

ACR Slate Recommendation Analysis: *Continuous Descent Approaches*

For ACR Review, Understanding, and Discussion

July 17, 2019

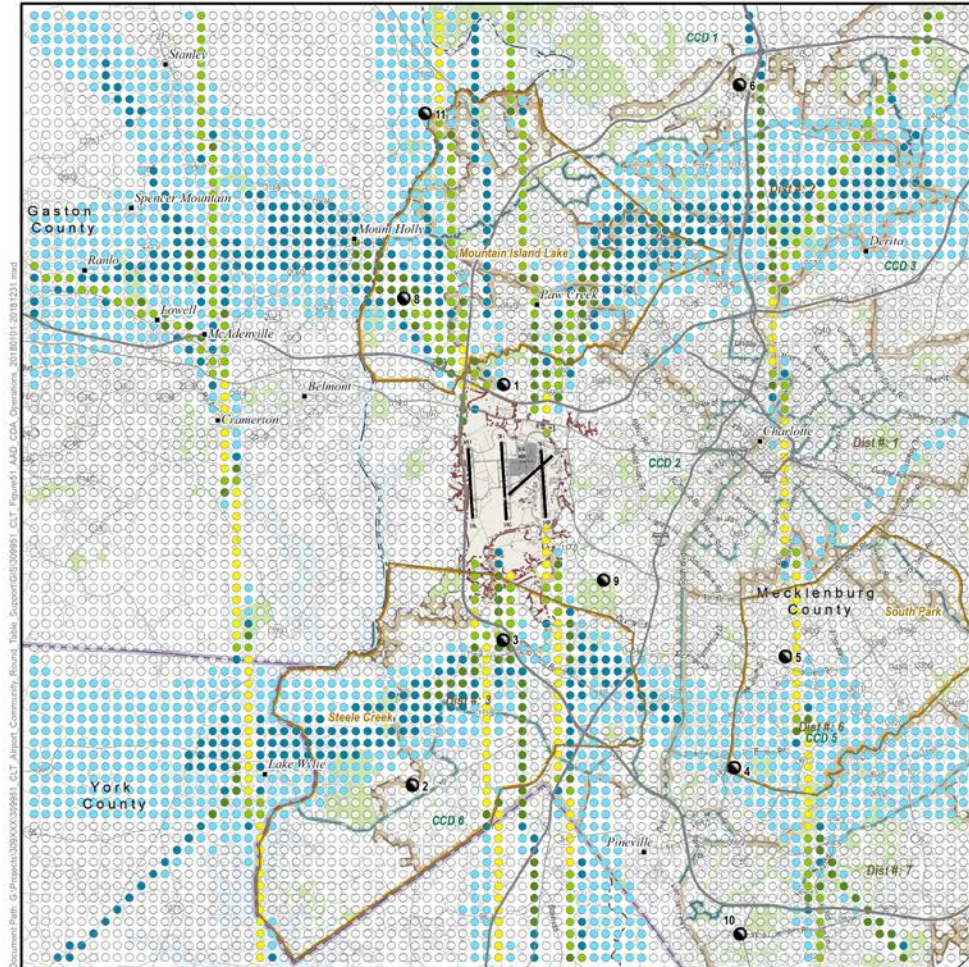
ACR Slate Recommendation – Continuous Descent Approaches (CDAs)

- Modified approximately 19% of calendar year 2018 aircraft arrivals to use continuous descent approach profiles for:
 - Aircraft equipped to support continuous descent approach
 - Aircraft arriving CLT between 9:30 pm and 5:30 am when traffic volumes are lower
- Modeled the full year of aircraft operations with the modified arrival flight paths and profiles
- Compared the modeled results with the 2018 baseline results at each of the grid points (including population estimates at each grid point) in terms of:
 - Number of annual-average overflights
 - Maximum noise level (Lmax)
 - Number of average daily noise events above 70 dB (N70)
 - Annual-average day Day-Night Average Sound Level (DNL)

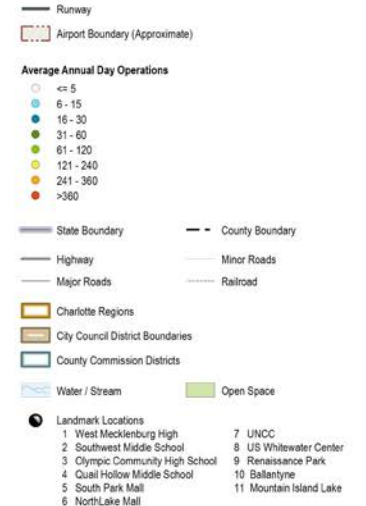


Annual Average Day Aircraft Overflights Analysis: 2018 Operations with CDAs

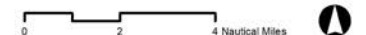
Overflight Interval (Operations)	Count of Grid Points	Count of Population
Less than 5	3,756	460,046
6-15	1,548	166,792
16-30	485	55,835
31-60	160	16,551
61-120	200	21,089
121-240	152	16,472
241-360	0	0
Greater than 360	0	0
Total	6,301	736,785



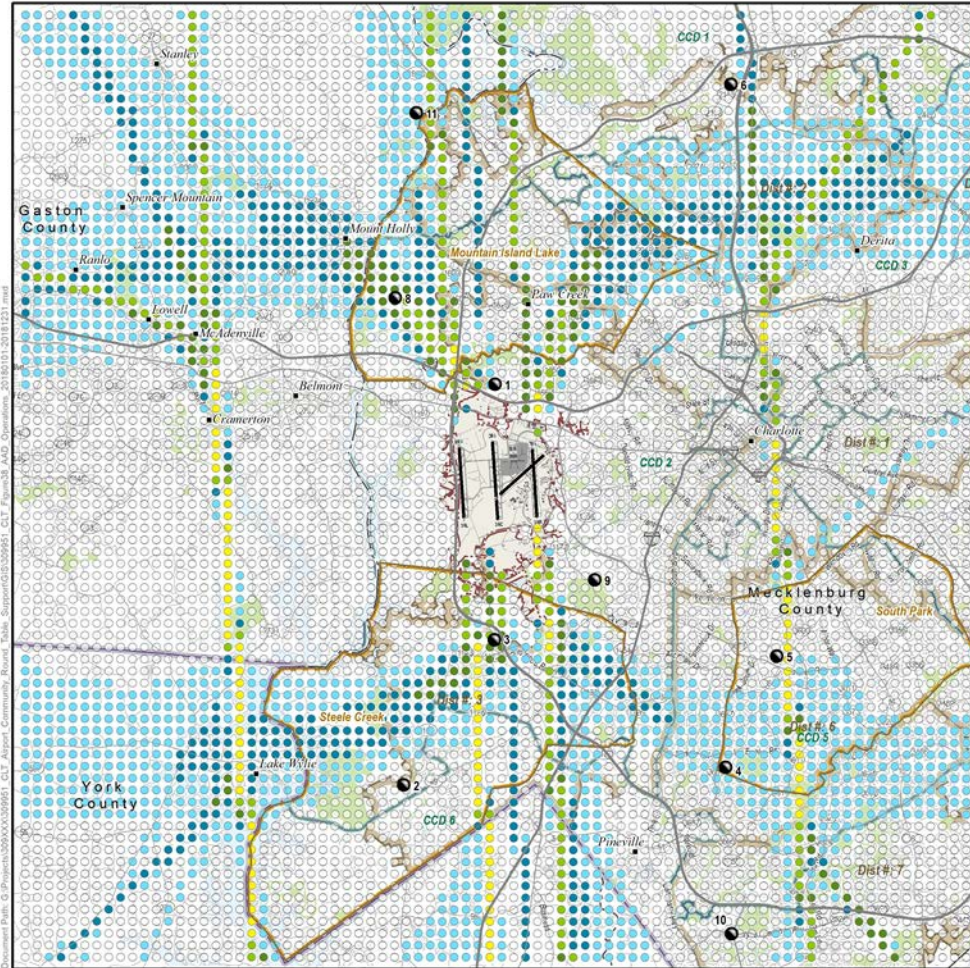
Average Annual Day Operations Grid Analysis
January 1, 2018 through December 31, 2018
CLT Operations with CDAs



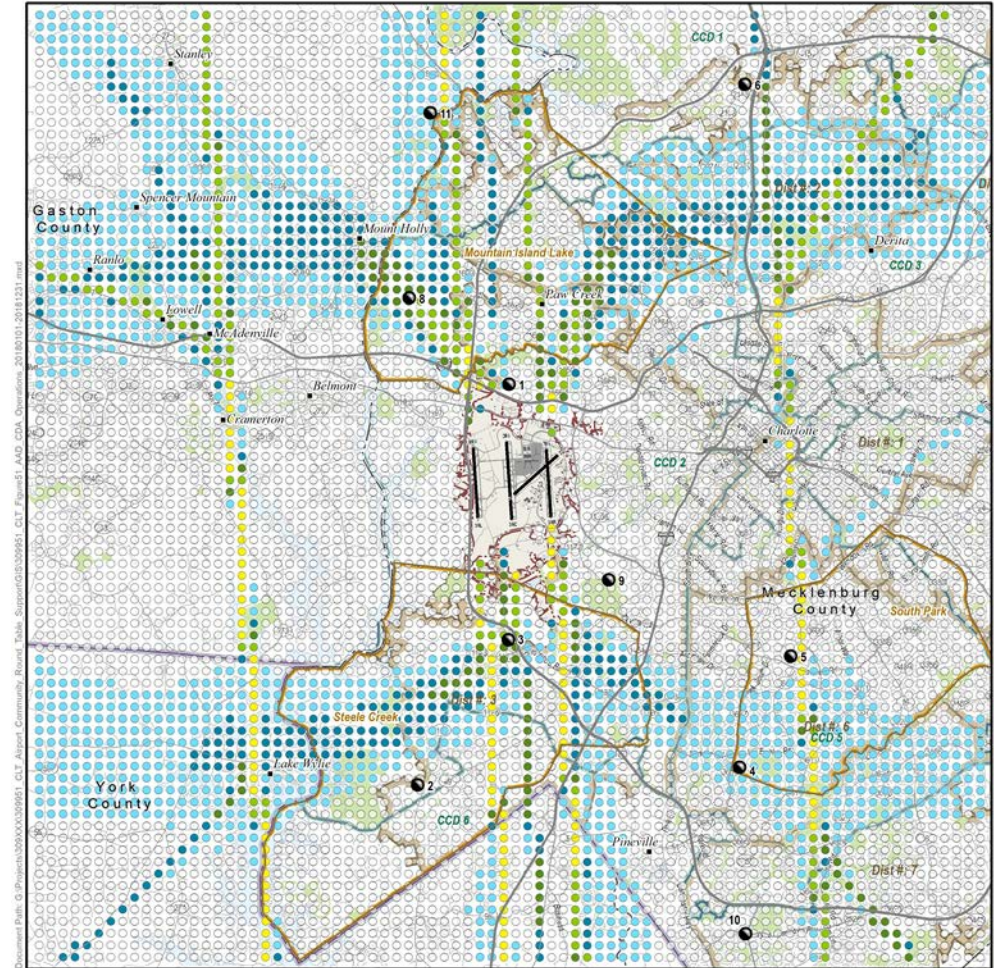
Data Source: Mecklenburg County GIS, November 2018; (Parks, Community Points, Lakes, Ponds, Roads); Gaston County GIS, November 2018; (Parks, Community Points); York County GIS, March 2019; (Parks, Community Points); CLT, March 2019; (County Boundary, City Boundary, Charlotte Regions)



Annual Average Day Aircraft Overflights Analysis: 2018 Operations with CDAs Compared to Baseline



Baseline

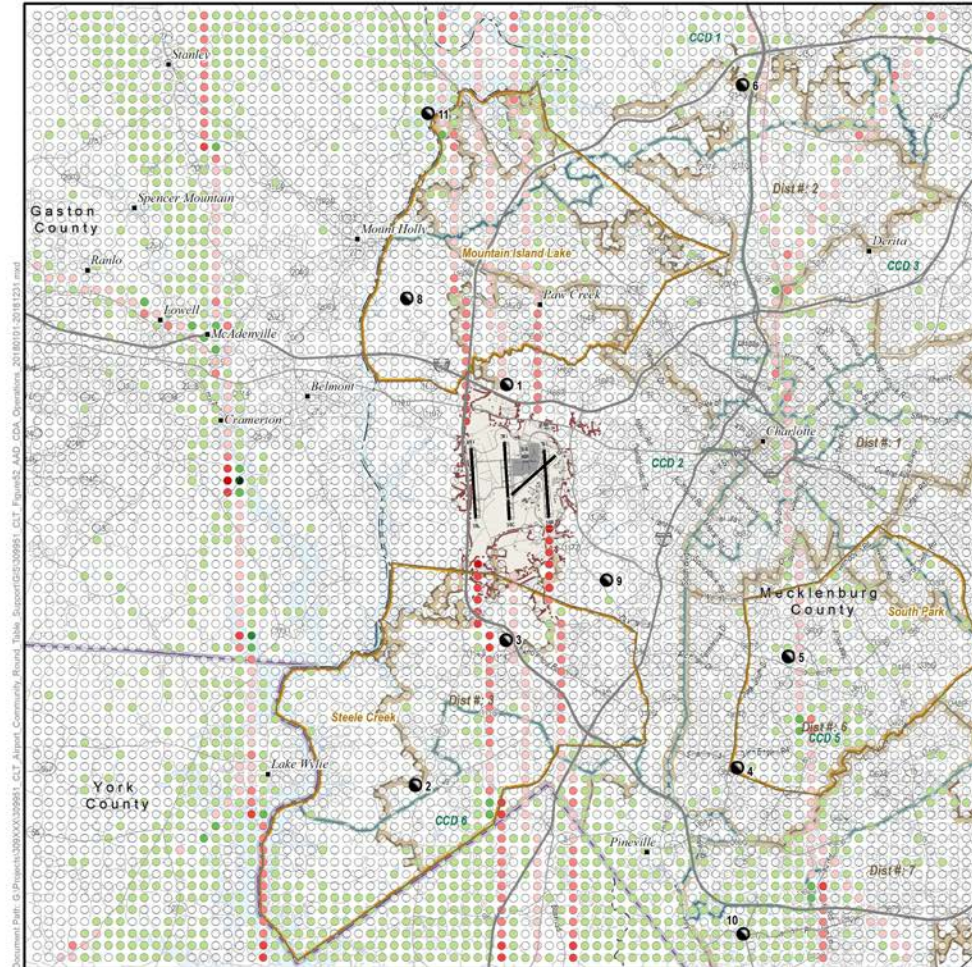


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Annual Average Day Aircraft Overflights Analysis: Difference – 2018 Operations with CDAs Compared to Baseline

Overflight Interval (Operations)	Count of Grid Points and %	Count of Population and %
Less than -30	1 / 0.0%	22 / 0.0%
-30 to -20	1 / 0.0%	2 / 0.0%
-20 to -10	17 / 0.3%	1,535 / 0.2%
-10 to -1	328 / 5.2%	28,848 / 3.9%
-1 to 1	5,524 / 87.7%	661,739 / 89.8%
1 to 10	283 / 4.5%	31,199 / 4.2%
10 to 20	115 / 1.8%	12,702 / 1.7%
20 to 30	29 / 0.5%	671 / 0.1%
Greater Than 30	3 / 0.0%	67 / 0.0%
Total	6,301 / 100.0%	736,785 / 100.0%

- 347 Grid points (5.5%) / 30,407 people (4.1%) would experience reduced numbers of overflights with CDAs
- 430 Grid points (6.8%) / 44,639 people (6.0%) would experience increased numbers of overflights with CDAs



Average Annual Day Operations Grid Analysis
January 1, 2018 through December 31, 2018
CLT Operations with CDAs
Compared to Baseline Operations

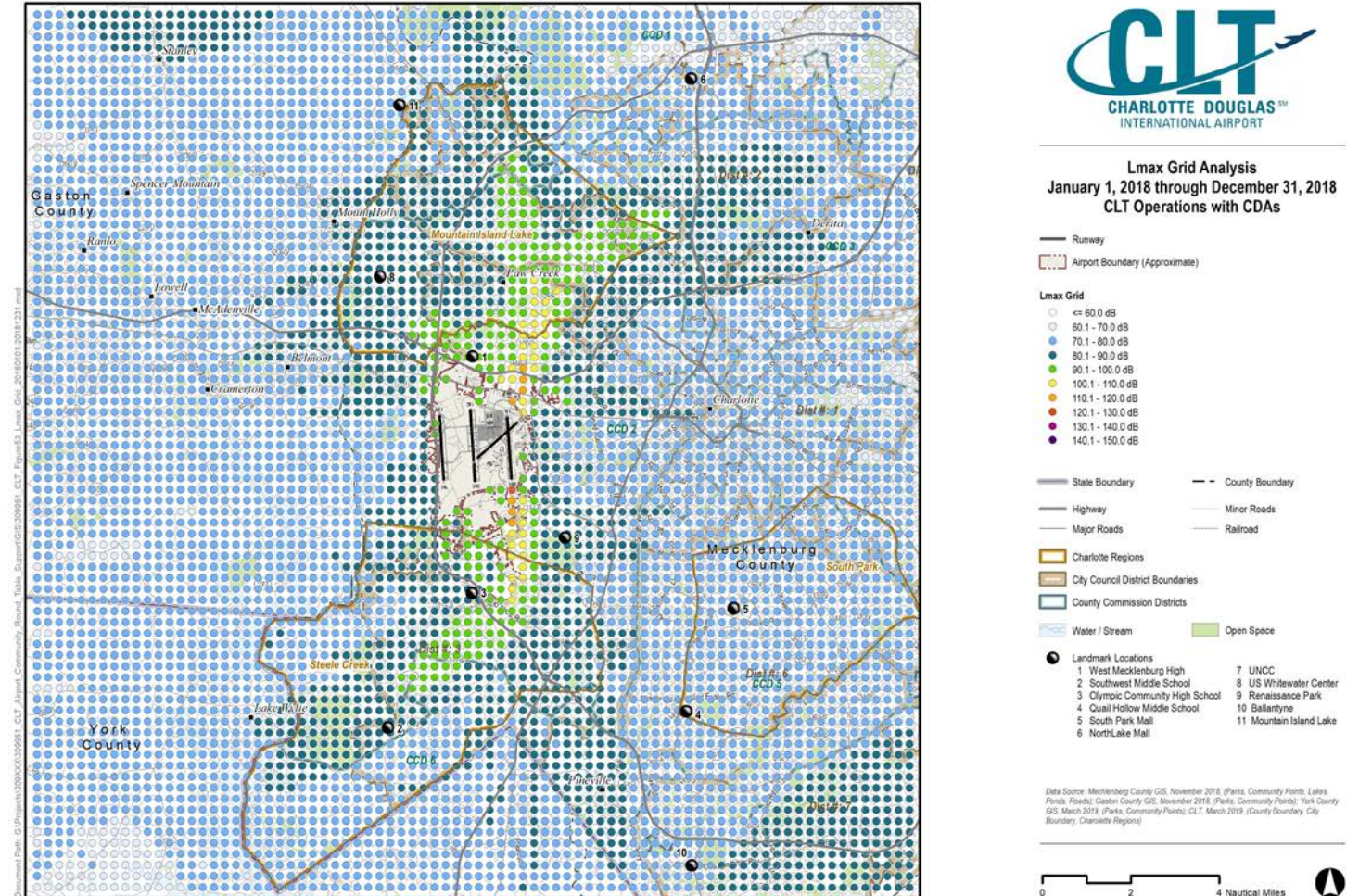


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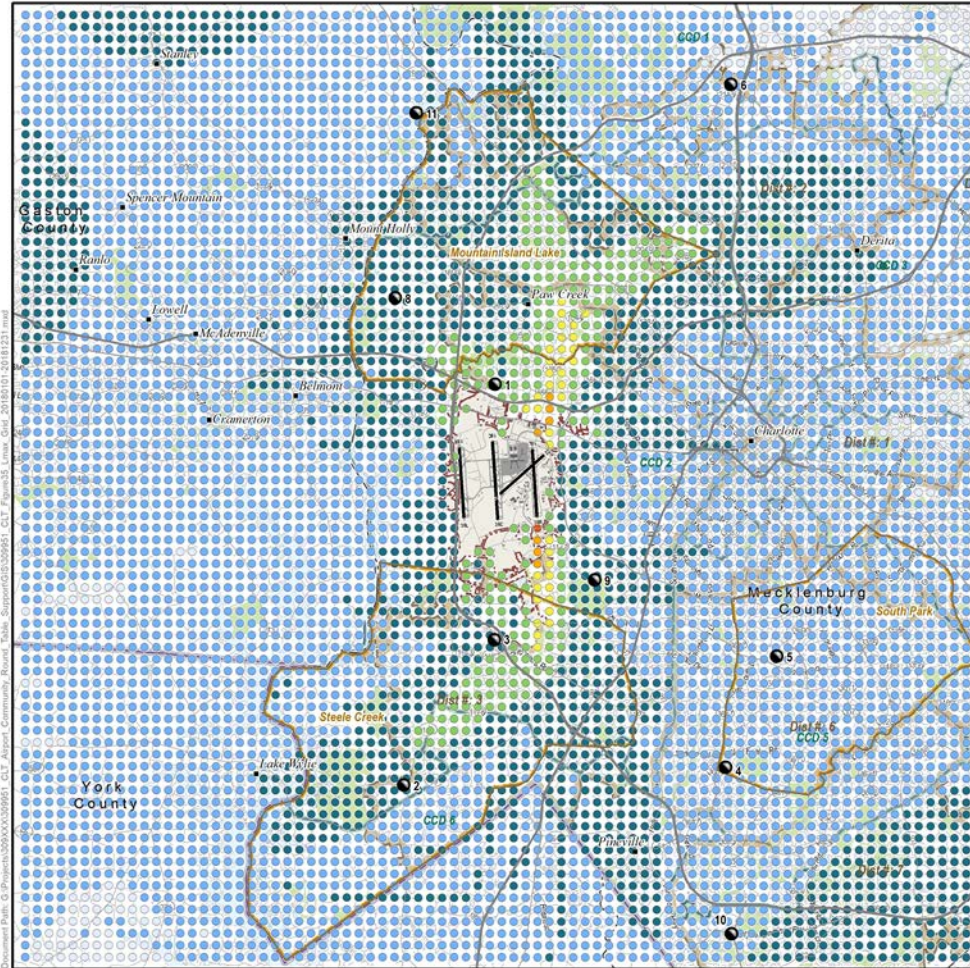


Maximum Noise Level (Lmax) Analysis: 2018 Operations with CDAs

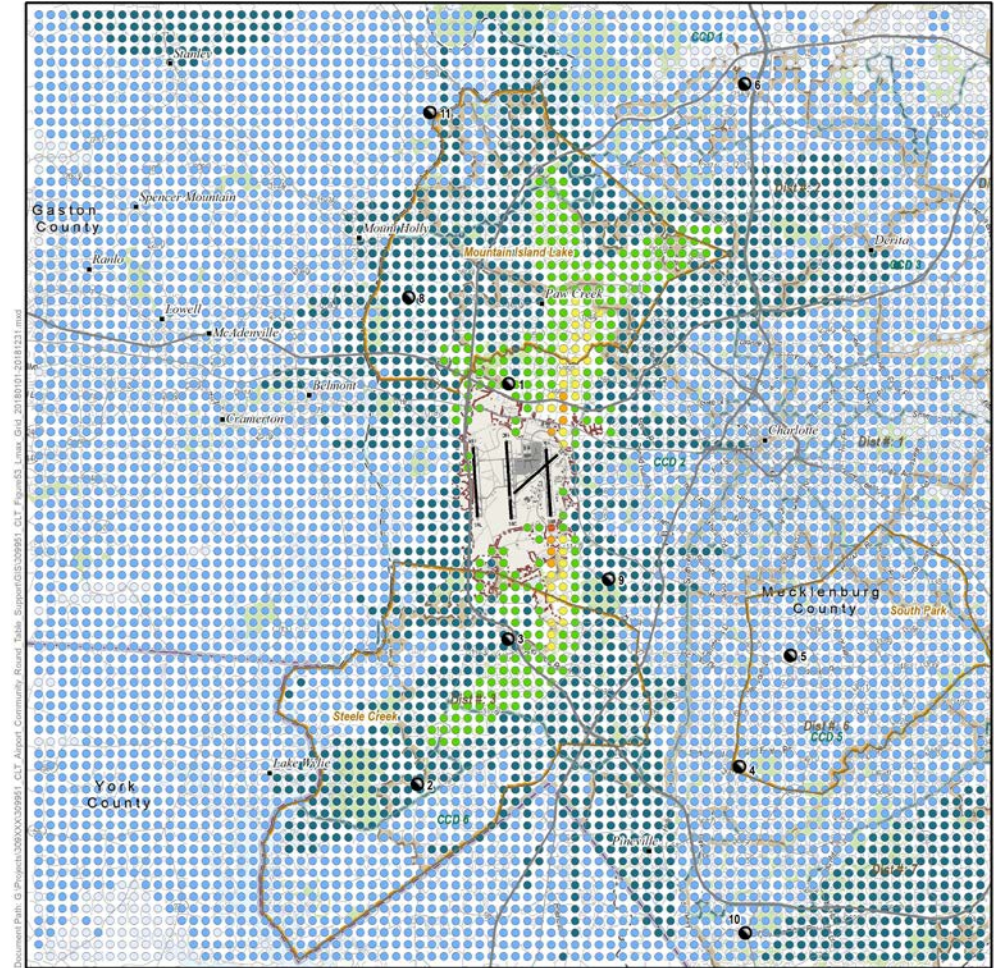
Lmax Interval (dB)	Count of Grid Points	Count of Population
Less Than 60.0	0	0
60.1-70.0	232	24,066
70.1 – 80.0	4,252	518,244
80.1 – 90.0	1,525	163,850
90.1 – 100.0	247	26,882
100.1 – 110.0	37	3,593
110.1 – 120.0	7	150
120.1 – 130.0	1	0
130.1 – 140.0	0	0
140.1 – 150.0	0	0
Total	6,301	736,785



Maximum Noise Level (Lmax) Analysis: 2018 Operations with CDAs Compared to Baseline



Baseline

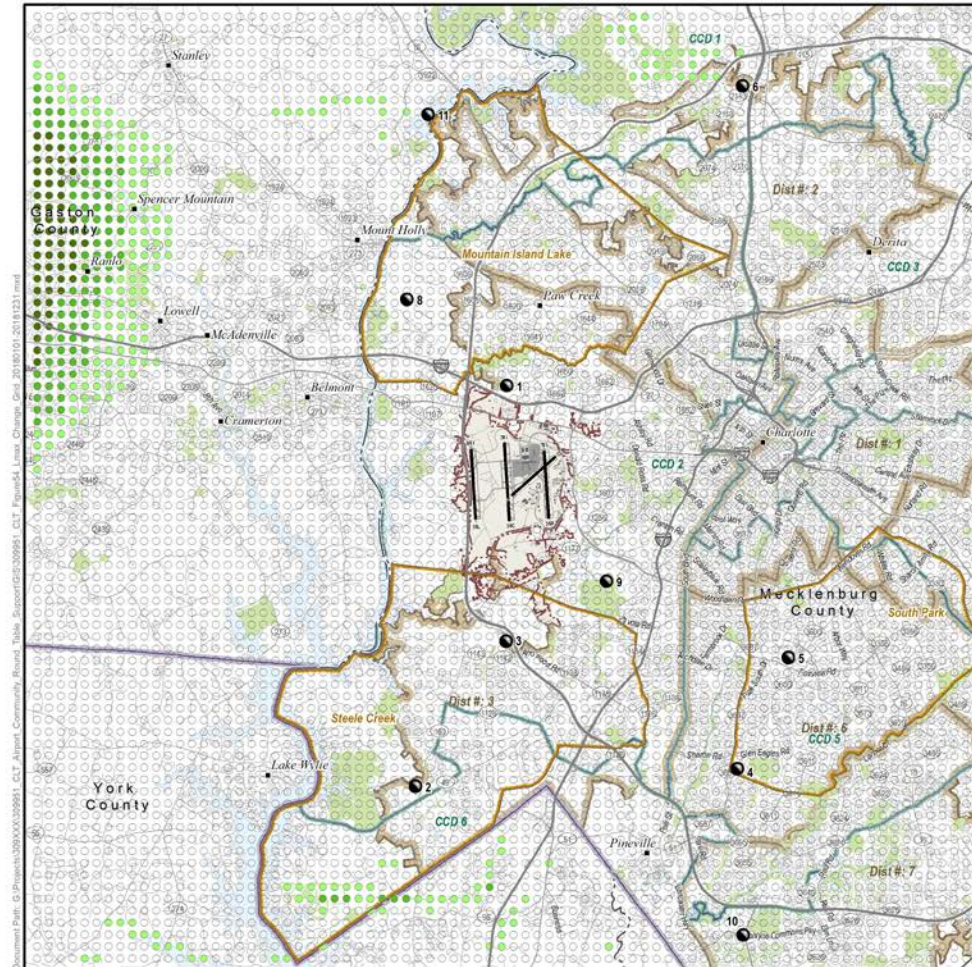


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Maximum Noise Level (Lmax) Analysis: Difference – 2018 Operations with CDAs Compared to Baseline

Lmax Difference Interval (dB)	Count of Grid Points / % Change	Count of Population / % Change
Less than -10	60 / 1.0%	4,772 / 0.6%
-5 to -10	105 / 1.7%	8,755 / 1.2%
-1 to -5	221 / 3.5%	12,774 / 1.7%
-1 to 1	5,915 / 93.9%	710,484 / 96.4%
1 to 5	0 / 0.0%	0 / 0.0%
5 to 10	0 / 0.0%	0 / 0.0%
Greater than 10	0 / 0.0%	0 / 0.0%
Total	6301 / 100.0%	736785 / 100.0%

- 386 Grid points (6.1%) / 26,301 people (3.6%) would experience reduced noise levels with CDAs
- 0 Grid points (0.0%) / 0 people (0.0%) would experience increased noise levels with CDAs



Lmax Grid Analysis
January 1, 2018 through December 31, 2018
CLT Operations with CDAs
Compared to Baseline Operations

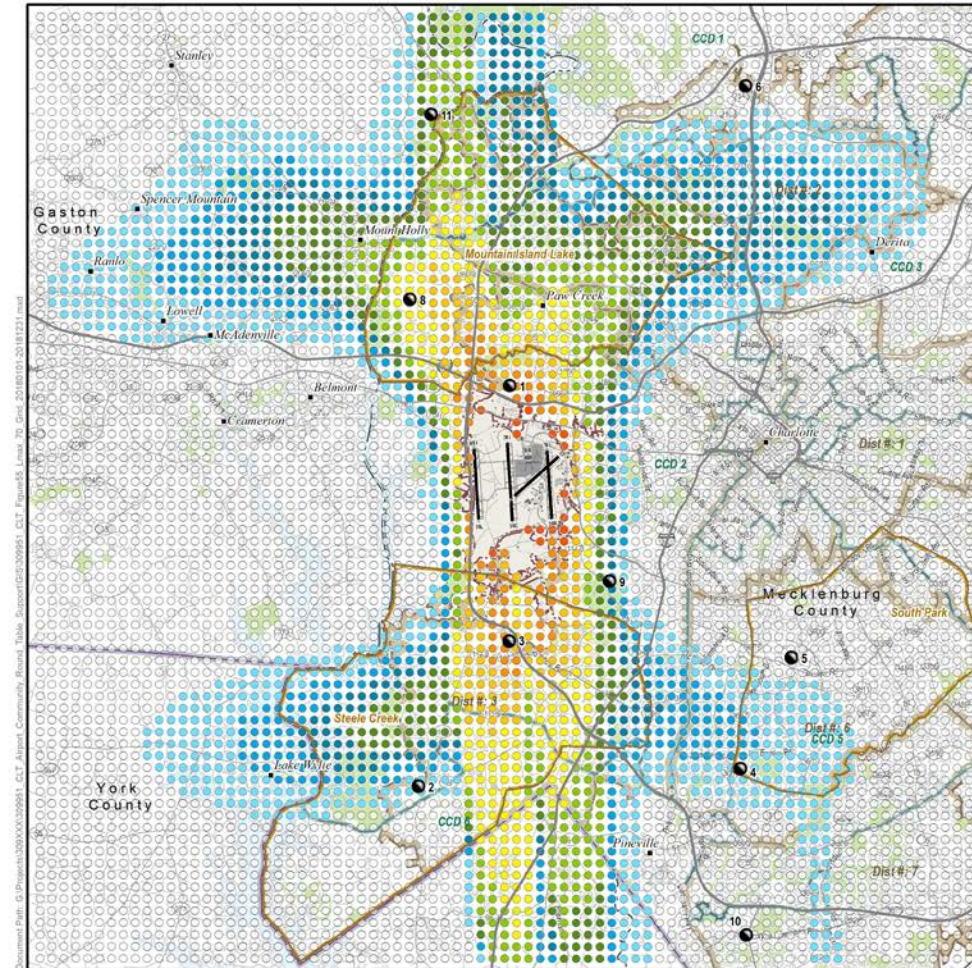


Data Source: Mecklenburg County GIS, November 2018; (Parks, Community Points, Lakes, Ponds, Roads) Gaston County GIS, November 2018; (Parks, Community Points) York County GIS, March 2019; (Parks, Community Points); CLT, March 2019; (County Boundary, City Boundary, Charlotte Regions)



Number of Noise Events Above 70 dB (N70) Analysis: 2018 Operations with CDAs

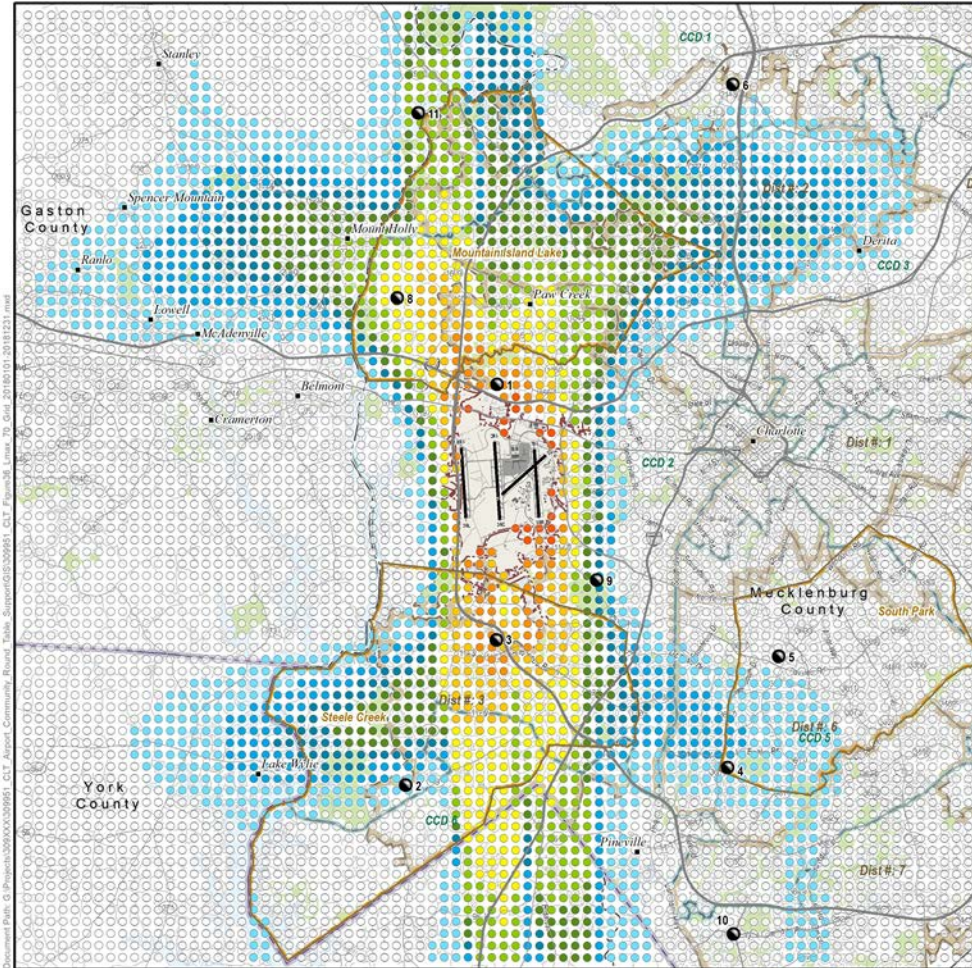
N70 Interval (Events)	Count of Grid Points	Count of Population
25 or Less	3,646	449,608
26-50	844	98,917
51-75	428	55,782
76-100	316	30,048
101-150	334	37,495
151-200	280	24,479
201-300	221	22,298
301-400	147	13,834
401-500	68	4,022
Greater than 500	17	302
Total	6,301	736,785



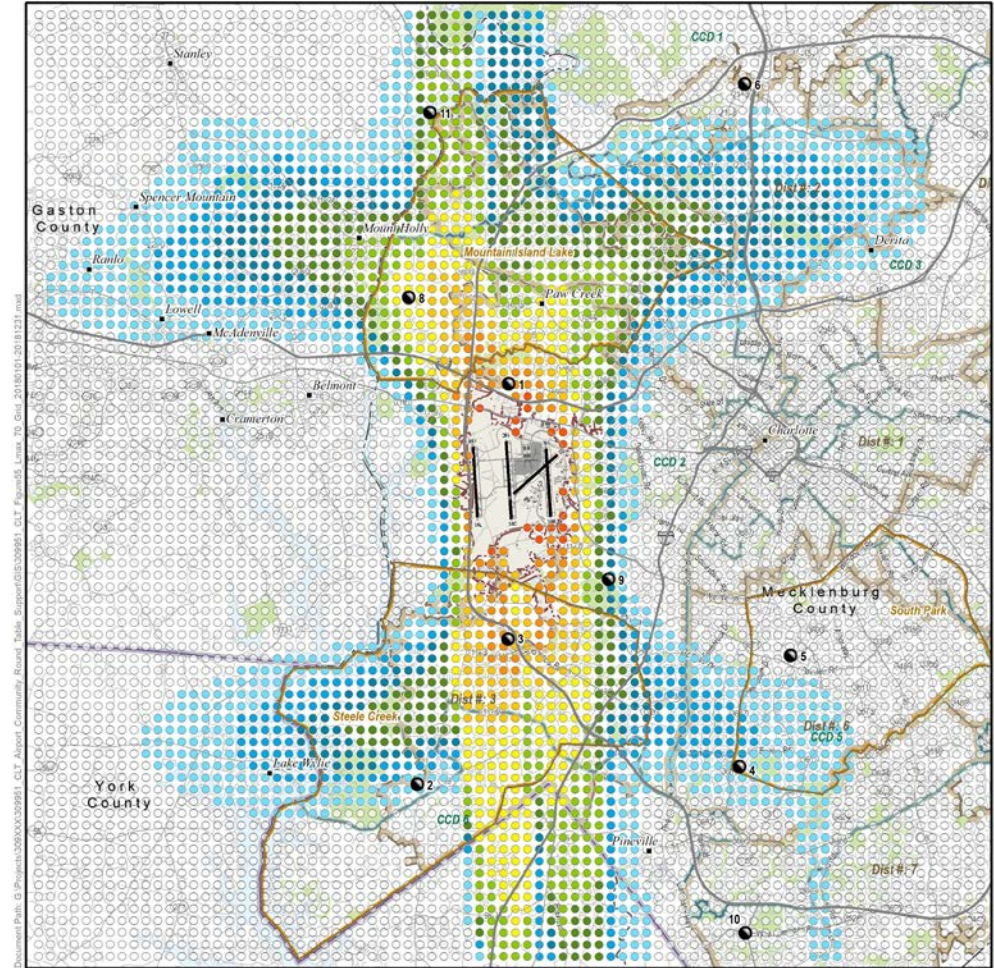
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Number Above Lmax 70 Grid Analysis
January 1, 2018 through December 31, 2018
CLT Operations with CDAs

Number of Noise Events Above 70 dB (N70) Analysis: 2018 Operations with CDAs Compared to Baseline



Baseline

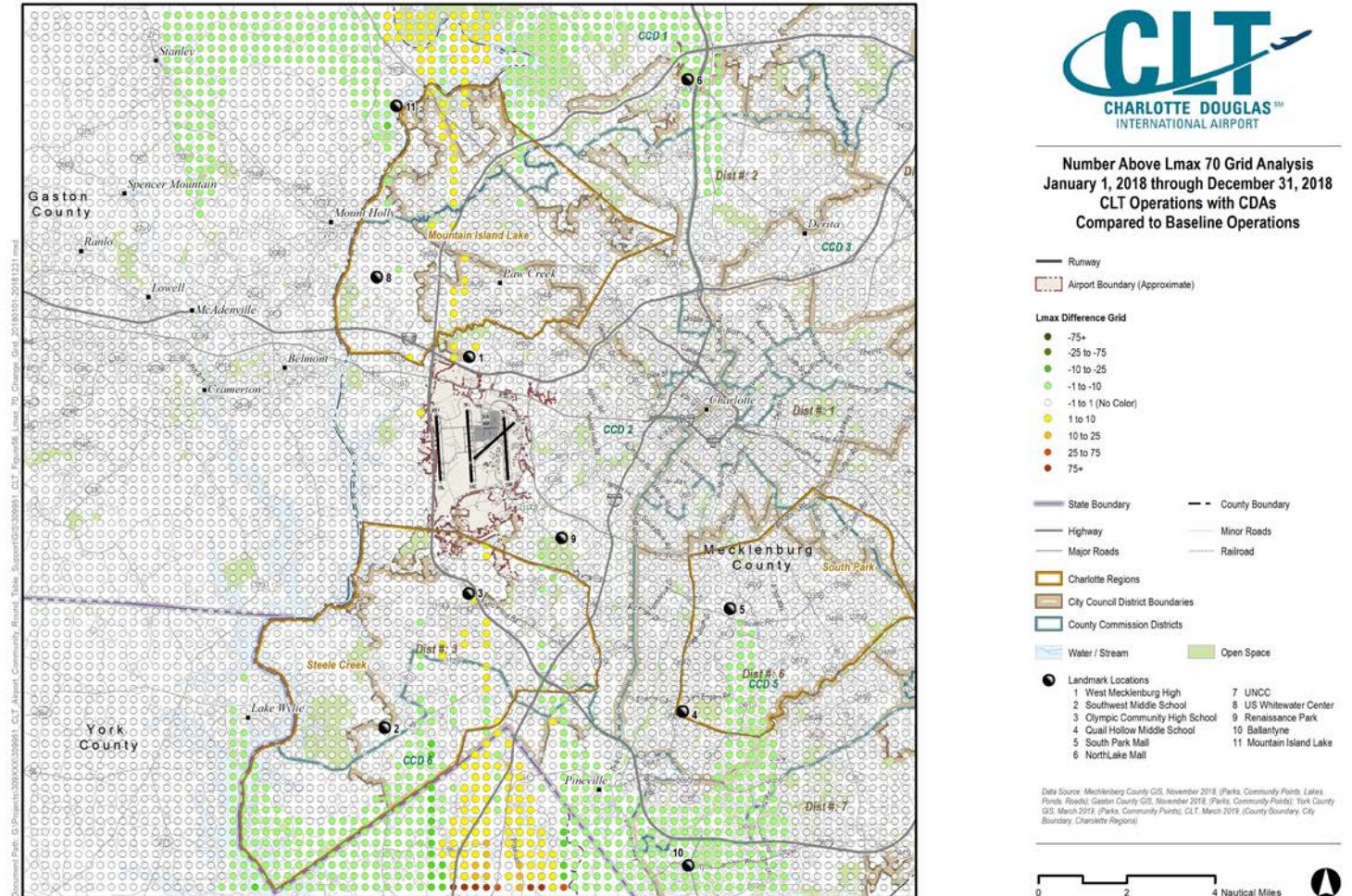


Modified

Number of Noise Events Above 70 dB (N70) Analysis: Difference – 2018 Operations with CDAs Compared to Baseline

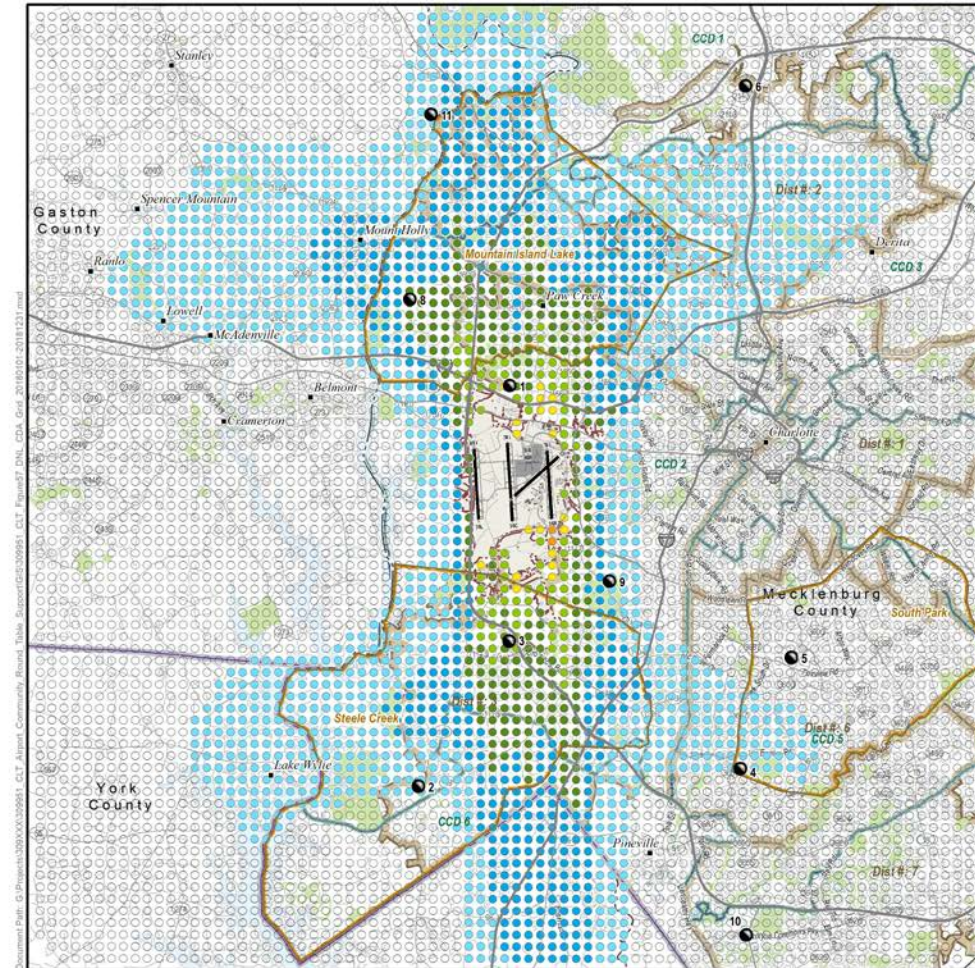
N70 Difference Interval (Events)	Count of Grid Points / % Change	Count of Population / % Change
Less than -75	0 / 0.0%	0 / 0.0%
-75 to -25	0 / 0.0%	0 / 0.0%
-25 to -10	21 / 0.3%	2,458 / 0.3%
-10 to -1	785 / 12.5%	68,373 / 9.3%
-1 to 1	5,311 / 84.3%	653,103 / 88.6%
1 to 10	167 / 2.7%	12,699 / 1.7%
10 to 25	9 / 0.1%	75 / 0.0%
25 to 75	2 / 0.0%	41 / 0.0%
Greater than 75	6 / 0.1%	36 / 0.0%
Total	6,301 / 100.0%	736,785 / 100.0%

- 806 Grid points (12.8%) / 70,831 people (9.6%) would experience fewer events above 70 dB Lmax with CDAs
- 184 Grid points (2.9%) / 12,851 people (1.7%) would experience more events above 70 dB Lmax with CDAs



Day-Night Average Sound Level (DNL) Analysis: 2018 Operations with CDAs

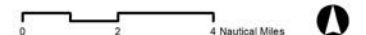
DNL Interval (dB)	Count of Grid Points	Count of Population
Less than 45	3,971	497,675
45.1-50.0	1,346	143,273
50.1-55.0	607	61,657
55.1-60.0	265	27,069
60.1-65.0	91	6,647
65.1-70.0	19	458
70.1-75.0	2	6
Greater than 75	0	0
Total	6,301	736,785



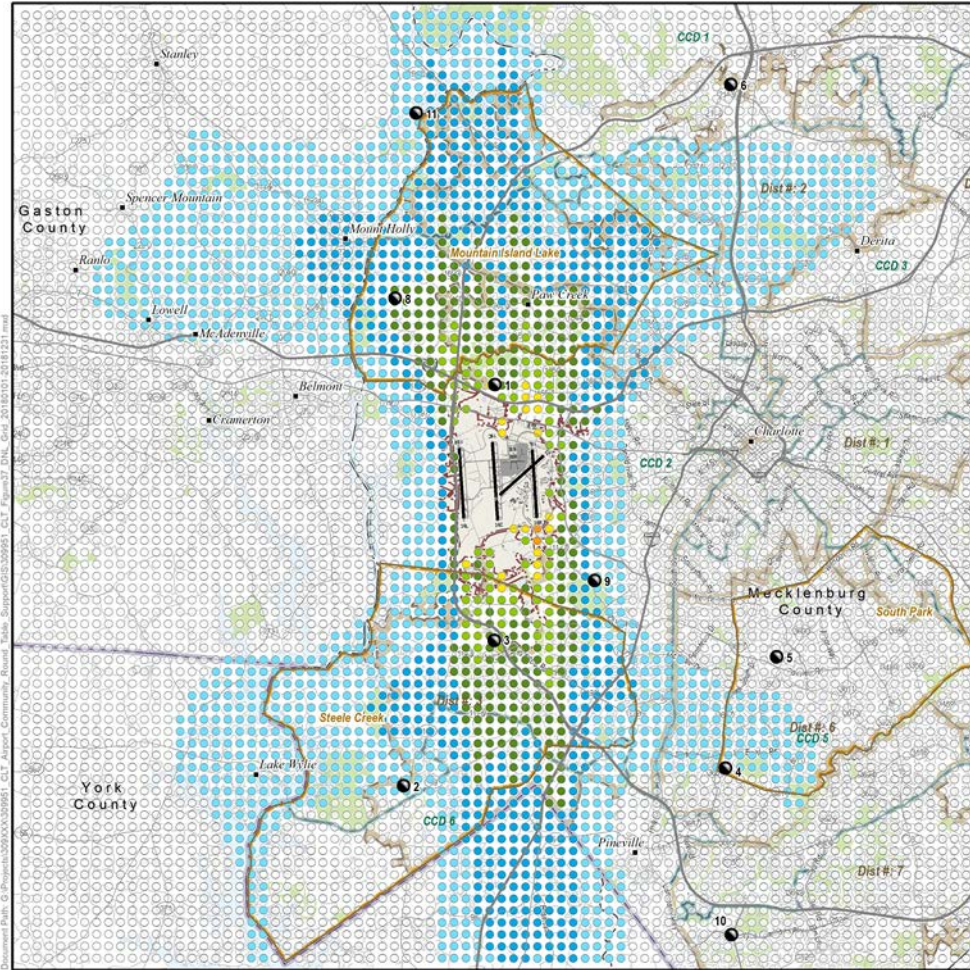
DNL Grid Analysis
January 1, 2018 through December 31, 2018
CLT Operations with CDAs

- Runway
- Airport Boundary (Approximate)
- DNL Grid
 - 0.0 - 45.0
 - 45.1 - 50.0
 - 50.1 - 55.0
 - 55.1 - 60.0
 - 60.1 - 65.0
 - 65.1 - 70.0
 - 70.1 - 75.0
 - >= 75.1
- State Boundary
- County Boundary
- Highway
- Minor Roads
- Major Roads
- Railroad
- Charlotte Regions
- City Council District Boundaries
- County Commission Districts
- Water / Stream
- Landmark Locations
 - 1 West Mecklenburg High
 - 2 Southwest Middle School
 - 3 Olympic Community High School
 - 4 Quail Hollow Middle School
 - 5 South Park Mall
 - 6 NorthLake Mall
 - 7 UNCC
 - 8 US Whitewater Center
 - 9 Renaissance Park
 - 10 Ballantyne
 - 11 Mountain Island Lake

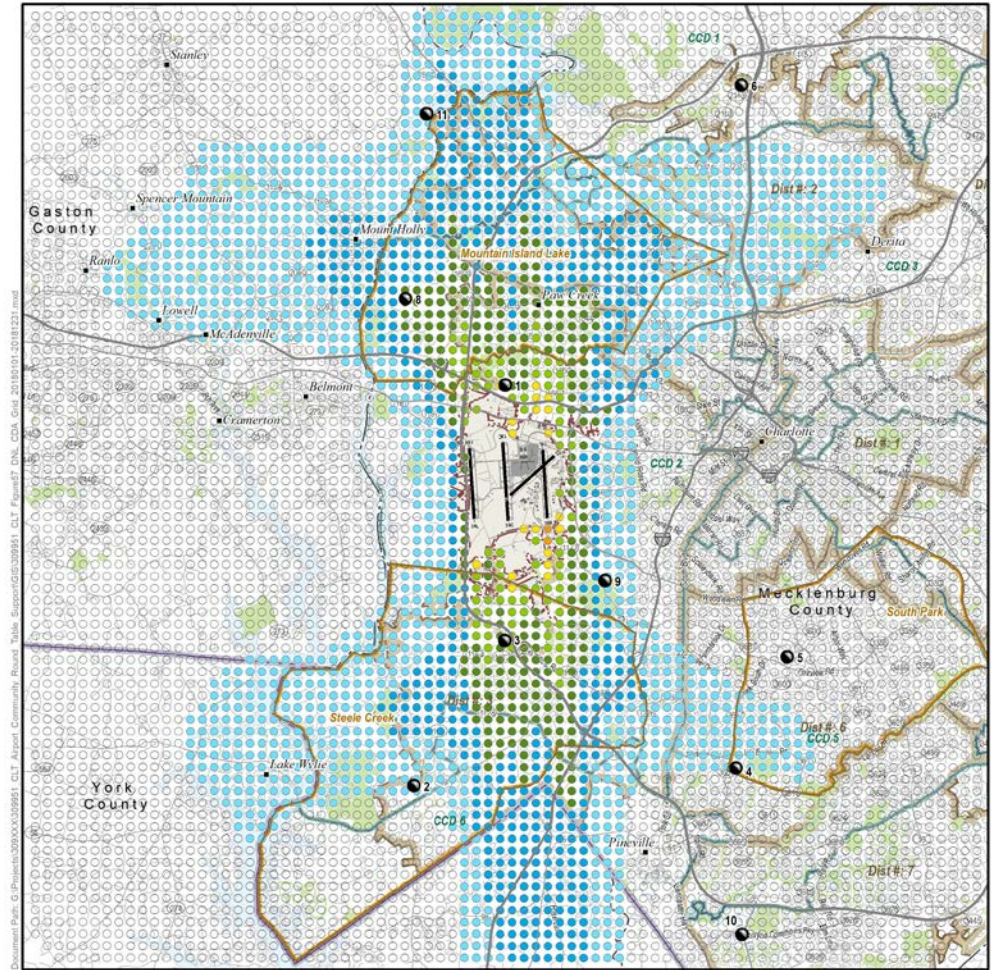
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Day-Night Average Sound Level (DNL) Analysis: 2018 Operations with CDAs Compared to Baseline



Baseline

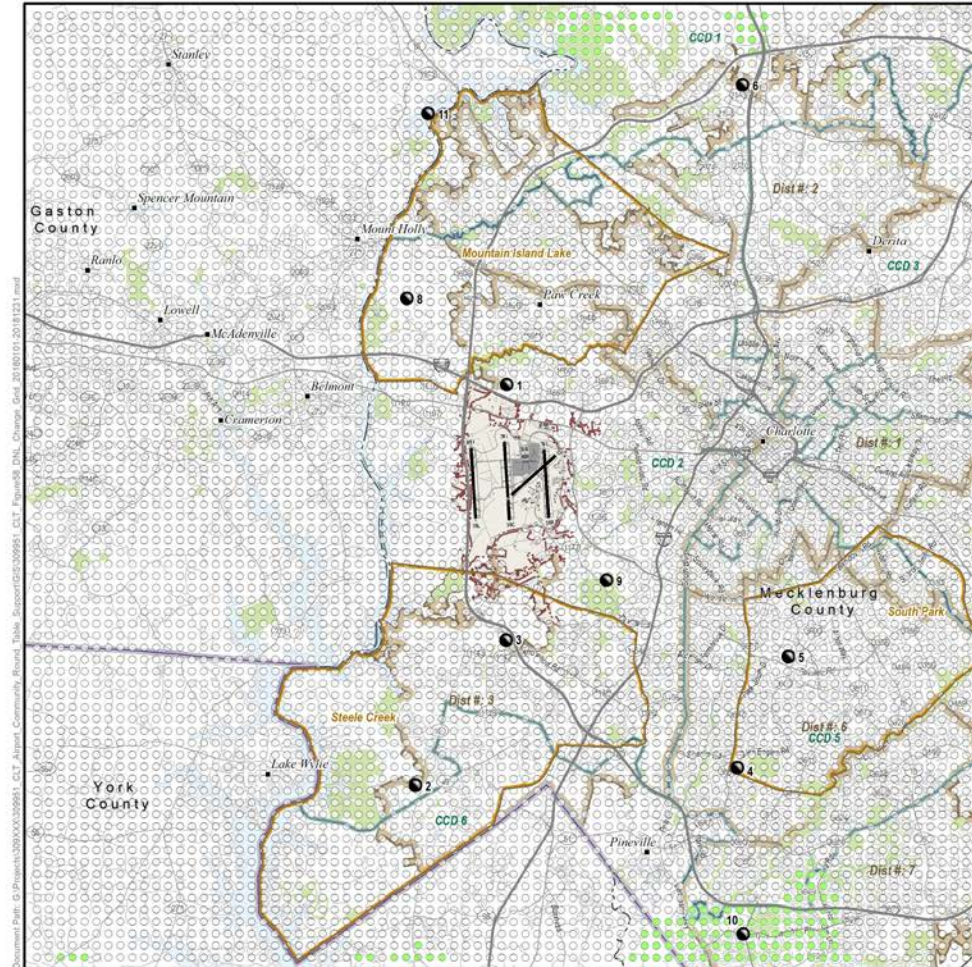


Modified

Day-Night Average Sound Level (DNL) Analysis: Difference – 2018 Operations with CDAs Compared to Baseline

DNL Difference Interval (dB)	Count of Grid Points / % Change	Count of Population / % Change
Less than -10	0 / 0.0%	0 / 0.0%
-5 to -10	0 / 0.0%	0 / 0.0%
-1 to -5	123 / 2.0%	17,690 / 2.4%
-1 to 1	6,178 / 98.0%	719,095 / 97.6%
1 to 5	0 / 0.0%	0 / 0.0%
5 to 10	0 / 0.0%	0 / 0.0%
Greater than 10	0 / 0.0%	0 / 0.0%
Total	6,301 / 100.0%	736,785 / 100.0%

- 123 Grid points (2.0%) / 17,690 people (2.4%) would experience reduced noise levels with CDAs
- 0 Grid points (0.0%) / 0 people (0.0%) would experience increased noise levels with CDAs



DNL Grid Analysis
January 1, 2018 through December 31, 2018
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Compared to Baseline Operations



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ACR Slate Recommendation Analysis: CDA Analysis Observations

- Number of average daily overflight:
 - A greater number of grid points and more people increased than decreased
- Maximum sound level (Lmax):
 - No grid points increased
 - Majority of grid points did not change
 - Relatively small number of grid points and associated population decreased
- Number of noise events greater than 70 dB (N70)
 - A greater number of grid points and more people decreased than increased
- Day-Night Average Sound Level (DNL):
 - No grid points or population experienced an increase in in DNL (45 dB and greater)
 - Grid points and associated population ether decreased or did not change



ACR Slate Recommendation Analysis: CDA Analysis Observations

- CDAs provide the greatest benefits for areas north and south of the analysis grid points where aircraft level-off on the downwind and base legs for extended periods
- Potential noise reductions from CDAs are realized at south edge of the analysis grid over the communities of Pineville and Steele Creek, and north edge near and north of Mountain Island Lake
- Flight Paths will become more concentrated with CDAs as aircraft turn from the downwind to final approach course due to precision of Area Navigation (RNAV) and Required Navigation Performance (RNP)
- With continued improvement of terminal sequencing and spacing tools available to air traffic controllers, the percentage of aircraft eligible and able to conduct CDAs will likely increase in the future which may result in increased noise reduction



ACR Slate Recommendation Analysis: CDA Analysis Considerations for the ACR

- Do the reported changes from the 2018 baseline to implementation of CDAs meet the goals of the ACR?
- Does the ACR want to recommend implementation of CDAs?

Discussion