2 Purpose and Need

Under NEPA, an EA must describe the purpose and need for the Proposed Action. The following sections discuss the need for the Proposed Action and provide specific examples of the problems in the Southern California Metroplex. This discussion is followed by a description of the purpose for the Proposed Action, the criteria that the FAA will use to evaluate the SoCal Metroplex Project alternatives, and the requested federal actions needed to complete the SoCal Metroplex Project.

2.1 The Need for the Proposed Action

In the context of an EA, "need" refers to the problem that the Proposed Action is intended to resolve. The problem in this case is the inefficiency of the existing aircraft flight procedures in the Southern California Metroplex. This is due to the use of older ground-based NAVAID technology when newer satellite-based RNAV technology is readily available. As described in Chapter 1, more than 90 percent of U.S. scheduled air carriers are equipped for some level of RNAV. However, under existing conditions[19], only 23 of the existing 96 procedures currently used in the Southern California Metroplex are RNAV procedures.

Conventional procedures lack efficiencies inherent in RNAV-based procedures. This is because they rely on technology that cannot provide specific navigational benefits for aircraft, including predetermined speeds or altitudes. Furthermore, as discussed in Section 1.2.5.1, conventional procedures are subject to lateral and vertical flight path limitations that are eliminated using 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.[20]

The following sections describe in greater detail the problem and the factors that have caused the problem. Explanations of the technical terms and concepts used in this chapter are found in Chapter 1, *Background*.

2.1.1 Description of the Problem

As previously stated, the Southern California Metroplex airspace can be improved to increase efficiency. Under existing conditions, 73 of the 96 existing procedures are conventional procedures which are less efficient than RNAV procedures. Efficiency decreases and procedural complexity increases in the Southern California Metroplex when ATC is required to use aircraft management tools and coordination techniques to provide separation services. These can include speed control, level flight segments, and vectoring.

[19] For purposes of this Environmental Assessment, "existing conditions" pertains to conditions for the period of December 1, 2012 through November 30, 2013 (the most recent year of radar data available). Existing conditions are further discussed in Chapter 4, Affected Environment.

[20] 49 U.S.C. § 40103(b).

In many situations, applying these tools and techniques increases the complexity of providing air traffic services and leads to less efficient aircraft operations and use of airspace. Aircraft management tools and coordination techniques are further discussed in Section 1.2.2., *Air Traffic Control within the National Airspace System*.

As described in Section 1.2.5.1, conventional procedures, compared to RNAV procedures, require larger areas of clearance to ensure accurate signal reception. As a result, conventional procedures typically require more airspace, are less efficient, and may result in increased controller and pilot workload due to the accuracy of the procedures. For example, it may be necessary for aircraft to fly an extended common route prior to diverging on their separate courses to their assigned exit fixes. To ensure appropriate separation between aircraft along the common route, controllers may employ airspace management tools, such as issuing speed control and/or vectors. This may result in more frequent controller/pilot, and controller/controller communication. This increased communication may result in less predictable flight paths due to the time needed for a controller to issue an instruction to a pilot and for a pilot to confirm the instruction prior to executing it. As a result, even more airspace must be protected to allow aircraft the room to operate. This reduces flexibility by limiting the airspace in which air traffic services can be provided to aircraft and results in less efficient operations.

For example, ATC often has to stop the climb of aircraft departing LAX and LGB on SID procedures to maintain separation from other IFR traffic. These aircraft may experience an altitude level-off that ranges from 10 NM to 25 NM.[21] When this occurs, aircraft cannot follow the currently published procedures, and many transitions become unusable.

Similar issues are found with the Standard Terminal Arrival Route (STAR) procedures. Current conventional procedures are less efficient and reduce flexibility in providing air traffic services. As a result, controllers must issue vectors or require aircraft to level-off more frequently to maintain required separation. This results in prolonged flight times, as well as increased workload for controllers and pilots as communication must be maintained between controllers and pilots as long as the aircraft is operating on the procedure. Combined, these factors form the basis for the problem within the Southern California Metroplex.

It is important to note that a key design constraint is safety. Any proposed change to a procedure to resolve a problem 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 SID and STAR procedures are the primary foundation for the problem in the Southern California Metroplex. A problem (or need) is best addressed by examining the circumstances or factors that cause it. Addressing the causal factors behind the problem will help develop a reasonable alternative designed to resolve the problem (i.e., meet the “purpose”).

[21] See Section 2.1.2.2 for a detailed description of these LGB SID level offs.

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

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

These three causal factors are discussed in the following sections.

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

Lack of procedural flexibility limits air traffic controllers' ability to adapt to often-changing traffic demands. For example, constraints associated with SUA, delays in other regions, or severe weather along an air traffic route may cause aircraft to enter or exit the enroute or terminal area airspace at times and locations other than those previously planned. Controllers require options to manage traffic when faced with these kinds of demands. Additional enroute transitions can reduce the need for the vectoring needed to maintain separation between aircraft. Additional transitions can also provide additional options to better balance traffic and controller workload. Transitions are further discussed in Section 1.2.4.1.

Less efficient procedures, with fixes based on ground-based navigational aids (NAVAIDs), may only allow for a limited number of transitions. This can result in some transitions experiencing heavy traffic and congestion while others may go unused. Some existing conventional transitions go unused because they are excessively long and result in inefficient lateral paths for aircraft travelling on them. Other transitions go unused because they conflict with other procedures.

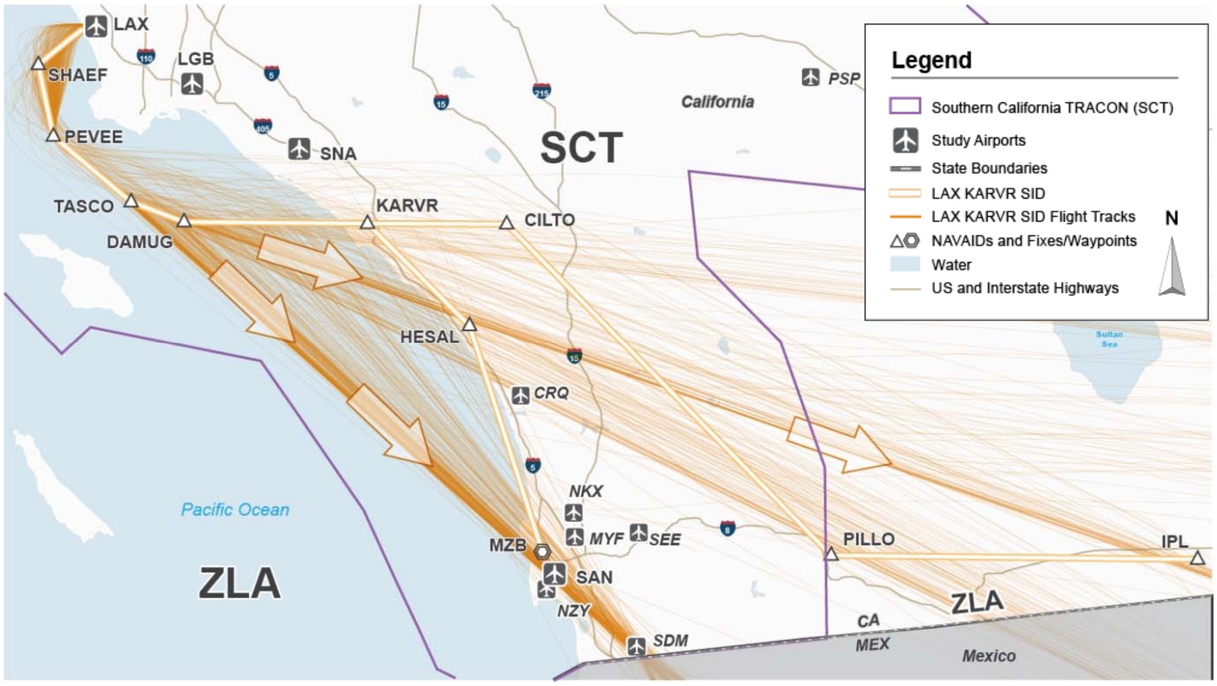
Some current transitions can provide additional challenges. For example, transitions that are used by both propeller and jet aircraft are often constrained because lower-performing aircraft are unable to maintain sufficient speed and altitude to ensure adequate separation from other aircraft on the route. As a result, controllers must employee airspace management tools, such as issuing vectors, to maintain separation between aircraft.

The following sections provide specific examples of how these interactions function within the Southern California Metroplex.

LAX KARVR Departure

Exhibit 2-1 depicts traffic operating on the LAX KARVR departure procedure. This departure procedure accounts for approximately eight percent of all LAX jet departures. The procedure has two enroute transitions beginning at the KARVR intersection. One transition ends at the Imperial (IPL) VOR, and the other ends at the Mission Bay (MZB) VOR. Currently, the IPL transition is unused due to heavy traffic from conflicting procedures.

Exhibit 2-1 Inefficient Lateral Paths and Unused Transitions - LAX KARVR SID



Notes:

ZLA – Los Angeles Center
SNA - John Wayne – Orange County Airport
NKX - Miramar Marine Corps Air Station
SAN - San Diego International Airport
SCT – Southern California TRACON
LGB - Long Beach Airport (Daugherty Field)
MYF - Montgomery Field Airport
SDM - Brown Field Municipal Airport
LAX - Los Angeles International Airport
NZY - North Island Naval Air Station (Halsey Field)
SEE - Gillespie Field Airport
CRQ - McClellan-Palomar Airport
PSP - Palm Springs International Airport

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

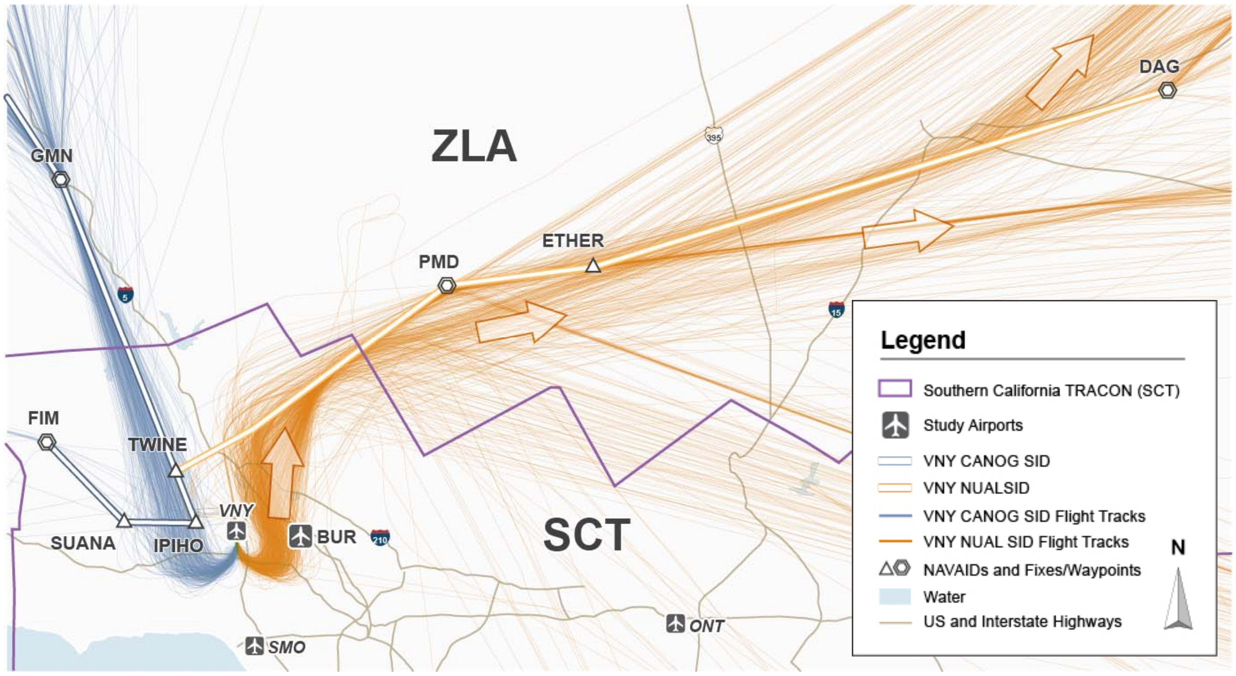
Prepared by: ATAC Corporation, March 2015.

As shown by the arrows overlaying the flight tracks depicted on **Exhibit 2-1**, aircraft departing LAX on the KARVR departure procedure are being vectored off the procedure at the PEVEE fix and directed to the south. By issuing vectors, controllers are able to deconflict departures and arrivals from adjacent airports and allow for more flexible use of transitions. The extensive vectoring results in more frequent controller/pilot and controller/controller communication. This increases controller and pilot workload, reducing efficiency.

VNY CANOGA and NEWHALL Departures

Exhibit 2-2 depicts traffic operating on the CANOGA (CANOG) and NEWHALL (NUAL) departure procedures. These conventional SIDs account for 37 percent of jet departures from Van Nuys Airport (VNY); however, both propeller and jet aircraft use these procedures. These procedures include unused transitions, and as shown by the arrows overlaying the flight tracks, aircraft are not flying the currently published routes. This is partly due to propeller aircraft operating over the DAG VOR that constrain the flow of traffic, delaying jet aircraft that are traveling the same path. Because of the varying performance characteristics of the aircraft flying the procedures, controllers must issue additional vectors to ensure appropriate in-trail separation between aircraft.

Exhibit 2-2 Unused Transitions and Jet and Propeller Traffic - VNY CANOG and NUAL SIDs



Notes:

ZLA – Los Angeles Center	*SCT – Southern California TRACON*	*BUR – Bob Hope Burbank International Airport*	*ONT – Ontario International Airport*
SMO – Santa Monica Municipal Airport	*VNY – Van Nuys Airport*		

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

Prepared by: ATAC Corporation, March 2015.

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 airspace use. This requires that controllers carefully observe aircraft activity along the proximate or crossing flight routes and be prepared to provide air traffic services to ensure standard separation is maintained.[22] 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.

[22] 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.

The limited number of ground-based NAVAIDs often results in multiple procedures sharing the same NAVAIDs. This can cause areas of congestion and routes that are dependent on each other. For example, propeller-driven and jet aircraft are frequently placed on different routes that share the same ground-based 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.

The following sections provide examples of how these interactions function within the Southern California Metroplex.

SAN BAYVU STAR Arrivals over the LAX VOR

Table 2-1 identifies seven procedures serving six Study Airports during west flow operating conditions that pass over the LAX VOR. Multiple procedures using the same waypoint can result in congestion. As discussed in Section 1.2.5.1, ground-based NAVAIDs such as VORs are affected by invariable terrain and other obstructions that can limit their signal accuracy. Routes using ground-based NAVAIDS require at least six NM of clearance on either side of a route's main path to ensure accurate signal reception. These issues affect routing for conventional procedures and can result in limits on the location and number of transitions available in the Southern California Metroplex.

Table 2-1 Existing Conditions (2013) Procedures That Utilize the LAX VOR

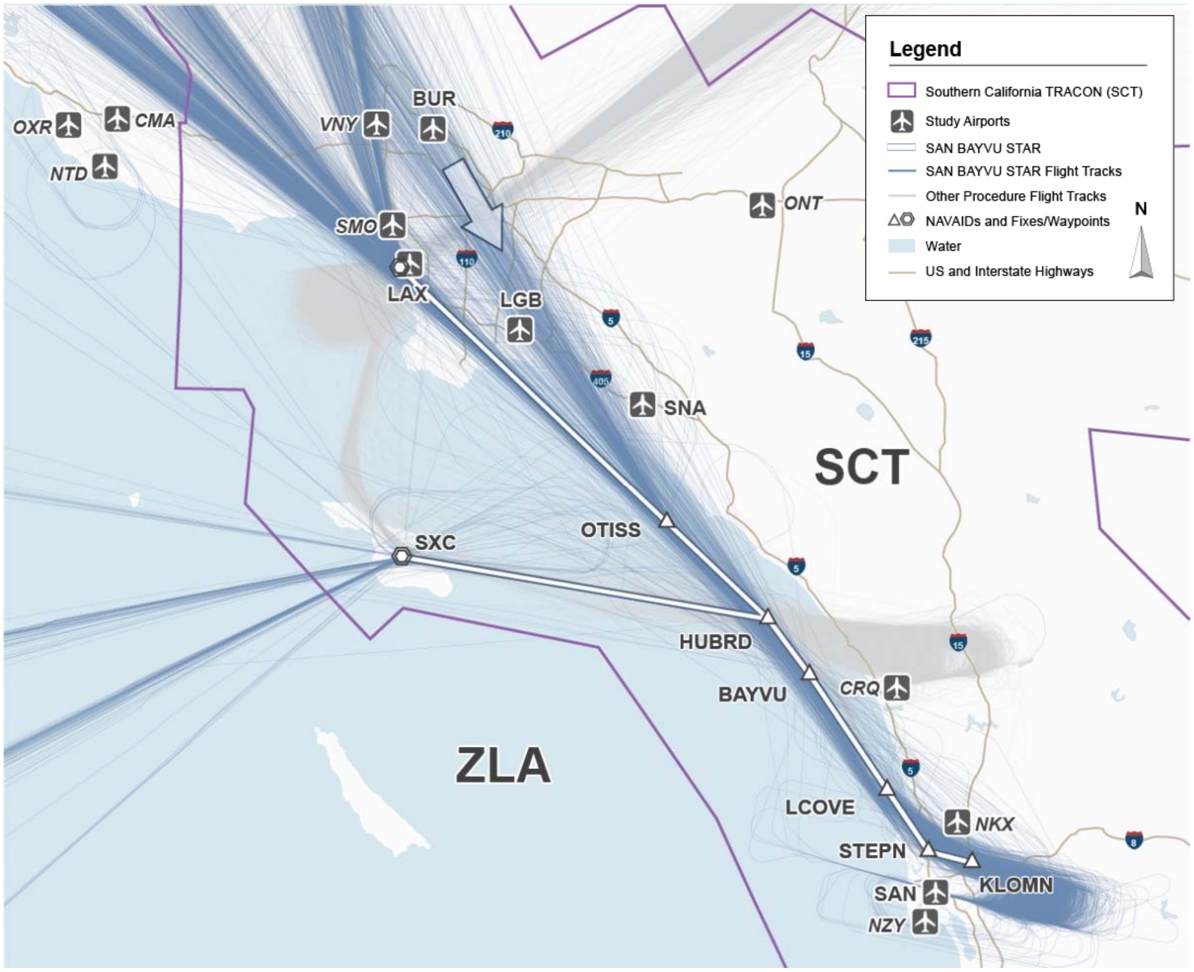
Procedure	Airport Served
ANAHM3	LGB, SNA
BAYVU3	SAN
CHANL1	SNA
FODRR1	CRQ
HUBRD1	SAN
IRV1	SNA
LOOP6	LAX

Notes:
CRQ - McClellan-Palomar Airport
LAX – Los Angeles International Airport
SAN – San Diego International Airport
LGB - Long Beach Airport (Daugherty Field
SNA – John Wayne-Orange County Airport

Source: OAPM Study Team Final Report Southern California Metroplex, November 2011; NFDC, accessed February 2014.
Prepared By: ATAC Corporation, January 2014.

Exhibit 2-3 shows the current routing for arrivals from the north on the BAYVU3 STAR into San Diego International Airport (SAN). The BAYVU3 accounts for 39 percent of all jet arrival traffic to SAN. As shown by the arrows overlying the flight tracks, some aircraft flying near VNY and BUR are vectored off the procedure to provide standard separation from converging traffic flows over the LAX VOR. Issuing vectors increases both controller and pilot workload due to the time needed for the controller to issue an instruction to the pilot and for the pilot to reply, confirming the instruction before following it. This may cause the aircraft to fly additional miles and increase congestion.

Exhibit 2-3 SAN BAYVU STAR Arrivals over the LAX VOR



Notes:

ZLA – Los Angeles Center	*SCT – Southern California TRACON*	*BUR – Bob Hope Burbank International Airport*	*CMA - Camarillo Airport*
CRQ - McClellan-Palomar Airport	*LAX – Los Angeles International Airport*	*LGB - Long Beach Airport (Daugherty Field)*	*NTD - Naval Air Station Point Mugu (Naval Base Ventura County)*
NKX – Miramar Marine Corps Air Station	*NZY - North Island Naval Air Station (Halsey Field)*	*ONT – Ontario International Airport*	*OXR – Oxnard Airport*
SAN – San Diego International Airport	*SDM - Brown Field Municipal Airport*	*SMO – Santa Monica Municipal Airport*	*SNA - John Wayne Airport – Orange County*
VNY – Van Nuys Airport			

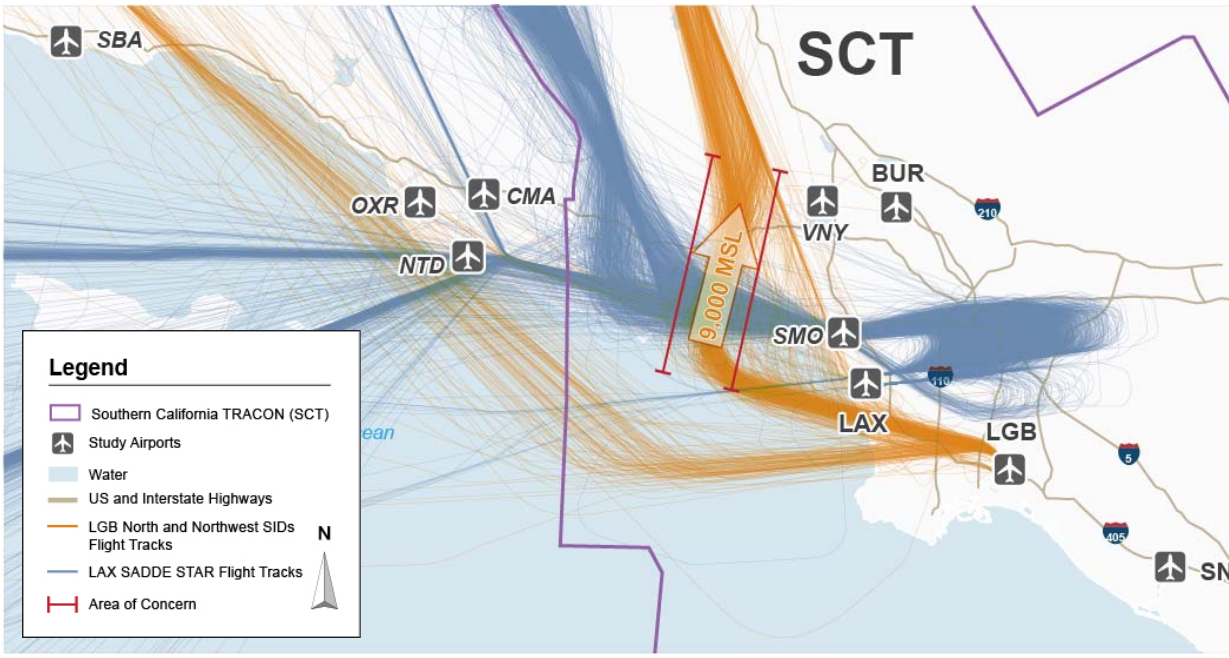
Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

Prepared by: ATAC Corporation, March 2015.

LGB North and Northwest Departures

Exhibit 2-4 depicts the lateral paths for north- and northwest-bound departures from Long Beach Airport (LGB), and **Exhibit 2-5** depicts their vertical profile. North and northwest departures from LGB account for 28 percent of all LGB jet departures. The red brackets on **Exhibit 2-4** depict an area where departures from LGB are required to level-off at 9,000 ft. above mean sea level (MSL) to avoid arrivals on the SAADE STAR to Los Angeles International Airport (LAX).

Exhibit 2-4 North and Northwest LGB departures – Lateral Path



Notes:

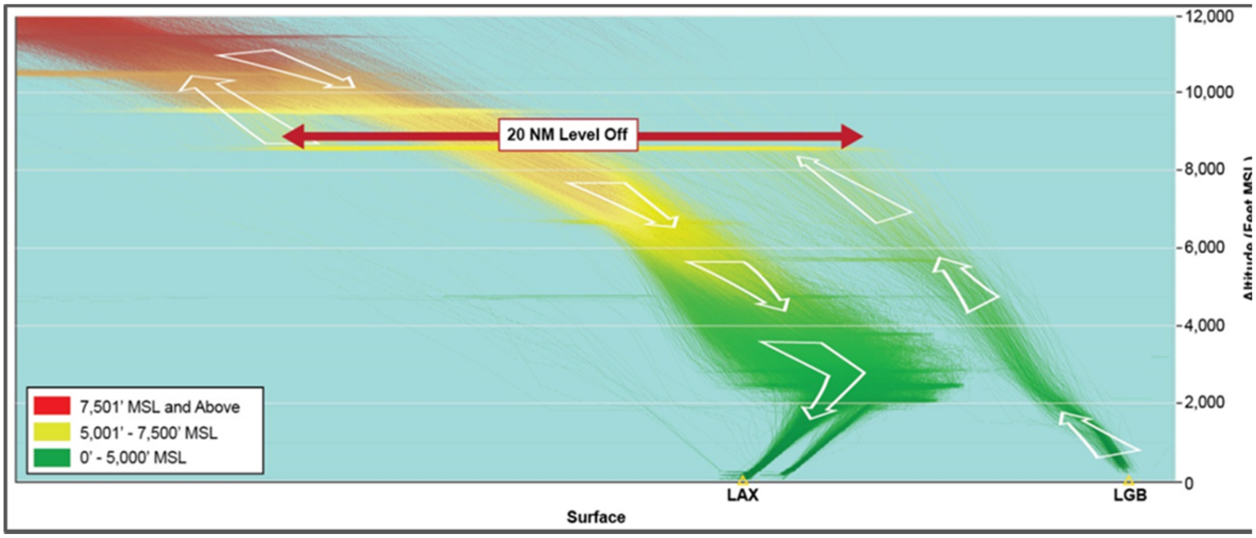
SCT – Southern California TRACON	*BUR – Bob Hope Burbank International Airport*	*CMA - Camarillo Airport*	*LAX – Los Angeles International Airport*
LGB - Long Beach Airport (Daugherty Field)	*NTD - Naval Air Station Point Mugu (Naval Base Ventura County)*	*OXR – Oxnard Airport*	*SMO – Santa Monica Municipal Airport*
SNA - John Wayne Airport – Orange County	*SBA - Santa Barbara Municipal Airport*	*VNY – Van Nuys Airport*	

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

Prepared by: ATAC Corporation, May 2015.

The area marked with the red arrow on **Exhibit 2-5** shows the area of level-off. This level segment extends for approximately 20 NM. Flight time and distance can be increased for traffic flows with interrupted climbs and descents as the aircraft exit/enter the terminal airspace or transition to/from the runway approach environment. Unpredictable vertical guidance resulting from conflicting traffic can lead to increased controller workload and causes the aircraft to operate in a less then optimal manner.

Exhibit 2-5 North and Northwest LGB departures – Vertical Path



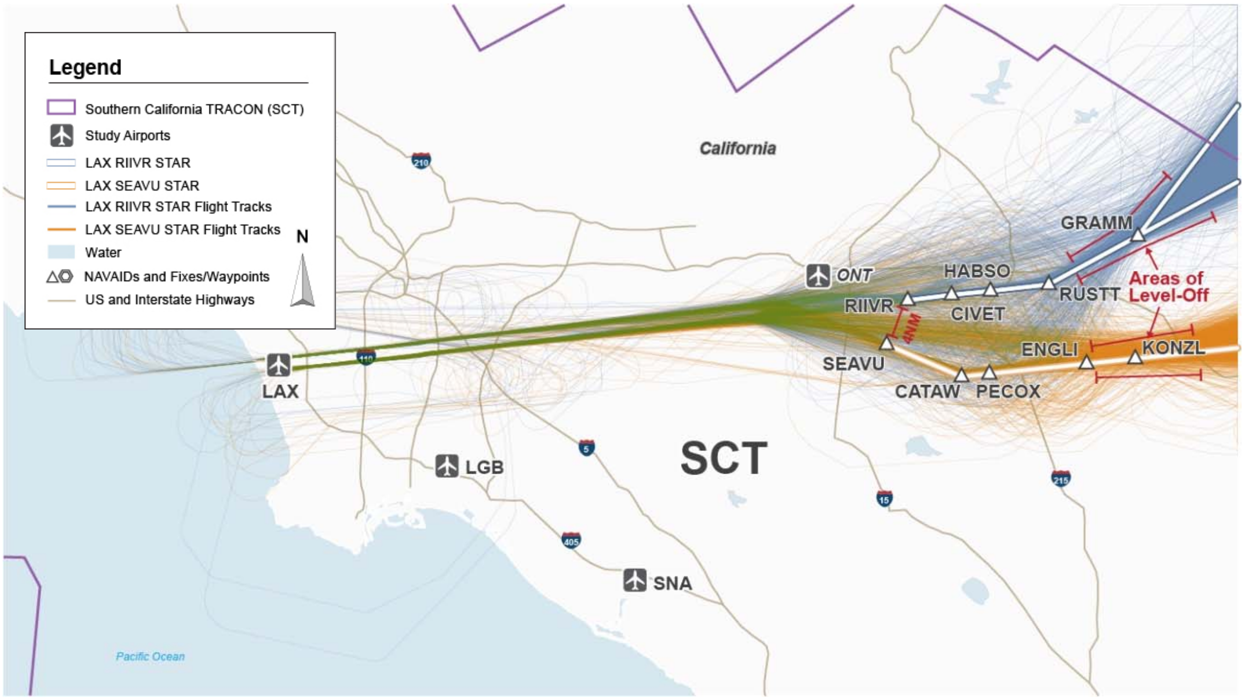
Notes:
LAX – Los Angeles International Airport *LGB - Long Beach Airport (Daugherty Field)*

Source: ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.
Prepared by: ATAC Corporation, May 2015.

LAX RIIVR and SEAVU STARs

Exhibit 2-6 depicts the RIIVR and SEAVU STARs. These two procedures account for 47 percent of all jet arrival traffic into LAX. Laterally, the fixes at the end of the STARs (identified by the red line) are located approximately four NM apart. Because standard enroute separation requires more than four NM between aircraft, controllers treat these waypoints as a single entry point into the SCT airspace. As a result, air traffic experiences a “bottleneck” as controllers must sequence traffic operating on two procedures through a single entry point. Due to the congestion, aircraft are frequently directed to level off at the GRAMM and KONZL fixes (see red brackets). This decreases efficiency and increases pilot and controller workload due to the need for increased communications.

Exhibit 2-6 Arrivals to LAX on the RIIVR TWO and SEAVU TWO STARs



Notes:
SCT – Southern California TRACON
LAX – Los Angeles International Airport
LGB - Long Beach Airport (Daugherty Field)
ONT – Ontario International Airport
SNA - John Wayne Airport – Orange County

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

Prepared by: ATAC Corporation, March 2015.

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

Airports with a significant volume of IFR aircraft need SID and STAR procedures to help achieve optimal efficiency. SID and STAR procedures establish consistent flight routes, which help maintain a predictable flow of aircraft to and from an airport. Predictable, defined routes enable pilots and controllers to know ahead of time how, where, and when an aircraft should be operated. This allows for better planning of airspace use and aircraft control within a given volume of airspace. A predictable route may include expected locations (i.e., where), altitudes (i.e., where and how high), and speeds (i.e., how fast and when) at key points. Aircraft performance and/or piloting technique can vary and may be a factor in reducing predictability. Because conventional procedures are less predictable than RNAV procedures, controllers use vectoring and verbal instructions governing speed and altitude level-offs to ensure standard separation between aircraft. As discussed in Section 1.2.5.1, RNAV procedures enable aircraft to follow more accurate and better-defined flight routes. This allows for more predictable routes, with fixed locations and altitudes that can be planned ahead of time by the pilot and air traffic control. Fixed routes help segregate traffic by providing separation between aircraft on the routes. This allows for improved use of the airspace. Therefore, increased availability of RNAV procedures in a metroplex provides a greater degree of predictability. **Table 2-2** summarizes the conventional and RNAV-based procedures for the Study Airports under existing conditions.

Table 2-2 Existing Conditions (2013) STAR and SID Procedures at the Study Airports (1 of 3)

	Procedures			
	Conventional Procedures		RNAV Procedures	
Airport	**STAR**	**SID**	**STAR**	**SID**
BUR	FERNANDO FIVE	ELMOO SIX	CEEME ONE	None
	LYNXX EIGHT	VAN NUYS NINE	JANNY ONE	
CMA	None	None	None	None
CRQ	FODRR ONE	None	None	None
LAX	BASET THREE	CATALINA FIVE	BUFIE THREE	CASTA TWO
	DOWNE FOUR	CHATY TWO	KEACH ONE	FIXIT ONE
	KIMMO TWO	GABRE SEVEN	SYMON ONE	HOLTZ NINE
	LEENA FOUR	GORMAN FOUR		JEDDD ONE
	MOORPARK THREE	IMPER ONE		KARVR THREE
	OCEAN TWO	LAXX SIX		MUELR ONE
LAX	OLDEE ONE	LOOP SIX		OSHNN FOUR
	REDEYE TWO	PERCH NINE		ZILLI ONE
	REEDR THREE	SAN DIEGO SIX		
	RIIVR TWO	SEAL BEACH FIVE		
	SADDE SIX	SEBBY SEVEN		
	SEAVU TWO	VENTURA FIVE		
	SHIVE ONE			
	VISTA TWO			
	KAYOH FOUR	ANAHEIM THREE	KEFFR ONE	SENIC ONE
LGB	TANDY THREE			
MYF	None	None	None	None
NKX	None	LAKEE ONE	None	None
		REDIN ONE		
		SWOLF SIX		
		TINNY ONE		
		VITKO ONE		
NTD	None	DOYLE SEVEN	None	None
		FILLMORE TWO		
		SAN MARCUS SEVEN		

Table 2-2 Existing Conditions (2013) STAR and SID Procedures at the Study Airports (2 of 3)

	Procedures			
	Conventional Procedures		RNAV Procedures	
Airport	STAR	SID	STAR	SID
NZY	BARET FOUR	NASNI FIVE	None	None
ONT	SETER TWO	HASSA FIVE	None	None
	ZIGGY FOUR	ONTARIO THREE		
		POMONA SEVEN		
		PRADO SEVEN		
OXR	None	CAMARILLO FIVE	None	None
		SKIFF SIX		
PSP	CLOWD ONE	CATHEDRAL ONE	None	None
	SBONO ONE	PALM SPRINGS FIVE		
		THERMAL SIX		
SAN	BARET FOUR	BORDER SIX	BAYVU THREE	POGGI TWO
	HUBRD ONE	LNSAY THREE	LYNDI THREE	
	SHAMU ONE	PEBLE FOUR		
SBA	None	FLOUT FIVE	None	None
		HABUT FOUR		
		KWANG FIVE		
SBA		SANTA BARBARA TWO		
SDM	None	None	None	None
SEE	None	None	None	None
SMO	FERNANDO FIVE	None	None	PEEER ONE
	KIMMO TWO			PEVEE ONE
SNA	KAYOH FOUR	ANAHEIM THREE	KEFFR ONE	DUUKE TWO
	TANDY THREE	CHANNEL ONE		STREL ONE
		EL TORO ONE		
		IRVINE ONE		
		MUSEL SIX		
TRM	CLOWD	None	None	None
	SBONO			
UDD	CLOWD	None	None	None
	SBONO			

Table 2-2 Existing Conditions (2013) STAR and SID Procedures at the Study Airports (3 of 3)

	Procedures			
	Conventional Procedures		RNAV Procedures	
Airport	STAR	SID	STAR	SID
VNY	FERNANDO FIVE LYNXX EIGHT	CANOGA ONE GLENDALE ONE NEWHALL EIGHT	None	HAYEZ ONE

Notes:
UDD - Bermuda Dunes Airport; BUR - Bob Hope Airport; SDM - Brown Field Municipal Airport; CMA - Camarillo Airport; SEE - Gillespie Field Airport; TRM - Jacqueline Cochran Regional Airport; SNA - John Wayne – Orange County Airport; LGB - Long Beach Airport (Daugherty Field); LAX - Los Angeles International Airport; CRQ - McClellan-Palomar Airport; NKX - Miramar Marine Corps Air Station; MYF - Montgomery Field Airport; NZY - North Island Naval Air Station (Halsey Field); ONT - Ontario International Airport; OXR - Oxnard Airport; PSP - Palm Springs International Airport; NTD - Naval Air Station Point Mugu; SAN - San Diego International Airport; SBA - Santa Barbara Municipal Airport; SMO - Santa Monica Municipal Airport; VNY - Van Nuys Airport

Source: OAPM Study Team Final Report Southern California Metroplex, November 2011; NFDC, accessed February 2014.
Prepared by: ATAC Corporation, January 2014.

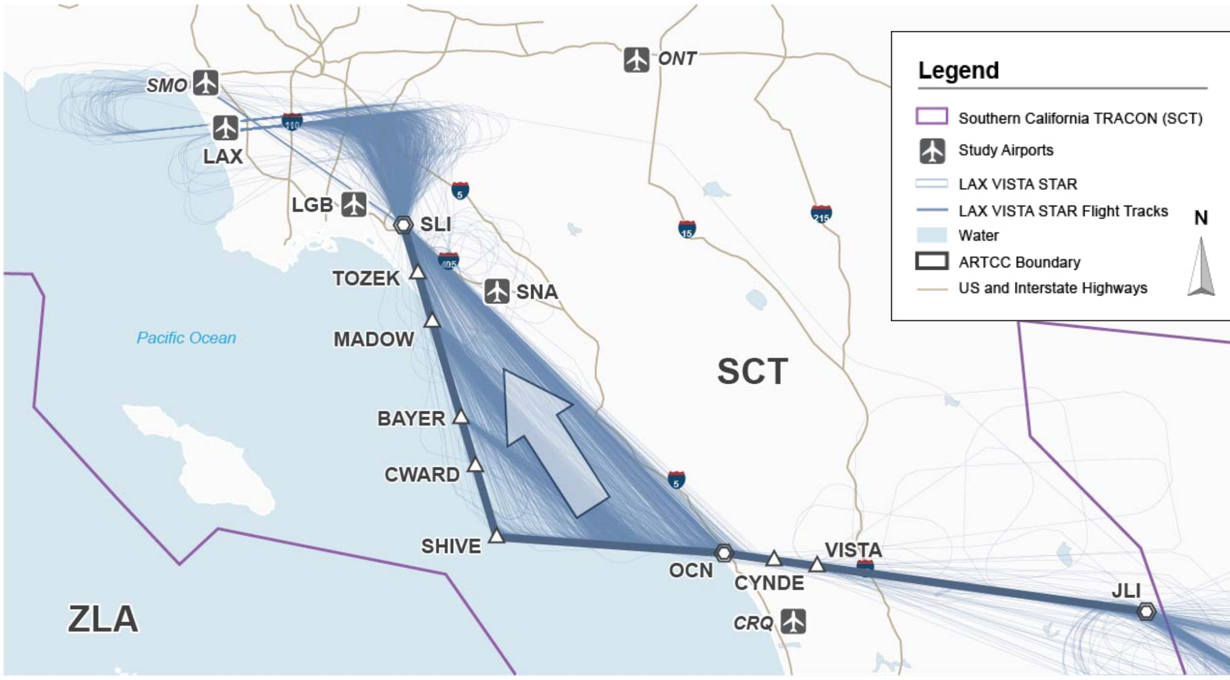
The following sections describe the two areas - ground path and vertical path - in which conventional procedures in the Southern California Metroplex are less predictable than RNAV procedures.

Ground Path (Lateral Path)

The ground path is the track along the surface of the earth directly below an aircraft that represents where it is flying. Since most of the STAR and SID procedures in the Southern California Metroplex airspace use ground-based NAVAIDs, navigation can be affected by line-of-sight and signal degradation issues associated with this type of technology. This limits where conventional procedure routes can be located. Because the NAVAIDs are less precise, conventional procedures require wider areas of airspace to protect aircraft flying on neighboring routes. This can result in aircraft flying routes that vary from those that are published.

Exhibit 2-7 depicts the published VISTA STAR as well as the flight tracks of aircraft arriving to LAX on this procedure. This provides an example of the variance between a published procedure and the ground path of the aircraft. As shown by the flight tracks, most traffic using the procedure is turned directly to the BAYER, MADOW, or SLI fixes for initial sequencing of the multiple arrival routes. The extensive vectoring required results in more frequent controller/pilot and controller/controller communication, increasing controller and pilot workload and reducing predictability.

Exhibit 2-7 LAX VISTA STAR Arrivals



Notes:

ZLA – Los Angeles Center	*SCT – Southern California TRACON*	*CRQ - McClellan-Palomar Airport*	*LAX – Los Angeles International Airport*
ONT – Ontario International Airport	*SMO – Santa Monica Municipal Airport*	*SNA - John Wayne Airport – Orange County*	

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.

Prepared by: ATAC Corporation, March 2015.

Vertical Path

In guiding aircraft along their routes, controllers direct aircraft to climb, descend, or level off. During climb, the point when an aircraft reaches an assigned altitude may vary depending upon factors such as aircraft performance, weather conditions, and piloting technique. Aircraft arriving at or departing from the Study Airports are often required to level off during climb and descent to maintain vertical separation from other aircraft. Interrupted climbs and descents can increase flight time and distance as the aircraft exit/enter the terminal airspace or transition to/from the runway approach environment. Additionally, unpredictable vertical guidance resulting from conflicting traffic leads to increased controller workload and inefficient aircraft operation.

Exhibit 2-8 depicts vertical profiles for aircraft arriving on the BUFIE STAR into LAX. As shown by the area circled in red, LAX inbound traffic is directed to level off at 12,000 feet MSL for a distance of 24 NM. This level-off is required to ensure separation from traffic operating out of SNA on the CHANL SID, which also utilizes the Santa Catalina (SXC) VOR. Due to this conflict, the BUFIE STAR is rarely used, and aircraft are instead directed to the SADDE STAR.

Extended level-offs often result in increased controller/pilot communication. They also may require increased traffic advisories to pilots about the proximity of other aircraft or point-outs to other controllers responsible for neighboring airspace sectors. This adds to complexity and inefficient aircraft performance during a descent or climb.) This results in less predictable routes and reduced airspace efficiency.

2.2 Purpose of the Proposed Action

The purpose of the Proposed Action is to address the problems and airspace issues discussed in the previous sections in order to improve the efficiency of the procedures and airspace utilization in the Southern California Metroplex. 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 flexibility in transitioning traffic between enroute and terminal area airspace and between terminal area airspace area and the runways;
- Improve the segregation of arrivals and departures in terminal area and enroute airspace; and,
- Improve the predictability in transitioning traffic between enroute and terminal area airspace and between terminal area airspace area and the runways.

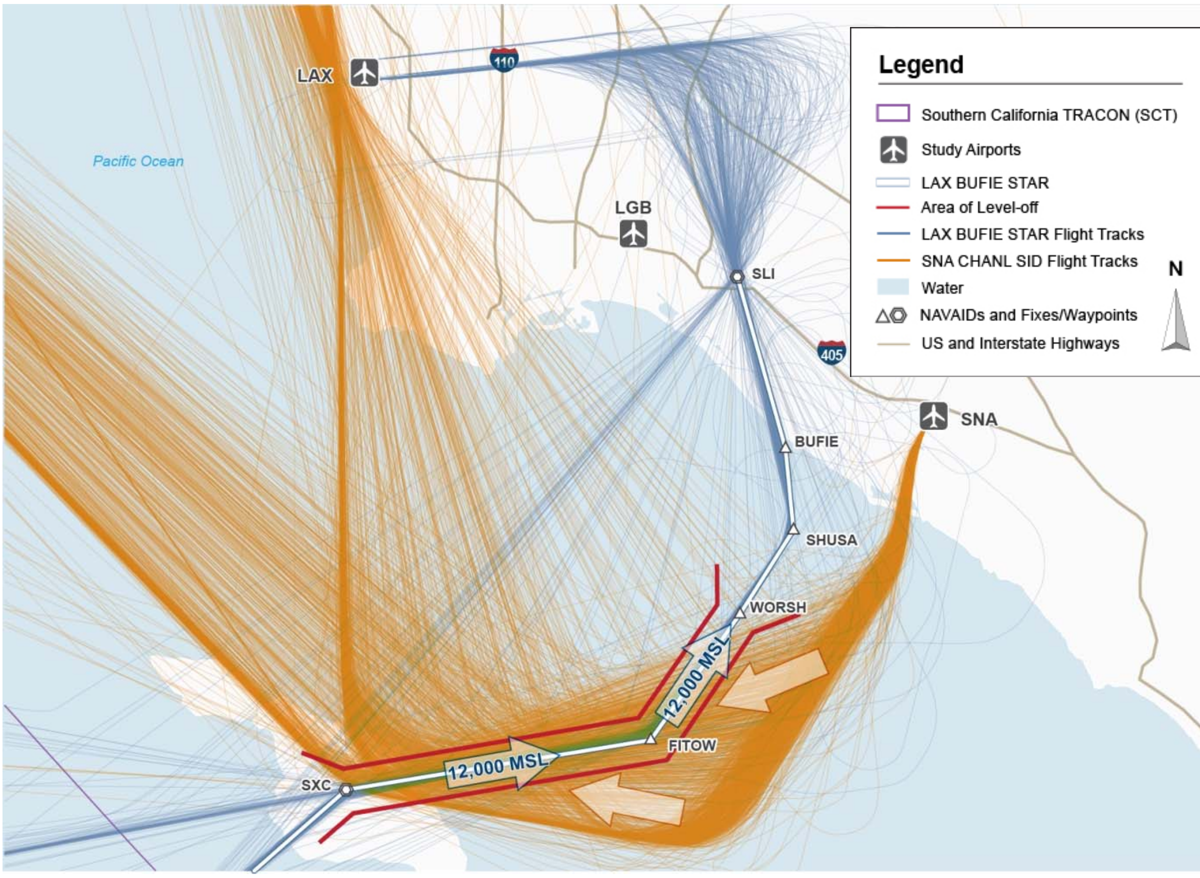
The FAA expects that the frequency of controller/pilot communication would decrease, reducing both controller and pilot workload. Improvements from RNAV procedures would reduce the need for vectoring and level flight segments, resulting in more predictable traffic flows.

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

2.2.1 Improve Flexibility in Transitioning Aircraft

As discussed in Section 2.1.2.1, the limited number of practically available transitions and associated procedures constrain efficiency in the terminal and enroute 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:

Exhibit 2-8 Arrivals to LAX on the BUFIE STAR Arrivals



Notes:
SXC – Santa Catalina Island VOR *SNA - John Wayne Airport – Orange County* *LAX – Los Angeles International Airport*
LGB - Long Beach Airport (Daugherty Field)

Source: U.S. Department of Transportation, Federal Aviation Administration, National Flight Data Center, National Airspace System Resources, Airport, and Runway databases, accessed February 2015 (airspace boundaries); National Atlas of the United States of America (U.S. County and State Boundaries, Water Bodies); Bureau of Transportation Statistics, National Transportation Atlas Database (U.S. and Interstate Highways); ATAC Corporation (Flight Track Data); SoCal OAPM Study Team, November 2011.
Prepared by: ATAC Corporation, March 2015.

- 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).

2.2.2 Segregate Arrivals and Departures

As discussed in Section 2.1.2.2, arrival and departure routes cross, converge, or are within close proximity of each other in some portions of the airspace. 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. 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 with the following criterion:

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

2.2.3 Improve the Predictability of Air Traffic Flow

As discussed in Section 2.1.2.3, the lack of up-to-date airspace procedures requires controllers to use vectoring, speed control, and level-offs 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. Some STARS are underused because of flow restrictions.[23] There are also a limited number of procedures with runway transitions to and from the runways at each of the Study Airports. In addition, there is a lack of RNAV procedures to and from the Satellite Airports, preventing pilots from filing their preferential arrival or departure with predictable flight expectations. These factors affect predictability within the Southern California Metroplex.

This objective can be measured with the following criteria:

- RNAV procedures with altitude controls intended to optimize descent or climb patterns, and
- 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).

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 (2013) air traffic procedures serving the Study Airports would remain unchanged except for planned procedure modifications that 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 RNAV SID and STAR procedures with optimized climb and descent profiles, respectively, and RNP approaches, where feasible, in the Southern California Metroplex. Refer to Section 1.2.5 for a description of RNAV, RNP, and optimized climb and descent profiles. This would improve the predictability and segregation of routes, as well as increase flexibility 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 does not involve physical construction of any facilities such as additional runways or taxiways, and does not require permitting or other approvals or actions on a state or local level. Therefore, the

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

implementation of the proposed changes to procedures in the Southern California Metroplex would not require any physical alterations to environmental resources identified in FAA Order 1050.1E.

2.5 Required Federal Actions to Implement Proposed Action

Implementing the Proposed Action requires the FAA to publish new or revised STARs, SIDs, and transitions and undertake controller training.

2.6 Agency Coordination

On January 16, 2014, the FAA distributed notice of intent to prepare an EA for the SoCal Metroplex Project to 282 federal, state, regional, and local officials as well as to 30 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 study area established for the EA, and
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 January 21, 2014, notice of intent to prepare an EA was published in five newspapers: the Los Angeles Times, the San Diego Union Tribune, the Press Enterprise (Riverside, CA), the Santa Barbara News Press, and the Ventura County Star. Seventeen comments were received in response to the notice of intent and were considered in preparation of the Draft EA. **Appendix A**, *Agency Coordination, Agency Consultation, and Public Involvement*, includes a copy of the notice of intent letter (and attachments), affidavits of newspaper publication, as well as a list of the receiving agencies and tribes.

2.7 Public Involvement

The Draft EA was released on June 10, 2015, and notice of availability of the Draft EA was published in five newspapers: the Los Angeles Times, the San Diego Union Tribune, the Press Enterprise, the Santa Barbara News Press, and the Ventura County Star. The initial 30-day comment period was extended twice. On July 10, 2015, the FAA extended the EA document comment period 60 days (to September 8, 2015). Notice was distributed electronically via an email "E-Blast." In addition, notice was published in the above mentioned newspapers, the Inland Valley Daily Bulletin, and in five Spanish language newspapers: La Opinion, El Latino, Hoy Los Angeles, Excelsior, and Enlace. Notice was also published in the Ontario Inland Valley Daily Bulletin, and announcements were made on the SoCal Metroplex Project and FAA websites, Facebook, via Twitter, and through a press release. The FAA extended the comment period again on September 8, 2015 for an additional 30 days ending October 8, 2015. The second comment period extension notice was distributed in a second E-Blast and published in the same newspapers and via the same websites used for the first extension announcement. In total, the public comment period was 120 days. **Appendix A**, *Agency Coordination, Agency Consultation, and Public Involvement*, includes the distribution lists, copies of the notice of availability letter (and attachments), announcements of the comment period extensions, affidavits of newspaper publication, as well as a list of the receiving agencies and tribes.

Hard copies of the EA were made available to eight libraries, and digital copies were made available to 40 libraries throughout the General Study Area. A list of the libraries through which the Draft EA was made available to the public can be found in **Appendix A**. The FAA received comments from private citizens and groups, elected officials, municipalities, and local, State, and Federal agencies. In total, 4,095 individual substantive comments were included in the 2,754 unique comment letters and form letters received on the Draft EA. The comments received on the Draft EA and responses to those comments can be found in **Appendix F**, *Responses to Comments on the Draft EA*.

The FAA conducted public workshops between June 16th and July 1st, 2015 in Santa Ana, Santa Monica, Los Angeles, San Diego, Palm Springs, Torrance, Long Beach, Ontario, Ventura, Santa Barbara, and Burbank, California. Not including FAA and consultant staff, a total of 311 people attended the workshops. Display boards used at each workshop were posted to the SoCal Metroplex Project website along with other supplemental materials, including TARGETS distribution packages for each of the procedures included in the Proposed Action, as well as Google Earth KML files presenting the flight tracks, flight corridors, and TARGETS designs for each of the Proposed Action and No Action Alternative procedures, as well as the noise analysis results. These materials can be downloaded at:

http://www.metroplexenvironmental.com/socal_metroplex/socal_introduction.html.

After the release of the Draft EA, the FAA participated in 33 briefings requested by Study Airport administrators and local, state, and federal elected representatives. In addition, FAA conducted an update briefing on September 1, 2015 for local, state, and federal elected representatives and Study Airports.

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