2 Purpose and Need

The FAA is preparing this EA to evaluate the potential environmental impacts associated with implementation of new RNAV-defined IFPs for the Atlanta Metroplex (Proposed Action). According to the CEQ regulations implementing NEPA, the purpose of and need for the action being proposed must be described in the EA.[21] The following sections discuss the need for and the purpose of the Proposed Action. Following this discussion, the Proposed Action is described in detail.

2.1 The Need for the Proposed Action

In the context of an EA, "need" refers to the problem that the Proposed Action intends to resolve. By law, the FAA must "develop plans and policy for the use of navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace."[22] Although RNAV based SIDs and STARs have been in effect in the Atlanta Metroplex since 2005, these procedures can be improved to increase efficient use of the airspace. For example, under current conditions, single departure routes rely upon a greater degree of divergence than necessary. This requires aircraft to fly more miles than necessary before diverging towards the exit points from A80 airspace. In addition, separation between traffic flows can be improved to increase lateral and vertical separation between traffic flows. Furthermore, several STARs lack defined transitions to specific runways, requiring controllers to use vectoring and speed adjustments to manage traffic. This leads to increased controller and pilot workload. Finally, there is a lack of available RNAV procedures for satellite airports. Currently, all RNAV SIDs serve only Hartsfield-Jackson Atlanta International Airport (ATL). This requires aircraft operating from satellite airports to follow vectored routes that emulate the RNAV procedures.

The following sections describe the causal factors that contribute to the problem. Explanations of the technical terms and concepts used in this chapter are found in Chapter 1, *Background*.

2.1.1 Description of the Problem

As stated above, use of the airspace in the Atlanta Metroplex can be improved to increase efficiency. Decreased efficiency requires Air Traffic Control (ATC) to use aircraft management tools and coordination techniques such as speed control, level flight segments, and vectoring to guide aircraft. Applying these tools and techniques increases procedural complexity. In many situations, this leads to less efficient aircraft operations and use of airspace. For example, ATC may issue instructions requiring an aircraft to level off during climb and descent to prevent conflicts with other aircraft. This results in increased flight time and distance. Aircraft management tools and coordination techniques are further discussed in Section 1.2.2., *Air Traffic Control within the National Airspace System*.

Increased communication between controller and pilot may result in less precise flight paths due to the time it takes the controller to issue an instruction to the pilot and for the pilot to read the instruction back to the controller for confirmation before the instruction can be executed. As a result, more airspace must be protected to allow aircraft the latitude to

[21] 40 CFR 1508.9(b); *see also* FAA Order 1050.1E, Change 1, para. 405c.

[22] 49 USC 40103(b)(1).

operate. This also increases controller and pilot workload requiring constant monitoring by ATC. Combined, these factors form the basis of the existing operational inefficiencies within the Atlanta Metroplex.

FAA's ability to meet one of its primary missions as mandated by Congress – to provide for the efficient use of airspace – is impeded as a result of these types of inefficiencies. Therefore, the problem is the inability to fully realize the additional efficiency afforded by current RNAV technology. Improved use of RNAV technology can add efficiency to an air traffic system with enhanced predictability, flexibility, and route segregation.

It is important to note that a key design constraint is safety. Any proposed change to a procedure to resolve the problem must not degrade safety, and, if possible, actually enhance safety. Current procedures do not include any safety issues because published procedures must meet defined safety criteria; accordingly, the Proposed Action is not being proposed to address any safety issues.

2.1.2 Causal Factors

A problem (or need) is best addressed by examining the circumstances or causal factors that, when combined together, result in the need. The inefficiencies and resulting complexities associated with the existing Atlanta Metroplex SID and STAR procedures are considered by the FAA as the primary problem. The need for the Proposed Action can be best understood and addressed by examining the specific factors causing the problem. Addressing the causal factors that lead to the problem will ultimately facilitate development of a reasonable alternative designed to resolve the problem (or meet the purpose).

Several key issues were identified by the Atlanta Metroplex Study Team as causes for the lower level of efficiency in the Atlanta Metroplex. For purposes of this EA, these issues were grouped into three key causal factors:

- Lack of flexibility in the efficient transfer of traffic between the enroute and terminal area airspace;
- Complex converging and dependent route and procedure interactions; and,
- Lack of predictability in the efficient transfer of traffic between enroute and terminal area airspace.

These three causal factors are discussed in the following sections.

2.1.2.1 Lack of Flexibility for the Efficient Transfer of Traffic between the Enroute and Terminal Area Airspace

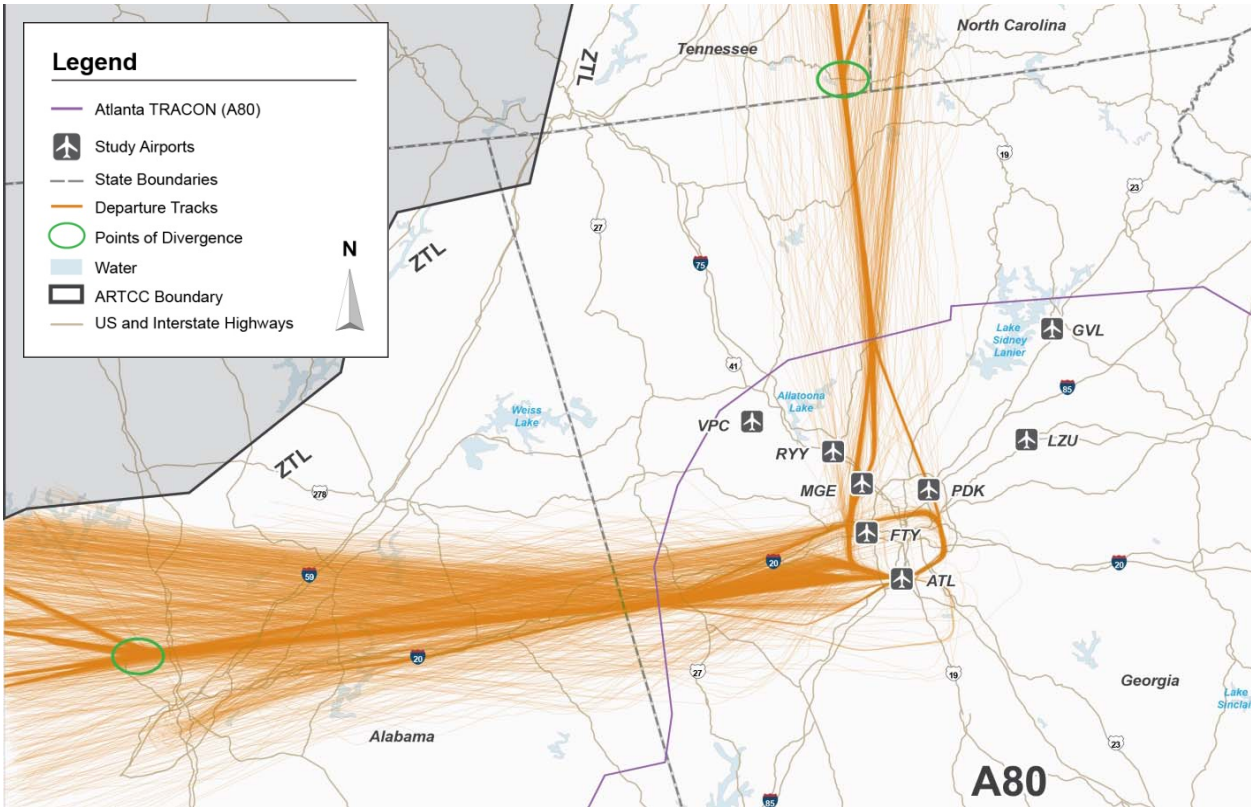
Flexibility allows ATC to plan and adapt to traffic demands, which change frequently within any given hour. Although flights are scheduled, delays in other regions of the U.S. or severe weather along an aircraft's route may cause aircraft to enter or exit the enroute and terminal area airspace at times other than those previously scheduled. Accordingly, controllers require options to manage dynamic traffic demand. The following example describes a specific issue that contributes to the lack of flexibility within the Atlanta Metroplex.

Single Departure Routes

In 2011, Equivalent Lateral Spacing Operation (ELSO) SID procedures were implemented in the Atlanta Metroplex. ELSO procedures permit reduced (less than 15 degrees) divergence between aircraft using the same or parallel runways. Divergence is necessary for aircraft to change heading to discontinue parallel flight with adjacent traffic. These procedures eliminate the need for ATC to assign initial vectors to departing aircraft to ensure that they maintain a 15 degree or more divergent heading.

ELSO procedures also enable dual and triple departure runway operations. For example, during dual runway east departures from ATL, aircraft employing the north and east SIDs depart from the north departure runway and aircraft employing the south and west SIDs depart from the center departure runway. **Exhibit 2-1** shows aircraft flying to the north and west on these SIDs.

Exhibit 2-1 Established Points of Divergence – West and Northbound SIDs



Notes:

A80 – Atlanta TRACON	*ZTL – Atlanta ARTCC*	*ZJX – Jacksonville ARTCC*	*ZME – Memphis ARTCC*
ATL - Hartsfield - Jackson Atlanta International Airport	*FTY - Fulton County Airport-Brown Field*	*GVL - Lee Gilmer Memorial Airport*	*LZU - Gwinnett County Airport-Briscoe Field*
MGE - Dobbins Air Reserve Base	*PDK - DeKalb-Peachtree Airport*	*RYY - Cobb County Airport-McCollum Field*	*VPC - Cartersville Airport*

Source: ATAC (PDARS radar data), June 2012.
Prepared by: ATAC Corporation, August 2013.

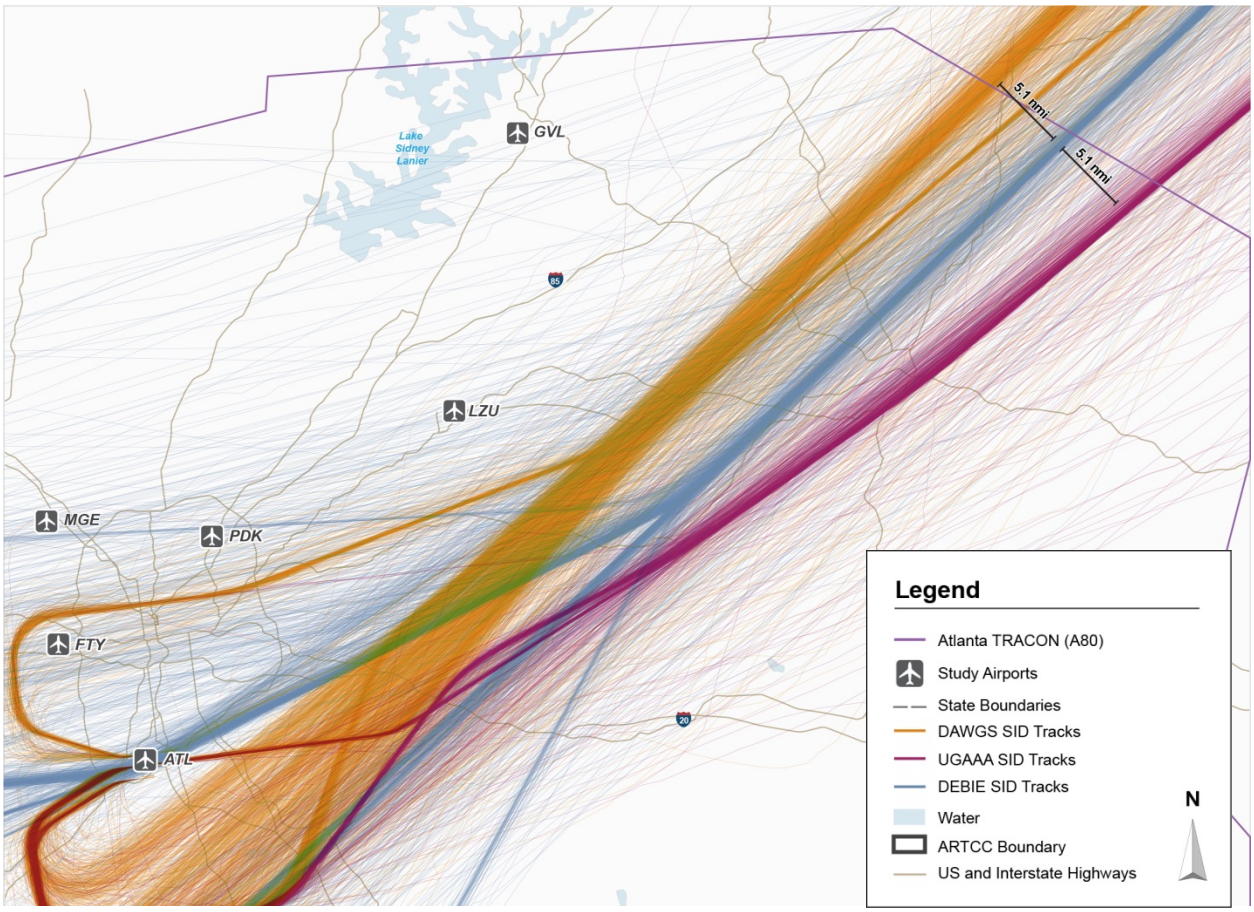
As depicted, aircraft on multiple SIDs follow a single departure route from the runway before reaching a point where they diverge into separate corridors. However, as shown by the westbound flight tracks that diverge from the main route to the northwest and the

northbound flight tracks that diverge from the main route to the northeast prior to these points, there are multiple exit gate opportunities available at earlier points. The lack of earlier divergence points reduces flexibility in the efficient transfer of traffic between the terminal and enroute airspace. In addition, because the distance aircraft in the main corridor are required to fly before reaching the divergence points is greater than necessary, aircraft must fly more miles than necessary in A80 airspace.

2.1.2.2 Complex Converging and Dependent Route and Procedure Interactions

Lateral (side-by-side) separation between aircraft tracks enables aircraft on parallel routes to achieve the minimum required separation from other aircraft when operating in parallel directions. However, a lack of adequate separation can increase operational complexity. **Exhibit 2-2** shows departure traffic from ATL on the DAWGS and UGAA SIDs and departure traffic from Charlotte-Douglas International Airport (CLT) on the DEBIE RNAV SID.

Exhibit 2-2 Lateral Separation - DAWGS SID and UGAAA SID and (CLT) DEBIE RNAV SID



Notes:

A80 – Atlanta TRACON
ATL - Hartsfield - Jackson Atlanta International Airport
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GVL - Lee Gilmer Memorial Airport
RYY - Cobb County Airport-McCollum Field
ZME – Memphis ARTCC
LZU - Gwinnett County Airport-Briscoe Field
VPC - Cartersville Airport

Source: ATAC (PDARS radar data), June 2012.
Prepared by: ATAC Corporation, August 2013.

DAWGS and UGAA represent the two primary eastbound SIDs from ATL. Both DAWGS and UGAAA lack lateral separation between the traffic originating from the DEBIE SID on the BGRED transition. As depicted, the majority of traffic on the BGRED transition is located 5.1 nautical miles (nmi) laterally from aircraft using the DAWGS and UGAAA RNAV SIDS. These closely spaced, opposite direction procedures create numerous traffic alerts for aircraft flying these routes. This increases task complexity for both controllers and pilots.

2.1.2.3 Lack of Predictability in the Efficient Transfer of Traffic between Enroute and Terminal Area Airspace

Predictability provides pilots and controllers the ability to know ahead of time how, where, and when an aircraft should be operated along a defined route allowing them to better plan airspace use and the control of aircraft in the given volume of airspace. A predictable route may include expected locations (where), altitudes (where and how high), and speeds (how fast and when) at key points. A procedure that provides these elements results in a more predictable route for the pilot and controller.

Aircraft performance and/or piloting technique can vary, and as a result, may also play a factor in reducing predictability. Because conventional procedures are less precise than RNAV procedures and less predictable, controllers will use vectoring as well as instructions governing speed and altitude level-offs to ensure safe vertical and lateral separation between aircraft. As discussed in Section 1.2.6.1, RNAV procedures enable aircraft to follow more accurate and better defined, direct flight routes in areas covered by GPS-based navigational aids. This allows for predictable routes with fixed locations and altitudes that can be planned ahead of time by the pilot and air traffic control. Fixed routes help maintain segregation between aircraft by allowing defined vertical and horizontal separation of traffic. As a result, some routes can be shortened and the need for level-offs can be eliminated. This allows for improved use of the airspace. Therefore, the greater the number of RNAV procedures in a Metroplex the greater the degree of predictability. The following sections describe the conditions that reduce predictable air traffic management in the Atlanta Metroplex.

Inefficient Altitude Routing

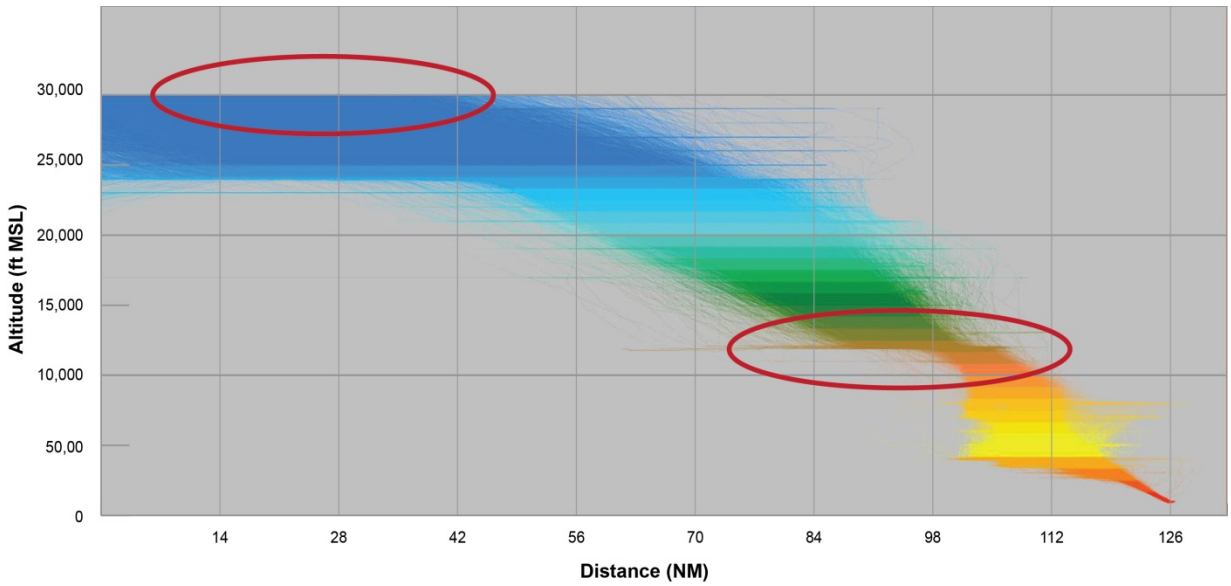
For the Atlanta Metroplex, existing RNAV procedures provide predictable route locations over the ground, but do not offer more predictable altitudes along the route during descents and climbs. In addition, several of the STAR procedures do not include defined transition routes to specific runways.

Aircraft climb or descend when instructed by a controller. The point where an aircraft reaches an assigned altitude may vary depending on a combination of factors, including aircraft performance, weather conditions, and/or piloting technique. Aircraft arriving to or departing from the Study Airports are frequently required to level-off during descent/climb to maintain vertical separation from other arriving and departing aircraft. Flight time and distance can be increased for traffic flows with interrupted climbs and descents as the aircraft exit/enter the terminal airspace or transition to/from the runway approach environment. Unpredictable vertical guidance resulting from conflicting traffic leads to increased controller workload and inefficient aircraft operation. In addition, power variations associated with the need for aircraft to level off may result in additional fuel consumption.

There are routes in the Atlanta Metroplex that require climbing or descending aircraft to level-off to accommodate aircraft crossing above or below. In these instances, aircraft efficiency suffers due to: 1) power variability during leveling-off; 2) power variability in reinitiating the climb or descent; and 3) increased fuel consumption. The level-off in the climb phase typically results in aircraft taking longer to reach the altitude necessary to exit the terminal airspace. During the descent phase, the level-off requires application of thrust for aircraft to maintain appropriate speeds and altitude on approach. This results in extended fuel burn.

Inefficient vertical profiles are identified as an issue primarily in the ATL STARs from the northwest, northeast, and southeast. Aircraft arriving from the enroute transitions are required to level-off at the Transfer of Control Point (TCP), resulting in extended level-off segments in the A80 airspace. **Exhibit 2-3** shows vertical profiles for arrival traffic over the Meridian VORTAC (MEI) and Greene County VORTAC (GCV) transitions where they level off at 24,000 feet (FL240)[23] for approximately 25 nmi. This extended level-off is noted by the

Exhibit 2-3 Vertical Arrival Flow Profile Example (Arrival Traffic Over MEI and GCV)



Source: ATAC (PDARS radar data), June 20121.
Prepared by: ATAC Corporation, July 2013.

collection of dark blue flight tracks circled in red. There is an additional level-off at approximately 12,000 feet MSL, noted by the collection of orange/green flight tracks circled in red. This situation involves additional controller-pilot communications, including additional point-outs.[24] This adds to complexity (e.g., higher controller workload, the number of times controller-to-pilot communication occurs, and inefficient use of aircraft performance capabilities during a descent or climb) and reduces airspace efficiency.

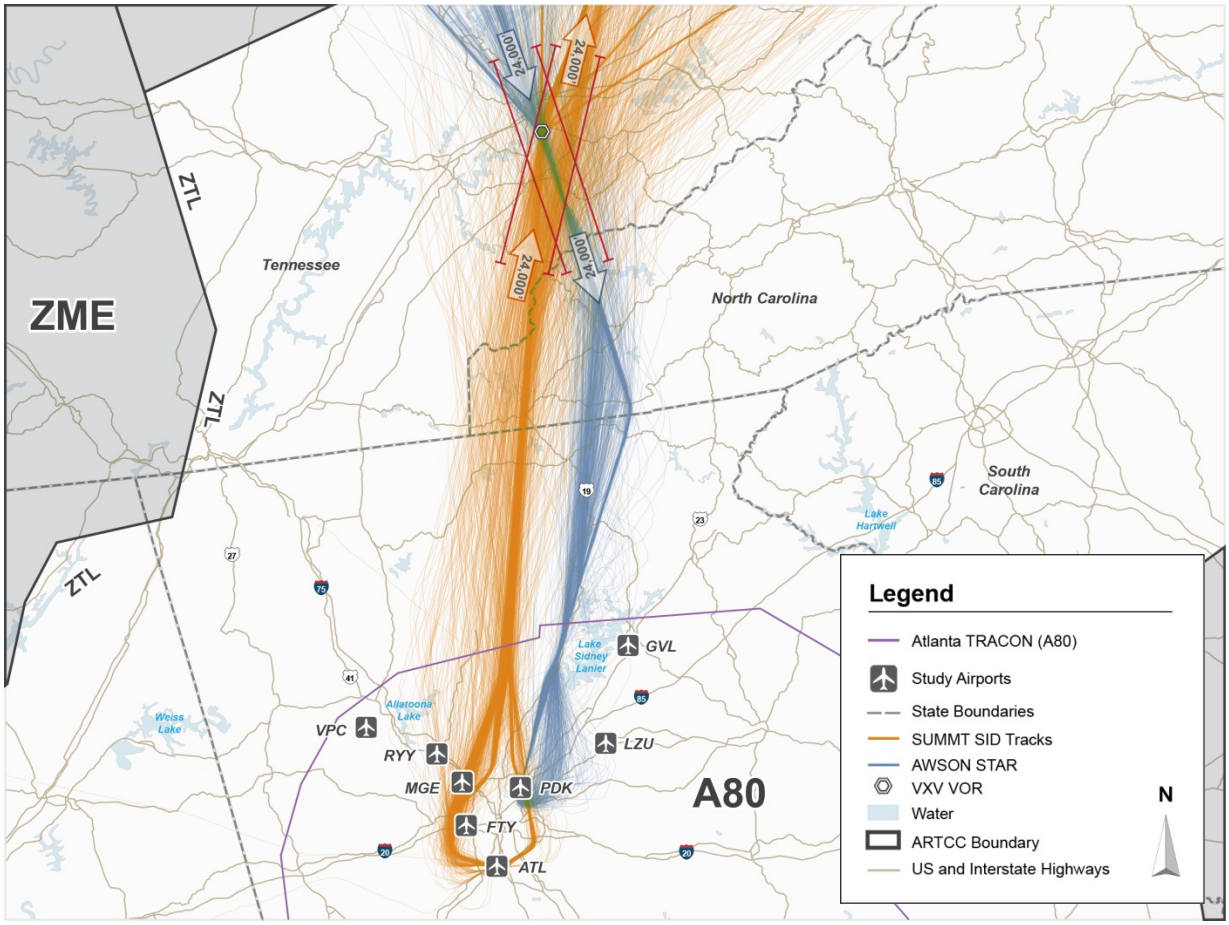
[23] Flight Levels are pressure altitudes referenced to a standardized altimeter setting of 29.92" Hg. Actual altitudes above ground or sea level depend on local atmospheric pressure variations.

[24] While the aircraft is in a climb or descent, controllers may need to alert adjacent aircraft or another controller, who is responsible for a nearby airspace sector, of the proximity of a nearby aircraft. This notification is called a “point-out” and adds to the airspace complexity, because of the communication requirement and time taken to provide the point-out and receive confirmation from the recipient. Reducing point-outs improves efficiency in communications.

Accordingly, the STAR does not currently offer a predictable route. The procedure does not take full advantage of RNAV capabilities, including the ability to use the current technology to reduce the complexity of the terminal airspace system and allow for more efficient use of the airspace.

The inefficient vertical profiles are also present within Atlanta Metroplex satellite airport procedures. As shown on **Exhibit 2-4**, aircraft headed for satellite aircrafts on the AWSON STAR are often forced below ATL arrivals or ATL departures on the SUMMT SID over the Volunteer (VXV) VOR. This results in level-offs or early descents. Additionally, aircraft typically encounter level segments of 8-10 nmi on the short-side[25] arrival and level segments of 15-18 nmi on the long-side[26] near the A80/ZTL Transfer of Control Point (TCP).

Exhibit 2-4 Vertical Arrival Flow Profile Example (Arrival Traffic Over MEI and GCV)



Source: ATAC (PDARS radar data), June 20121.
Prepared by: ATAC Corporation, July 2013.

[25]Short-side is defined as the shortest flying distance from the arrival gate to the landing threshold (base leg entry side).

[26] Long-side defined as the longest distance from the arrival gate to the landing threshold (downwind entry side).

Timely Assignment of Runway Transitions

Airports such as ATL are typically operated under different runway operating configurations (as discussed in Section 1.4.1) based on factors such as weather, prevailing wind, and the type and amount of air traffic aircraft. Given the high level of aircraft traffic, especially during peak periods, a lack of STAR and SID procedures for each runway used in the various runway operating configurations would contribute to a less efficient air traffic system.

ATL is the only major airport in A80 airspace. The ATL airfield design, as depicted on Exhibit 1-9, in Section 1.4.1, shows five parallel east-west runways, two of which are designated as primary departure runways (Runways 8R/26L and 9L/27R), two as primary arrival runways (Runways 8L/26R and 9R/27L), and one runway for either departures or arrivals as demand dictates (Runway 10/28). Current airspace does not permit timely assignment of proposed short-side runway transitions.[27] Runway transitions must be assigned at least 10 nmi from the transition waypoint.[28] ATC operational requirements dictate that transition waypoints must be approximately 10 nmi from the current A80 airspace boundary. The location of the current boundary and the 10 nmi operational requirement does not permit A80 to assign these short-side transitions in a timely manner.

Lack of Satellite Airport Procedures

Currently SIDs do not exist for aircraft departing from Atlanta Metroplex satellite airports. One RNAV STAR, JRAMS THREE serves all the satellite airports except Cartersville Airport (VPC). With the exception of aircraft on the JRAMS STAR, all other aircraft arriving to satellite airports are vectored on approximate routes that closely track or overlay/underlay the ATL RNAV STARs. Controllers are required to vector satellite departures near A80 exit gates, and then mimic ATL departures to join the enroute structure. System efficiency is affected by the lack of more predictable STAR and SID procedures at the Atlanta Metroplex satellite Study Airports. These airports serve as reliever or alternate airports in the event ATL is closed due to unexpected conditions such as bad weather. The existing procedures for the satellite Study Airports do not allow for predictable segregation of routes between air traffic arriving to or departing from these Study Airports and ATL.

2.2 Purpose of the Proposed Action

The goal (purpose) of the Proposed Action is to address the problems discussed in the previous sections in order to improve the efficiency of procedures within the terminal area airspace serving the Atlanta Metroplex. To reasonably achieve a goal, objectives are developed to represent the steps or actions that need to be addressed or achieved to accomplish the goal as much as possible. The previous section identified causal factors that the FAA identified to be both individually and cumulatively causes of the problem. Therefore, the objectives of the Proposed Action involve addressing the causal factors. If the objectives are reasonably achieved, the FAA expects to enhance the efficient movement of aircraft serving the Atlanta Metroplex. The objectives include the following:

[27] The runway transition on an RNAV STAR defines a path from the common route to the final point(s) on a STAR. Frequently, this final point on the STAR establishes the aircraft on the Instrument Landing System (ILS) arrival track for a specific runway. Runway transitions enable a STAR to serve multiple runways.

[28] A waypoint is a set of defined coordinates referencing 3 dimensional space. Waypoints in the RNAV context exist as imaginary poles (capable of identifying a point at all altitudes) because waypoints are not altitude specific.

- Improve the flexibility in transitioning traffic between enroute and terminal area airspace and between terminal area airspace area and the runways;
- Improve the segregation of arrivals and departures in terminal area and enroute airspace; and,
- Improve the predictability in transitioning traffic between enroute and terminal area airspace and between terminal area airspace area and the runways.

Air traffic controller workload and controller-to-pilot communication would be expected to decrease, reducing both workload and airspace complexity. Procedures that are more predictable and flexible would be expected to reduce complexity, and reduce the time it takes aircraft to transition through the airspace. Reducing the need for level segments and vectoring can be addressed by improving arrival and departure segregation among the Atlanta Metroplex airports and reducing the need to vector aircraft causing unpredictable and longer paths.

Each objective of the Proposed Action is discussed in greater detail below.

2.2.1 Improve Flexibility in Transitioning Aircraft

Having divergent SIDs for aircraft departing from the same runway enhances efficiency by minimizing the overall controller-pilot communication and providing the flexibility to depart aircraft more quickly than if there was a single path.

This objective can be measured for the Proposed Action and the Alternative with the following criteria:

- Additional RNAV procedures with divergent heading requirements off the runway.

STAR and SID procedures with one or multiple runway transition paths enhance efficiency by minimizing the need for controller-to-pilot communication, providing flexibility to redirect aircraft to a secondary runway during peak demand, and making multiple route options available to minimize the need for holding aircraft or use of other airspace management tools to meet aircraft separation requirements. Standard instrument arrival procedures also make it easier for controllers to monitor the flow of traffic to the runways and to maintain a constant and predictable flow of aircraft to the runways.

This objective can be measured for the Proposed Action and the Alternative with the following criteria:

- Additional RNAV procedures with multiple departure routes for a departure gate
- Additional RNAV procedures with multiple runway transition routes to individual runways
- Increased use of offload northeast and northwest STAR procedures.

2.2.2 Segregate Arrivals and Departures

As discussed in Section 2.1.2.2, in some portions of the terminal airspace, arrival and departure flight routes cross, converge, or are within proximity of each other, requiring controllers to actively manage the traffic to ensure that safe separations between aircraft are maintained. Current procedures do not take full advantage of RNAV capabilities. The current RNAV criteria and guidance allow for additional capabilities (such as speed control

and altitude restrictions built specifically into the RNAV procedure) that can be designed into a procedure. The additional capabilities, which reduce pilot workload and the need for controller-to-pilot communication, provide a more predictable and repeatable flight, ground, and vertical path than is possible in most conventional procedure designs.

One objective of the Proposed Action is to implement procedures that would achieve better segregation of arrivals and departures within the terminal airspace. This objective can be measured with the following criterion:

- Increase lateral spacing between RNAV STARs and SIDs compared with the No Action Alternative.

2.2.3 Improve the Predictability of Air Traffic Flow

As discussed in Section 2.1.2.1, the lack of optimized airspace procedures results in increased level-offs during the arrival and departure phases of flight. There are STARS that are underutilized because of flow restrictions.[29] This results in decreased predictability within the Atlanta Metroplex.

Predictability is also affected by the limited number of procedures that include runway transitions to and from the runways at each of the EA Airports. RNAV procedures with runway transitions provide for a predictable flow of air traffic through the airspace and require less controller-to-controller and controller-to-pilot communications to manage air traffic flows through the airspace.

In addition, RNAV procedures to and from satellite airports would enable pilots to file for their preferential arrival or departure with predictable flight expectations. This predictable flow of air traffic through the airspace also requires less controller-to-controller and controller-to-pilot communications to manage air traffic flows through the airspace.

This objective can be measured with the following criteria:

- RNAV procedures with altitude controls intended to optimize descent or climb patterns;
- RNAV procedures with runway transition routes to designated runways; and,
- RNAV procedures for satellite airports.

2.3 Criteria Application

The Proposed Action is evaluated to determine how well it meets the purpose and need based on the measurable criteria for each objective described above. The evaluation of alternatives will include the No Action Alternative, under which the existing (2011) air traffic procedures serving the Study Airports would be maintained, along with approved procedure modifications already planned and approved for implementation. The criteria are intended to aid in comparing the Proposed Action Alternative with the No Action Alternative.

2.4 Description of the Proposed Action

The Proposed Action considered in this study would include the implementation of optimized RNAV SID and STAR procedures that would improve existing procedures. The

[29] Those air traffic control processes and decisions made to avoid overloads and to ensure that airspace and airport capacity is fully exploited.

primary components of the Proposed Action are, to the extent possible, redesign standard instrument arrival and departure procedures to more efficiently serve the Study Airports and to improve the flexibility and predictability of air traffic routes. The Proposed Action is described in detail in Chapter 3, *Alternatives*.

Implementation of the Proposed Action would not result in an increase in the number of aircraft operations at the Study Airports. However, inefficiencies in the air traffic routes currently serving the Study Airports would be reduced. The Proposed Action does not involve physical construction of any facilities, such as additional runways or taxiways, and does not require any state or local actions. Therefore, the implementation of the proposed changes to procedures in the Atlanta Metroplex would not require any physical alterations to environmental resources identified in FAA Order 1050.1E, Chg.1.

2.5 Required Federal Actions to Implement Proposed Action

Implementation of the Proposed Action requires the following actions to be taken by the FAA:

- Controller training;
- Publication of new or revised STARs, SIDs, and transitions;
- Revision of appropriate boundaries of affected airspace sectors;
- Revision of the standard operating procedures of the enroute and terminal airspace ATC facilities;
- Promulgation and execution of new/revised Letters of Agreement (LOA) between ARTCC and TRACON ATC facilities; and
- Promulgation and execution of new/revised LOA between each ATCT and the TRACON (A80) ATC facilities.

2.6 Agency Coordination

On May 15, 2013, the FAA distributed an early notification letter to 332 federal, state, regional, and local officials as well as to two tribes. FAA sent the early notification letter to provide notice of the initiation of the EA; request background information related to the EA study area; and to gain an understanding of issues, concerns, policies, and/or regulations that may affect the environmental analysis. The FAA sent the early notification letter to:

1. To advise agencies and tribes of the initiation of the EA study;
2. To request background information regarding the study area established for the EA; and
3. To provide an opportunity to advise the FAA of any issues, concerns, policies or regulations regarding the environmental analysis that will be undertaken in the EA.

Appendix A, *Agency Coordination, Agency Consultation, and Public Involvement*, includes a copy of the early coordination letter (and attachments) as well as a list of the receiving agencies and tribes.

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