Draft Environmental Assessment for Charlotte Optimization of Airspace and Procedures in the Metroplex

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1 Introduction

The National Environmental Policy Act of 1969 (NEPA) [42 United States Code (U.S.C.) § 4321 *et seq.*], requires federal agencies to disclose to decision makers and the interested public a clear, accurate description of the potential environmental impacts that could arise from proposed federal actions. Through NEPA, Congress has directed federal agencies to consider environmental factors in their planning and decision-making processes and to encourage public involvement in decisions that affect the quality of the human environment. As part of the NEPA process, federal agencies are required to consider the environmental effects of a proposed action, reasonable alternatives to the Proposed Action, and a No Action Alternative (i.e., analyzing the potential environmental effects of not undertaking the proposed action). The Federal Aviation Administration (FAA) has established a process to ensure compliance with the provisions of NEPA through FAA Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1E).

This Environmental Assessment (EA), prepared in accordance with FAA Order 1050.1E, documents the potential effects to the environment that may result from the optimization of Air Traffic Control (ATC) procedures that would standardize aircraft routing to and from airports in the Charlotte Metroplex,[1] including Charlotte/Douglas International Airport (CLT), Charlotte-Monroe Executive Airport (EQY), Greenville Downtown Airport (GMU), Piedmont Triad International Airport (Greensboro) (GSO), Greenville Spartanburg International Airport (GSP), Donaldson Center Airport (GYH), Hickory Regional Airport (HKY), Smith Reynolds Airport (INT), Concord Regional Airport (JQF), Rowan County Airport (RUQ), Spartanburg Downtown Memorial Airport (SPA), Statesville Regional Airport (SVH), and Rock Hill (York Co) Airport-Bryant Field (UZA). The Proposed Action, the subject of this EA, is called the Optimization of Airspace and Procedures in the Charlotte Metroplex or "CLT OAPM" Project. The procedures designed for the CLT OAPM Project would be used by arriving and departing aircraft operating under Instrument Flight Rules (IFR) at the study area airports ("the Study Airports"), using currently available navigational technology.

This EA includes the following chapters and appendices:

- **Chapter 1: Introduction.** Chapter 1 provides basic background information on the air traffic system, the Next Generation Air Transportation System (NextGen) program, Performance-Based Navigation (PBN), the FAA's OAPM initiative, and information on the Charlotte Metroplex and the Study Airports.
- **Chapter 2: Purpose and Need.** Chapter 2 discusses the need (i.e., problem) and purpose (i.e., solution) for airspace and procedure optimization in the Charlotte Metroplex area, and identifies the Proposed Action.
- **Chapter 3: Alternatives.** Chapter 3 discusses the Proposed Action and the No Action Alternative analyzed as part of the environmental review process.
- **Chapter 4: Affected Environment.** Chapter 4 discusses existing environmental conditions within the Charlotte Metroplex area.

[1] A Metroplex is a geographic area covering several airports, serving major metropolitan areas and a diversity of aviation stakeholders.

- **Chapter 5: Environmental Consequences.** Chapter 5 discusses the potential environmental impacts associated with the Proposed Action and the No Action Alternative.
- **Appendix A: Agency and Public Coordination and List of Receiving Parties. Appendix A** documents agency and public coordination associated with the EA process and lists the local agencies and parties identified to receive copies of the Draft and Final EA documents.
- **Appendix B: List of Preparers. Appendix B** lists the names and qualifications of the principal persons contributing information to this EA.
- **Appendix C: References. Appendix C** provides references to documents used to prepare the EA document.
- **Appendix D: List of Acronyms and Glossary. Appendix D** lists acronyms and provides a glossary of terms used in the EA.
- **Appendix E: Basics of Noise. Appendix E** presents information on aircraft noise as well as the general methodology used to analyze noise associated with aviation projects.

1.1 Project Background

On January 16, 2009, the FAA asked RTCA[2] to create a joint government-industry task force to make recommendations for implementation of Next Generation Air Transportation System (NextGen) operational improvements for the nation's air transportation system. In response, RTCA assembled the NextGen Mid-Term Implementation Task Force (Task Force 5), which included more than 300 representatives from commercial airlines, general aviation, the military, aerospace manufacturers, and airport stakeholders.[3] Section 1.2.5 discusses the NextGen Program in more detail.[4]

On September 9, 2009, RTCA issued the NextGen Mid-Term Implementation Task Force Report, which provided the Task Force 5 recommendations. One of these recommendations directed the FAA to undertake planning for the implementation of Performance-Based Navigation (PBN)[5] procedures on a metroplex basis, including Area Navigation (RNAV) and Required Navigation Performance (RNP), discussed further in Sections 1.2.5.1 and 1.2.5.2. Based on this recommendation, the FAA began the OAPM initiative.

The purpose of the OAPM initiative is to optimize air traffic procedures and airspace on a regional scale. This would be accomplished by developing procedures that take advantage

[2] RTCA, Inc. Executive Summary, *NextGen Mid-Term Implementation Task Force Report*, September 9, 2009.

[3] RTCA, Inc. is a private, not-for-profit corporation that develops consensus-based recommendations regarding communications, navigation, surveillance (CNS), and air traffic management (ATM) system issues. RTCA functions as a federal advisory committee and includes roughly 400 government, industry, and academic organizations from the United States and around the world. Members represent all facets of the aviation community, including government organizations, airlines, airspace users, airport associations, labor unions, and aviation service and equipment suppliers. More information is available at http://www.rtca.org.

[4] RTCA Inc., Executive Summary, *NextGen Mid-Term Implementation Task Force Report*, September 9, 2009.

[5] Additional information on Performance-Based Navigation (PBN) is provided on the FAA Fact Sheet, "NextGen Goal: Performance-Based Navigation," April 24, 2009 [http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=8768 (accessed April 11, 2012)].

of technological advances in navigation, such as RNAV, while ensuring that aircraft that are not equipped to use RNAV continue to have access to National Airspace System (NAS). This approach addresses congestion and other factors that reduce efficiency in busy metroplex areas and accounts for key operating airports and airspace in the metroplex. The CLT OAPM Study Airports are further discussed in Section 1.4. The OAPM initiative also addresses connectivity with other metroplex areas. The overall intent is to use limited airspace as efficiently as possible for congested metroplex areas.[6]

1.2 Air Traffic Control and the National Airspace System

The following sections provide basic background information on air traffic control and the NAS. This information includes a description of the NAS, the role of Air Traffic Control (ATC), the methods used by air traffic controllers to manage the Air Traffic Control system, and the different phases of aircraft flight within the NAS. Following this discussion, information is provided on the FAA's NextGen program and the OAPM initiative.

1.2.1 National Airspace System

Under the Federal Aviation Act of 1958 (49 USC § 40101 *et seq*.), the FAA is delegated control over use of the nation's navigable airspace and regulation of domestic civil and military aircraft operations in the interest of maintaining safety and efficiency. To help fulfill this mandate, the FAA established the NAS. Within the NAS, the FAA manages aircraft takeoffs, landings, and the flow of aircraft between airports through a system of infrastructure (e.g., air traffic control facilities), people (e.g., air traffic controllers, maintenance, and support personnel), and technology (e.g., radar, communications equipment, ground-based navigational aids [NAVAIDs],[7] etc.) The NAS is governed by various FAA rules and regulations.

The NAS comprises one of the most complex aviation networks in the world. The FAA continuously reviews the design of all NAS resources to ensure they are effectively and efficiently managed. The FAA Air Traffic Organization (ATO) is the primary organization responsible for managing airspace and flight procedures used in the NAS. When changes are proposed to the NAS, the FAA works to ensure that the changes maintain or enhance system safety and improve efficiency. One way to accomplish this mission is to employ emerging technologies to increase system flexibility and predictability.[8]

1.2.2 Air Traffic Control within the National Airspace System

The combination of infrastructure, people, and technology used to monitor and guide (or direct) aircraft within the NAS is referred to collectively as ATC. One of ATC's responsibilities is to maintain safety and expedite the flow of traffic in the NAS through enforcement of defined minimum distances between aircraft (referred to as "separation"). This is accomplished through required communications between air traffic controllers and pilots and the use of navigational technologies such as radar.

[6] U.S. Department of Transportation, Federal Aviation Administration, *FAA Response to Recommendations of the RTCA NextGen Mid-Term Implementation Task Force*, January 2010, p. 14.

[7] NAVAIDs are facilities that transmit signals that define key points or routes.

[8] U.S. Department of Transportation, Federal Aviation Administration, Order JO 7400.2J, Change 3, *Procedures for Handling Airspace Matters*, Section 32-3-5(b) "National Airspace Redesign," August 22, 2013.

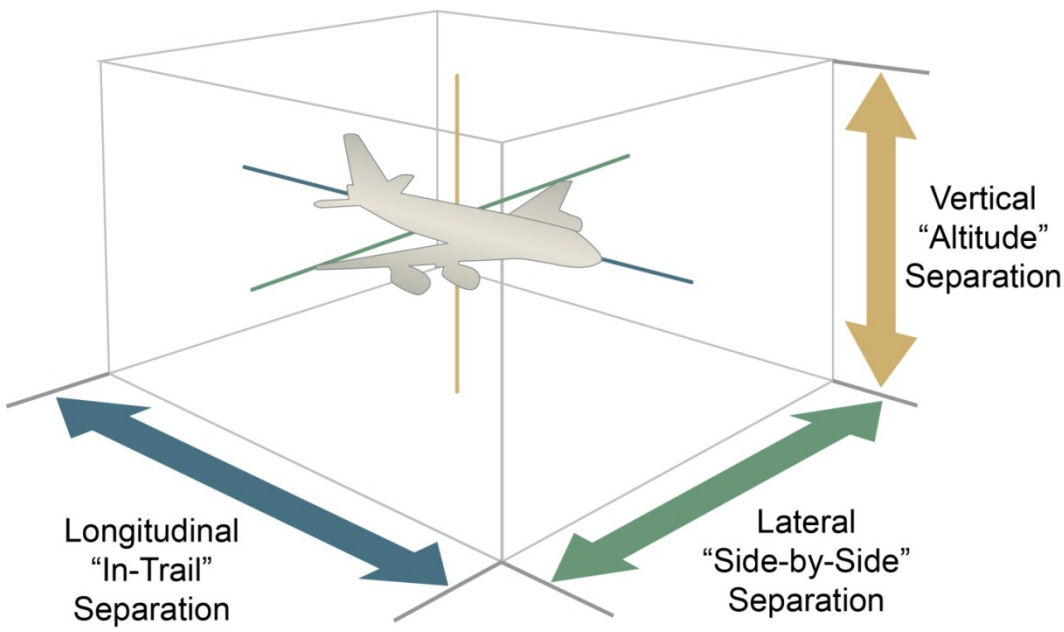
Aircraft operate under two distinct categories of flight rules: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).[9] Under VFR, pilots are responsible to "see and avoid" other aircraft and obstacles such as terrain to maintain safe separation yet have greater flexibility to choose altitudes and routes. Under IFR, aircraft operators are required to file flight plans and use navigational instruments to operate within the NAS. The majority of commercial air traffic operates under IFR.

Depending on whether aircraft are operating under IFR or VFR, air traffic controllers apply various techniques to maintain separation between aircraft,[10] including the following:

- **Vertical or "Altitude" Separation:** separation between aircraft operating at different altitudes;
- **Longitudinal or "In-Trail" Separation:** separation between two aircraft operating along the same flight route referring to the distance between a lead and a following aircraft; and,
- **Lateral or "Side-by-Side" Separation:** separation between aircraft (left or right side) operating along two separate but nearby flight routes.

Exhibit 1-1 depicts the three dimensions around an aircraft used to determine separation.

Exhibit 1-1 Three Dimensions Around an Aircraft



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, October 2013.

Air traffic controllers use radar to monitor all aircraft and provide services that ensure separation. Published instrument procedures are tools used by ATC to provide predictable, efficient routes that move aircraft through the NAS in a safe and orderly manner. These

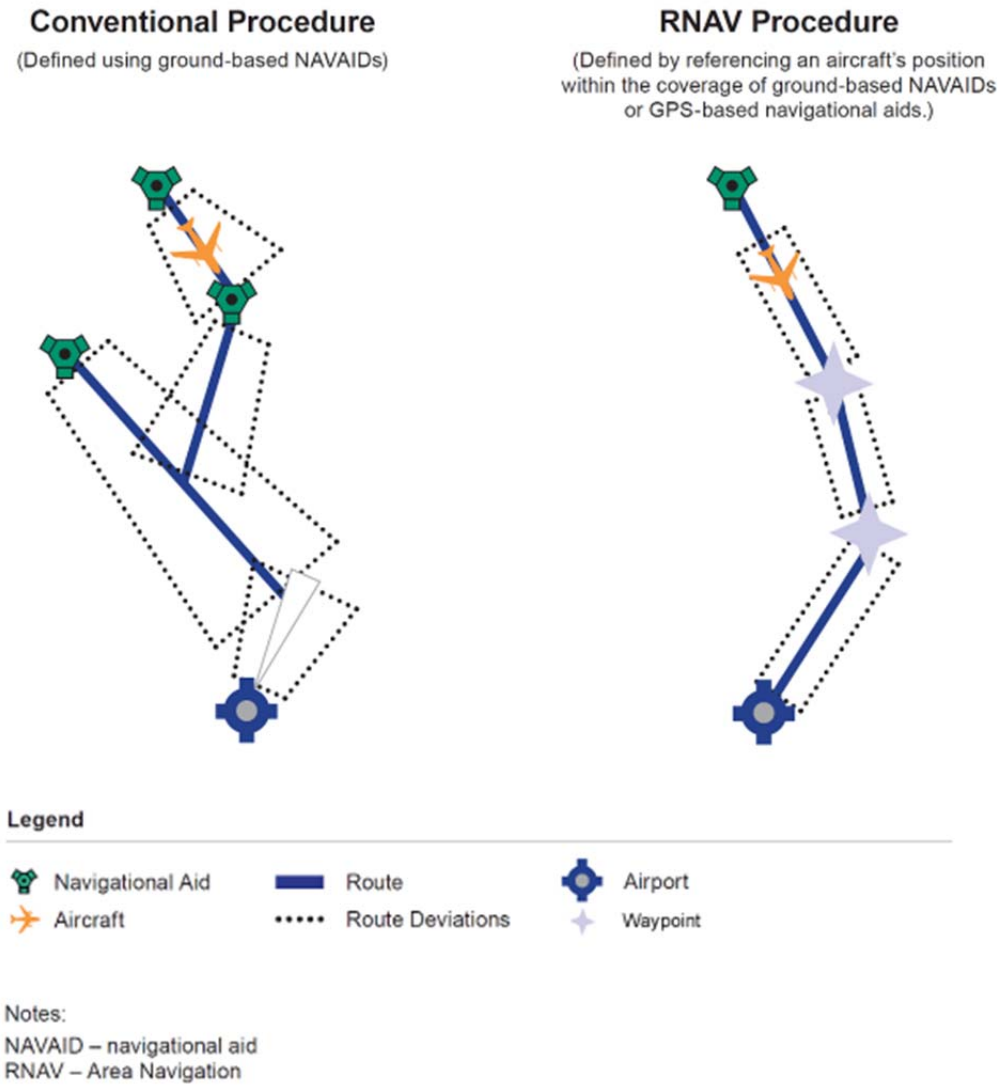
[9] 14 Code of Federal Regulations (C.F.R.), Part 91.

[10] Defined in FAA Order 7110.65U, *Air Traffic Control*.

procedures minimize the need for communication between air traffic controllers and pilots.

Published instrument procedures are described as "conventional" procedures when they use ground-based NAVAIDs or are based on verbal instructions (vectors) issued by an air traffic controller. In its effort to modernize the NAS, the FAA is developing instrument procedures that use advanced technologies. A primary technology being applied in this effort is RNAV. RNAV uses Global Positioning System (GPS) technology to allow an RNAV-equipped aircraft to fly a more efficient route. This route is based on instrument guidance that references an aircraft's position relative to ground-based NAVAIDs or satellites. **Exhibit 1-2** compares a conventional procedure and an RNAV procedure.

Exhibit 1-2 Comparison of Routes Following Conventional versus RNAV Procedures



Source: U.S. Department of Transportation, Federal Aviation Administration, "Performance-Based Navigation (PBN)" brochure, 2009.
Prepared by: ATAC Corporation, March 2014.

ATC uses a variety of tools and coordination techniques to maintain safety within the NAS, including:

- **Vectors:** Headings issued to aircraft to provide navigational guidance and to maintain separation between aircraft and/or obstacles.
- **Speed Control:** Direction issued to aircraft to reduce or increase aircraft speed to maintain separation between aircraft.
- **Holding Pattern/Ground Hold:** Controllers assign aircraft to a holding pattern in the air or hold aircraft on the ground before departure to maintain separation between aircraft and to manage arrival/departure volume.
- **Altitude Assignment/Level-off:** Controllers assign altitudes to maintain separation between aircraft and/or to protect airspace. This may result in aircraft "leveling off" during ascent or descent.
- **Reroute:** Controllers may change an aircraft's route for a variety of reasons, such as avoidance of inclement weather, to maintain separation between aircraft, and/or to protect airspace.
- **Point-out:** Notification issued by one controller when an aircraft might pass through or affect another controller's airspace and radio communications will not be transferred.

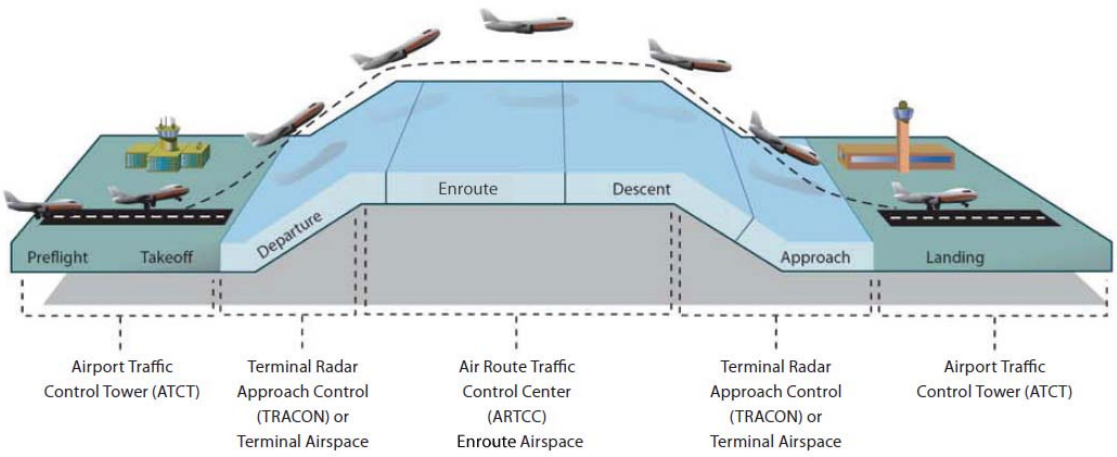
As an aircraft moves from origin to destination, ATC personnel function as a team and transfer control of the aircraft from one controller to the next, and from one ATC facility to the next.

1.2.3 Aircraft Flow within the National Airspace System

An aircraft traveling from airport to airport typically operates through six phases of flight (plus a "preflight" phase.) **Exhibit 1-3** depicts the typical phases of flight for a commercial aircraft. These phases include:

- **Preflight (Flight Planning):** The preflight route planning and flight checks performed in preparation for takeoff.
- **Push Back/Taxi/Takeoff:** The aircraft's transition across the airfield from push-back at the gate, taxiing to an assigned runway, and takeoff from the runway.
- **Departure:** The aircraft's in-flight transition from takeoff to the enroute phase of flight, during which it climbs to the assigned cruising altitude.
- **Enroute:** Generally, the level segment of flight (i.e., cruising altitude) between the departure and destination airports.
- **Descent:** The aircraft's in-flight transition from an assigned cruising altitude to the point at which the pilot initiates the approach to a runway at the destination airport.
- **Approach:** The segment of flight during which an aircraft follows a standard procedure that guides the aircraft to the landing runway.
- **Landing:** Touch-down of the aircraft at the destination airport and taxiing from the runway to the gate or parking position.

Exhibit 1-3 Typical Phases of a Commercial Aircraft Flight



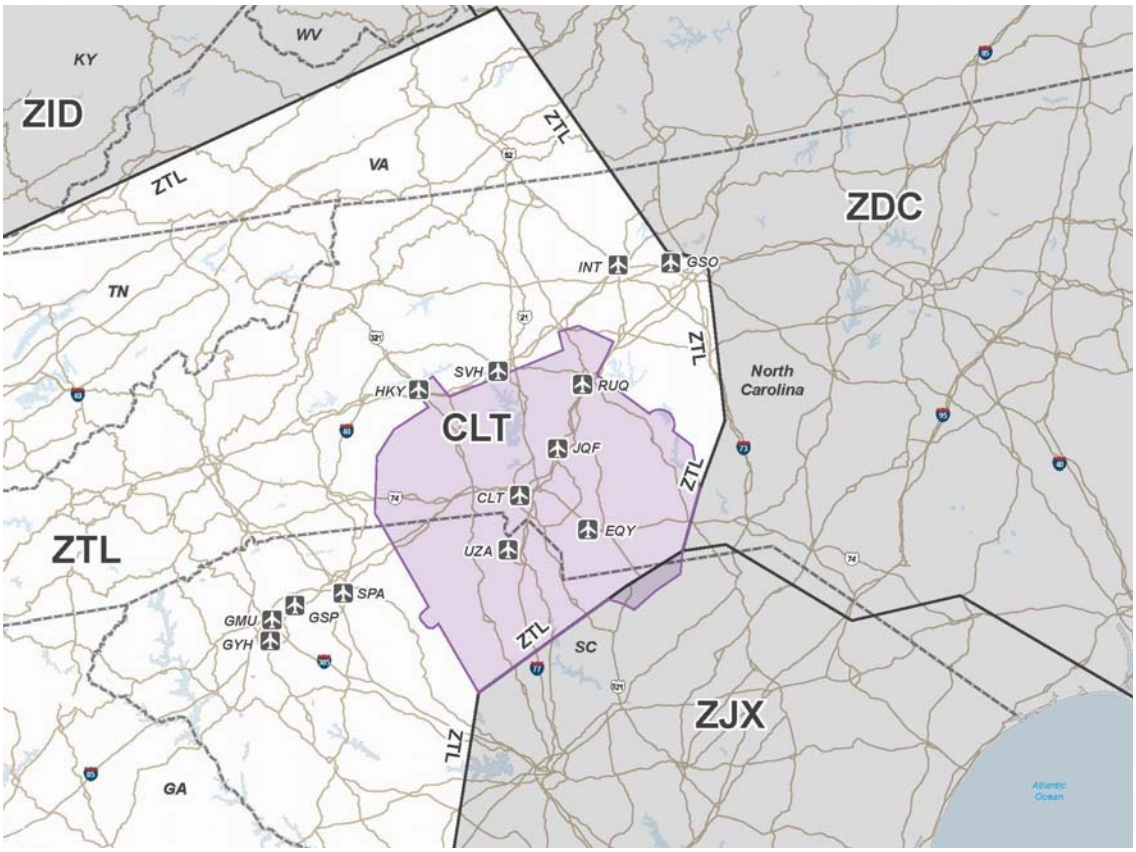
Source: U.S. Department of Transportation, Federal Aviation Administration, Houston Area Air Traffic System (HAATS), Airspace Redesign, Final Environmental Assessment, Figure 1.1.1-1, March 2008.
Prepared by: ATAC Corporation, March 2014.

1.2.4 Air Traffic Control Facilities

The NAS is organized into three-dimensional areas of navigable airspace (defined by a floor, a ceiling, and a lateral boundary), managed by different types of ATC facilities including:

- **Air Traffic Control Tower:** Controllers at an Air Traffic Control Tower (ATCT) located at an airport manage phases of flight associated with aircraft takeoff and landing. The ATCT typically controls airspace extending from the airport out to a distance of several miles.
- **Terminal Radar Approach Control:** Controllers at a Terminal Radar Approach Control (TRACON) facility manage aircraft as they transition between an airport and the enroute phase of flight. This includes the departure, climb, descent, and approach phases of flights. The TRACON airspace is broken down into sectors managed by individual TRACON controllers. As an aircraft moves between sectors, responsibility for management of that aircraft is transferred from controller to controller. Controllers maintain separation between aircraft that operate within their sectors. The terminal airspace in the Charlotte Metroplex area is referred to as Charlotte TRACON, or "CLT" and is shown on **Exhibit 1-4**.
- **Air Route Traffic Control Centers:** Controllers at Air Route Traffic Control Centers (ARTCCs or "Centers") manage the flow of traffic during the enroute phase of flight. Similar to TRACON airspace, the Center airspace is broken down into sectors managed in a similar manner by individual controllers. As shown on **Exhibit 1-4**, the Charlotte Metroplex is comprised of airspace delegated to the Washington ARTCC (ZDC), Atlanta ARTCC (ZTL), Jacksonville ARTCC (ZJX), Indianapolis ARTCC (ZID) and CLT.

Exhibit 1-4 Airspace in the Charlotte Metroplex Area



Notes:

CLT - Charlotte/Douglas International Airport	*EQY - Charlotte-Monroe Executive Airport*
GMU - Greenville Downtown Airport	*GSO - Piedmont Triad International Airport (Greensboro)*
GSP - Greenville Spartanburg International Airport	*GYH - Donaldson Center Airport*
HKY - Hickory Regional Airport	*INT - Smith Reynolds Airport*
JQF - Concord Regional Airport	*RUQ - Rowan County Airport*
SPA - Spartanburg Downtown Memorial Airport	*SVH - Statesville Regional Airport*
UZA - Rock Hill (York Co) Airport-Bryant Field	*CLT – Charlotte TRACON*
ZDC - Washington ARTCC	*ZTL - Atlanta ARTCC*
ZJX - Jacksonville ARTCC	*ZID – Indianapolis ARTCC*

Sources: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed September 16, 2012 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database; ATAC Corporation (Study Area Boundary).

Prepared by: ATAC Corporation, August 2014.

The following sections discuss how air traffic controllers at these ATC facilities control the phases of flight for aircraft operating under IFR.

1.2.4.1 Departure Flow

As an aircraft operating under IFR departs a runway and follows its assigned heading, it moves from the ATCT airspace, through the terminal airspace, and into enroute airspace where it proceeds on a specific route to its destination airport.

Within the terminal airspace, TRACON controllers manage aircraft departing from the ATCT airspace to transfer control points referred to as "exit gates." An exit gate represents an area along the boundary between terminal airspace and enroute airspace. Exit gates are generally established near commonly used routes to better facilitate transfer of aircraft between terminal and enroute airspace. When aircraft pass through the exit gate, control is transferred from TRACON to ARTCC controllers as an aircraft joins a specific route.

Standard Instrument Departures

Departing aircraft operating under IFR use a procedure called a Standard Instrument Departure (SID). A SID provides pilots with defined lateral and vertical guidance to facilitate safe and predictable navigation from an airport through the terminal airspace to a specific route in the enroute airspace. A "conventional" SID follows a route defined by ground-based NAVAIDs, may be based on vectoring, or a combination of both. Because of the increased precision inherent in RNAV technology, an RNAV SID, which uses GPS-based navigation, defines a more predictable route through the airspace than does a conventional SID. Currently, the Study Airports are served by seven RNAV SIDs and six conventional SIDs.

Some RNAV SIDs may be designed to include paths called "runway transitions" that serve particular runways at airports. A SID may have several runway transitions serving one or more runways at one or more airports. From the runway transition, aircraft may follow a common path before being directed along one or several diverging routes referred to as "enroute transitions." Enroute transitions may terminate at exit fixes or continue into enroute airspace where aircraft join a specific route.

1.2.4.2 Arrival Flow

An aircraft will begin the descent phase of flight within the enroute airspace. During descent, the aircraft will pass into the terminal airspace through an "entry gate," bound for the destination airport. The entry gate represents a point along the boundary between terminal airspace and enroute airspace where control of the aircraft is passed from ARTCC to TRACON controllers.

Standard Terminal Arrival Routes

Aircraft that arrive within the terminal airspace normally follow an instrument procedure called a Standard Terminal Arrival Route (STAR). Aircraft leaving enroute airspace and entering terminal airspace may follow an enroute transition from an entry fix to the STAR's common route in the terminal airspace. From the common route segment, aircraft may follow a runway transition before making an approach to the airport. However, not all STARs include enroute or runway transitions. Currently, the Study Airports are served by six RNAV STARs and nine conventional STARs.

1.2.4.3 Required Aircraft Separation

As controllers manage the flow of aircraft into, out of, and within the NAS, they maintain the following separation distances between aircraft:

- **Altitude Separation (vertical):** When operating below 41,000 feet above mean sea level (MSL), two aircraft on separate routes must be at least 1,000 feet above/below each other until lateral separation is ensured.

- **In-Trail Separation (longitudinal):** Within a radar controlled area, the minimum distance between two aircraft on the same route (i.e., in-trail) can between three to ten miles, depending on factors such as aircraft class, weight, and type of airspace.
- **Side-by-Side Separation (lateral):** Similar to in-trail separation, the minimum side-by-side (left or right side of an aircraft) separation between aircraft must be at least three miles in the terminal airspace and five miles in the enroute airspace.

1.2.5 Next Generation Air Transportation System

The NextGen program is the FAA's long-term plan to modernize the NAS through evolution from a ground-based system of air traffic control to a GPS-based system of air traffic management.[11] The OAPM initiative is a key step in the overall process of transitioning to the NextGen system by 2018. Achieving the NextGen ATC system requires implementation of PBN procedures, including RNAV and RNP, which use GPS-based technology, aircraft "auto-pilot", and Flight Management System (FMS)[12] capabilities. RNAV and RNP capabilities are now readily available and PBN can serve as the primary means aircraft use to navigate along a route. Most U.S. scheduled air carriers are equipped to support RNAV and RNP.[13] The following sections describe PBN procedures in greater detail.

1.2.5.1 RNAV

Exhibit 1-5 compares conventional and RNAV routes. RNAV enables aircraft traveling through terminal and enroute airspace to follow more accurate and better-defined routes in areas covered by GPS-based NAVAIDs. This results in more predictable routes and altitudes that can be pre-planned by the pilot and air traffic control. Predictable routes provide the ability to ensure vertical, longitudinal, and lateral separation between aircraft.

Routes based on ground-based NAVAIDs are often limited by issues such as line-of-sight and signal reception accuracy. NAVAIDs such as VHF Omnidirectional Range (VOR) are affected by variable terrain and other obstructions that can limit their signal accuracy. Consequently, routes dependent upon ground-based NAVAIDS require at least six nautical miles (nm) of clearance on either side of a route's main path to ensure accurate signal reception. As demonstrated by the dashed lines on **Exhibit 1-5**, this clearance requirement increases the farther an aircraft is from the VOR. In comparison, RNAV signal accuracy requires only two nm of clearance on either side of a route's main path.

RNAV routes can mirror conventional routes or by using satellite technology, provide routes within the airspace that were not previously possible with ground-based NAVAIDs.

1.2.5.2 RNP

RNP is an RNAV procedure that is enhanced by the use of onboard performance monitoring and alerting systems. A defining characteristic of an RNP operation is the ability for an RNP-capable aircraft navigation system to monitor the accuracy of its navigation

[11] U.S. Department of Transportation, Federal Aviation Administration, Fact Sheet, "NextGen Goal: Performance-Based Navigation," April 24, 2009 [http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=8768 (accessed April 11, 2012)].

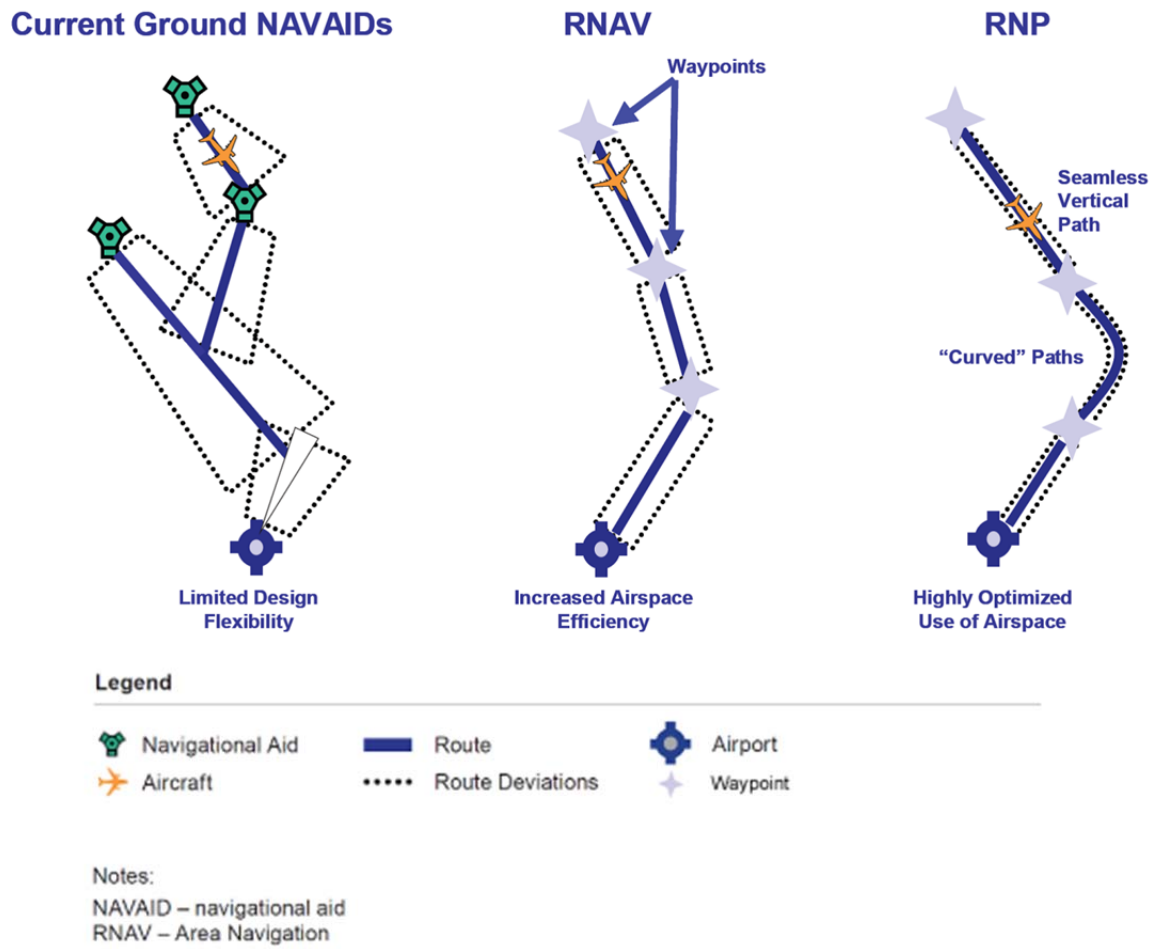
[12] A Flight Management System (FMS) is an onboard computer that uses inputs from various sensors (e.g., GPS and inertial navigation systems) to determine the geographic position of an aircraft and help guide it along its flight path.

[13] U.S. Department of Transportation, Federal Aviation Administration, *NextGen Implementation Plan-2013*, June 2013, p. 36.

(based on the number of GPS satellite signals available to pinpoint the aircraft location) and inform the crew if the required data becomes unavailable.

Exhibit 1-5 compares conventional, RNAV, and RNP procedures and shows how an RNP capable aircraft navigational system provides a more accurate location (down to less than a mile from the intended path) and will follow a highly predictable path. The enhanced accuracy and predictability makes it possible to implement procedures within controlled airspace that are not always possible under the current air traffic system.

Exhibit 1-5 Navigational Comparison – Conventional/RNAV/RNP

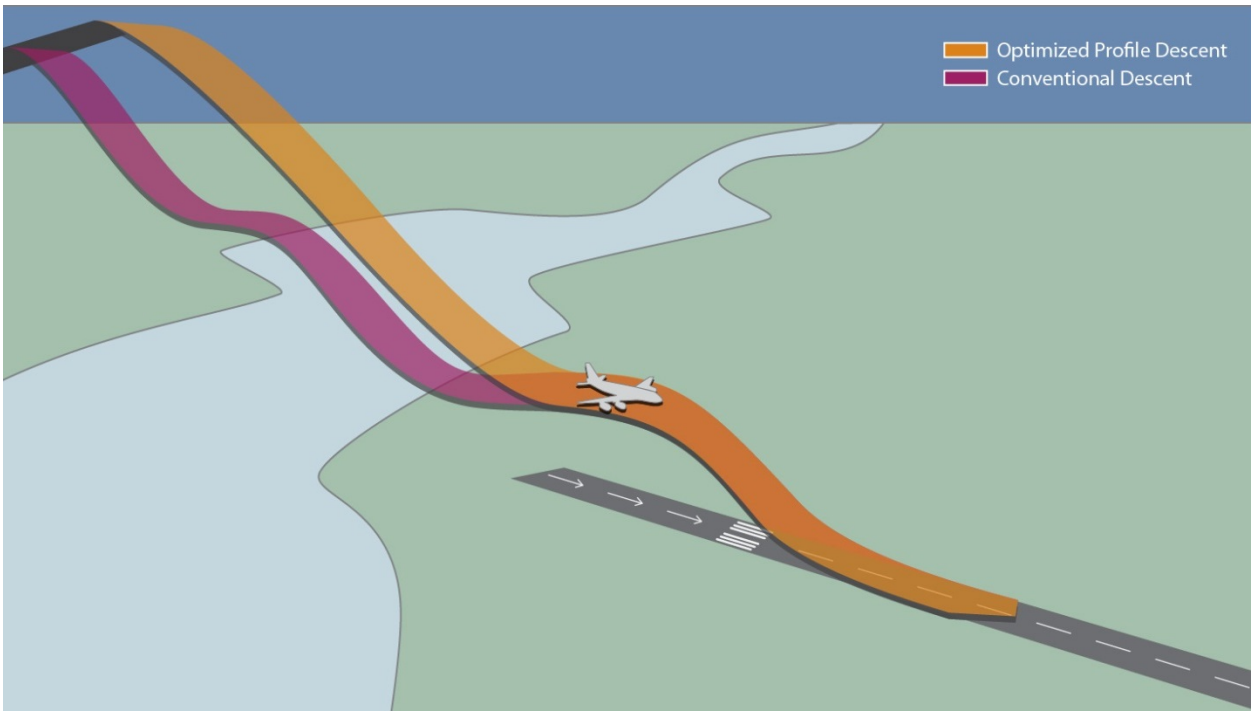


Source: U.S. Department of Transportation, Federal Aviation Administration, "Performance-Based (PBN) Brochure," October 2009.
Prepared by: ATAC Corporation, March 2013.

1.2.5.3 Optimized Profile Descent

An Optimized Profile Descent (OPD) is a flight procedure that allows the aircraft FMS to fly continuously from the top of descent to landing with minimal level-off segments. **Exhibit 1-6** illustrates an OPD procedure compared to a conventional descent. Aircraft that fly OPDs can maintain higher altitudes and lower thrust for longer periods. As level-off segments are eliminated, OPDs reduce the need for communications between controllers and pilots.

Exhibit 1-6 Optimized Profile Descent Compared to a Conventional Descent



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, October 2013.

1.2.6 The OAPM Initiative

As part of the OAPM initiative, the FAA will design and implement RNAV procedures that take advantage of the technology that is readily available in a majority of commercial service aircraft. The OAPM initiative specifically addresses congestion, airports in close geographical proximity, and other limiting factors that reduce efficiency in busy metroplex airspace. Efficiency is improved by expanding the implementation of RNAV-based standard instrument procedures and connecting the routes defined by the standard instrument procedures to high- and low-altitude RNAV routes. Efficiency is further improved by using RNAV to maximize the use of the limited airspace in congested metroplex environments.

1.3 The Charlotte Metroplex

The following sections describe the airspace structure and existing standard instrument procedures of the Charlotte Metroplex that would be affected by the CLT OAPM Project.

1.3.1 Charlotte Metroplex Airspace

Exhibit 1-4 depicts the airspace structure in the Charlotte Metroplex. The Charlotte Metroplex consists of airspace delegated to CLT, ZDC, ZTL, ZJX, and ZID. Excluding airspace delegated to the ATCTs at controlled airports, CLT controllers currently manage airspace from the surface to 14,000 feet MSL over the Charlotte Metroplex area. CLT airspace is configured as a “four corner-post” airspace design for arrivals to CLT. In a typical four-corner post system, aircraft arrive to the terminal airspace through entry gates to

the northeast, southeast, southwest, and northwest. This provides the most efficient way to transfer aircraft to an airport from an entry gate.

1.3.1.1 Charlotte Metroplex Special Use Airspace

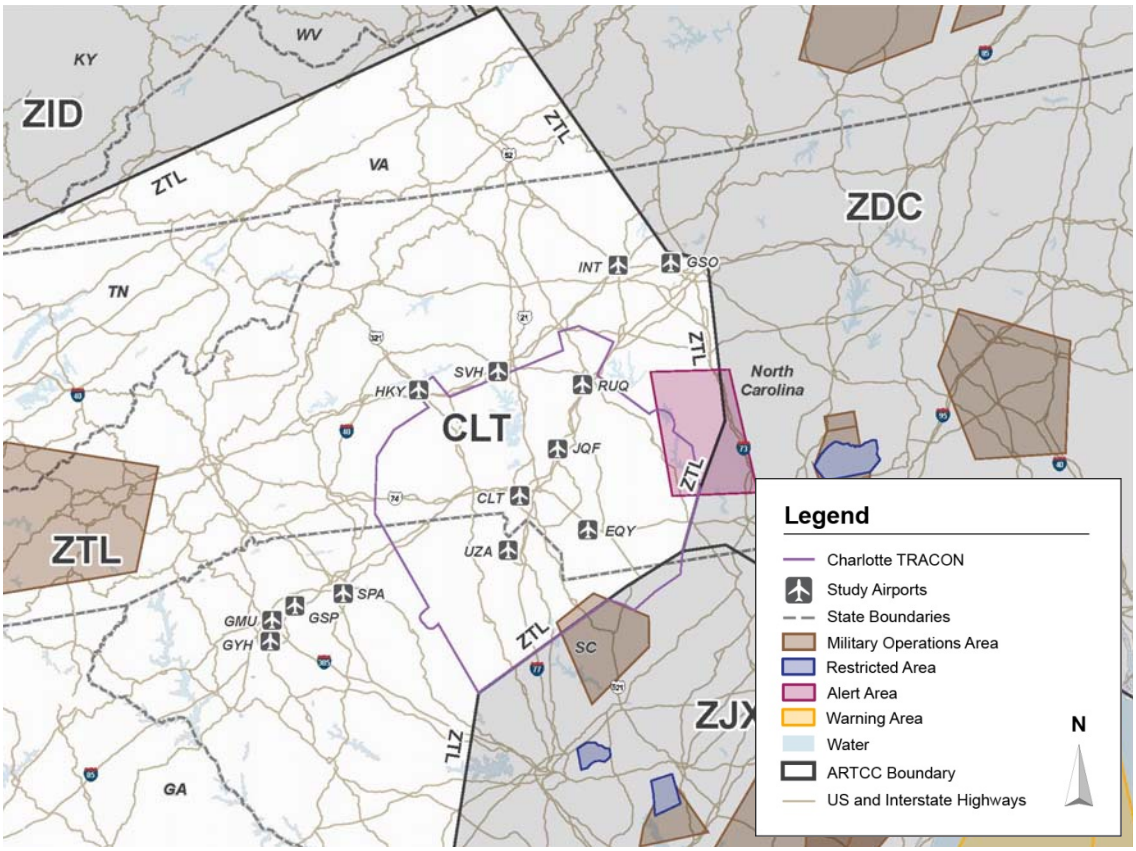
Exhibit 1-7 depicts the boundaries of Special Use Airspace (SUA) in the Charlotte Metroplex. SUA is airspace with defined boundaries in which certain activities such as military flight training and air-to-ground military exercises must be confined. These areas either restrict other aircraft from entering or limit aircraft activity allowed within the airspace. Three types of SUA are found within the Charlotte Metroplex:

- **Restricted Area:** Restricted areas contain airspace identified by an area within which aircraft, while not wholly prohibited, are subject to restrictions when the area is being used. The area denotes the existence of unusual, often invisible hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Entering a restricted area without authorization may be extremely hazardous to the aircraft and its occupants. When the area is not being used, control of the airspace is released to the FAA and ATC can use the area for normal operations.
- **Warning Area:** Warning areas are airspace of defined dimensions, extending from three nm outward from the coast of the U.S. in which activity may occur that is hazardous to non-participating aircraft. The purpose of warning areas is to warn pilots of potential danger. A warning area may be located over domestic and/or international waters.
- **Military Operating Area:** Military Operating Areas (MOAs) consist of airspace with defined vertical and lateral limits established for the purpose of separating certain military training activities (e.g., air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics) from IFR traffic. Whenever a MOA is being used, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic.

1.3.2 Current STARs and SIDs

As of October 2014, 31 published STARs and SIDs serve the airports within the CLT Metroplex airspace. Of these, 17 are conventional procedures (nine conventional STARs and eight conventional SIDs) and 14 are RNAV procedures (seven RNAV STARs and seven RNAV SIDs).

Exhibit 1-7 Special Use Airspace



Notes:

CLT - Charlotte/Douglas International Airport	*EQY - Charlotte-Monroe Executive Airport*
GMU - Greenville Downtown Airport	*GSO - Piedmont Triad International Airport (Greensboro)*
GSP - Greenville Spartanburg International Airport	*GYH - Donaldson Center Airport*
HKY - Hickory Regional Airport	*INT - Smith Reynolds Airport*
JQF - Concord Regional Airport	*RUQ - Rowan County Airport*
SPA - Spartanburg Downtown Memorial Airport	*SVH - Statesville Regional Airport*
UZA - Rock Hill (York Co) Airport-Bryant Field	*CLT – Charlotte TRACON*
ZDC - Washington ARTCC	*ZTL - Atlanta ARTCC*
ZJX - Jacksonville ARTCC	*ZID – Indianapolis ARTCC*

Sources: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center (NFDC), National Airspace System Resources, Airport, and Runway databases, accessed September 16, 2012 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics,
Prepared by: ATAC Corporation, August 2014.

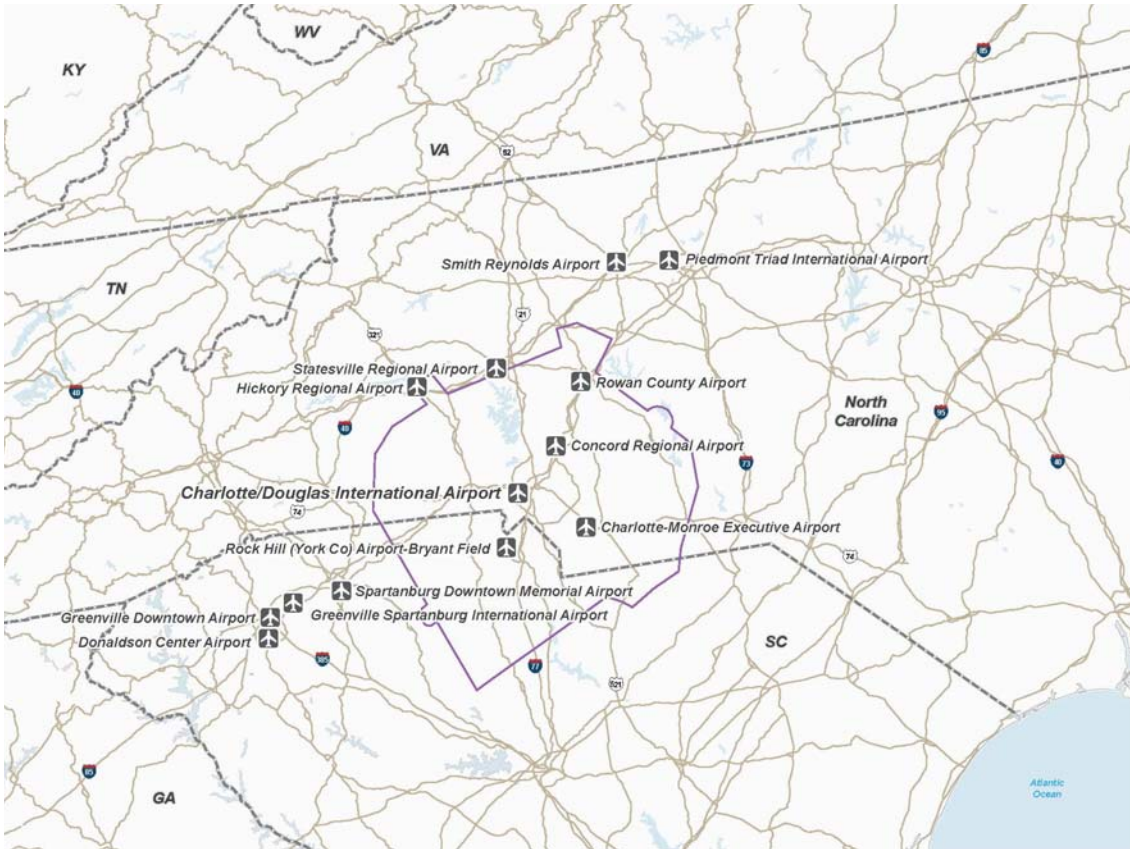
1.4 Charlotte Metroplex Airports

Exhibit 1-8 shows the locations of the CLT OAPM Study Airports. The CLT OAPM Study Airports include one major airport (Charlotte-Douglas International Airport) and 12 satellite airports.

Charlotte-Douglas International Airport (CLT) is classified as a large-hub primary commercial service airport in the National Plan of Integrated Airport Systems (NPIAS). CLT is the primary commercial service airport serving the Charlotte Metroplex area. Accordingly, CLT receives scheduled commercial service and accommodates at least 2.7 percent of total U.S. enplaned passengers. CLT supports a mix of domestic and international passenger airlines, air cargo carriers, and corporate aviation activity. The airport has four runways,

described in Table 1-1. As of October 2014, an aircraft arriving at CLT may be assigned one of five RNAV STARs or one of four conventional STARs. A departing aircraft may be assigned one of seven RNAV SIDs or one of five conventional SIDs.

Exhibit 1-8 Study Airport Locations



Sources: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center (NFDC), National Airport, and Runway databases; National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database; ATAC Corporation (Study Area Boundary).

Prepared by: ATAC Corporation, October 2013.

Table 1-1 Charlotte Metroplex EA Study Airports

Airport Name	Airport Code	Location	Runways[1/]
Major Airports			
Charlotte-Douglas International Airport	CLT	Charlotte, North Carolina	18C, 36C, 18R, 36L, 18L, 36R, 05, 23
Satellite Airports			
Charlotte-Monroe Executive Airport	EQY	Monroe, North Carolina	05, 23
Greenville Downtown Airport	GMU	Greenville, South Carolina	01, 19, 10, 28
Piedmont Triad International Airport (Greensboro)	GSO	Greensboro, North Carolina	05R, 23L, 05L, 23R, 32, 14
Greenville Spartanburg International Airport	GSP	Greer, South Carolina	04, 22
Donaldson Center Airport	GYH	Greenville, South Carolina	05, 23
Hickory Regional Airport	HKY	Hickory, North Carolina	06, 24, 01, 19
Smith Reynolds Airport	INT	Winston Salem, North Carolina	15, 33, 04, 22
Concord Regional Airport	JQF	Concord, North Carolina	02, 20
Rowan County Airport	RUQ	Salisbury, North Carolina	02, 20
Spartanburg Downtown Memorial Airport	SPA	Spartanburg, South Carolina	05, 23
Statesville Regional Airport	SVH	Statesville, North Carolina	10, 28
Rock Hill (York Co) Airport-Bryant Field	UZA	Rock Hill, South Carolina	02, 20

Notes:

1/ A runway can be used in both directions, but are named in each direction separately. The runway number is based on the magnetic direction of the runway (e.g., Runway 09 points to the east direction). The two numbers on either side always differ by 180 degrees. If there is more than one runway pointing in the same direction, each runway number includes an "L," "C," or "R" at the end. This is based on which side a runway is next to another one in the same direction.

Source: U.S. Department of Transportation, Federal Aviation Administration, Digital Airport/Facility Directory, January 1, 2013 [http://aeronav.faa.gov/index.asp?xml=aeronav/applications/d_afd (accessed August 2014)].

Prepared by: ATAC Corporation, August 2014.

As shown in **Table 1-2**, in 2011, approximately 59 percent of all IFR traffic within the Charlotte Metroplex area operated at the Study Airports.

Table 1-2 2011 IFR Operations at Study Airports in the Charlotte Metroplex

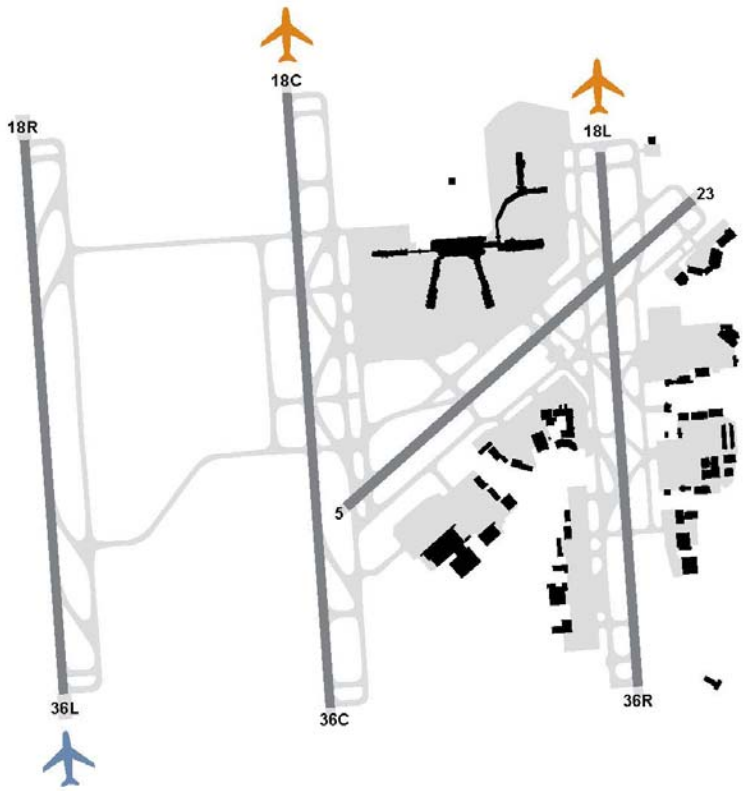
Airport	IFR Operations	Percent of Total Operations
Charlotte-Douglas International Airport	533,947	76.6%
Charlotte-Monroe Executive Airport	--	--
Greenville Downtown Airport	15,500	2.2%
Piedmont Triad International Airport (Greensboro)	67,915	9.7%
Greenville Spartanburg International Airport	44,816	6.4%
Donaldson Center Airport	4,109	0.6%
Hickory Regional Airport	5,412	0.8%
Smith Reynolds Airport	11,163	1.6%
Concord Regional Airport	14,527	2.1%
Rowan County Airport	--	--
Spartanburg Downtown Memorial Airport	--	--
Statesville Regional Airport	--	--
Rock Hill (York Co) Airport-Bryant Field	--	--
Total IFR Operations	**697,387**	**58.7%**
Total Metroplex IFR Operations	**1,188,674**	

Source: U.S. Department of Transportation, Federal Aviation Administration, Operations Network, Tower Counts [https://aspm.faa.gov/opsnet/sys/Tower.asp (accessed August 2014)].
Prepared by: ATAC Corporation, August 2014.

1.4.1 Study Airports Runway Operating Configurations

Exhibit 1-9 illustrates the primary runway operating configurations at CLT. CLT represents the major Study Airport for purposes of this EA. CLT often operates under several different runway operating configurations depending on conditions such as weather, prevailing wind, and air traffic conditions. As a result, it is possible for the runway ends used for arrivals and departures to change several times throughout a day. Controllers at these airports generally use two different runway operating configurations, and each runway operating configuration may designate primary and secondary arrival and departure runway ends for each configuration.

Exhibit 1-9 CLT Runway Operating Configurations



CLT: North Flow
Operating Configuration – 34.9%

CLT: South Flow
Operating Configuration – 59.6%

Primary Arrival **Primary Departure**

Notes: Noise abatement procedures (midnight configuration) represent 5.5% of operations.

Source: U.S. Department of Transportation, Federal Aviation Administration, Airport Diagrams [http://www.faa.gov/airports/runway_safety/diagrams/ (accessed October 2013)]; FAA ASPM (retrieved July 2014).

Prepared By: ATAC Corporation, August 2014.