

CLT Continued Aircraft Operations Evaluations

Airport Community Roundtable Presentation

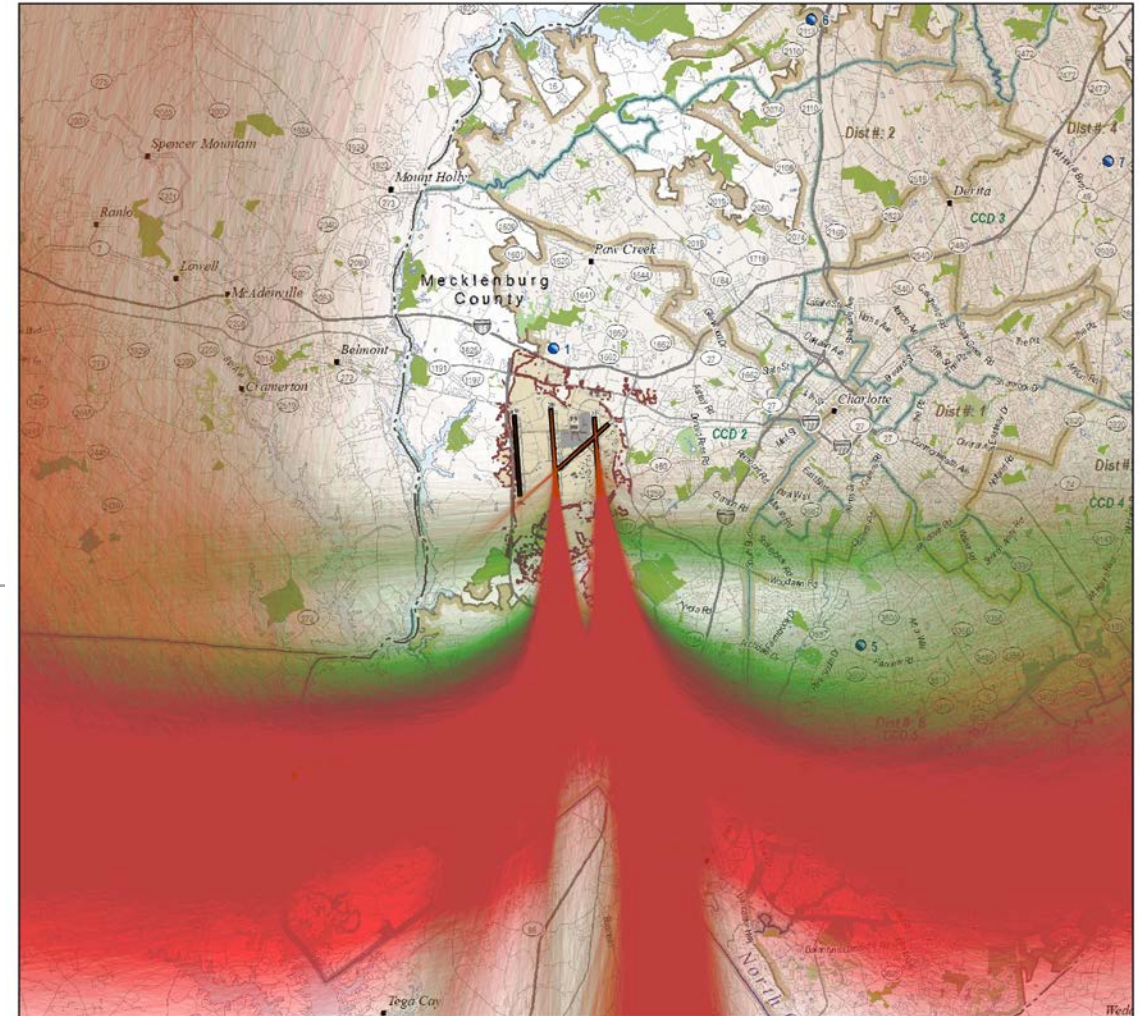
February 20, 2019

ACR Requests of the CLT Technical Consultant

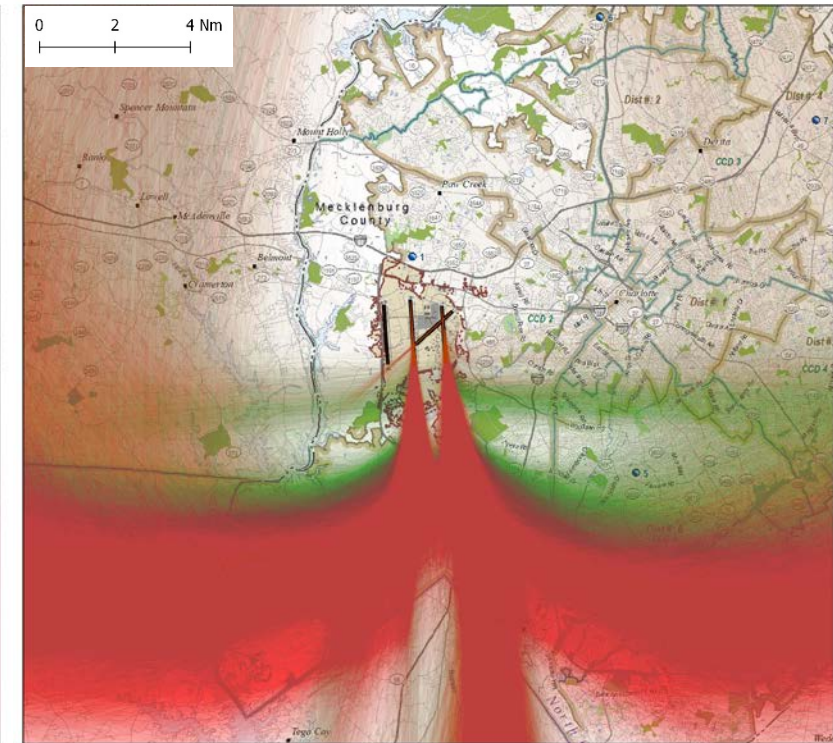
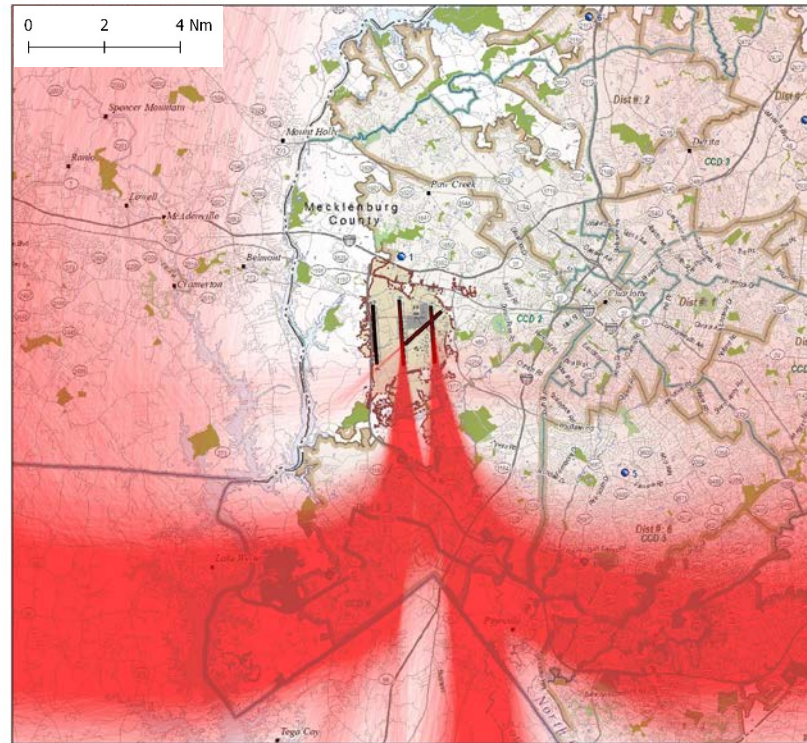
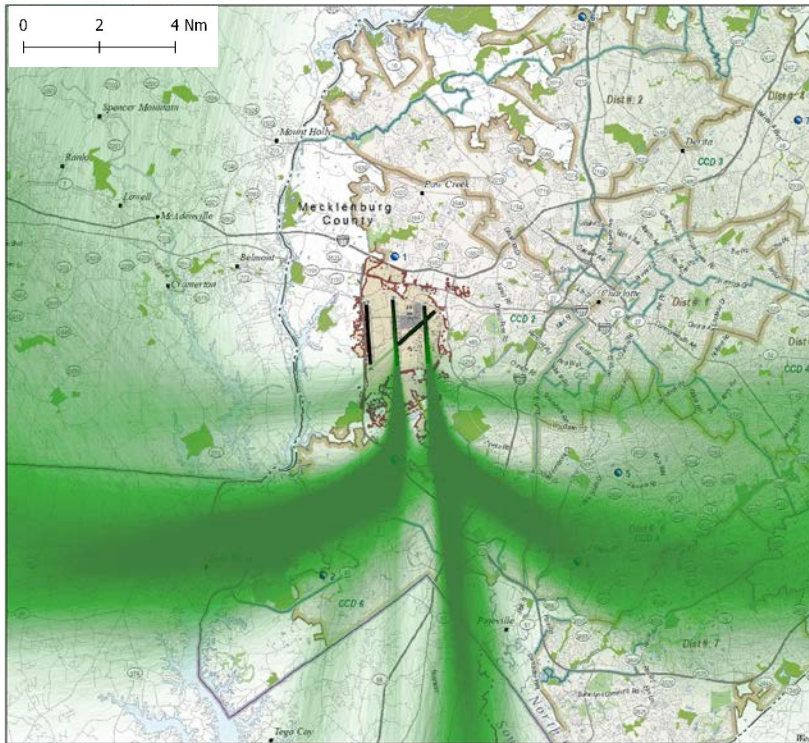
- Altitude based departure turns
 - *additional analysis with turns at 3,500 feet above means sea level (MSL)*
 - Entire year of operations
 - May 31, 2017 – May 30, 2018 (115,134 aircraft operations)
 - Lmax and N70 grid analyses
 - Conclusions and next steps
- Noise Abatement Departure Profiles (NADPs)
 - Review of American Airlines (AAL) noise abatement departure profiles

Altitude Based Turns at 3,500 feet MSL

Continuation of analysis presented at
January 2019 ACR meeting



South Flow Departures - Modified Flight Tracks with Turns at 3,500 feet MSL Compared to Original (May 31, 2017 – May 30, 2018)



Legend

Runways
South Flow Departures
Potential Tracks on a 3,500ft Altitude Based Turn

State Boundary

Highway

Major Roads

Park / Open Space

County Boundary

Minor Roads

Railroad

Water

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

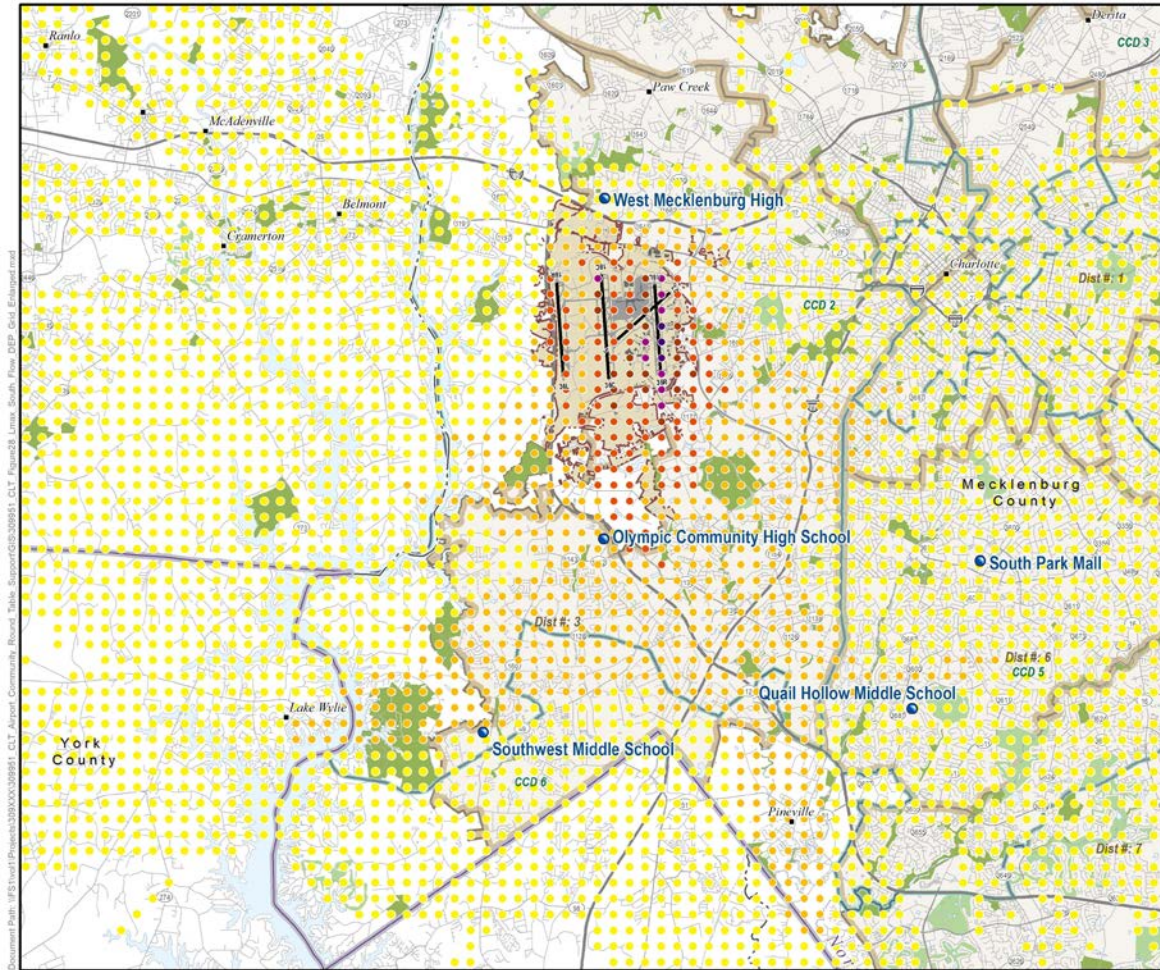
Airport Boundary (Approximate)

City Council District Boundaries

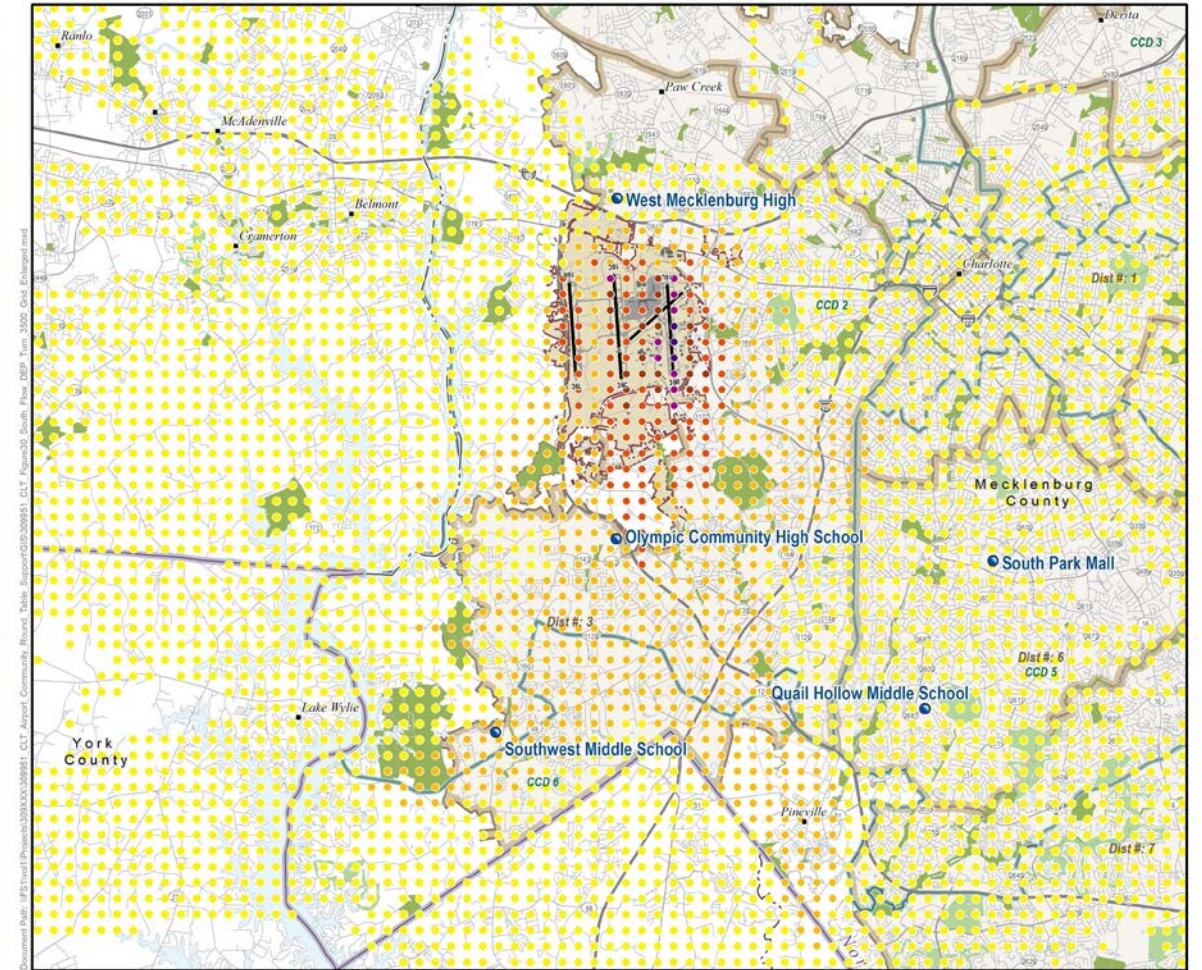
County Commission Districts



Noise Analysis (Lmax 70 dB and greater) Comparison: Unmodified South Flow Departures to Altitude Based Departure Turns at 3,500 feet MSL

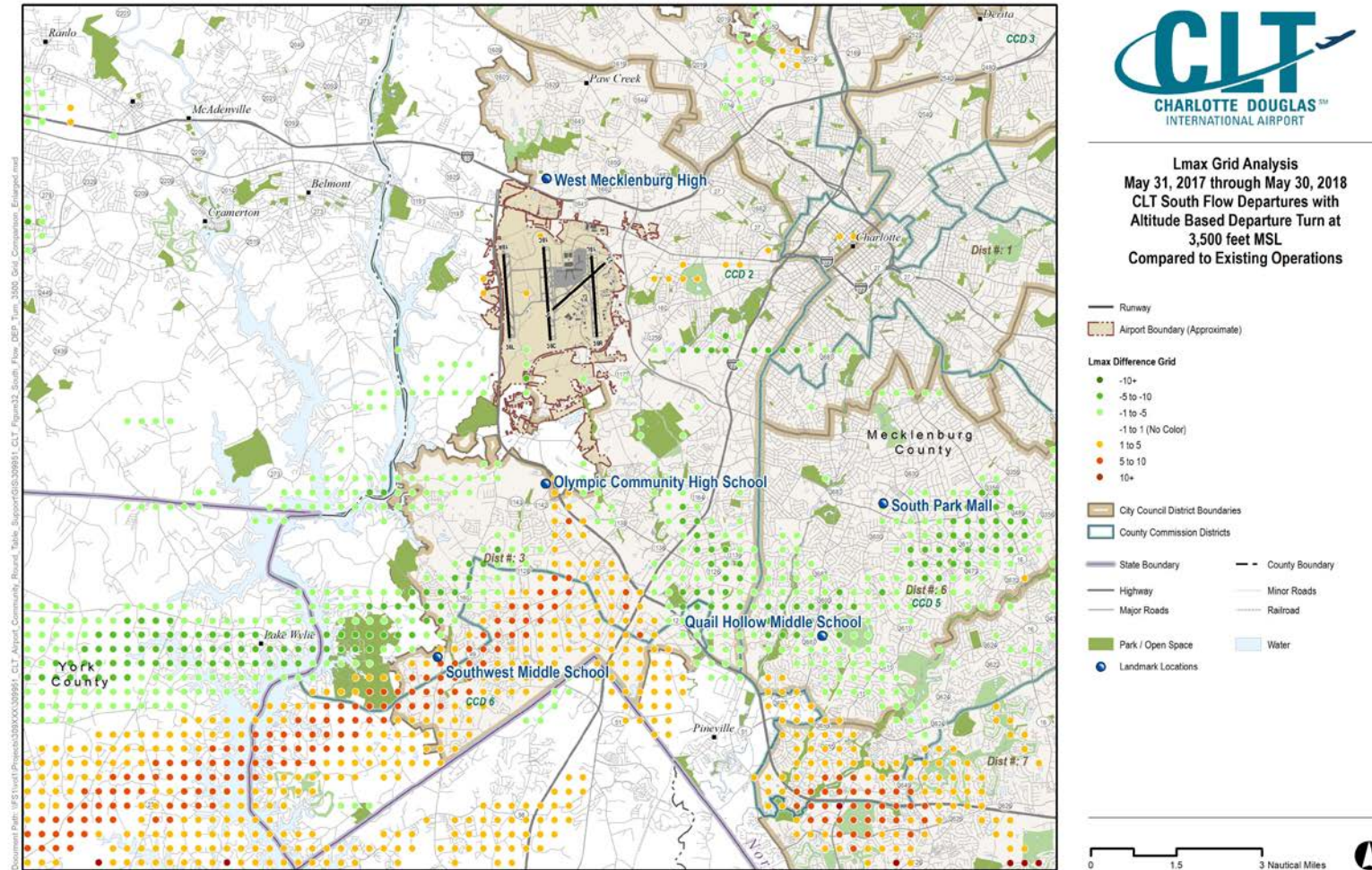


Baseline

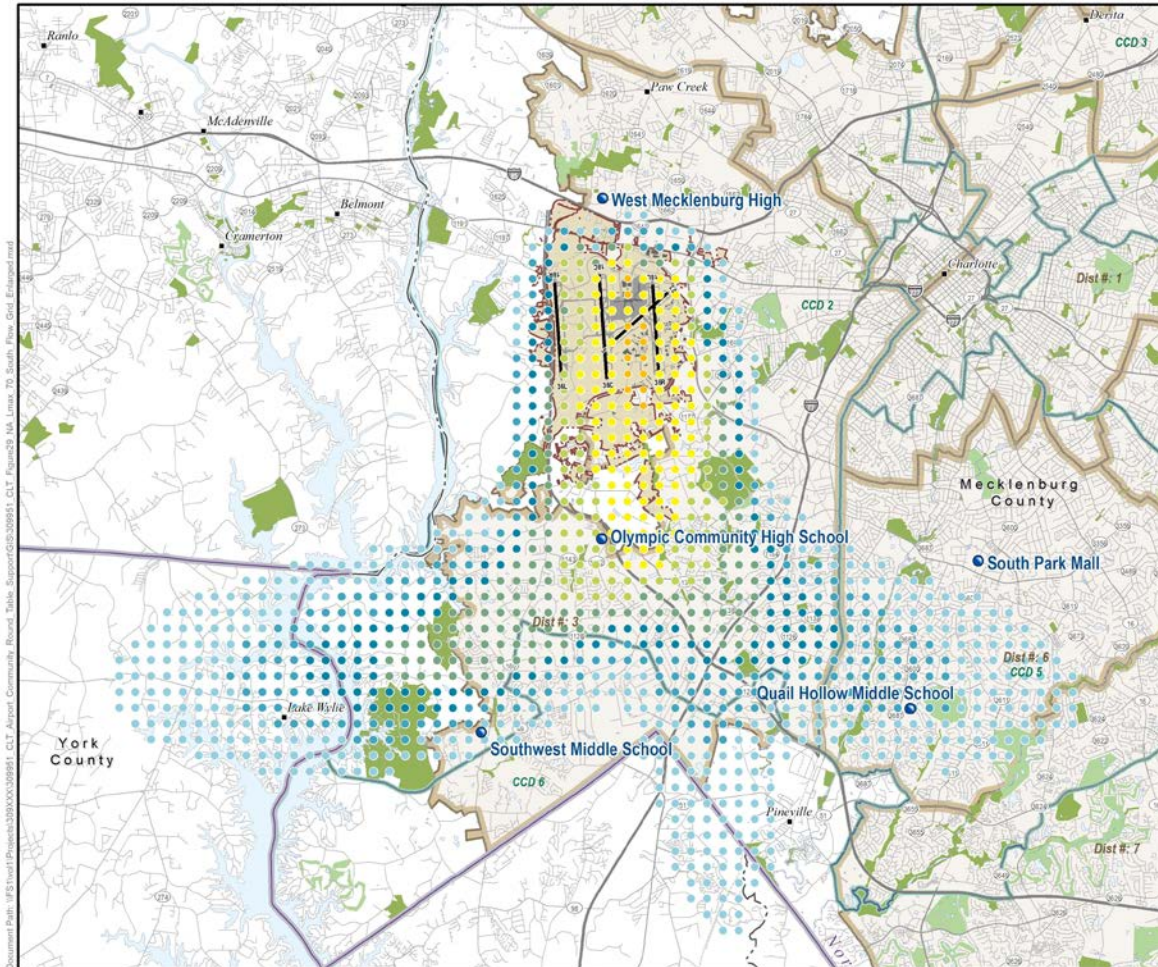


Modified

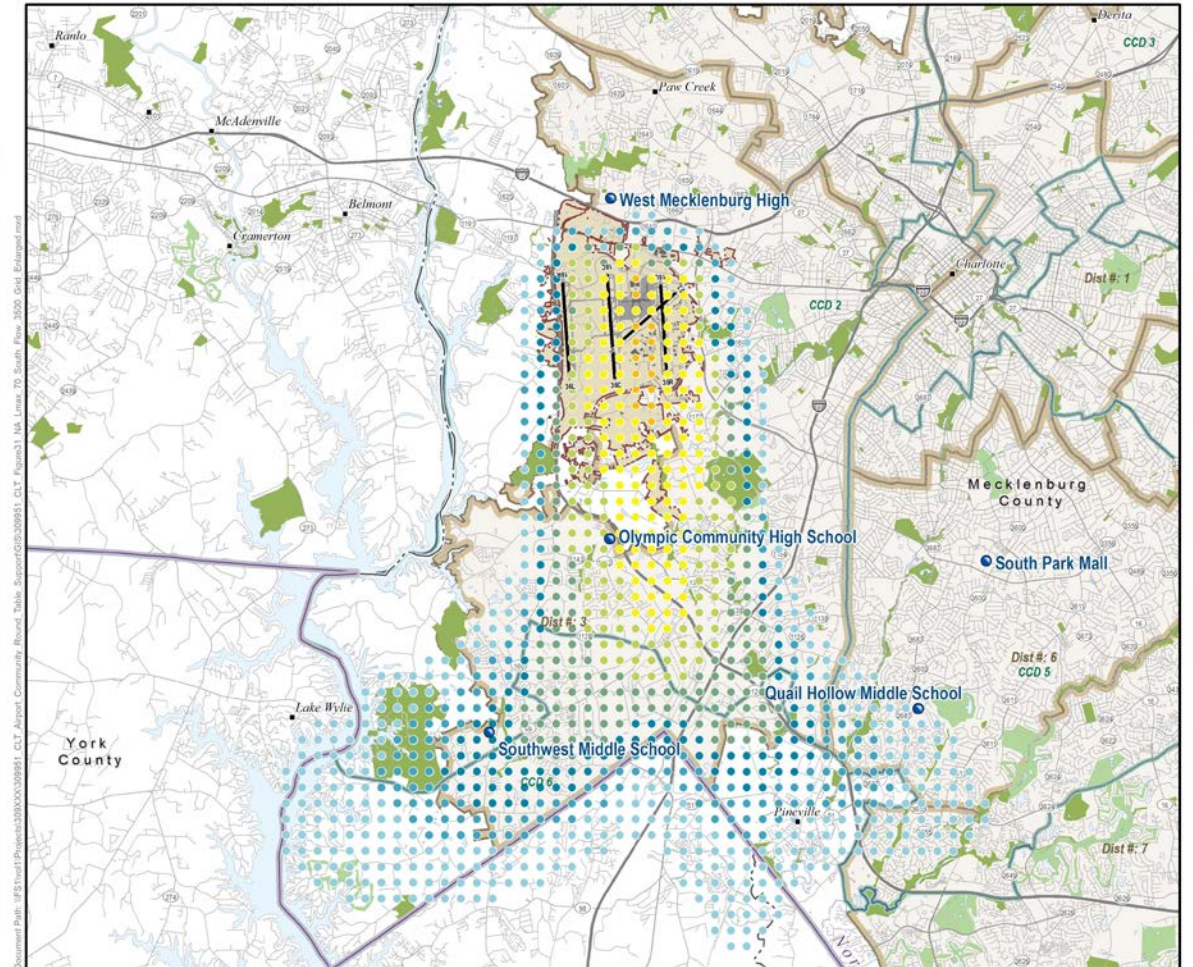
Areas of Change in Noise Levels of 3,500 feet MSL Altitude Based Departure Turns Compared to Unmodified Departures



Number of Events Analysis (N70) Comparison: Unmodified South Flow Departures to Altitude Based Departure Turns at 3,500 feet MSL

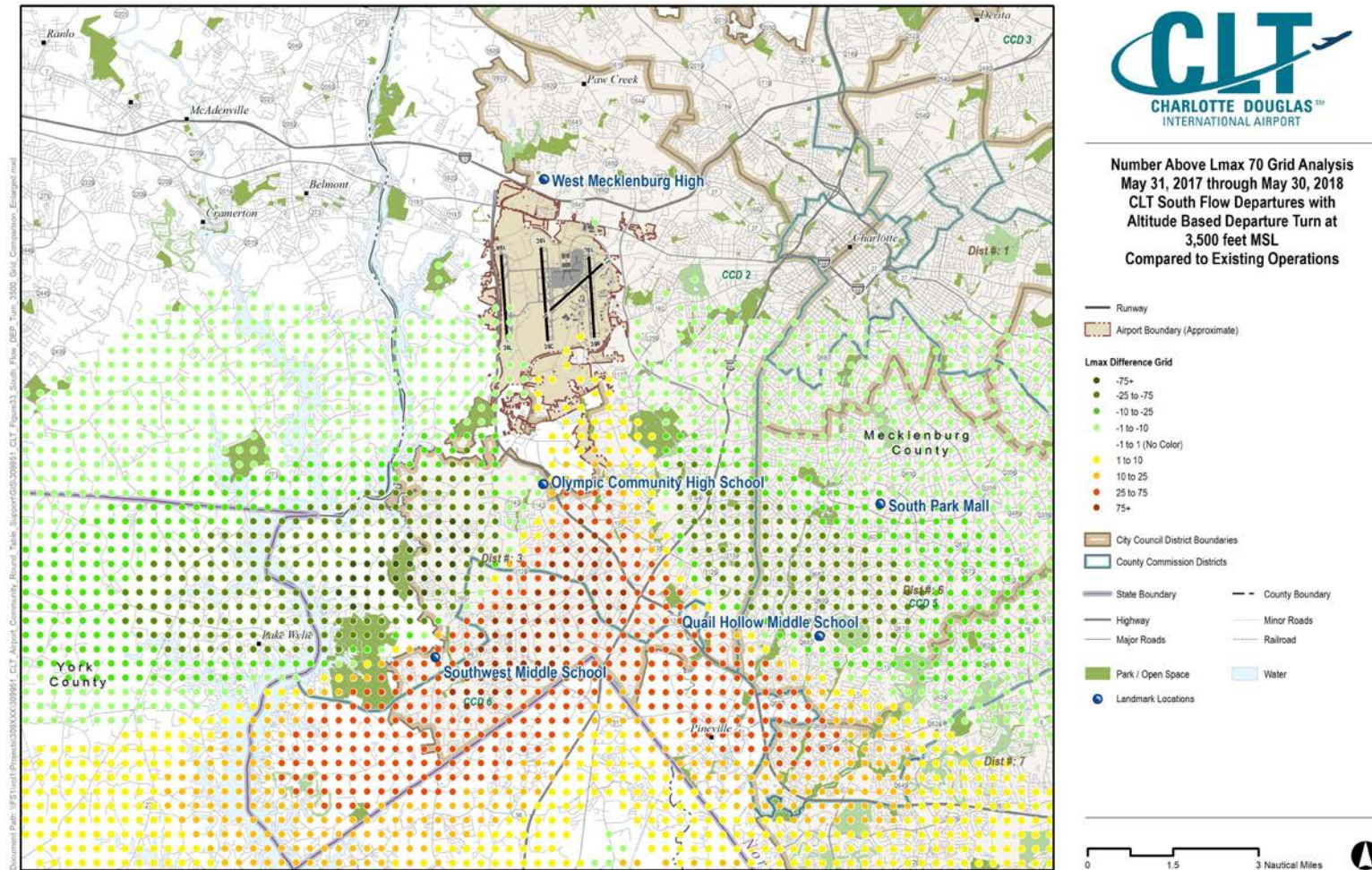


Baseline



Modified

Areas of Change in Number of Events of 3,500 feet MSL Altitude Based Departure Turns Compared to Unmodified Departures



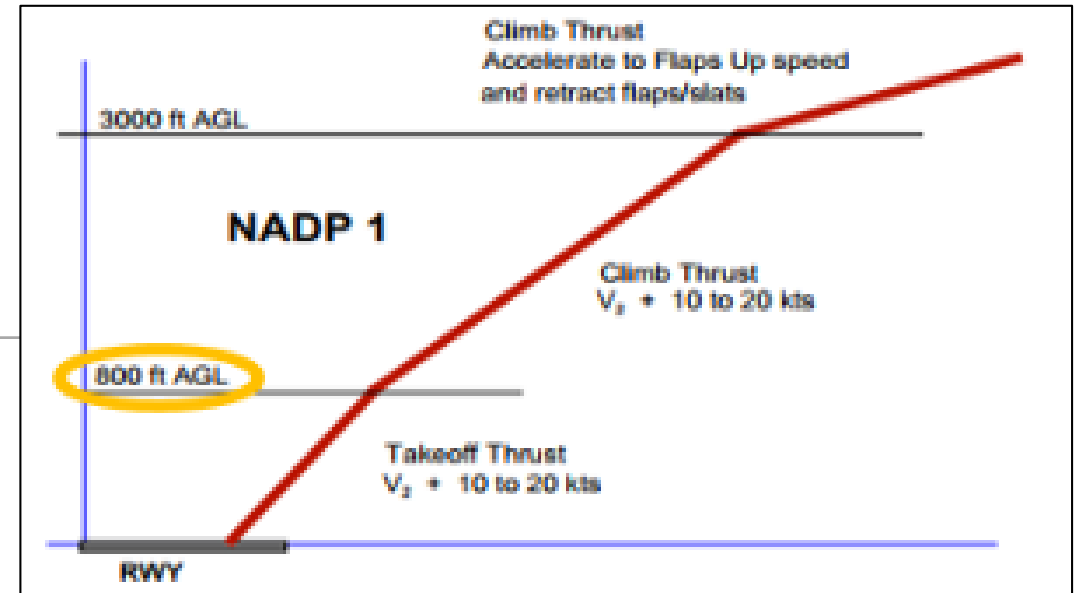
Results of Altitude Based Departure Turns Conclusions and Next Steps

- Consistent with our prior analysis, altitude based departure turns for south flow departures would potentially:
 - Shift departure turns further to the south before making turn to the west or east
 - Correspondingly decrease noise levels over areas closest to the airport, and increase noise levels further from the airport to the south by delaying the turns
 - Increase dispersion for turns to the west and southeast as the altitude at which aircraft turn is increased
 - Increased dispersion with increased aircraft turn altitudes as expected
 - Turning altitudes introduce more variability based on climb performance
- Next Steps:
 - Repeat for turns at 2,500 and 3,000 feet
 - Quantitatively assess affect of altitude based turns on airport capacity and throughput



Departure Profiles

Continuation of analysis presented at
October and December 2018 ACR meetings



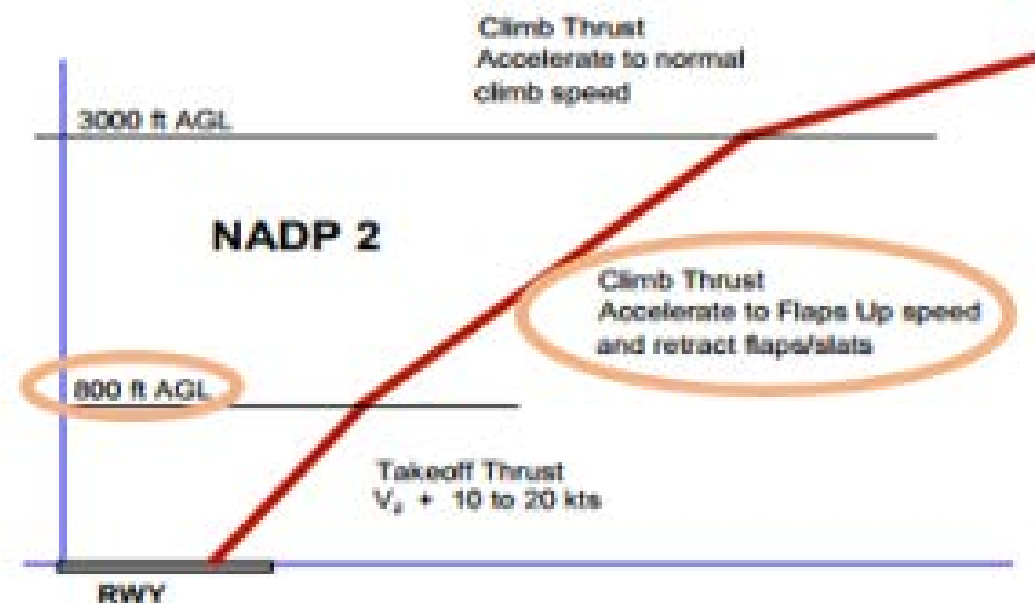
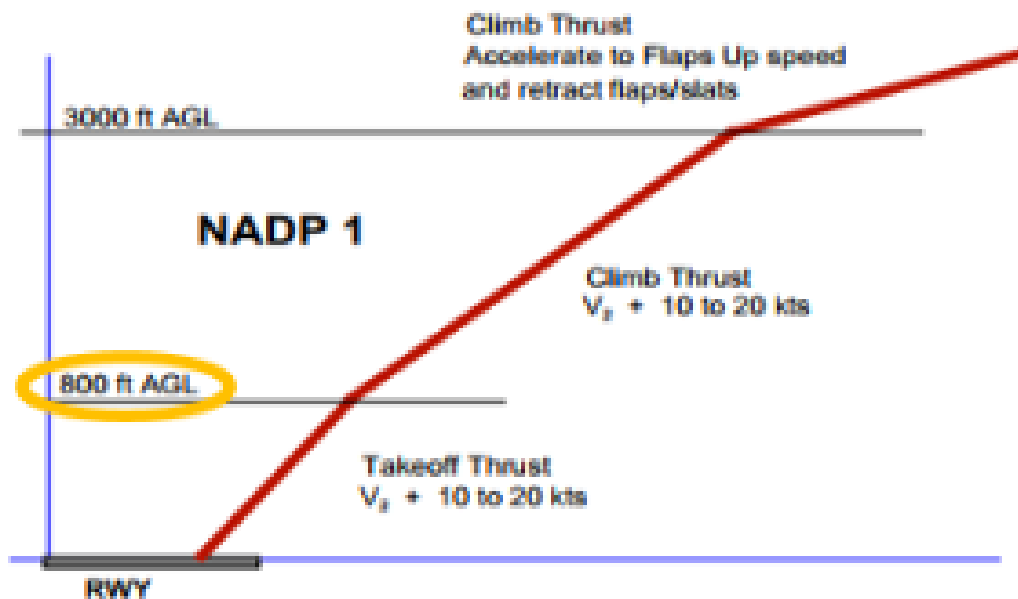
Noise Abatement Departure Procedures Review

- NADP-1 “Close In”

- Flaps to 3,000 ft AGL
 - Increased airframe noise compared to NADP-2
 - More lift creating less noise close in to the airport
 - Increases fuel consumption compared to NADP-2

- NADP-2 “Distant”

- Flaps to 800 ft AGL
 - Less airframe noise compared to NADP-1
 - Less lift creating more noise close in to the airport
 - Reduces fuel consumption compared to NADP-1



Noise Abatement Departure Procedures – Comparison to AAL Departure Profiles (confirms our findings)

- American Airlines (AAL) provided Standard Operating Procedures (SOPs) and Noise Abatement Departure Procedures/Profiles (NADPs) for the Airbus A319 (A319), Airbus A320 (A320), and Airbus A321 (A321) aircraft
- *AAL mandates all aircraft fly a “Normal Takeoff Profile”* on departure at all airports (including CLT) unless otherwise specified to fly a “Noise Abatement Profile”
- HMMH compared the AAL “Normal” and “Noise Abatement” profiles to NADP1 and NADP2
 - *The AAL “Normal Takeoff Profile” is compliant with NADP2 (Distant)*
 - The AAL “Noise Abatement Profile” is compliant with NADP1 (Close-in)
- As detailed in our prior CLT departure noise analysis for the A321 and A319:
 - NADP2 showed no benefit as compared to the Standard departure
 - Consistent with the AAL “Normal” procedure
 - NADP1 (AAL “Noise Abatement”) departure profile decreased sound levels on initial departure close to the airport and increased sound levels further from the airport compared to the Standard and NADP2 procedures



Discussion

CLT Technical Consultant to the ACR

