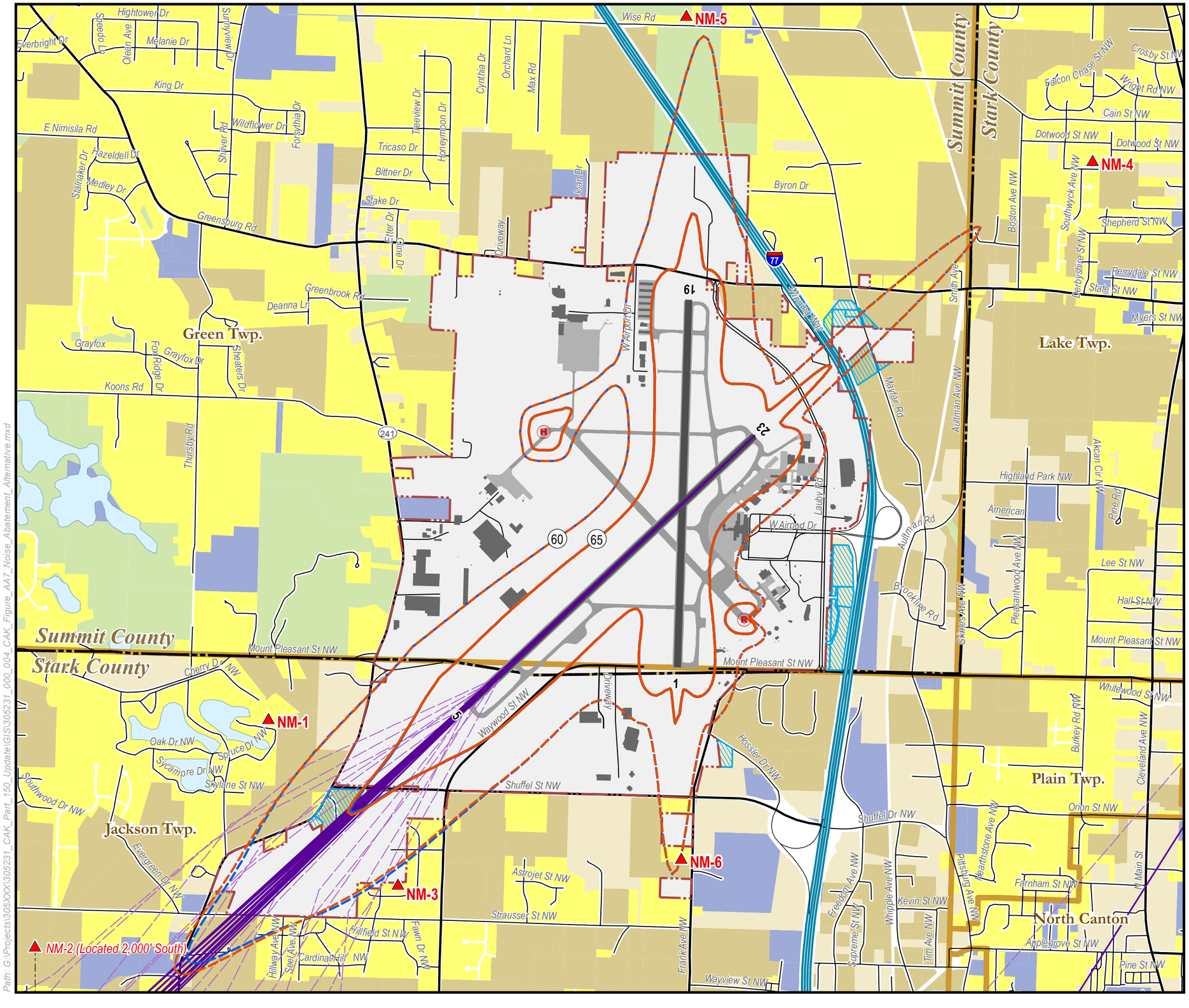


Based on this analysis, it appears the minimum altitude turn criterion may be reducing the effectiveness of the existing procedure, by permitting some faster-climbing aircraft to turn relatively close in to the airport and overfly residential areas off to either side of the runway centerline. As both figures show, most of the early turns are to the south (left-hand turns), resulting in overflight of the residential area south of Strausser Street.

To address this issue, a seventh abatement alternative was prepared to test a revised version of the existing procedure. This alternative eliminates the altitude condition and requires that all aircraft maintain runway heading until past three nautical miles, thereby requiring some fast-climbing aircraft to fly straight out farther.

The following figure depicts this "Alternative 7." As in the preceding figures for the preferential runway alternatives, the figure compares the 60 and 65 dB DNL contour for the abatement case to the 2014 existing conditions. The figure also shows the relatively widely dispersed tracks modelled in the existing conditions case and the narrower spread of tracks modelled for the alternative.

The figure shows relatively little change in the 60 dB DNL contour.



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Alternative 7: 2014 DNL with All Eastbound Jet Departures on Runway 23 Flying Runway Heading Until 3 Nautical Miles from Radar, Compared to 2014 Exist. Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Existing Flight Track
- Compliant Flight Track
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- (H) OANG Helipad
- (R) Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case. The alternative reduces the encompassed population by two residents.

Table 20 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 7
Source: HMMH, 2014

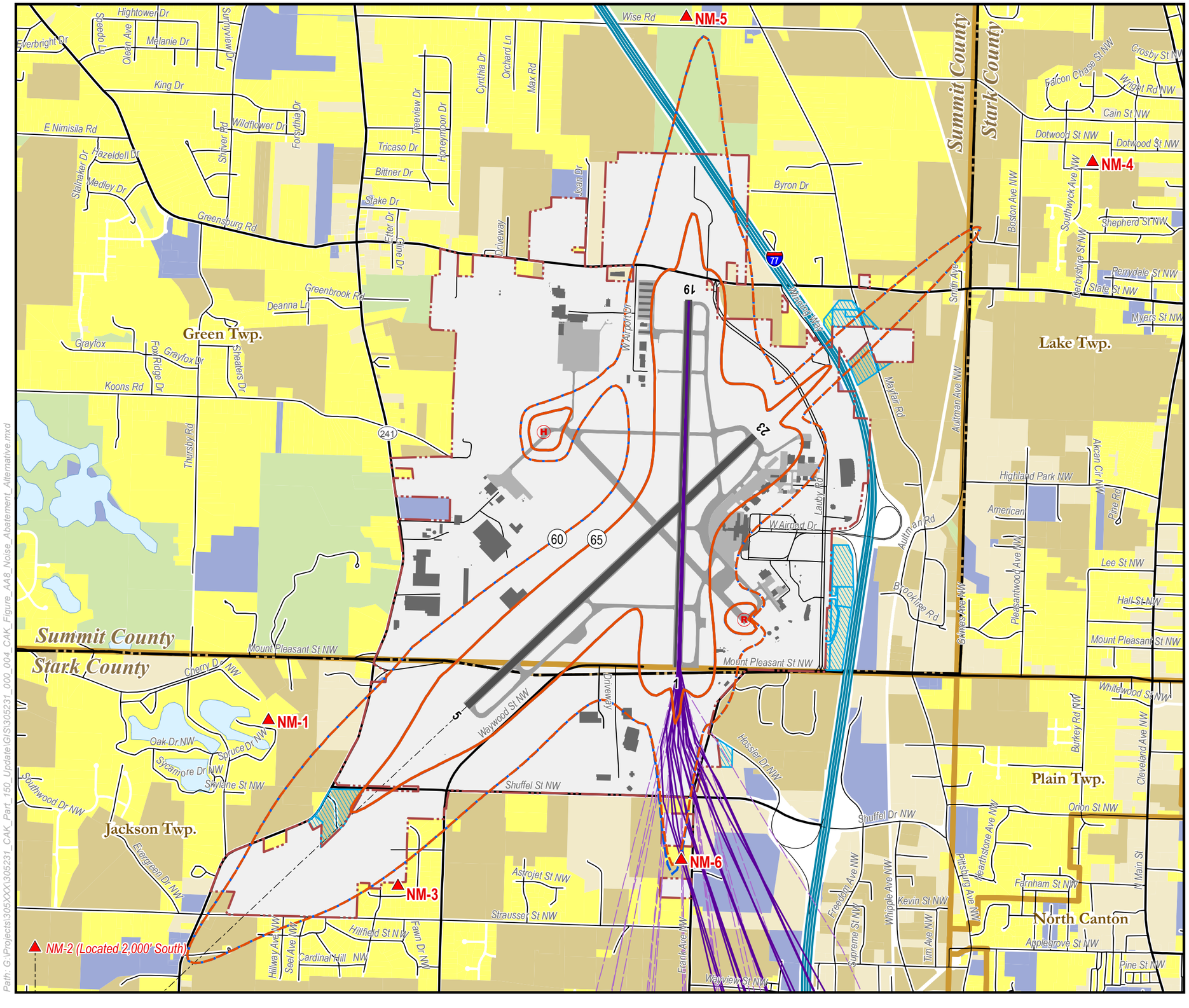
Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 7	Residents	0	2	4	54	60
	Dwelling Units	0	1	2	23	26
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

4.5 Existing Noise Abatement Measure 5: Runway 19 Departure Turn to 160° at One Nautical Mile

The purpose of this measure was to revise a measure that the FAA approved at the conclusion of the first Part 150 study, which called for Runway 19 turbojet departures to turn to a heading of 160 degrees at two nautical miles from the radar and to maintain that heading until reaching four nautical miles. The second Part 150 recommended changing the procedure to start at one nautical mile. The FAA disapproved this change, but approved continued voluntary implementation of the original procedure:

> NA-5 All eastbound and southbound turbojet aircraft departing on Runway 19 initiate a turn to a heading of 160 degrees at 1 nautical mile from the radar and maintain that heading until 4 nautical miles. (NCP Table 3.2, Page 20; Section 3.2.5, Page 23; Table 3.5, Page 36; Section 5.8.2, Pages 59, 63).
>
> The Akron-Canton Regional Airport Authority recommends that the departure procedure developed for Runway 19 in the original Part 150 study be implemented in full to minimize overflights on residential areas south. Although this has been implemented in some fashion by FAA for several years, having a formal procedure in place will help minimize the impact of the runway extension. In addition, it is recommended that the turn to 160 degrees be initiated at 1 nautical mile instead of the 2 nautical miles recommended in the original Part 150 study.
>
> The original NCP called for the implementation of a noise abatement turn for turbojet aircraft departing on Runway 19 to a heading of 160 degrees at 2 nautical miles from the radar and maintain until 4 nautical miles. In the original Part 150, this procedure assumed that Runway 1-19 would be extended to the south and that operations would increase considerably on that runway. That extension is now planned within the next 10 years. The procedure has not been implemented although departures are routinely turned to avoid the residential areas to the south.
>
> One home is within the 5-year 65 DNL contour (area C). Approval of this revised procedure does not eliminate this home from the contour. However, it would eliminate residentially zoned vacant land and would reduce noise from overflights of the residential area south of the airport and west of Frank Avenue.
>
> DISAPPROVED. The FAA will continue the current voluntary procedure to turn at 2 nautical miles. One nautical mile from the radar site is approximately over the departure end of the runway. Flights will be very low to the ground and at relatively slow airspeed. Crews should not be required or requested to initiate turns at this critical phase of the flight.

Noise contours were prepared to determine if there is an objective basis for reapplying for the one nautical mile turn limit, as shown in the following figure for "Alternative 8."



Path: G:\Projects\305XXX\305231_CAK_Part_150_Update\GIS\305231_000_004_CAK_Figure_AA8_Noise_Abatement_Alternative.mxd

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Alternative 8: 2014 DNL with All East- and Southbound Jet Departures on Runway 19 initiating a Turn to 160° at 1 Nautical Mile from the Radar, Compared to 2014 Exist. Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Existing Flight Track
- Compliant Flight Track
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- OANG Helipad
- Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

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As in the preceding figures for Alternative 7, the figure depicts the existing conditions and abatement flight tracks, with the dispersed abatement tracks initiating turns when one nautical mile from the radar.

Once again, the figure shows very little change in the 60 dB DNL contour, even though it represents a highly idealized set of assumptions regarding compliance with this voluntary procedure.

The following table compares the residential land uses within the 65-65 dB DNL contour – by runway end – for this case to that for the 2014 existing conditions case. The alternative reduces the encompassed population by just a single resident.

Table 21 Residential Land Uses within 2014 60-65 dB DNL Contours by Runway End for Alternative 8
Source: HMMH, 2014

Case	Metric	North – off Runway 19 approach / 1 departure end	Northeast – off Rwy 23 approach / Rwy 5 departure end	South – off Runway 1 approach / 19 departure end	Southwest – off Runway 5 approach / 23 departure end	Total
Alternative 8	Residents	0	2	3	56	61
	Dwelling Units	0	1	2	24	27
2014 Existing Conditions	Residents	0	2	4	56	62
	Dwelling Units	0	1	2	24	27

4.6 Existing Noise Abatement Measure 6: Designate the Location and Orientation of Engine Runups

The ROA approved voluntary implementation of a procedure described as follows:

> NA-6 Designate the location and orientation of engine runups. (NCP Table 3.2, Page 20; Section 3.2.6, Pages 23-24; Table 3.5, Page 36; Section 5.9.9, Pages 70-71; Section 5.10.2, Pages 76,79; Figure 5.4, Pages 77,78; Airport Memo on Engine Runup Operations - Appendix F).
>
> The Akron-Canton Regional Airport Authority recommends that the location and orientation of engine runups be designated. Several residents in close proximity to the airport have expressed concern regarding the noise associated with the engine runups that result from the maintenance operators at the airport. This measure designates a maintenance runup area to limit the noise impacts from runups. Given the amount of residential development to the south of the airport and the lack of residential development to the southeast of the airport, a designated area at the threshold to Runway 32 would be a suitable location for all engine maintenance runups above flight idle power. Flight idle power maintenance runups would continue to be allowed on the ramp areas. Maintenance runups above flight idle power should be prohibited from all areas of the airfield, except the designated engine runup area at the threshold to Runway 32 at the runway heading of 320 degrees if at all possible. Maintenance runups at flight idle power should also be limited to certain directions. On the Chautauqua ramp on the west side of the airport, flight idle runs should be limited to a heading of 360 degrees if possible, while on the PSA ramp on the east side of the airport flight idle runups should be limited to headings of 360 degrees or 050 degrees if possible.
>
> The intent of this measure is to minimize the single event noise levels from aircraft engine runups at night. This is a new measure.

As discussed previously and shown on all contour figures, this procedure has been implemented by designating a maintenance runup location on the east side of the airport, with the preferred aircraft heading being to the west. Operations data collected for development of the existing conditions contours reveal essentially complete compliance with this procedure. The associated significant noise exposure remains on airport property.

4.7 Existing Noise Abatement Measure 7: Designate the Location for an Engine Runup Enclosure

The ROA approved consideration of a location for a future engine runup enclosure, for depiction on the next update of the airport layout plan:

> NA-7 Designate the location for an engine runup enclosure. (NCP Table 3.2, Page 20; Section 3.2.7, Pages 24-25; Table 3.5, Page 36; Section 5.10.6, Pages 80-81; Figure 5.5, Pages 83-84).
>
> The Akron-Canton Regional Airport Authority recommends that a location be designated for construction of an engine runup enclosure, should the number and type of runups increase substantially in the near future. Noise runup enclosures are structures that help where the runups are in close proximity to noise sensitive receivers and where maintenance runup restrictions or the designation of a maintenance runup area is insufficient to control noise from the runups in the surrounding areas.
>
> A ground runup enclosure (GRE) may be appropriate at Akron-Canton Regional Airport. The GRE is generally closed on all 4 sides but open over the roof area. Aircraft are towed into the GRE and the front doors are closed with the aircraft inside. The rear of the GRE incorporates a blast deflector, while the rear, side, and front walls are treated with sound absorbing material.
>
> At the present time, the runup noise at the airport is the result of a relatively low number of propeller runup operations. Noise levels from these runup operations, although disturbing to some people, are much less than the runup noise created by turbojet aircraft. If the activity level of runup operations increases in the next several years, or if the type of aircraft changes, the airport should consider a ground runup enclosure to mitigate the noise from the runup operations. Given the relatively low noise levels from engine runups (propeller aircraft only), and the low number of runup operations, a GRE is not recommended at this time. However, the airport should consider the location of such a structure.
>
> This is a new measure.

The runup analyses discussed in the preceding section indicate that the existing runup location has been successful in keeping significant runup-related noise exposure within the airport property boundary, eliminating the justification for consideration of a costly enclosure.

4.8 Existing Noise Abatement Measure 8: Improve Engine Runup and Taxiing Procedures

The ROA approved voluntary implementation of a procedure described as follows:

> NA-8 Improve engine runup and taxiing procedures. (NCP Table 3.2, Page 20; Section 3.2.8, Page 25; Table 3.5, Page 36; Section 5.11.1, Pages 85-86.
>
> The Akron-Canton Regional Airport Authority recommends that engine runup and taxiing procedures be improved. Aircraft that undertake these procedures are recommended to perform them at specific designated areas on the airport so as to minimize the impact on residential areas to the north and northeast of the airport. Pre-flight engine checks should be undertaken either near the passenger terminal area or on Taxiway "C" with an aircraft orientation of 360 degrees.
>
> The intent of these measures is to provide a reduction in the single event noise levels over residential areas around the airport. This is a new measure.

Once again, the runup analyses discussed in the Section 4.6 indicate that the existing runup location has been successful in keeping significant runup-related noise exposure within the airport property boundary, eliminating the justification for consideration of additional actions to address the concerns raised in the prior study. In addition, there has been no input regarding noise from engine runups or taxiing from community representatives north or northeast of the airport.

5. PART 150 NOISE ABATEMENT ALTERNATIVE ANALYSIS REQUIREMENTS

5.1 Categories of Noise Abatement Alternatives to Consider

Part 150 Section B150.7, "Analysis of program alternatives," provides the following guidance regarding three basic categories of noise abatement measures which the airport must consider:

(a) Noise control alternatives must be considered and presented according to the following categories:

(1) Noise abatement alternatives for which the airport operator has adequate implementation authority.

(2) Noise abatement alternatives for which requisite implementation authority is vested in a local agency or political subdivision governing body, or a state agency or political subdivision governing body.

(3) Noise abatement options for which requisite authority is vested in the FAA or other Federal agency.

The implementation of each alternative discussed in this memorandum requires involvement of the airport, aircraft operators, and FAA. The airport must propose the measures to the FAA and, if approved, advertise and promote their use. FAA air traffic control staff must assist in providing instructions to flight crews to use the procedures, as safe and feasible. Operators must comply with FAA instructions and take steps to follow those procedures, again as safe and feasible.

On a more formal basis, the Authority has the right to identify the maintenance runup location and require its use, again as safe and feasible. The FAA has approved all existing operational noise abatement measures as "voluntary informal" procedures, and almost certainly will continue that practice in approving any new or revised measures, consistent with its well-established practice under the Part 150 program.

5.2 Specific Measures to Consider

Part 150 Section B150.7, "Analysis of program alternatives," provides the following guidance regarding three basic categories of noise abatement measures which the airport must consider. [*Text inserted in brackets briefly addresses how this memorandum addresses these categories.*]:

(b) At a minimum, the operator shall analyze and report on the following alternatives, subject to the constraints that the strategies are appropriate to the specific airport (for example, an evaluation of night curfews is not appropriate if there are no night flights and none are forecast):

(1) Acquisition of land and interests therein, including, but not limited to air rights, easements, and development rights, to ensure the use of property for purposes which are compatible with airport operations.

[*CHA will address this category in a separate memorandum.*]

(2) The construction of barriers and acoustical shielding, including the soundproofing of public buildings.

[*As discussed under Sections 4.6, 4.7, and 4.8, there are no ground noise issues meriting consideration, since runup noise considerations have been addressed through the designated maintenance runup location and orientation. Since there are no public buildings within the 65 dB DNL (or even within the 60 dB DNL) contour, soundproofing is not an eligible consideration.*]

(3) The implementation of a preferential runway system.

[*Section 3.1 discusses this category in detail and leads to a particularly promising option, "Alternative 1A," as summarized in Section 3.1.9.*]

(4) The use of flight procedures (including the modifications of flight tracks) to control the operation of aircraft to reduce exposure of individuals (or specific noise sensitive areas) to noise in the area around the airport.

[*Sections 4.4 and 4.5 discuss this category in detail. They demonstrate the effectiveness of the FAA-approved noise abatement flight track procedures for Runway 23 and 19, respectively, and suggest that a modest revision of the Runway 23 procedure could enhance its effectiveness.*]

(5) The implementation of any restriction on the use of airport by any type or class of aircraft based on the noise characteristics of those aircraft. Such restrictions may include, but are not limited to:

(i) Denial of use of the airport to aircraft types or classes which do not meet Federal noise standards;

(ii) Capacity limitations based on the relative noisiness of different types of aircraft;

(iii) Requirement that aircraft using the airport must use noise abatement takeoff or approach procedures previously approved as safe by the FAA;

(iv) Landing fees based on FAA certificated or estimated noise emission levels or on time of arrival; and

(v) Partial or complete curfews.

[*Formal use restrictions are not candidates for consideration at CAK, since there are no noncompatible land uses within the 65 dB DNL contour that the FAA considers the outer limit of the impact area for use in justifying restrictions under 14 C.F.R. Part 161, "Notice and Approval of Airport Noise and Access Restrictions."*[10] *Voluntary use of noise abatement takeoff procedures are addressed by existing FAA-approved measure #1 discussed in Section 4.1.*]

(6) Other actions or combinations of actions which would have a beneficial noise control or abatement impact on the public.

[*An Advisory Committee member requested that an airport layout oriented measure be considered, consisting of displacing the Runway 5 start-of-takeoff roll point to reduce associated noise exposure in neighboring communities to the southwest of the airport. Section 5.3 addresses this recommendation.*]

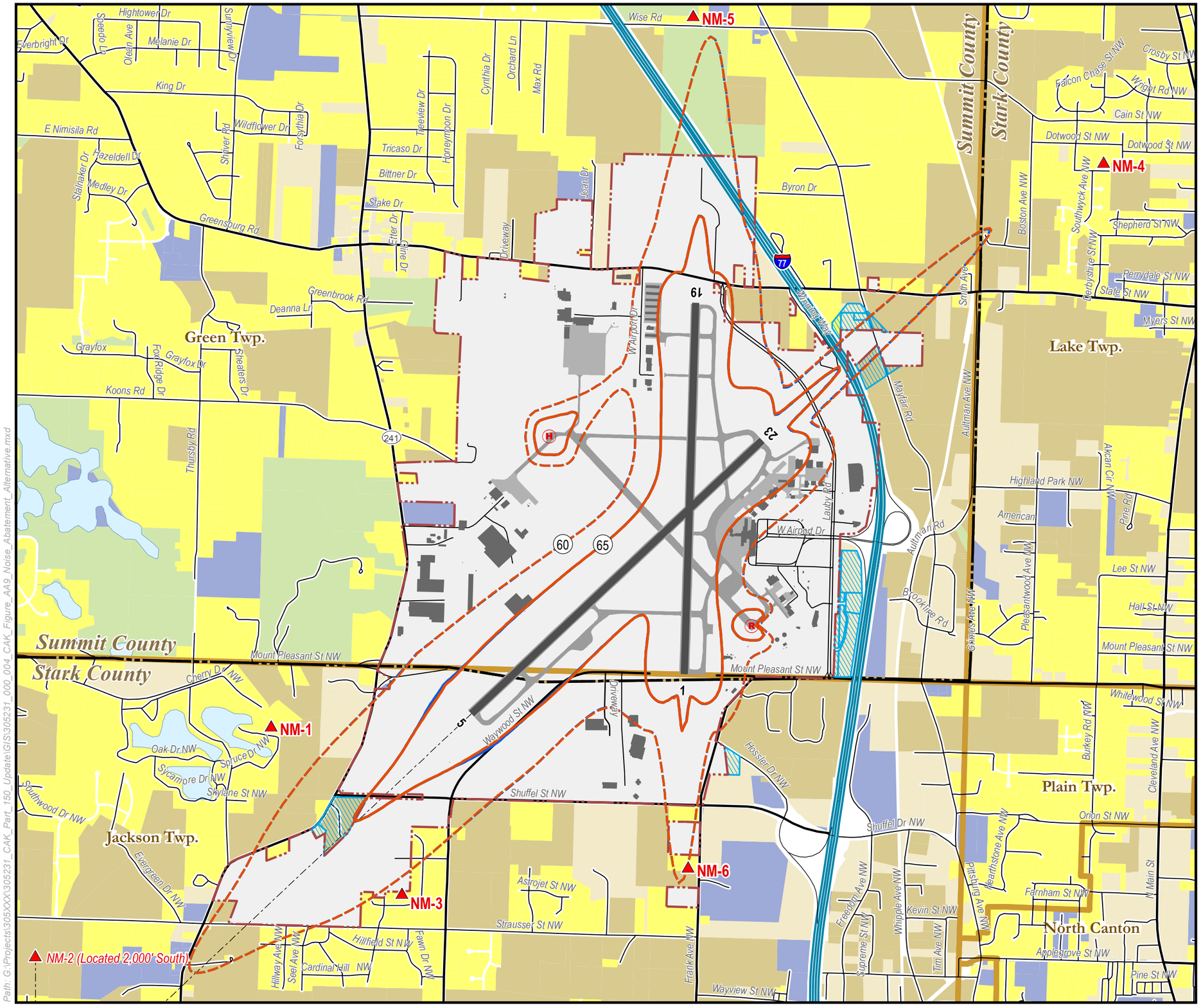
(7) Other actions recommended for analysis by the FAA for the specific airport.

[*FAA Airport Traffic Control Tower staff representatives have participated in the Advisory Committee meeting discussions of alternatives to consider.*]

5.3 Airport Layout Alternative

As illustrated in Section 3.3, 2004 Environmental Assessment (EA) investigated an extension of Runway 5-23 to the southwest. This extension relocated the Runway 23 start-of-takeoff-roll point closer to the residential communities on either side of the extended runway centerline southwest of the airport. Advisory Committee members from those neighborhoods requested an analysis of an alternative that would relocate that start-of-takeoff-roll point roughly back to its former location, at the first taxiway intersection northeast of the runway end. The following figure ("Alternative 9") presents the results of that analysis. It shows that the effect on the 60 and 65 dB DNL contours is insignificant. That lack of benefit, combined with the fact that it would reduce runway length available for takeoff, make this alternative an unrealistic candidate for further consideration.

[10] See: http://www.faa.gov/airports/environmental/airport_noise/part_161/.



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AKRON-CANTON AIRPORT

Alternative 9: 2014 DNL with Runway 5 Start-of-Takeoff Roll Point Displaced 1,250' to the Northeast (Next Taxiway Intersection), Compared to 2014 Existing Conditions

14 CFR Part 150 Update

- Noise Abatement DNL Contour (65 dB)
- Noise Abatement DNL Contour (60 dB)
- 2014 DNL Contour (65 dB)
- 2014 DNL Contour (60 dB)
- Airport Property Boundary
- Avigation Easement
- Airport Runway
- NM-# Portable Noise Monitoring Sites
- OANG Helipad
- Designated Runup Location
- County Boundary
- Township Boundary

Land Use (Actual or zoned. Draft subject to verification.)

- Residential Use
- Public Use
- Commercial Use
- Manufacturing and Production
- Recreational and Open Space
- Interstate Highways
- Primary Roads
- Local Roads
- Water Bodies

Notes:
Part 150 Sec. A150.101, Table 1 presents FAA land use compatibility guidelines as a function of yearly DNL. Under those guidelines, all land uses are considered compatible with noise exposure outside 65 DNL.

Portable Noise Monitoring Site NM-2 (Not Shown) is located southwest 11,327' along runway 5 extended centerline, offset northwest 1,031'

North

0 2,000 4,000 Feet

HARRIS MILLER MILLER & HANSON INC.

APPENDIX A: FAA Order 8400.9, National Safety and Operational Criteria for Runway Use Programs

ORDER DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

8400.9

11/9/81

SUBJ: NATIONAL SAFETY AND OPERATIONAL CRITERIA FOR RUNWAY USE PROGRAMS

1. PURPOSE. The purpose of this order is to provide safety and operational criteria for runway use programs. These criteria are applicable to all runway use programs developed for turbojet aircraft. This order provides parameters in the form of safety and operational criteria which must be used in the evaluation and/or approval of runway use programs.

2. DISTRIBUTION. This Order is distributed to selected offices in Washington and Regional Headquarters, Mike Monroney Aeronautical Center, and FAA Technical Center; Air Traffic Field Offices and Facilities; General Aviation and Air Carrier District Offices, Flight Standards District Offices, Flight Inspection District Offices, Field Offices and Groups, Airports District Offices, and interested aviation public.

3. BACKGROUND.

a. FAA has responsibility to provide the public right of freedom of transit through the navigable airspace of the United States and to regulate air commerce in such a manner as to best promote its development. FAA also has the responsibility for, and must maintain a detailed knowledge of, the safe operation of aircraft at our nation's airports. A primary function of this responsibility is determining under what conditions flight operations may be conducted without causing a degradation of safety.

b. Under ideal conditions aircraft takeoffs and landings should be conducted into the wind. However, other considerations such as delay and capacity problems, runway length, available approach aids, noise abatement, and other factors may require aircraft operations to be conducted on runways not directly aligned into the wind.

c. The Aviation Noise Abatement Policy of 1976 and Order 1050.11, Noise Control Plans, identify airport proprietors as responsible for taking the lead in local aviation noise control plans. Accordingly, airport proprietors may propose specific noise abatement programs to the FAA. Order 1050.11 assigns FAA responsibilities in relation to noise control plans. It requires the Air Traffic Service to "Provide guidance and administer programs for aircraft noise abatement procedures. . . ." Further, it requires that the Office of Flight Operations "Evaluate and make decisions in conjunction with the regional offices, as appropriate, concerning safety factors for flight operational procedures. . . ." The criteria in this order

Distribution: ZFS-840; ZAT-710 (minus field facilities); A-FAT-2,3,4,5,6,8 (STD); A-FFS-1,2,4,7 (STD); A-FAS-1 (STD)
Initiated By: AFO-210/AAT-320

will be utilized by Flight Standards personnel in evaluating the safety of proposed programs and by Air Traffic personnel in administering Formal and Informal Runway Use Programs.

d. This order is not intended to restrict a pilot's use of the full certificated capability of an aircraft. This order also does not limit a pilot in the use of instrument approach procedures or any other such factors. Applicable FAR's, flight and operations manuals and advisory material address the necessary safety aspects of aircraft operations for pilots and aircraft operators.

4. EFFECTIVE DATE. January 1, 1982.

5. DEFINITIONS.

a. Runway Use Programs. A noise abatement runway selection plan designed to enhance noise abatement efforts with regard to airport communities for arriving and departing aircraft. These plans are developed into runway use programs and apply to all turbojet aircraft 12,500 pounds or heavier; turbojet aircraft less than 12,500 pounds are included only if the airport proprietor determines that the aircraft creates a noise problem. Runway use programs are coordinated with FAA offices as outlined in Order 1050.11. Safety criteria used in these programs are developed by the Office of Flight Operations. Runway use programs are administered by the Air Traffic Service as "Formal" or "Informal" programs.

b. Formal Runway Use Program. An approved noise abatement program which is defined and acknowledged in a Letter of Understanding between Flight Standards, Air Traffic Service, the airport proprietor and the users. Once established, participation in the program is mandatory for aircraft operators and pilots as provided for in FAR Section 91.87.

c. Informal Runway Use Program. An approved noise abatement program which does not require a Letter of Understanding and participation in the program is voluntary for aircraft operators/pilots.

6. RESPONSIBILITIES.

a. Terminal Facility Chiefs.

(1) Provide technical assistance upon request of the airport proprietor in developing a runway use program.

(2) Before any runway use program is implemented, ensure coordination with, and encourage participation in the development of the program by the airport proprietor, the local community, and aircraft operators who regularly use the airport.

(3) Forward the completed runway use program to the Regional Air Traffic Division for review, further intra-agency coordination, and approval.

b. Regional Air Traffic Division.

(1) Review and coordinate all runway use programs with the regional Flight Standards and Airports Divisions, and the appropriate office for environmental/noise matters. When necessary as outlined in paragraph 8 of this order, or if concurrence cannot be reached within the region, forward the program with comments to the Air Traffic Service, AAT-1, for final approval.

(2) Upon completing proper coordination, return the runway use program to the facility with approval or disapproval and rationale.

(3) Maintain a current status of all runway use programs and periodically review for accuracy and completeness in accordance with this directive.

c. Regional Flight Standards Division. Coordinate with the regional Air Traffic Division on all runway use programs and review them for compliance with the criteria in this order. If the program is within the criteria of this order, return it to the Air Traffic Division with concurrence and supporting rationale. If it is not within the criteria in this order, return it to the Air Traffic Division with nonconcurrence and rationale. If a waiver is requested in accordance with paragraph 8, perform a safety analysis to evaluate the proposed alternate criteria and return the program to the Air Traffic Division with concurrence or nonconcurrence, recommendations, and supporting rationale (see Appendix 2).

7. OPERATIONAL SAFETY CRITERIA FOR RUNWAY USE PROGRAMS. Except as provided for in paragraph 8, the following criteria shall be applied to all runway use programs:

a. Wind Shear or Thunderstorms. There should be no significant wind shear or thunderstorms which affect the use of the selected runway(s) such as:

(1) That reported by an operating Low Level Wind Shear Alert System (LLWSAS), or

(2) Pilot report (PIREP) of wind shear, or

(3) No thunderstorms on the initial takeoff departure path or final approach path (within 5 nm) of the selected runway(s).

b. Visibility. In order to utilize landing runways associated with a runway use program, the reported visibility shall not be less than one statute mile (runway visual range [RVR] 5000).

c. Runway Braking Effectiveness. There should be no snow, slush, ice or standing water present or reported (other than isolated patches which do not impact braking effectiveness) on that width of the applicable runway or stopway (overrun) to be used. Braking effectiveness must be "good" (e.g., not "fair," "poor," or "nil") and no reports of hydroplaning or unusual slippery runway surfaces (e.g., as may occur on ungrooved new pavement or contaminated surfaces).

d. Winds.

(1) Clear and Dry Runways.

(a) Unless a greater crosswind component is approved by the applicable Flight Standards office considering local weather factors, facilities and characteristics of aircraft normally using the facility, the crosswind component for the selected runway (including gust values) must not be greater than 20 knots (Appendix 1, Table 1).

(b) Except for (c) below, the tailwind component must not be greater than 5 knots (Appendix 1, Table 4).

(c) Where anemometers are installed near the touchdown zone of the candidate runway for landings, or near the departure end for takeoffs, any tailwind component must not be greater than 7 knots (Appendix 1, Table 3).

(2) Runways Not Clear or Not Dry.

(a) The crosswind component (including gust values) must not exceed 15 knots (Appendix 1, Table 2), and

(b) No tailwind component may be present except the nominal range of winds reported as calm (0-3 knots) may be considered to have no tailwind component.

(c) Unless otherwise approved by the applicable FAA Flight Standards office based on runway available and field lengths required for aircraft normally using the runway, the runway must be grooved or have a porous friction course surface.

e. Other Safety Factors. Factors peculiar to a specific airport must also be considered to the extent that they have been identified. These factors may include: runway length, runway gradient, aircraft type and performance characteristics, approach aids, etc.

8. WAIVERS. When necessary to accommodate unique site-specific situations, requests for waivers to the criteria contained in this order shall be submitted with justification, a safety analysis, and supporting data to AAT-1 who shall coordinate with AFO-1 for concurrence before granting final approval.

9. APPLICABILITY.

a. This order applies to FAA personnel who may be called upon to advise, evaluate, or coordinate on specific noise abatement plans for runway use programs for particular airports.

b. This order does not require development or use of a runway use program where such a program has not been used or is not needed.

J. Lynn Helms
Administrator

APPENDIX 1. TABLE OF MAXIMUM WIND VALUES

The following table illustrates the maximum components for wind directions in 10-degree increments relative to a runway. No headwind component limitation is stated because strong headwinds would dictate use of a runway aligned into the wind due to the crosswind limitation. Velocity values are rounded down to the nearest whole number.

CROSSWIND COMPONENT TABLE 1
(DRY RUNWAY)

Wind Angle (Degrees) From Runway Heading	Wind Velocity (Knots)
10	114
20	58
30	40
40	31
45	28
50	26
60	23
70	21
80	20
90	20

CROSSWIND COMPONENT TABLE 2
(RUNWAY NOT DRY)

Wind Angle (Degrees) From Runway Heading	Wind Velocity (Knots)
10	86
20	44
30	30
40	23
45	21
50	19
60	17
70	16
80	15
90	15

TAILWIND COMPONENT TABLE 3
(WITH ANEMOMETERS)
DRY RUNWAY

Wind Angle (Degrees) From Runway Heading	Wind Velocity (Knots)
100	20
110	20
120	14
130	10
135	9
140	9
150	8
160	7
170	7
180	7

TAILWIND COMPONENT TABLE 4
(WITHOUT ANEMOMETERS)
DRY RUNWAY

Wind Angle (Degrees) From Runway Heading	Wind Velocity (Knots)
100	20
110	14
120	10
130	7
135	7
140	6
150	5
160	5
170	5
180	5

APPENDIX 2. EVALUATION OF REQUESTS FOR WAIVERS

When reviewing waiver requests in accordance with paragraph 8 of the order, Flight Standards personnel must consider the operational impact of the following factors when providing a safety analysis to support alternate criteria:

a. Are there significant occurrences of wind shear or thunderstorms?

b. Is a low level wind shear alert system (LLWSAS) installed?

c. Do runways significantly exceed critical field length for aircraft commonly using the airport?

d. Are runways grooved or do they have a porous friction course surface?

e. Are precision approach aids available to these runways?

f. Is a VASI present if these runways require a nonprecision approach?

g. Are 2 transmissometers installed?

h. Is runway slope a factor? If so, does it impact aircraft performance?

i. Is Maximum Brake Energy V_{MBE} a factor? If so, does it impact aircraft performance?