

# Metroplex

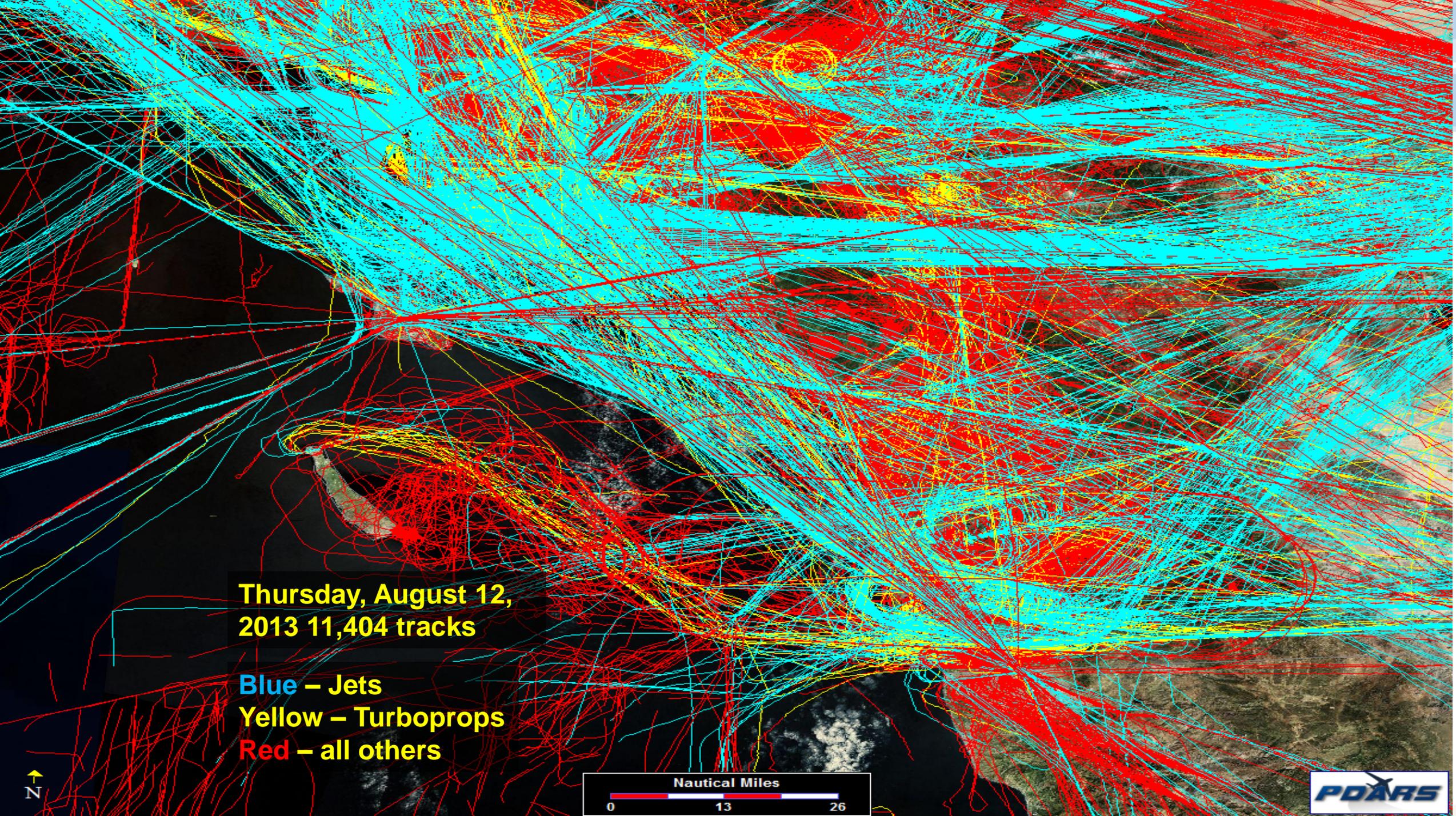
An Update on Southern California Airspace Modernization  
WRP Seminar

November 1, 2016



**FAA**

| **NextGEN**



**Thursday, August 12,  
2013 11,404 tracks**

**Blue – Jets**  
**Yellow – Turboprops**  
**Red – all others**





# SOCAL METROPLEX BACKGROUND

# We Must Modernize



## NEXT GEN Components: RNAV/RNP

Moving to Performance-Based Navigation

### Conventional Routes

Today's airways connect ground-based navigation aids



Limited Design Flexibility

### RNAV

Area Navigation (RNAV) routes follow defined "waypoints"



Increased Airspace Efficiency

### RNP

Required Navigation Performance (RNP) routes within specified "containment area"



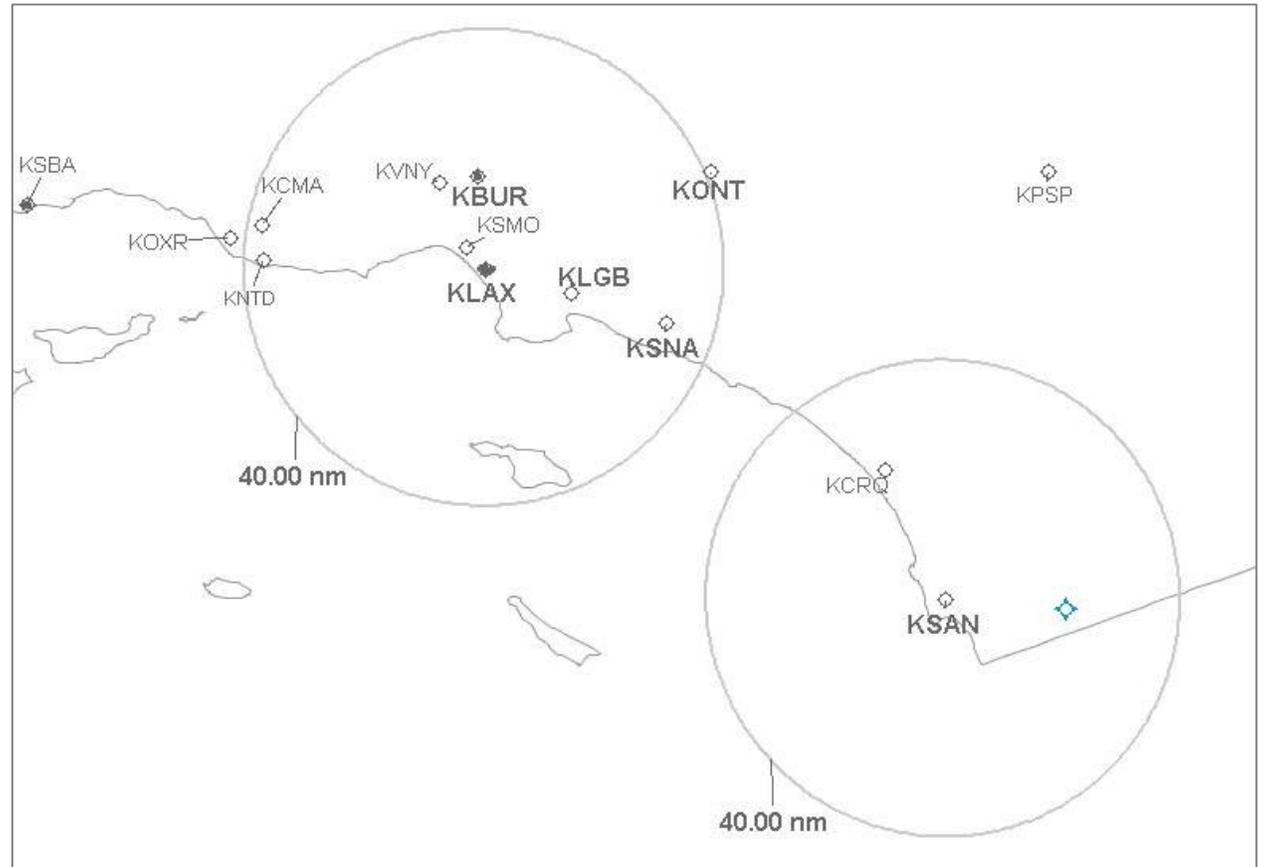
Optimize Use of Airspace

Source: Federal Aviation Administration

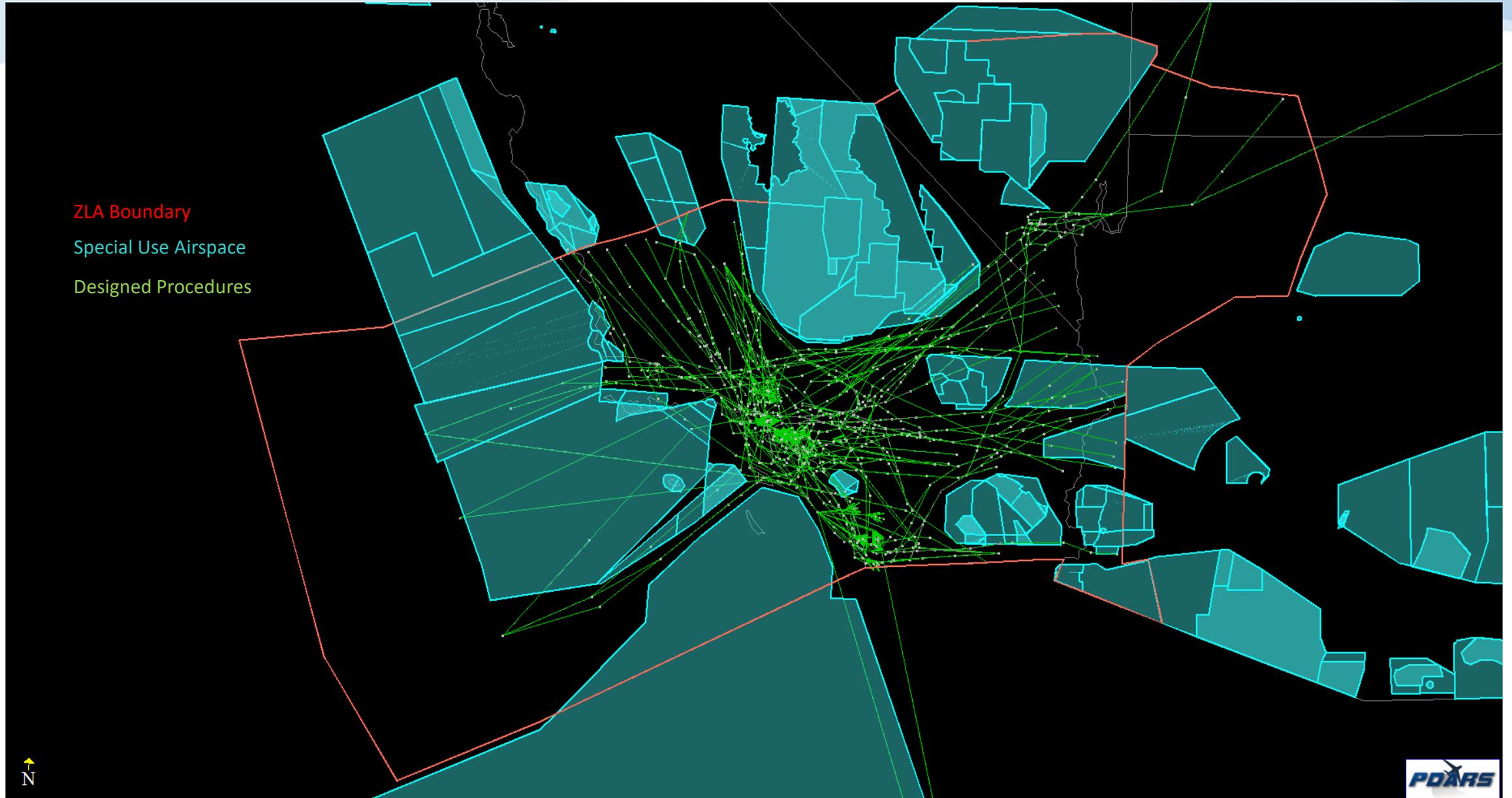


# SoCal Metroplex Study Area

- Scope: Six major airports and 15 satellite airports:
  - Bob Hope Airport (BUR)
  - Los Angeles International Airport (LAX)
  - Long Beach Airport (LGB)
  - Ontario International Airport (ONT)
  - San Diego International Airport (SAN)
  - John Wayne-Orange County Airport (SNA)
- Other airports include but not limited to:
  - McClellan-Palomar Airport (CRQ)
  - Palm Springs International Airport (PSP)
  - Santa Monica Municipal Airport (SMO)
  - Van Nuys Airport (VNY)



# Special Use Airspace and Metroplex Procedures



# SoCal Metroplex Overview

- Goals include improving flexibility and predictability of air traffic routes through increased use of performance based navigation (PBN)
- Improvements will be achieved by utilizing satellite technology and publishing and implementing advanced procedures
  - Area Navigation (RNAV)
  - Standard Terminal Arrivals (STARs)
  - Standard Instrument Departures (SIDs)
  - Required Navigation Performance (RNP) Approach procedures
  - Optimized Profile Descent (OPD)

# SoCal Metroplex Phases

- Study Team Phase (Completed December 2011)
  - Potential opportunities and operational issues were identified to determine if a benefit could be developed through the application of Performance Based Navigation (PBN) procedures and airspace changes
  - These designs were highly conceptual
- Design Team Phase (Completed March 2014)
  - This phase was used to refine the Study Team recommendations and conceptual designs into final, implementable PBN procedure and airspace designs
- Evaluation Phase (Completed August 2016)
  - The proposed procedures were evaluated to determine if they met operational, environmental and safety requirements
- Implementation Phase (Began August 31, 2016)
  - After issuance of a FONSI/ROD, activities in this phase are to complete and execute the implementation of the procedures developed during the previous phase(s)

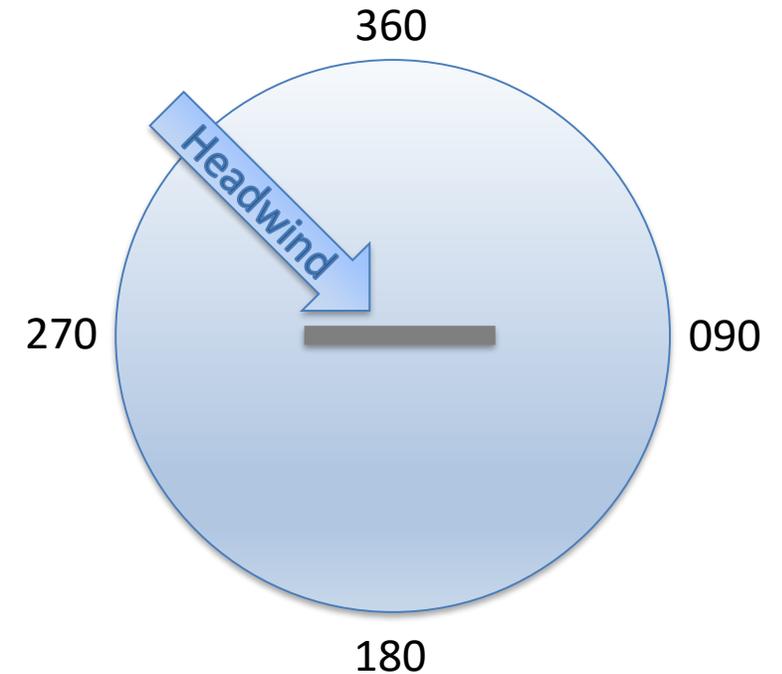


# DESIGN PRINCIPLES

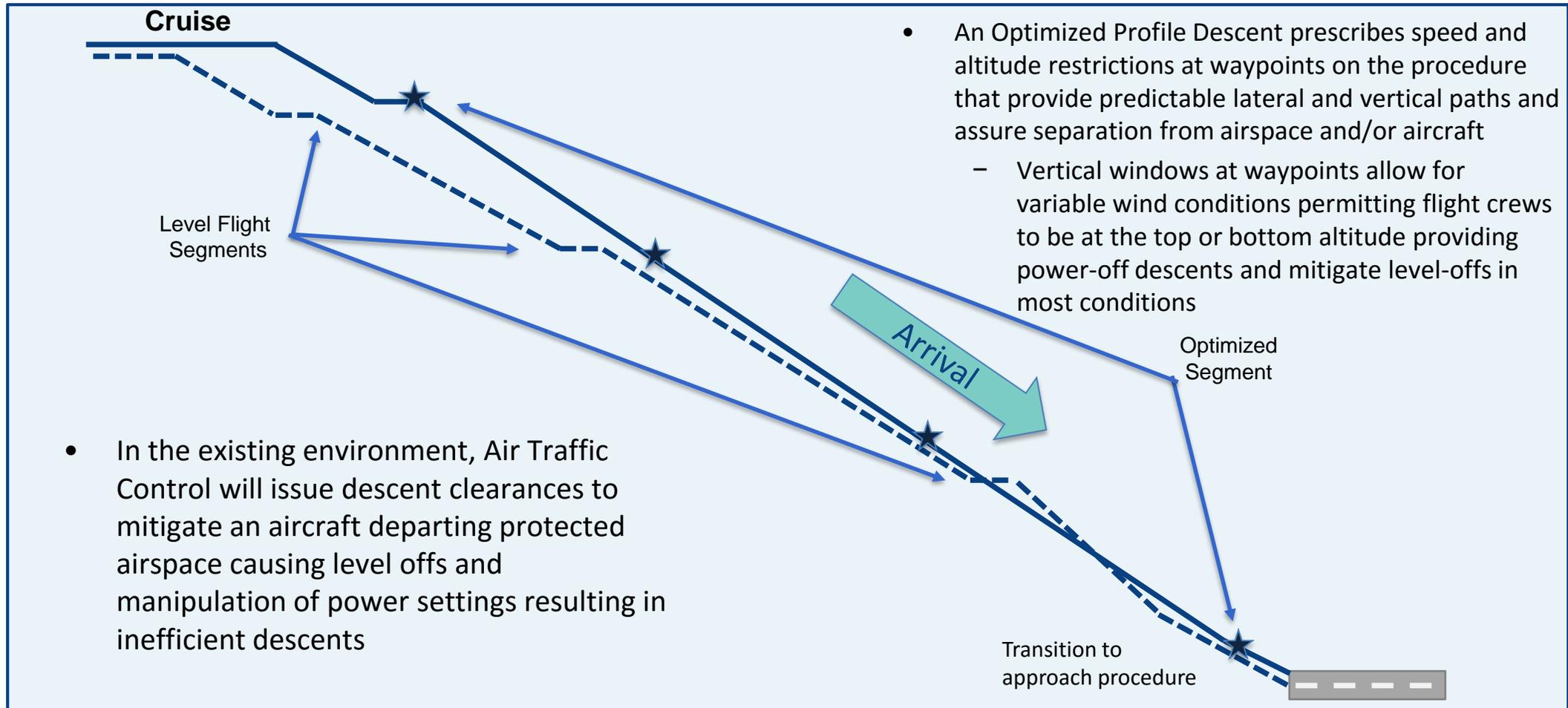
# Departure and Landing Direction

## *Runway Use*

- Wind direction and velocity are key factors used to determine departure and landing direction
- Southern California airports typical experience westerly winds which favors west operations

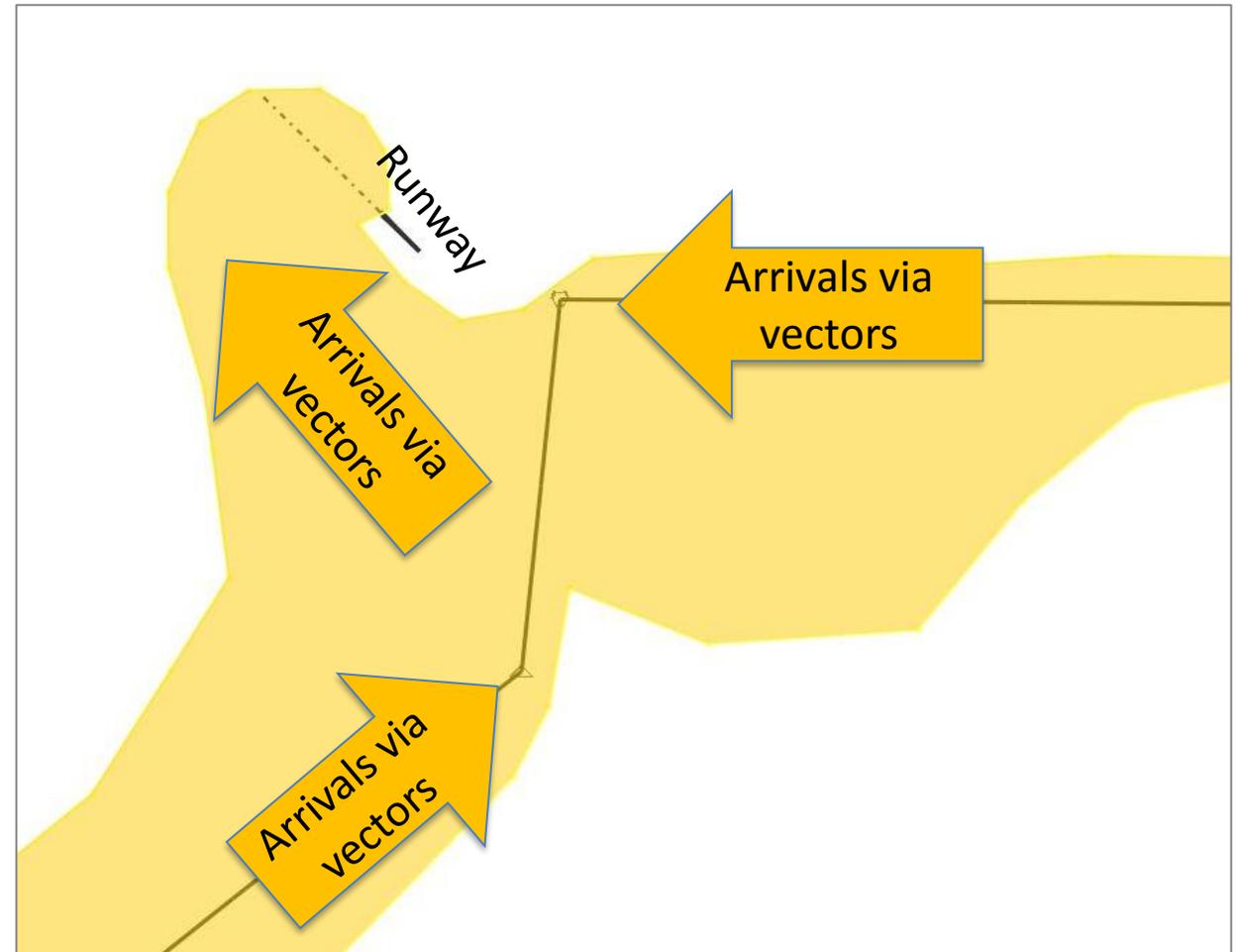


# Optimized Profile Descent Example (Arrival)



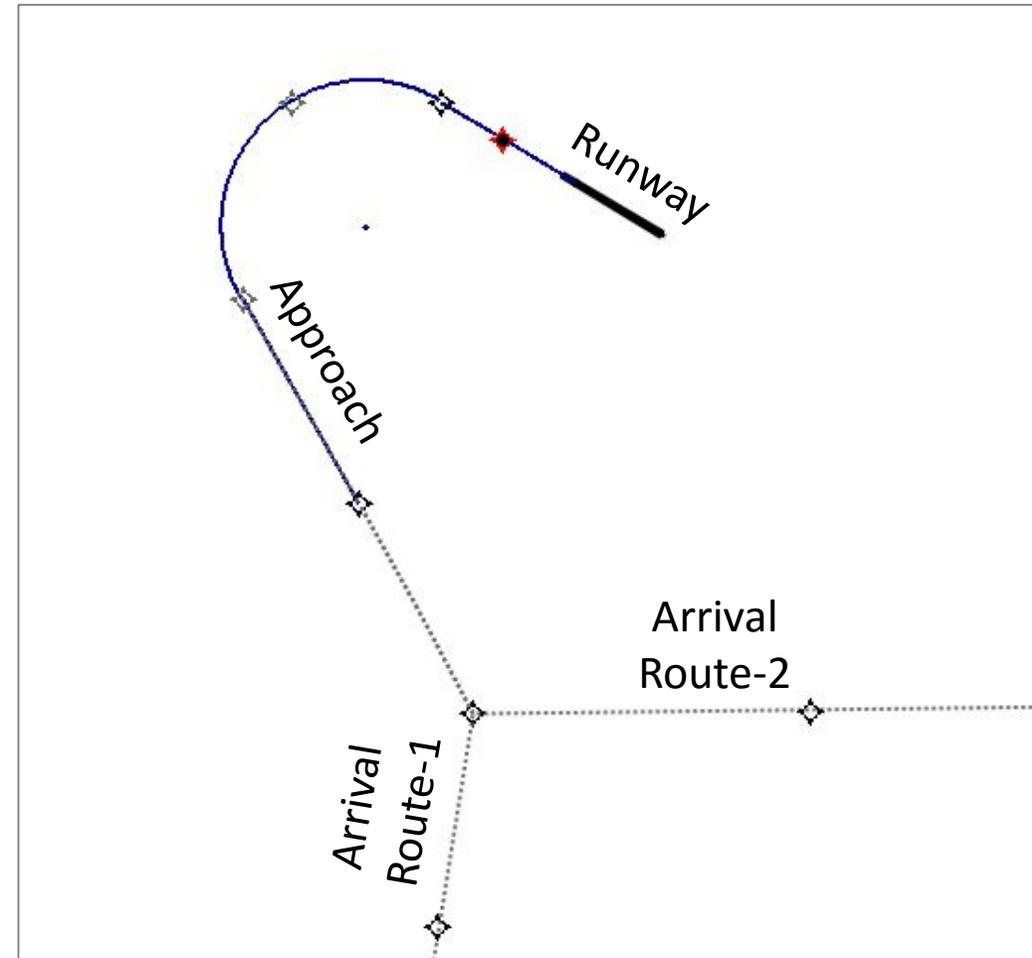
# Vectoring Example

- Current arrival procedures utilize ground based navigation and radar vectors
  - High workload for air traffic controllers and flight crew
  - Inconsistent flight paths create wide dispersion for arriving traffic
  - Inconsistent vertical profiles
    - Altitudes assigned by air traffic control
    - Arrival procedure not connected to approach

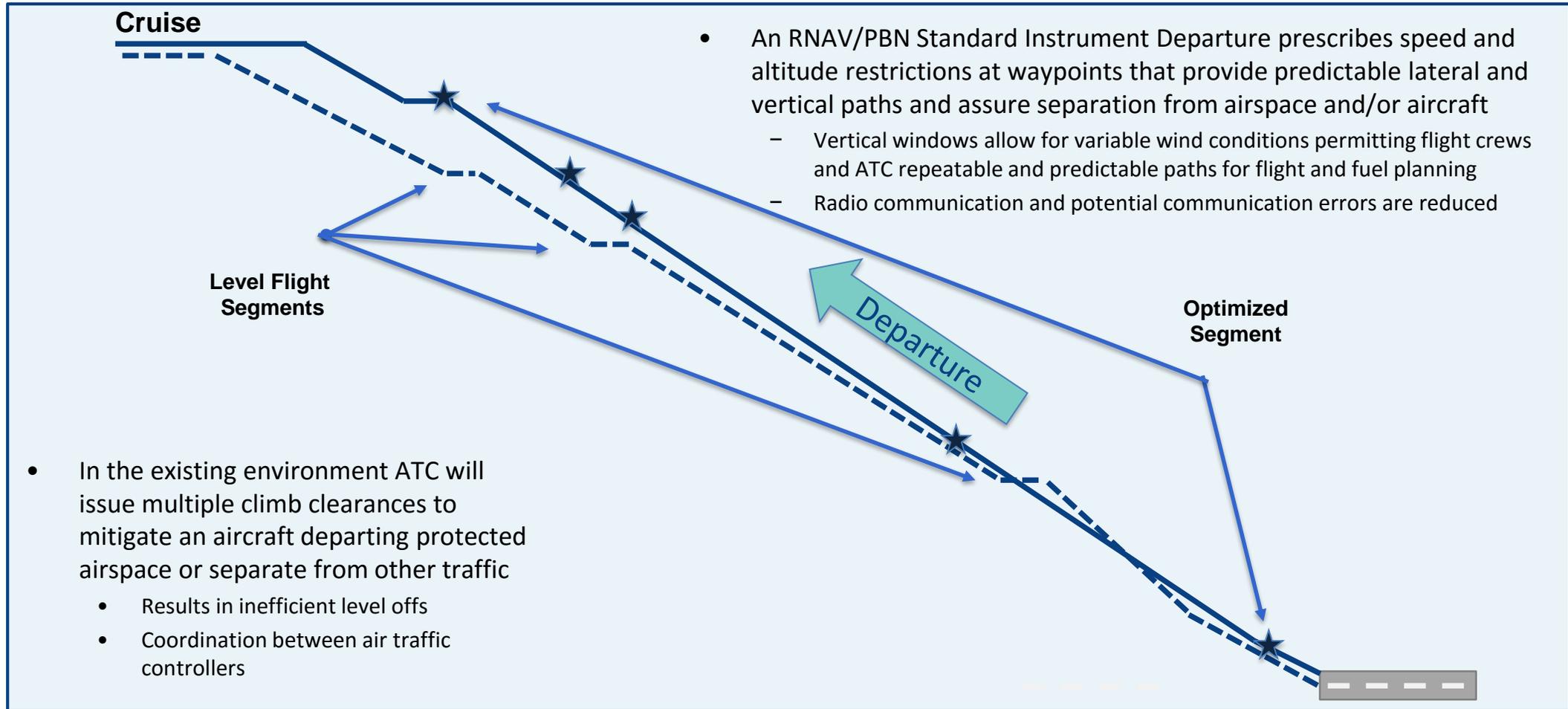


# RNAV RNP Example

- RNAV STAR connects an arrival route to an arrival route to an RNAV RNP approach procedure
- STAR/Approach connectivity provides repeatable and predictable flight paths
  - Simplifies operations for flight crews and ATC
  - Allows use of flight-deck automation
  - Stabilized and efficient approach operations



# Optimized Climb Profile Example (Departure)



# Summary of Qualitative Benefits

- Reduced ATC task complexity
- Reduced communications (flight deck and controller)
  - Reduced phraseology
  - Reduced frequency congestion
- Reduced pilot workload
- Repeatable, predictable flight paths
- Accurate fuel planning
- Laterally or vertically segregated flows



# NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

# SoCal Environmental Assessment (EA)

- The Environmental process began with Study Team participation in November of 2011
- Draft EA released June 10, 2015
  - Public comment period was open for 120 days
- Finding of No Significant Impact/Record of Decision (FONSI/ROD) signed August 31, 2016
  - + FONSI/ROD enables the agency to move forward with replacing dozens of existing conventional air traffic control procedures with new satellite-based procedures
  - + FAA is working to phase in use of the procedures, starting in November 2016 and continuing through April 2017
  - + Additional informational briefings will be conducted to inform the public of the project at each phase
- Final EA is available on the SoCal Metroplex website

# SoCal Environmental Information

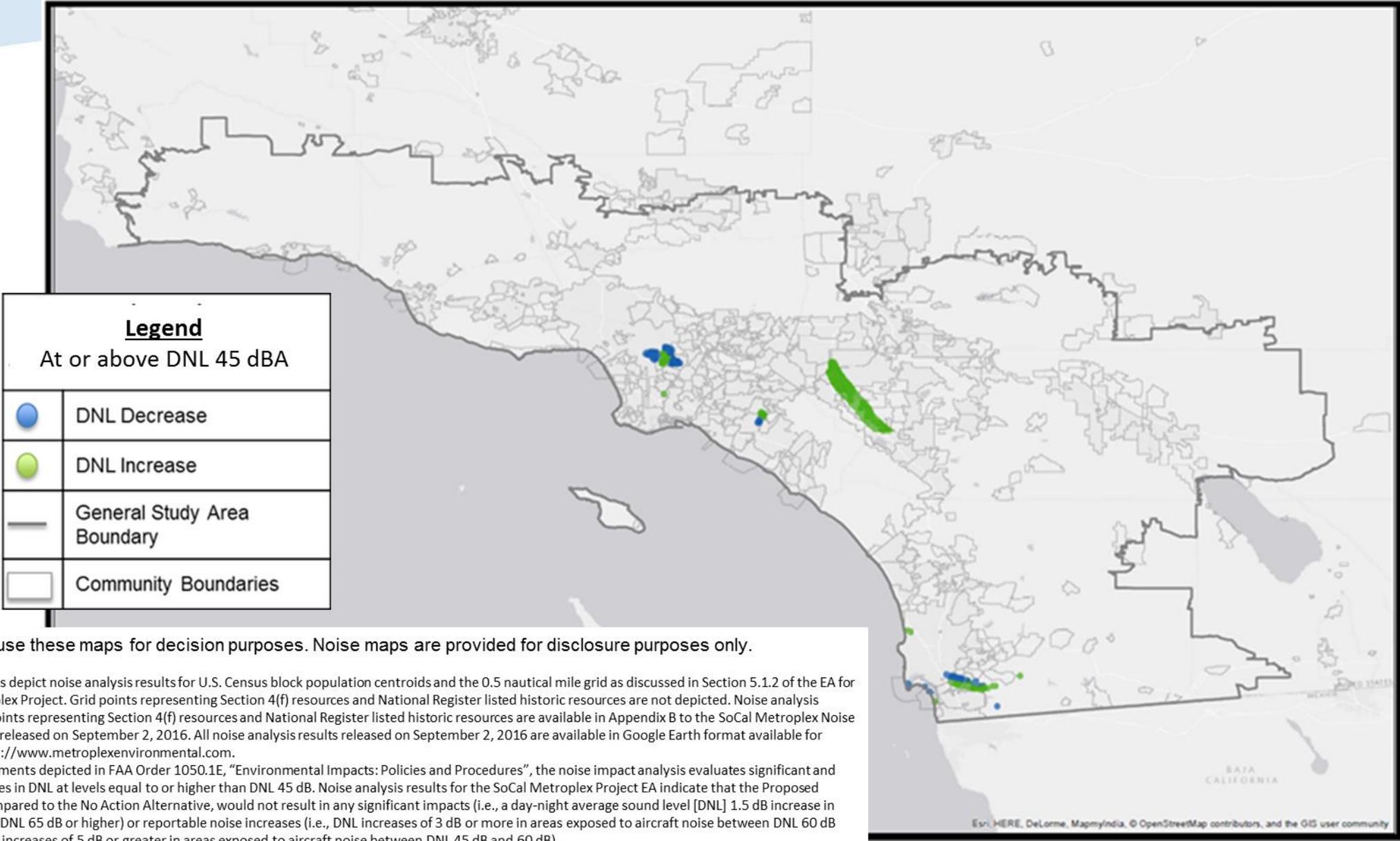
- When the Southern California Metroplex procedures are implemented, some people might see aircraft where they did not previously fly. This is because some air route changes will occur, and because satellite-based procedures create more concentrated flight paths than conventional procedures
- Some people will experience noise decreases or increases and some will experience no changes at all
- Some flight track dispersion will continue to occur after the new procedures are implemented because the Metroplex project includes a number of existing procedures
- Also, air traffic controllers will need to occasionally vector aircraft for safety or efficiency reasons or to reroute them around weather systems

# SoCal Metroplex Noise Maps

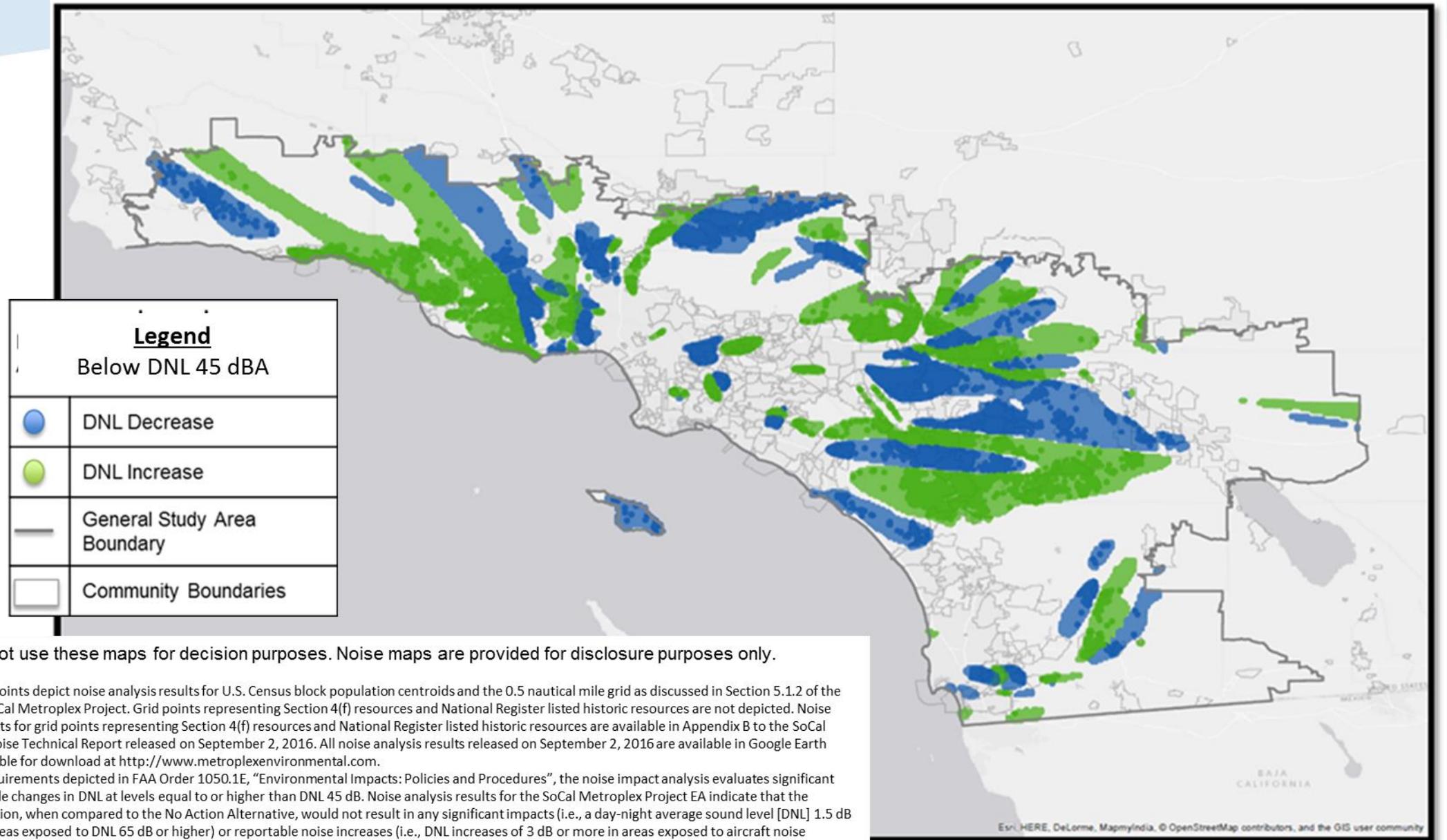
- The following noise maps are created to enhance the understanding of all potential noise changes in the study area
- Please note that many of these changes occur at noise levels at or below the noise level experienced in everyday living situations in the area
- Noise maps represent noise changes of DNL\* +/-1 dB
  - For many people, this small change is difficult to distinguish
- FAA did not use these maps for decision purposes
- Noise maps are provided for disclosure purposes only

\*The DNL metric is a value representing the aircraft sound level over a 24-hour period and includes all of the sound energy generated within 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).

# Increase/Decrease in DNL At or Above DNL 45 dBA



# Increase/Decrease in DNL Below DNL 45 dBA





# COMMUNITY ENGAGEMENT

# SoCal Community Engagement

- Early Notification of EA – January 21, 2014
- FAA conducted 11 public workshops: June 16 through July 1, 2015
  - Santa Ana, Santa Monica, Los Angeles, San Diego, Palm Springs, Torrance, Long Beach, Ontario, Ventura, Santa Barbara, and Burbank
- FAA extended public comment period for total of 120 days (October 8, 2015)
- Approximately 4,000 individual substantive comments received
  - Approximately 2,700 unique comment/form letters received
  - Approximately 380 comments received after public comment closed
  - Approximately 570 comments were received from three online community groups
  - Responses to comments are included in the environmental assessment



# NOVEMBER 10, 2016 PROCEDURE IMPLEMENTATION

## Group One Procedures - Publication November 10, 2016

BUR/VNY WEESL One STAR (RNAV)	LAX RNAV (GPS) Z RWY 06R	SAN BAYVU FIVE STAR (RNAV)
BUR ILS Y or LOC Y RWY 8 (Conventional)	LAX RNAV RNP Z RWY 07L	SAN LOC RWY 27 (Conventional)
BUR ILS Z or LOC Z RWY 8 (Conventional)	LAX RNAV RNP Z RWY 07R	SAN LUCKI ONE STAR (RNAV)
BUR RNAV (GPS) Y RWY 8	LAX RNP Z RWY 06L (RNAV)	SAN RNAV (GPS) Y RWY 27
BUR RNAV (GPS) Z RWY 8	LAX RNP Z RWY 07L (RNAV)	SAN RNAV (RNP) Z RWY 27
CRQ RNAV (GPS) Y RWY 06 (RNAV)	LAX/SMO WAYVE ONE STAR (RNAV)	SAN ZZOOO ONE SID (RNAV)
CRQ RNAV (RNP) Z RWY 06 (RNAV)	LGB ILS or LOC RWY 30 (Conventional)	SBA GAUCH ONE SID (RNAV)
LAS STAAV SEVEN SID (RNAV)	LGB RNAV (RNP) RWY 12	SBA MISHN ONE SID (RNAV)
LAS TRALR SEVEN SID (RNAV)	LGB RNAV (RNP) RWY 25R	SBA PITBL ONE STAR (RNAV)* N/A until 4/27
LAX ILS or LOC RWY 06L (Conventional)	LGB RNAV (RNP) Y RWY 30	SDM CHASR ONE STAR (RNAV)
LAX ILS or LOC RWY 07R (Conventional)	LGB RNAV GPS Z RWY 30	SMO VOR-A
LAX ILS or LOC RWY 06R (Conventional)	LGB VORTAC RWY 30	SNA RNAV (GPS) Y RWY 02L
LAX ILS or LOC RWY 07L (Conventional)	LGB/SNA/SLI/FUL/TOA KAYOH SIX (Conventional)	SNA RNAV (RNP) Z RWY 02L
LAX RNAV (GPS) Y RWY 06L	ONT/ONT Satellites SETER FOUR STAR (Conventional)	SNA RNAV (RNP) Z RWY 20R
LAX RNAV (GPS) Y RWY 06R	PSP RNAV (RNP) RWY Z 13R	
LAX RNAV (GPS) Y RWY 07L	SAN BAYVU FIVE STAR (RNAV)	





# FUTURE CHART DATES

# Future Chart Dates

Future Chart Dates	
JANUARY 5, 2017	SMO Procedures
MARCH 2, 2017	BUR, CRQ, LAX, LGB, NTD, ONT, PSP, SAN, SBA, SMO, SNA and VNY Procedures
APRIL 27, 2017	BUR, LAX, LGB, ONT and SNA Procedures



# ENVIRONMENTAL AND PROJECT INFORMATION

# Additional Public Information

- Before publishing the procedures, the agency will conduct additional public information meetings and webinars to further inform people about the changes
- The FAA will announce the upcoming public outreach to select officials, in press releases and on Facebook, Twitter, Instagram, the Metroplex website and possibly other platforms too

# Community Engagement

Meeting	Date and Location
Community Pre-implementation (Webinar)	October 17, 2016, 6:00 PM (SBA, BUR, PSP, ONT and VNY)
Community Pre-implementation (Webinar)	October 17, 2016, 8:00 PM (LGB, SNA, SLI, FUL and TOA)
Community Pre-implementation (Webinar)	October 18, 2016, 6:00 PM (LGB, SNA, SLI, FUL and TOA)
Community Pre-implementation (Webinar)	October 18, 2016, 8:00 PM (SAN, CRQ, SDM and NZY)
Community Pre-implementation (Webinar)	October 20, 2016, 6:00 PM (LAX and SMO)
Community Pre-implementation (Webinar)	October 20, 2016, 8:00 PM (SBA, BUR, PSP, ONT and VNY)
Community Informational Briefing	October 25, 2016 D.W. Griffith Middle School (LAX and SMO)
Community Informational Briefing	October 26, 2016 Palms Middle School (LAX and SMO)
Community Informational Briefing	October 27, 2016 Liberty Station-Corky McMillin Event Center (SAN Area)
Community Informational Briefing	November 1, 2016 6:00 – 9:00 PM, La Presa Middle School, 1001 Leland Street, Spring Valley, CA 91977 (SAN Area)
Community Informational Briefing	November 2, 2016 6:00 – 9:00 PM, El Modena High School at 3920 E. Spring Street Orange, CA 92869 (LGB, SNA, SLI and TOA)



# SOCAL METROPLEX WEBSITE INFORMATION

# Website Links

*(1 of 2)*

## SoCal Environmental Assessment Website

- [http://www.metroplexenvironmental.com/socal\\_metroplex/socal\\_introduction.html](http://www.metroplexenvironmental.com/socal_metroplex/socal_introduction.html)

## SoCal Metroplex Frequently Asked Questions

- [http://www.metroplexenvironmental.com/socal\\_metroplex/socal\\_questions.html](http://www.metroplexenvironmental.com/socal_metroplex/socal_questions.html)

## SoCal Metroplex Documents (EA and Google Earth)

- [http://metroplexenvironmental.com/socal\\_metroplex/socal\\_docs.html](http://metroplexenvironmental.com/socal_metroplex/socal_docs.html)

# Website Links

## (2 of 2)

Volume 1 (Responses to public comments)

- [http://metroplexenvironmental.com/docs/socal\\_metroplex/final/SoCal\\_Metroplex\\_FEA\\_Appendix\\_F-Vol\\_I.pdf](http://metroplexenvironmental.com/docs/socal_metroplex/final/SoCal_Metroplex_FEA_Appendix_F-Vol_I.pdf)

Volume 2 (Responses to public comments)

- [http://metroplexenvironmental.com/docs/socal\\_metroplex/final/SoCal\\_Metroplex\\_FEA\\_Appendix\\_F-Vol\\_II.pdf](http://metroplexenvironmental.com/docs/socal_metroplex/final/SoCal_Metroplex_FEA_Appendix_F-Vol_II.pdf)

Volume 3 (Responses to public comments)

- [http://metroplexenvironmental.com/docs/socal\\_metroplex/final/SoCal\\_Metroplex\\_FEA\\_Appendix\\_F-Vol\\_III.pdf](http://metroplexenvironmental.com/docs/socal_metroplex/final/SoCal_Metroplex_FEA_Appendix_F-Vol_III.pdf)

# Metroplex

Thank you!



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| **NextGEN**



**BACKUP SLIDES**



# SANTA BARBARA MUNICIPAL AIRPORT (SBA)

# SBA PITBL RNAV STAR



Santa Barbara Municipal (SBA)  
STAR (Arrival)  
Publication:  
PITBL Nov 10, 2016

- There is no existing published arrival procedure for SBA
- This STAR will reduce complexity and verbiage between Air Traffic Control and flight crews providing a repeatable and predictable path for SBA arrivals
- The STAR was not designed with an Optimized Profile Descent, but contains altitude restrictions to de-conflict SBA arrivals from San Diego International Airport departures and Los Angeles International Airport arrivals
- The design will reduce complexity between SBA arrivals and John Wayne-Orange County Airport, Long Beach Airport (Daugherty Field) and McClellan-Palomar Airport (Carlsbad) arrivals
- The design does not conflict with existing noise procedures

# SBA GAUCH and MISHN RNAV SIDs



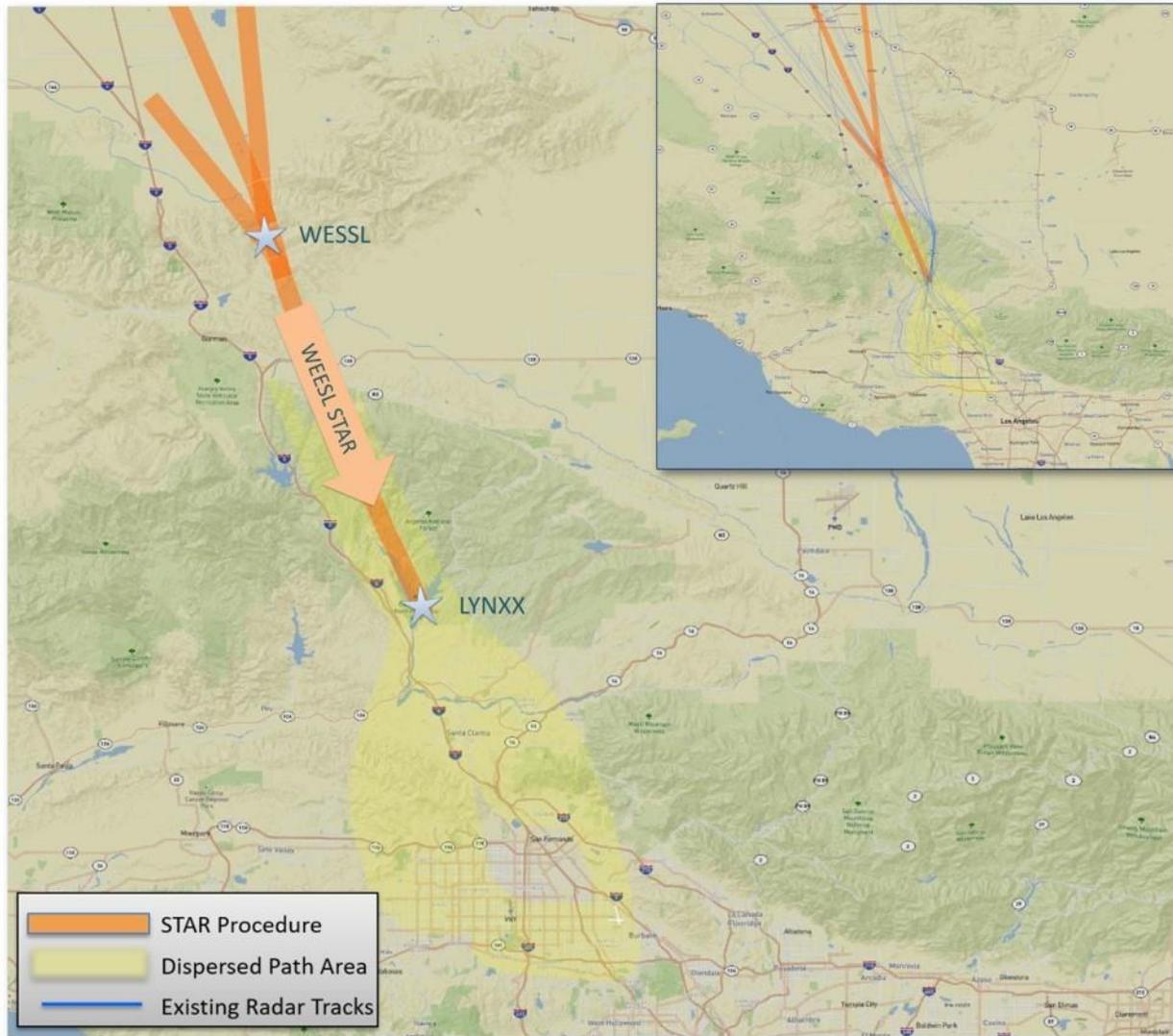
Santa Barbara Municipal (SBA)  
SID (Departure)  
Publication:  
GAUCH, MISHN Nov 10, 2016

- Current departure procedures are dependent on ground based navigation and radar vectors
- The GAUCH and MISHN SIDs are designed as RNAV-off-the-ground procedures
- The MISHN SID provides de-confliction from the newly designed SBA PITBL STAR
- Concurrence of the designs was achieved with the airport operator, pilot groups and ATC
- The design does not conflict with existing noise procedures



# BOB HOPE AIRPORT (BUR)

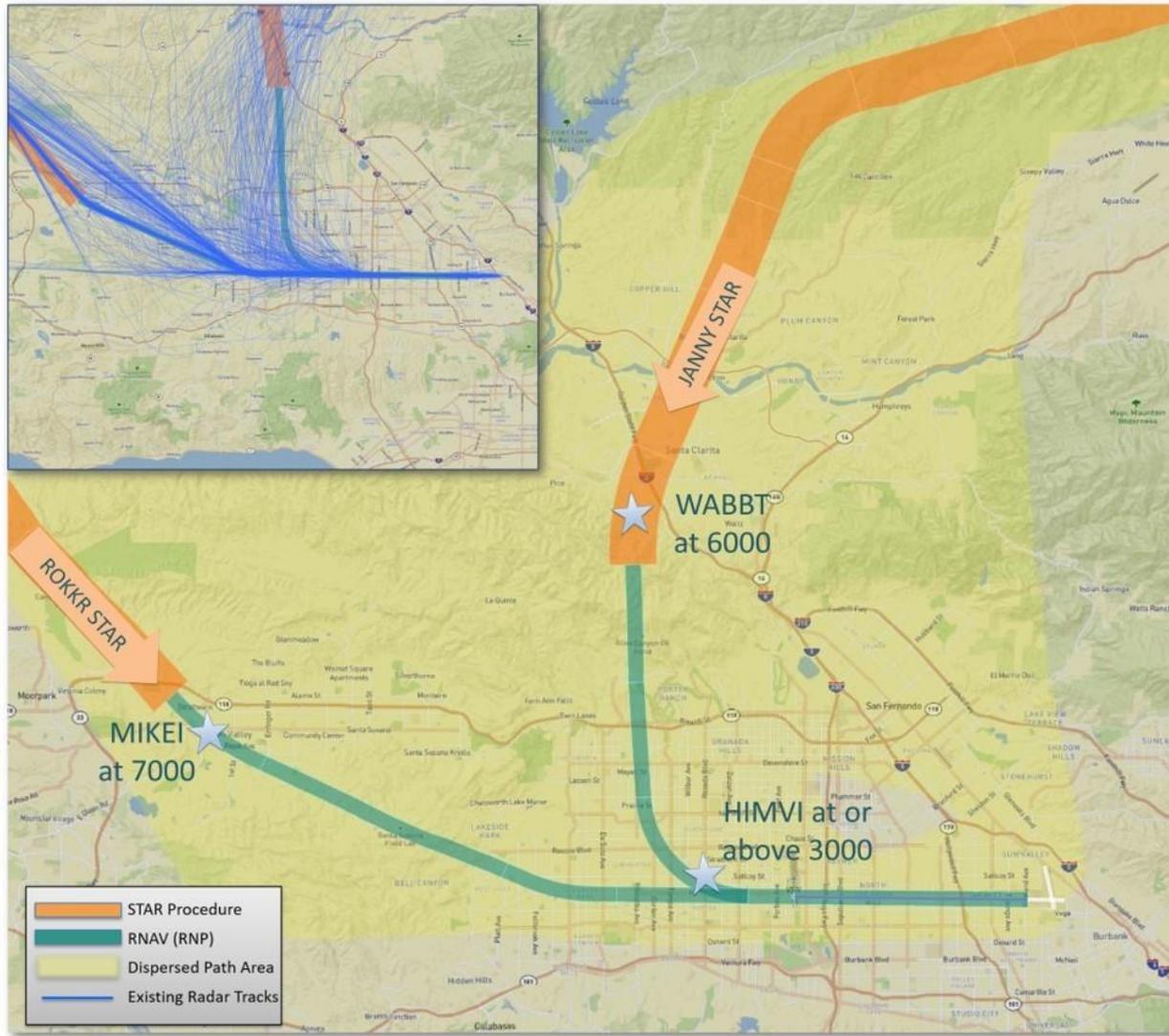
# BUR WEESL RNAV STAR (RNAV)



Bob Hope Airport (BUR)  
STAR (Arrival)  
Publication:  
WEESL Nov 10, 2016

- This STAR will reduce complexity and verbiage between Air Traffic Control and flight crews providing a repeatable and predictable path for BUR arrivals
- The WEESL STAR will de-conflict BUR arrivals from aircraft on the newly designed LAX WAYVE STAR and overflight traffic in the area

# BUR RNAV (RNP) Y RWY 08 Approach



Bob Hope Airport (BUR)

RNP Approach

Publication:

RNAV (RNP) 08 Nov 10, 2016

- The RNAV RNP approach will reduce complexity and verbiage between Air Traffic Control and flight crews providing a repeatable and predictable path for BUR arrivals
- STAR transitions from the west and northwest join the approach

# BUR RNAV GPS Z RWY 8 Approach



Bob Hope Airport (BUR)  
Instrument Approach  
RNAV (GPS) Z RWY 08  
Publication: Nov 10, 2016

- The RNAV GPS approach was modified to incorporate SoCal Metroplex waypoints to provide continuity

# BUR ILS Z or LOC Z RWY 8 (Conventional) BUR ILS Y or LOC Y RWY 8 (Conventional)



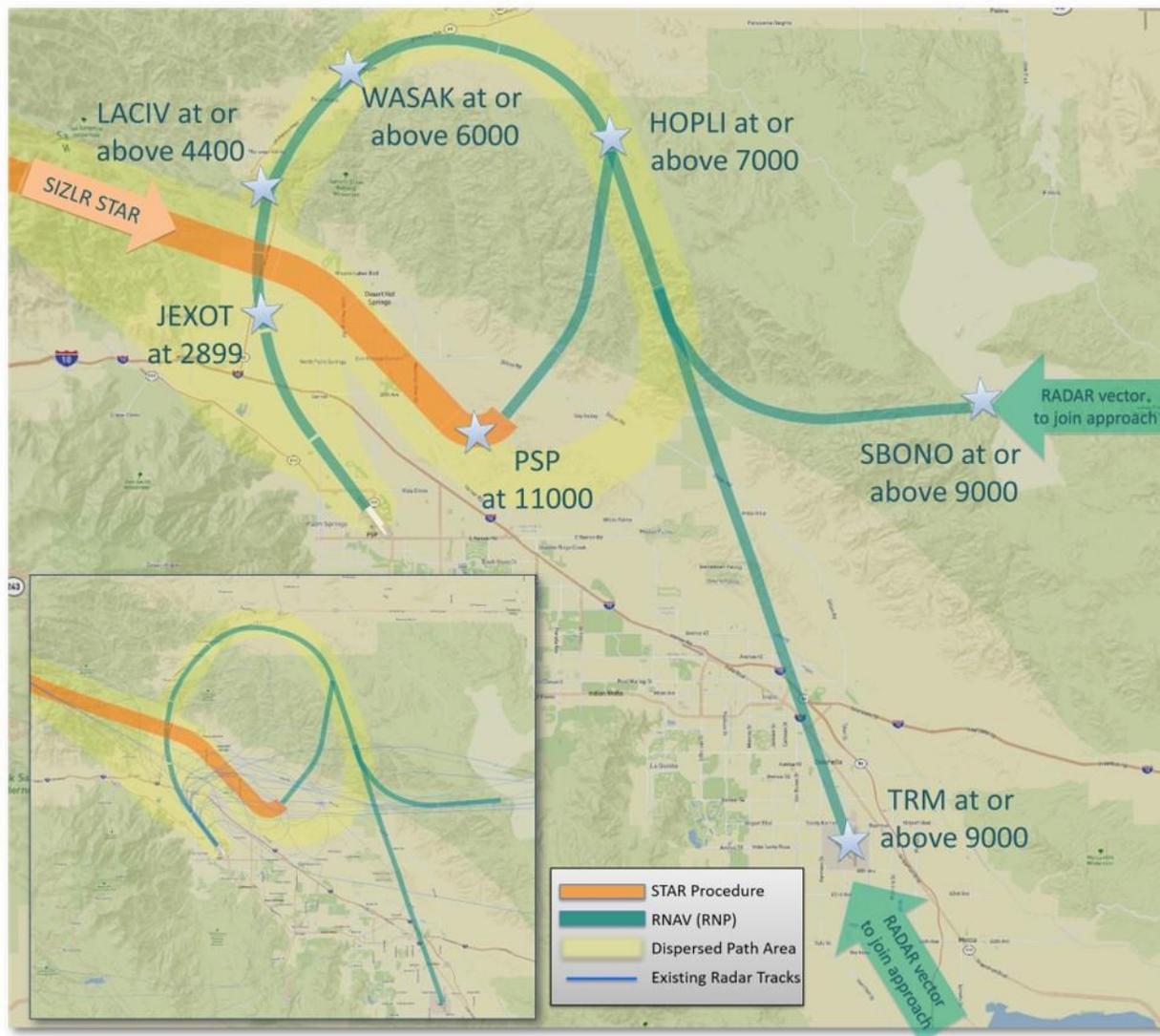
Bob Hope Airport (BUR)  
Instrument Approach  
ILS (Z) or LOC Z RWY 08  
ILS (Y) or LOC Y RWY 08  
Publication:  
RNAV (GPS) Z and Y RWY 08  
Nov 10, 2016

- The RNAV GPS approaches were modified to incorporate SoCal Metroplex waypoints to provide continuity



# PALM SPRINGS INTERNATIONAL AIRPORT (PSP)

# PSP RNAV (RNP) Z RWY 13R



Palm Springs International Airport (PSP)  
Instrument Approach  
RNAV (RNP) RWY 13R  
Publication:  
RNAV (RNP) 13R Nov 10, 2016

- The development of the PSP RNAV RNP RWY 13R approach will provide a more repeatable and predictable path
- The PSP/ SIZLR RNAV STAR ties into the PSP RNP RWY 13R approach
  - + The PSP SIZLR STAR also serves Jacqueline Cochran Regional Airport and Bermuda Dunes Airport
- Additional transitions will allow access to the approach from the east and southeast via radar vectors over TRM and SBONO as shown in the figure



# ONTARIO INTERNATIONAL AIRPORT (ONT)

# ONT/ONT Satellites SETER FOUR STAR (Conventional)



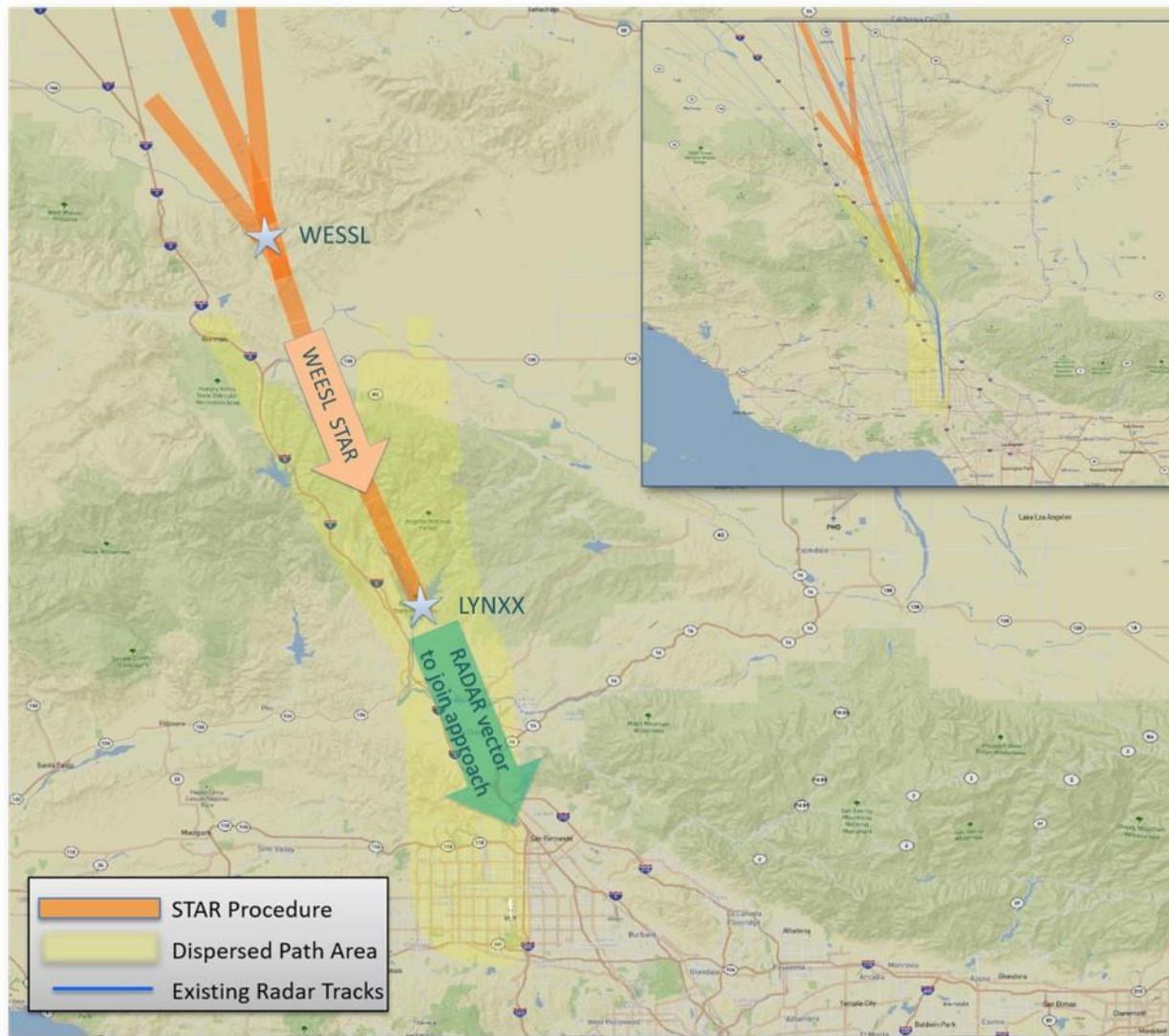
Ontario International Airport (ONT)  
STAR (Arrival)  
SETER 4 Conventional  
Publication:  
SETER 4 Nov 10, 2016

- The conventional STAR was modified to incorporate SoCal Metroplex waypoints to provide continuity



# VAN NUYS AIRPORT (VNY)

# VNY WEESL ONE RNAV STAR



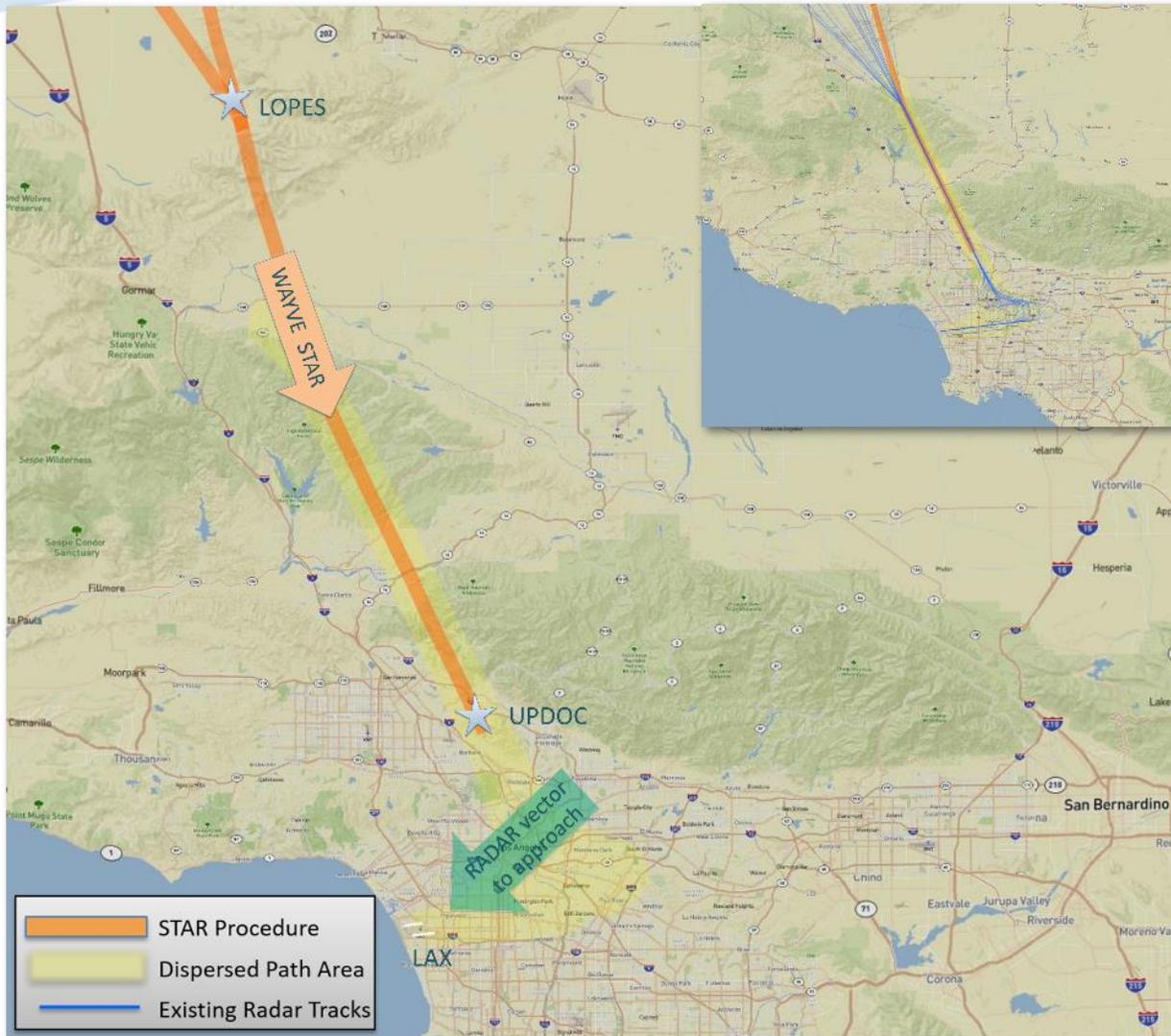
Van Nuys Airport (VNY)  
STAR (Arrival)  
WEESL RNAV  
Publication:  
WEESL Nov 10, 2016

- This STAR will reduce complexity and verbiage between Air Traffic Control and flight crews providing a repeatable and predictable path for VNY arrivals
- The WEESL STAR will de-conflict VNY arrivals from aircraft on the newly designed LAX WAYVE STAR and overflight traffic in the area



# LOS ANGELES INTERNATIONAL AIRPORT (LAX)

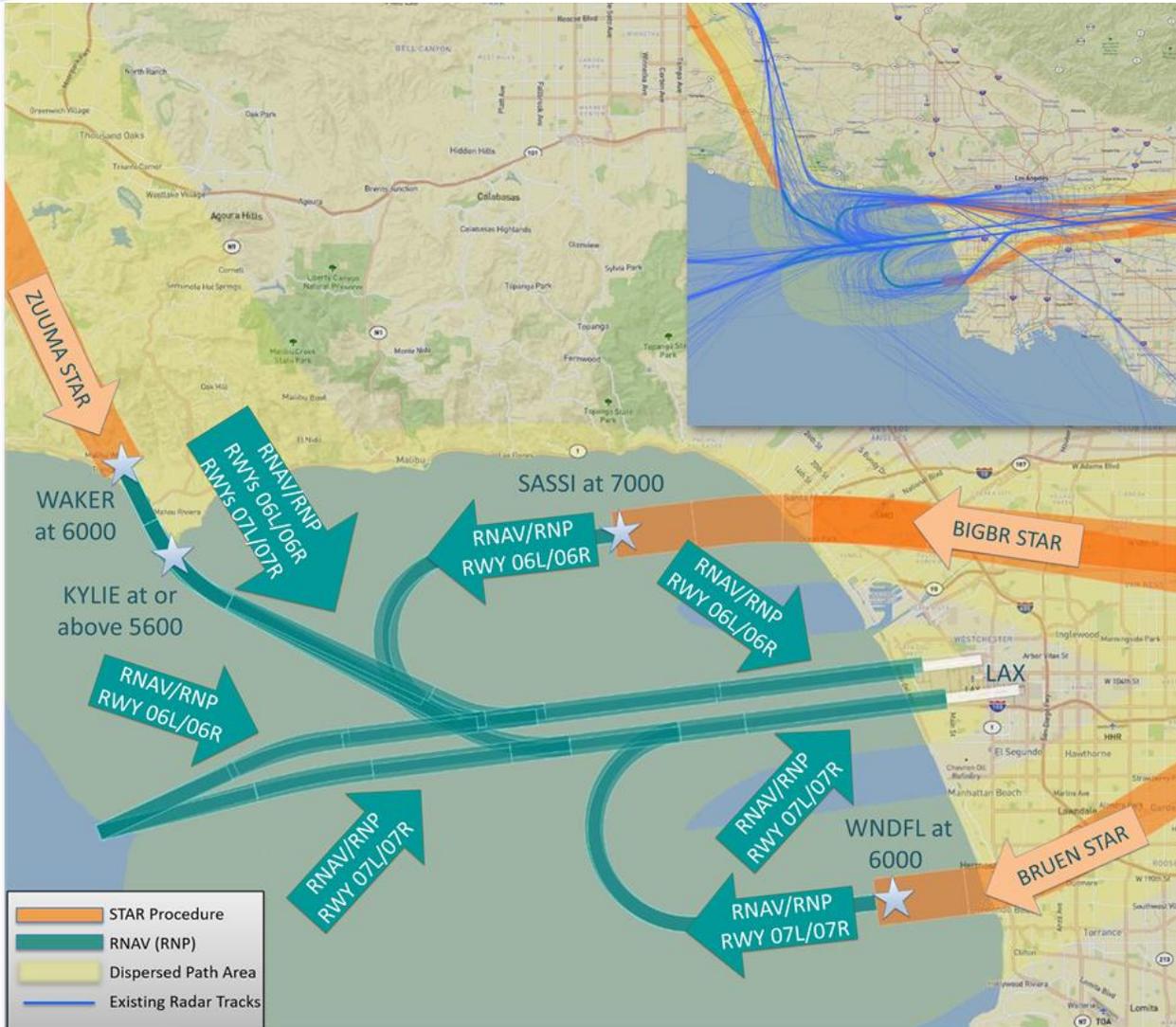
# LAX WAYVE RNAV STAR



Los Angeles International (LAX)  
STAR (Arrival)  
WAYVE STAR  
Publication: Nov 10, 2016

- The current LAX Standard Terminal Arrival Route (STAR) for propeller aircraft is a conventional ground based procedure
- The Design Team developed the procedure without vertical navigation due to complex interaction with other SIDs and STARS
- The STAR provides a segregated route from BUR and VNY traffic entering the terminal area
- The STAR terminates at UPDOC waypoint and ATC will radar vector arrivals to the runway in use
- LAX traffic on this procedure are propeller type only

# LAX RNAV RNP RWY 06L/R and 07L/R



Los Angeles International (LAX)  
Instrument Approach  
RNAV (RNP) Z RWY 06R  
RNAV (RNP) Z RWY 06L  
RNAV (RNP) Z RWY 07R  
RNAV (RNP) Z RWY 07L  
Publication: Nov 10, 2016

- The lack of Standard Terminal Arrival Route (STAR) to approach transitions was identified as a safety concern
- The east flow RNAV/RNP approach procedures were developed to provide safety and operational efficiencies
- The Metroplex RNP approaches provide STAR to approach continuity



# SANTA MONICA MUNICIPAL AIRPORT (SMO)

# SMO WAYVE RNAV STAR



Santa Monica Municipal Airport (SMO)  
STAR (Arrival)  
WAYVE RNAV STAR  
Publication: Nov 10, 2016

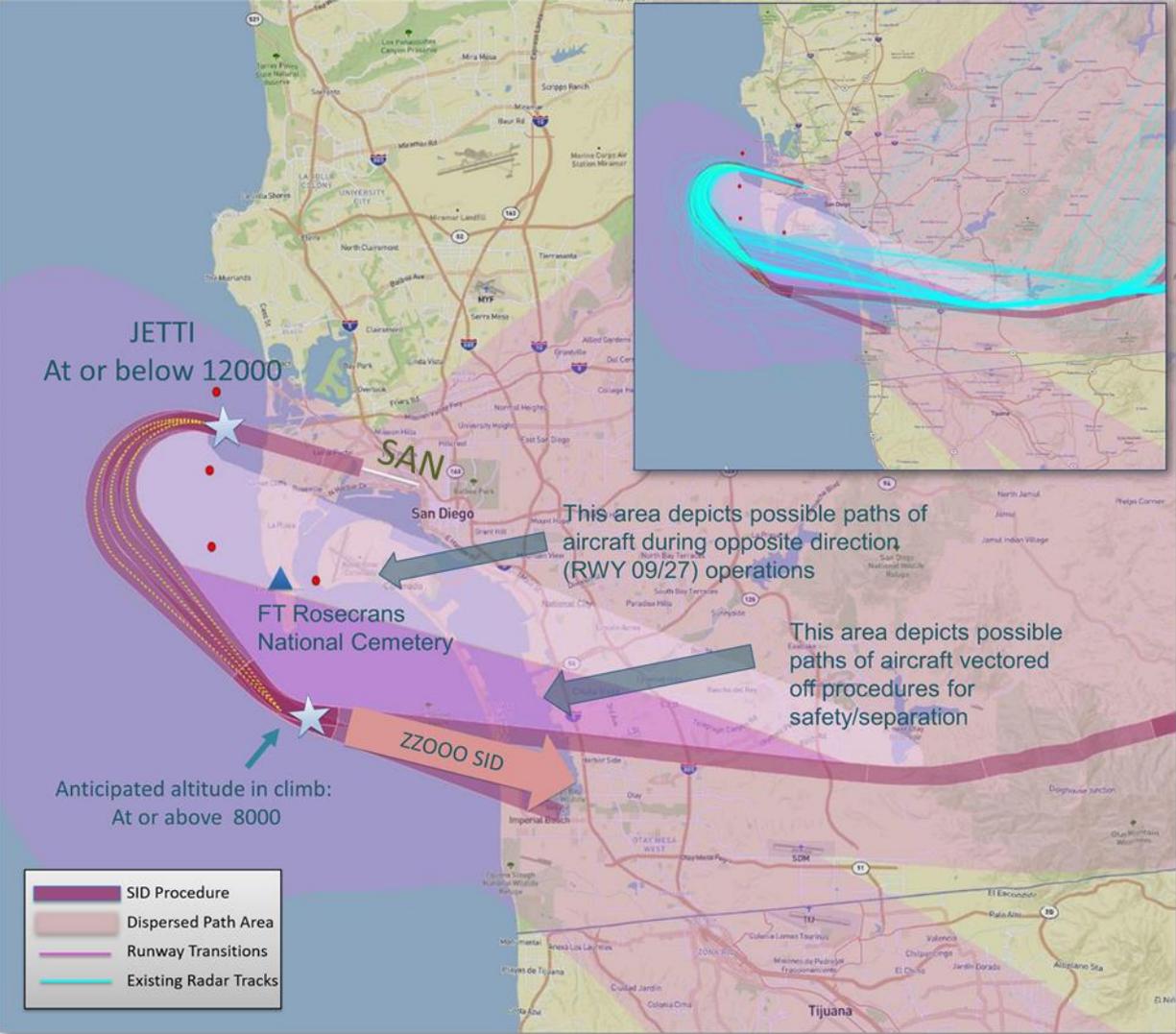
- The current LAX Standard Terminal Arrival Route (STAR) for propeller aircraft is a conventional ground based procedure
- The Design Team developed an RNAV procedure to replace the LAX conventional STAR
  - SMO was added as an operational benefit
- The STAR was designed without vertical navigation due to complex interaction with other SIDs and STARS
- The STAR provides a segregated route from BUR and VNY traffic entering the terminal area
- The STAR terminates at UPDOC waypoint and ATC will radar vector arrivals to the runway in use



**SAN DIEGO INTERNATIONAL (SAN)**

# SAN ZZOOO RNAV SID

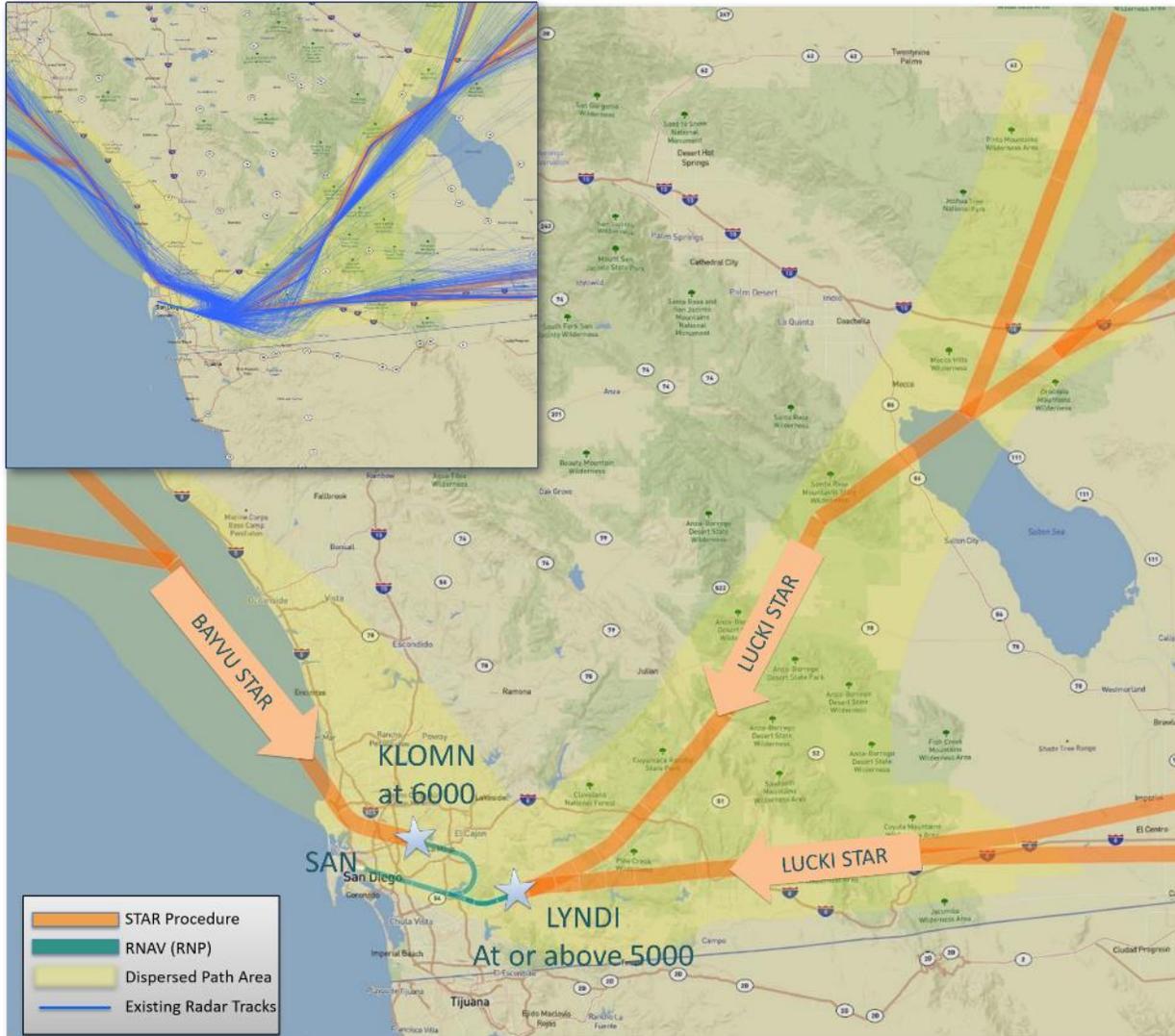
San Diego International (SAN)  
 SID (Departure)  
 SAN ZZOOO RNAV SID  
 Publication: Nov 10, 2016



- The RNAV off-the-ground ZZOOO SID replaces the current POGGI SID
- The design duplicates the POGGI SID to the JETTI intersection, flying runway heading and complying with the noise abatement agreement
- ZZOOO waypoint ensures the procedure remains south of Fort Rosecrans National Cemetery
- The design circumnavigates a busy parachute jump zone area
- The SID is deconflicted from the SAN LUCKI/TOPGN and SDM/NZY CHASR STARS

# SAN BAYVU5 STAR

# SAN LUCKI RNAV STAR



San Diego International (SAN)  
STAR (Arrival)  
SAN BAYVU5 STAR  
SAN LUCKI RNAV STAR  
Publication:  
SAN BAYVU5 STAR: Nov 10, 2016  
SAN LUCKI RNAV STAR: Nov 10, 2016

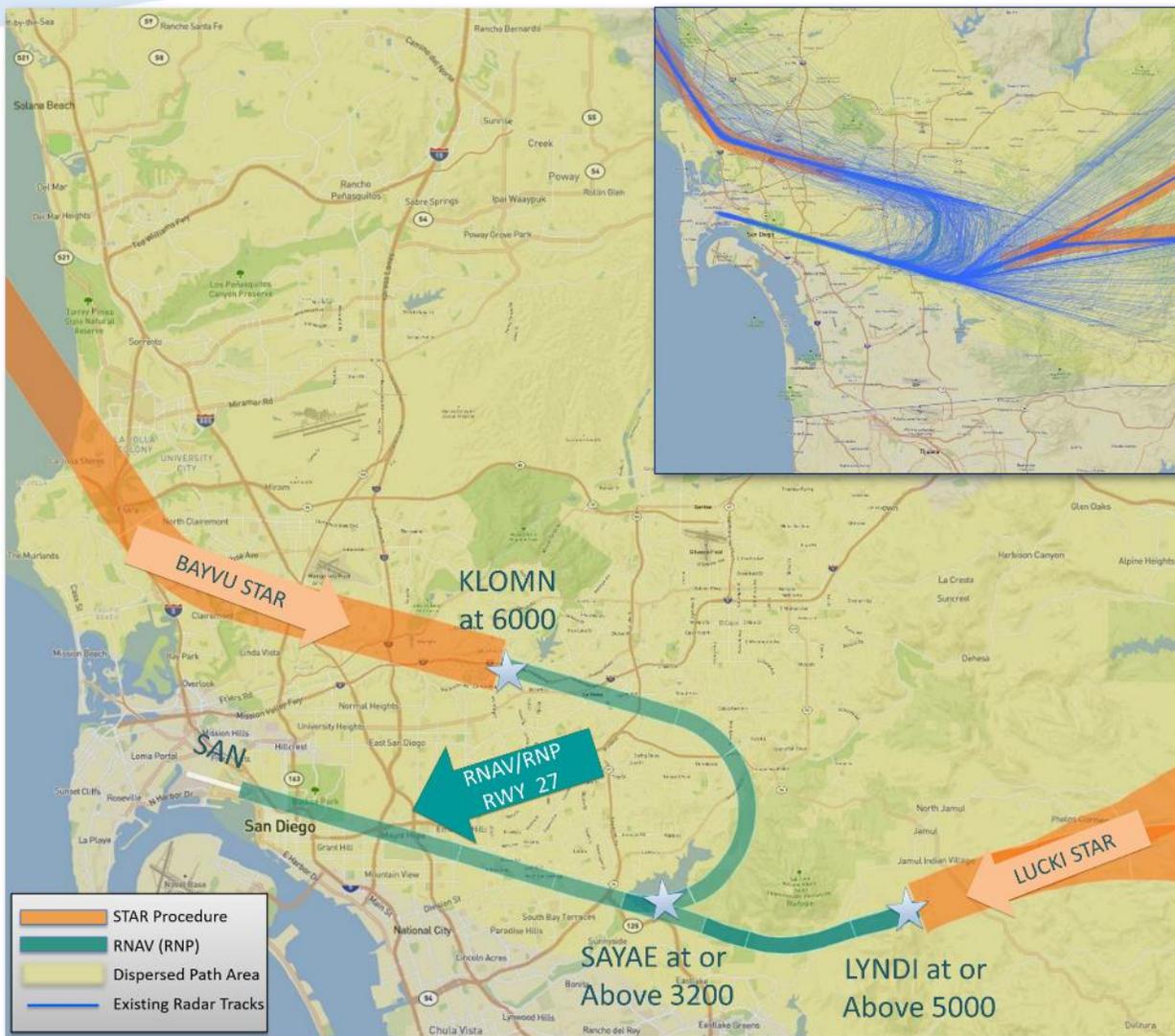
## SAN BAYVU 5 STAR:

- KLOMN waypoint was moved 2.36 miles to the southeast to accommodate SoCal Metroplex designs
  - Moving KLOMN resulted in a change to the lateral path of the current BAYVU4 STAR
- This change allows connectivity to the SAN RNP Z RWY 27 approach and provides continuity between procedures

## SAN LUCKI STAR:

- The LUCKI STAR is an Optimized Profile Descent
- The STAR is deconflicted from the SAN ZZ000 SID and the SDM/NZY CHSR STAR at lower altitudes
- The LUCKI STAR connects to the SAN RNP Z RWY 27 approach and provides continuity between procedures
- The lateral path was modified to avoid military airspace

# SAN RNAV/RNP RWY27



San Diego International (SAN)  
Instrument Approach  
RNAV (RNP) RWY 27  
Publication: Nov 10, 2016

- A Required Navigation Performance (RNP) approach provides a higher level of precision, providing a more repeatable and predictable path, increasing efficiency for SAN arrivals
- The approach is expected to reduce reported Traffic Collision Avoidance alerts, high energy-high rate of descent approaches and enhanced ground proximity warnings for aircraft on approach to SAN RWY 27
- The approach is assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews



**MCCLELLAN PALOMAR (CRQ)**

# CRQ RNAV RNP Z RWY 06



McClellan Palomar (CRQ)  
Instrument Approach  
RNAV (RNP) Z RWY 06  
Publication: Nov 10, 2016

- The approach will provide a repeatable and predictable path, increasing efficiency for CRQ arrivals
- Runway transitions allow access to CRQ from the north, northeast and southeast
- The CRQ LEGOS STAR will tie into the approach for aircraft arriving from the northwest
- The approach is assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews
- Existing radar track data are not provided due to limited use of Runway 06

# CRQ GPS Y RWY 06



McClellan Palomar (CRQ)  
Instrument Approach  
GPS Y RWY 06  
Publication: Nov 10, 2016

- The GPS approach will tie into the CRQ LEGOS STAR and mirrors the runway transition of the CRQ RNP Z RWY 06 approach
- Existing radar track data are not provided due to limited use of Runway 06



**BROWN FIELD MUNICIPAL (SDM)  
NAVY NORTH ISLAND (NZY)**

# SDM/NZY CHASR RNAV STAR



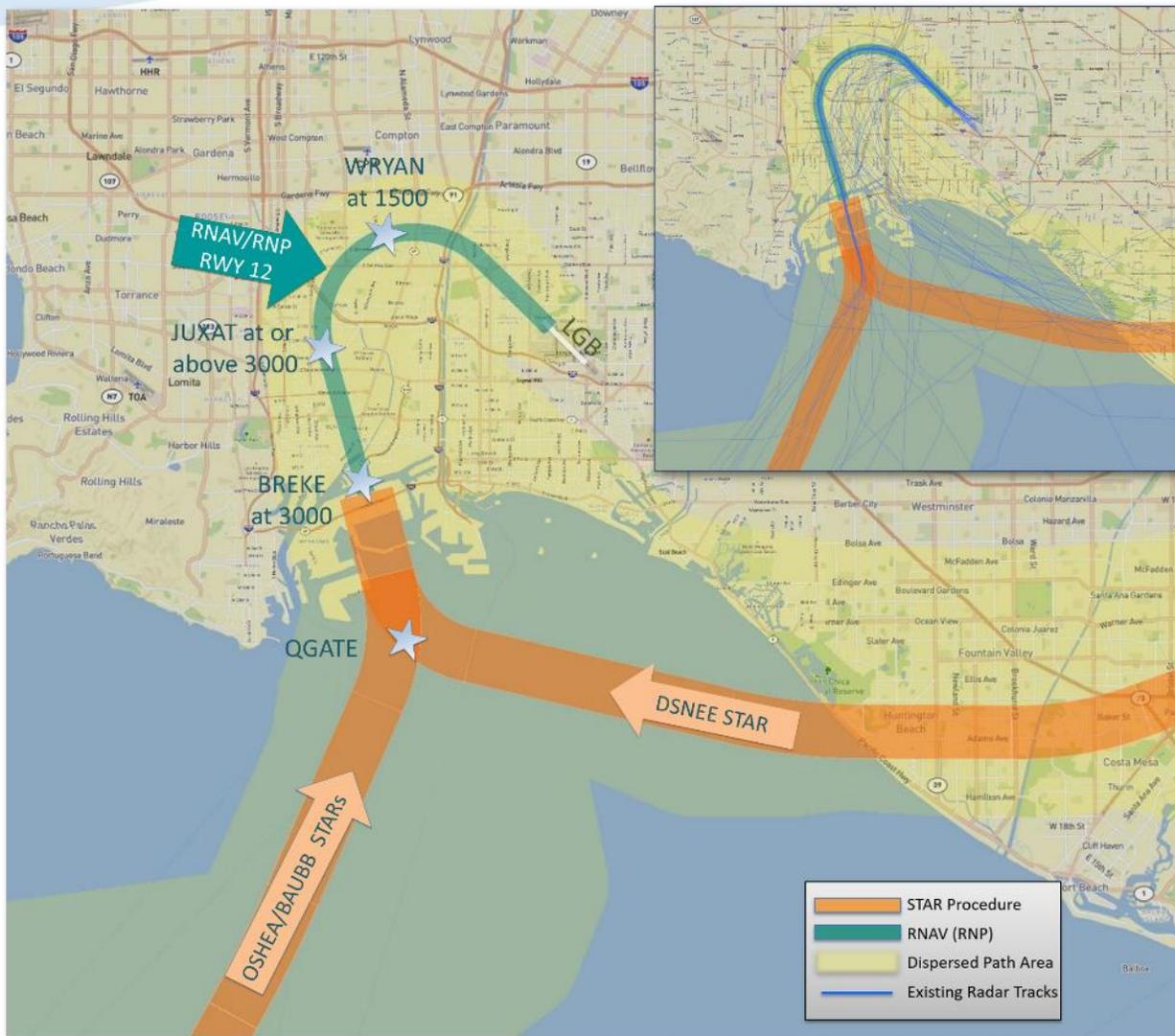
Brown Field Municipal (SDM)  
North Island Naval Air Station-Halsey Field (NZY)  
STAR (Arrival)  
CHASR RNAV STAR  
Publication: Nov 10, 2016

- The CHASR STAR was designed to segregate SDM and NZY arrivals from SAN arrivals
- The STAR was designed as an RNAV procedure with OPD benefits
- To reduce complexity for ATC, the CHASR STAR shares the same route as the SAN TOPGN STAR (SAN east flow) which moves the flow away from SAN arrivals on the LUCKI STAR
- The CHASR STAR terminates at CHASR waypoint and arrivals are radar vectored to the runway in use



# LONG BEACH DAUGHERTY AIRPORT (LGB)

# LGB RNAV RNP RWY 12



Long Beach Daugherty Airport (LGB)  
Instrument Approach  
RNAV (RNP) RWY 25R  
Publication: Nov 10, 2016

- A Required Navigation Performance (RNP) approach provides a higher level of precision, providing a more repeatable and predictable path for LGB arrivals
- The BAUBB, PCIFC and DSNEE STARs are designed to join the RNP approach increasing efficiency
  - + The LGB ROOBY STAR will require a radar vector to the approach
- The approach is assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews

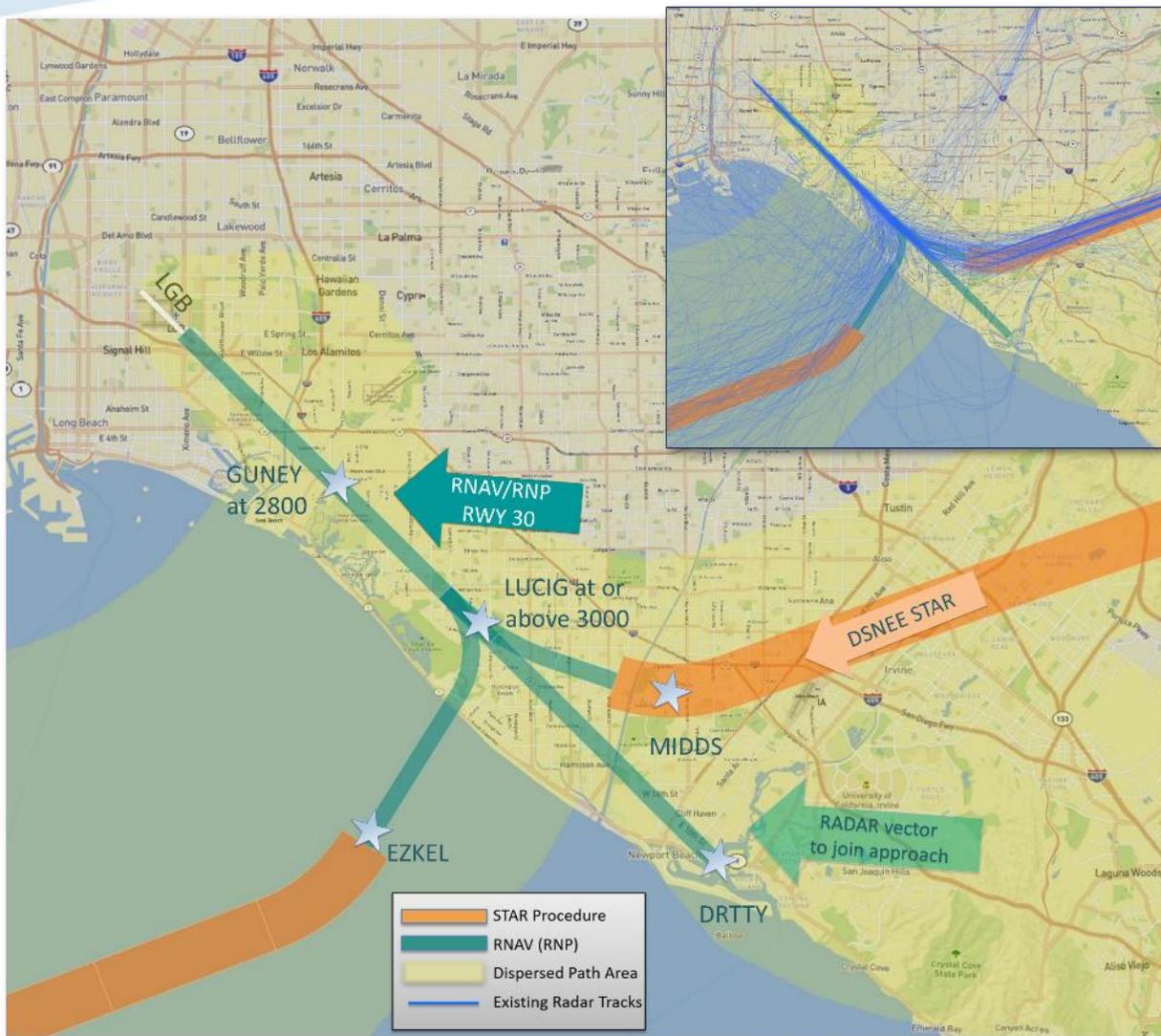
# LGB RNAV RNP RWY 25R



Long Beach Daugherty Airport (LGB)  
Instrument Approach  
RNAV (RNP) RWY 25R  
Publication: Nov 10, 2016

- A Required Navigation Performance (RNP) approach provides a higher level of precision, providing a more repeatable and predictable path for LGB arrivals
- The BAUBB, PCIFC and DSNEE STARs are designed to join the RNP approach increasing efficiency
  - The LGB ROOBY STAR will require a radar vector to the approach
- The approach is assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews
- Existing Radar Tracks are not provided due to limited use of RWY 25R

# LGB RNAV RNP RWY 30



Long Beach Daugherty Airport (LGB)  
Instrument Approach  
RNAV (RNP) RWY 30  
Publication: Nov 10, 2016

- A Required Navigation Performance (RNP) approach provides a higher level of precision, providing a more repeatable and predictable path for LGB arrivals
- The BAUBB, PCIFC and DSNEE STARs are designed to join the RNP approach increasing efficiency
  - The LGB ROOBY STAR will require a radar vector to the approach
- The approach is assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews

# LGB ILS and GPS RWY 30



Long Beach Daugherty Airport (LGB)  
Instrument Approach  
GPS RWY 30  
Publication: Nov 10, 2016

- These approaches were modified to incorporate Metroplex waypoints in order to provide continuity

# LGB KAYOH 6 Conventional STAR Amendment



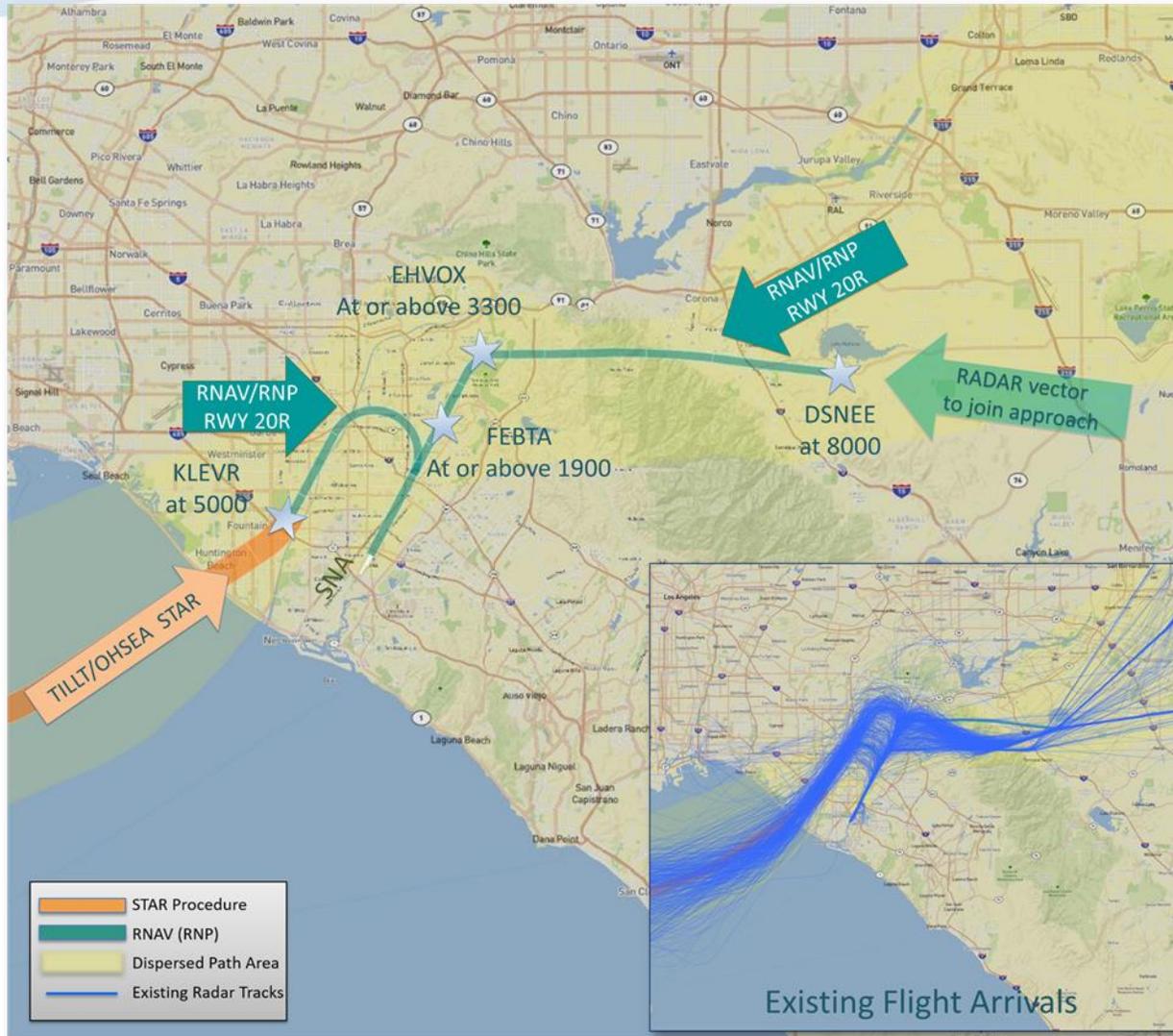
Long Beach Airport (LGB)  
STAR (Arrival)  
KAYOH 6  
Publication:  
KAYOH 6, November 10, 2016

- The KAYOH Conventional STAR terminates at SLI
- Arrivals on the KAYOH STAR are usually radar vectored prior to the end of the procedure to the runway in use
- This conventional STAR was modified to incorporate Metroplex waypoints in order to provide continuity



# JOHN WAYNE ORANGE COUNTY AIRPORT (SNA)

# SNA RNAV RNP Z RWY 20R



SNA John Wayne- Orange County Airport (SNA)  
Instrument Approach  
RNAV (RNP) Z RWY 20R  
Publication:  
RNAV (RNP) Nov 10, 2016  
TILLT OHSEA APR 27, 2017

- RNAV RNP approaches provide a repeatable and predictable path with precise vertical and lateral guidance
- RNP approaches are assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews
- Inbound aircraft from the east would be vectored to join the approach by ATC

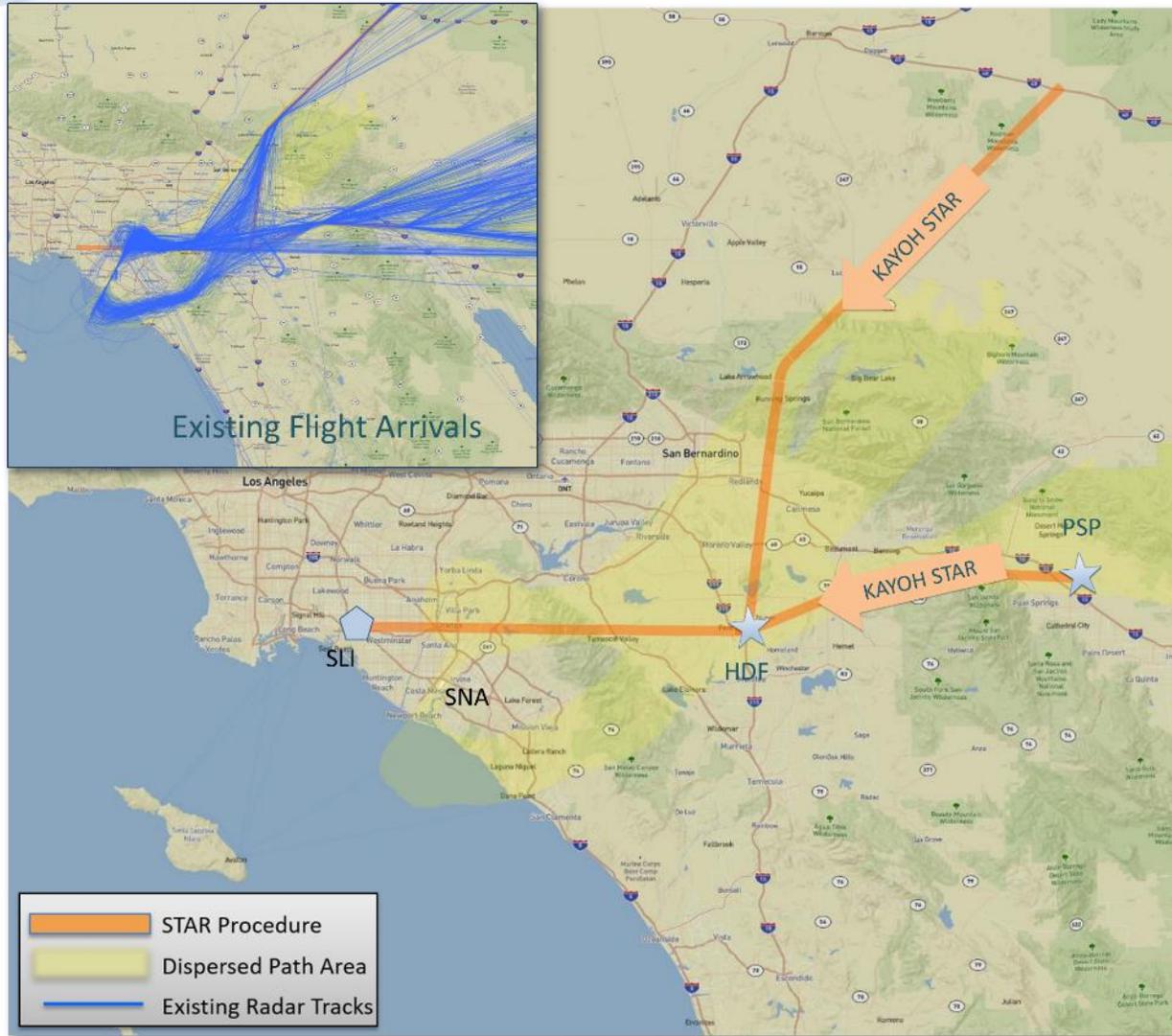
# SNA RNAV RNP RWY 02L



John Wayne- Orange County Airport (SNA)  
Instrument Approach  
RNAV (RNP) RWY 02L  
Publication:  
RNAV(RNP) Nov 10, 2016  
ROOBY MAR 2, 2017  
TILLT, OHSEA APR 27, 2017

- RNAV RNP approaches provide a repeatable and predictable path with precise vertical and lateral guidance
- RNP approaches are assigned by ATC to properly equipped jet and high performance turboprop aircraft with qualified aircrews
- The SNA TILLT, OHSEA and ROOBY RNAV STARS connect to the RNP approach
- Arrivals from the east on the LGB/SNA DSNEE will not utilize RWY 02L

# SNA KAYOH 6 Conventional STAR Amendment



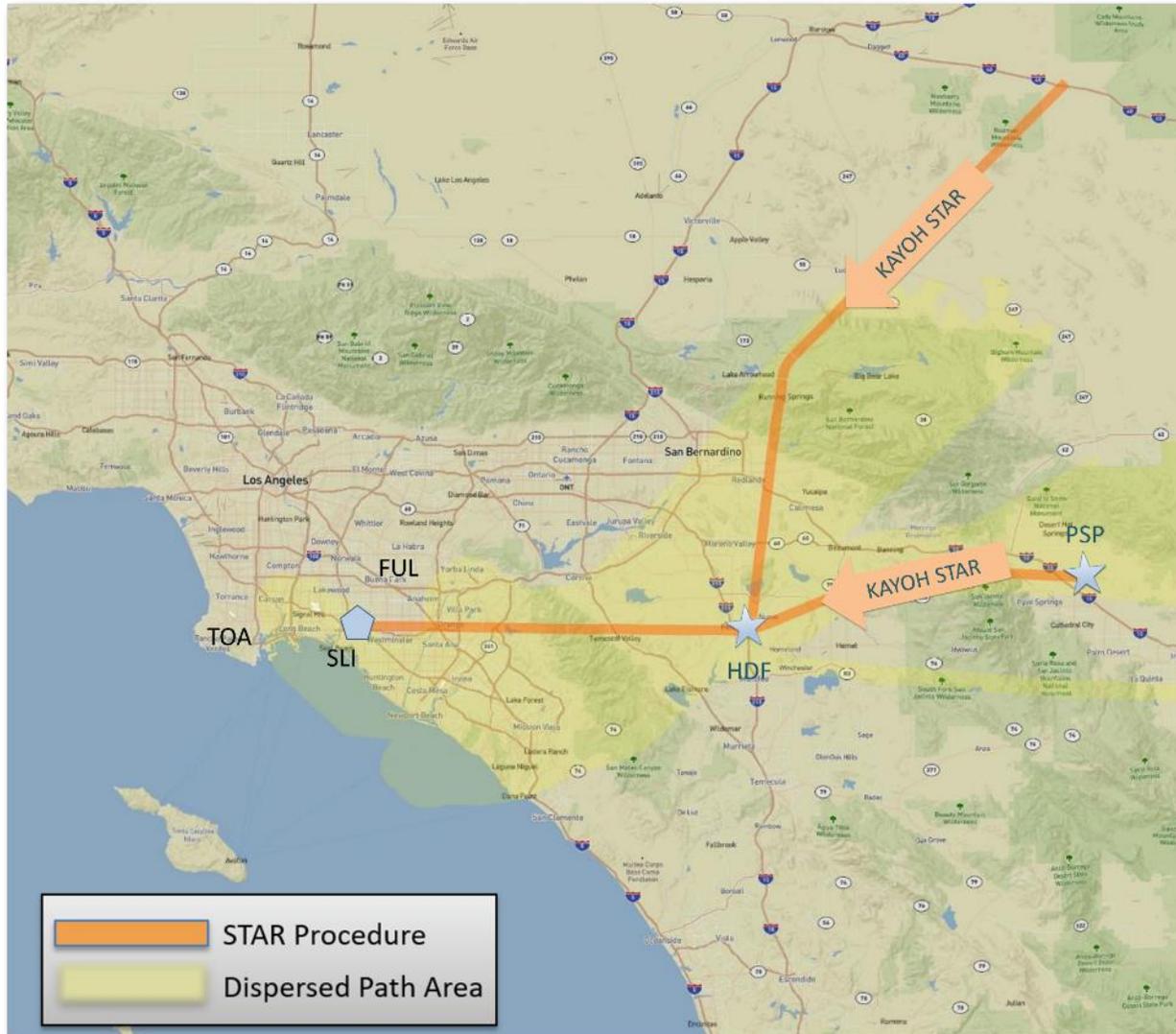
John Wayne- Orange County Airport (SNA)  
STAR (Arrival)  
KAYOH 6  
Publication:  
KAYOH 6, November 10, 2016

- The KAYOH Conventional STAR terminates at SLI
- Arrivals on the KAYOH STAR are usually radar vectored prior to the end of the procedure to the runway in use
- This conventional STAR was modified to incorporate Metroplex waypoints in order to provide continuity



**LOS ALAMITOS AIRPORT (SLI)  
FULLERTON MUNICIPAL AIRPORT (FUL)  
ZAMPERINI FIELD (TOA)**

# SLI, FUL and TOA KAYOH 6 Conventional STAR Amendment



Fullerton Municipal Airport (FUL)  
Zamperini Field Airport (TOA)  
Los Alamitos Army Airfield (SLI)  
STAR (Arrival)  
KAYOH 6  
Publication:  
KAYOH 6

- The KAYOH Conventional STAR terminates at SLI
- Arrivals on the KAYOH STAR are usually radar vectored prior to the end of the procedure to the runway in use
- This conventional STAR was modified to incorporate Metroplex waypoints in order to provide continuity
- Existing Radar Tracks are not provided due to limited use

# SoCal Metroplex Terms

- Area Navigation (RNAV) - A method of navigation that mitigates the limitations of an aircraft navigating from one ground based navigational aid to a satellite system providing point to point operational capabilities
- Standard Terminal Arrival Route (STAR) - A specific repeatable path with lateral and often vertical descent guidance for arrivals to an airport
- Standard Instrument Departure (SID) - A specific repeatable path with lateral and often vertical climb guidance for departures from an airport
- Required Navigation Performance (RNP Approach) - Approach providing a higher level of precision than an approach using ground based navigation
- Optimized Profile Descent (OPD) - A procedure that keeps arrival aircraft at cruise altitude as long as possible before beginning a uninterrupted descent. Once begun, the procedure departs from the usual pattern of stair step descent all the way down to landing

# Community Engagement

- Additional engagement was conducted with other organizations, elected officials, and governments. That included:
  - Approximately 35 individual airport Briefings
  - Approximately 37 local, state, and federal representative Briefings
  - Two National Park Service Briefings
  - Five Tribal meetings

# List All Procedures for Implementation for November

## (1 of 3)

### Group One Publication November 10, 2016

BUR/VNY WEESL One STAR (RNAV)	LAX RNP Z RWY 06L (RNAV)
BUR RNP Y RWY 8 (RNAV)	LAX GPS Y RWY 06L (RNAV)
BUR GPS Z RWY 8 (RNAV)	LAX RNP Z RWY 07L (RNAV)
BUR ILS Z or LOC Z RWY 8 (Conventional)	LAX ILS or LOC RWY 06R (Conventional)
BUR ILS Y or LOC Y RWY 8 (Conventional)	LAX ILS or LOC RWY 07L (Conventional)
LAX ILS or LOC RWY 06L (Conventional)	LAX GPS Y RWY 06R (RNAV)
LAX ILS or LOC RWY 07R (Conventional)	LAX GPS Z RWY 06R (RNAV)
LAX GPS Y RWY 07L (RNAV)	LAX/SMO WAYVE ONE STAR (RNAV)
LAX GPS Y RWY 07R (RNAV)	SMO GPS Y RWY 03 (RNAV)
LAX RNP Z RWY 07L (RNAV)	SMO GPS Z RWY 03 (RNAV)
LAX RNP Z RWY 07R (RNAV)	SMO GPS RWY 21 (RNAV)

# List All Procedures for Implementation for November

## (2 of 3)

### Group One Publication November 10, 2016

SMO VOR-A (Conventional)	LGB VOR TAC RWY 30 (Conventional)
SAN BAYVU FIVE STAR (RNAV)	LGB RNP RWY 12, (RNAV)
SAN SWEETWATER Visual RWY 27	LGB RNP RWY 25R (RNAV)
SAN LOC RWY 27 (Conventional)	LGB RNP Y RWY 30 (RNAV)
SAN LUCKI ONE STAR (RNAV)	LGB ILS or LOC RWY 30 (Conventional)
SAN ZZOOO ONE SID (RNAV)	LGB GPS Z RWY 30 (RNAV)
SAN RNP Z RWY 27 (RNAV)	LGB/SNA/SLI/FUL/TOA KAYOH SIX (Conventional)
SAN GPS Y RWY 27 (RNAV)	SNA RNP Z RWY 20R (RNAV)
CRQ RNP Z RWY 06 (RNAV)	SNA RNP Z RWY 02L (RNAV)
CRQ RNAV/GPS Y RWY 06 (RNAV)	SNA GPS Y RWY 02L (RNAV)

# List All Procedures for Implementation for November (3 of 3)

Group One Publication November 10, 2016
SBA GAUCH ONE SID (RNAV)
SBA MISHN ONE SID (RNAV)
SBA PITBL ONE STAR (RNAV)*
ONT/ONT Satellites SETER FOUR STAR (Conventional)
PSP RNP RWY Z 13R (RNAV)
SDM CHASR ONE STAR (RNAV)
T ROUTE (T-326)
LAS STAAV SEVEN SID (RNAV)
LAS TRALR SEVEN SID (RNAV)

\* NOTE: NA until April 27, 2017