Draft Environmental Assessment for the San Antonio Airspace Modernization Project

October 2022

Prepared by:

United States Department of Transportation

Federal Aviation Administration

Fort Worth, Texas

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

List of Tables

List of Exhibits

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*.

The Proposed Action, the subject of this Environmental Assessment (EA), is called the San Antonio Airspace Modernization Project. The San Antonio Airspace Modernization Project seeks to optimize aircraft arrival and departure procedures in the San Antonio Airspace Modernization Project by employing advanced navigational technology. The procedures designed for the San Antonio Airspace Modernization 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 detailed further in Section 1.3 and are named, followed by their abbreviated FAA identifier:[1]

- San Antonio International Airport – SAT
- Kelly Field – SKF
- New Braunfels National Airport – BAZ
- Randolph Air Force Base Airfield – RND

This EA includes the following chapters and appendices:

- **Chapter 1: Introduction.** Chapter 1 provides basic background information on the air traffic system and airspace for the San Antonio Airspace Modernization Project, the General Study Area, 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 San Antonio Airspace Modernization Project 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 San Antonio Airspace Modernization Project General Study Area.

1 The FAA is responsible for assignment and tracking the designation of unique 3-character (letters only or numbers and letters except those beginning with the letters N, W, Y, and Z) identifiers for aircraft landing facilities published in U.S. Department of Transportation, Federal Aviation Administration, *FAA Order JO 7350.9BB, Location Identifiers*, July 14, 2022.

- **Chapter 5: Environmental Consequences.** Chapter 5 discusses the potential environmental impacts associated with the Proposed Action and the No Action Alternative.
- **Appendix A: Basic Concepts of Performance Based Navigation (PBN) and Air Traffic Control (ATC).** Appendix A introduces the basic terminology and concepts related to ATC and the specialized components of satellite based PBN.
- **Appendix AA: Proposed Action Procedures and Flight Corridors.** Appendix AA is the comprehensive visualization of all proposed action flight procedures and associated flight corridors.
- **Appendix B: Agency Coordination, Community Involvement, and List of Receiving Parties.** Appendix B documents agency coordination and community involvement associated with the EA process and lists the local agencies and parties identified to receive copies of the Draft and Final EA documents.
- **Appendix C: List of Preparers.** Appendix C lists the names and qualifications of the principal persons contributing information to this EA.
- **Appendix D: References.** Appendix D provides references to documents and resources cited to prepare the EA document.
- **Appendix E: Acronyms and Glossary.** Appendix E lists acronyms and provides a glossary of terms used in the EA.
- **Appendix F: Basics of Noise.** Appendix F presents information on aircraft noise as well as the general methodology used to analyze noise associated with aviation projects.
- **Appendix G: FAA PBN Design Team Briefing.** Appendix G contains the conceptual FAA Design Team background briefing slides summarizing the proposed mature designs.
- **Appendix H: Flight Schedules Technical Report.** 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 from commercial airlines, general aviation, the military, aerospace manufacturers, and airport stakeholders.

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

2 RTCA, Inc. (RTCA is not an acronym, simply the name for the organization) 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.
3 RTCA, Inc. Executive Summary, *NextGen Mid-Term Implementation Task Force Report*, September 9, 2009.

FAA to undertake planning for implementing Performance-Based Navigation PBN[4] procedures, including Area Navigation (RNAV) and Required Navigation Performance (RNP), which are discussed further in Appendix A.

The purpose of the airspace modernization 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 airport and airspace areas. The San Antonio Airspace Modernization Project Study Airports are further discussed in Section 1.3. The overall intent is to use limited airspace as efficiently as possible in congested airport and airspace areas.[5]

1.2 General Study Area

To describe the background elements and existing conditions in the San Antonio Airspace Modernization Project, the FAA developed a General Study Area. The General Study Area is used to evaluate the potential for environmental impacts under the Proposed Action. Two overall objectives guided the development of the General Study Area:

1. The General Study Area captures all IFR flight tracks using radar data from the period of March 1, 2021 to February 28, 2022 (referred to as 2021/2022)[6], which was the most recent year of data available at the study's inception. The General Study Area also captures IFR flight tracks designed for the Proposed Action, where 95 percent of departing aircraft leaving the major Study Airport (SAT) are below 10,000 feet Above Ground Level (AGL) and 95 percent of arriving aircraft to the major Study Airport are below 7,000 feet AGL. The threshold for capturing flight tracks at BAZ, RND, and SKF is set at 85 percent to account for the lower altitudes at which many aircraft operating from these airports tend to fly. The thresholds are set below 100 percent to account for outlier operations which may not reach the prescribed altitudes within a reasonable distance of the Study Airports or at all. By excluding the flight tracks for these kinds of operations, potential distortion of the lateral boundary can be avoided, and the General Study Area is kept to the most reasonable size. The FAA requires consideration of impacts of airspace actions from the surface to 10,000 feet AGL if the study area is larger than the immediate area around an airport or involves more than one airport or up to 18,000'AGL if the proposed action or alternative(s) are over a national park or wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.[7,8] Furthermore, policy guidance issued by the FAA Program Director for Air Traffic Airspace Management states that for air traffic project environmental analyses, noise impacts should be evaluated for proposed changes in arrival procedures between 3,000 feet AGL and 7,000 feet AGL and

4 Additional information on Performance-Based Navigation (PBN) is provided at *Forming NextGen: From Vision to Reality* (https://www.faa.gov/nextgen/background/forming [accessed June 30, 2022]).
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 Radar data obtained from the FAA's Performance Data Analysis and Reporting System (PDARS) and System-Wide Information Management (SWIM) was used to identify military and civilian IFR flights to and from the Study Airports between March 1, 2021 to February 28, 2022 for the existing conditions of the General Study Area.
7 Department of Transportation, Federal Aviation Administration, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Appendix B. *Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303)*, Para. B-1.3, *Affected Environment*. July 16, 2015.
8 Department of Transportation, Federal Aviation Administration, *1050.1F Desk Reference*, Ch. 11, *Noise and Noise-Compatible Land Use*, Para 11.2, *Affected Environment*., February 2020.

departure procedures between 3,000 feet AGL and 10,000 feet AGL for large civil jet aircraft weighing over 75,000 pounds.[9]

2. The lateral boundary of the General Study Area is defined by U.S. Census tract boundaries where aircraft cross at or below the 10,000/7,000 feet AGL thresholds. This extent is concisely defined to focus on areas of air traffic flow.

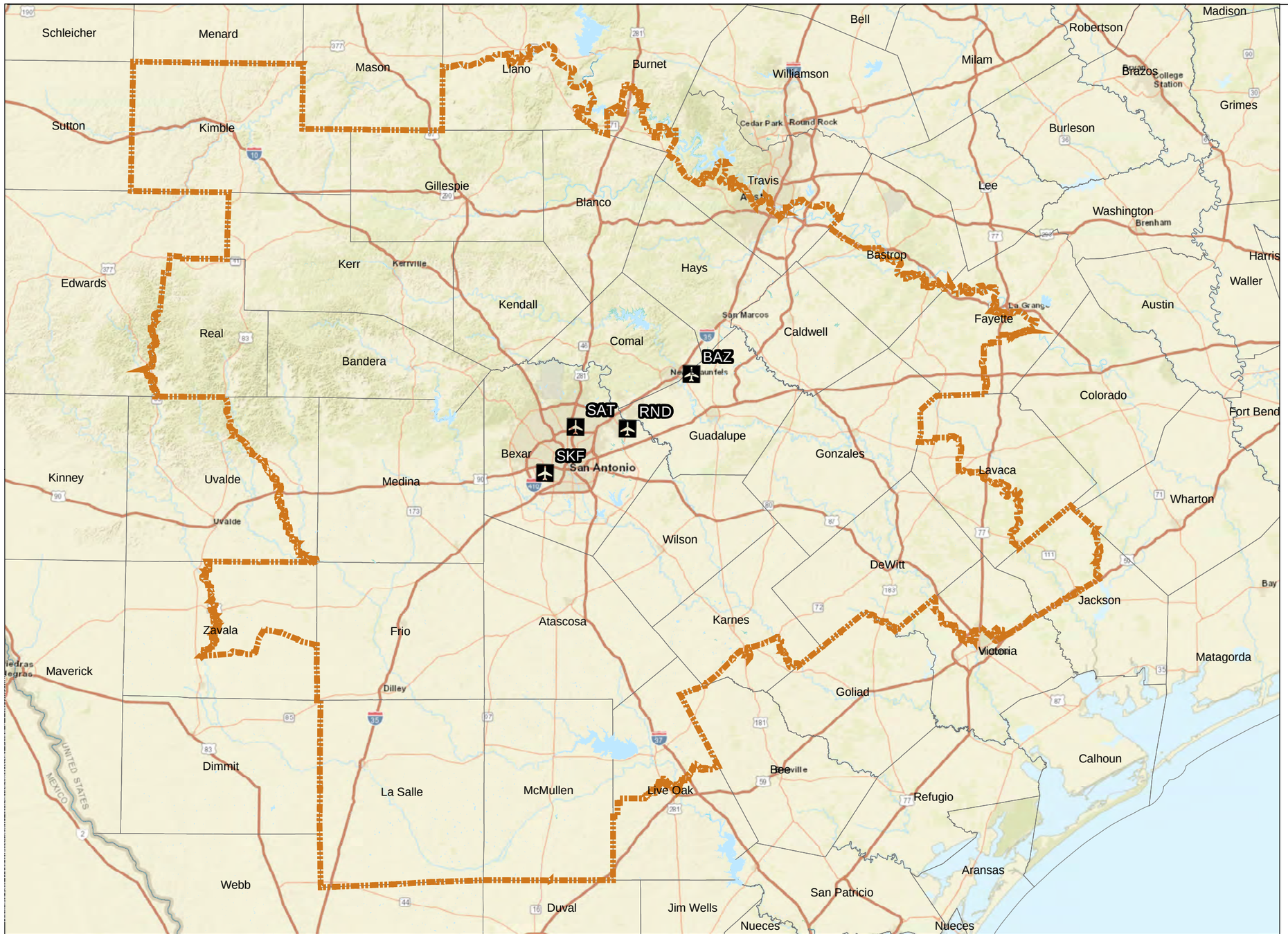
Exhibit 1-1 depicts the General Study Area. **Table 1-1** lists the 32 counties included in whole or in part in the General Study Area.

Table 1-1 Counties within General Study Area

Atascosa	Gillespie	Live Oak
Bandera	Gonzales	Llano
Bastrop	Guadalupe	McMullen
Bexar	Hays	Medina
Blanco	Jackson	Real
Burnet	Karnes	Travis
Caldwell	Kendall	Uvalde
Comal	Kerr	Victoria
DeWitt	Kimble	Wilson
Fayette	La Salle	Zavala
Frio	Lavaca	

Sources: ESRI, U.S. Census Bureau, 2022, ATAC Corporation General Study Area, 2022.
Prepared by: ATAC Corporation, June 2022.

9 Department of Transportation, Federal Aviation Administration, *Memorandum Regarding Altitude Cut-Off for National Airspace Redesign (NAR) Environmental Analyses*, September 15, 2003.



LEGEND

- Study Airport
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, September 2022.

Exhibit 1-1

General Study Area

SAN ANTONIO AIRSPACE MODERNIZATION PROJECT

THIS PAGE INTENTIONALLY LEFT BLANK

1.3 Study Airports

Exhibit 1-2 depicts the locations of the four San Antonio Airspace Modernization 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. This project is unique in that military as well as civilian airports were selected due to the use of existing IFR procedures by military aircraft. 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 Major Study Airport and the three Satellite Study Airports (collectively, the Study Airports) are:

San Antonio International Airport (SAT) is considered the Major Study Airport due to a focus for procedure and airspace optimization. SAT serves as the primary commercial airport classified as a medium hub primary commercial service airport under the FAA's National Plan of Integrated Airport Systems (NPIAS).[10] As described in **Table 1-2**, SAT has one set of parallel runways (Runways 13R-31L and 13L-31R) and a crosswind runway (Runway 4-22). Aircraft arriving at SAT may be assigned the one RNAV STAR or one of four conventional STARs. Departing aircraft may be assigned one of three RNAV SIDs or three conventional SIDs.

Kelly Field (SKF) is the Satellite Study Airport located approximately 11 miles southwest of SAT. Kelly Field is owned by the US Air Force (USAF) and managed by the USAF 502nd Operational Support Squadron of Lackland Air Force Base, a part of Joint-Base San Antonio (JBSA). Port San Antonio leases airside access property on the north airfield as well as the East Kelly Railport adjacent to the airfield. It is classified as a regional general aviation facility in the NPIAS, and functions as a joint use airport with civilian and military based aircraft. As described in **Table 1-2,** SKF has one runway (Runway 16-34). SKF arrivals may be assigned the one RNAV STAR or one of four conventional STARs. There are currently no designated departure procedures for SKF.

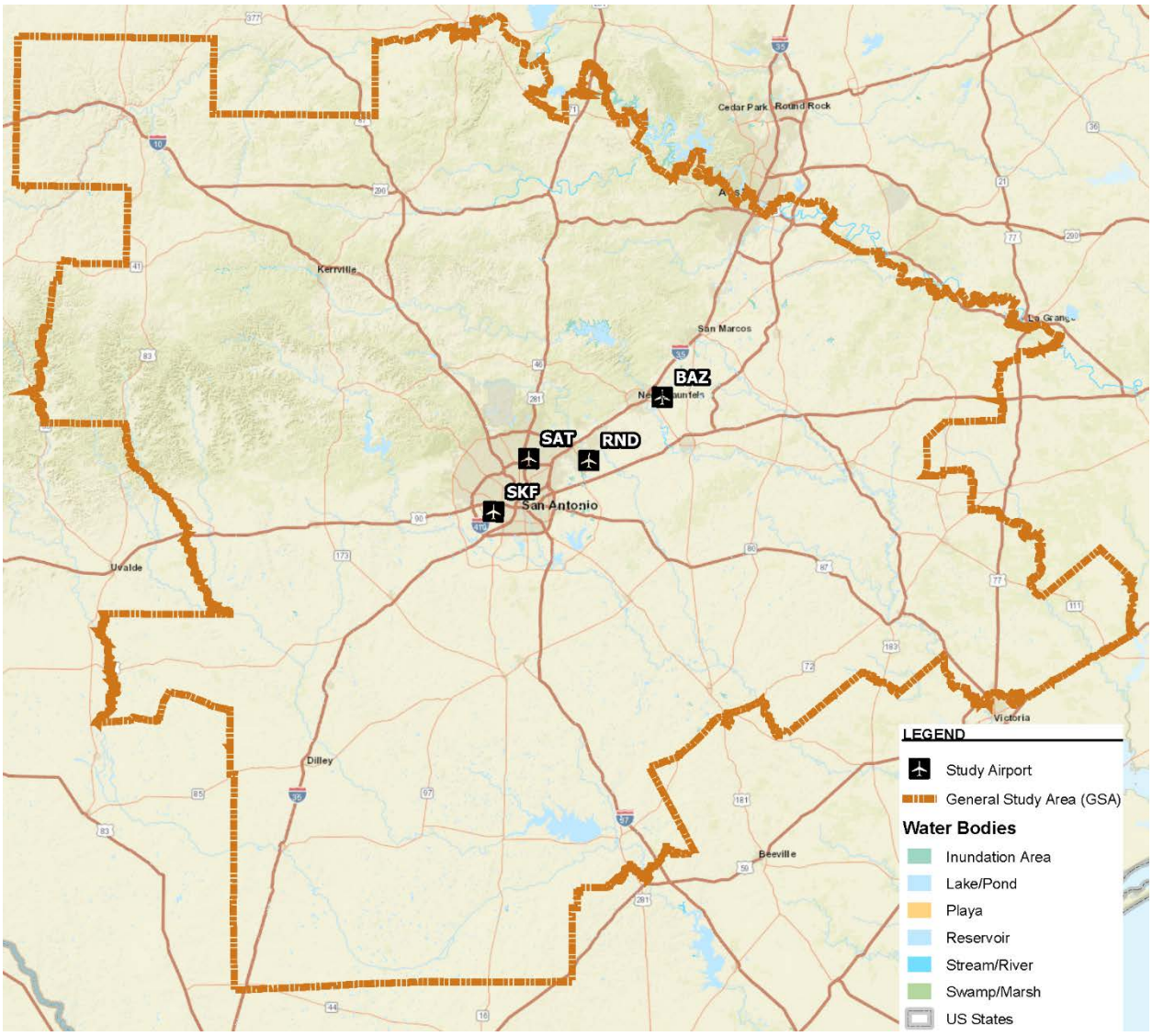
New Braunfels National Airport (BAZ) is the Satellite Study Airport located approximately 27 miles east-northeast of SAT and accommodates a mix of general aviation activity. This airport has been planned and developed as a general aviation airport, serving non-commercial private aircraft. BAZ is classified as a national general aviation airport in the NPIAS. As described in **Table 1-2**, the airport has 2 runways (Runway 13-31 and Runway 17-35). BAZ arrivals have RNAV (GPS) instrument approach procedures to each runway and a Very High Frequency Omnidirectional Range with Distance Measuring Equipment (VOR/DME-A) circle-to-land approach to all runways. The "-A" in VOR/DME-A indicates in this case that the approach is not aligned within 30 degrees of the runways at the airport.

Randolph Air Force Base Airfield (RND) is the Satellite Study Airport located approximately 10 miles east of SAT and is a non-public military use facility that is part of the JBSA complex owned and operated by the U.S. Air Force. RND is used primarily for training in a number of USAF aircraft. As described in **Table 1-2**, the Airfield has two parallel runways (Runway 15L-33R and

10 U.S. Department of Transportation, Federal Aviation Administration, *National Plan of Integrated Airport Systems, 2021-2025, Appendix A*. September 30, 2020.

15R-33L). RND arrivals may be assigned the one RNAV STAR or one of four conventional STARs. There are currently no designated departure procedures for RND.

Exhibit 1-2 Study Airport Locations



Note: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Sources: FAA, National Airspace System Resource, Special Use Airspace, ESRI, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, METI, NGCC, (c) OpenStreetMap contributors, and the GIS User Community, ESRI US Water Bodies, US Census Bureau, Incorporated Places, State Boundary. FAA Code of Instrument Flight Procedures, Study Airports, ATAC Study Area Boundary.
Prepared by: ATAC Corporation, June 2022.

Table 1-2 San Antonio Airspace Modernization Project EA Study Airports

Airport Name	Airport Code	Location	Runways[1/]
Airports			
San Antonio International Airport[1]	SAT	San Antonio, TX	04, 22, 13R, 31L, 13L, 31R
Kelly Field	SKF	San Antonio, TX	16, 34
New Braunfels National Airport	BAZ	New Braunfels, TX	13, 31, 17, 35
Randolph Air Force Base Airfield	RND	San Antonio, TX	15L, 33R, 15R, 33L

Notes:
1/ San Antonio International Airport is the Major Study Airport due to the primary focus for flight procedure enhancements.
2/ Runway surfaces 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' (left, center, or right) at the end. This is based on which side a runway is on when next to another one in the same direction.

Source: Department of Transportation, Federal Aviation Administration. Chart Supplements. (https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/search/ [Accessed August 17, 2022]).
Prepared by: ATAC Corporation, August 2022.

As shown in **Table 1-3**, for the 2021/2022 radar sample approximately 52.7 percent of all IFR traffic within the San Antonio Airspace Modernization Project area operated at SAT.

Table 1-3 Distribution of 2021/2022 IFR Traffic Among Study Airports

Airport	IFR Annual Operations	Percent of Total Annual Operations
San Antonio International Airport	130,588	52.7%
Kelly Field	17,185	6.9%
New Braunfels National Airport	8,407	3.4%
Randolph Air Force Base Airfield	91,850	37.0%
Total IFR Operations	248,030	100.0%

Note: For consistency with military aircraft operating at civilian airports and due to the mixed nature of military operations under IFR and VFR, military aircraft at RND and SKF were assumed to be operating under IFR since aircraft were in radar contact at some point in the operation.

Source: Department of Transportation, Federal Aviation Administration. Operations Network: Tower Counts for SAT and BAZ (https://aspm.faa.gov/opsnet/sys/Airport.asp; [accessed March 23, 2022]), Department of the Air Force, *Final Environmental Impact Statement for T-7A Recapitalization at Joint Base San Antonio, Texas*, February 2022.
Prepared by: ATAC Corporation, August 2022.

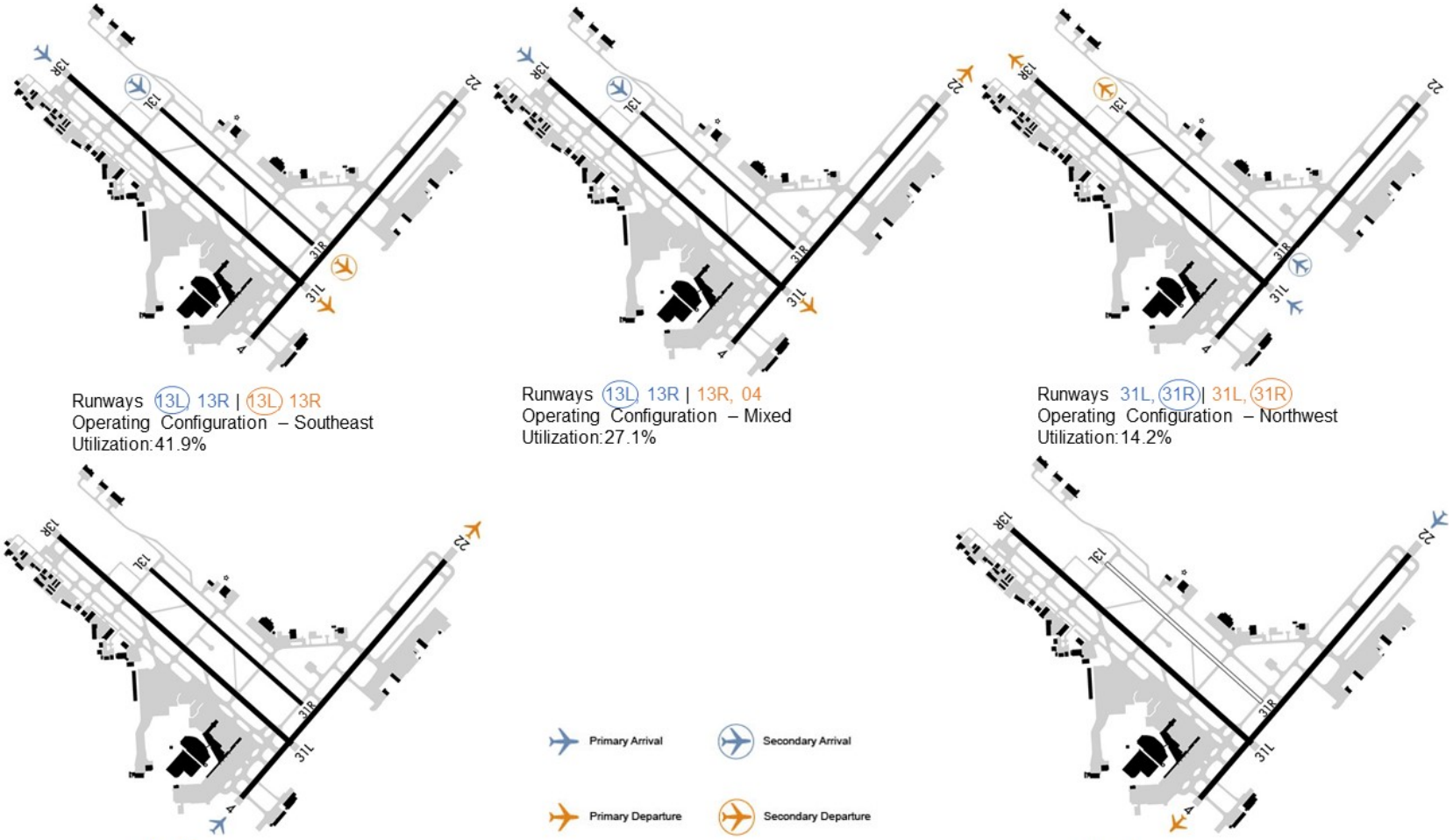
1.3.1 Major Study Airport (SAT) Runway Operating Configurations

SAT 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 1-3 illustrates the primary runway operating configurations at SAT. These configurations are based on the FAA's Performance Data Analysis and Reporting System (PDARS) runway configuration data for 2021/2022 sample.

THIS PAGE INTENTIONALLY LEFT BLANK

Exhibit 1-3 SAT Runway Operating Configurations



Source: Department of Transportation, Federal Aviation Administration. Airport Diagrams [http://www.faa.gov/airports/runway_safety/diagrams/ (accessed July 2022) PDARS Airport Configuration files for SAT, July 2022.
Prepared By: ATAC Corporation, July 2022.

THIS PAGE INTENTIONALLY LEFT BLANK

1.4 Air Traffic Control Facilities

The NAS[11] 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 four Study Airports shown on **Exhibit 1-2** have ATCT facilities. BAZ is a non-federal ATCT staffed by qualified third-party contract personnel funded through an FAA program, whereas SAT is staffed by FAA employees, and SKF and RND are staffed by the US Air Force and civilian (non-FAA) employees. RND is unique due to the extensive military training mission that necessitates an east and west ATCT operated under the US Air Force 12th Operations Support Squadron. The east ATCT is referred to as Randolph Control Tower, while the west ATCT is referred to as Hangover Control Tower.
- **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 San Antonio Airspace Modernization Project area is controlled by the SAT TRACON whose boundaries are shown in **Exhibit 1-4**.
- **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 1-4**, the San Antonio Airspace Modernization Project is comprised of airspace delegated to the Houston ARTCC (ZHU).

1.5 Controlled Airspace in the General Study Area

The following sections describe the airspace structure, type, and constraints of the General Study Area Airspace that would be affected by the San Antonio Airspace Modernization Project.

1.5.1 Airspace Responsibility

Exhibit 1-4 depicts the terminal and en route airspace structure within the immediate vicinity of the General Study Area. For an introduction to air traffic and performance based navigation concepts, graphics, and descriptions, please refer to Appendix A. The General Study Area consists of airspace delegated to ZHU and SAT ATCT/TRACON. ZHU provides ATC services covering 276,866 square miles of lateral airspace across the south central United States. ZHU airspace covers the entirety of the General Study Area's 23,849 square miles from various base altitudes up to FL600, occupying roughly 8.6% of ZHU's total lateral coverage. Including the General Study Area, the total breadth of ZHU airspace overlies parts of Mississippi, Louisiana, and Texas as well as the Gulf of Mexico. It abuts Albuquerque Center (ZAB) to the west, Fort

11 See Appendix A: *Basic Concepts of Performance Based Navigation (PBN) and Air Traffic Control (ATC)* for additional descriptions of concepts, terms, and illustrations related to PBN operations in the NAS.

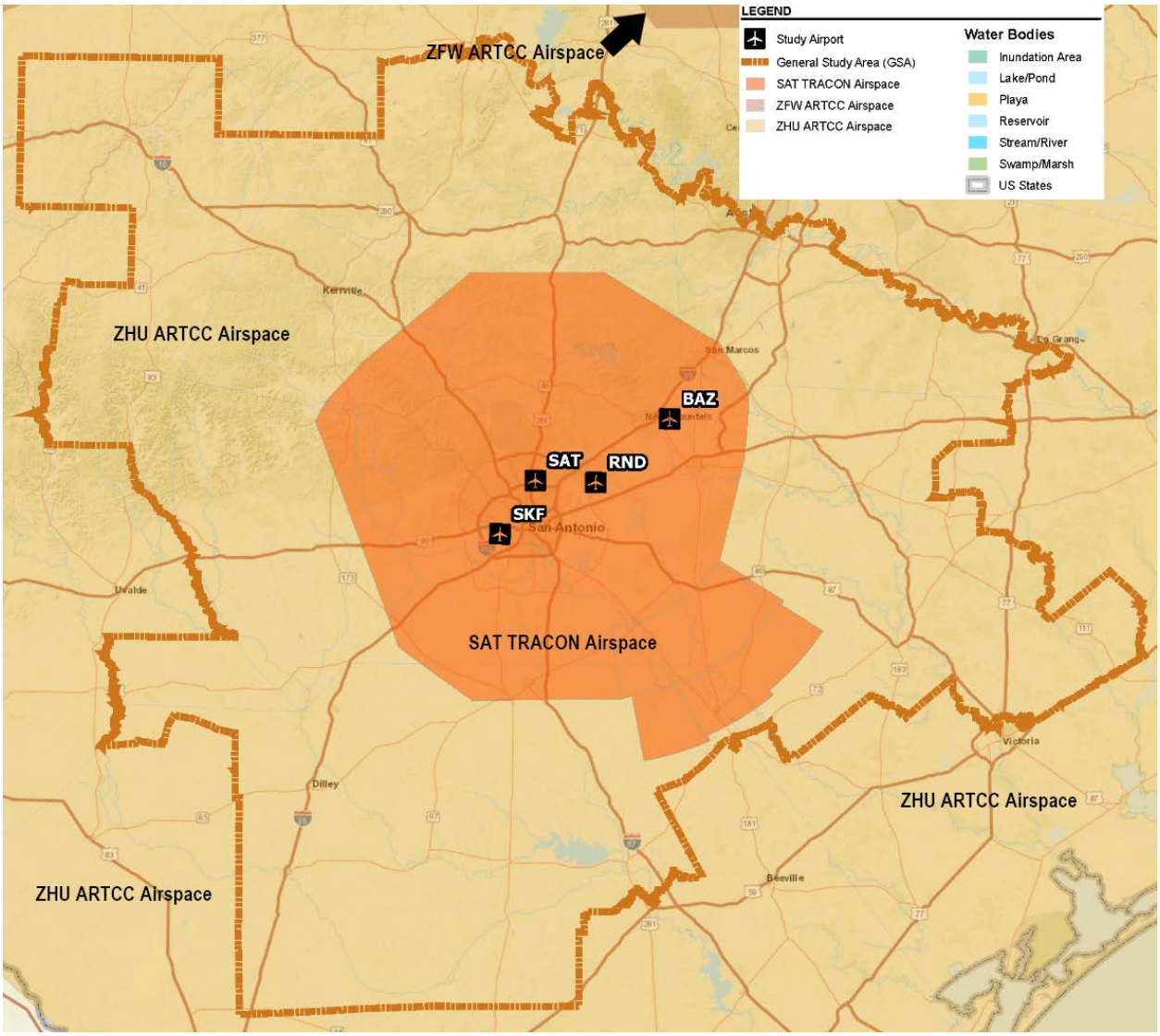
Worth Center (ZFW) to the north, Memphis Center (ZME) to the north, Atlanta Center (ZTL) to the north, Jacksonville Center (ZJX) to the east, ZHU oceanic airspace to the south, and Mexican airspace to the south and southwest. ZHU is responsible for all military, private, and commercial aircraft arriving, departing, and traversing inside its lateral and vertical boundaries when they are operating under IFR and offers select services to aircraft operating under Visual Flight Rules (VFR). ZHU provides air traffic control service to United States and foreign military aircraft operating under both IFR and VFR in ZHU airspace. ZHU controllers provide air traffic services in the airspace above and adjacent to the SAT TRACON airspace.

SAT ATCT and TRACON are a combined operation, offering service to regional as well as SAT-specific local and ground air traffic. This differs from a separate stand-alone TRACON that is unaffiliated with a single local ATCT and offers regional air traffic service, such as I90 TRACON in Houston or D10 TRACON in Dallas-Fort Worth. The lateral boundary of the SAT TRACON airspace is an irregularly shaped circular polygon, extending from SAT approximately 36 miles to the north, 35 miles to the east, 31 miles to the west, and 43 miles to the south. A portion of coverage to the southeast extends approximately 60 miles from SAT. Excluding airspace delegated to the ATCTs at SAT, BAZ, SKF, and RND, SAT TRACON controllers currently manage the airspace within these boundaries from the surface to 18,000' above mean sea level (MSL). Of the 23,849 square miles of the General Study Area, SAT TRACON laterally covers 5,889 square miles, or roughly 24.7% of the General Study Area.

SAT TRACON is generally the first or final radar facility responsible for separating and sequencing airborne aircraft landing at and departing from airports in its airspace. For example, aircraft arriving to SKF are handled by SAT TRACON, then handed over to Kelly Field ATCT until landing. Roughly 25% of all IFR and VFR itinerant operations handled by SAT TRACON are military operations.[12] This includes the initial sequencing of SAT departures, as well as providing safe and expeditious flows of traffic into and out of other area civilian and military airports which have control towers. SAT TRACON coordinates with SKF and RND military towers and provides air traffic control services to IFR-filed aircraft and, when requested or required, VFR aircraft. As with ZHU, SAT TRACON also provides these services to military aircraft that are operating in its airspace.

12 US Department of Transportation, Federal Aviation Administration, Aviation System Performance Metrics (ASPM) Operations Network (OPSNET) (https://aspm/faa.gov/opsnet/sys/opsnet-server-x.asp accessed for SAT TRACON 1/2021 to 6/2022. [Accessed Aug 17, 2022]).

Exhibit 1-4 TRACON and ARTCC Airspace in the General Study Area



Note: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Sources: FAA, National Airspace System Resource, ESRI, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, METI, NGCC, (c) OpenStreetMap contributors, and the GIS User Community, ESRI US Water Bodies, US Census Bureau, Incorporated Places, State Boundary. FAA Airspace Type Files, Study Airports, ATAC Study Area Boundary.
Prepared by: ATAC Corporation, July 2022.

1.5.2 Airspace Constraints

The following sections provide a general overview of the constraints related to controlling aircraft within the San Antonio Airspace Modernization Project area airspace.

1.5.2.1 Class C Airspace

Class C airspace is regulatory airspace, generally located around complex airspace at mid-sized airports including SAT. Class C generally extends 4,000 feet above an airport elevation, and for SAT, the Class C ceiling is 4,800 feet MSL. The rules for flying inside of Class C airspace are

more restrictive than for other types of terminal airspace and require ATC contact. These rules make for a safer and more orderly flow of traffic within Class C airspace. Class C airspace design has a direct impact on the flow of traffic within the San Antonio Airspace Modernization Project area.

1.5.2.2 Special Use Airspace

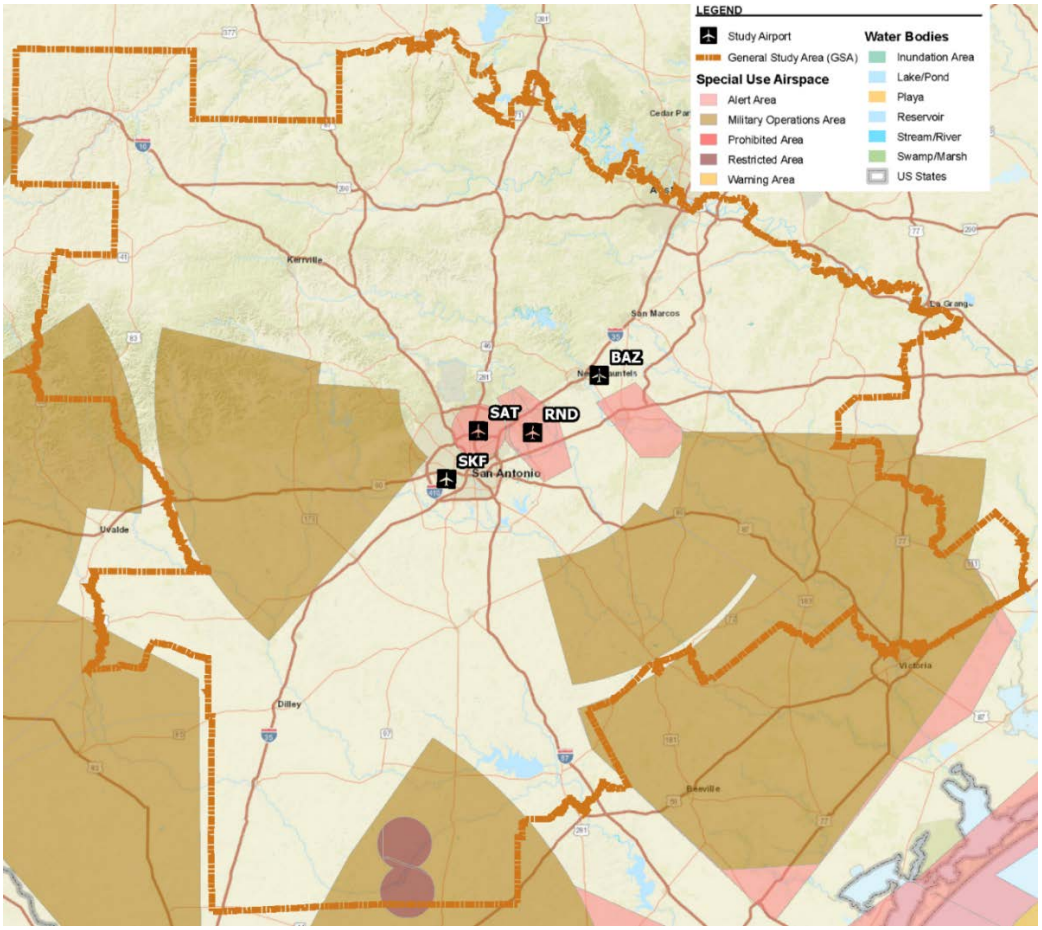
Exhibit 1-5 depicts the boundaries of Special Use Airspace (SUA) in the San Antonio Airspace Modernization Project, illustrating the limited available options for entering and exiting the San Antonio area airspace. SUA is airspace with defined vertical and lateral boundaries containing certain hazardous 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. For example, of the 23,849 square miles in the General Study Area, 7,509 square miles or roughly 31.5% is constrained by SUA of various types. Three types of SUA are found within the San Antonio Airspace Modernization Project:

- **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.[13] MOAs are established to contain certain military activities such as air combat maneuvers, air intercepts, aerobatics, etc.[14] The regional MOA airspace is referred to generally as the Randolph, Crystal, Laughlin, and Kingsville MOAs. These areas are further broken into maneuvering blocks such as the Randolph 1A MOA, the Kingsville 4 MOA, and the Crystal North MOA. MOAs have a defined floor and ceiling, with floors ranging from 6,000’ MSL (Crystal and Crystal North) to 14,000’ MSL (Randolph 2B). All MOAs extend to but do not include 18,000’ MSL unless otherwise indicated in tabulation or on an FAA published chart. All MOAs have scheduled operation hours (e.g., Randolph 1A operates sunrise to sunset Monday-Friday) with alternate or modified times indicated by Department of Defense Notices to Air Missions (NOTAMs).[15]
- **Alert Area:** An alert area is depicted on an aeronautical chart to inform pilots of an area or areas that may contain a high volume of pilot training or an unusual type of aerial activity, neither of which is hazardous to aircraft. An Alert Areas is depicted on aeronautical charts for the information of non-participating pilots. For example, on the eastern boundary of the General Study Area, Alert Area A-632 D notes concentrated student jet training within the Kingsville 4 MOA from 6,000’ MSL up to but not including 11,000’ MSL sunrise to midnight Monday-Friday and 2pm-midnight Sundays as indicated by Department of Defense NOTAM.[16]

13 Class A airspace is generally that airspace from 18,000’ MSL up to and including FL 600 over the 48 contiguous States and Alaska. While in Class A airspace pilots use “flight level” altitudes that rely on a common barometric pressure altitude reference of 29.92 inches of mercury. These “flight level” altitudes are not referenced to sea level or ground level as is the case below 18,000’ MSL and outside of Class A airspace.
14 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 7400.10D, *Special Use Airspace*, February 16, 2022.
15 U.S. Department of Transportation, Federal Aviation Administration, San Antonio Sectional Chart effective 0901Z 14 July 2022 to 0901Z 8 September 2022.
16 Id.

- **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. For example, the Kingsville 3 MOA south of the San Antonio area contains Restricted Area R-6312, used for aircraft to ground live fire exercises and operates from sunrise to sunset via Department of Defense NOTAM. The R-6312 ceiling is FL230 to provide for military high altitude release bombing training.[17]

Exhibit 1-5 Special Use Airspace



Note: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Sources: FAA, National Airspace System Resource, Special Use Airspace, ESRI, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, METI, NGCC, (c) OpenStreetMap contributors, and the GIS User Community, ESRI US Water Bodies, US Census Bureau, Incorporated Places, State Boundary. FAA Code of Instrument Flight Procedures, Study Airports, ATAC Study Area Boundary.
Prepared by: ATAC Corporation, July 2022.

17 Id.

THIS PAGE INTENTIONALLY LEFT BLANK

2 Purpose and Need

The FAA has prepared this Draft EA to evaluate the potential environmental impacts associated with implementation of new RNAV-based flight procedures for the San Antonio Airspace Modernization Project (Proposed Action). As required by FAA Order 1050.1F, an EA must include a discussion of the underlying purpose and need for the Proposed Action. This includes a discussion of the need(s) being addressed and what the FAA plans to achieve by implementing the Proposed Action. The following sections describe the need for the Proposed Action (i.e., the existing issues in the San Antonio Airspace Modernization Project that would be addressed by the Proposed Action), as well as the Proposed Action itself. Explanations of the technical terms and concepts used in this chapter are found in Appendix A: *Basic Concepts of Performance Based Navigation (PBN) and Air Traffic Control (ATC)*.

2.1 The Need for the Proposed Action

In the context of an EA, "need" describes the problem that the Proposed Action is intended to resolve. The need in this case is the inefficiency of the existing aircraft flight procedures in the San Antonio Airspace Modernization Project. RNAV-based SIDs and STARs have been in effect in the San Antonio Airspace for over 10 years. However, since these procedures were first implemented, RNAV design criteria and guidance have been regularly updated as experience has been gained in the design and use of RNAV procedures. As a consequence, older RNAV procedures do not take full advantage of current RNAV design capabilities and have become increasingly less efficient. The arrival and departure procedures serving the San Antonio Airspace Modernization Project can be improved to increase the efficient use of the airspace to the benefit of pilots, controllers, and the general public. Additionally, conventional procedures lack efficiencies inherent in RNAV-based design. This is because they rely on technology that cannot provide specific and precise navigational benefits for aircraft, including predetermined speeds or altitudes. Furthermore, as discussed in Appendix A: *Basic Concepts of Performance Based Navigation (PBN) and Air Traffic Control (ATC)*, conventional procedures are subject to lateral and vertical flight path limitations eliminated through use of RNAV technology. RNAV procedures can reduce the need for controllers to employ vectoring and speed adjustments, thus reducing controller and pilot workload. In turn, this adds efficiency to an air traffic system by enhancing predictability, flexibility, and route segregation. By taking advantage of the increased benefits associated with RNAV technology, the FAA is better able to meet one of its primary missions as mandated by Congress – to provide for the efficient use of airspace, to develop plans and policy for the use of the navigable airspace, and to assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace. The following sections describe the need in greater detail.

2.1.1 Description of the Need

There are several issues associated with the arrival and departure procedures currently implemented in the San Antonio Airspace Modernization Project. These issues are predominantly caused by inefficient lateral and vertical paths, procedures lacking adequate runway transitions, conflicts between arriving and departing traffic, and delays associated with the close proximity of SAT and surrounding satellite (other airports within the San Antonio Area Class C airspace) airports.

Most of the STARs serving SAT do not provide for runway transitions. When a controller issues instructions for a pilot to follow an RNAV STAR with a runway transition, the controller knows when and where the aircraft will fly until it reaches the approach to the runway. Without a runway

transition, the controller must issue vectors and speed adjustments to direct the aircraft to the approach to the runway. This requires increased communication between controller and pilot. Consequently, less-precise flight paths may result 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, flight route predictability is reduced, as is efficient use of the airspace.

Current departure traffic flows rely on vectors for traffic departing to the north and east, increasing task complexity. In addition, the current departure flows have inefficient routes and altitudes. Converging flows requires sequencing and separation through the vectoring and leveling off of aircraft reducing the predictability and repeatability of the procedures while increasing the complexity of the task.

Predictability is also reduced due to a lack of RNAV arrival and departure procedures serving satellite airports. BAZ has no arrival or departure procedures serving the airport, while RND and SKF have only arrival procedures (of which only one is RNAV). RNAV routes allow controllers to know the expected location of aircraft, their altitudes (i.e., where and how high), and speeds (i.e., how fast and when) at key points along a flight path. Procedures that provide these elements result in more predictable routes for both controllers and pilots. This analysis considers and evaluates localized existing and proposed RNAV instrument approach procedures close to the respective Study Airport, but prioritizes arrival and departure procedures at a higher order due to the importance of system connectivity to and from the en route system relative to causal factors such as predictability.

In addition, some arrival and departure flight paths intersect, requiring controllers to direct pilots to vector/level off to maintain adequate vertical and/or lateral separation between aircraft. Aircraft arriving to SAT on RNAV STARs and departing on RNAV SIDs can experience segments of flight where aircraft are required to level off. Some transitions that intersect other procedures may be rarely or completely unused due to the conflicts. Departures from BAZ, RND, and SKF may experience delays due to conflicts with arrivals into SAT. These complex, converging interactions require more frequent controller-to-pilot and controller-to-controller communication and reduce the efficient use of the airspace.

Similarly, underutilized en route transitions limit the number of entry and exit points into SAT airspace. As a result, multiple arriving and departing traffic flows must be sequenced over the same points, increasing both controller and pilot workload and complexity. The entry point for southeast and southwest arrivals serving SAT require coordination between ZHU controllers managing neighboring airspace sectors. Furthermore, some departure procedures are inefficient due to design constraints, and there are no departure procedures serving the airport for aircraft departing to the east. Again, these issues lead to an increase in controller-to-pilot and controller-to-controller communication and reduce flexibility in the management of the airspace.

The 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 need is the inability to fully employ the additional efficiency provided by current RNAV design criteria and guidance. By developing RNAV procedures that take full advantage of current design criteria and guidance, the air traffic system would experience increased efficiency demonstrated by enhanced predictability, route segregation, and flexibility.

It is important to note that a key design constraint is safety. Any proposed change to a procedure to resolve a need must not compromise safety, and if possible must enhance safety. Although the current procedures are less efficient, they meet current FAA safety criteria.

2.1.2 Causal Factors

The inefficiencies and resulting complexities associated with existing procedures are the primary foundation for the need in the San Antonio Airspace Modernization Project. A need is best addressed by examining the circumstances or factors that cause it. Addressing the causal factors behind the need will help develop a reasonable alternative designed to resolve the need (i.e., meet the "purpose").

As summarized above, several issues have been identified as causes for the inefficiencies in the San Antonio airspace. For purposes of this EA, these issues were grouped into three key causal factors:

- Lack of predictable standard routes defined by the need for additional RNAV arrival and departure procedures connecting to/from the en route airspace and a need for runway transitions;
- Complex converging and dependent arrival and departure route procedure interactions; and,
- Lack of flexibility in the efficient transfer of traffic between the en route and terminal area airspace.

These three causal factors are discussed in the following sections.

2.1.2.1 Lack of Predictable Standard Routes Defined by the Need for Additional RNAV Arrival and Departure Procedures Connecting to/from En Route Airspace and a Need for Runway Transitions

Predictable standard routes allow both pilots and controllers to know in advance how, where, and when an aircraft should be operated along a defined route. This also allows controllers and pilots 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 and predictable than RNAV procedures, 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 Appendix A, 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.

The following sections describe some of the issues with predictability in the San Antonio Airspace Modernization Project airspace.

Current Arrival and Departure Procedures Do Not Take Full Advantage of RNAV Capabilities

As shown in **Table 2-1**, the Study Airports are currently served by four RNAV arrival and departure procedures and seven conventional arrival and departure procedures. Most of the current procedures serving SAT, SKF, and RND are conventional arrival and departure procedures developed over a decade ago. The development of the current RNAV procedures mirrored the conventional procedures so all aircraft could follow the same route. Because conventional

procedures are dependent on the location of ground-based navigational aids, the locations where procedures can be established are limited due to factors such as terrain. Accordingly, the RNAV procedures developed to mirror the conventional procedures do not take full advantage of RNAV design capabilities. As a result, the overall benefit that could have been gained for RNAV-equipped aircraft has not been fully realized.

Table 2-1 Existing STAR and SID Procedures

Airport Served	Gate Served	Procedure Name	Procedure Type	Transitions (en route/runway)
ARRIVALS (STARs)				
SAT, RND, SKF	N, NE	BRAUN	RNAV	6/4
SAT, RND, SKF	W, NW	CENTERPOINT	Conventional	2/0
SAT, RND, SKF	SE, SW	LEMIG	Conventional	4/0
SAT, RND, SKF	N, NE	MARCS	Conventional	5/0
SAT, RND, SKF	N, NW	STONEWALL	Conventional	3/0
DEPARTURES (SIDs)				
SAT	N	ALAMO	Conventional	4/0
SAT	W, NW	ALISS	RNAV	2/0
SAT	SE	BOWIE	Conventional	2/0
SAT	NW	LEJON	Conventional	1/0
SAT	S	MILET	RNAV	1/0
SAT	SE	THREE RIVERS	RNAV	1/0

Notes:
1/ Radar vectors are not defined routes and therefore are not included in runway transition counts.
2/ Three STAR procedures, the BELLR serving HOU and the HTOWN and TEJAS serving IAH are not included in this list as HOU and IAH are not study airports and there was only one change to the procedures in the en route environment to allow for connectivity to the proposed SNIDR SID. This change was considered and is discussed in Section 3.1.2.2 of this EA.

Source: U.S. Department of Transportation, Federal Aviation Administration, Instrument Flight Procedures Information Gateway <https://www.faa.gov/air_traffic/flight_info/aeronav/procedures/>, accessed May 2022.
Prepared by: ATAC Corporation, June 2022.

Since the implementation of the current procedures, RNAV design criteria and guidance have been regularly updated as experience has been gained in the design and use of RNAV procedures. Consequently, the older RNAV procedures in effect in the San Antonio Airspace Modernization Project do not take full advantage of current RNAV design capabilities and have become increasingly less efficient. Maintaining the current conventional procedures and the RNAV procedures that mirror them decreases flight route predictability by reducing the efficiency of the airspace and increasing complexity due to increased controller and pilot workload.

Lack of Runway Transitions

As discussed in Section 1.3.1, SAT operates under five different runway operating configurations depending on factors such as weather, wind direction, 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. Because of the high level of aircraft traffic, especially during peak periods, not providing procedures for each runway end contributes to a less efficient air traffic system.

As the only major commercial airport in SAT TRACON airspace, SAT experiences the highest levels of civilian and military aircraft traffic. As shown in **Table 2-1** previously, SAT is currently served by one RNAV STAR. This STAR (BRAUN) is the only existing procedure to provide any

runway transitions into SAT. The lack of runway transitions for the other procedures requires controllers to use vectors to direct aircraft to their final approach. The extensive vectoring required results in more frequent controller-to-pilot and controller-to-controller communication, increasing controller and pilot workload and reducing predictability.

Lack of Predictable Satellite Airport Arrival or Departure Procedures

The existing arrival and departure 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 SAT. While SFK and RND are currently served by one RNAV STAR, there are no RNAV SIDs serving the airports.

Currently, BAZ has no established RNAV or conventional arrival or departure procedures. All arrivals and departures are vectored and must be released for departure by the SAT TRACON. The lack of RNAV procedures for the BAZ Study Airport increases workload for both controllers and pilots and reduces predictability.

2.1.2.2 Complex Converging and Dependent Route Procedure Interactions

In some areas, the separation between arrival and departure flight routes (e.g., lateral separation between two routes or vertical separation between crossing routes) does not allow for efficient use of the airspace. This requires that controllers carefully observe aircraft activity along the nearby or crossing flight routes and be prepared to provide air traffic services to ensure standard separation is maintained.[18] For example, where arrival and departure flight routes intersect, flight level-offs may be required for either arrivals or departures to ensure adequate vertical separation between aircraft. In some cases, arriving and departing aircraft on nearby flight routes may need to be vectored to ensure safe lateral separation. In other cases, controllers may need to issue point-outs (a physical or automated action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred).

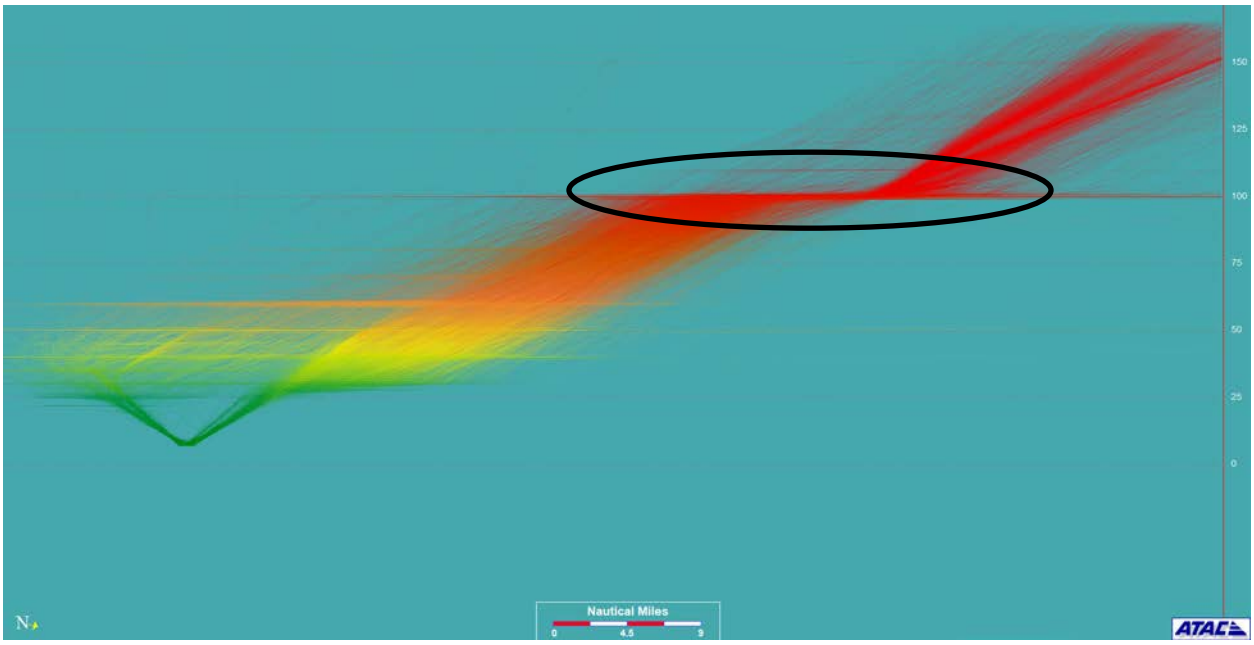
Because the procedures currently in use in the San Antonio Airspace Modernization Project do not take full advantage of RNAV capabilities, multiple procedures share the same NAVAIDs. This may result in conflicts such as aircraft flying at different speeds along adjacent routes, requiring greater separation to prevent operations at similar altitudes or occupation of the same airspace. To avoid potential conflicts, controllers may need to reroute aircraft by issuing vectors or directing aircraft to level off. This increases pilot and controller workload and system complexity.

Aircraft arriving to SAT are frequently required to level off or vector off a procedure during descent to maintain vertical and/or lateral separation from other arriving and departing aircraft. Aircraft operating on the LEMIG, BRAUN, STONEWALL, CENTERPOINT, and MARCS STARs typically experience one or more periods of level-off of more than 10 nautical miles (NM).[19] Similarly, aircraft operating on SIDs departing the Study Airports may also experience periods of level-off. **Exhibit 2-1** shows the vertical profiles for aircraft arriving at SAT on the STONEWALL STAR. As shown by the black circle, aircraft using the STONEWALL STAR are directed to level off for approximately 20 NM at 10,000' MSL. Extended level-offs often result in increased controller-to-pilot communication and may require traffic alerts to pilots in the proximity of other aircraft or point-outs to other controllers responsible for neighboring airspace sectors. This adds to the complexity of managing and operating in the airspace due to higher controller workload, increased controller-

18 Areas where the lateral or vertical separation distances are inadequate to allow efficient use of the airspace are referred to as "confliction points" by air traffic controllers.
19 A nautical mile measures 6,076 feet or 1,852 meters.

to-pilot communication, and inefficient use of aircraft performance capabilities during descent or climb.

Exhibit 2-1 STONEWALL STAR - Vertical Profile



Notes: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Source: US Department of Transportation, Federal Aviation Administration, Performance Data and Reporting System (PDARS) radar data, March 1, 2021 to February 28, 2022, ATAC Corporation.
Prepared by: ATAC Corporation, August 2022.

2.1.2.3 Lack of Flexibility in the Efficient Transfer of Traffic between the En Route and Terminal Area Airspace

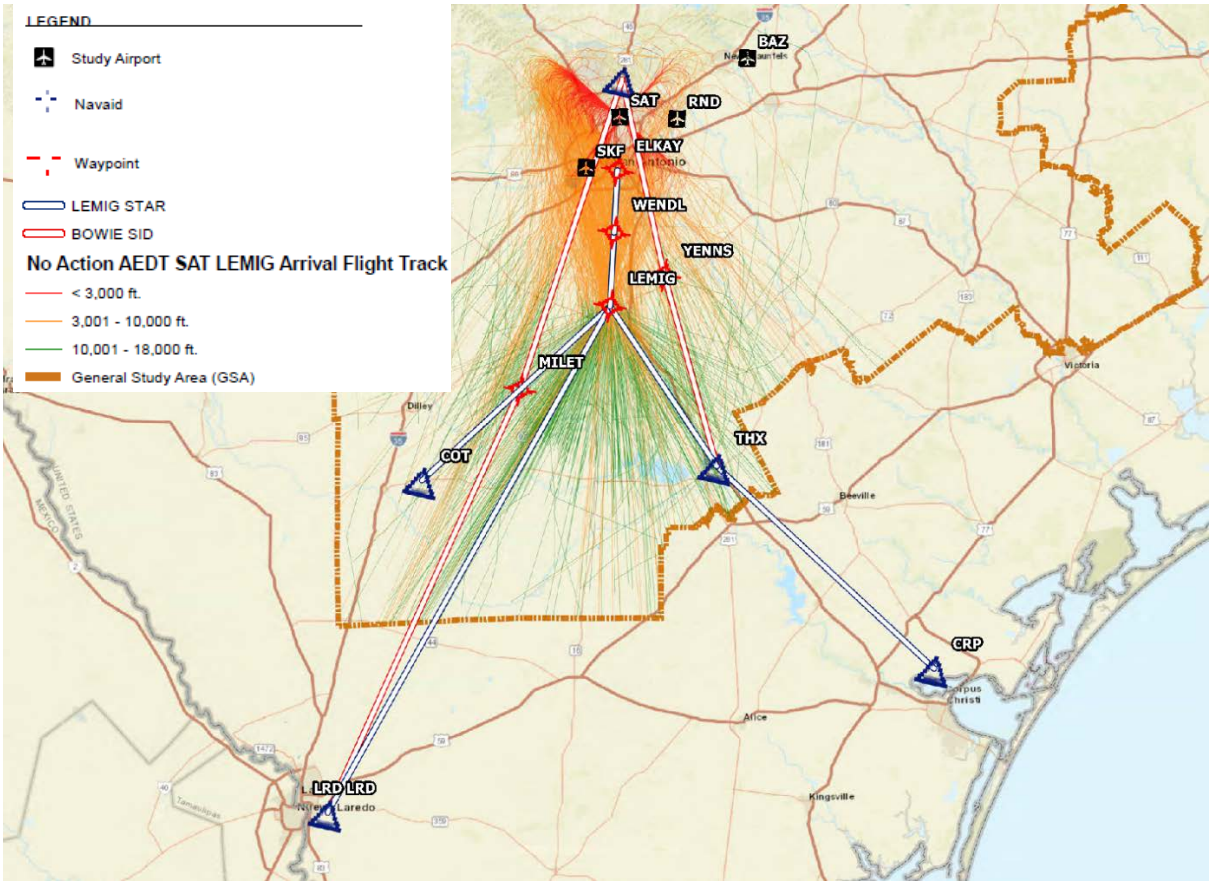
Flexibility allows controllers to plan for and adapt to traffic demands, which change frequently throughout the day. Although commercial flights are scheduled, delays in other regions of the U.S. or severe weather along a route may cause aircraft to enter or exit the en route and terminal area airspace at times other than those previously scheduled. Controllers require options to manage shifting traffic demand.

Factors such as too few entry or exit points, requiring multiple aircraft flows to be sequenced over the same point, can increase the amount of vectoring needed to merge traffic and maintain safe separation. In addition, too few departure procedures can increase airspace complexity and workload for both controllers and pilots. The following sections further discuss flexibility issues specific to San Antonio Airspace Modernization Project airspace.

Entry Points

Exhibit 2-2 depicts aircraft arriving on the LEMIG STAR. Aircraft arriving on the LEMIG STAR have three en route transitions available on the procedure. However, two of the arrival transition waypoints (LRD and CRP) are shared with the BOWIE SID departure transitions

Exhibit 2-2 SAT LEMIG Arrivals



Notes: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Source: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, August 2022.

requiring controllers to either coordinate the arrivals and departures or issue a vector to a different point along the route that avoids the potential conflict. The third transition (COT) is rarely used and requires arriving traffic to interact with aircraft departing on the BOWIE SID (LRD transition). These terminal airspace entry points require excessive coordination between sectors which can result in gaps in the arrival flows to the Study Airports. This excessive coordination is further exacerbated by the lack of vertical guidance for all existing procedures in the SAT airspace.

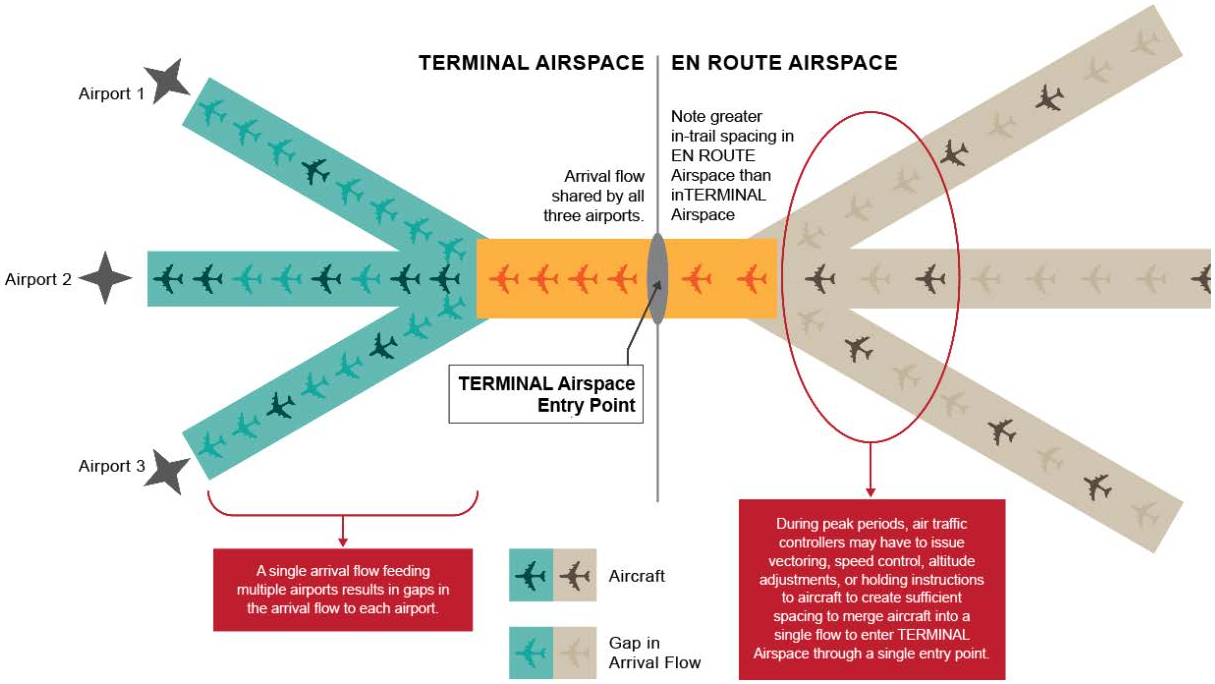
Exhibit 2-3 illustrates how aircraft arrivals are sequenced in the en route airspace and then merged to enter terminal airspace through a single-entry gate. Aircraft arriving from en route airspace must be merged into a single arrival flow before entering terminal airspace through an entry gate. This is similar to automobile traffic traveling in multiple freeway lanes merging into one lane before exiting a freeway. The process of multiple lanes of traffic merging into one lane can cause congestion. In terms of air traffic, to maintain safe separation, controllers must create sufficient gaps between aircraft along a route to safely line up aircraft from multiple streams. This may require controllers to employ airspace management techniques such as vectoring aircraft off procedures or directing pilots to reduce speed, which can

increase congestion. The need to employ these management techniques results in increased workload for both the controller and pilot.

Aircraft destined for the Study Airports share arrival procedures that enter the terminal airspace on a single arrival flow through an entry point. Aircraft are then split from a single arrival flow and issued instructions to the final approaches to the various runways at the different Study Airports. Similar to what is depicted in **Exhibit 2-3**, gaps in the flow to the individual Study Airports can develop after aircraft are sequenced and directed to the final approaches to the Study Airport runways.

To some extent, the gaps can be closed if controllers direct the rear aircraft to increase speed along the arrival route to the airport. However, at this critical phase of flight, when aircraft are descending and maneuvering to the final approach to a runway, the feasibility of making significant speed adjustments and reducing the gaps in the arrival flow is limited.

Exhibit 2-3 Illustration of Single Terminal Airspace Entry Point and Single Arrival Flow with Traffic Sequenced to Multiple Airports

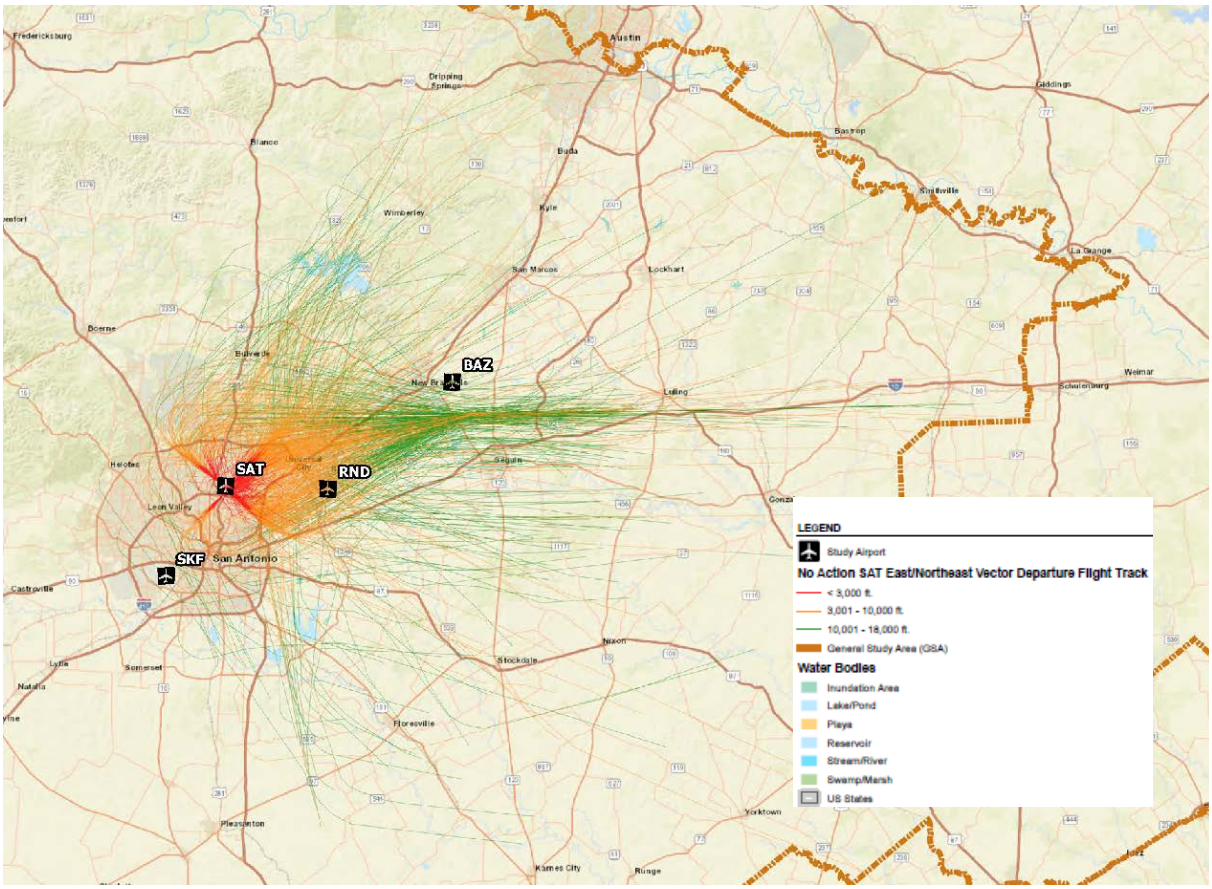


Source: Federal Aviation Administration, July 2012.
Prepared by: ATAC Corporation, August 2022.

Exit Points – SAT Eastbound Departures

Exhibit 2-4 depicts traffic departing SAT to the east. There is currently no departure procedure for aircraft departing to the east; this requires controllers to issue vectors or preferred routes that may vary based upon destination. The lack of a departure procedure for the eastbound traffic increases pilot and controller workload, while increasing the complexity of the operations and reducing the predictability of aircraft movements. Since there is no published exit point, controllers must coordinate the transfer control point with the pilots and other controllers.

Exhibit 2-4 SAT Eastbound Departures



Notes: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

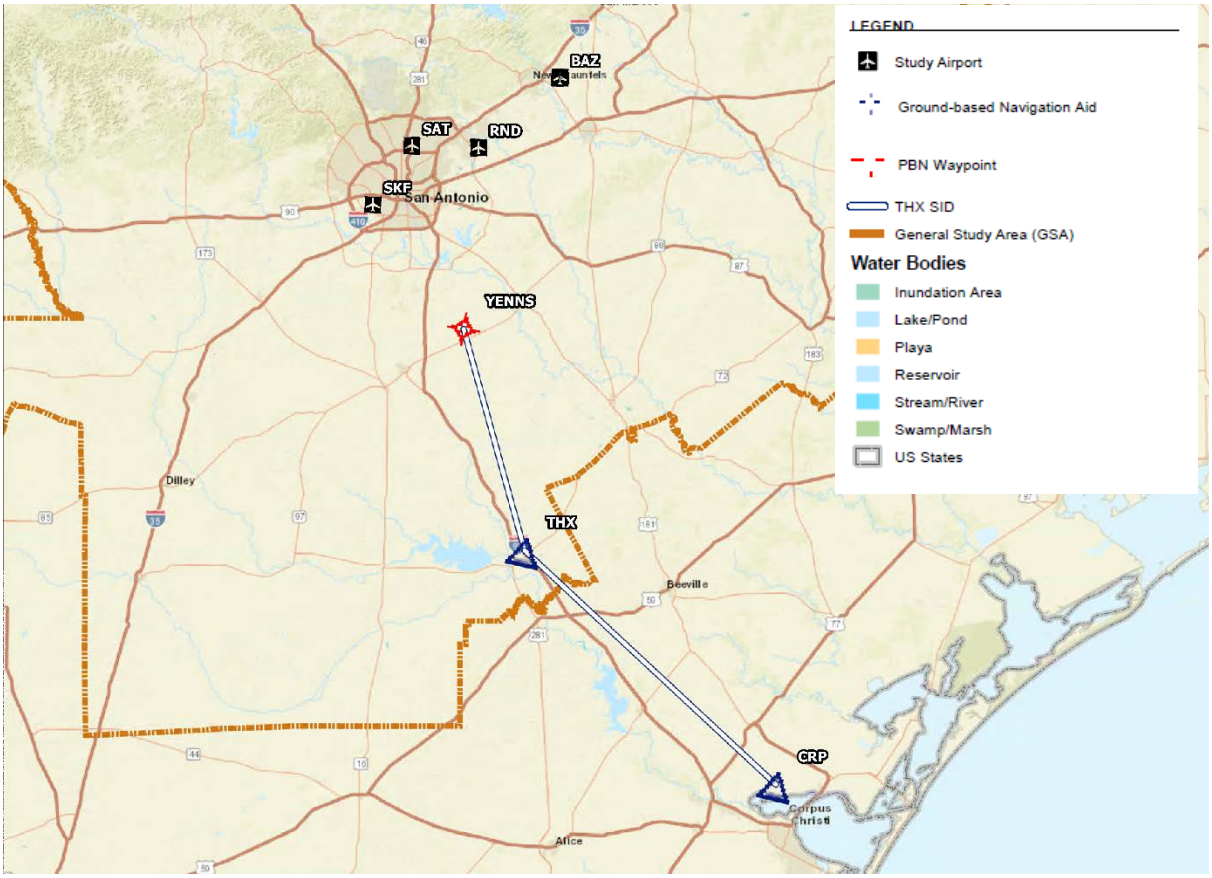
Source: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, August 2022.

Several of the existing RNAV procedures utilize ground-based navigational aids rather than PBN waypoints. **Exhibit 2-5** depicts the THX SID departing from SAT. The use of ground-based navigational aids limits the flexibility in location of routes and entry and exit points. For the THX SID, it is also in conflict with another FAA initiative called the VOR Minimum Operational Network (MON). VOR MON is the FAA program to transition to PBN navigation from the conventional VOR-defined routes and procedures. As a result, the VOR infrastructure in the Contiguous United States (CONUS) is being repurposed to provide a conventional backup navigation service during potential Global Positioning System (GPS) outages.[20] The VOR MON Program will implement the MON by discontinuing approximately

20 Navigation Programs - Very High Frequency Omnidirectional Range Minimum Operational Network (VOR MON). (https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gbng/vormon [Accessed, August 2022]).

30-50% of the VORs in the NAS, of which, one slated for decommissioning is the THX VOR.[21,22]

Exhibit 2-5 THX SID



Notes: SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Source: Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). Shaded Relief, 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, August 2022.

In addition, departing aircraft may conflict with arriving aircraft when sequenced over the same point. There are several consequences that result from arrivals and departures to and from the Study Airports using common arrival and departure procedures and terminal airspace entry and exit points. These consequences include:

- The need to merge arriving aircraft into a single arrival flow at each entry point can increase flight time and distances.

21 VOR MON Program Presentation to Aeronautical Charting Forum, October 28-30, 2014
22 *Provision of Navigation Services for the Next Generation Air Transportation System (NextGen) Transition to Performance-Based Navigation (PBN) (Plan for Establishing a VOR Minimum Operational Network)*, 81 Federal Register Vol. 143, 48694-48700, July 26, 2016.

- Gaps in the final arrival flows do not allow for the formation of a constant stream of aircraft to the Study Airports.
- Merging departing aircraft into single departure streams for each exit point requires controllers to create greater separation between subsequent departures from the same airport than would otherwise be required if the routes were separated.
- Holding aircraft on the runway to protect enough airspace to allow for adequate separation leads to departure delays, especially during peak travel periods.
- The need for additional controller-to-pilot communication to issue the variety of instructions required to merge and desegregate the flow of aircraft adds to the workload of both controllers and pilots.
- Options for controllers to redirect aircraft to avoid bad weather or to more efficiently handle sequencing are limited when the pilot does not have the runway in sight due to low visibility.

2.2 Purpose of the Proposed Action

The purpose of the Proposed Action is to address the issues discussed in the previous sections in order to improve the efficiency of the procedures and airspace utilization in the San Antonio Airspace Modernization Project. To meet this goal, the Proposed Action would optimize procedures serving the Study Airports, while maintaining or enhancing safety, in accordance with FAA's mandate under federal law. This goal would be achieved by reducing dependence on ground-based NAVAID technology in favor of more efficient satellite-based navigation, such as RNAV. Specifically, the objectives of the Proposed Action are as follows:

- Improve the predictability in transitioning air traffic between en route and terminal area airspace and between terminal area airspace area and the runways
- Improve the segregation of arrivals and departures in terminal area and en route airspace
- Improve the flexibility in transitioning aircraft traffic between en route and terminal area airspace and between terminal area airspace area and the runways

The FAA expects that the frequency of controller/pilot communication would decrease, reducing both controller and pilot workload by decreasing the complexity of the procedures. Improvements from RNAV procedures would reduce the need for vectoring and level flight segments, resulting in more predictable traffic flows.

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

2.2.1 Improve the Predictability of Transitioning Air Traffic

As discussed in Section 2.1.2.1, the lack of most current RNAV procedures requires controllers to disproportionately use inefficient air traffic management techniques such as vectoring to ensure safe vertical and lateral separation between aircraft during the arrival and departure phases of flight. As a result, controllers and pilots experience a more complex workload. In addition, there is an insufficient number of runway transitions to and from the runways at each of the Study Airports. Finally, there is a lack of RNAV arrival and departure procedures to and from the Satellite Airports, preventing pilots from filing (submitting a flight plan to ATC) their preferential arrival or departure with predictable flight expectations. These factors affect predictability within the San Antonio Airspace Modernization Project.

This objective can be measured with the following criteria:

- Ensure that the majority of STARs and SIDs to and from the Study Airports are based on RNAV technology utilizing the most current RNAV criteria (measured by count of RNAV STARs and SIDs for an individual Study Airport)
- Increase the number of runway transitions (measured by count of runway transitions for all STAR procedures)

2.2.2 Segregate Arrivals and Departures

As discussed in Section 2.1.2.2, aircraft are frequently required to level off to ensure adequate separation between different traffic flows. RNAV procedures can be designed with capabilities such as speed control and altitude restrictions that segregate aircraft on the route while reducing controller and pilot workload by reducing the complexity of the procedures. One objective of the Proposed Action is to implement procedures that would better segregate arrivals and departures within the airspace. This objective can be measured by number of RNAV STARs and/or SIDs that can be used independently to/from Study Airports and those that have altitude and/or speed controls.

2.2.3 Improve Flexibility in Transitioning Aircraft Traffic

As discussed in Section 2.1.2.3, the limited number of available transitions and associated procedures constrain efficiency in the terminal and en route transitional airspace. This requires merging multiple traffic flows before aircraft arrive at and depart from terminal airspace. One objective of the Proposed Action is to minimize the need for merging traffic flows by increasing the number of transitions and procedures that are dedicated to specific Study Airports. This objective can be measured with the following criteria:

- Where possible, increase the number of available independent transitions compared with the No Action Alternative (measured by number of independent exit/entry points)
- Where possible, increase the number of RNAV STARs and SIDs compared with the No Action Alternative (measured by total count of RNAV STARs and RNAV SIDs for each of the Study Airports)

2.3 Criteria Application

The FAA will evaluate the Proposed Action to determine how well it meets the purpose and need based on the measurable criteria and objectives described above. The evaluation of alternatives will include the No Action Alternative, under which the existing 2021/2022 air traffic procedures serving the Study Airports would remain unchanged except for planned procedure modifications, independent of the San Antonio Airspace Modernization Project, which were or are expected to be approved for implementation. The criteria are intended to help compare the Proposed Action with the No Action Alternative.

2.4 Description of the Proposed Action

The Proposed Action would implement optimized RNAV SID and STAR procedures in the San Antonio Airspace Modernization Project. This would improve the predictability and segregation of air traffic routes, as well as increase flexibility and efficiency in providing air traffic services. The Proposed Action is described in detail in Chapter 3, *Alternatives*.

Implementation of the Proposed Action would not increase the number of aircraft operations at the Study Airports. Furthermore, the Proposed Action would not involve physical construction of

any facilities such as additional runways or taxiways, and would not require permitting or other approvals or actions at either the state or local level. Therefore, the implementation of the proposed changes to procedures in the San Antonio Airspace Modernization Project would not require any physical alterations.

2.5 Required Federal Actions to Implement Proposed Action

Implementing the Proposed Action requires the FAA to publish new or revised STARs, SIDs, Standard Instrument Approach Procedures (SIAPs), and transitions and undertake controller training.

2.6 Agency Coordination

On July 28, 2022, the FAA distributed an early notification letter to 255 federal, state, regional, and local officials and agencies, as well as to eight tribes. The FAA sent the early notification letter to:

1. Advise agencies and tribes of the initiation of the EA study
2. Request background information about the General Study Area established for the EA
3. Provide an opportunity to advise the FAA of any issues, concerns, policies or regulations that may affect the environmental analysis that the FAA will undertake in the EA

On July 31, 2022, a Notice of Intent to Prepare an EA was published in English and Spanish in the San Antonio Express-News, New Braunfels Herald-Zeitung, and La Prensa Texas newspapers. Due to weekly publishing, the same notice was published in the August 3, 2022 San Antonio Observer newspaper. Written comments were received in response to the Notice of Intent and where applicable, were considered in preparation of the Draft EA. Appendix B, *Agency Coordination, Community Involvement and List of Receiving Parties*, includes a copy of the notice of intent letter (and attachments), an affidavit of newspaper publication, a list of the receiving parties, and all comments received.

In October 2022, the FAA initiated formal Section 106 consultation with the Texas Historical Commission (THC) State Historic Preservation Office (SHPO) and Tribal Historic Preservations Officers (THPOs) from the Alabama Coushatta Tribe of Texas, Apache Tribe of Oklahoma, Comanche Nation Oklahoma, Coushatta Tribe of Louisiana, Mescalero Apache Tribe of the Mescalero Reservation New Mexico, Osage Nation, Tonkawa Tribe of Indians of Oklahoma, and the Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie) Oklahoma, who may have interests within the General Study Area in accordance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq.) and the implementing regulations at 36 C.F.R. Part 800.

THIS PAGE INTENTIONALLY LEFT BLANK

3 Alternatives

The alternatives analysis is prepared pursuant to Council on Environmental Quality (CEQ) regulations and Federal Aviation Administration (FAA) guidance provided in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1F). This chapter discusses the following topics:

- Alternative Development Process
- Alternatives Overview
- Comparison of Alternatives
- Listing of Federal Laws and Regulations

The technical terms and concepts discussed in this Chapter are explained in Chapter 1, *Background*.

3.1 San Antonio Airspace Modernization Project Alternative Development

Developing alternatives for the San Antonio Airspace Modernization Project was a multi-step process that began with the request of instrument flight procedures (IFPs) to be improved in April of 2015. A preliminary PBN Design Team defined operational issues related to improving efficiency, reducing complexity, and improving predictability in the (then unnamed) San Antonio Airspace Modernization Project in March of 2016 and recommended conceptual designs for procedures that would address these issues.[23] The recommended procedures were reported to the PBN Design Team for further consideration and procedure development. The PBN Design Team designed individual procedures based on the evolving recommendations and captured input from regional stakeholders. Each procedure that the PBN Design Team designed had to meet several design criteria as well as the project's purpose and need. As discussed in Chapter 2, the purpose and need for the Proposed Action is to address existing inefficiencies with San Antonio Airspace Modernization Project aircraft instrument arrival and departure procedures. The FAA rejected individual procedures if, on their own merit, they did not meet the purpose and need of the project. Following the design process, the PBN Design Team held a series of public outreach meetings to introduce the eventual San Antonio Airspace Modernization Project to relevant organizations, communities, and officials via web based presentations to gather comments on the proposed designs (see Appendix B). The feedback received from this community involvement was instructive and considered in the alternative development process.

The Proposed Action alternative that this EA evaluates is a package of many individual, interrelated procedures combined into one alternative. These procedures were considered and evaluated individually and in combination with one another to determine whether the alternative would meet the project's purpose and need. The FAA considered multiple versions of each air traffic procedure. Several versions were not carried forward as they failed to meet the purpose of the project. More detail on the various iterations of each procedure can be found in Appendix G: *FAA PBN Design Team Briefing*.

The following sections describe the alternatives development process the FAA used to create and evaluate a series of procedures that, when employed together, would enhance the air traffic efficiency to the San Antonio region.

23 *KSAT Procedures, Intro, and Engagement Planning – Updated Jan31 (kka).pdf*, February 2022.

3.1.1 PBN Design Team

In August 2015, the San Antonio Airspace Modernization Project PBN Design Team began work to identify operational needs in the San Antonio Airspace Modernization Project and define potential solutions to those needs. The PBN Design Team included experts on the Air Traffic Control (ATC) system for the San Antonio region. The PBN Design Team's work was completed following a multi-step process that included: (1) working collaboratively with local aviation facilities and industry stakeholders to identify and characterize existing issues in the San Antonio Airspace Modernization Project, (2) proposing conceptual procedure designs and airspace changes to address these issues, and (3) identifying the expected benefits and potential risks associated with the conceptual designs.

During the first two steps above, the PBN Design Team held meetings with local FAA ATC facilities, industry representatives, and other stakeholders including the Department of Defense, business and general aviation interests, and airports.[24] These meetings were held to discuss potential needs for operating aircraft in the San Antonio Airspace Modernization Project, including identifying operational needs associated with existing procedures and potential solutions that would increase efficiency in the airspace. The PBN Design Team also worked to analyze the expected benefits of the potential solutions identified. Finally, the PBN Design Team engaged with specialized experts to help identify the benefits and risks associated with the conceptual procedure designs. The specialized experts were from various FAA lines of business, including environmental, safety, and airports.

The PBN Design Team identified several performance-based navigation (PBN) solutions expected to improve efficiency in the San Antonio Airspace Modernization Project. The modifications proposed were conceptual in nature, and did not include a detailed technical assessment to evaluate the feasibility of the procedures. A detailed technical assessment of the proposed solutions was reserved for the PBN Design Team to conduct.[25] The PBN Design Team issued its final presentation (Appendix G) in February 2022.

3.1.2 Key PBN Design Team Considerations

Following draft completion of the designs, the PBN Design Team engaged the public (i.e., local residents, the general public, and stakeholders) by holding a series of informational meetings on the San Antonio Airspace Modernization Project. In developing the proposed procedures, the PBN Design Team was responsible for following regulatory and technical guidance, as well as meeting criteria and standards in three general categories:

1. **Performance Based Navigation (PBN) Design Criteria and Air Traffic Control Regulatory Requirements** – Flight procedure design is subject to requirements found in several FAA Orders, including:
    a. FAA Order 8260.58B, *The United States Standard Performance Based Navigation (PBN) Instrument Procedure Design*
    b. FAA Order JO 7110.65Y, *Air Traffic Control*
    c. FAA Order 8260.3E, *United States Standards for Terminal Instrument Procedures (TERPS) including Change 1*
    d. FAA Order 7100.41A, *Performance Based Navigation Implementation Process*
    e. FAA Order 8260.19I, *Flight Procedures and Airspace*
    f. FAA Order 8260.46J, *Departure Procedure (DP) Program*

24 Id.
25 Id.

These FAA Orders collectively define the majority of processes, procedures, and methods for PBN flight procedure design, amendment, and implementation. Requirements governing air traffic control procedures, air traffic management, and appropriate technical terminology are additionally considered as integral process components

2. **Operational Criteria** – Operational criteria were consistent with the purpose and need for the project. This includes increasing efficiency and flexibility while decreasing complexity in air traffic management. These criteria were evaluated and validated that operations in the San Antonio Airspace Modernization Project would not be limited by the proposed procedures. The evaluation and validation helped ensure that aircraft could fly the proposed procedure as designed without any negative effects on efficiency (e.g., pilot workload).

3. **Safety Factors** – Proposed changes were evaluated using the FAA's Air Traffic Organization (ATO) Safety Management System (SMS).[26] The SMS is the system for assessing and managing the safety of ATC and navigation services in the National Airspace System (NAS). If a proposed change introduced a new hazard or increased the severity and/or likelihood of an existing hazard, the design was adjusted or mitigated to reduce the hazard to acceptable levels. In compliance with SMS requirements, the proposed changes were evaluated by a Safety Risk Management Panel (SRMP) following a five-step process: (1) system analysis, (2) identify hazards, (3) analyze safety risk, (4) assess safety risk, and (5) control safety risk.[27]

3.1.2.1 Community Involvement in Design Process

Following proposed mature designs, the PBN Design Team engaged in two virtual community involvement meetings. The goal was to educate and involve the participants, including the communities, about this project. During the different events, the PBN Design Team discussed the FAA's PBN deployment program on a national level. Specific information was provided about this project, including graphics containing current and notional future flight paths.[28]

3.1.2.2 Alternative Design Process

The San Antonio Airspace Modernization Project consists of airspace and air traffic control as noted in Sections 1.4 and 1.5. While the PBN Design Team focused on aircraft operations at SAT, they also evaluated operations at three satellite Study Airports as identified in Section 1.3.

Additionally, flight procedures for the following airports are being developed and are included in the EA but do not meet the FAA Order 1050.1F criteria[29] to be designated an EA Study Airport.

- Boerne Stage Field Airport (5C1)
- Castroville Municipal Airport (CVB)
- Stinson Municipal Airport (SSF)

26 U.S. Department of Transportation, Federal Aviation Administration, FAA Order JO 1000.37B, *Air Traffic Organization Safety Management System*, October 26, 2018.
27 U.S. Department of Transportation, Federal Aviation Administration, FAA Order 8040.4B, *Safety Risk Management Policy*, May 2, 2017.
28 More details on the PBN Design Team Community Involvement process can be found in Appendix G to this Draft EA and on the FAA's website at: https://www.faa.gov/nextgen/communityengagement/
29 Department of Transportation, Federal Aviation Administration, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Appendix B. *Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act* (49 U.S.C. § 303), Para. B-1, Noise and Noise-Compatible Land Use. July 16, 2015.

- Pleasanton Municipal Airport (PEZ)

While the design of one procedure into one airport can be a fairly simple process, the PBN Design Team was charged with providing a more complete and integrated solution to air traffic complexities and inefficiencies over a large area. The PBN Design Team worked to design procedures that would remain laterally separated from each other to the extent feasible.

Arrival procedure designs that remain laterally separated are most efficient when they allow aircraft to descend at or near idle speed, unaffected by other procedures or obstructions. As aircraft arrive into and depart from congested airspace, interaction between procedures increases substantially. This increase in interactions among aircraft operating on different procedures reduces available design options.

Departure procedure designs are most efficient when they allow aircraft to climb unrestricted to cruising altitude. Although departures in the San Antonio Airspace Modernization Project will often accommodate unrestricted climbs, the procedure designs allow for complex interactions among arrivals and departures to SAT and the other airports in the General Study Area.

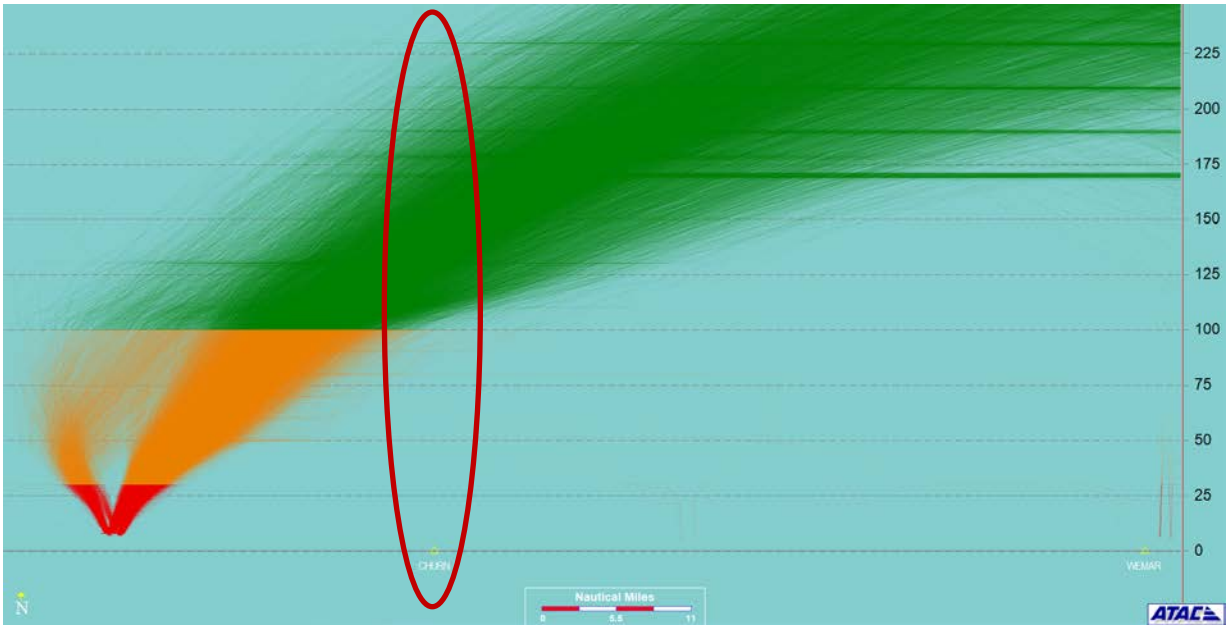
PBN procedure designs were developed with lateral routings, crossing points, and altitude restrictions that were as optimal as possible, considering the lateral and vertical constraints inherent in the San Antonio Airspace Modernization Project. The PBN Design Team considered a multitude of factors and continuously refined its designs based on design solution tools such as design and testing software, aircraft simulator results, human-in-the-loop controller simulations, and the criteria described above. The combined procedure designs in this Draft EA are the Proposed Action alternative. The following sections provide two examples of the process used to develop procedures carried forward as part of the designated Proposed Action.

SAT Eastbound SID SNIDR

The development of the proposed SAT SNIDR SID provides a good example of the alternative development process. The FAA developed and evaluated different versions of the proposed SAT SNIDR SID. The first version was the defined by the existing routing of aircraft departing the SAT airspace and combined those flows into a proposed SID to be evaluated. The second iteration was the PBN Design Team's procedure based on the additional recommendations that the SID be connected to corresponding arrival routes into the Houston Area. Finally, after several revisions, the PBN Design Team designed a final proposed version of the procedure.

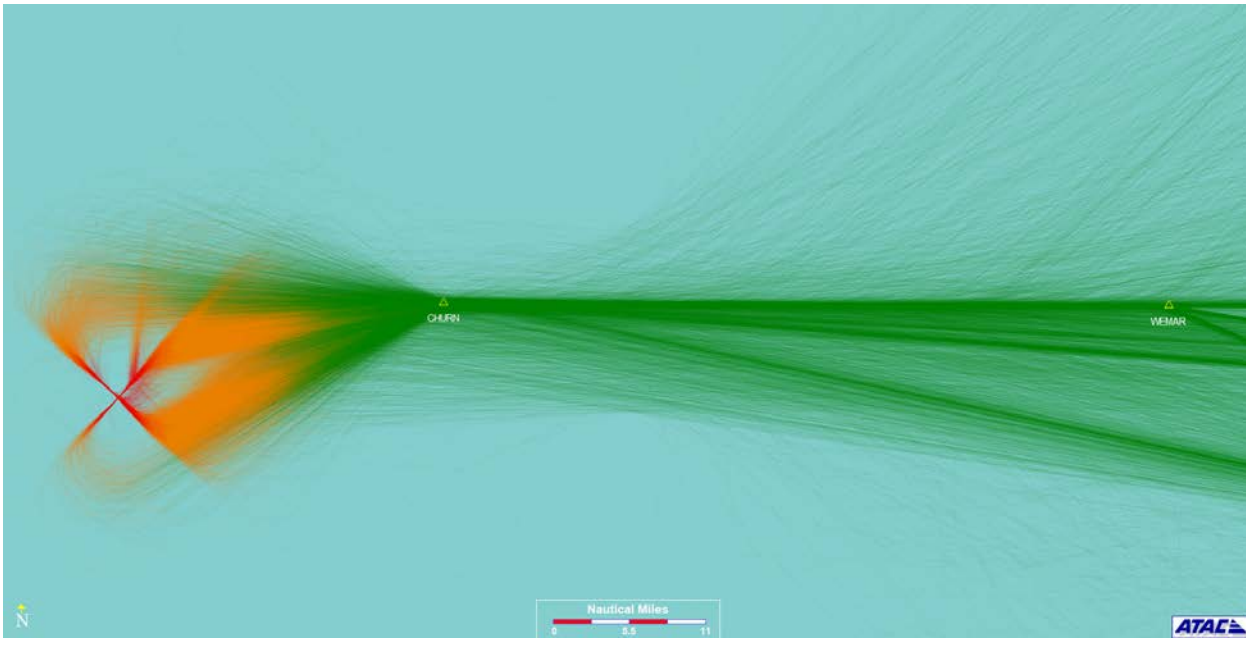
Departures from SAT to the east represent approximately 22 percent of all jet departures from the airport. Currently, SAT does not provide a published departure procedure to the east, relying on vector departures and preferred routing. The current routing requires aircraft to be manually directed to the CHURN, WEMAR, and GMANN waypoints. The PBN Design Team identified several issues resulting from these conditions, including additional communications between pilot and controller. The lack of a published procedure requires controllers to vector aircraft along the route, increasing pilot/controller task complexity. **Exhibit 3-1** depicts a selection of existing conditions flight tracks for aircraft departing to the east out of SAT. In the vertical profile, areas circled in red indicate where departures are crossing the CHURN waypoint. In part, due to different routing (vectoring) to the CHURN waypoint, aircraft arrive at the waypoint between 10,000 ft. MSL and 20,000+ ft. MSL. In the plan view in **Exhibit 3-2**, the flight tracks depict aircraft being vectored south of WEMAR off the route approximately 33 percent of the time, thereby reducing the repeatability and predictability of the route.

Exhibit 3-1 Current Eastbound SAT Departures (Vertical Profile)



Source: *San Antonio Airspace Modernization Project SME Consultations*, July 2022. ATAC Corporation, PDARS radar data, February 2022.
Prepared by: ATAC Corporation, September 2022.

Exhibit 3-2 Current Eastbound SAT Departures (Plan View)

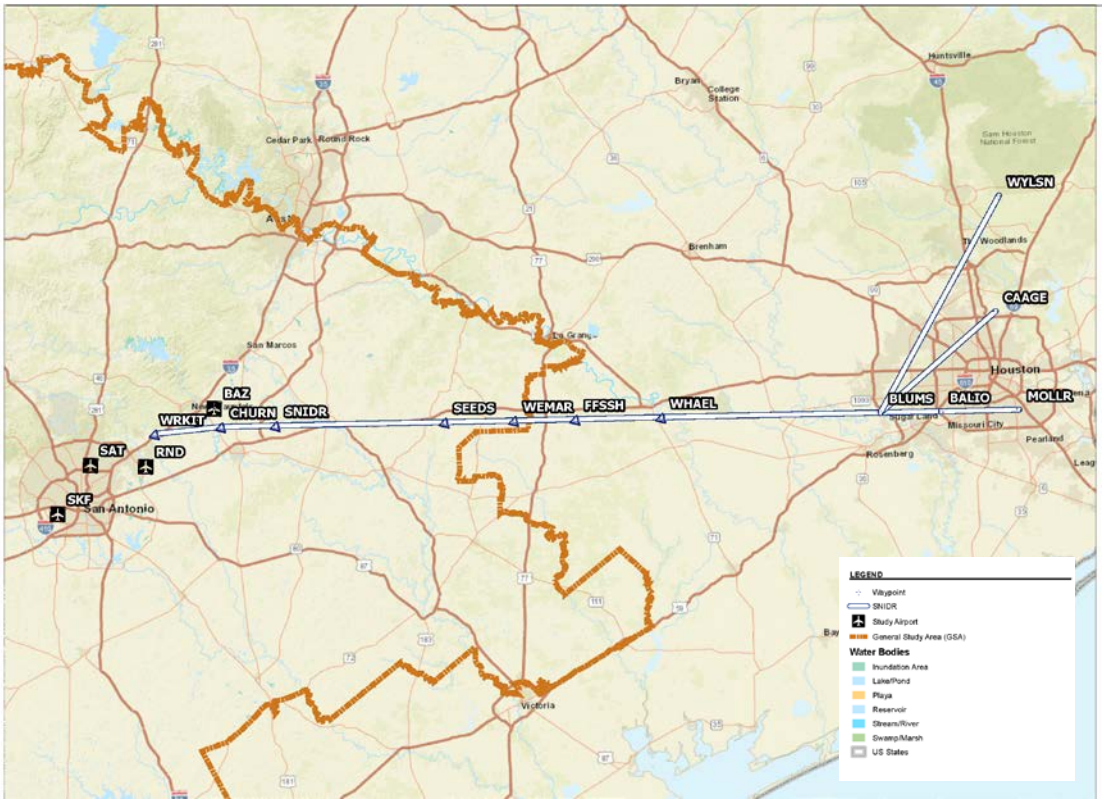


Source: *San Antonio Airspace Modernization Project SME Consultations*, July 2022. ATAC Corporation, PDARS radar data, February 2022.
Prepared by: ATAC Corporation, September 2022.

The PBN Design Team recommended the creation of an RNAV SID to address the issues identified with east departures at SAT. The PBN Design Team developed a new RNAV SID

named SNIDR. The PBN Design Team modified the SNIDR SID several times to increase the efficiency of the design and to ensure the procedure complied with current design criteria. **Exhibit 3-3** depicts the proposed design for the SNIDR SID.

Exhibit 3-3 PBN Design Team Proposed Procedure – SAT SNIDR SID



Sources: FAA, National Airspace System Resource, Airspace Boundaries. Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides.US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports, proposed SNIDR Route. ATAC, Study Area Boundaries.

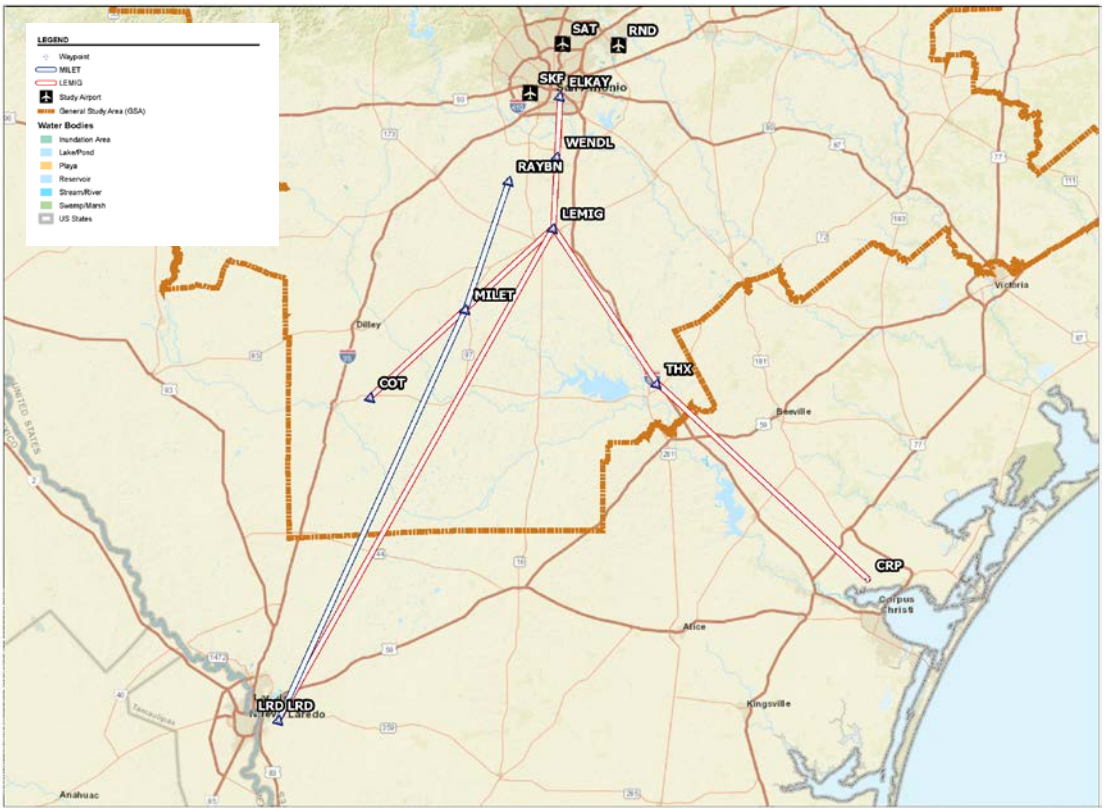
Prepared by: ATAC Corporation, September 2022.

SAT Southwest SID/STAR – TJANO SID/CRVZA STAR

The development of the proposed TJANO SID, which would replace the current MILET SID, is another good example of the alternative development process. The FAA developed and evaluated several versions of the proposed SID that would serve SAT to the southwest. The current MILET SID serves departures to the southwest but is not procedurally separated from aircraft arriving on the LEMIG STAR. Both the Cotulla-La Salle County Airport (COT) transition and the Laredo International Airport (LRD) transition on the LEMIG STAR intersect the MILET SID. Since both the MILET and LEMIG procedures use the LRD Very High Frequency Omni-Range (VOR) ground-based aircraft navigational aid, it requires extensive coordination between controllers and pilots. The stakeholders requested that a new procedure be developed that would procedurally separate these flows. The TJANO SID, after several revisions, created two transitions to the west of the proposed CRVZA STAR, while the two CRVZA transitions remain to the east of the proposed TJANO.

Exhibit 3-4 depicts the MILET SID and LEMIG STAR. The PBN Design Team identified numerous issues with the MILET SID, including a lack of connectivity with routes and neighboring procedures, and a lack of independent en route transitions. The LEMIG STAR issues included traffic conflicting with the MILET SID and a lack of vertical guidance on the procedure, increasing ATC task complexity.

Exhibit 3-4 Current Procedures MILET SID and LEMIG STAR



Source: FAA, National Airspace System Resource, Airspace Boundaries. Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides.US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports, existing MILET and LEMIG Routes. ATAC, Study Area Boundaries.

Prepared by: ATAC Corporation, September 2022.

The PBN Design Team made recommendations to address the issues identified with the MILET SID. Two of these recommendations were:

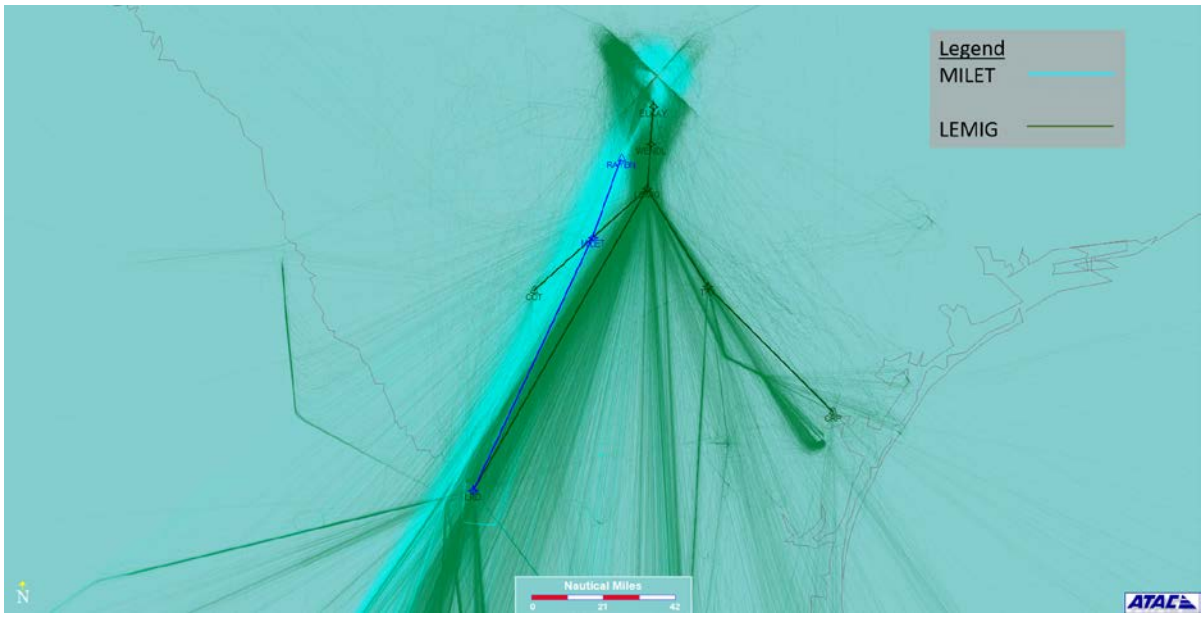
- Create an RNAV SID with multiple transitions to allow for better traffic management.
- Create an independent RNAV SID procedurally separated from arrival traffic in the area.

The PBN Design Team made recommendations for the LEMIG STAR to address the identified issues. Two of these recommendations were:

- Create a STAR with vertical guidance (altitude controls to separate traffic flows in congested airspace.
- Eliminate the conflicts of intersecting routes allowing for utilization of all transitions.

Exhibit 3-5 illustrates the existing flight tracks associated with the existing procedures. As depicted, the COT transition is rarely used and traffic from the west is often re-routed to the LRD transition. Traffic on the MILET SID are often vectored to the west of the route to avoid arriving traffic on the LEMIG LRD transition. Arriving traffic on the LEMIG are often required to level off at 10,000 ft. MSL. Lastly, arriving traffic on the LEMIG are often directed to the LEMIG waypoint, bypassing the en route transitions and reducing predictability and repeatability.

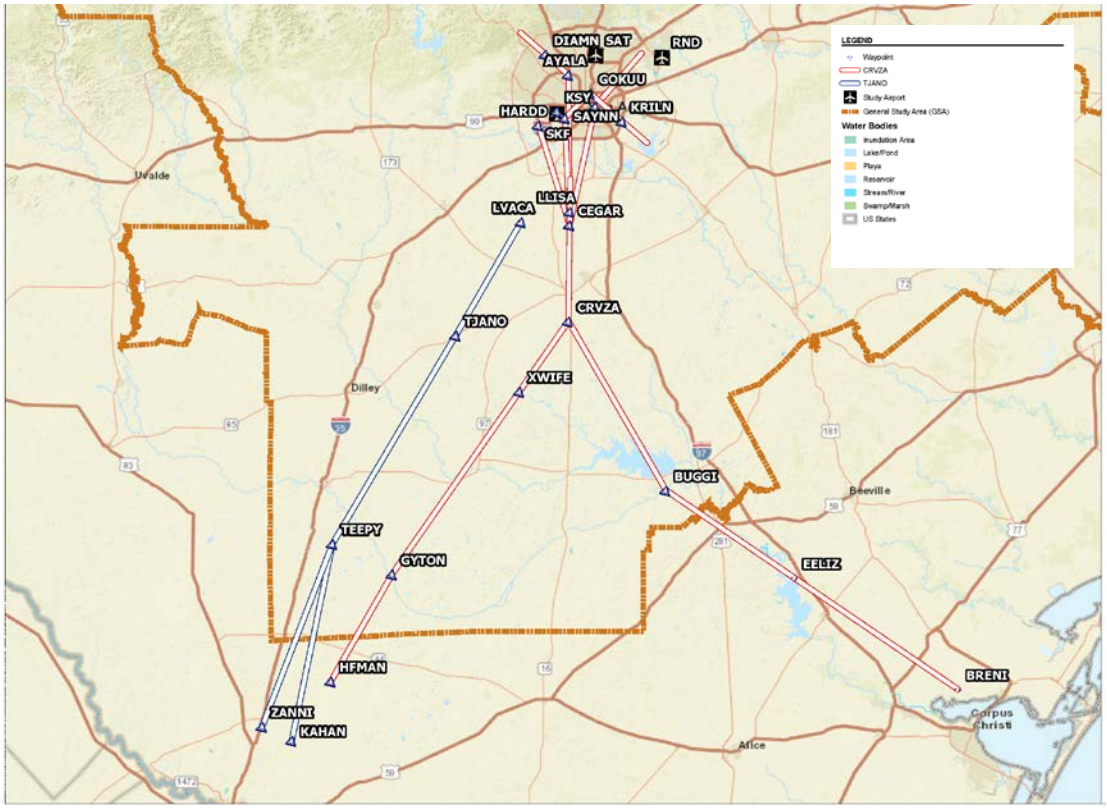
Exhibit 3-5 Existing Traffic – MILET SID and LEMIG STAR



Source: Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). ATAC Corporation, 2021/2022, (PDARS Data) (General Study Area boundary).
Prepared by: ATAC Corporation, September 2022.

In further refining the proposed designs, the PBN Design Team added an en route transition allowing for two points of entry (ZANNI and KAHAN). The PBN Design Team also eliminated the COT en route transition as it was unused and conflicted with the proposed TJANO SID. The elimination of conventional ground based navigational aids was also proposed as some of the currently utilized ground based navaids are scheduled to be decommissioned in the future. **Exhibit 3-6** depicts the proposed TJANO SID and CRVZA STAR.

Exhibit 3-6 Proposed Design – TJANO SID and CRVZA STAR



Source: FAA, National Airspace System Resource, Airspace Boundaries. Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides.US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports, proposed TJANO and CRVZA Routes. ATAC, Study Area Boundaries.

Prepared by: ATAC Corporation, September 2022.

3.2 Alternatives Overview

The following sections discuss the No Action Alternative and the Proposed Action, which are the two alternatives carried forward for analysis in the EA.

3.2.1 No Action Alternative

Under the No Action Alternative, the FAA would maintain existing arrival/departure procedures. The related routes and air traffic flow in use for the 2021/2022 period would remain largely the same under the No Action Alternative. Some procedure modifications and/or cancellations independent of those recommended as part of the San Antonio Airspace Modernization Project would be anticipated to be implemented prior to the Proposed Action to address specific issues separate from this Project. Existing procedures with expected modifications are listed on the FAA's Instrument Flight Procedure Gateway website. Details related to changes to procedures were collected and defined for purposes of the No Action Alternative.

In addition, work is underway on the FAA's VOR-MON program, which involves gradual reduction of the current VOR network to a minimum level necessary to provide a conventional navigation

backup as the NAS transitions to PBN navigation. The FAA has conducted and plans to continue conducting the program in two phases. Phase 1 was between 2016 and 2020, and Phase 2 is between 2021 and 2025. However, there are no forecasted procedure changes and/or cancellations related to Phase 1 and Phase 2 VORs located within the San Antonio Study Area.

The No Action Alternative accounts for current airport runway and facility modifications under construction or those to be implemented during the planning horizon of the EA (2025). These changes are taken into account in the analyses of impacts associated with the No Action Alternative (see Chapter 5, *Environmental Consequences*).

3.2.1.1 No Action Alternative Procedures

The No Action Alternative includes 14 procedures: 7 conventional procedures (procedures that use conventional NAVAIDs), and 7 RNAV procedures. **Table 3-1** lists the names of the No Action Alternative procedures, the procedure type (i.e., SID or STAR), the basis of design, and the number of runway and en route transitions for each procedure.

Table 3-1 No Action Alternative SIDs and STARS

No Action Alternative Procedure	Procedure Type	Basis of Design	Transitions (en route/ runway)[1]	Airports Served
BELLR	STAR	RNAV	5/4	HOU
BRAUN	STAR	RNAV	6/4	SAT, RND, SKF
CENTERPOINT	STAR	Conventional	2/0	SAT, RND, SKF
HTOWN	STAR	RNAV	6/0	IAH
LEMIG	STAR	Conventional	4/0	SAT, RND, SKF
MARCS	STAR	Conventional	5/0	SAT, RND, SKF
STONEWALL	STAR	Conventional	3/0	SAT, RND, SKF
TEJAS	STAR	RNAV	3/6	IAH
ALAMO	SID	Conventional	4/0	SAT
ALISS	SID	RNAV	2/0	SAT
BOWIE	SID	Conventional	2/0	SAT
LEJON	SID	Conventional	1/0	SAT
MILET	SID	RNAV	1/0	SAT
THREE RIVERS	SID	RNAV	1/0	SAT

Notes:
1\ A runway transition is counted if there is at least one waypoint or fix beyond (or prior to) the common route to create a defined segment between the runway and common route (i.e. a defined route between two fixes or waypoints).
N/A = Not Applicable *STAR = Standard Terminal Arrival* *SID = Standard Instrument Departure* *RNAV = Area Navigation*
SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Sources: National Flight Data Center National Airspace System Resources Database, accessed July 2022; Department of Transportation, FAA Operational Procedure Files, July 2022.
Prepared by: ATAC Corporation, September 2022

3.2.1.2 Airspace Control Structure under the No Action Alternative

When aircraft depart from or arrive to the San Antonio Area on an assigned route or SID/STAR, transfer of control occurs between multiple air traffic facilities. Under the No Action Alternative, the transfer areas would remain unchanged from existing conditions. For purposes of this EA, the areas where transfers occur are defined based on entry and exit gates/points. The gates/points are purposely located to segregate arrivals and departures where possible.

SAT has independent operating configurations that are based on weather and wind (refer to Section 1.3.1). Airport traffic flows can interact with other airport traffic flows in different runway operating configurations. Therefore, the PBN Design Team was required to consider all possible combinations of the various runway operating configurations.

Appendix AA: *No Action and Proposed Action Procedures and Flight Corridors* illustrates all arrival and departure flows to the Study Airports associated with the No Action Alternative. Corridors are grouped by procedure type (conventional or RNAV), operation (arrival or departure), and airport. Depending on specific airport traffic flows, the interaction between specific flows changes.

3.2.2 Proposed Action Alternative

As discussed in Section 3.1, the Proposed Action includes the proposed mature designs for all procedures the PBN Design Team developed, plus existing procedures that would continue to be used. This alternative will increase efficiency in the San Antonio Airspace Modernization Project airspace by improving flexibility in transitioning aircraft, segregating arrivals and departures, and improving the predictability of air traffic flows.

The Proposed Action includes 19 procedures:

- 5 new/amended RNAV SIDs
- 7 new/amended RNAV STARs
- 3 existing conventional SIDs
- 4 existing conventional STARs

The Proposed Action maintains seven existing conventional procedures.

The Draft EA also includes actions related to existing procedures with planned modifications that are carried forward as part of the Proposed Action, and any reasonably foreseeable projects that would alter/affect airspace procedures.

Appendix AA: *No Action and Proposed Action Procedures and Flight Corridors* illustrates all arrival and departure flows to the Study Airports associated with the Proposed Action Alternative. Corridors are grouped by procedure type (conventional or RNAV), operation (arrival or departure), and airport. Depending on specific airport traffic flows, the interaction between specific flows changes.

Table 3-2 lists the Proposed Action alternative procedures, the No Action Alternative procedure that the Proposed Action alternative would replace (if applicable), the procedure type, and the basis of design. The table also shows the airports that the Proposed Action procedures serve, and the number of runway and en route transitions for each procedure. Finally, the table lists the objectives each procedure design achieves.

Table 3-2 Proposed Action SIDs and STARs

Proposed Action Procedure	No Action Procedure	Procedure Type	Basis of Design	Airports Served	Transitions (en route/ runway)[2]	Objectives
BELLR[1]	BELLR[1]	STAR	RNAV	HOU	5/4	Predictability/ Repeatability/ Complexity
DNKIN	CENTERPOINT	STAR	RNAV	SAT, RND, SKF	2/4	Predictability/ Repeatability/ Complexity
	N/A			BAZ		
CENTERPOINT	CENTERPOINT	STAR	Conventional	SAT, RND, SKF	2/0	N/A
HTOWN[1]	HTOWN[1]	STAR	RNAV	IAH	6/0	Predictability/ Repeatability/ Complexity
CRVZA	LEMIG	STAR	RNAV	SAT, RND, SKF	5/4	Predictability/ Repeatability
	N/A			BAZ		
LEMIG	LEMIG	STAR	Conventional	SAT	4/0	N/A
POPPO	STONEWALL	STAR	RNAV	SAT, RND, SKF	4/4	Predictability/ Repeatability
STONEWALL	STONEWALL	STAR	Conventional	SAT, RND, SKF	3/0	N/A
TEJAS[1]	TEJAS[1]	STAR	RNAV	IAH	6/3	Predictability/ Repeatability/ Complexity
QERVO	BRAUN	STAR	RNAV	SAT, RND, SKF	6/4	Flexibility/ Complexity
MARCS	MARCS	STAR	Conventional	SAT, RND, SKF	5/0	N/A
ALAMO	ALAMO	SID	Conventional	SAT	4/0	N/A
ALISS	ALISS	SID	RNAV	SAT	1/0	Flexibility/ Complexity
	N/A			SKF, BAZ, RND		
BOWIE	BOWIE	SID	Conventional	SAT	2/0	N/A
LEJON	LEJON	SID	Conventional	SAT	1/0	N/A
SLENA	THREE RIVERS	SID	RNAV	SAT	1/0	Complexity
	N/A			SKF, BAZ, RND		
SNIDR	N/A	SID	RNAV	SAT, RND, SKF, BAZ	8/0	Predictability/ Repeatability/ Complexity

Proposed Action Procedure	No Action Procedure	Procedure Type	Basis of Design	Airports Served	Transitions (en route/ runway)[2]	Objectives
TJANO	MILET	SID	RNAV	SAT	3/0	Flexibility/ Complexity
	N/A			SKF, BAZ, RND		
YODUH	ALAMO	SID	RNAV	SAT	2/0	Predictability/ Repeatability
	N/A			SKF, BAZ, RND		

Notes:
1\These procedures have independent utility, were examined using FAA Order 7400.2N screening methods, and are part of the proposed action for Section 4(f), Section 106 historic, and cultural resource, and •Biological Resources – Wildlife sub-category only examination only due to a portion of the procedures being below 18,000' but above 10,000'. These procedures are the basis for the SNIDR Supplemental Study Area formed by a polygon connecting waypoints with a line drawn from SMAKR to WEMAR to GMANN to BELLR and closing back to SMAKR.
2\ A runway transition is counted if there is at least one waypoint or fix beyond (or prior to) the common route to create a defined segment between the runway and common route (i.e. a defined route between two fixes or waypoints).
N/A = Not Applicable STAR = Standard Terminal Arrival SID = Standard Instrument Departure RNAV = Area Navigation
SAT – San Antonio International Airport; SKF – Kelly Field; BAZ – New Braunfels National Airport; RND – Randolph Air Force Base Airfield

Sources: San Antonio Airspace Modernization Project PBN Design Team 100% Design TARGETS File, May 2022. National Flight Data Center National Airspace System Resources Database, accessed July 2022; Department of Transportation, FAA Operational Procedure Files, July 2022.
Prepared by: ATAC Corporation, September 2022

In addition to 16 SID and STARs, the San Antonio Airspace Modernization Project incorporates 12 new RNAV/ILS approaches. **Table 3-3** lists the new or revised RNP/RNAV GPS approaches, as well as the type of procedure and the airports served.

Table 3-3 Proposed Action RNAV/ILS Procedures

Proposed Action Procedure	Procedure Type	Design	Airport Served
RNAV (RNP) Z Rwy 4	RNP	RNAV	SAT
RNAV (RNP) X RWY 22	RNP	RNAV	SAT
RNAV (RNP) Z RWY 22	RNP	RNAV	SAT
RNAV (RNP) RWY 13R	RNP	RNAV	SAT
RNAV (RNP) RWY 31L	RNP	RNAV	SAT
KSAT ILS OR LOC RWY 4	ILS	ILS	SAT
KSAT ILS OR LOC RWY 13R	ILS	ILS	SAT
KSAT ILS OR LOC RWY 31L	ILS	ILS	SAT
KSAT RNAV (GPS) RWY 4	GPS	RNAV	SAT
KSAT RNAV (GPS) RWY 13R	GPS	RNAV	SAT
KSAT RNAV (GPS) RWY 22	GPS	RNAV	SAT
KSAT RNAV (GPS) RWY 31L	GPS	RNAV	SAT

Sources: San Antonio Airspace Modernization Project D&I Team 100% Design TARGETS File, May 2022. National Flight Data Center National Airspace System Resources Database, accessed July 2022; Department of Transportation, FAA Operational Procedure Files, July 2022.
Prepared by: ATAC Corporation, September 2022.

The Study Airports all have independent operating configurations dependent upon weather and wind. Airport traffic flows can interact with other airport traffic flows in different runway operating configurations. Therefore, the PBN Design Team was required to take into consideration all possible runway operating configurations or combinations thereof. Appendix AA: *No Action and Proposed Action Procedures and Flight Corridors* illustrates all arrival and departure flows to the

Study Airports associated with the Proposed Action. Corridors are grouped by procedure type (conventional or RNAV), operation (arrival or departure), and airport. Dependent upon specific airport flows, the interaction between specific flows changes.

3.3 Summary Comparison of the Proposed Action and No Action Alternative

This section provides a comparative summary between the Proposed Action and No Action Alternative based on the objectives defined in Section 2.2:

- Improve the flexibility in transitioning traffic between en route and terminal area airspace and between terminal area airspace and the runways
- Improve the segregation of arrivals and departures in terminal area and en route airspace
- Improve the predictability in transitioning traffic between en route and terminal area airspace and between terminal area airspace area and the runways

3.3.1 Improve the Flexibility in Transitioning Aircraft

Section 2.2.1 includes two criteria established to measure the objective to increase the flexibility in transitioning aircraft between the terminal and en route airspace:

- Where possible, increase the number of available transitions compared with the No Action Alternative (measured by number of exit/entry points)
- Where possible, increase the number of RNAV STARs and SIDs compared with the No Action Alternative (measured by total count of RNAV STARs and RNAV SIDs for each of the Study Airports)

Table 3-4 provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above. Under the No Action Alternative, there are four Instrument Flight Rules (IFR) entry transfer control points into the San Antonio Airspace Modernization Project airspace and four exit transfer control points. Under the Proposed Action, the number of IFR entry transfer control points remain at four, while the IFR exit transfer control points increases to five. The increase allows for more efficient use of the airspace.

Under the No Action Alternative, there are 45 en route transitions and 14 runway transitions. Under the Proposed Action the number of en route transitions increases to 70, and the number of runway transitions increases to 23. The additional en route transitions result from more procedures being designed to tie into both existing and proposed entry and exit points, allowing for more flexibility within the airspace. The additional runway transitions allow controllers to assign aircraft to routes that were not available previously.

Table 3-4 Alternatives Evaluation: Improve Flexibility in Transitioning Aircraft

Criteria	Alternative	
	No Action	Proposed Action
Total Entry Points	4	4
Total Exit Points	4	5
Total En Route Transitions	45	70
Total Runway Transitions	14	23

Sources: National Flight Data Center National Airspace System Resources Database, accessed July 2022; Department of Transportation, FAA Operational Procedure Files, July 2022.
Prepared by: ATAC Corporation, September 2022

3.3.2 Segregate Arrival and Departure Flows

Section 2.2.2 includes one criterion to measure the objective to increase flexibility in transitioning aircraft between the terminal and en route airspace:

- Segregate arrival and departure traffic (measured by number of RNAV STARs and/or SIDs that can be used independently to/from Study Airports)

Table 3-5 provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above. Under the No Action Alternative, there are six RNAV procedures/airport combinations. The Proposed Action alternative has 31 RNAV procedures/airport combinations. The greater number of RNAV routes serving the study airports and better usability allows for greater segregation of arrival and departure flows.

Table 3-5 Alternatives Evaluation: Segregate Arrival and Departure Flows

Criteria	Alternative	
	No Action	**Proposed Action**
Number of Independent RNAV Procedures		
SAT	4	8
SKF	1	8
BAZ	0	7
RND	1	8

Sources: National Flight Data Center National Airspace System Resources Database, accessed July 2022; Department of Transportation, FAA Operational Procedure Files, July 2022.
Prepared by: ATAC Corporation, September 2022

3.3.3 Improve Predictability of Air Traffic Flow

Section 2.2.3 includes two criteria to measure the objective to increase flexibility in transitioning aircraft between the terminal and en route airspace:

- RNAV procedures with altitude controls intended to optimize descent or climb patterns (measured by count of procedures with altitude controls)
- Ensure that the majority of STARs and SIDs to and from the Study Airports are based on RNAV technology (measured by count of RNAV STARs and SIDs for an individual Study Airport)

Under the No Action Alternative, three procedures include altitude controls. In comparison, the Proposed Action includes 9 procedures with altitude controls. **Table 3-6** provides a summary comparison of the Proposed Action and No Action Alternative based on the criteria defined above. The total number of RNAV procedures/airport combinations with altitude controls serving the study airports increases from 3 under the No Action Alternative to 34 under the Proposed Action. The No Action alternative has seven published conventional/radar vector procedures, and the Proposed Action alternative maintains those seven conventional procedures.

Table 3-6 Alternatives Evaluation: Improve Predictability of Air Traffic Flow

Criteria	Alternative	
	No Action	Proposed Action
SAT	3	9
SKF	0	9
BAZ	0	7
RND	0	9

Source: Department of Transportation, Federal Aviation Administration, *PBN Design Team Final Design TARGETS file San Antonio Airspace Modernization Project*, July 2022.
Prepared by: ATAC Corporation, September 2022

3.4 Preferred Alternative Determination

Of the two alternatives carried forward for analysis, only the Proposed Action would meet the Purpose and Need for the San Antonio Airspace Modernization Project based on the criteria discussed above. Therefore, the Proposed Action is the Preferred Alternative. Although it would not meet the Purpose and Need, the No Action Alternative was carried forward, as required by Council on Environmental Quality (CEQ) regulations, to establish a norm against which decision makers can measure the environmental effects of undertaking the Proposed Action.

3.5 Listing of Federal Laws and Regulations Considered

Table 3-7 lists the relevant federal laws and statutes, Executive Orders, and regulations applicable to the Proposed Action and the No Action Alternative and considered in preparation of this EA.

Table 3-7 List of Federal Laws and Regulations Considered

Federal Laws and Statutes	Citation
National Environmental Policy Act of 1969	42 U.S.C. § 4321 *et seq.*
Clean Air Act of 1970, as amended	42 U.S.C. § 7401 *et seq.*
American Indian Religious Freedom Act of 1978	42 U.S.C. § 1996
Department of Transportation Act of 1966, Section 4(f)	49 U.S.C. § 303(c)
Aviation Safety and Noise Abatement Act of 1979	49 U.S.C. § 47501 et seq.
Federal Aviation Act of 1958, as amended	49 U.S.C. § 40101 et seq.
Endangered Species Act of 1973	16 U.S.C. § 1531 *et seq*.
Fish and Wildlife Coordination Act of 1958	16 U.S.C. § 661 *et seq*.
The Bald and Golden Eagle Protection Act of 1940	16 U.S.C. § 668 *et seq*.
Lacey Act of 1900	16 U.S.C. § 3371 *et seq*.
Migratory Bird Treaty Act of 1918	16 U.S.C. § 703 *et seq.*
National Historic Preservation Act of 1966, as amended	16 U.S.C. § 470
The Wilderness Act of 1964	16 U.S.C. § 1131-1136
Archaeological and Historic Preservation Act of 1974, as amended	16 U.S.C. § 469 *et seq*.

Executive Orders	Citation
11593, Protection and Enhancement of the Cultural Environment	36 Federal Register (FR) 8921
12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	59 FR 7629
13045, Protection of Children from Environmental Health Risks and Safety Risks	62 FR 19885
13423, Strengthening Federal Environmental, Energy, and Transportation Management	72 FR 3919
13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis	86 FR 10252

Table 3-7 List of Federal Laws and Regulations Considered

Federal Regulations	Citation
Council for Environmental Quality Regulations	40 C.F.R. Part 1500 to Part 1508
General Conformity Regulations	40 C.F.R. Part 93 Subpart B
Protection of Historic Properties Regulations	36 C.F.R. 800
Airport Noise Compatibility Planning Regulations	14 C.F.R. Part 150
Federal Aviation Regulations (FAR) Part 71: Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points, December 17, 1991.	14 C.F.R. Part 71

FAA/U.S. Department of Transportation Orders

U.S. DOT Order 5610.2a: Final Order to Address Environmental Justice in Low-Income and Minority Populations, May, 2012.
FAA Order 8260.58B, *The United States Standard Performance Based Navigation (PBN) Instrument Procedure Design*, August 23, 2020.
FAA Order 8260.43C, *Flight Procedures Management Program*, April 8, 2019.
FAA Order JO 7110.65Z, *Air Traffic Control*, May 4, 2021.
FAA Order 1050.1F: *Environmental Impacts: Policies and Procedures*, June 16, 2015.
FAA Order 7100.41A, *Performance Based Navigation Implementation Process*, April 27, 2016.
FAA Order JO 7400.2N, *Procedures for Handling Airspace Matters*, May 12, 2021.
FAA Order 8260.3E, *United States Standard for Terminal Instrument Procedures (TERPS)*, September 16, 2020.
FAA Order 8040.4B, *Safety Risk Management Policy*, May 01, 2017
FAA Order JO 1000.37C, *Air Traffic Organization Safety Management System*, September 30, 2021.
FAA Order 8260.19I, *Flight Procedures and Airspace*, June 28, 2020.
FAA Order 8260.46J, *Departure Procedure (DP) Program*, July 11, 2022.

FAA Advisory Circulars

FAA Advisory Circular 150/5020-1: *Noise Control and Compatibility Planning for Airports*, August 5, 1983.
FAA Advisory Circular 150/5200-33C: *Hazardous Wildlife Attractants on or near Airports*, February 20, 2022.
FAA Advisory Circular 36-3H: *Estimated Airplane Noise Levels in A-Weighted Decibels*, April 24, 2002.

Source: ATAC Corporation, September 2022
Prepared by: ATAC Corporation, September 2022

THIS PAGE INTENTIONALLY LEFT BLANK

4 Affected Environment

This chapter describes the human, physical, and natural environmental conditions that could be affected by the Proposed Action. Specifically, this Environmental Assessment (EA) considers effects on the environmental resource categories identified in Federal Aviation Administration (FAA) Order 1050.1F, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1F) and 1050.1F *Desk Reference*. The potential environmental impacts of the Proposed Action and No Action Alternatives are discussed in Chapter 5, *Environmental Consequences.*

The technical terms and concepts discussed in this chapter are explained in Appendix A: *Basic Concepts of Performance Based Navigation (PBN) and Air Traffic Control (ATC)* and Appendix I: *Basics of Noise*.

4.1 Resource Categories or Sub-Categories Not Affected

This section discusses the environmental resource categories or sub-categories that would remain unaffected by the Proposed Action. These resource categories would remain unaffected because the resource either does not exist within the General Study Area or the types of activities associated with the Proposed Action would not affect them. The resource categories or sub-categories are:

- **Coastal Resources**: The Proposed Action would not involve any actions (physical changes or development of facilities) that would be inconsistent with management plans for designated Coastal Barrier Resource System (CBRS) areas, which are not found in the General Study Area. The Proposed Action is not expected to directly affect shorelines or change the use of shoreline zones, or be inconsistent with a NOAA−approved state Coastal Zone Management Plan (CZMP).
- **Farmlands**: The Farmland Protection Policy Act (FPPA)[30] regulates federal actions with potential to convert farmland to non−agricultural uses. Implementation of Proposed Action would not normally involve the development of land regardless of use, nor do they have the potential to convert farmland to non−agricultural uses.
- **Biological Resources (including fish and plants only)**: The Proposed Action would not involve ground disturbing activities and would not normally impact critical habitats. The Proposed Action would not normally affect habitat for non−avian animals, fish, or plants.
- **Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)**
    - **Wetlands**: The proposed action would not involve the construction of facilities or infrastructure and would therefore not impact wetlands or navigable waters. Therefore, no further analysis is required.
    - **Floodplains**: The Proposed Action would not involve the construction of facilities. Therefore, it would not impact nor be affected by locations designated as a 100−year flood event area as described by the Federal Emergency Management Agency (FEMA), and no further analysis is required.
    - **Water Quality**: The Proposed Action would not involve any discharges or changes to existing discharges to water bodies, create a new discharge that would result in impacts to water quality, or modify a water body. Therefore, the

30 7 CFR Part 658

Proposed Action would not result in any direct or indirect impacts to water quality, and no further analysis is required.

- **Groundwater**: The Proposed Action does not involve land acquisition or ground disturbing activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to ground water resources through the introduction of new impervious surfaces, and thus, no further analysis is required.
- **Wild and Scenic Rivers**: A portion of the Rio Grande River is designated Wild and Scenic River west from the Val Verde – Terrell County line. Both Counties are beyond the General Study Area. The Proposed Action would not adversely impact any wild, scenic, or recreational status of a river or river segment included in the Wild and Scenic River System and therefore, no further analysis is required.

- **Hazardous Materials, Solid Waste, and Pollution Prevention:** The Proposed Action would not involve construction or development, or any physical disturbances of the ground. Therefore, the potential for impact from hazardous materials, pollution, or solid waste is not anticipated, and no further analysis or pollution prevention actions would be required.
- **Historical, Architectural, Archeological, and Cultural Resources –Archeological and Architectural sub-category only**: The Proposed Action would not involve any construction, development, or any physical disturbance of the ground, or excavation that could impact archaeological resources on Federal, State, or Indian lands, and therefore, would not impact cultural resources, or affect the physical integrity or access to American Indian sacred or culturally significant sites. The Proposed Action would not involve any construction, development, or any physical disturbance of the ground. Therefore, the potential for impact in relation to architectural compatibility with the character of a surrounding historic district or property is not anticipated. However, in certain circumstances, some analysis of the potential for impacts related to aircraft noise may be required.
- **Land Use:** The Proposed Action would not involve any changes to existing, planned, or future land uses within the General Study Area. Therefore, no further analysis is required.
- **Visual Effects – Light Emissions only**: There are no special purpose laws for light impacts and visual impacts. Aviation lighting is required for security, obstruction clearance, and navigation and is the chief contributor to light emissions from airports. The proposed action will not normally involve aviation lighting. Therefore, no further analysis is required.
- **Natural Resources and Energy Supply – Natural Resources sub-category only**: The Proposed Action would not require the need for unusual natural resources and materials, or those in short supply. Therefore, no further analysis is required.
- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks** –
  - **Socioeconomic Impacts sub-category**: The Proposed Action would not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community.

- **Children's Environmental Health and Safety Risks sub-categories**: The Proposed Action would not affect products or substances that a child would be likely to come into contact with, ingest, use, or be exposed to, and would not result in environmental health and safety risks that could disproportionately affect children.

4.2 Potentially Affected Resource Categories or Sub-Categories

This section provides information on the current conditions within the General Study Area for environmental resource categories or components that the Proposed Action could potentially affect. These environmental resource categories or sub-categories include:

- **Noise and Compatible Land Use** (Section 4.2.1)
- **Department of Transportation Act, Section 4(f)** (Section 4.2.2)[31]
- **Historic, Architectural, Archeological, and Cultural Resources – Historic and Cultural Resources sub-categories only** (Section 4.2.3)[32]
- **Biological Resources – Wildlife sub-category only** (Section 4.2.4)[33]
- **Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks – Environmental Justice sub-category only** (Section 4.2.5)
- **Natural Resources and Energy Supply – Energy Supply sub-category only (Aircraft Fuel only**) (Section 4.2.6)
- **Air Quality** (Section 4.2.7)
- **Climate** (Section 4.2.8)
- **Visual Effects (Visual Resources / Visual Character Only)** (Section 4.2.9)

The following sections discuss each of the above listed environmental resource categories in detail.

4.2.1 Noise and Compatible Land Use

Aircraft noise is often the most noticeable environmental effect associated with any air traffic project. This section discusses FAA guidance on conducting noise analyses, noise model input development, and existing aircraft noise conditions. Appendix F: *Basics of Noise* provides background information on the physics of sound, the effects of noise on people, and noise metrics. Detailed application and use of two specific noise models and results of the combined noise analyses are included in Appendix I: *Noise Technical Report*.

4.2.1.1 Noise Modeling Methodology

To comply with NEPA requirements, the FAA has issued policies and procedures for assessing aircraft noise in Order 1050.1F. This Order requires that aircraft noise analysis use the yearly Day-Night Average Sound Level (DNL) metric. The DNL metric is a single value representing the aircraft sound level over a 24-hour period and includes all of the sound energy generated within

31 In addition to the 18,000 Foot Study Area and the General Study Area, the SNIDR Supplemental Study Area is similarly considered for this resource for screening and reporting purposes only.
32 In addition to the 18,000 Foot Study Area and the General Study Area, the SNIDR Supplemental Study Area is similarly considered for this resource for screening and reporting purposes only.
33 In addition to the General Study Area, the SNIDR Supplemental Study Area is being analyzed for this resource as a comprehensive measure for reporting purposes despite altitudes of the screened procedures being above 10,000' AGL.

that period. The DNL metric includes a 10-decibel (dB) weighting for noise events occurring between 10:00 p.m. and 7:00 a.m. (nighttime). This weighting helps account for the greater level of annoyance caused by nighttime noise events. Accordingly, the metric essentially equates one nighttime flight to 10 daytime flights. The DNL metric is further discussed in Appendix F.

Order 1050.1F also requires the FAA to evaluate aircraft noise using the current FAA-approved computer model at the beginning of the environmental analysis process. In accordance with this requirement, the FAA is using the Aviation Environmental Design Tool Version 3d (AEDT 3d). Also in this project, due to the presence of a significant population of military aircraft originating from a dedicated military base (RND), and a primarily military joint-use facility (SKF), the FAA Office of Environment and Energy (AEE) directed the use of NOISEMAP issued under the BaseOPS version 7.368 software suite. Both models were used to analyze noise associated with Existing Conditions, the Proposed Action Alternative, and No Action Alternative.

Although the noise environment around major airports comes almost entirely from jet aircraft operations, the DNL calculations reflect noise from many types of jet and propeller aircraft on IFR flight plans that could be affected by the Proposed Action.

When operating outside certain categories of controlled airspace, aircraft operating under Visual Flight Rules (VFR) are not required to be in contact with ATC. Because these aircraft operate at the pilot's discretion and are often not required to file flight plans, the FAA has very limited information about these operations. Consequently, there is no known source for comprehensive route, altitude, aircraft type, and frequency information for VFR operations in the General Study Area. However, even if complete information were available for VFR operations, the Proposed Action would not require any changes to routing or altitudes to accommodate these operations. If they could be modeled, they would use the same flight routes and altitudes under the Proposed Action and No Action Alternative scenarios. Their operations would not be affected by the forecast conditions in 2023 (the proposed first year of implementation) and 2028 (five years after implementation) for either the Proposed Action or the No Action Alternative. Therefore, VFR aircraft were not included in the analysis.

AEDT 3d requires a variety of inputs, including local environmental data temperature and humidity, runway layout, number and type of aircraft operations, runway use, and flight tracks. Accordingly, the FAA assembled detailed information on aircraft operations for the Study Airports for input into AEDT 3d. This includes specific aircraft fleet mix information such as aircraft type, arrival and departure times, and origin/destination airport.

NOISEMAP required extensive knowledge and forecasting for the specific military aircraft at SKF and RND. The models for SKF and RND were developed from recent Air Installations Compatible Use Zones (AICUZ) studies directed by the U.S. Air Force Civil Engineer Center. The FAA provided two studies, with a NOISEMAP model and report for each study. The first study was focused on RND, while the second study focused on SKF, each with an accompanying report.[34][35] Information and data within these reports supported assumptions and decisions made during the modeling process. An additional resource for T-38C and T-7A operation levels for the modeled scenarios was referenced as needed.[36]

Radar data obtained from the FAA's Performance Data Analysis and Reporting System (PDARS) identified 248,030 IFR-filed flights to and from the Study Airports for 2021/2022. The 2021/2022 usable data spans all seasons and runway usage configurations for the Study Airports. The FAA

34 Department of the Air Force, *Joint Base San Antonio-Randolph and Seguin Auxiliary Airfield, Texas: Air Installations Compatible Use Zones (AICUZ) Study Final*, 2017.
35 Department of the Air Force, *Final Joint Base San Antonio-Lackland, Texas, Air Installations Compatible Use Zones (AICUZ) Study*, October 2019.
36 Department of the Air Force, *Final Environmental Impact Statement for T-7A Recapitalization at Joint Base San Antonio, Texas*, February 2022.

used this data to develop the average annual day (AAD) fleet mix, time of day and night, and runway use input for AEDT 3d. More detailed information about the AEDT 3d and NOISEMAP input for Existing Conditions can be found in Appendix I: *Noise Technical Report*.

The PDARS data provided tracks for each relevant flight that occurred during the 2021/2022 sample. The data was used to define the Average Annual Day (AAD) track locations, also referred to as "trajectories," as representing a typical day's traffic flow, as well as the typical climb and descent patterns that occur along each flow. All trajectories were "bundled" into a set of tracks representing a flow. The flows comprise all the typical flight routings within the General Study Area for an AAD.[37] AEDT 3d tracks are then developed based on the group of radar tracks representing each flow. NOISEMAP flight tracks were derived from the respective AICUZ studies. Overall, 180,460 radar flight tracks were used to evaluate and model typical flight routes and flows throughout the General Study Area, irrespective of AEDT 3d or NOISEMAP usage.

The AEDT 3d and NOISEMAP models were used to calculate noise levels for the following specific locations on the ground:

Census Block Centroids: The AEDT 3d and NOISEMAP models were used to calculate DNL at the geographic centers (centroids) of census blocks to estimate the population exposed to varying levels of aircraft noise. This EA analyzed population within the General Study Area using 2020 U.S. Census block geometry. A census block is the smallest geographical unit that the United States Census uses to collect data. The census block population centroid DNL represents the DNL for the total maximum potential population within that census block. Because noise levels are analyzed only at the centroid point and applied to the entire census block area population, and because the area represented by each centroid varies depending on the density of population, the actual noise exposure level for individuals will vary from the reported level based on their proximity to the geographic centroid.

Grid Points: The AEDT 3d and NOISEMAP models calculated noise exposure at evenly spaced grid points. This EA covered the 18,000 Foot Study Area, General Study Area, and the SNIDR Supplemental Study Area with a grid of noise receptor points spaced evenly at 0.5 nautical mile (NM) intervals. Noise at regular intervals was calculated for these grid points as identified in Appendix I: *Noise Technical Report*. In addition, these grid points were evaluated for noise at any Section 4(f) resource or historic property not captured using unique points as described below.

Unique Points – Section 4(f) and Historical and Cultural Resources: The AEDT 3d and NOISEMAP models analyzed noise levels at sites of interest that are more specific and finite than those captured in the 0.5 NM grid. These sites include individual Section 4(f) resources that are less than one square NM in area (such as public parks or trails), and specific historic sites listed on the National Register of Historic Places (such as individual buildings)[38][39]. See Section 4.2.2 for a discussion of what constitutes a Section 4(f) resource and Section 4.2.3 for a discussion of historic properties and cultural resources.

Unique Points – Noise Sensitive Areas and Uses: In addition to the unique points identified for individual Section 4(f) resources and specific listed historic sites, the AEDT 3d and NOISEMAP models were used to analyze noise at noise sensitive areas and uses generally exposed to existing noise of DNL 65 dB and above. These locations are further discussed in Section 4.2.1.3.

37 Appendix H: Flight Schedules Technical Report.
38 Multiple state and federal databases were used, resulting in duplicates of the same point. To best capture all named resources from various federal and state sources, some points are duplicated in name but represented by and reported for the same receptor point.
39 Appendix I: Noise Technical Report.

In total, noise exposure levels were calculated at 46,954 census block centroids, 118,489 grid points, and 46,453 unique points (Section 4(f) and Historical and Cultural Resources) and 198 unique points (Noise Sensitive Areas and Uses).

4.2.1.2 Existing Aircraft Noise Exposure

Table 4-1 identifies the total population exposed to aircraft noise between DNL 45 dB and 60 dB, DNL 60 dB and 65 dB, and DNL 65 dB and higher. This data establishes a baseline for existing aircraft noise exposure. **Exhibit 4-1** provides a graphical representation, by DNL 5 dB differences, of existing noise exposure based on radar data collected for 2021/2022 within the General Study Area. Each point on the exhibit represents a Census block population centroid. As shown in **Exhibit 4-1**, areas exposed to higher DNL are generally aligned with Study Airport runways and areas with existing aircraft traffic.

Table 4-1 Population Exposed to Aircraft Noise (DNL) within the General Study Area

DNL Range (dB)	Population
DNL 45 dB to DNL 60 dB	556,088
DNL 60 dB to less than DNL 65 dB	24,555
DNL 65 dB and higher	7,899
Total above DNL 45 dB	588,542

Sources: AEDT version 3d; US Census Bureau, 2020 Tracts, American Community Survey Selected Economic Characteristics, 2011-2015.
Prepared by: ATAC Corporation, October 2022.

4.2.1.3 Noise Sensitive Areas and Uses

Appendix B to FAA Order 1050.1F, paragraph B-1.3, *Affected Environment,* requires the FAA to identify the location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) that could be significantly impacted by noise. As defined in Paragraph 11-5.b(10) of FAA Order 1050.1F, a noise sensitive area is "[a]n area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites." Potential impacts to residential population are considered using US Census block population centroids as described in Section 4.2.1.2. Parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are further discussed in Sections 4.2.2 and 4.2.3, below. Appendix I: *Noise Technical Report*, Table S6.1 lists those locations identified as noise sensitive in the General Study Area and reports the noise values associated with each location.

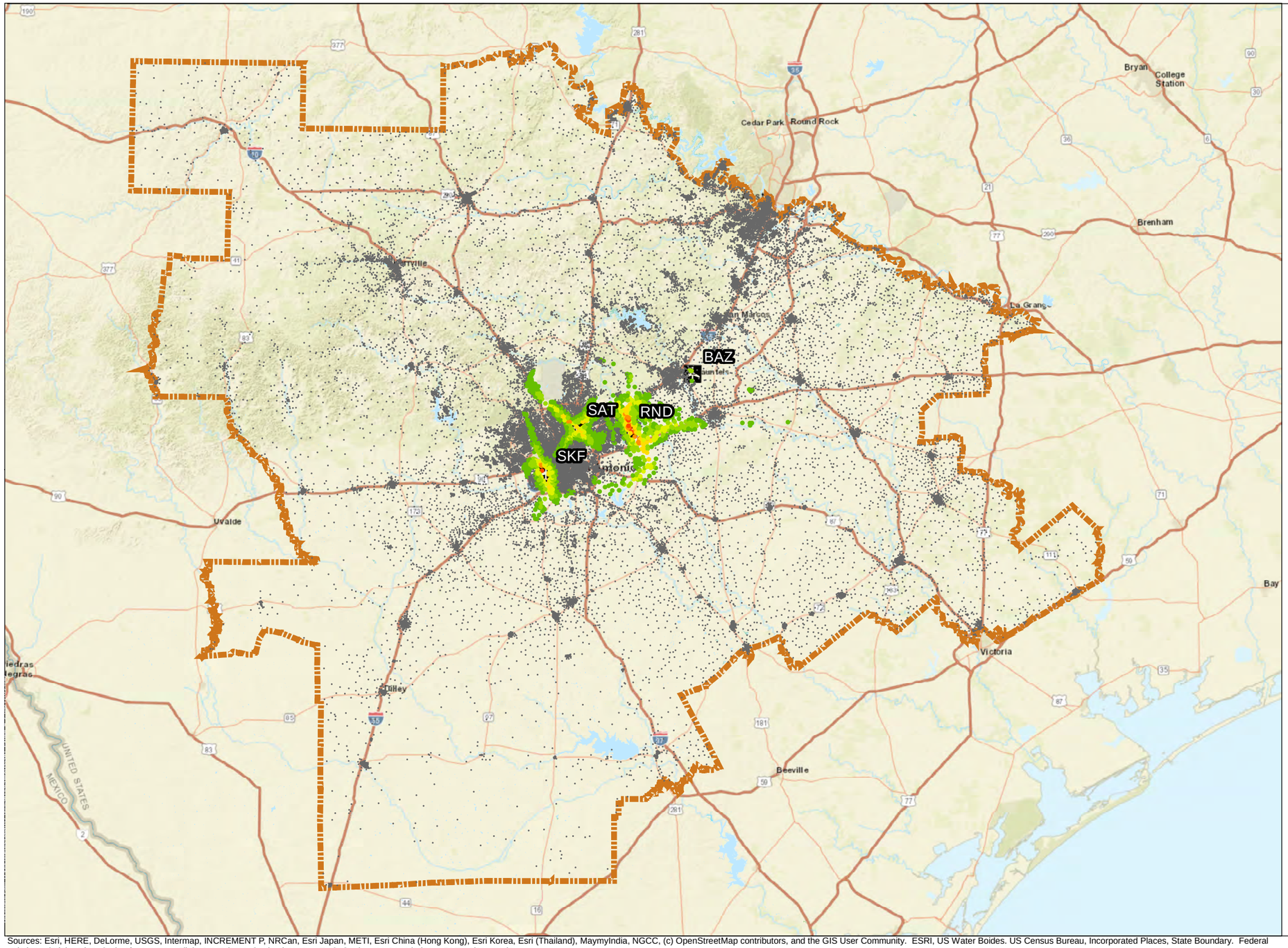
4.2.1.4 Compatible Land Use

The Noise compatibility of land use is determined by comparing the aircraft DNL values at a site to the values of the FAA's land use compatibility guidelines in Title 14, Code of Federal Regulations, Part 150, Appendix A, Table 1.

Existing land types that suggest potential land uses in the General Study Area are depicted in **Exhibit 4-2**. It is characterized using generalized land coverage data from the USGS National Land Cover Database 2019 (NLCD 2019). As depicted in the exhibit, the majority of the General Study Area is dominated by shrub/scrub. Portions of the southeastern area are dominated by hay/pasture with the central and southwestern area interspersed by cultivated crops. Four large lakes represent the open water with no coastal presence. The majority of urban development lies in the central to north central part of the General Study Area, predominantly characterized by areas of low-, medium-, and high-density urban development around San Antonio and extending

northeast along the I-35 corridor toward the Austin area. The General Study Area also includes numerous large parks, recreational areas, wilderness areas, and other types of resources managed by local, state, and federal agencies. These resources potentially affected are further discussed in Section 4.2.2.

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

Noise Levels (DNL)

- <45 dB
- 45-50 dB
- 50-55 dB
- 55-60 dB
- 60-65 dB
- 65-70 dB
- 70-75 dB
- >75 dB
- Study Airport
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

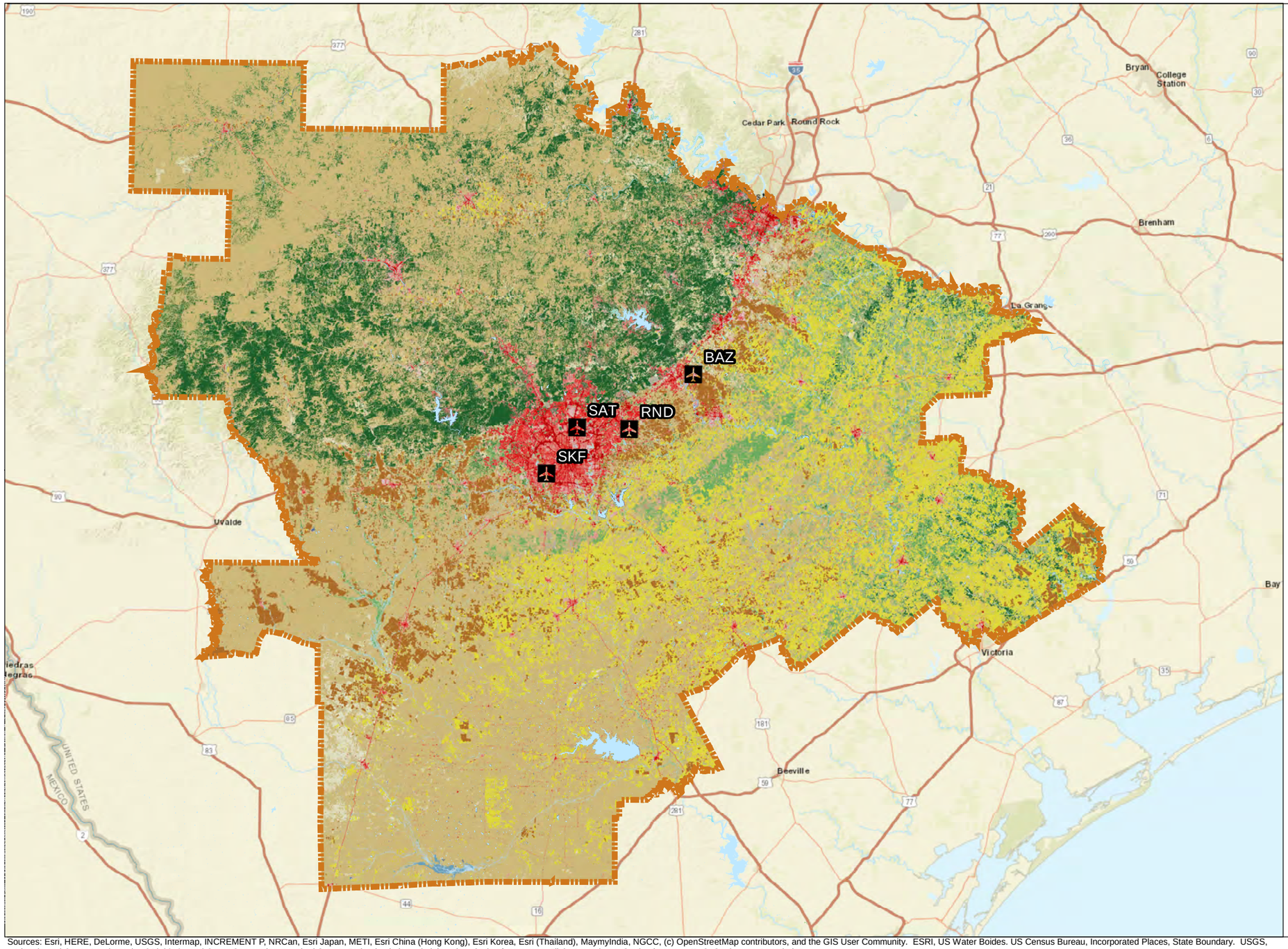
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries, AEDT Noise Levels.
Prepared by: ATAC Corporation, September 2022.

Exhibit 4-1

Baseline DNL - Noise Exposure by Census Block

SAN ANTONIO AIRSPACE MODERNIZATION PROJECT

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Study Airport
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

National Land Cover Data

- Woody Wetlands
- Shrub/Scrub
- Open Water
- Mixed Forest
- Herbaceous
- Hay/Pasture
- Evergreen Forest
- Emergent Herbaceous Wetlands
- Developed, Open Space
- Developed, Medium Intensity
- Developed, Low Intensity
- Developed, High Intensity
- Deciduous Forest
- Cultivated Crops
- Barren Land

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. USGS, National Land Cover Database (NLCD) 2019 Land Cover Conterminous United States. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, September 2022.

Exhibit 4-2

Land Coverage in the General Study Area

THIS PAGE INTENTIONALLY LEFT BLANK

4.2.2 Department of Transportation Act, Section 4(f)

Section 4(f) of the DOT Act (codified at 49 U.S.C. § 303(c)), states that, subject to exceptions for *de minimis*[40] impacts:

> the Secretary may approve a transportation program or project (other than any project for a park road or parkway under section 204 of title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if--
>
> (1) there is no prudent and feasible alternative to using that land; and
>
> (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

The term "use" includes both physical and indirect or "constructive" impacts to Section 4(f) resources. Direct use is the physical occupation or alteration of a Section 4(f) property or any portion of a Section 4(f) property. A "constructive" use does not require direct physical impacts or occupation of a Section 4(f) resource. A constructive use would occur when a proposed action would result in substantial impairment of a resource to the degree that the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. The determination of use must consider the entire property and not simply the portion of the property used for a proposed project.

Parks and natural areas where a quiet setting is a generally recognized purpose and attribute receive special consideration. In these areas, the FAA "…must consult all appropriate Federal, State, and local officials having jurisdiction over the affected Section 4(f) resources when determining whether project-related noise impacts would substantially impair the resource." Privately-owned parks, recreation areas, and wildlife refuges are not subject to the Section 4(f) provisions.

4.2.2.1 Section 4(f) Resources

Data from federal and state sources identified 46,453 Section 4(f) resources catalogued in Appendix I: *Noise Technical Report*. **Exhibit 4-3** depicts the locations of Section 4(f) resources, other than those listed or eligible for listing in the National Register of Historic Places (NRHP). The locations of Section 4(f) resources that are listed or eligible for listing in the NRHP are discussed in Section 4.2.3 and depicted in **Exhibit 4-4**. A list of the Section 4(f) resources identified in the General Study Area, the type of resource (i.e., federal, state, or local), the county in which they are located, site acreage, and DNL calculated for each resource under existing conditions is included in the Appendix I: *Noise Technical Report*.

40 A *de minimis* impact is one that, after taking into account any measures to minimize harm (such as avoidance, minimization, mitigation or enhancement measures), results in either: a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f); or a Section 106 finding of no adverse effect or no historic properties affected on a historic property.

4.2.3 Historic, Architectural, Archeological, and Cultural Resources – Historic Properties and Cultural Resources Sub-Categories

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. §470 et seq., as amended) requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the NRHP. Compliance requires agencies to consider the effects of such undertakings on properties listed, or eligible for listing, in the National Register of Historic Places (NRHP). Regulations implementing Section 106 of the NHPA are located in Title 36 CFR Part 800, *Protection of Historic Properties*. In accordance with Executive Order 13175 Consultation and Coordination with Indian and Tribal Governments and FAA Order 1210.20 American Indian and Alaska Native Tribal Consultation Policy and Procedures the FAA invited identified tribal government-to-government consultations regarding any concerns that uniquely or significantly affect a Tribe related to the proposed project.

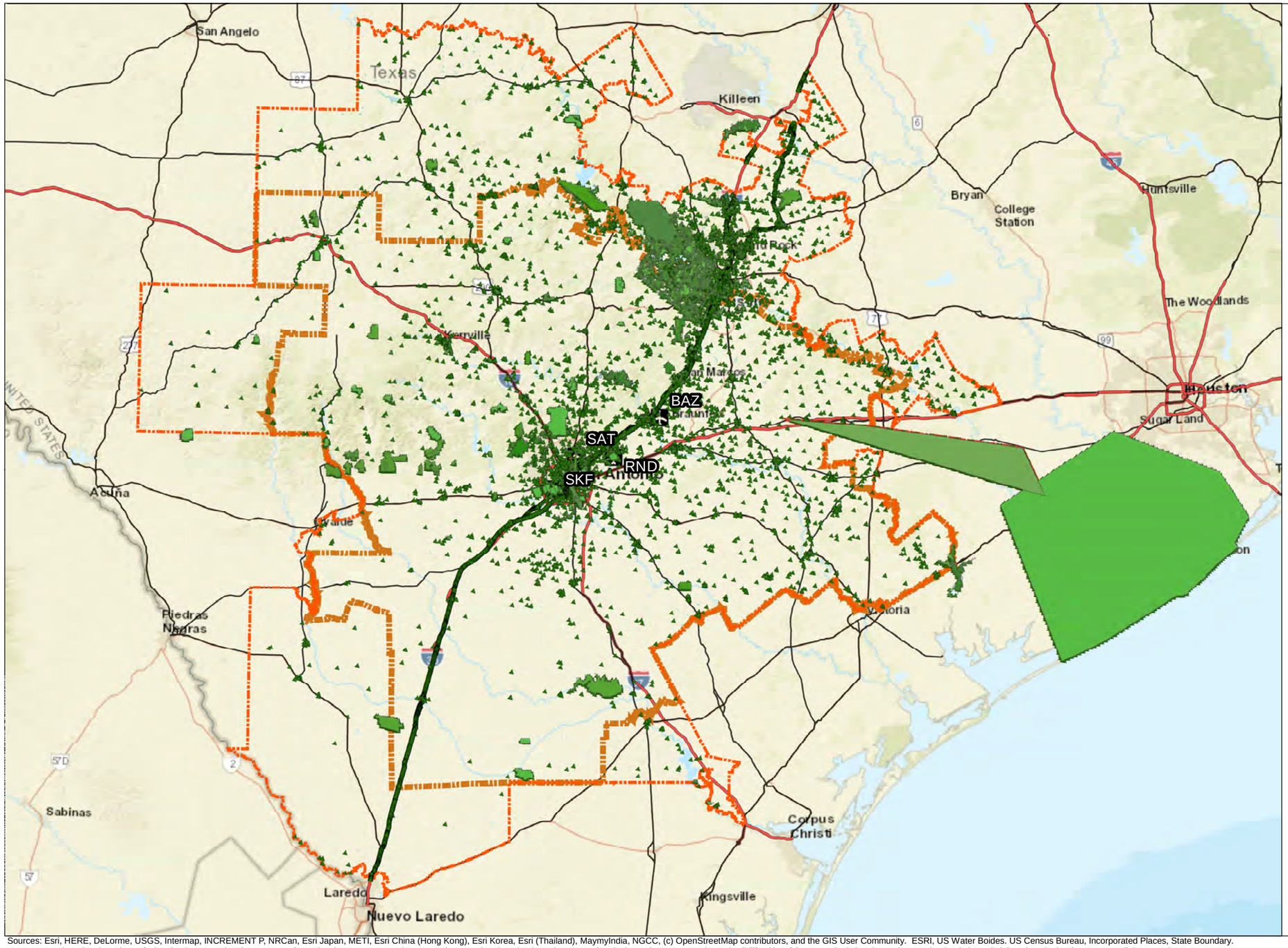
Consistent with Section 106, this EA defines "historic property" as "…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria."[41] It is possible that changes in aircraft flight routes associated with the Proposed Action could introduce or increase aircraft routing over historic properties and result in potential adverse noise impacts. As noted in Section 4.2, the Proposed Action would not involve ground disturbance that, including FAA-defined significant noise, would physically impact archaeological or architectural resources. The Proposed Action is located above the ground and would not involve the construction, disturbance, or alteration of any physical structure on, in, or emanating from the ground. Thus, the EA does not further discuss these resources.

4.2.3.1 Historic Properties in the Study Areas

Exhibit 4-4 shows the location of historic properties and cultural resources identified in the Study Areas. Over 500 NRHP listed properties were initially identified and consultations to identify other listed or eligible resources are on-going. A list of the historic and cultural resources identified and DNL calculated for each resource under existing conditions is included in the Appendix I: *Noise Technical Report*.

Federal regulations require the FAA to define an area of potential effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[42] The FAA initially defined the APE as contiguous with the General Study Area boundary. The FAA subsequently determined that the Proposed Action would not introduce aircraft overflights to any area within the General Study Area where they do not already occur. Accordingly, the FAA redefined the APE to focus on the potential for the Proposed Action to cause adverse noise effects on Section 106 resources. Therefore, the resulting APEs are based on where noise modeling showed any reportable noise (no significant noise was identified through the analyses) and these noise grid points were sorted and bounded to define the smaller and focused APEs.

41 Title 36 CFR Part 800.16(l)(1)
42 Title 36 CFR 800.16(d).



LEGEND

- Section 4F, Section 106, Cultural, Historic Resource Points
- Study Airport
- Additional Section 4(f), Historic, and Cultural Resources Screening Area
- 18K Study Area
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Section 4F, Section 106, Cultural, Historic Resource Areas

- Unlisted Properrty
- Alamo Viewshed
- Cemeteries in GSA
- Cemeteries in 18K Boundary
- Federal Lands
- Golden-cheeked Warbler Habitat
- Historic Landmark Sites
- Historic Districts
- LWRCRP Boundary in GSA
- LWRCRP_Boundary in 18K Boundary
- Mission Protection Overlay District
- National Registry Information System Buildings NRIS
- NRIS Districts
- NRIS Sites
- NRIS Trusts
- Protected Area Data - United States - Tribal Areas PADUS2
- PADUS2 - Designated Region 6
- PADUS2 - Easement Region 6
- PADUS2 - Fee Region 6
- PADUS2 - Proclamation Region 6
- Park Boundaries
- River Improvement Overlay Districts
- State Historic Sites
- State Historic Sites
- TPWD State Parks Boundary
- USA Parks
- Wildlife Management Areas
- World Heritage Buffer

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

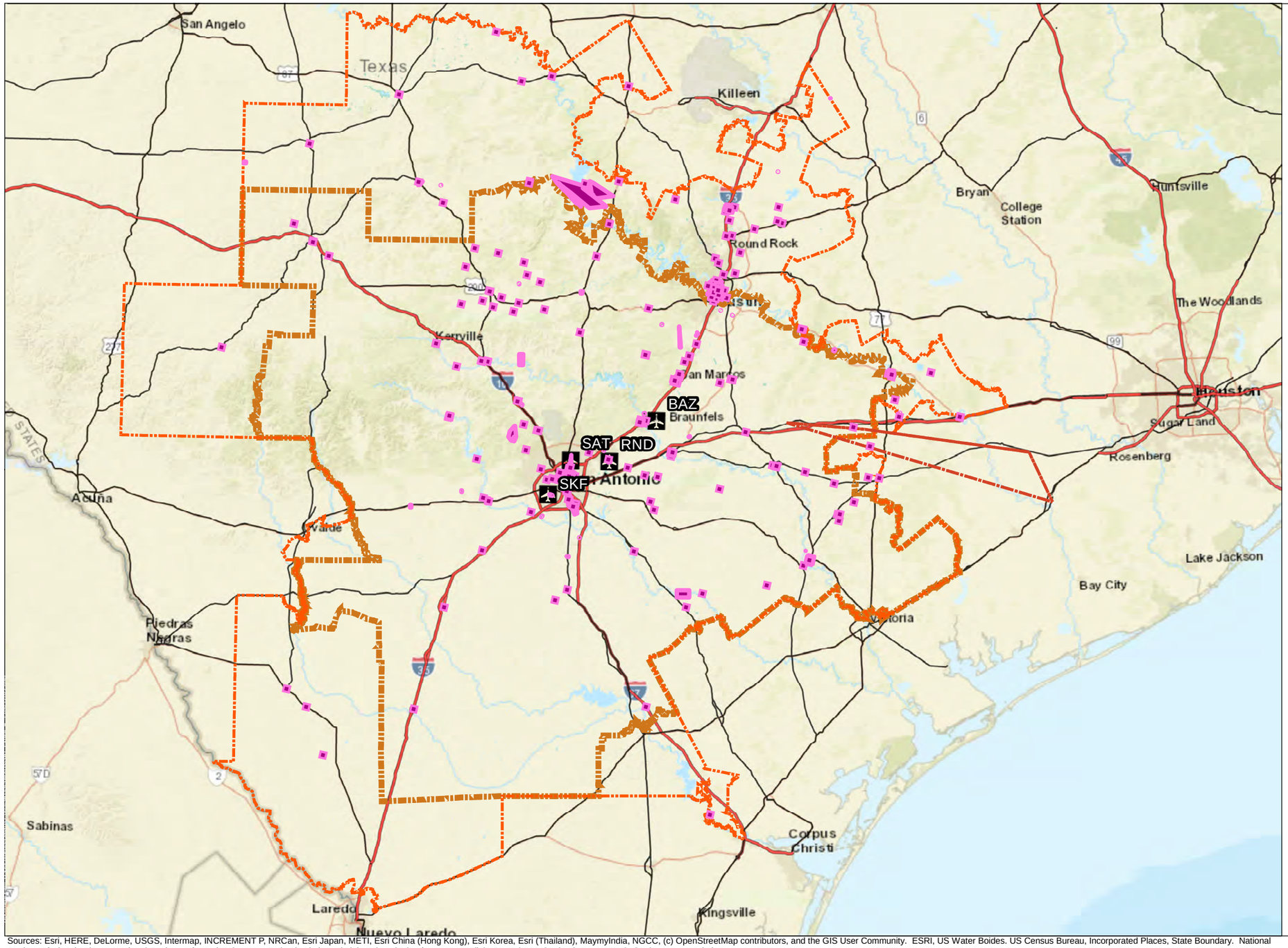
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary.
Resources: US National Registry of Historic Places, National Resource Information System, Protected Area Database - US, US Federal Lands, Texas Historic Comssion, Texas Parks and Wildlife, City of San Antonio GIS, USA Parks, Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, September 2022.

Exhibit 4-3

Section 4(f) Resources in the Study Areas

SAN ANTONIO AIRSPACE MODERNIZATION PROJECT

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Historic/Cultural Resources Points
- Historic/Cultural Resources Areas
- Study Airport
- Additional Section 4(f), Historic, and Cultural Resources Screening Area
- 18K Study Area
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. National Registry of Historic Places, National Registry Information System. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries.
Prepared by: ATAC Corporation, September 2022.

Exhibit 4-4

Historic and Cultural Resources in the Study Areas

SAN ANTONIO AIRSPACE MODERNIZATION PROJECT

THIS PAGE INTENTIONALLY LEFT BLANK

4.2.4 Biological Resources – Wildlife Sub-Category

This section discusses the existing wildlife resources within the General Study Area. The Proposed Action involves redesigning standard instrument arrival and departure procedures and the supporting airspace management structure serving the Study Airports. Accordingly, the discussion is limited to avian and bat species that may be present within the 18,000 Foot Study Area (of which the General Study Area is a contained subset) and identifies the SNIDR Supplemental Study Area species for screening and reporting purposes.

4.2.4.1 Threatened and Endangered Species and Migratory Birds

The Endangered Species Act (ESA) of 1973, (16 U.S.C. § 1531 et seq. (1973)), requires the evaluation of all federal actions to determine whether a Proposed Action is likely to jeopardize any proposed or listed threatened or endangered species or proposed or designated critical habitat. A federal action is one conducted, funded, or permitted by a federal agency. Section 7 of the ESA requires the lead federal agency (in this case the FAA) to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries to determine whether the proposed federal action would jeopardize the continued existence of any species listed or proposed for listing as threatened or endangered or result in the destruction or adverse modification of designated or proposed critical habitat. Critical habitat includes areas that will contribute to the recovery or survival of a listed species. Federal agencies are responsible for determining if an action "may affect" listed species. If so, the federal agency is required to prepare a Biological Assessment (BA) to determine if the action is "likely to adversely affect the species." The potential for federal and state listed avian and bat species was assessed based on agency lists and reports. Data from the USFWS was used to identify and geo-reference federally-listed species and Texas Parks & Wildlife Department was used to identify and geo-reference state-listed species.

4.2.4.2 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. §§ 703-712) prohibits the taking of any migratory bird and any part, nest, or egg of any such bird, without a permit issued by the USFWS. "Take" under the MBTA is defined as the action or attempt to "pursue, hunt, shoot, capture, collect, or kill." Migratory birds listed under the ESA are managed by the agency staff members who handle compliance with Section 7 of the ESA; management of all other migratory birds is overseen by the Migratory Bird Division of the ESA. Several migratory bird species occur in, or migrate through, the General Study Area.

Birds migrate along four main routes or flyways in North America: the Atlantic, the Central, the Mississippi, and the Pacific flyways, which are loosely delineated in these geographic regions. The General Study Area is located within the Central flyway. These flyways are not specific lines the birds follow but broad areas through which the birds migrate.

Migration routes may be defined as the various lanes birds travel from their breeding ground to their winter quarters. The actual routes followed by a given bird species differ by distance traveled, starting time, flight speed, and geographic position and latitude of the breeding and wintering grounds. Hundreds of bird species make the round-trip each year along the Central Flyway from their breeding grounds in the Arctic tundra and northern United States to wintering grounds found in eastern Mexico.

Table 4-2 lists the Federal bird species of concern which are known or believed to occur within the 18,000 Foot Study Area or SNIDR Supplemental Study Area by County. **Table 4-3** lists the State of Texas bird species of concern which are known or believed to occur within the 18,000

Foot Study Area or SNIDR Supplemental Study Area by County. No bat species of concern are listed by the State of Texas or Federal government.

Table 4-2 Federally Listed Bird Species

Federal Status	Species	Type	18,000 Foot Study Area County of Occurrence
Endangered	Attwater's Greater Prairie-Chicken (*Tympanuchus cupido attwateri*)	Bird	Colorado, DeWitt, Fayette, Jackson, Lavaca, San Patricio, Victoria
Threatened	(Eastern) Black Rail (*Laterallus jamaicensis ssp. jamaicensis*)	Bird	San Patricio
Endangered	Golden Cheeked Warbler (*Setophaga chrysoparia*)	Bird	Bandera, Bell, Bexar, Blanco, Burnet, Comal, Edwards, Gillespie, Hays, Kendall, Kerr, Kimble, Lampasas, Llano, Mason, Medina, Real, San Saba, Travis, Uvalde, Williamson
Threatened	Piping Plover (*Charadrius melodus*)	Bird	Bastrop, Bell, Bexar, San Patricio, Travis, Williamson
Threatened	(Rufa) Red Knot (*Calidris canutus rufa*)	Bird	Atascosa, Bandera, Bastrop, Bell, Bexar, Blanco, Burnet, Caldwell, Colorado, Comal, DeWitt, Dimmit, Edwards, Fayette, Frio, Gillespie, Gonzales, Guadalupe, Hays, Jackson, Karnes, Kendall, Kerr, Kimble, La Salle, Lampasas, Lavaca, Live Oak, Llano, Mason, McCulloch, McMullen, Medina, Menard, Milam, Real, San Patricio, San Saba, Travis, Uvalde, Victoria, Webb, Williamson, Wilson, Zavala
Endangered	Whooping Crane (*Grus Americana*)	Bird	Atascosa, Bastrop, Bell, Bexar, Blanco, Burnet, Caldwell, Colorado, Comal, DeWitt, Fayette, Gonzales, Guadalupe, Hays, Jackson, Karnes, Lampasas, Lavaca, Live Oak, McMullen, Milam, San Patricio, Travis, Victoria, Williamson, Wilson
Federal Status	**Species**	**Type**	**Supplemental Study Area County of Occurrence**
Endangered	Attwater's Greater Prairie-Chicken (*Tympanuchus cupido attwateri*)	Bird	Colorado, Fayette, Lavaca, Wharton
Threatened	(Rufa) Red Knot (*Calidris canutus rufa*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton
Endangered	Whooping Crane (*Grus Americana*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton

Sources: US Fish and Wildlife Service, https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=TX&stateName=Texas&statusCategory=Listed (accessed June 14, 2022).
Prepared by: ATAC Corporation, June 2022.

Table 4-3 State of Texas Listed Bird Species

State Status	Species	Type	18,000 Foot Study Area County of Occurrence
Endangered	Attwater's Greater Prairie-Chicken (*Tympanuchus cupido attwateri*)	Bird	Colorado, Victoria
Threatened	(Eastern) Black Rail (*Laterallus jamaicensis ssp. jamaicensis*)	Bird	Bastrop, Bell, Caldwell, Colorado, DeWitt, Fayette, Gonzales, Guadalupe, Jackson, Karnes, Lampasas, Lavaca, Milam, San Patricio, Travis, Victoria, Williamson, Wilson
Endangered	Golden Cheeked Warbler (*Setophaga chrysoparia*)	Bird	Bandera, Bell, Bexar, Blanco, Burnet, Comal, Edwards, Gillespie, Hays, Kendall, Kerr, Kimble, Lampasas, Llano, Mason, Medina, Real, San Saba, Travis, Uvalde, Williamson
Threatened	Piping Plover (*Charadrius melodus*)	Bird	Atascosa, Bastrop, Bell, Bexar, Caldwell, Colorado, Comal, DeWitt, Fayette, Gonzales, Guadalupe, Hays, Jackson, Karnes, Lavaca, Live Oak, McMullen, Milam, San Patricio, Travis, Victoria, Williamson, Wilson
Threatened	(Rufa) Red Knot (*Calidris canutus rufa*)	Bird	Bastrop, Bell, Caldwell, Colorado, DeWitt, Fayette, Gonzales, Jackson, Karnes, Lavaca, Milam, San Patricio, Victoria, Williamson
Endangered	Whooping Crane (*Grus Americana*)	Bird	Atascosa, Bastrop, Bell, Bexar, Blanco, Burnet, Caldwell, Colorado, Comal, DeWitt, Fayette, Frio, Gillespie, Gonzales, Guadalupe, Hays, Jackson, Karnes, Kendall, La Salle, Lampasas, Lavaca, Live Oak, Llano, McMullen, Medina, Milam, San Patricio, San Saba, Travis, Victoria, Williamson, Wilson

State Status	Species	Type	Supplemental Study Area County of Occurrence
Endangered	Attwater's Greater Prairie-Chicken (*Tympanuchus cupido attwateri*)	Bird	Colorado, Wharton
Threatened	(Eastern) Black Rail (*Laterallus jamaicensis ssp. jamaicensis*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton
Threatened	Piping Plover (*Charadrius melodus*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton
Threatened	(Rufa) Red Knot (*Calidris canutus rufa*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton
Endangered	Whooping Crane (*Grus Americana*)	Bird	Colorado, Fayette, Gonzales, Lavaca, Wharton

Sources: 31 TAC §65.175 *State listed Threatened Species*, https://texreg.sos.state.tx.us/fids/202001043-1.pdf (accessed June 14, 2022); 31 TAC §65.176 *State listed Endangered Species*, https://texreg.sos.state.tx.us/fids/202001043-2.pdf (accessed June 14, 2022); https://tpwd.texas.gov/gis/rtest using "*Quick Download (All species for all counties)*" (accessed June 14, 2022).

Prepared by: ATAC Corporation, June 2022.

4.2.5 Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks – Environmental Justice Sub-Category

This section is limited to a discussion of Environmental Justice as it pertains to potential aircraft noise impacts in the General Study Area. An environmental justice analysis considers the potential of the proposed project alternatives to cause disproportionate and adverse effects on low-income or minority populations. In the event that adverse effects are determined, applicable mitigation ensures that no low-income or minority population bears a disproportionate burden of effects.

The FAA's 1050.1F *Desk Reference* notes that Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and the accompanying Presidential Memorandum, as well as DOT Order 5610.2a, *Final Order to Address Environmental Justice in Low-Income and Minority Populations,* require the FAA to provide for meaningful public involvement by minority and low-income populations. These documents encourage considering environmental justice impacts in EAs to determine whether a disproportionately high and adverse impact may occur.

The socioeconomic and racial characteristics of the population within the General Study Area are based on data from the U.S. Census, 2011-2015 American Community Survey (ACS) 5-Year Data Release. Minority and low-income populations for each census block group within the General Study Area are identified using the AEDT 3d noise model and depicted in **Exhibit 4-5** using geographical information systems (GIS).[43] This analysis defines and identifies minority population and low-income population as follows:

- A **minority census block group** is a census block group with a minority population percentage greater than the average minority population percentage of the overall General Study Area. Based on U.S. Census data, the average percentage of minority population residing in the General Study Area was 64.43 percent. Therefore, every census block group with a percentage of minority population greater than 64.43 percent is designated a census block group of environmental justice concern.
- A **low-income population census block group** is a census block group with a greater percentage of low-income population than the average percentage of low-income population in the overall General Study Area. The average percentage of low-income population residing in the overall General Study Area was 18.43 percent. Therefore, every census block group with a low-income population greater than 18.43 percent is designated a census block group of environmental justice concern.

Given these demographics in the region, the FAA promoted and conducted two virtual public workshops in English and Spanish on May 31, 2022 and June 1, 2022 prior to issuing a Notice of Intent to Prepare an EA on July 28, 2022. The FAA's Notice of Intent was published in select regional and local newspapers and their online components in English and Spanish to ensure broad visibility among minority communities in the General Study Area. See Appendix B: *Agency Coordination, Community Involvement, and List of Receiving Parties* for the notices and a list of online and print publications. FAA also selected "La Prensa," the first and oldest English and Spanish publication in the state of Texas, to publish EA-related releases as another direct avenue to best reach groups of environmental justice concern. **Exhibit 4-5** depicts areas of environmental justice concern in the General Study Area. **Table 4-4** presents minority and low-income populations by county within the General Study Area.

43 All GIS work was conducted using ESRI ArcGIS version 10.5.1, QGIS 3.2.0, and Manifold System 8.0.30.0

Table 4-4 Low-Income and Minority Populations by County in General Study Area

County	Population	Minority	% of Total	Low Income	% of Total
Atascosa County[1,2]	7,395	6,236	*84.33%*	1,877	*25.38%*
Bandera County	9,900	1,911	19.30%	1,375	13.89%
Bexar County[1]	1,569,917	1,124,289	*71.61%*	277,494	17.68%
Caldwell County	16,934	8,637	51.00%	1,932	11.41%
Comal County	63,852	21,415	33.54%	6,226	9.75%
DeWitt County	12,759	4,155	32.57%	1,536	12.04%
Fayette County	10,609	2,735	25.78%	1,189	11.21%
Gillespie County	11,504	2,223	19.32%	1,136	9.87%
Gonzales County[2]	18,070	10,450	57.83%	3,561	*19.71%*
Guadalupe County	81,713	43,594	53.35%	9,712	11.89%
Hays County	41,226	16,392	39.76%	6,389	15.50%
Jackson County	9,576	4,674	48.81%	1,324	13.83%
Karnes County	7,926	3,861	48.71%	1,418	17.89%
Kendall County	14,654	3,898	26.60%	1,003	6.84%
Kerr County	22,923	7,033	30.68%	3,711	16.19%
Kimble County[2]	3,372	925	27.43%	777	*23.04%*
Lavaca County	14,726	4,026	27.34%	1,237	8.40%
Live Oak County	6,324	2,672	42.25%	1,005	15.89%
Llano County	4,798	521	10.86%	573	11.94%
Medina County[2]	19,292	11,372	58.95%	3,653	*18.94%*
Real County	3,356	687	20.47%	541	16.12%
Travis County[2]	131,225	71,768	54.69%	24,354	*18.56%*
Uvalde County	3,199	1,616	50.52%	527	16.47%
Victoria County	17,176	5,591	32.55%	2,238	13.03%
Wilson County	34,931	14,534	41.61%	4,228	12.10%
Zavala County[1,2]	2,464	2,074	*84.17%*	619	*25.12%*

Notes: 1/ County with minority population census block group or groups of environmental justice concern
2/ County with low-income population census block group or groups of environmental justice concern

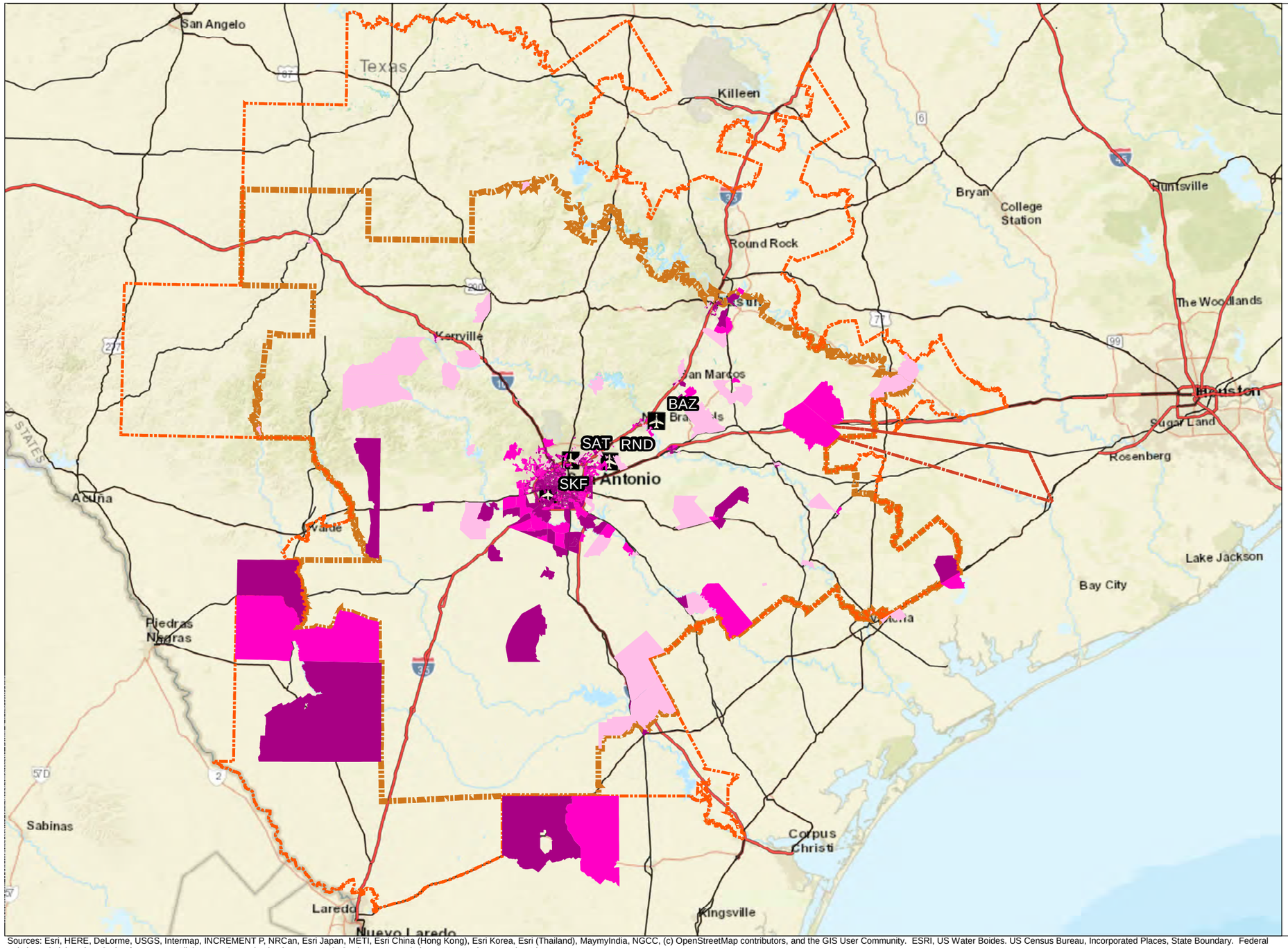
Source: US Census Bureau, 2011-2015 American Community Survey (ACS) 5-Year Estimate.
Prepared by: ATAC Corporation, July 2022.

4.2.6 Energy Supply (Aircraft Fuel)

This section describes fuel consumption by IFR military and civilian aircraft arriving at and departing from the SAT and BAZ Study Airports. Using the AEDT 3d noise model, aircraft fuel consumption was calculated to estimate fuel consumption associated with air traffic flows under existing conditions. AEDT 3d calculates fuel consumption using the same input used for calculating noise. NOISEMAP does not calculate fuel consumption for military aircraft (See Appendix I: *Noise Technical Report* for a discussion of AEDT 3d and NOISEMAP model inputs.) Based on the 2021/2022 AEDT 3d calculation, IFR civilian and military aircraft arriving at and departing from the SAT and BAZ Study Airports consume approximately 376,620 gallons of fuel[44] on an annual average day. NOISEMAP does not calculate fuel consumption, thus no fuel consumption was calculated for IFR military aircraft arriving and departing RND and SKF.

44 For fuel consumption purposes, Jet A-1 at 15C/59F is 6.71lbs/gal. Jet A-1 is the most common jet fuel for the US. Approximately 376,620 lbs. of fuel are consumed by IFR military and civilian aircraft arriving and departing the SAT and BAZ Study Airports on an existing conditions annual average day.

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Study Airport
- Additional Section 4(f), Historic, and Cultural Resources Screening Area
- 18K Study Area
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States
- Low Income Population
- Minority Population
- Low Income/Minority Population

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 5 10 20 Miles

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries, AEDT Environmental Justice Areas.
Prepared by: ATAC Corporation, September 2022.

Exhibit 4-5

Environmental Justice Communities in the Study Areas

THIS PAGE INTENTIONALLY LEFT BLANK

4.2.7 Air Quality

This section describes air quality conditions within the General Study Area. In the United States, air quality is generally monitored and managed at the county or regional level. The U.S. EPA, pursuant to mandates of the federal Clean Air Act, (42 U.S.C. § 7401 et seq. (1970)), has established the National Ambient Air Quality Standards (NAAQS) to protect public health, the environment, and quality of life from the detrimental effects of air pollution. Standards have been established for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). PM standards have been established for inhalable coarse particles ranging in diameter from 2.5 to 10 micrometers (µm) (PM_{10}) and fine particles less than 2.5 µm ($PM_{2.5}$) in diameter.

In accordance with the Clean Air Act Amendments (CAAA) of 1997, (91 Stat. 685, P.L. 95-95), the U.S. EPA uses air monitoring data it compiles, as well as data collected by local air quality agencies, to classify counties and some sub-county geographical areas by their compliance with the NAAQS. An area with air quality at or below the NAAQS is designated as an attainment area. An area with air quality that exceeds the NAAQS is designated as a nonattainment area. Nonattainment areas are further classified as extreme, severe, serious, moderate, and marginal by the extent the NAAQS are exceeded. Areas that have been reclassified from nonattainment to attainment are identified as maintenance areas. An area may be designated as unclassifiable when there is a temporary lack of data on which to base its attainment status. **Table 4-5** identifies those areas that fall within the General Study Area that are in nonattainment or maintenance status for these pollutants.

Table 4-5 NAAQS Nonattainment and Maintenance Areas in the General Study Area

Pollutant	Status	Area
Ozone (O3) – (8-Hour Standard [2015])	Nonattainment (Marginal)	Bexar County (San Antonio, TX)
Ozone (O3) – (1-Hour Standard [1979])	Nonattainment (Moderate)	Victoria County (Victoria, TX)

Source: US Environmental Protection Agency Green Book (http://www.epa.gov/airquality/greenbook/ancl.html [Accessed July 2022]).
Prepared by: ATAC Corporation, September 2022.

Both the EPA and the FAA have determined that aircraft operations at or above a mixing height of 3,000 feet AGL have a very small effect on pollutant concentrations at ground level.[45,46,47] The mixing height represents the height of the completely mixed portion of the atmosphere that begins at the earth's surface and extends to a few thousand feet overhead where the atmosphere becomes fairly stable.[48] Mixing heights will vary based on a variety of factors including topography, time of day, temperature, wind, and season. A mixing height of 3,000 feet AGL represents the annual national average mixing height. While 3,000 feet AGL is the threshold established by the EPA and the FAA, FAA research on mixing heights indicates that changes in air traffic procedures above 1,500 ft. AGL and below the mixing height would have little if any effect on emissions and ground concentrations.[49]

45 Wayson, Roger, and Fleming, Gregg, "Consideration of Air Quality Impacts by Airplane Operations at or Above 3000 feet AGL," Volpe National Transportations Systems Center and FAA Office of Environment & Energy, FAA-AEE-00-01-DTS-34, September 2000. (http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/)
46 40 C.F.R. § 93.150(c)(2) (xxii).
47 72 Fed. Reg. 6641 (February 12, 2007).
48 U.S. Department of Transportation, Federal Aviation Administration, Air Quality Procedures For Civilian Airports & Air Force Bases, April 1997.
(http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Handbook.PDF)
49 Report on ''Consideration of Air Quality Impacts by Airplane Operations At or Above 3,000 feet AGL,''FAA–AEE–00–01, September 2000, p. 5.

4.2.8 Climate

Greenhouse gases (GHGs) are naturally occurring and man-made gases that trap heat in the earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). According to the EPA, domestic aviation contributed approximately three percent of total national CO_2 emissions.[50] The only GHG emissions AEDT 3d calculates are CO_2 emissions from aircraft engines, thus this EA will only consider CO_2 emissions.[51]

In January 2021, Section 7(e) of Executive Order 13990[52] directed the Council on environmental Quality (CEQ) to rescind their 2019 Draft GHG Guidance and review, revise, and update its 2016 GHG Guidance. CEQ rescinded their 2019 Draft GHG Guidance. That action does not change any law, regulation, or other legally binding requirement. CEQ has not yet addressed its review of and any appropriate revisions and updates to the 2016 GHG Guidance. CEQ directs that, "In the interim, agencies should consider all available tools and resources in assessing GHG emissions and climate change effects of their proposed actions, including, as appropriate and relevant, the 2016 GHG Guidance."[53]

Accordingly, this Draft EA calculated total Metric Tons (MT) of CO_2, reported as MT CO_2e, using AEDT 3d estimates of the amount of fuel consumed by IFR civilian and military aircraft arriving and departing from SAT and BAZ Study Airports in the 18,000 Foot Study Area and applying the accepted Global Warming Potential Environmental Protection Agency factor of one (1) for CO_2 to calculate CO_2e. Fuel consumption calculations are discussed in Section 4.2.6, *Energy Supply*.

4.2.9 Visual Effects (Visual Resources / Visual Character Only)

Visual Effects deal with the extent to which a Proposed Action would result in visual impacts within the General Study Area. The Proposed Action includes IFR procedure changes that would generally occur at altitudes at or above 3,000 feet AGL (with IFR procedure lateral and/or vertical changes at and below that altitude occurring within the footprint of existing flight operations). Currently, portions of the General Study Area are exposed to the sight of aircraft arriving and departing from the Study Airports. Any potential visual impacts would only arise from changes in the visibility of aircraft within the General Study Area as perceived from the ground.

50 U.S. Environmental Protection Agency. https://www.epa.gov/regulations-emissions-vehicles-and-engines/control-air-pollution-airplanes-and-airplane-engines-ghg, Accessed October 2022 to obtain EPA Finalizes Airplane Greenhouse Gas Emission Standards
51 US Department of Transportation, Federal Aviation Administration, *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA, Section 1.1.3 Fuel burn and greenhouse gas emissions*, https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf, Accessed September 2022.
52 Executive Office of the President. Executive Order 13990 of January 20, 2021 "Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis," 86FR7037.
53 Council on Environmental Quality, "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions." 86FR10252, February 19, 2021.

5 Environmental Consequences

This chapter discusses the potential environmental impacts that could result from implementing the Proposed Action and the No Action Alternative. Specifically, this EA considers effects on the environmental resource categories identified in FAA Order 1050.1F. Both the Proposed Action and the No Action Alternative were evaluated under forecasted 2023 conditions, which is the first year the Proposed Action could potentially be implemented, and under forecasted 2028 conditions. This evaluation considers the direct, indirect, and cumulative effects associated with the Proposed Action and No Action Alternative, as required under FAA Order 1050.1F.

Potential environmental impacts are identified for the environmental resource categories described in Section 4.3. Neither the Proposed Action nor the No Action Alternative would involve land acquisition; physical changes to the environment resulting from ground disturbance or construction activities; changes in patterns of population movement or growth, increases in public service demands, or business and economic activity; or generation, disturbance, transportation, or treatment of hazardous materials. Therefore, neither alternative is expected to result in impacts to certain environmental resource categories (please see Section 4.2 for a list of excluded categories). The excluded environmental resource categories are not further discussed in this chapter.

Table 5-1 identifies the environmental impact categories that the Proposed Action could potentially affect, the thresholds of significance used to determine the potential for impacts, and a side-by-side comparative summary of the potential for environmental impacts resulting from implementing the Proposed Action under 2023 and 2028 forecast conditions.

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Significant Impact? 2023	Significant Impact? 2028
Noise and Noise Compatible Land Use	The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.	No	No
Department of Transportation Act, Section 4(f) Resources	The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately owned land from an historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.	No	No
Historical, Architectural, Archeological, and Cultural Resources	The FAA has not established a significance threshold for Historical, Architectural, Archeological, and Cultural Resources. For historic properties subject to Section 4(f) of the DOT Act, a significant impact would occur when the action involves more than minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource	No	No

Table 5-1 Summary of Potential Environmental Impacts

Environmental Impact Category	Threshold of Significance/Factors to Consider	Significant Impact? 2023	Significant Impact? 2028
Wildlife (Avian and Bat Species)	A significant impact to federally-listed threatened and endangered species would occur when the United States Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) determines that the Proposed Action would be likely to jeopardize the continued existence of the species in question, or would result in the destruction or adverse modification of Federally-designated critical habitat. The FAA has not established a significance threshold for non-listed species.	No	No
Environmental Justice	The FAA has not established a significance threshold for Environmental Justice. However, a significant factor to consider to determine potential significant impact is if the action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population due to significant impacts in other environmental impact categories, or impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines is unique to the environmental justice population and significant to that population.	No	No
Energy Supply (Aircraft Fuel)	The FAA has not established a significance threshold for Energy Supply. However, a factor to consider is if the action would have the potential to cause demand to exceed available or future (2025) supplies of these resources.	No	No
Air Quality	A significant impact would occur if the Proposed Action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.	No	No
Climate	The FAA has not established a significance threshold for Climate and has not identified specific factors to consider in making a significance determination for GHG emissions.	No	No
Visual Effects	The FAA has not established a significance threshold for Visual Resources / Visual Character. Factors to consider include the potential to affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources; the degree to which the action would have the potential to contrast with the visual resources and/or visual character in the study area; and the degree to which the action would have the potential to block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations.	No	No

Source: FAA Order 1050.1F, Exhibit 4-1, October 2019, FAA 1050.1F Desk Reference (v2), February 2020.
Prepared By: ATAC Corporation, August 2022.

The following sections describe the impact findings for each environmental resource category, followed by a discussion of potential cumulative impacts. In summary, no significant impacts to any environmental resource category have been identified.

5.1 Noise and Compatible Land Use

This section discusses the analysis of aircraft noise exposure under the Proposed Action and the No Action Alternative, under both 2023 and 2028 forecast conditions. This discussion includes identifying the differences in noise exposure between the Proposed Action and the No Action Alternative. This comparison is used to determine if implementing the Proposed Action would result in significant noise impacts. Additional information on noise metrics and the basics of noise can be found in Appendix F: *Basics of Noise*. Detailed information on the noise analysis is included in Appendix I: *Noise Technical Report*.

5.1.1 Summary of Impacts

Aircraft noise exposure was modeled for both the Proposed Action and the No Action Alternative under 2023 and 2028 forecast conditions. For 2023:

- No significant noise (+1.5 DNL dB resulting in 65 DNL dB or higher) was identified.
- 11 Census block centroid receptor points representing 573 persons were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.
- Six 0.5 NM evenly spaced grid receptor points were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.
- Finally, six 4(f) receptor points representing 11 named resources were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.

For 2028,

- No significant noise (+1.5 DNL dB resulting in 65 DNL dB or higher) was identified.
- Three Census block centroid receptor points representing 100 persons were identified in the +3.0 dB resulting in a value of 60-65 DNL dB.
- Two 0.5 NM evenly spaced grid receptor points were identified in the +3.0 dB resulting in a value of 60-65 DNL dB.
- 108 Census block centroid receptor points representing 8,608 persons were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.
- 130 0.5 NM evenly spaced grid receptor points were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.
- Finally, 19 4(f) receptor points representing 24 named resources were identified in the +5.0 dB resulting in a value of 45-60 DNL dB.

The noise analysis demonstrates that implementing the Proposed Action would not result in a day-night average sound level (DNL) increase of 1.5 DNL dB or higher in noise-sensitive areas exposed to DNL 65 dB or higher. Therefore, neither the Proposed Action nor No Action Alternative would result in a significant noise impact.

5.1.2 Methodology

The noise analysis evaluated noise exposure to communities within the General Study Area from aircraft forecasted to be operating under Instrument Flight Rules (IFR)-filed flight plans, at altitudes from ground level up to 10,000 feet above ground level (AGL). If the FAA approves the Proposed Action, the agency expects to begin implementation in 2023. Therefore, aircraft noise modeling was conducted for 2023 and five years later (2028), as required by FAA Order 1050.1F.

IFR-filed aircraft activity was forecasted for the years 2023 and 2028 and used to model conditions under both the Proposed Action and the No Action Alternative. Noise modeling was conducted using Aviation Environmental Design Tool version 3d (AEDT 3d), the FAA-required noise model for aviation projects including air traffic changes over large areas and altitudes over 3,000 feet AGL.[54] Due to the presence of a dedicated military airbase (RND) as a Study Airport and joint-use civilian but primarily military Study Airport (SKF), NOISEMAP was use for military aircraft modelling and the results were combined with AEDT 3d noise output using the BaseOPS NMPlot to combine results. Noise was modelled from the ground level up to and including 18,000' AGL for the General Study Area and the 18,000 Foot Study Area due to the presence of national parks and/or wildlife refuges.[55] The SNIDR Supplemental Study Area was also included for screening purposes of dependent utility procedures

Future year noise exposure levels modeled for the Proposed Action and the No Action Alternative were compared to determine whether there is a potential for noise impacts. While the overall number and type of aircraft operations will increase between 2023 and 2028, the number and type of aircraft operations are the same under both the Proposed Action and No Action Alternative in 2023 and 2028. The Proposed Action would not include developing or constructing facilities, such as runways or terminal expansions, that would be necessary to accommodate an increase in aviation activity; therefore, no additional growth in operations associated with the Proposed Action is anticipated. The noise analysis reflects the change in noise exposure resulting from the proposed changes in aircraft routes (i.e., flight tracks) under the Proposed Action compared to the No Action Alternative.

Detailed information on IFR-filed aircraft operations within the General Study Area was assembled for input into AEDT 3d and NOISEMAP, including the following data:

Average Annual Day IFR-Filed Aircraft Flight Schedules: The IFR-filed aircraft flight schedules identify arrival and departure times, aircraft types, and origin/destination information for an average annual day (AAD) in 2023 and 2028. The AAD represents all the aircraft operations for every day in a study year divided by 365, the number of days in a year. The AAD does not reflect a particular day, but is meant to represent a typical day over a period of a year. The AEDT forecast was based on the FAA's Fiscal Years 2021-2045 Terminal Area Forecast (TAF),[56] modified for 2023 and 2028 with additional details using previously identified arrival/departure times, aircraft types, and origin/destination information. For NOISEMAP, the 2023 and 2028 aircraft operations were developed from information contained in the NOISEMAP AICUZ models in combination with projected future basing for T-38C and T-7A taken from the EIS.[57] Future aircraft operations at RND and SKF reflect an overall increase in T-7A operations and a decrease in T-38C operations, among other military aircraft. More detail related to the development of the forecasts is provided in Appendix H: *Flight Schedules Technical Report*.

Weather: The AEDT 3d and NOISEMAP models includes data for multiple meteorological parameters, including temperature, pressure, and humidity. Weather conditions for all Study Airports were defined and used in the noise study. Terrain is consistent between both models, while SKF and RND weather models relied on the respective AICUZ study inputs reflecting typical local April conditions. Further discussion on the weather data employed in the AEDT 3d model can be found in Appendix I: *Noise Technical Report*.

54 FAA 1050.1F *Desk Reference*, *Noise and Noise-Compatible Land Use*, Sec. 11.1.3, February 2020.
55 FAA 1050.1F *Desk Reference*, Noise and Noise-Compatible Land Use, App. B-1.3, February 2020.
56 U.S. Department of Transportation, Federal Aviation Administration, *Terminal Area Forecast, FY 2021-2045* (https://aspm.faa.gov/main/taf.asp; accessed May 2022).
57 Department of the Air Force. *Final Environmental Impact Statement: T-7A Recapitalization at Joint Base San Antonio, Texas*; 2022

Flight Tracks: The flight tracks used in noise modeling were based on radar data collected for the existing conditions (2021/2022) noise analysis and information provided by FAA and US Air Force Air Traffic Control (ATC) personnel.[58] Aircraft routings and flight corridors under both the No Action Alternative and Proposed Action are depicted Appendix AA: *Proposed Action Procedures and Flight Corridors*. For the Proposed Action, flight tracks were developed from the aircraft procedures created by the San Antonio Airspace Modernization Project PBN Design Team using the Terminal Area Route Generation, Evaluation, Traffic and Simulation (TARGETS) program. The majority of the No Action Alternative modeled flight tracks are based on the existing conditions noise analysis. The remaining No Action Alternative flight tracks for amended or new procedures were modeled based on input from the air traffic control experts who developed the procedures. Illustrations depicting Existing Conditions radar tracks and Proposed Action procedure designs were developed and shared with representatives of the PBN Design team as part of the consultation process. The consultations were conducted to seek out key model input assumptions such as frequency of Proposed Action procedure usage and air traffic control techniques such as vectoring. The assumptions were then used for refining model track locations, altitude profiles, and utilization.

TARGETS flyability lines, or the lines indicating the actual 3D path of different categories of aircraft ideally flying the procedure for the Proposed Action procedures served as the center of the 1 nautical mile and 0.3 nautical mile containment area for RNAVs and RNPs, respectively. The containment area is generally where dispersed tracks are contained, but during the PBN Design consultation process, air traffic control experts could indicate the need for vectors off of the RNAV with a rejoin of the RNAV at a later point. For those identified cases AEDT 3d model tracks were developed to account for that type of dispersion. NOISEMAP limitations do not enable track dispersion similar to AEDT 3d, however multiple tracks were used to approximate dispersion along a flight track.

Runway Use: Runway use percentages were identified for all runways at the Study Airports through a number of previously referenced resources for each model. Forecasted aircraft operations were assigned to particular runways representing operating conditions at the Study Airports under Proposed Action and No Action Alternative conditions. Runway use patterns did not change under the Proposed Action Alternative at the Study Airports compared to the No Action Alternative.

More detail related to the development of the AEDT 3d and NOISEMAP model input files is provided in Appendix I: *Noise Technical Report*.

As discussed in Section 4.2.1.1, the AEDT 3d and NOISEMAP models were used to compute DNL values for 2023 and 2028 Proposed Action and No Action Alternative conditions at multiple sets of data points:

- 46,954 2020 Census block centroids;
- 118,489 uniform grid points at 0.5-nautical mile (NM) intervals on a uniform grid covering the General Study Area, which were also used to calculate DNL values at potential Department of Transportation Act (DOT), Section 4(f) resources and historic sites; and,
- 46,453 unique points representing Section 4(f) resources, including 143 National Register of Historic Places (NRHP) listed historic sites. Other unique points evaluated add 198 noise sensitive uses in areas around the Study Airports exposed to noise levels of DNL 65 dB and higher.

58 Due to DOD data security protocols regarding PDARS military flight track data, this document only visualizes those civilian and military flight tracks originating from and arriving to civilian Study Airports (BAZ and SAT). Flight tracks for civilian and military aircraft arriving and departing to all Study Airports including SKF and RND were used for all NEPA analysis.

Also discussed in Section 4.2.1.1, DNL is the FAA's primary noise metric. **Table 5-2** provides the criteria used to assess the changes in aircraft noise exposure attributable to the Proposed Action compared with the No Action Alternative. FAA Order 1050.1F defines a significant impact as an increase of DNL 1.5 dB at noise-sensitive land use locations (e.g., residences, schools, etc.) exposed to aircraft noise of DNL 65 dB or higher under the Proposed Action. For example, an increase from 63.5 dB to 65 dB is considered a significant impact.

FAA Order 1050.1F also recommends that when there are DNL increases of 1.5 dB or more at noise-sensitive locations in areas exposed to aircraft noise of DNL 65 dB and higher, DNL increases of 3 dB or more in areas exposed to aircraft noise between DNL 60 dB and 65 dB should also be evaluated and disclosed. It is important to note that DNL increases of 3 dB in areas exposed to aircraft noise below DNL 65 dB are not considered "significant impacts" but are to be considered in the environmental evaluation of a proposed project.

FAA Order 1050.1F also stipulates that changes in exposure of DNL 5 dB or greater in areas exposed to aircraft noise between DNL 45 dB and 60 dB should be considered for airspace actions such as changes to air traffic routes. This threshold was established in 1990, following issuance of an FAA noise screening procedure to evaluate whether certain airspace actions above 3,000 feet AGL might increase DNL levels by 5 dB or more. The FAA prepared this noise-screening procedure because experience indicated that DNL increases 5 dB or more at cumulative levels well below DNL 65 dB could be disturbing to people and become a source of public concern. As shown in **Table 5-2**, a 3 dB increase in areas exposed to DNL 60 to 65 dB and a 5 dB increase in areas exposed to DNL 45 to 60 dB are considered *reportable noise increases*.

Table 5-2 Criteria for Determining Impact of Changes in Aircraft Noise

DNL Noise Exposure Level	Increase in DNL with Proposed Action	Aircraft Noise Exposure Change Consideration
DNL 65 and higher	DNL 1.5 dB or more 1/	Exceeds Threshold of Significance
DNL 60 to 65	DNL 3.0 dB or more 2/	Reportable Noise Increase (Considered When Evaluating Air Traffic Actions)
DNL 45 to 60	DNL 5.0 dB or more 3/	Reportable Noise Increase (Information Disclosed When Evaluating Air Traffic Actions)

Notes:
1/ Source FAA 1050.1F Desk Reference, Pg. 11-10; Title 14 C.F.R. Part 150.21 (2) (d); and Federal Interagency Committee on Noise, Federal Agency Review of Selected Airport Noise Issues, August 1992.
2/ Source FAA 1050.1F Desk Reference, Pg. 11-10; and Federal Interagency Committee on Noise, Federal Agency Review of Selected Airport Noise Issues, August 1992.
3/ Source FAA, 1050.1F Desk Reference, Pg. 11-10.

Source: FAA 1050.1F *Desk Reference*, Ch. 11, *Noise and Noise-Compatible Land Use*, February 2020.
Prepared by: ATAC Corporation, September 2022

5.1.3 Potential Impacts – 2023 and 2028

Table 5-3 summarizes the results of the noise analysis for 2023 and 2028 conditions. The results for both years indicate that, when compared to the No Action Alternative, the Proposed Action would not result in a DNL 1.5 dB or higher increase in noise-sensitive areas exposed to DNL 65 dB or higher. These results indicate the Proposed Action would not result in a significant noise exposure impact on population exposed to DNL 65 dB or higher levels under the Proposed Action. Additional information, exhibits, as well as a full accounting of all receptor points can be found in Appendix I: *Noise Technical Report*.

5.1.3.1 Census Block Centroids

The 2023 Proposed Action did result in a reportable noise increase of DNL 5.0 dB in areas exposed to DNL 45 dB to 60 dB. According to census data, a total of 573 people, associated with 11 population centroids, would be impacted. The population centroids are located in two general areas. The first area is located approximately 12.5 NM east of SAT near the border of Guadalupe and Bexar Counties. The second area is located approximately 10 NM northeast of SAT in Comal County. The reportable noise increases are attributable to military aircraft departing RND heading north in the 2023 No Action scenario shifting to utilize the YODUH SID in the 2023 Proposed Action scenario.

Additionally, the 2028 Proposed Action did result in reportable noise increases of DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB. According to census data, a total of 100 people, associated with three population centroids, would be impacted by this increase. The population centroids are located approximately 12.5 NM east of SAT near the border of Guadalupe and Bexar Counties. In the same instance as the 2023 results, these centroids align with modeled departure tracks for military flights and can be attributed to departing RND military aircraft using the proposed YODUH SID.

Finally, the Proposed Action resulted in a reportable noise increase of DNL 5.0 dB in areas exposed to DNL 45 dB to 60 dB. According to census data, a total of 8,068 people, associated with 108 population centroids, would be impacted by this increase. The population centroids are located in five general areas. The first area is located approximately 10 NM northeast of SAT near the border of Bexar and Comal Counties. The second area is located approximately 20 NM north of SAT in Comal and Blanco Counties. The impact points at these first two locations align with modeled departure tracks for flights departing RND using the proposed YODUH SID. The third and fourth areas are located approximately 12 NM north and 17 NM northwest of SAT, respectively. These areas are near the borders of Comal, Bexar, and Kendall counties. These areas align with modeled departure tracks for military flights departing RND using the proposed ALISS SID. The fifth area is about 17 NM northwest of SAT in Bexar County and aligns with modeled tracks for flights arriving to SKF using the proposed POPPO STAR.

The reportable noise increase at the aforementioned locations is attributable to aircraft operations utilizing three Proposed Action procedures. The first set of operations that are the likely cause of these noise impacts are military aircraft departing RND heading north in the 2028 No Action scenario shifting to utilize the YODUH SID in the 2028 Proposed Action scenario. These operations impact locations to the north and east of SAT. The second set of operations that are a likely cause of noise impacts are military aircraft departing RND heading northwest in the 2028 No Action scenario shifting to utilize the ALISS SID in the 2028 Proposed Action scenario. These operations impact locations to the north and northwest of SAT. Finally, arrivals to SKF utilizing the STV arrival procedure in the No Action 2028 Scenario shifting to utilize the POPPO STAR in the Proposed Action 2028 Scenario are attributable to the noise impacted locations northwest of SAT.

5.1.3.2 4(f), Historic, and Cultural Resources

For the 4(f), Historic, and Cultural Resources areas in the 2023 scenarios, the analysis indicates that the Proposed Action would not result in a DNL 1.5 dB increase in areas exposed to DNL of 65 dB and higher, nor would it result in a reportable noise increase of DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB compared with the 2023 No Action scenario. However, the 2023 Proposed Action did result in a reportable noise increase of DNL 5.0 dB in areas exposed to DNL 45 dB to 60 dB. The locations of these 4(f), Historic, and Cultural Resources reportable noise points are in the same two general areas as the noise impacted population centroids found in the 2023

scenarios: one area is approximately 12.5 NM east of SAT near the border of Guadalupe and Bexar Counties; and another approximately 10 NM northeast of SAT in Comal County. The reportable noise increase in the 2023 Proposed Action scenario is attributable to the use of the YODUH SID from RND military aircraft departures.

Similarly, for the 4(f), Historic, and Cultural Resources areas in the 2028 scenarios, the analysis indicates that the Proposed Action would not result in a DNL 1.5 dB increase in areas exposed to DNL of 65 dB and higher, nor would it result in a reportable noise increase DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB compared with the 2028 No Action scenario. However, the 2028 Proposed Action did result in a reportable noise increase of DNL 5.0 dB in areas exposed to DNL 45 dB to 60 dB. The locations of these 4(f), Historic, and Cultural Resources reportable noise points are in similar areas as the noise impacted population centroids found in the 2028 scenarios. The points are all about 10 to 20 NM north and east of SAT. For the reportable noise increase in the 2028 Proposed Action scenario, reportable noise can be attributed to the use of YODUH and ALISS SIDs from RND military aircraft departures.

5.1.3.3 One-Half Nautical Mile Grid

For the 0.5 NM Grid Point data in both the 2023 and 2028 scenarios, the analysis indicates the Proposed Action would not result in a DNL 1.5 dB increase in areas exposed to DNL of 65 dB and higher. Moreover, the 2023 Proposed Action scenario also did not result in a DNL 3.0 dB increase in areas exposed to DNL 60 dB to 65 dB compared to the 2023 No Action scenario.

However, the 2028 Proposed Action scenario did result in a reportable noise increase of DNL 3.0 dB in areas exposed to DNL 60 dB to 65 dB compared with the 2028 No Action scenario at two grid points. The locations of these grid points are in similar areas as the noise impacted population centroids found in the 2028 scenarios near Cibolo.

In addition, for the 2023 scenarios, six grid points would experience a greater than DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB in the Proposed Action scenario. The locations of these grid points are in similar areas as the noise impacted population centroids found in the 2023 scenarios. For the 2028 scenarios, 130 grid points would experience a greater than DNL 5 dB increase in areas exposed to DNL between 45 dB and 60 dB in the Proposed Action scenario. The locations of these grid points are in similar areas as the noise impacted population centroids found in the 2028 scenarios.

Similar to the population centroid results, the reportable noise increase in the 2023 Proposed Action scenario is attributable to the use of the YODUH SID from RND military aircraft departures. For the reportable noise increase in the 2028 Proposed Action scenario, the likely causes are the YODUH and ALISS SIDs from military aircraft departures from RND and the POPPO STAR from SKF arrivals.

5.1.3.4 Noise Sensitive Land Use Areas

For all 2023 and 2028 scenarios, the analysis indicates that the Proposed Action would not result in any significant increase in noise in any of the identified Noise Sensitive Land Use Areas.

5.1.3.5 SNIDR Supplemental Study Area

For all 2023 and 2028 scenarios, the analysis indicates that the Proposed Action would not result in any significant increase in noise in any of the points that intersect the SNIDR Supplemental Study Area.

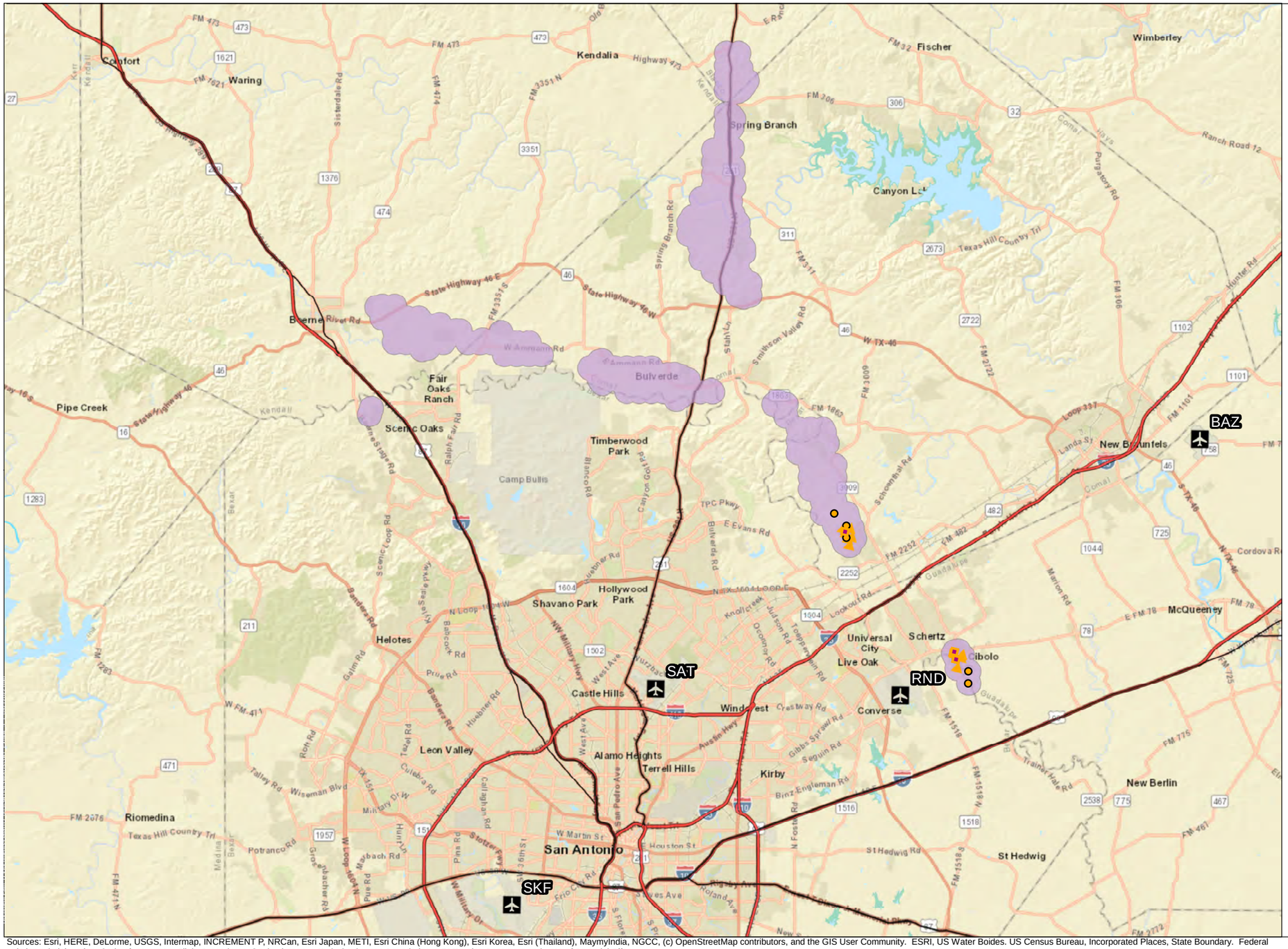
Table 5-3 Change in Potential Population Exposed to Aircraft Noise – 2023 and 2028

DNL Noise Exposure Level Under the Proposed Action	Increase in DNL with the Proposed Action	Population Exposed to Noise that Exceeds the Threshold	
		2023	2028
DNL 65 and higher	DNL 1.5 dB or greater	0	0
DNL 60 to 65	DNL 3.0 dB or greater	0	108
DNL 45 to 60	DNL 5.0 dB or greater	573	8,068

Sources: U.S. Census Bureau, 2020 Census Population Centroids, ATAC Corporation, August 2022 (AEDT 3d and NOISEMAP modeling results).
Prepared by: ATAC Corporation, September 2022.

Under the No Action Alternative no changes to air traffic routes in the San Antonio Airspace Modernization Project would occur in 2023 and 2028, and no effects related to changes in aircraft noise exposure would be anticipated.

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Section 4(f), Section 106 Historic and Cultural Resource Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Census Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Study Airport
- Area of Potential Effect
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 1 2 4 Miles

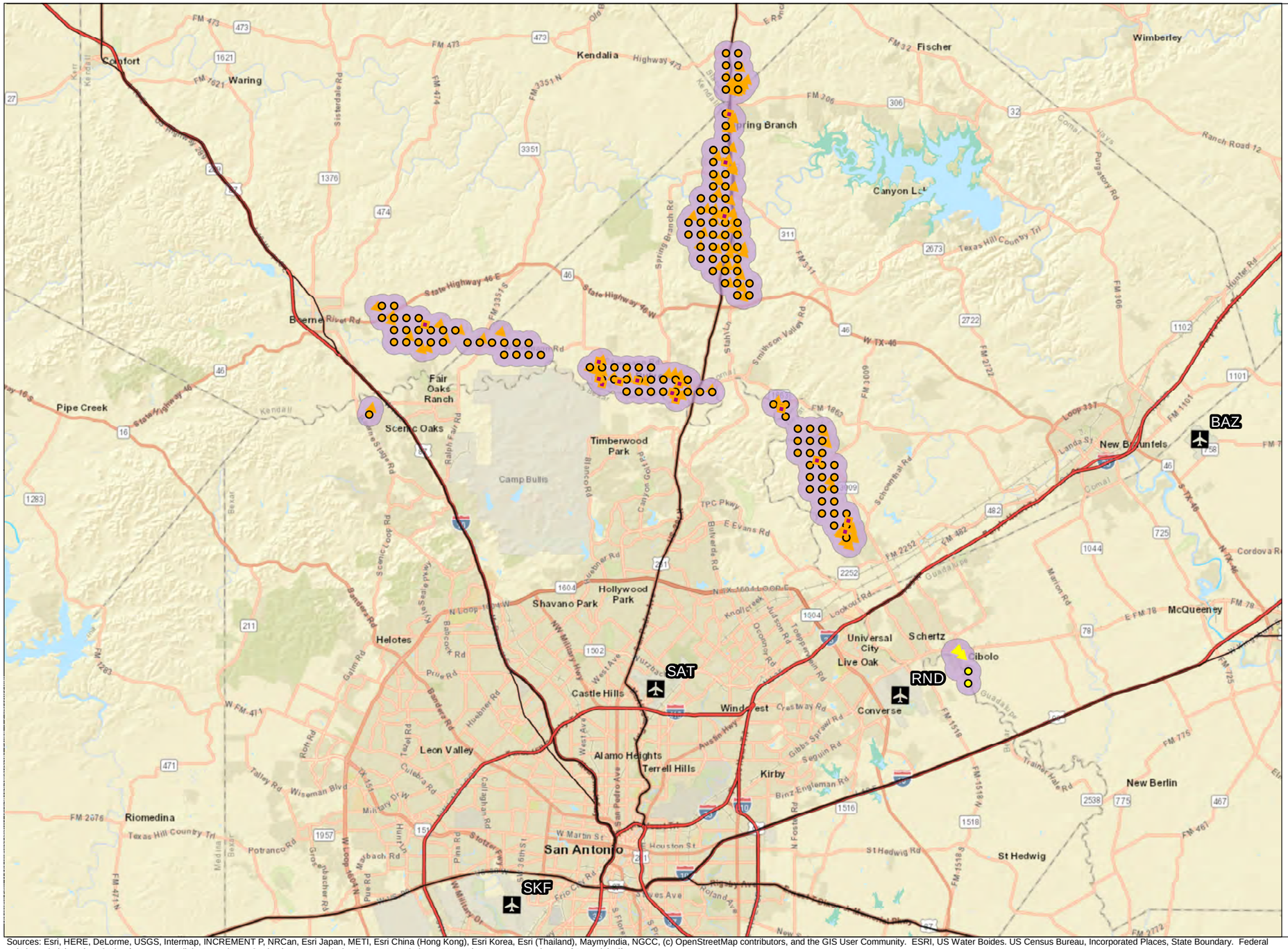
N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries, AEDT Noise Receptors and Area of Potential Effect.
Prepared by: ATAC Corporation, September 2022.

Exhibit 5-1

Change in Aircraft Noise – Reportable Noise Increase 2023

THIS PAGE INTENTIONALLY LEFT BLANK



LEGEND

- Section 4(f), Section 106 Historic and Cultural Resource Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 60 to 65 dB with a DNL 3 dB Increase
- Evenly-Spaced Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Census Grid Centroid Exposed to a DNL 60 to 65 dB with a DNL 3 dB Increase
- Census Grid Centroid Exposed to a DNL 45 to 60 dB with a DNL 5 dB Increase
- Study Airport
- Area of Potential Effect
- General Study Area (GSA)

Water Bodies

- Inundation Area
- Lake/Pond
- Playa
- Reservoir
- Stream/River
- Swamp/Marsh
- US States

Notes:

Major Study Airports
San Antonio International Airport **SAT**

Satellite Study Airports
Kelly Field **SKF**
New Braunfels National Airport **BAZ**
Randolph Air Force Base Airfield **RND**

Projection :GCS North American 1983
Scale: 1:2,631,162

0 1 2 4 Miles

N

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MaymyIndia, NGCC, (c) OpenStreetMap contributors, and the GIS User Community. ESRI, US Water Boides. US Census Bureau, Incorporated Places, State Boundary. Federal Aviation Administration, Code of Instrument Flight Procedures, Study Airports. ATAC, Study Area Boundaries, AEDT Noise Receptors and Area of Potential Effect.
Prepared by: ATAC Corporation, September 2022.

Exhibit 5-2

Change in Aircraft Noise – Reportable Noise Increase 2028

THIS PAGE INTENTIONALLY LEFT BLANK

5.1.4 Noise Sensitive Uses and Areas

In addition to disclosing potential noise impacts to residential population, FAA Order 1050.1F requires the FAA to identify and describe noise sensitive uses and areas in the General Study Area. As defined in Paragraph 11-5b(10) of FAA Order 1050.1F, a noise sensitive area is "an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites." Potential impacts to residential population are discussed in Sections 5.1.3. Potential impacts to recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are discussed in Sections 5.2 and 5.3. Excluding these resources, Appendix I Table S6.1 lists those locations identified as noise sensitive in the General Study Area and reports the noise values associated with each location. The noise analysis results indicate that the Proposed Action when compared to the No Action Alternative would not result in a DNL 1.5 dBA or higher increase to noise sensitive uses or noise sensitive areas in locations exposed to DNL 65 dB or higher. In addition, none of these resources would experience reportable noise increases between DNL 60 dB and 65 dB and DNL 45 and 60 dB.

5.1.5 Noise Compatible Land Use

FAA Order 1050.1F requires that EA documents discuss possible conflicts between the Proposed Action and the objectives of federal, regional, state, local, and tribal land use plans, policies, and controls for the area concerned. Analysis of the potential impacts to noise compatible land use was focused on changes in aircraft noise exposure resulting from implementing the Proposed Action. FAA Order 1050.1F states, "The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impact. If the noise analysis concludes that there is no significant impact, a similar conclusion usually may be drawn with respect to compatible land use." Air traffic actions like the San Antonio Airspace Modernization Project do not result in direct impacts to land such as ground disturbance. Accordingly, the compatible land use analysis relies on changes in aircraft noise exposure between the Proposed Action and the No Action Alternative (discussed in Section 5.1) as the basis for determining compatible land use impacts within the General Study Area.

5.1.5.1 Potential Impacts – 2023 and 2028

As stated in Section 5.1, the Proposed Action, when compared with the No Action Alternative, would not result in changes in aircraft noise exposure in 2023 and 2028 that would exceed the FAA's significance threshold. Likewise, there are no conflicts with federal, regional, state, or local land use plans, policies, and controls. Therefore, the Proposed Action would not result in significant compatible land use impacts.

Under the No Action Alternative, there would be no changes to air traffic routing in the General Study Area and no changes in aircraft noise exposure expected to occur in either 2023 or 2028. Therefore, the No Action Alternative would not result in significant compatible land use impacts.

5.2 Department of Transportation Act, Section 4(f) Resources

This section discusses potential impacts to Department of Transportation (DOT) Act, Section 4(f) Resources. In Chapter 4, **Exhibit 4-3** depicts Section 4(f) resources other than those listed or eligible for listing in the National Register of Historic Places (NRHP) within the Study Areas as described in Section 4.2.2.

5.2.1 Summary of Impacts

Evaluating potential impacts to Section 4(f) resources focuses on changes in aircraft noise exposure resulting from implementing the Proposed Action. The FAA's aircraft noise exposure analysis indicates that the Proposed Action would result in a reportable noise increase at six Section 4(f) resources in 2023 and 19 identified Section 4(f) resources in 2028 within the General Study Area, when compared with the No Action Alternative. The Section 4(f) resources identified within the areas of reportable noise increase consist of recreational parks, cemeteries, historical markers, and private attractions. None of the resources are managed for a quiet setting, are located in suburban, intensive recreational, or near high traffic areas, and are easily vehicle accessible. None of the resources have been designated by the state, local, or federal resource managers as having a high potential value for further noise reduction. Those closest to RND have historically experienced jet aircraft noise since the earliest days of military jet aviation in the 1950s and identified resources in the Cibolo area were converted from residential to park uses in the prior 15 years. RND itself is a National Park Service Historic District and a listed NRHP resource.[59] Furthermore, changes in aircraft overflight would occur at altitudes and distances from viewers that would not substantially impair the view or setting of Section 4(f) resources. Therefore, no constructive use of a Section 4(f) resource associated with the Proposed Action would occur and no significant impact would be anticipated.

Under the No Action Alternative, no changes in air traffic routes in the General Study Area would occur. Therefore, no changes to aircraft noise exposure or aircraft overflight patterns would occur over Section 4(f) resources and no impacts would be anticipated.

5.2.2 Methodology

The FAA evaluates potential effects on Section 4(f) resources in terms of both physical impacts (i.e., physical use) and non-physical impacts (i.e., constructive use). A physical impact would occur as a result of land acquisition, construction, or other ground disturbance activities that would result in physical use of all or a portion of a Section 4(f) property. As land acquisition, construction, or other ground disturbance activities would not occur under either the Proposed Action or the No Action Alternative, neither alternative would have the potential to cause a physical impact to a Section 4(f) resource. Therefore, analysis of potential impacts to Section 4(f) resources is limited to identifying non-physical impacts resulting from constructive use.

A constructive use of a Section 4(f) resource would occur if there were a substantial impairment of the resource to the degree that the activities, features, or attributes of the site that contribute to its significance or enjoyment are substantially diminished. This could occur as a result of both visual and/or noise impacts. Concerning aircraft noise, a constructive use would occur if noise levels substantially impair the resource. Refer to Section 5.9, Visual Effects, regarding potential visual impacts within the General Study Area.

Noise exposure levels were calculated for noise receptor points placed at Section 4(f) resources. A list of the resources evaluated is provided in Appendix I: *Noise Technical Report*. The analysis

59 https://npgallery.nps.gov/NRHP/GetAsset/NHLS/96000753_text, Accessed August 2022.

of potential impacts to Section 4(f) resources considered whether these resources would experience a significant or reportable noise increase when comparing the Proposed Action with the No Action Alternative using the applicable thresholds shown in **Table 5-2**.

FAA Order 1050.1F identifies additional factors in deciding whether to apply the thresholds listed above to determine the significance of noise impacts on Section 4(f) resources. If a reportable noise increase were to occur, the Section 4(f) resources would be evaluated further to determine if the project-related effects would constitute a constructive use. Further evaluation can include confirming that the property is in fact a Section 4(f) resource and identifying the specific attributes for which the resource is managed (e.g., for traditional recreational uses or where other noise is very low and a quiet setting is a generally recognized purpose and attribute).

In cases where Land and Water Conservation Fund Act (LWCF)[60] resources are "used" by a transportation project, FAA Order 1050.1F stipulates that a replacement satisfactory to the Secretary of the Interior is required for recreation lands aided by the Department of Interior's LWCF. Therefore, these resources are considered as part of the Section 4(f) impact analysis process.

5.2.3 Potential Impacts – 2023 and 2028

As stated in Section 5.1, the Proposed Action, when compared with the No Action Alternative, would not result in changes in aircraft noise exposure in 2023 or 2028 that would exceed the FAA's significance threshold for noise increases to Section 4(f) resources. Noise analysis results for Section 4(f) resources can be found in Appendix I: *Noise Technical Report*.

For 2023 and 2028, no 4(f) resources would experience a DNL 1.5 dB increase or decrease in areas exposed to DNL of 65 dB and higher, nor would they experience a reportable noise increase or decrease of DNL 3 dB in areas exposed to DNL 60 dB to 65 dB. For 2023, **Table 5-4** identifies the six 2023 and seven 2028 named 4(f) resources experiencing a greater than DNL 5 dB increase in areas exposed to DNL 45 dB to 60 dB for 2023 and 2028. See Section 5.3 for THC listed Section 106 Resources. A description of each resource relative to the potential for constructive use follows.

Table 5-4 4(f) Resources Exposed to Reportable Aircraft Noise – 2023 and 2028

Resource	+5.0 db DNL or Greater Value by Alternative	
	2023	2028
Cibolo[2]	5.13	
Cibolo[2]	5.13	
Crescent Bend Nature Park[3]	5.89	
Niemietz Park[1]	5.22	
Park, Cibolo, City of[4]	5.22	
Park Lane Park[1]	6.50	9.18
Bulverde Community Park[1]		5.62
Jumbo Evans Sports Park[3]		6.27

60 16 U.S.C. §§ 460l-4, et seq.

Resource	+5.0 db DNL or Greater Value by Alternative	
	2023	2028
Natural Bridge Caverns[2]		8.37
Natural Bridge Caverns[2]		8.38
Pinta Trail in Kendall County[2]		5.88
Pinta Trail in Kendall County[2]		5.88

Notes:
/1 Resource has same name and same unique receptor point across multiple federal, state, and/or local 4(f) databases. These resources are only mentioned once here to avoid duplication.
/2 Resource has same name and different unique receptor point across multiple federal, state, and/or local 4(f) databases.
/3 Resource has different names and same unique receptor point across multiple federal, state, and/or local 4(f) databases. These resources are referred to by the most used common name for ease of identification (e.g. rather than County of Comal County Park from one database, there is an identical receptor point reference for Jumbo Evans Sports Park. Jumbo Evans Sports Park is a most used common name, thus used for clarity).
4/ Resource is a different name, different point, but same resource as Niemetz Park.

Sources: ATAC Corporation, Appendix I: *Noise Technical Report*, Supplement 4.1 *Inventory*. ATAC Corporation, AEDT 3d and NOISEMAP modeling results, August 2022.
Prepared by: ATAC Corporation, September 2022.

The following presents a brief discussion of the resource attributes and features relevant to the applicability for potential constructive use:

- Cibolo: See Niemietz Park, below. The unique point as identified for this named 4(f) resource is located at the north end of Niemietz Park between the football field and the Farm to Market Road 78.
- Cibolo: See Niemietz Park, below. The unique point as identified for this named 4(f) resource is located at the north end of Niemietz Park between the football field and the Farm to Market Road 78.
- Crescent Bend Nature Park:[61] This park, accessed off Schaefer Road, is owned and managed by the City of Schertz and is bordered on the northwest and north by Cibolo Creek, and single family residential on the south, southwest, and west. The park was once a private residential neighborhood that frequently flooded and was eventually purchased and converted to public use in 2009. The park features bird blinds, picnic grounds, and a 1.3 mile walking trail with restroom facilities. The avian diversity and general wildlife presence is well documented. The park is immediately adjacent to Niemietz Park at the northern edge across the Cibolo River. The park is approximately 2.2 miles east-northeast of the RND Study Airport Runway 15L/33R complex and is located below the downwind arrival and upwind departure paths for RND.
- Niemietz Park[62]: Located in the City of Cibolo and accessed off Farm to Market Road 78 at the north end. The park was dedicated in 1977 as a Land and Water Conservation Project (making this a Section 6(f) resource) sponsored by the City of Cibolo, Texas Park and Wildlife Department, the Bureau of Outdoor Recreation and the United States Department of the Interior. The park features a lighted football/soccer field, lighted baseball diamond, walking trails, playground, parking, and public facilities for meetings and events. The park is immediately adjacent to Crescent Bend Nature Park and across the Cibolo River at the southern edge. The park is approximately 2.4 miles east-northeast of the RND Runway 15L/33R complex and is located under the downwind arrival and upwind departure paths for RND.

61 https://friendscbnp.zenfolio.com/, Accessed September, 2022.
62 https://cibolotx.gov/Facilities/Facility/Details/Niemietz-Park-4, Accessed September 2022.

- Park, Cibolo, City of: See Niemietz Park, above. The unique point as identified for this named 4(f) resource is located behind home plate of the baseball diamond in Niemietz Park.
- Park Lane Park:[63] This park is a neighborhood corner park located on the south corner of the Bat Cave Road and Park Lane Drive intersection in the City of Garden Ridge. It is located approximately 7.6 miles north-northeast of RND. It is considered a "pocket park" along with 3 other parks in the City and is bordered on the south and east sides by residences. The park features parking, picnic tables, a gazebo, and water fountain. The park historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.
- Bulverde Community Park:[64] This park is a 13 acre facility dedicated in February 2014 and is owned and operated by the City of Bulverde, located approximately 16 miles north of SAT. The park is bordered by residences and rural open land on 3 sides and is accessed from and located across Bulverde Lane from the privately owned and operated Bulverde Airpark (FAA identifier 1TT8).[65] The park features parking, 0.77 miles of walking paths, baseball diamond, multi-sport practice fields, a basketball court, playground, pavilions, gazebo, and restrooms. The FAA remarks for the Airpark users include the following translation from the literal print FAA uses for aviation shorthand: "Use extreme caution for high performance military aircraft from Randolph Air Force Base at or above 3000 feet MSL Monday through Friday 8am-10pm and when tower hours extend by Notices to Air Missions (NOTAMS), occasional Saturdays and Sundays." The park historically experienced overflight arrival and departure traffic from SKF and SAT as well.
- Jumbo Evans Sports Park:[66] This park is approximately 65 acres and is owned and operated by Comal County located approximately 24.8 miles north northeast of SAT. The park is bordered by rural and commercial land on the north and residential land to the south. Access is off of US Highway 281on Jumbo Evans Boulevard. The park features 7 soccer fields, 4 baseball fields, a football field, and six tennis courts with a pavilion. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Natural Bridge Caverns: This unique point is located in the public area of the for-profit privately-owned and operated attraction immediately south of the main buildings and parking lot. The area is accessed from Natural Bridge Caverns Road and is bordered by Natural Bridges Wildlife Ranch to the East, the Cibolo Bluffs Nature Preserve to the west, the Bracken Cave Bat preserve to the south, and private rural land to the north. This underground natural cavern discovered in 1960 is the largest known commercial cavern in Texas ranging from the entrance at ground level to 230 feet below ground and is listed as a State Historical Site and a National Natural Landmark[67]. The co-located area known as the Natural Bridge Caverns Sinkhole Site is an underground archaeological preservation area listed in the National Register of Historic Places (see Section 5.3) and is an undisclosed and off limits to the public due to the significant resources present in the Sinkhole. The resource historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.

63 https://www.ci.garden-ridge.tx.us/114/Parks, Accessed September, 2022.
64https://bulverdetx.gov/168/Bulverde-Community-Park, Accessed September 2022.
65 https://nfdc.faa.gov/nfdcApps/services/ajv5/airportDisplay.jsp?airportId=1TT8, Accessed September 2022.
66 https://cceo.org/parks/jumbo-evans , Accessed September, 2022.
67 https://naturalbridgecaverns.com/natural-bridge-caverns-hires-general-manager-to-assist-with-future-growth, Accessed September 2022.

- Natural Bridge Caverns: This unique point is located in the public area immediately south of the main buildings and parking lot; see Natural Bridge Caverns, above.
- Pinta Trail in Kendall County:[68] This unique 4(f) resource point is located as a THC Marker on the north side of approximately 229 Ammann Road east of the City of Boerne in a rural residential area. No facilities are present other than the Historical Marker and a small single car gravel pull-off for viewing. The marker commemorates a rough corridor that extended from San Antonio northwest to Menard, Texas to serve as the eventual Upper Immigrant Trail used by the Forty-Niners on their way to the California gold fields. No actual trail is at or near the site nor are any resources other than the commemorative marker. All surrounding property save and except Ammann Road and associated right-of-way or other utility rights-of-way is residential and rural private property. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Pinta Trail in Kendall County: This unique 4(f) resource point is located feet from the above-referenced Pinta Trail in Kendall County unique point.

Constructive use of a 4(f) resource occurs when the impacts of a project on a Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the Section 4(f) property that contribute to its significance or enjoyment are substantially diminished. This means that the value of the Section 4(f) property, in terms of its prior significance and enjoyment, is substantially reduced or lost. Special consideration was given to noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks, national wildlife and waterfowl refuges and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. Parks and recreation plans and descriptions for Bexar, Blanco, Comal, Guadalupe, and Kendall Counties, state parks and recreation plans and regulations, and local parks and recreation plans and regulations were reviewed for quiet enjoyment and noise intrusions, with a focus on the identified APEs within the areas of reportable noise. Amplified noise is the primary land use or zoning tool used to describe noise intrusions, while “quiet hours” are generally a rule in camping areas between 10pm and 6am. These hours are related to camper behavior and are not attributed to external noise. However, no specific descriptions of resources being managed for natural quiet were found that would indicate expectations of prior use and enjoyment thresholds.

In reviewing the aforementioned properties, the historic incidence of overflight, and the respective dB DNL changes in 2023 and 2028, the noise would need to be at levels high enough to have negative consequences of a substantial nature that amount to a taking of a resource or portion of a resource for air transportation purposes. Due to the reportable noise values that are less than significant noise values, the FAA does not find that the reportable noise values amount to a taking of a park or a portion of a park, nor does the reportable noise diminish the significance or enjoyment of the 4(f) resource. Thus, the Proposed Action, when compared to the No Action alternative, would not result in a constructive use of the aforementioned Section 4(f) resources.

As stated in Section 5.9, the Proposed Action, when compared with the No Action Alternative, would not cause a significant visual impact in 2023 and 2028. Any changes in aircraft traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of the Section 4(f) resources. As stated in Section 5.3, there would be no physical taking of a Section 106 property or adverse effects that would substantially impair a Section 106 resource’s historical integrity, thus there would be no potential for “use” under Section 4(f) of those resources. Therefore, the Proposed Action would not result in potential impacts to

68 https://www.fbgtx.org/928/Pinta-Trail, Accessed September 2022.

Section 4(f) resources. Similarly, because there would be no constructive use of Niemietz Park as a Section 4(f) park, as a Section 6(f) public outdoor recreation area, there would be no use or conversion of a Section 6(f) resource.

Under the No Action Alternative, no changes to air traffic routes in the San Antonio Airspace Modernization Project would occur in either 2023 or 2028, and no effects related to changes in aircraft noise exposure or impairment to the view or setting of Section 4(f) resources would be anticipated. Therefore, the No Action Alternative would not result in potential impacts to Section 4(f) resources or 6(f) resources.

5.3 Historic and Cultural Resources

This section discusses the analysis of impacts to historic and cultural resources under the Proposed Action and the No Action Alternative. Section 4.2.3 provides information on historic or cultural resources within the General Study Area and 18,000 Foot Study Area. The FAA initiated consultation with the State Historic Preservation Officers (SHPOs) for the State of Texas and Tribal Historic Preservation Officers (THPOs) of Indian tribes that may have interests within the General Study Area in October, 2022, in accordance with Section 106 of the *National Historic Preservation Act of 1966* (16 U.S.C. § 470 *et seq*.) and the implementing regulations at 36 C.F.R. Part 800. The original outreach effort included contacting eight tribes with identified interests in the Counties of the General Study Area in the outreach. For additional information, see Appendix A – *Agency Coordination, Public Involvement, and List of Receiving Parties*. There are no tribal lands located within the General Study Area or revised Areas of Potential Effect (APEs). The FAA is in the process of consulting with federal and state agencies regarding the APEs.

5.3.1 Summary of Impacts

The aircraft noise exposure analysis indicates that there would be no significant impact to the noise environment at any historic or cultural resources under the Proposed Action compared with the No Action Alternative. The aircraft noise exposure analysis indicates there would be reportable noise increases (see Exhibits 5-1 and 5-2) in the vicinity of Bulverde, Spring Branch, and Cibolo within the General Study Area. Changes in historic and current aircraft traffic patterns would occur at altitudes and distances from viewers that would not substantially impair the view or setting of historic or cultural resources or those resources potentially eligible for NHRP listing. The Proposed Action would not directly or indirectly change any known characteristics qualifying or potentially qualifying a historic resource for inclusion in or its eligibility for the NRHP. Consultation is ongoing regarding historic resources in the APEs. No adverse effects to historic or cultural resources under the Proposed Action would be anticipated for either 2023 or 2028.

Under the No Action Alternative, no changes to air traffic routes in the San Antonio Airspace Modernization Project would occur in either 2023 or 2028 and no changes to aircraft noise exposure or changes in aircraft overflight patterns over historic or cultural resources would be anticipated. Therefore, no historic or cultural resources would be affected by aircraft noise, nor would there be any visual impacts at historic or cultural resources under the No Action Alternative.

5.3.2 Methodology

Section 106 of the National Historic Preservation Act of 1966 requires the FAA to consider the effects of its undertakings on historic properties listed or eligible for listing in the NRHP. **Exhibit 4-4** in Section 4.2.3 shows the historic and cultural resources listed on the NRHP that are found within the General Study Area. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion

in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The Proposed Action is located over and above the ground and would not involve the construction, disturbance, or alteration of any physical structure on, in, or emanating from the ground. Resources were obtained from multiple federal, state, and local georeferenced databases specific to Section 106 resources. These are identified in Appendix I: *Noise Technical Report*. Consistent with the Section 106 regulations, the FAA has focused its analysis on whether the Proposed Action would introduce visual elements or noise effects that would diminish the integrity of any historic properties.

Federal regulations require the FAA to define an APE as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[69] At the time of project initiation, the FAA had initially defined the APE as contiguous with the General Study Area boundary in order to ensure capturing the broadest range of resources. Overflights may vary for any number of reasons (e.g. weather, ATC vectors, ATC safety factors, aircraft performance capability), both related and unrelated to flight procedures. The flight procedures themselves have overflight variance within acceptable safety parameters of precision and accuracy. The FAA subsequently determined that the Proposed Action would not introduce aircraft overflights to any area within the General Study Area where they do not or have not already occurred given the extensive military and civilian aviation history within the General Study Area. Accordingly, the FAA redefined the APE to focus on the potential for the Proposed Action to cause adverse effects, primarily based on noise, on Section 106 resources. Once the FAA identified the instances of reportable noise (see Section 5.1.3), the reportable noise receptor points depicted in Exhibits 5-1 and 5-2 were combined into geographically proximate areas and bounded. The redefined APEs were determined based upon the 2023 and 2028 reportable noise results. The FAA presented both the original and these redefined APEs to the Texas SHPO and Tribal THPOs for consultation purposes.

Noise exposure levels at points representing historic properties in the redefined APE were calculated to determine potential adverse effects. Noise exposure results for the uniform grid points located at 0.5 NM intervals throughout the APE were evaluated to identify potential adverse noise effects on historic properties that are eligible but may not be listed on the NRHP, or whose exact location may not be disclosed. See **Table 5-5**, below. The 0.5 NM grid provides noise results within 2,148 feet or less of any location within the General Study Area. For noise exposure levels at NRHP listed properties within the General Study Area, see Appendix I: *Noise Technical Report*. State listed properties with the THC include NRHP properties, and other similar state and local databases may result in multiple receptor points for the same resource, multiple resources for the same receptor point, or different names and different receptor points for the same resource.

Consultation with the Texas SHPO is ongoing with respect to the APEs and the FAA's methodology for assessing potential effects on historic properties. Communication regarding the resources, methodology, and preliminary draft conclusion of this EA are ongoing with the SHPO.

Table 5-5 Section 106 Resources Exposed to Reportable Aircraft Noise – 2023 and 2028

Resource as Named	+5.0 db DNL or Greater Value by Alternative	
	2023	2028
Boehm		6.72
Kuebel		7.28
Kupferschmidt		5.80
Natural Bridge Caverns Sinkhole[1]		8.37
Poss		5.48

69 Title 36 CFR 800.16(d).

Resource as Named	+5.0 db DNL or Greater Value by Alternative	
	2023	2028
Prasch		6.25
Romple #1		5.25
Romple #2		5.18
Scharmann		5.14
Spring Branch		5.74
Stahl		6.04
Traughott #2		6.55
Tristan Grave		5.39

Note:
/1 This resource is undisclosed except to licensed archaeologists, so the FAA is using the nearby named 4(f) resource "Natural Bridge Caverns" as the preliminary location of the unknown but reasonably nearby Sinkhole location. Additionally, closely spaced 0.5nm grid point receptor values across the General Study Area are always less than 2,148 feet away from any 0.5nm grid point should the chosen resource be no nearer.
/2 With the exception of the Natural Bridge Caverns Sinkhole, no other Section 106 THC listed resources presented here are NHRP listed. All THC listed Section 106 resources are assumed to be resources potentially eligible for NRHP listing.

Sources: ATAC Corporation, Appendix I: *Noise Technical Report*, Supplement 4.1 *Inventory*. ATAC Corporation, Texas Historic Commission Atlas (https://atlas.thc.texas.gov/ [Accessed August, September, October, 2022]). AEDT 3d and NOISEMAP modeling results, August 2022.
Prepared by: ATAC Corporation, September 2022.

- Boehm: This unique THC Section 106 resource point is a cemetery with at least 3 graves located on private property at or about 22420 Bat Cave Road in San Antonio approximately 150 feet north of a power transmission line right of way. It is located 7.8 miles north-northwest of RND. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.
- Kuebel: This unique THC Section 106 resource point is located at 1310 Whispering Water in the City of Spring Branch Extra Territorial Jurisdiction (ETJ) area of Comal County. The FAA was unable to verify the private or public ownership of the vacant lot. It is approximately 250 feet west of the Guadalupe River. It is located 14.28 miles north of SAT. The resource location was verified and is on a vacant lot in a residential setting between two residences. No signs or markers are present, nor is the area fenced to prevent access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Kupferschmidt: This unique THC Section 106 resource point is a cemetery located on unimproved private property at 30547 Blanco Road in Bulverde at the intersection of Green Pastures and Blanco Road. It is located 22.35 miles north-northeast of SAT. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.
- Natural Bridge Caverns Sinkhole: This unique point is an underground, undisclosed location on private property in the vicinity of the underground Natural Bridge Caverns 4(f) resource described in Section 5.2. For the purposes of analysis, FAA assumed the same location as Natural Bridge Caverns, however, multiple 0.5NM evenly spaced grid points with reportable noise are also in the immediate vicinity should the actual location need to be disclosed to qualified FAA archeological personnel for further analysis. The underground archaeological preservation area is accessed from Natural Bridge Caverns Road and is National Register of Historic Places listed (2004 NRHP reference #04001202). It is undisclosed and off limits to the public due to the significant historic resources present in the Sinkhole under the Archaeological Resources Protection Act of

1979[70]. The resource historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.

- Poss: This unique THC Section 106 resource is a cemetery on private property at 1051 Comanche Drive in Comal County east of the intersection of Blanco Road and Comanche Drive. It is located 14.0 miles north of SAT. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Prasch: This unique THC Section 106 resource point is a cemetery on private property in the vicinity of 91 West Specht Road in Bulverde off the intersection of Aleman Way and Ludwig Trail. It is located approximately 14.1 miles north of SAT. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Romple #1: This unique THC Section 106 resource point is a cemetery on private property at approximately 6040 Farm to Market Road 1863 in Bulverde. It is located approximately 13.9 miles north northeast of SAT. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Romple #2: This unique THC Section 106 resource point is a cemetery on private property approximately 645 feet south of Romple #1, above.
- Scharmann: This unique THC Section 106 resource point is a cemetery on private property with no public access approximately 950 feet southwest of the previously cited, privately owned and operated Bulverde Airpark (FAA identifier 1TT8). The resource location was verified and has no public access except on foot from a gas line right-of way. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT as well as local 1TT8 traffic (1TT8 is not a Study Airport).
- Spring Branch (also referred to as “Gass” by THC): This unique THC Section 106 resource point is a cemetery containing over a dozen plots with above ground granite headstones and gated public access at approximately 13745 US-281 in Spring Branch. It is located approximately 27.16 miles north northeast of SAT. The resource historically experienced overflight arrival and departure traffic from RND, SKF, BAZ, and SAT.
- Stahl: This unique THC Section 106 resource point is a cemetery on private property approximately 360 feet north of 30235 Heimer Cove in Bulverde appearing to be in the public right of way of Heimer Cove. There is no marker or sign visible from the roadway and no dedicated pull-off from the roadway. It is approximately 890 feet northeast of the previously cited, privately owned and operated Bulverde Airpark (FAA identifier 1TT8). In addition to regular and historic 1TT8 overflight, the resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.
- Traughott #2 (THC also refers to the spelling as “Traugott”): This unique THC 4(f) resource point is on private property with no public access approximately 1.9 miles west of the previously cited, privately owned and operated Bulverde Airpark (FAA identifier 1TT8). The resource location was verified at 30450 Leroy Scheel Road in Bulverde and has no public access. The resource historically experienced 1TT8 Airpark historic and current overflight as well as arrival and departure traffic from RND, SKF, and SAT.

70 16 U.S.C. 470hh

- Tristan Grave: This unique THC Section 106 resource point is a cemetery on private property at 31361 Blanco Road in Bulverde north of Adams Road. It is approximately 15.16 miles from SAT. The resource location was verified and has no public access. The resource historically experienced overflight arrival and departure traffic from RND, SKF, and SAT.

The analysis of potential impacts to the Section 106 listed and eligible resources identified above considers whether these resources would experience a significant noise increase, when comparing the Proposed Action with the No Action Alternative, using the applicable thresholds shown in Table 5-2. Properties exposed to DNL 65 dB or higher under the Proposed Action and an increase of DNL 1.5 dB or higher may be considered to be potentially adversely affected by the Proposed Action. Reportable increases in noise were detected for resources listed within the THC Atlas, with each of these assumed to eligible for the NRHP, and one listed with the NRHP. These properties would be exposed to noise between DNL 45 dB and lower than 65 dB, thus the FAA considered further whether the increase would result in an adverse effect on historic or cultural resources. The noise analysis indicated a reportable change to the resources identified above within the APEs.

Aircraft have been operating in the area, and therefore have been visually present, since approximately 1916 with the leasing of 500 acres for Stinson Municipal Airport and the primary tenant of Stinson Flying School. The flying school was taken over by the US Government from 1917-1919 to train military pilots.[71] Roughly six miles away, SKF was officially receiving military aircraft in April 1917, and quickly became the primary military aviation training facility in the US by graduating thousands of pilots supporting World War I.[72] In the later part of World War II, SKF employed 15,000 civilians and 16,000 military members. From 1927-1930, RND was constructed and in 1931 RND opened their first military primary flying school with thousands of graduates by 1935 and the earliest military jet aircraft arriving in the mid-1950's.[73] On the commercial front, SAT airport was opened in 1941 and became San Antonio Internal Airport in 1944. Jet traffic has served the region since the mid-1950s. An archaeological property has been identified whose location is undisclosed within an APE due to the proprietary and sensitive nature of those resources and cemeteries have been identified as historic resources. In these instances, the FAA does not anticipate at this time that the reportable noise increases within the APEs would diminish the integrity of any cemetery or below ground sinkhole resources for which the setting contributes to historical or cultural significance. Consultation and historic review is ongoing.

5.3.3 Potential Impacts – 2023 and 2028

As stated in Section 5.1, the Proposed Action, when compared with the No Action Alternative, would not result in changes in aircraft noise exposure in 2023 or 2028 that would exceed the FAA's significance threshold for noise increases to Section 106 resources. Noise analysis results for Section 4(f) resources can be found in Appendix I: *Noise Technical Report*.

For 2023 and 2028, no listed Section 106 resources would experience a DNL 1.5 dB increase or decrease in areas exposed to DNL of 65 dB and higher, nor would they experience a reportable noise increase or decrease of DNL 3 dB in areas exposed to DNL 60 dB to 65 dB. For 2023, **Table 5-5** identifies the 13 2028 Section 106 listed and potentially eligible resources experiencing a greater than DNL 5 dB increase in areas exposed to DNL 45 dB to 60 dB for 2023 and 2028.

As stated in Section 5.1, when compared with the No Action Alternative, the Proposed Action would not result in changes in aircraft noise exposure in 2023 or 2028 that would exceed the

71 https://history.txtransportationmuseum.org/san-antonio-airports/, Accessed August 2022.
72 https://www.kellyheritage.org/1917-1941era.php, Accessed July 2022.
73 https://en.wikipedia.org/wiki/Randolph_Air_Force_Base, Accessed September 2022.

FAA's significance threshold for noise. The historic and archaeological properties in the APEs are anticipated to experience no effect in their continuing potential eligibility for NRHP listing from implementation of the Proposed Action due to the historic and continuing substantial overflight presence of civilian and military propeller aircraft since 1917, and civilian and military jet aircraft since the mid-1950s. The single NHRP listed Section 106 property is an underground resource, and is not subject to overflight noise that would introduce an atmospheric, audible, or visual feature to the area that would diminish the integrity of the property's significant historic features, all of which are below ground. Therefore, the Proposed Action is not anticipated to result in an adverse effect to historic or cultural resources. Noise analysis results for historic and cultural resources located within the General Study Area, as well as the refined APEs reflecting reportable noise, can be found in Appendix I: *Noise Technical Report.*

Under the No Action Alternative no changes to air traffic routes in the San Antonio Airspace Modernization Project would occur in either 2023 or 2028, and no adverse effects related to changes in aircraft noise exposure would be anticipated. Therefore, the No Action Alternative would not result in an adverse effect to historic or cultural resources.

5.4 Wildlife (Avian and Bat Species) and Migratory Birds

This section discusses the analysis of potential impacts to avian and bat species under the Proposed Action and the No Action Alternative.

5.4.1 Summary of Impacts

The greatest potential for impacts to wildlife species would result from wildlife strikes on avian and bat species at altitudes below 3,000 feet AGL. Changes to flight paths under the Proposed Action would primarily occur at or above 3,000 feet AGL. Further, the Proposed Action would not increase the frequency of military or civilian flight operations. Therefore, the Proposed Action would not result in significant impacts to avian and bat species when compared with the No Action Alternative.

The No Action Alternative would not involve changes to air traffic flows, land acquisition, construction, or other ground disturbance activities. Therefore, the No Action Alternative would not result in significant impacts to fish, wildlife, or plants.

5.4.2 Methodology

The FAA's *Wildlife Strike Database* is the best information available for assessing potential impacts of aircraft on wildlife for civilian airports. Strike reports over the past 32 years are aggregated nationally as well as for individual airports and are available from the database to understand existing conditions. Strike reports are comparable to known information on the presence of specific species of concern to corroborate the reports. The FAA has initiated consultation with the USFWS to ascertain any additional factors useful to determining potential adverse effects.

This analysis involved a review of wildlife strike reports[74] for the Study Airports that have primarily civilian air traffic (SAT and BAZ) under both the Proposed Action and the No Action Alternative, and an evaluation of the potential for the presence of federal- and state-listed threatened and endangered species (i.e., special-status species) within the 18,000' Study Area and the Supplemental Study Area. The FAA compared modifications in flight procedures to the

74 U.S. Department of Transportation, Federal Aviation Administration, *Wildlife Strike Database* (http://www.faa.gov/airports/airport_safety/wildlife/database/ [Accessed August 2022]).

occurrence of special-status species to qualitatively assess the likelihood of whether wildlife strikes might change under the Proposed Action.

The USAF maintains aggregate data across the service and does not provide airfield-specific breakdowns in a fashion similar to the FAA. However, the aggregate data available does identify species and phase of flight aggregate data. The FAA compared modifications in flight procedures to the occurrence of special-status species to qualitatively assess the likelihood of whether wildlife strikes might change under the Proposed Action.

5.4.3 Potential Impacts – 2023 and 2028

A significant impact would be likely to occur if the Proposed Action were to jeopardize the existence of special-status species or result in destroying or adversely modifying critical habitat in the General Study Area. Changes to flight paths under the Proposed Action would primarily occur at or above 3,000 feet AGL, so there is no potential for these effects in the General Study Area. The FAA is conducting on-going consultation to obtain any noise related potential thresholds for adverse effects. Accordingly, the analysis is focused on the potential for significant impacts to species resulting from increased wildlife strikes with aircraft.

Since 1990, the FAA has compiled reports of wildlife strikes with aircraft. The information is available to the public through the FAA's *Wildlife Strike Database* and the "Annual Report: Wildlife Strikes to Civil Aircraft in the United States." Between 1990 and 2021, the Wildlife Strike Database reported 238,652 wildlife strikes nationally.[75] Of the records that identify the type of animal involved in the strike incident, birds represent 96 percent of all strikes.[76] Of those records, for commercial and GA aircraft, 71 percent of the strikes occurred at or below 500 feet AGL and declined by 32 percent for every 1,000-foot gain in height for commercial aircraft and 43 percent for general aviation aircraft. The Wildlife Strike Database reports that of identified species, waterfowl, gulls, and raptors are the species groups of birds with the most damaging strikes.[77] No state or federally listed or eligible species were identified in reviewing generalized military strike records containing species identification and a specific 32 year period for FAA civilian strike records for SAT and BAZ.

Table 5-6 provides a summary of wildlife strikes reported for the two civilian owned and operated Study Airports (BAZ and SAT) between January 1, 1990 and December 31, 2021 (32 years). The US Military maintains no publically accessible and location-specific bird strike data for RND or for SKF. However, anecdotal data about the Bird/Wildlife Aircraft Strike Hazard (BASH) program at Joint Base San Antonio has been published in military news articles and publically released environmental documents. According to the 12th Flying Training Wing BASH manager, RND in 2019 averaged 38 bird strikes per year and SKF averages 50 bird strikes per year.[78] No time frame of reference for the averages is given, however, between 2015 and 2019, RND had 314 bird strikes, which was a slightly higher 62.8 strikes per year average.[79] RND also cites 51 bird strikes in federal fiscal year 2020.[80] No similar data or analyses can be located for SKF.

The *Migratory Bird Treaty Act (MBTA) of 1918* (16 U.S.C. §§ 703–712) protects all the bird species identified in these reports. Furthermore, federal and state laws protect listed endangered and threatened species. In Chapter 4, **Table 4-2** identifies the six federally-listed bird species and **Table 4-3** lists the six state-listed bird species found in counties in the 18,000 Foot Study Area.

75 Federal Aviation Administration. Wildlife Strikes to Civil Aircraft in the United States 1990-2021, July 2022
76 Id.
77 Id.
78 https://www.jbsa.mil/News/News/Article/1759554/bash-program-keeps-jbsa-kelly-field-safe/ February 15, 2019. Accessed July 12, 2022.
79 US Air Force. *BASH Risk Mitigation through Habitat Management Draft Environmental Assessment*. Page 1-4. May, 2021.
80 Id. at Page 2-1

None of the bird strike reports at the Study Airports included the species listed in **Table 4-2** or **Table 4-3**.

The number of aircraft operations under the Proposed Action and No Action Alternative would be the same. Therefore, the assessment of the potential impacts focuses on changes to flight paths and the potential for impact due to wildlife strikes. As shown in **Table 5-6**, 296 of bird/bat strikes (an average of 9.2/year) occurred at altitudes above 3,000 feet AGL. According to the 12th Flight Training Wing BASH manager, from 2008-2019, approximately 62 percent of the bird strikes occurred during takeoff/landing or initial climb/approach operations at RND.[81]The decline in the number of civilian strikes reported above 3,000 feet AGL and USAF strikes above the takeoff/landing or initial climb/approach operational phases of flight indicates that there is a decreasing likelihood of bird/bat strikes at higher altitudes. Under the Proposed Action, changes to proposed flight paths would primarily occur at or above 3,000 feet AGL and no significant changes to arrival and departure corridors below 3,000 feet AGL would be expected. Military aircraft aircrews would adhere to existing flight safety regulations and BASH protocols to avoid impacts on migratory birds. Aircraft transiting to and from RND and SKF are generally between 7,000 feet and 18,000 feet AGL. Continuing adherence to existing BASH protocols would limit the potential adverse effects. Therefore, no effects on biological resources would be expected due to continued military aircraft operations for SAT and RND. Therefore, no significant impacts to avian or bat species would occur.

The No Action Alternative would not involve changes to air traffic flows, land acquisition, construction, or other ground disturbance activities. Therefore, no impacts to avian or bat species would occur.

Table 5-6 FAA Wildlife Strike Records for BAZ and SAT by Altitude (1990 – 2021)

Type of Strike	Civilian Airport	3,000 ft. AGL or less	>3,000 ft. AGL to ≤ 10,000 ft. AGL	Greater than 10,000 ft. AGL	Total
Identified Bird and Bat Species	BAZ	10	0	0	10
	SAT	2,786	286	10	3,082
Total		2,796	286	10	3,092
Annual Average		87.4	8.9	0.3	96.6

Source: U.S. Department of Transportation, Federal Aviation Administration, *FAA Wildlife Strike Database* (https://wildlife.faa.gov/search [Accessed August 2022]).
Prepared by: ATAC Corporation, August 2022.

5.5 Environmental Justice

This section presents a summary of the analysis of environmental justice impacts under the Proposed Action and the No Action Alternative.

5.5.1 Summary of Impacts

Neither the Proposed Action nor the No Action Alternative would displace people or businesses; therefore, implementing the Proposed Action or No Action Alternative would not result in direct impacts in this category. No areas within the General Study Area would experience significant impacts to air quality or noise. While some areas would be exposed to reportable noise increases of DNL 5 dB within areas exposed to DNL 45 to 60 dB, these would not constitute a significant impact related to a change in DNL exposure to people, including members of minority and/or low-income populations (see Section 5.1). Moreover, the FAA has engaged and is engaging with environmental justice communities within the study area and has not identified impacts that would

81 Id. at Page 1-4

affect an environmental justice population in a way that would be unique to the environmental justice population and significant to that population. Therefore, no disproportionately high and adverse effects to minority populations or low-income populations would occur under either the Proposed Action or the No Action Alternative.

5.5.2 Methodology

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that federal agencies include environmental justice as part of their mission by identifying and addressing as appropriate, the potential for disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Environmental justice applies to all environmental resources. Therefore, a disproportionately high and adverse human health or environmental effect on minority and low-income populations may represent a significant impact. **Table 4-4** identified those counties in the General Study Area who have minority and/or low-income census block groups of concern for consideration of a disproportionately high and adverse human health or environmental effect. Out of those listed in **Table 4-4**, no counties would experience FAA-defined significant noise. Bexar is the only county with a minority population of concern that would experience aircraft overflight resulting in reportable noise.

5.5.3 Potential Impacts – 2023 and 2028

Under the Proposed Action, neither people nor businesses would be displaced. As discussed in Section 5.1, under the Proposed Action, no census block centroids in the General Study Area, and therefore no minority or low-income population, would experience a change in noise exposure in 2023 or 2028 that exceeds any of the FAA's significance thresholds for noise impacts on people. No census block centroids in Bexar County, as an environmental justice minority population of concern, were identified for reportable noise. Guadalupe, Kendall, and Comal Counties each had reportable noise census centroids representing 573 persons in 2023 and 8,168 persons in 2028, but each County is below the General Study Area average in minority or low-income populations. Therefore, no adverse direct or indirect effects would occur to any environmental justice populations within the General Study Area under the Proposed Action for 2023 and 2028.

Under the No Action Alternative, neither people nor businesses would be displaced. Furthermore, air traffic routes would not change and there would be no change in aircraft noise exposure in 2023 or 2028 that could result in an indirect impact. Therefore, the No Action Alternative would not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.

5.6 Energy Supply (Aircraft Fuel)

This section discusses whether changes in the movement of aircraft would result in measurable effects on local energy supplies under the Proposed Action and the No Action Alternative.

5.6.1 Summary of Impacts

In comparison to the No Action Alternative, the Proposed Action would result in a slight increase in aircraft fuel consumed in 2023 of 1.59 percent. The Proposed Action would result in a slight increase in aircraft fuel consumed in 2028 of 1.59 percent. These increases would not be expected to be disruptive to or meaningfully affect local aircraft fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

The No Action Alternative would not involve changes to air traffic flows, construction, or other ground disturbance activities. Therefore, the No Action Alternative would not result in the depletion of local energy supply.

5.6.2 Methodology

The Proposed Action would involve changes to air traffic flows during the departure, descent, and approach phases of flight. These changes affect both the route an aircraft may follow as well as its climb-out and descent profiles. This in turn may directly affect aircraft fuel consumed. Aircraft fuel consumption is considered a proxy for determining whether the Proposed Action would have a measurable effect on local fuel supplies when compared with the No Action Alternative.

In addition to calculating aircraft noise exposure, the FAA's AEDT 3d model calculates aircraft-related fuel consumption (e.g., AAD flight schedules, flight tracks, and runway use). See Section 5.1.2 and Appendix I: *Noise Technical Report* for further discussion on AEDT 3d input data. NOISEMAP does not calculate fuel consumption, thus no consumption was calculated for aircraft arriving and departing SKF and RND. Determining the difference in fuel consumption between alternatives can be used as an indicator of changes in fuel consumption resulting from implementation of the Proposed Action when compared with the No Action Alternative.

5.6.3 Potential Impacts – 2023 and 2028

Table 5-7 presents the results of the fuel consumption analysis for the Proposed Action and No Action Alternative. In comparison to the No Action Alternative, the Proposed Action would result in a relatively small increase in aircraft fuel consumed in 2023 of 1.59 percent. The proposed Action would result in a slight increase in aircraft fuel consumed in 2028 of 1.59 percent. The FAA expects that when compared with the No Action Alternative, the Proposed Action would not have a measurable effect on local fuel supplies. Therefore, no significant impacts to energy supply would be anticipated.

Table 5-7 Energy Consumption Comparison

	2023		2028	
	No Action Alternative	**Proposed Action**	**No Action Alternative**	**Proposed Action**
Fuel Consumption (MT)	231.25	234.92	263.27	267.46
Weight Change (MT) (Proposed Action – No Action Alternative)		3.67		4.19
Percent Change from No Action Alternative		1.59%		1.59%

Note: MT = Metric Ton

Source: ATAC Corporation, AEDT 3d modeling results, September 2022.
Prepared by: ATAC Corporation, September 2022.

5.7 Air Quality

This section discusses the analysis of air quality impacts under the Proposed Action and the No Action Alternative.

5.7.1 Summary of Impacts

The Proposed Action would result in a slight increase in emissions when compared to the No Action Alternative. However, changes to flight paths under the Proposed Action would primarily

occur at or above 3,000 feet AGL and are presumed to conform to the applicable state implementation plans (SIPs). Furthermore, changes to flight paths below the mixing height are also presumed to conform when modifications to procedures are designed to enhance operational efficiency. The slight increase in emissions is expected to have little if any effect on emissions or ground concentrations. Therefore, no significant impacts to air quality would be anticipated.

The No Action Alternative would not result in a change in the number of aircraft operations or air traffic routes; therefore, no impacts to air quality would be anticipated.

5.7.2 Methodology

Typically, significant air quality impacts would be identified if an action would result in the exceedance of one or more of the NAAQS for any time period analyzed.[82] Section 176(c) of the *Clean Air Act* requires that federal actions conform to the appropriate SIP in order to attain the air quality goals identified in the CAA. However, a conformity determination is not required if the emissions caused by a federal action would be less than the *de minimis* levels established in regulations issued by EPA.[83] FAA Order 1050.1F provides that further analysis for NEPA purposes is normally not required where emissions do not exceed the EPA's *de minimis* thresholds.[84] The EPA regulations identify certain actions that would not exceed these thresholds, including ATC activities and adoption of approach, departure, and en route procedures for aircraft operations above the mixing height specified in the applicable SIP (or 3,000 feet AGL in places without an established mixing height). In addition, the EPA regulations allow federal agencies to identify specific actions as "presumed to conform" (PTC) to the applicable SIP.[85] In a notice published in the Federal Register, the FAA has identified several actions that "will not exceed the applicable *de minimis* emissions levels" and, therefore, are presumed to conform, including ATC activities and adoption of approach, departure, and en route procedures for air operations.[86] The FAA's PTC notice explains that aircraft emissions above the mixing height do not have an effect on pollution concentrations at ground level. The notice also specifically notes that changes in air traffic procedures above 1,500 feet AGL and below the mixing height "would have little if any effect on emissions and ground concentrations."[87] Furthermore, "air traffic actions below the mixing height are also presumed to conform when modifications to routes and procedures are designed to enhance operational efficiency (i.e., to reduce delay)."[88]

5.7.3 Potential Impacts – 2023 and 2028

Under the Proposed Action there would be a slight increase in fuel consumption (1.59 percent) in 2023 and a slight increase in fuel consumption (1.59 percent) in 2028 when compared to the No Action Alternative. While increased fuel consumption corresponds with an increase in emissions, operational changes that could result in an increase in fuel consumption would occur at 3,000 feet AGL or above and would not result in an increase in emissions and ground concentrations. Any operational changes that could result in an increase in fuel consumption would occur at or above 3,000 feet AGL. Procedures above 3,000 feet AGL are considered a *de minimis* action, would have little if any effect on emissions and ground concentrations, and are presumed to conform to all SIPs for criteria pollutants. Therefore, no further air quality analysis is necessary, a conformity determination is not required, and the Proposed Action would not result in a significant impact to

82 FAA 1050.1F *Desk Reference*, Section 1, February 2020.
83 40 C.F.R. § 93.153(b).
84 FAA 1050.1F *Desk Reference (v2)*, Section 1, February 2020.
85 Id at 93.153(f).
86 Federal Presumed to Conform Actions under General Conformity, 72 Fed. Reg. 41565 (July 30, 2007).
87 Id.
88 Id.

air quality. The No Action Alternative would not result in a change in the number of aircraft operations or air traffic routes; therefore, no impacts to air quality would be anticipated.

5.8 Climate

This section discusses greenhouse gas (GHG) emissions and effects to the climate as they relate to the Proposed Action and the No Action Alternative.

5.8.1 Summary of Impacts

Although fuel consumption would increase slightly under the Proposed Action as compared to the No Action Alternative, no significant impacts to the climate would be anticipated.

The No Action Alternative would not result in a change in the number of aircraft operations or air traffic routes; therefore, no impacts to climate would be anticipated.

5.8.2 Methodology

In accordance with FAA guidance, estimated CO_2 emissions were calculated from the amount of fuel consumed under the No Action Alternative and the Proposed Action in 2023 and 2028 (see Section 5.8). The only GHG emissions AEDT calculates are CO_2 emissions from aircraft engines.[89] The resulting CO_2 emissions were then reported as CO_2e (carbon dioxide equivalent).

5.8.3 Potential Impacts – 2023 and 2028

Table 5-8 shows project-related CO_2e emissions. In 2023, the Proposed Action would produce approximately 741.16 MT of CO_2e, and the No Action Alternative would produce approximately 730.00 MT of CO_2e. This represents a slight increase of approximately 11.16 MT of CO2e or 1.53 percent under the Proposed Action when compared to the No Action Alternative. This would comprise less than 0.00000024 percent of U.S.-based CO_2e greenhouse gas emissions as reported for 2020.[90] Similarly, in 2028, the No Action Alternative would produce approximately 831.00 MT of CO_2e, and the Proposed Action would produce approximately 843.85 MT of CO2e. This represents a slight increase of approximately 12.85 MT of CO_2e or 1.55 percent under the Proposed Action when compared to the No Action Alternative. This would comprise less than 0.00000027 percent of U.S.-based CO_2e greenhouse gas emissions as reported for 2020.

Table 5-8 CO_2e Emissions – 2023 and 2028

	2023		2028	
	No Action Alternative	**Proposed Action**	**No Action Alternative**	**Proposed Action**
CO_2e Emissions (MT)	730.00	741.16	831.00	843.85
Weight Change (MT)		11.16		12.85
(Proposed Action – No Action Alternative)		1.53%		1.55%

Note: CO_2e = Carbon Dioxide Equivalent where the CO_2 Global Warming Potential conversion is 1.

Source: ATAC Corporation, AEDT 3d modeling results, September 2022.
Prepared by: ATAC Corporation, October 2022.

89 US Department of Transportation, Federal Aviation Administration, *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA, Section 1.1.3 Fuel burn and greenhouse gas emissions*, https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf, Accessed September 2022.
90 US Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020 Executive Summary* https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf, Accessed September 2022.

5.9 Visual Effects

This section discusses the analysis of visual impacts under the Proposed Action and the No Action Alternative.

5.9.1 Summary of Impacts

As stated in Section 5.1, implementation of the Proposed Action would not increase the number of aircraft operations at the Study Airports compared with the No Action Alternative. Changes in aircraft traffic movement under the Proposed Action are expected to be at altitudes and distances sufficiently removed from viewers that new visual impacts would not be anticipated.

Under the No Action Alternative, no changes in air traffic routes would occur and no changes in aircraft overflight would be expected. Therefore, the No Action Alternative would not result in visual impacts.

5.9.2 Methodology

As discussed in FAA Order 1050.1F, visual, or aesthetic, impacts are difficult to define and evaluate because of the subjectivity involved. Aesthetic impacts deal more broadly with the extent that the project contrasts with the existing environment and whether the difference is considered objectionable by the agency responsible for the location in which the project is set. Visual impacts are typically related to the disturbance of the aesthetic integrity of an immediate lateral foreground "view shed" (typically less than 0.5 mile) caused by development, construction, or demolition. Thus, these criteria would not apply to airspace changes which typically occur at vertical distances of over 0.5 mile or greater than 2,600 feet AGL. As noted in Sections 5.2 and 5.3, both 4(f) and Section 106 resources identified in this EA have current and historic day and night overflight of military and civilian aircraft beginning in 1917 and continuing to the current era.

To evaluate the potential for indirect impacts resulting from changes in aircraft routings and visual intrusion, the general altitudes at which aircraft route changes occur beyond the immediate airport environs which experience overflights on a routine basis and are considered to evaluate the potential for visual impacts.

5.9.3 Potential Impacts – 2023 and 2028

According to FAA Order 1050.1F, the visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact. Changes to flight paths under the Proposed Action would primarily occur at or above 3,000 feet AGL; therefore, the visual sight of aircraft and aircraft lights would not be considered intrusive. Close to the respective Study Airports, the lateral and vertical movement of aircraft is fixed by the length, location, and direction of a particular runway or runways. IFR military and civilian aircraft below 3,000 feet AGL are generally either on approach to a runway, or within the designated landing pattern for a specific runway. Similarly, aircraft departing a runway do so climbing on a departure runway heading, and typically alter course after exiting the immediate tower controlled airfield area. The Proposed Action does not consider aircraft repetitively landing and departing in a closed loop operation since they would not use flight procedures included in the Proposed Action. Consequently, the Proposed Action would not result in significant visual impacts. Neither the Proposed Action nor the No Action Alternative would result in significant visual impacts.

5.10 Cumulative Impacts

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Proposed Action with other actions. CEQ regulations define a cumulative impact as "an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions."[91] The regulations also state that cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

5.10.1 Summary of Impacts

The implementation of the Proposed Action when considered with other past, present, and reasonably foreseeable future actions would not be expected to result in significant cumulative impacts.

The No Action Alternative would not result in a change in the number of aircraft operations or air traffic routes; therefore, no cumulative impacts would be anticipated.

5.10.2 Methodology

Research was conducted to identify planned airport improvement projects at all Study Airports that in combination with the Proposed Action might result in cumulative environmental impacts relevant to the alternatives evaluated in this document. Due to the nature of the resources affected by the Proposed Action, only past, present, and reasonably foreseeable future actions that would have direct or indirect effects on aircraft flight patterns within the General Study Area were to be considered. Therefore, the type of projects that would be considered under the cumulative impact analysis were primarily limited to airfield projects, specifically projects that directly affect or involve runways and modifications to parallel taxiways. "Reasonably foreseeable future actions" refers to projects that would likely be completed and in-service before 2028.

The same significance thresholds used to determine impacts associated with the Proposed Action are applied to determine significant cumulative impacts. Because there is no potential for impact, those environmental resource categories that are not affected by the Proposed Action (listed in Section 4.1) are not further evaluated for cumulative impacts. Similarly, if no impacts to an environmental resource category were identified under the Proposed Action when compared to the No Action Alternative, then no further analysis for cumulative impacts was required.

5.10.3 Potential Impacts – 2023 and 2028

As stated in Section 5.10.2, research was conducted to identify relevant airport improvement projects related to runway and parallel taxiway changes. Sources reviewed included FAA, state, and local Capital Improvement Project lists and websites for all airports and associated state, county, and local planning, public works, and transportation agencies. FAA is conducting a VOR-MON program that will reduce the number of ground-based navigation aids over time to serve as a backup to PBN. However, the decommissioning would not typically require NEPA analysis and all changes to flight procedures as a result of VOR decommissioning (e.g. THX VOR) are cleared through NEPA. SAT is conducting a landside focused major terminal project, and an eventual series of improvements to the airport's airfield, including runway decoupling, runway lengthening, and other changes. The terminal project is not relevant to this analysis due to completion beyond 2028 and the Runway 31R decoupling lacks of a dependent utility to current flight procedures. A

91 40 C.F.R § 1508.7

future series of runway projects (lengthening, taxiway changes) are similarly not relevant to this analysis due to a lack of dependent utility and a time horizon for implementation extending beyond 2028 for which separate NEPA analysis will be conducted.[92] For the SAT Runway 31R decoupling project, a separate NEPA analysis or analyses would address amendments to that portion or those portions of the Proposed Action procedures that are dependent on the fixed location and elevation of SAT Runway 31R. No additional documents were identified that included information on past, present, and reasonably foreseeable future actions with the potential for direct or indirect effects on aircraft flight patterns within the General Study Area. Accordingly, no cumulative impacts would be anticipated for the Proposed Action when compared to the No Action Alternative for either 2023 or 2028.

92 https://flysanantonio.com/business/about-saas/strategic-development and https://flysanantonio.com/wp-content/uploads/2022/09/SAP_Executive-Summary_online.pdf, Accessed October 2022.

THIS PAGE INTENTIONALLY LEFT BLANK