Draft Environmental Assessment for the Las Vegas Metroplex Project

November 18, 2019

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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 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1F).

The Proposed Action, the subject of this Environmental Assessment (EA), is called the Las Vegas Metroplex Project.[1] The Las Vegas Metroplex Project seeks to optimize aircraft arrival and departure procedures in the Las Vegas Metroplex by employing advanced navigational technology. The procedures designed for the Las Vegas Metroplex Project would be used by aircraft operating under Instrument Flight Rules at the study area airports ("the Study Airports").

This EA, prepared in accordance with FAA Order 1050.1F, documents the potential effects to the environment that may result from the optimization of Air Traffic Control (ATC) procedures at the Study Airports. These airports were selected based on whether they would be directly served by a proposed procedure and if so, whether they served the required number of annual Instrument Flight Rules (IFR) filed operations under FAA Order 1050.1F. The Study Airports are:

- McCarran International Airport (LAS)
- Henderson Executive Airport (HND)
- North Las Vegas Airport (VGT)

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 Metroplex initiative, and information on the Las Vegas 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 Las Vegas 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.

[1] The Metroplex initiative was formerly referred to as the Optimization of Airspace and Procedures in the Metroplex (OAPM) initiative. A Metroplex is a geographic area covering several airports, serving major metropolitan areas and a diversity of aviation stakeholders.

- **Chapter 4: Affected Environment.** Chapter 4 discusses existing environmental conditions within the Las Vegas Metroplex area.
- **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.
- **Appendix F: Study Team Report.** Appendix F contains the conceptual FAA Study Team methodology, findings, and designs used by the FAA Design and Implementation Team to craft Preliminary and Proposed Final Designs.
- **Appendix G: Design and Implementation Team Report.** Appendix G contains a summary and detailed summaries of the Preliminary Final Designs for proposed air traffic control procedures analyzed in this EA.
- **Appendix H: Flight Schedule.** Appendix H describes the methodology and inputs used to forecast air traffic for the Study Airports described in this EA.
- **Appendix I: Noise Technical Report.** Appendix I presents detailed and technical information on the noise analysis conducted in support of this EA.
- **Appendix J:** Appendix J is reserved for Comments on the Draft EA and is not included in this Draft EA.

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 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

[2] 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.

from commercial airlines, general aviation, the military, aerospace manufacturers, and airport stakeholders. Section 1.2.5 discusses the NextGen Program in more detail.

On September 9, 2009, RTCA issued the NextGen Mid-Term Implementation Task Force Report,[3] which provided the Task Force 5 recommendations. One of these recommendations directed the FAA to undertake planning for implementing Performance-Based Navigation PBN[4] procedures on a Metroplex basis, including Area Navigation (RNAV) and Required Navigation Performance (RNP), which are discussed further in Sections 1.2.5.1 and 1.2.5.2. Based on this recommendation, the FAA began the Metroplex initiative.

The purpose of the Metroplex initiative is to optimize air traffic procedures and airspace on a regional scale. This is accomplished by developing procedures that take advantage of technological advances in navigation, such as RNAV, while ensuring that aircraft not equipped to use RNAV continue to have access to the National Airspace System (NAS). This approach addresses congestion and other factors that reduce efficiency in busy Metroplex areas and accounts for key airports and airspace in the Metroplex. The Las Vegas Metroplex Study Airports are further discussed in Section 1.4. The Metroplex initiative also addresses connectivity with other Metroplex areas. The overall intent is to use limited airspace as efficiently as possible for congested Metroplex areas.[5]

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 air traffic controllers use to provide services within 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 Metroplex 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 provides air traffic services for 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],[6] etc.) The NAS is governed by various FAA rules and regulations.

The NAS is 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 in the NAS. When changes to the NAS are

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

[4] 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)].

[5] 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.

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

proposed, 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.[7]

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 by applying defined minimum distances or altitudes between aircraft (referred to as "separation"). This is accomplished through required communications between air traffic controllers and pilots and the use of navigational technologies.

Aircraft operate under two distinct categories of flight rules: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).[8] Under VFR, pilots are responsible to "see and avoid" other aircraft and obstacles such as terrain to maintain safe separation. 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,[9] 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
- **Lateral or "Side-by-Side" Separation:** separation between aircraft (left or right side) operating along two separate but nearby flight routes.

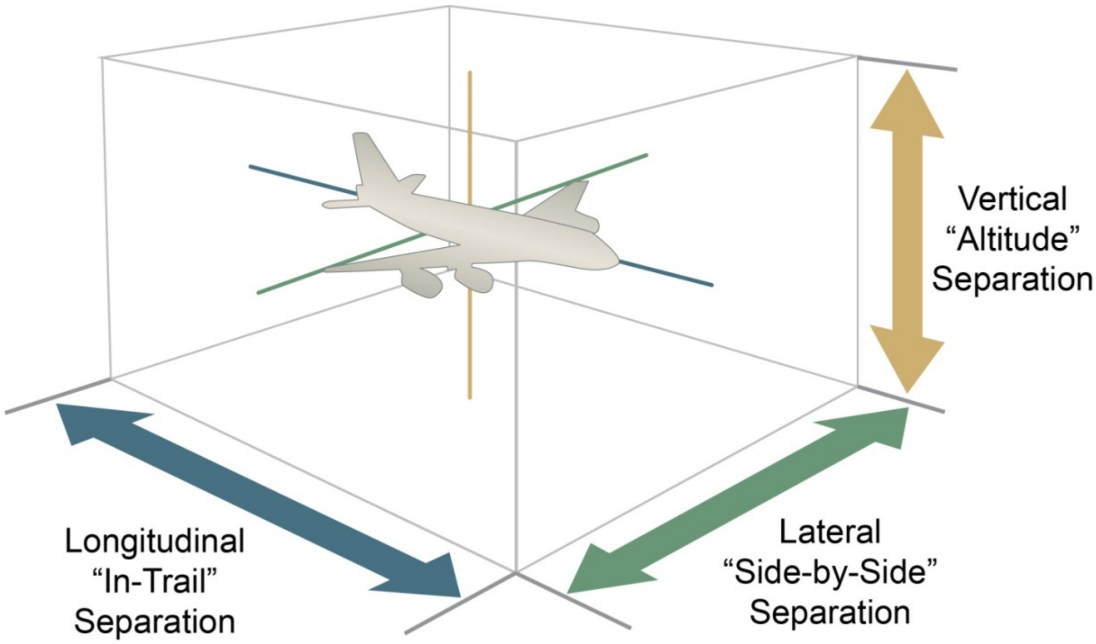
Exhibit 1-1 depicts the three dimensions around an aircraft used to determine separation.

[7] U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.2M, Change 3, *Procedures for Handling Airspace Matters*, Section 32-3-5(b) "National Airspace Redesign," April 10, 2008.

[8] 14 Code of Federal Regulations (C.F.R.), Part 91.

[9] Defined in FAA Order JO 7110.65Y, *Air Traffic Control*.

Exhibit 1-1 Three Dimensions Around an Aircraft



Source: ATAC Corporation, December 2012.
Prepared by: ATAC Corporation, November 2019.

In its effort to modernize the NAS, the FAA is developing instrument ATC procedures that use advanced technologies. A primary technology in this effort is RNAV. RNAV uses technology, including Global Positioning System (GPS), 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.

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

- **Vectors:** Directional headings issued to aircraft to provide navigational guidance and to maintain separation between aircraft and/or obstacles.
- **Speed Control:** Instructions 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.

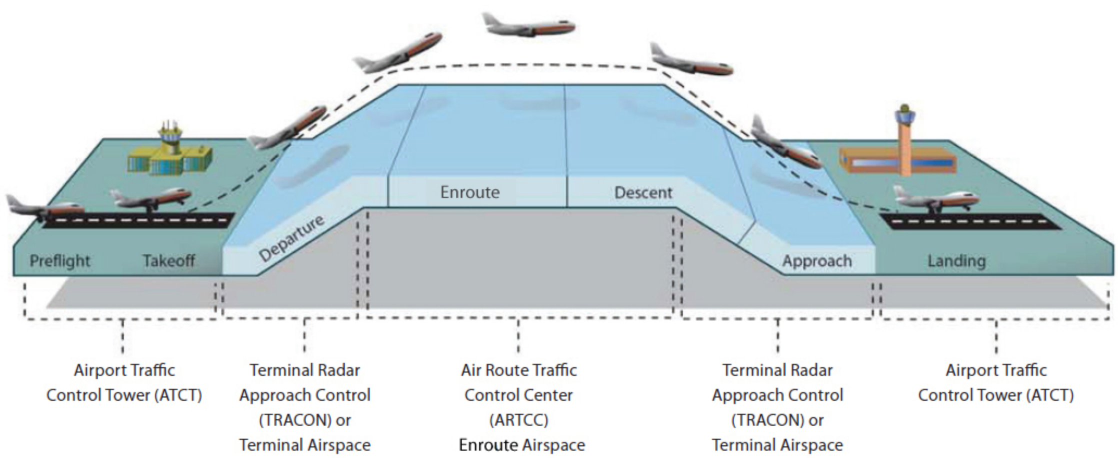
As an aircraft moves from origin to destination, ATC personnel function as a team and transfer control of the aircraft from one controller to the next, and from one ATC facility to the next.

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 1-2** 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 (i.e., backing away from the gate), taxiing to an assigned runway, and takeoff from the runway.
- **Departure:** The aircraft’s in-flight transition from takeoff to the en route phase of flight, during which it climbs to the assigned cruising altitude.
- **En Route:** 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 1-2 Typical Phases of a Commercial Aircraft Flight



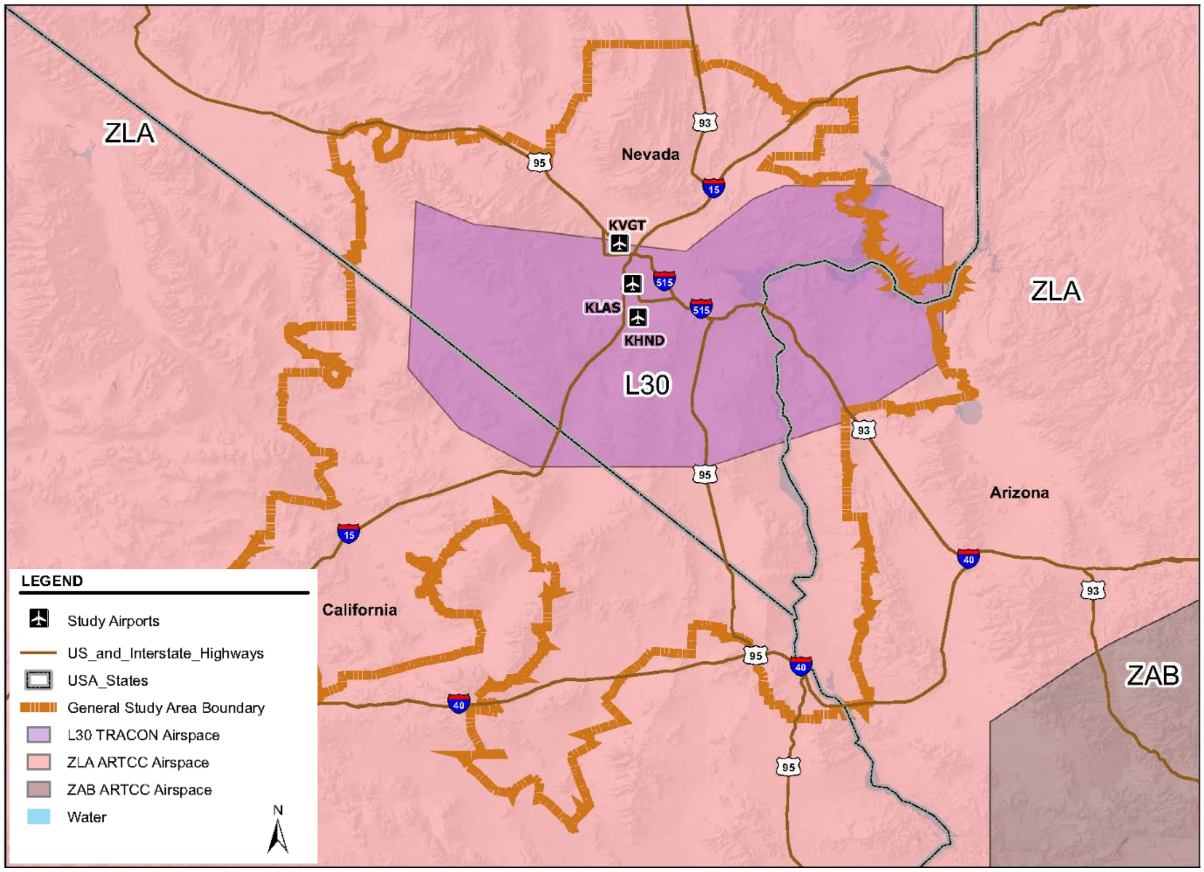
Source: U.S. Department of Transportation, Federal Aviation Administration, Houston Area Air Traffic System (HAATS), Airspace Redesign, Final Environmental Assessment, Figure 1.1.1-1, March 2008.
Prepared by: ATAC Corporation, November 2019.

1.2.4 Air Traffic Control Facilities

The NAS is organized into three-dimensional areas of navigable airspace that are defined by a floor, a ceiling, and a lateral boundary. Each is controlled by different types of ATC facilities including:

- **Air Traffic Control Tower:** Controllers at an Air Traffic Control Tower (ATCT) located at an airport provide air traffic services for 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. All three Study Airports shown on **Exhibit 1-3** have ATCT facilities.
- **Terminal Radar Approach Control:** Controllers at a Terminal Radar Approach Control (TRACON) provide air traffic service to aircraft as they transition between an airport and the en route phase of flight, and from the en route phase of flight to an airport. This includes the departure, climb, descent, and approach phases of flights. The TRACON airspace is broken down into sectors. As an aircraft moves between sectors, responsibility for it transfers from controller to controller. Controllers maintain separation between aircraft that operate within their sectors. The terminal airspace in the Las Vegas Metroplex area is referred to as L30 and is shown in **Exhibit 1-3**. Airspace to the north of L30 is controlled by the Nellis Air Traffic Control Facility (NATCF).
- **Air Route Traffic Control Centers:** Controllers at Air Route Traffic Control Centers (ARTCCs or “Centers”) provide air traffic services during the en route phase of flight. Similar to TRACON airspace, the Center airspace is broken down into sectors. As shown in **Exhibit 1-3**, the Las Vegas Metroplex is comprised of airspace delegated to the Los Angeles ARTCC (ZLA) and L30.

Exhibit 1-3 Airspace in the Las Vegas Metroplex Area



Notes:
KLAS – McCarran International Airport
KHND – Henderson Executive Airport
KVGT – North Las Vegas Airport
L30 – Las Vegas Terminal Radar Approach Control (TRACON)
ZAB – Albuquerque Center
ZLA – Los Angeles Center

Sources: Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files). Water bodies, National Atlas of the United States of America. Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). FAA, Aeronautical Information Services, Airspace Boundaries. U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed December 2018. Shaded Relief, ESRI 2018. General Study Area boundary, ATAC Corporation, 2018.

Prepared by: ATAC Corporation, November 2019.

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, also known as an “IFR aircraft,” departs a runway and follows its assigned heading, it moves from the ATCT airspace, through the terminal airspace, and into en route airspace where it proceeds on a specific route to its destination airport.

Within the terminal airspace, TRACON controllers provide services to aircraft departing from the ATCT airspace to transfer control points referred to as “exit points.” An exit point represents an area along the boundary between terminal airspace and en route airspace. Exit points are generally established near commonly used routes to transfer aircraft efficiently between terminal and en route airspace. When aircraft pass through the exit point, control transfers from TRACON to ARTCC controllers as the aircraft joins a specific route.

Standard Instrument Departures

Departing IFR aircraft 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 en route airspace. A "conventional" SID follows a route defined by ground-based NAVAIDs, may be based on vectoring, or both. Because of the increased precision inherent in RNAV technology, an RNAV SID defines a more predictable route through the airspace than a conventional SID.

Some RNAV SIDs may be designed to include paths called "runway transitions" that serve particular runways at airports. Transitions are a series of fixes leading to/from a common route. They serve as the entry and exit points into terminal and en route airspace. 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 "en route transitions." En route transitions may terminate at exit fixes or continue into en route airspace where aircraft join a specific route.

1.2.4.2 Arrival Flow

An aircraft begins the descent phase of flight within the en route airspace. During descent, the aircraft bound for the destination airport transitions into the terminal airspace through an "entry point." The entry point represents a point along the boundary between terminal airspace and en route airspace where control of the aircraft transfers from ARTCC to TRACON controllers.

Standard Terminal Arrivals

Aircraft that arrive in the terminal airspace normally follow an instrument procedure called a Standard Terminal Arrival (STAR). Aircraft leaving en route airspace and entering terminal airspace may follow an en route 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.

1.2.4.3 Required Aircraft Separation

As controllers manage the flow of aircraft into, out of, and within the NAS, they maintain some of the following separation distances between aircraft:[10]

- **Altitude Separation (vertical):** When operating below 41,000 feet above mean sea level (MSL), two aircraft must be at least 1,000 feet above/below each other until or unless 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 be between 2.5 to

[10] For a detailed explanation of separation standards, see FAA Order 7110.65Y.

10 nautical miles (NM),[11] 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 separation between aircraft must be at least three NM in terminal airspace and five NM in en route airspace.
- **Visual Separation:** Aircraft may be separated by visual means when other approved separation is assured before and after the application of visual separation.

1.2.5 Next Generation Air Transportation System

The NextGen program is the FAA's long-term plan to modernize the NAS from a ground-based system of air traffic control to a GPS-based system of air traffic management that allows for the development of PBN (Performance-Based Navigation) procedures.[12] The Metroplex initiative is a key step in the overall process of transitioning to the NextGen system. Achieving the NextGen system requires implementing RNAV (Area Navigation) and RNP (Required Navigation Performance) PBN procedures and aircraft "auto-pilot" and Flight Management System (FMS) capabilities.[13] RNAV and RNP capabilities are now readily available, and PBN can serve as the primary means aircraft use to navigate along a route. More than 90 percent of U.S. scheduled air carriers are equipped for some level of RNAV. The following sections describe PBN procedures in greater detail.

1.2.5.1 RNAV

Exhibit 1-4 compares conventional and RNAV routes. RNAV enables aircraft traveling through terminal and en route airspace to follow more accurate and better-defined routes. This results in more predictable routes and altitudes that can be pre-planned by the pilot and air traffic control. Predictable routes improve the ability to ensure vertical, longitudinal, and lateral separation between aircraft.

Routes based on ground-based NAVAIDs rely on the aircraft equipment directly communicating with the NAVAID radio signal and are often limited by issues such as line-of-sight and signal reception accuracy. NAVAIDs such as Very High Frequency (VHF) Omnidirectional Ranges (VORs) are affected by variable terrain and other obstructions that can limit their signal accuracy. Consequently, a route that is dependent upon ground-based NAVAIDS requires at least six NM of clearance on either side of its main path to ensure accurate signal reception. As demonstrated by the dashed lines in **Exhibit 1-4**, this clearance requirement increases with an aircraft's distance 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 paths within the airspace that were not previously possible with ground-based NAVAIDs.

[11] A nautical mile is equivalent to 1.15 statute miles.

[12] 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)].

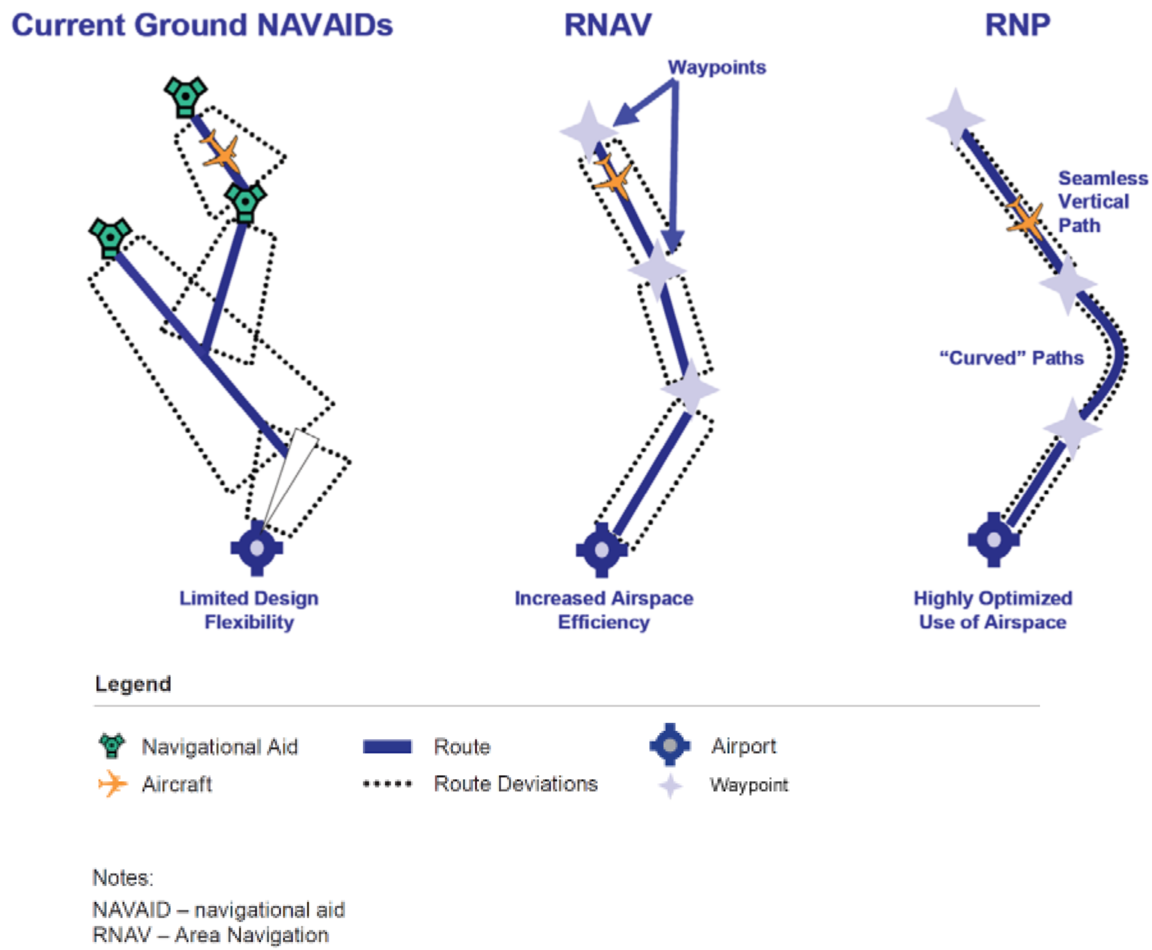
[13] A Flight Management System (FMS) is an onboard computer that uses inputs from various sensors (e.g., GPS and inertial navigation systems) to determine the geographic position of an aircraft and help guide it along its flight path.

1.2.5.2 RNP

RNP is an RNAV procedure with signal accuracy that is increased through 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 (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 1-4 compares conventional, RNAV, and RNP procedures. It shows how an RNP-capable aircraft navigation 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 make it possible to implement procedures within controlled airspace that are not always possible under the current air traffic system.

Exhibit 1-4 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

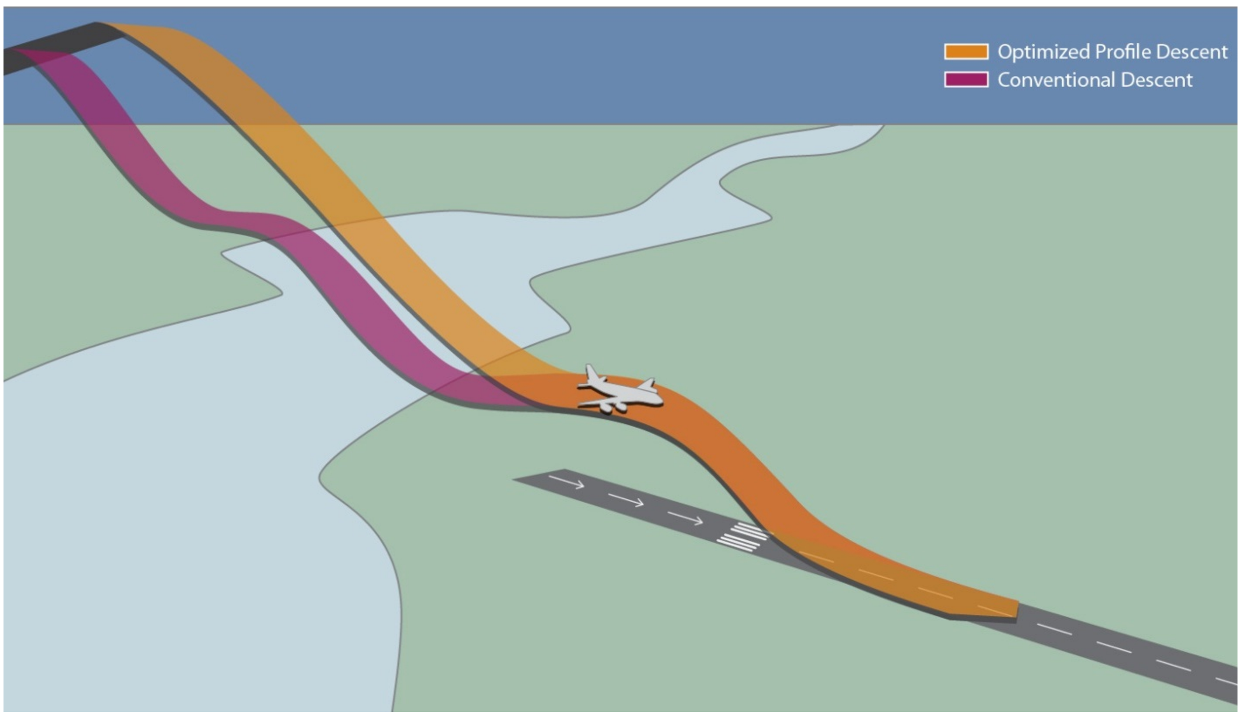
An Optimized Profile Descent (OPD) is a flight procedure that allows an aircraft using FMS to fly continuously from the top of descent to landing with minimal level-off segments. **Exhibit**

1-5 illustrates an OPD procedure compared to a conventional descent. Aircraft that fly OPDs can maintain higher altitudes and lower thrust for longer periods thereby reducing emissions and noise. As level-off segments are minimized, OPDs reduce the need for communication between controllers and pilots.

1.2.5.4 Optimal Profile Climb

An Optimal Profile Climb (OPC) is similar to OPD, but related to departures. An OPC is a flight procedure that allows an aircraft using FMS to fly continuously from the runway to top of climb with minimal level-off segments. Aircraft that fly OPCs can get to higher altitudes sooner with minimal changes in thrust. As level-off segments are minimized, OPCs reduce the need for communications between controllers and pilots.

Exhibit 1-5 Optimized Profile Descent Compared to a Conventional Descent



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

1.2.6 The Metroplex Initiative

As part of the Metroplex initiative, the FAA is designing and implementing RNAV procedures that take advantage of the technology available in a majority of commercial service aircraft. The Metroplex initiative specifically addresses congestion, airports in close geographical proximity, and other limiting factors that reduce efficiency in busy Metroplex airspace. Efficiency is improved by implementing more 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 optimize the use of the limited airspace in congested Metroplex environments.

1.3 The Las Vegas Metroplex

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

1.3.1 Las Vegas Metroplex Airspace

Exhibit 1-3 depicts the airspace structure in the Las Vegas Metroplex. The Las Vegas Metroplex consists of airspace delegated to L30 and ZLA. ZLA provides Air Traffic Services to 179,416 square miles of airspace covering the southwestern United States. The airspace overlies parts of California, Nevada, Utah, and Arizona. It abuts Oakland Center (ZOA), oceanic airspace to the west, Oakland Center and Salt Lake Center (ZLC) airspace to the north, Denver Center (ZDV) and Albuquerque Center (ZAB) airspace to the east, and Mexican airspace to the south. ZLA is responsible for all private and commercial aircraft landing, departing, and traversing inside its lateral boundaries when they are operating under Instrument Flight Rules (IFR) and offers select services to aircraft operating under Visual Flight Rules (VFR). ZLA provides air traffic control service to United States and foreign military aircraft operating both IFR and VFR in ZLA airspace. ZLA controllers provide air traffic services in the airspace above and adjacent to the L30 airspace.

The lateral boundary of the L30 airspace is irregularly shaped, extending from LAS approximately eight NM to the north, 35 NM to the east, and 30 NM to the south and west. Excluding airspace delegated to the ATCTs at LAS, HND, VGT, and Nellis Air Force Base, L30 controllers currently manage the airspace within these boundaries from the surface to 19,000 feet above mean sea level.

L30 is generally the final radar facility responsible for separating and sequencing aircraft that are landing at and departing from airports in its airspace. This includes the initial sequencing of LAS departures as well as providing safe and expeditious flows of traffic into and out of HND and VGT, which have control towers. L30 provides air traffic control services to IFR-filed aircraft and, when requested or required, VFR aircraft. As with ZLA, L30 also offers these services to military aircraft that are operating in its airspace.

1.3.2 Las Vegas Metroplex Airspace Constraints

The following provide a general overview of the constraints related to controlling aircraft within the Las Vegas Metroplex area airspace.

1.3.2.1 Mountainous Terrain

The Las Vegas Metroplex area is situated in a basin in the Mojave Desert and is surrounded by mountain ranges. The Las Vegas area is bordered to the north by the Sheep Range, to the east by Frenchman, Sunrise, and the River Mountains, to the south by the North and South McCullough Ranges, and to the west by the Spring Mountains. Mount Charleston in the Spring Mountains has an elevation of 11,916 feet above sea level and is the highest mountain in the Las Vegas area. Mountainous terrain poses significant challenges due to disturbed airflow, causing potentially high downdrafts and turbulence. These areas are typically categorized as precipitous terrain.[14] Procedures with identified precipitous terrain

[14] Terrain characterized by steep or abrupt slopes

require a higher than standard minimum altitude over the terrain. Due to the proximity of precipitous terrain and required higher standard minimum altitudes, location and altitude of flight procedures are limited within the Las Vegas Metroplex area.

1.3.2.2 Class B Airspace

Class B airspace is regulatory airspace, generally located around major airports, such as LAS. The rules for flying inside of Class B airspace are more restrictive than for other types of terminal airspace. These rules make for a safer and more orderly flow of traffic within Class B airspace. Class B airspace design has a direct impact on the flow of traffic within the Las Vegas Metroplex area.

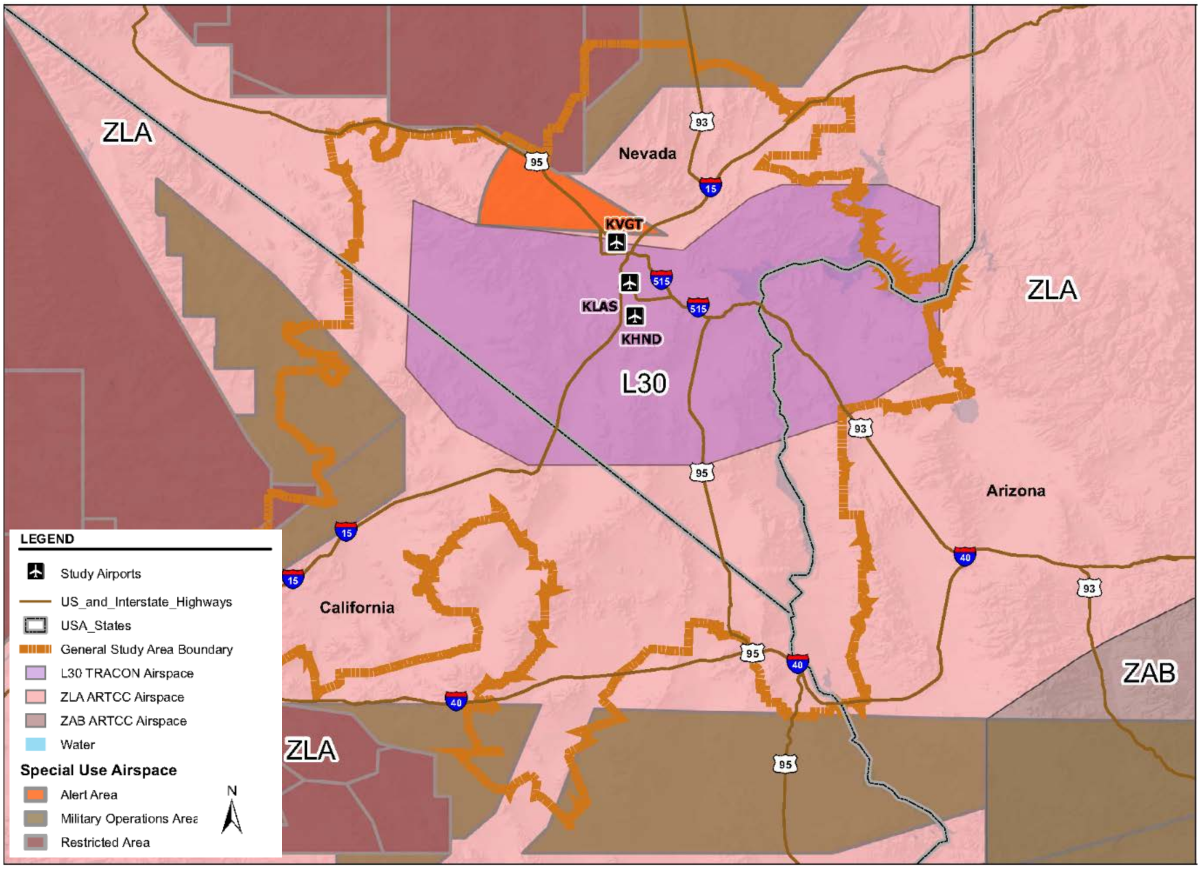
1.3.2.3 Las Vegas Metroplex Special Use Airspace

Exhibit 1-6 depicts the boundaries of Special Use Airspace (SUA) in the Las Vegas Metroplex, illustrating the limited available options for entering and exiting the Las Vegas airspace. SUA is airspace with defined vertical and lateral boundaries containing certain hazardous activities such as military flight training and air-to-ground military exercises that must be confined. SUA defined dimensions are identified by an area on the surface of the earth within which certain air traffic activities must be confined or where certain restrictions are imposed on aircraft operations that are not a part of those activities, or both. SUA is an important component of the NAS that allows for the safe use of the airspace by military and non-military air traffic. In addition to aviation activity, SUA can accommodate ground and combined arms training and testing. These areas either limit aircraft activity allowed within the airspace or restrict other aircraft from entering during specific days and/or times. Three types of SUA are found within the Las Vegas Metroplex:

- **Alert Areas:** Alert areas are depicted on an aeronautical chart to inform pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of non-participating pilots.
- **Restricted Area:** Restricted areas contain airspace 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 may use the area for normal operations.
- **Military Operations Area:** A Military Operations Area (MOA) is airspace established outside of Class A airspace to separate/segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are established to contain certain military activities such as air combat maneuvers, air intercepts, acrobatics, etc.[15]

[15] U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.10A, *Special Use Airspace*, February 15, 2019.

Exhibit 1-6 Special Use Airspace



Notes:
KLAS – McCarran International Airport *KHND – Henderson Executive Airport* *KVGT – North Las Vegas Airport*
L30 – Las Vegas Terminal Radar Approach Control (TRACON) *ZAB – Albuquerque Center* *ZLA – Los Angeles Center*

Sources: Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files). Water bodies, National Atlas of the United States of America. Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). FAA, Aeronautical Information Services, Airspace Boundaries. Shaded Relief, ESRI 2018. General Study Area boundary, ATAC Corporation, 2018.

Prepared by: ATAC Corporation, March 2015.

ZLA has 93,196 square miles of SUA, representing 52 percent of its total coverage area. ZLA is required to ensure that civilian and military aircraft (not under the authority of the United States Armed Forces)[16] are routed within the remaining 86,220 square miles of airspace.

Due to the limited commercial airspace outside of SUAs, there can be choke points for arrivals and departures into and out of the Las Vegas area when SUAs such as Restricted Areas are in effect. This is caused by the funneling of traffic into corridors that avoid SUAs.

When developing procedures that transect Restricted Areas, it may be necessary to design a number of procedures to account for some of the limitations imposed on usage inherent

[16] Aircraft under the direct control of the military air traffic control facilities are confined to Special Use Areas (SUAs) or departure and arrival patterns near military airfields. These SUAs are specific areas of airspace that are used by military aircraft and are provided air traffic control services by the military. The United States military branches are specifically charged with management of that airspace when active.

with this type of SUA. Accordingly, it is generally safer, simpler, and more effective to design procedures that avoid SUAs altogether.

1.3.3 STARs and SIDs Serving Study Airports

As of January 2019, 27 published STARs and SIDs serve the Study Airports within the Las Vegas Metroplex area. Of these, 10 are conventional procedures. Eight RNAV STARs and nine RNAV SIDs serve the Study Airports.

1.4 Las Vegas Metroplex Study Airports

Exhibit 1-7 depicts the locations of the three Las Vegas Metroplex Project Study Airports. The Study Airports were selected based on specific FAA criteria: each airport must have a minimum of 700 annual IFR-filed jet operations or 90,000 or more annual propeller aircraft operations. Airports that did not meet these thresholds were not included as Study Airports because the Proposed Action would result in little or no change to their operations. In addition, airports where the majority of traffic operates under VFR were also excluded from selection as Study Airports because they are not expected to be affected by the Proposed Action. VFR aircraft operating outside controlled airspace are not required to be in contact with ATC. Because these aircraft operate at the discretion of the pilot on a “see and be seen” basis and are not required to file flight plans, the FAA generally has very limited information for these operations.

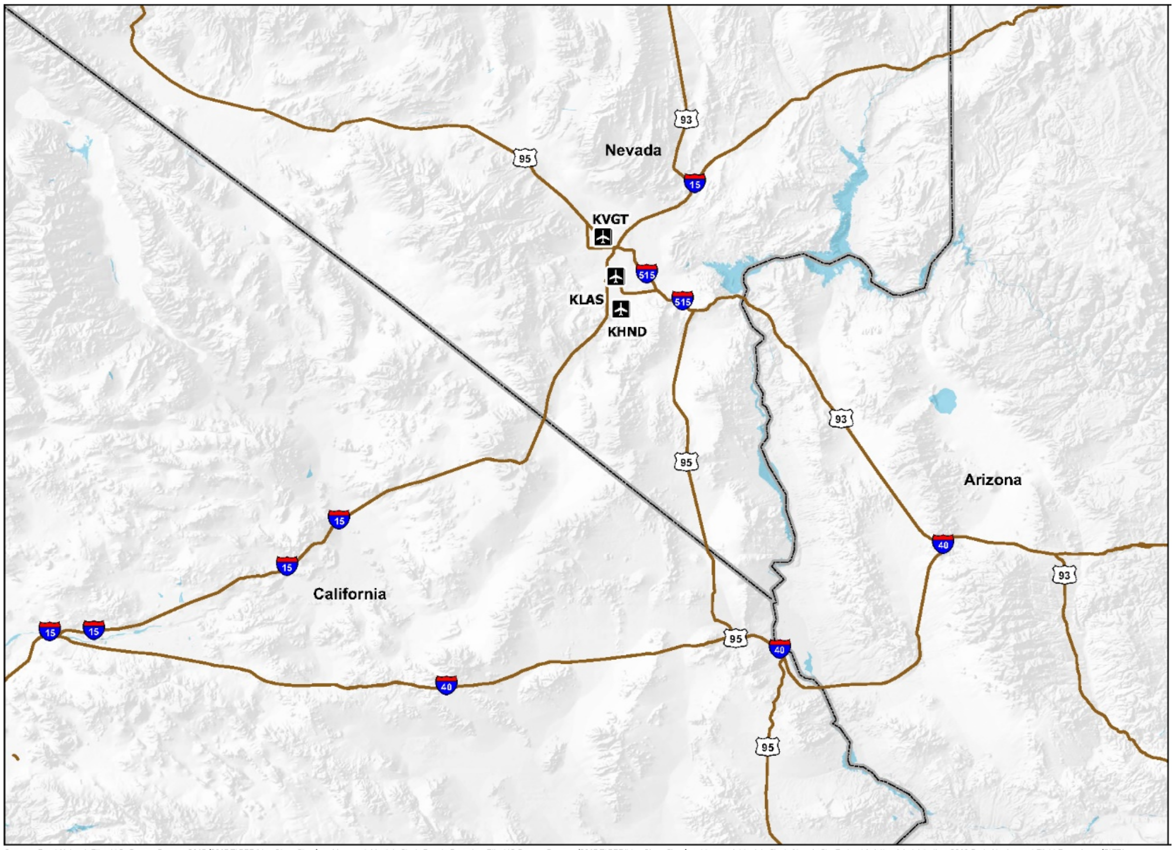
The three Study Airports are:

McCarran International Airport (LAS) is the primary commercial airport and only major airport serving the Las Vegas Metroplex and is classified as a large primary commercial service airport under the National Plan of Integrated Airport Systems (NPIAS). As described in **Table 1-1**, LAS has two sets of parallel runways (Runways 8L-26R and 8R-26L and Runways 1L-19R and 1R-19L). Aircraft arriving at LAS may be assigned one of four RNAV STARs or five conventional STARs. Departing aircraft may be assigned one of six RNAV SIDs or three conventional SIDs.

Henderson Executive Airport (HND) is located approximately 6 NM south of LAS. Similar to VGT, HND has been planned and developed to serve as a general aviation (particularly corporate aviation) reliever to LAS, and it is classified as a reliever airport under the NPIAS. As described in **Table 1-1,** HND has two parallel runways (Runways 17L-35R and 17R-35L). HND arrivals may be assigned one of four conventional STARs, shared with LAS and VGT, or one of four RNAV STARs unique to HND. The airport is served by three RNAV SIDs.

North Las Vegas Airport (VGT) is located approximately 8 NM northwest of LAS and accommodates a mix of corporate and general aviation activity, as well as Grand Canyon air tour operators. This airport has been planned and developed to serve as a general aviation reliever, meaning that it provides general aviation pilots alternative access to the Las Vegas metropolitan area. VGT is classified as a nonhub primary commercial service airport in the NPIAS. As described in **Table 1-1**, the airport has three runways (Runway 7-25, Runway 12R-30L, and Runway 12L-30R). Depending on where VGT IFR arrivals enter the terminal airspace, they may be assigned one of four conventional STARs shared with LAS and HND traffic. VGT departures may be assigned one of two conventional SIDs.

Exhibit 1-7 Study Airport Locations



Notes:
KLAS – McCarran International Airport KHND – Henderson Executive Airport KVGT – North Las Vegas Airport

Sources: Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files). Water bodies, National Atlas of the United States of America. Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). Shaded Relief, ESRI 2018.

Prepared by: ATAC Corporation, May 2019.

Table 1-1 Las Vegas Metroplex EA Major Study Airports

Airport Name	Airport Code	Location	Runways[1/]
Major Airports			
McCarran International Airport	LAS	Las Vegas, NV	08L, 26R, 08R, 26L, 01R, 19L, 01L, 19R
Henderson Executive Airport	HND	Henderson, NV	17R, 35L, 17L, 35R
North Las Vegas Airport	VGT	Las Vegas, NV	07, 25, 12R, 30L, 12L, 30R

Notes:
1/ Runways can be used in both directions, but are named in each direction separately. Runway number is based on the magnetic direction of the runway (e.g., Runway 09 points to 90 degrees, in the east direction). The two numbers on either side always differ by 180 degrees (e.g., If one runway end is labeled 09 (for 90 degrees), the other runway end is labeled 27 (for 270 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: Department of Transportation, Federal Aviation Administration. Chart Supplements. January 5, 2017 (https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/search/; accessed February 20, 2017).

Prepared by: ATAC Corporation, February 2017.

As shown in **Table 1-2**, from November 2016 to October 2017 approximately 94 percent of all IFR traffic within the Las Vegas Metroplex area operated at LAS.

Table 1-2 Distribution of 2017[17] IFR Traffic under FAA Control Among Study Airports in L30

Airport	IFR Annual Operations	Percent of Total Annual Operations
McCarran International Airport	429,442	94.2%
Henderson Executive Airport	14,346	3.1%
North Las Vegas Airport	11,935	2.6%
Total IFR Operations	455,723	100.0%

Source: Department of Transportation, Federal Aviation Administration. Operations Network: Tower Counts for LAS, HND, and VGT (https://aspm.faa.gov/opsnet/sys/Airport.asp; accessed June 26, 2018.)
Prepared by: ATAC Corporation, May 2019.

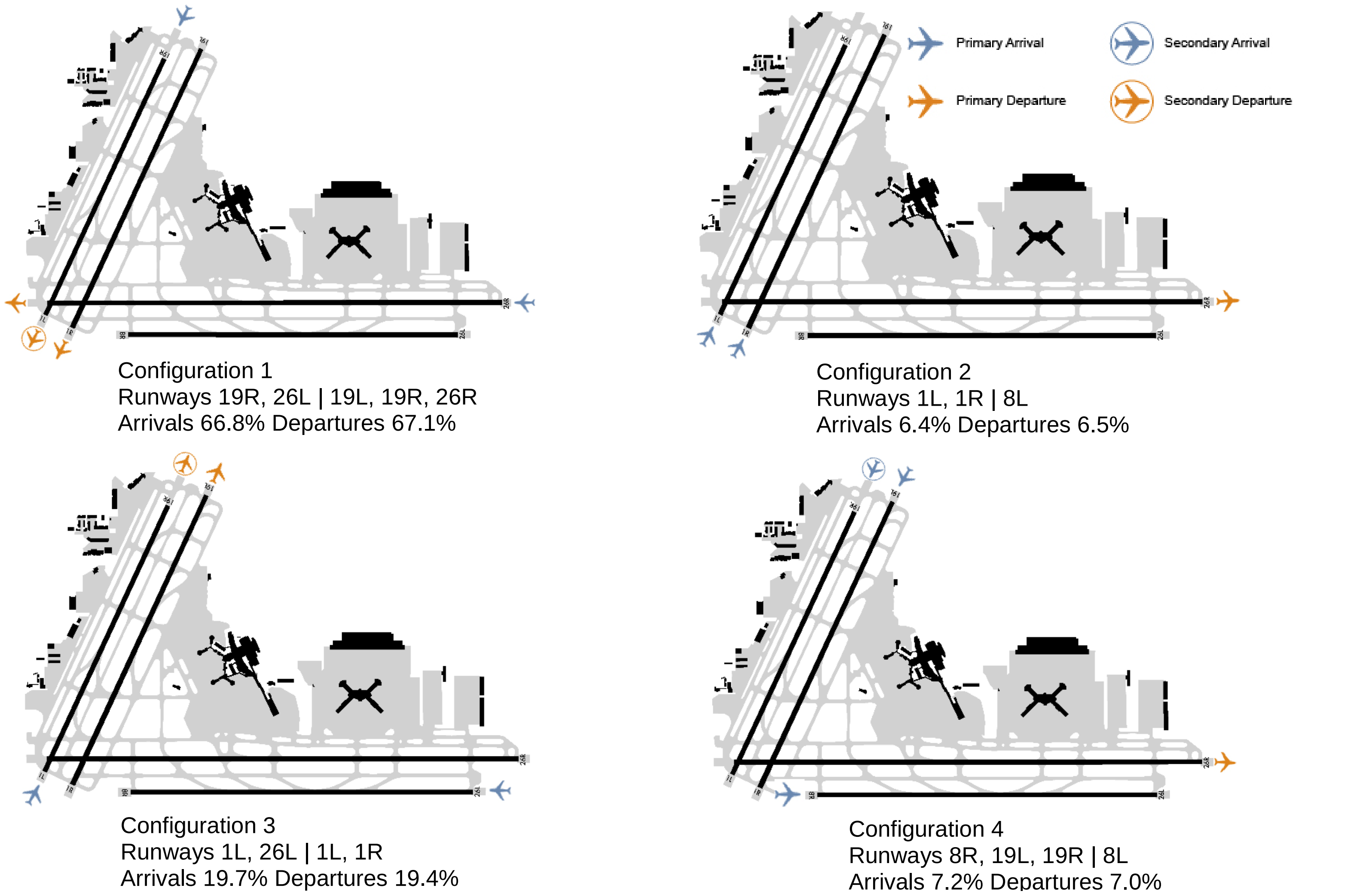
1.4.1 Major Study Airport (LAS) Runway Operating Configurations

LAS operates under several different runway operating configurations depending on factors 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 use different runway operating configurations depending on prevailing conditions.

Exhibit 1-8 illustrates the primary runway operating configurations at LAS. These configurations are based on the FAA's Aviation System Performance Metrics for November 2016 to October 2017.

[17] Radar data obtained from the FAA's Performance Data Analysis and Reporting System (PDARS) identified 447,403 IFR-filed flights to and from the Study Airports between November 1, 2016 to October 31, 2017 (hereafter referred to as 2017).

Exhibit 1-8 LAS Runway Operating Configurations



Source: Department of Transportation, Federal Aviation Administration. Airport Diagrams [http://www.faa.gov/airports/runway_safety/diagrams/ (accessed January 2019) ASPM: Efficiency Report for LAS (https://aspm.faa.gov/apm/sys/main.asp; accessed June 26, 2018.)

Prepared By: ATAC Corporation, May 2019.

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