

## 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 Appendix A of Federal Aviation Administration (FAA) Order 1050.1E, Chg. 1, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1E). 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 Chapter 1, *Background*.

### 4.1 General Study Area

To describe existing conditions in the Southern California Metroplex, 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 flight tracks identified for the No Action Alternative using radar data from the period of December 1, 2012 through November 30, 2013, which was the most recent year of data available. The General Study Area captures flight tracks designed for the Proposed Action where 95 percent of departing aircraft are below 10,000 feet altitude Above Ground Level (AGL) and 95 percent of arriving aircraft are below 7,000 feet AGL. Paragraph 14.5e of Appendix A to FAA Order 1050.1E, 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. 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 and 7,000 feet AGL and departure procedures between 3,000 and 10,000 feet AGL for large civil jet aircraft weighing over 75,000 pounds.<sup>34</sup>
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 4-1** depicts the General Study Area. The General Study Area includes the entirety of Orange county, and portions of eight additional counties (Los Angeles, San Diego, Imperial, Kern, Riverside, San Bernardino, Santa Barbara, and Ventura.)

### 4.2 Resource Categories or Sub-Categories Not Affected

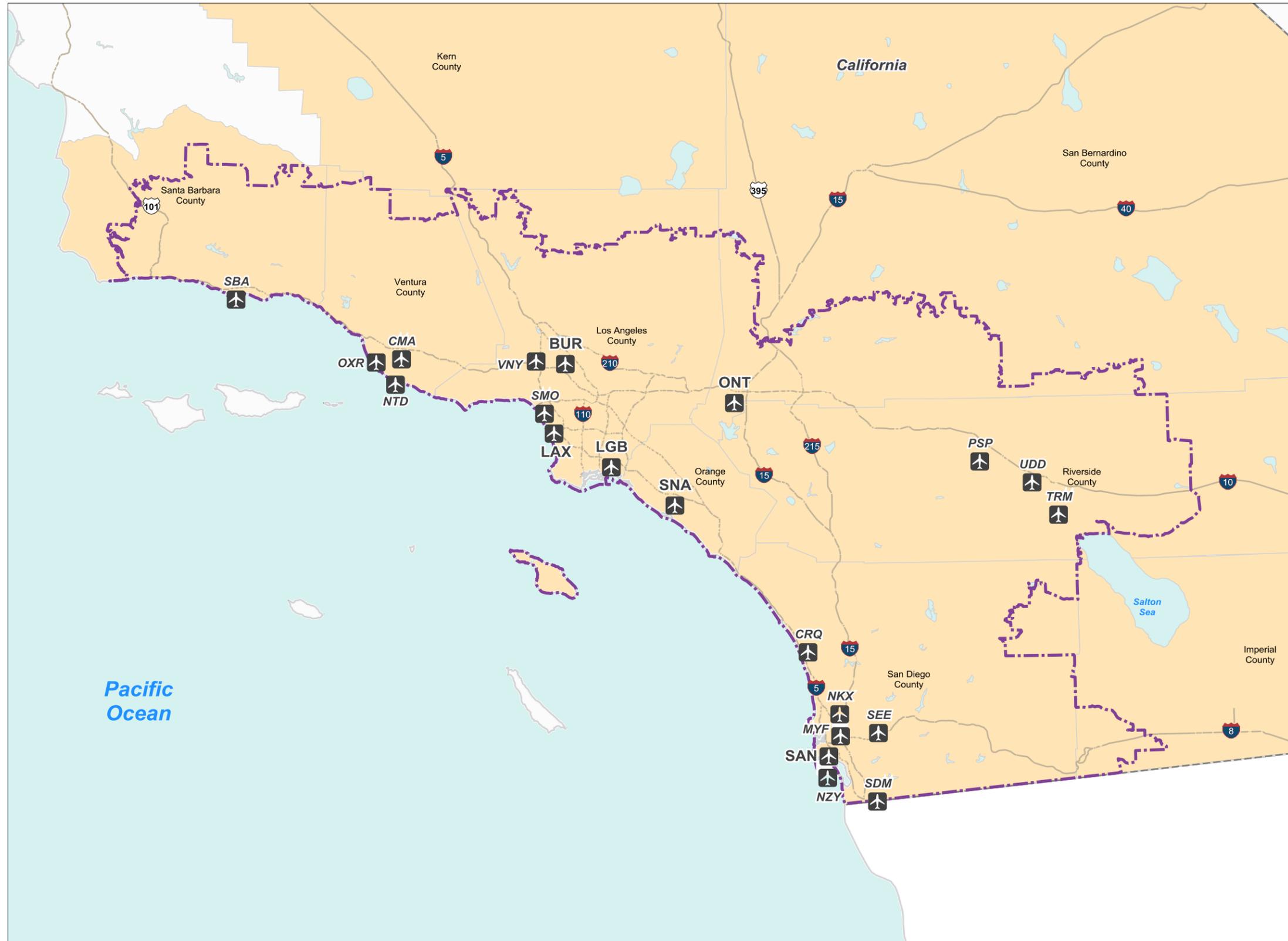
This section discusses the environmental resource categories or sub-categories that would remain unaffected by the Proposed Action. These resource categories would remain

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<sup>34</sup> Department of Transportation, Federal Aviation Administration, *Memorandum Regarding Altitude Cut-Off for National Airspace Redesign (NAR) Environmental Analyses*, September 15, 2003.

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 does not involve land acquisition or ground-disturbing activities that would affect coastal resources. Potential indirect effects to coastal resources associated with noise, air quality, and historic and cultural resources are considered in those individual environmental resource categories.
- **Construction Impacts:** The Proposed Action does not involve any construction or ground-disturbing activities.
- **Farmlands:** The Proposed Action would not involve land acquisition or ground disturbance that would have the potential to convert existing farmland to a non-agricultural use.
- **Fish, Wildlife, and Plants – Fish and Plants sub-categories only:** The Proposed Action is generally situated in areas above 3,000 feet AGL and would not involve ground disturbance or other activities that would affect plant or terrestrial animal species. Wildlife, specifically bat and migratory bird species, are discussed in Section 4.3.7.
- **Floodplains:** The Proposed Action would not be located in areas that include floodplains.
- **Hazardous Materials, Pollution Prevention, and Solid Waste:** The Proposed Action would not generate, disturb, transport, or treat hazardous materials or solid waste.
- **Historic, Architectural, Archeological, and Cultural Resources – Archeological and Architectural sub-category only:** The Proposed Action would not involve land acquisition or ground disturbing activities that would affect archaeological or architectural resources. Historical and Cultural Resources are discussed in Section 4.3.4.
- **Light Emissions and Visual Impacts:** The Proposed Action would not involve construction of any structures that would introduce new sources of lighting or result in visual impacts to surrounding areas. Furthermore, as the changes to air traffic associated with the Proposed Action would generally occur at altitudes at or above 3,000 feet AGL, distances between aircraft and viewers on the ground would be sufficient to avoid intrusions that would constitute an adverse impact.
- **Natural Resources and Energy Supply – Natural Resources sub-category only:** The Proposed Action would not require use of unusual natural resources or other materials, or those in short supply. Energy Supply is discussed in Section 4.3.5.
- **Secondary (Induced) Impacts:** The Proposed Action would not cause changes in patterns of population movement or growth, public service demands, or business and economic activity. In addition, the Proposed Action does not involve construction or other ground disturbing activities that would involve relocating people or businesses. The SoCal Metroplex Project (“Project”) is not a capacity-enhancing project, and the forecasted increase in operations is unrelated to the Project. Furthermore, the Proposed Action does not include constructing airport facilities that would result in or induce an increase in operational capacity.



**LEGEND**

- General Study Area Boundary
- Study Airport
- California County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water

**Notes:**

- BUR** Bob Hope Airport
- CMA** Camarillo Airport
- CRQ** McClellan-Palomar Airport
- LAX** Los Angeles International Airport
- LGB** Long Beach Airport/Daugherty Field
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- UDD** Bermuda Dunes Airport
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Projection: Lambert Conformal Conic  
Scale: 1,750,000

0 40 nm



Sources: National Atlas of the United States of America: U.S. County Boundaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport database, 2014; ATAC Corporation: Study Area Boundary, 2014.  
Prepared by: ATAC Corporation, August 2016.

**Exhibit 4-1**

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- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks –**
  - **Socioeconomic Impacts sub-category:** The Proposed Action would not involve acquiring real estate, relocating residents or community businesses, disrupting 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 involve products or substances that a child is likely to be exposed to, come into contact with, ingest, or use. Furthermore, the Proposed Action would not result in a local increase in emissions that would have the potential to affect children's health. Accordingly, there would be no increase in environmental health and safety risks that could disproportionately affect children.

Low income and minority communities (Environmental Justice Communities) are discussed in Section 4.3.8.

- **Water Quality:** The Proposed Action does not involve any ground-disturbing activities that would result in an increase in impervious surfaces or affect water quality or ground water.
- **Wetlands:** The Proposed Action does not involve land acquisition or ground-disturbing activities that would affect wetlands.
- **Wild and Scenic Rivers:** Portions of seven designated rivers are within the General Study Area: the Sisquoc River (29.4 miles), Piru Creek (7.7 miles), Sespe Creek (42.1 miles), Fuller Mill Creek (3.6 miles), Bautista Creek (11.7 miles), San Jacinto River North Fork (10.7 miles), and Palm Canyon Creek (8.8 miles). However, the Proposed Action would not involve ground disturbance or any other activity that would diminish the scenic, recreational, or biological value of the river.

### 4.3 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** (Section 4.3.1)
- **Compatible Land Use** (Section 4.3.2)
- **Department of Transportation Act: Section 4(f) Resources** (Section 4.3.3)
- **Historic, Architectural, Archeological, and Cultural Resources – Historic and Cultural Resources sub-categories only** (Section 4.3.4)
- **Fish, Wildlife, and Plants – Wildlife and Migratory Bird sub-category only** (Section 4.3.7)

- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks – Environmental Justice sub-category only** (Section 4.3.8)
- **Natural Resources and Energy Supply – Energy Supply sub-category only (aircraft fuel only)** (Section 4.3.5)
- **Air Quality** (Section 4.3.9)
- **Climate** (Section 4.3.6)

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

### 4.3.1 Noise

Aircraft noise is often the most noticeable environmental effect associated with any aviation project. This section discusses FAA guidance on conducting noise analyses, noise model input development, and existing aircraft noise conditions. **Appendix E** provides background information on the physics of sound, the effects of noise on people, and noise metrics. Detailed results of the noise analysis are included in the *Aircraft Noise Technical Report*, available on the Project website (<http://www.metroplexenvironmental.com>).

#### 4.3.1.1 Noise Modeling Methodology

To comply with NEPA requirements, the FAA has issued guidance on assessing aircraft noise in FAA Order 1050.1E. This guidance 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 that period. The DNL metric includes a 10-decibel (dB) weighting for noise events occurring between 10:00 P.M. and 6:59 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 E**.

FAA Order 1050.1E also requires the FAA to evaluate aircraft noise using one of three noise models: (1) the Integrated Noise Model (INM), (2) the Heliport Noise Model (HNM), or (3) the Noise Integrated Routing System (NIRS). The FAA typically uses NIRS for flight track changes over large areas and at altitudes over 3,000 feet AGL. For this EA, the FAA uses the NIRS, Version 7.0b3 to analyze noise associated with the Proposed Action 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 2016 (the first year of implementation) and 2021 (five years after implementation) for either the Proposed Action or the No Action Alternative. Therefore, VFR aircraft were not included in the analysis.

NIRS 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 NIRS. This includes specific aircraft fleet mix information such as aircraft type, arrival and departure times, and origin/destination airport.

Radar data obtained from the FAA's Performance Data Analysis and Reporting System (PDARS) identified 1,242,614 IFR-filed flights to and from the Study Airports from December 1, 2012 through November 30, 2013. The 365 days of usable data span all seasons and runway usage configurations for the Study Airports. The FAA used this data to develop the average annual day (AAD) fleet mix, time of day and night, and runway use input for NIRS. More detailed information about the NIRS input for Existing Conditions can be found in the *Aircraft Noise Technical Report*, available on the Project website (<http://www.metroplexenvironmental.com>).

The PDARS data provided tracks for each flight that occurred from December 1, 2012 through November 30, 2013. The FAA used the data to define the AAD track locations and use representing a typical flow of traffic, as well as the typical climb and descent patterns that occur along each flow. The FAA analyzed the tracks using proprietary software. All the trajectories were "bundled" into a set of tracks representing a flow. The flows comprise of all the typical flight routings within the General Study Area for an AAD. NIRS tracks are then developed based on the group of radar tracks representing each flow.

The NIRS model was used to calculate noise levels for the following specific locations on the ground:

**Census Block Centroids:** The NIRS model can calculate DNL at the geographic centers (centroids) of census blocks to estimate the population exposed to varying levels of aircraft noise exposure. This EA analyzed population within the General Study Area using 2010 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 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 NIRS model can also calculate noise exposure at evenly spaced grid points. This EA covered the General Study Area with a grid with points spaced evenly at 0.5 nautical mile (NM) intervals. These grid points were used to calculate noise at regular intervals throughout the General Study Area. In addition, these grid points can also be used to evaluate noise at any Section 4(f) resource or historic property not captured using unique points as described below.

**Unique Points:** The NIRS model also can analyze noise levels at sites of interest that are too small to be 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 significant public parks or trails), and specific historic sites (such as individual buildings). See Section 4.3.3 for a discussion of what constitutes a Section 4(f) resource and Section 4.3.4 for a discussion of historic properties in the General Study Area.

In total, noise exposure levels were calculated at 175,488 census block centroids, 87,069 grid points, and 76,966 unique points throughout the General Study Area.

#### 4.3.1.2 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 4-2** provides a graphical representation, by DNL 5dB bands, of existing noise exposure based on radar data collected from December 1, 2012 through November 30, 2013 (hereafter referred to as 2013) within the General Study Area. As shown on **Exhibit 4-2**, areas exposed to higher DNL are generally aligned with Study Airport runways and areas with existing aircraft traffic.

**Table 4-1 Maximum Population Exposed to Aircraft Noise (DNL) within the Study Area (2013)**

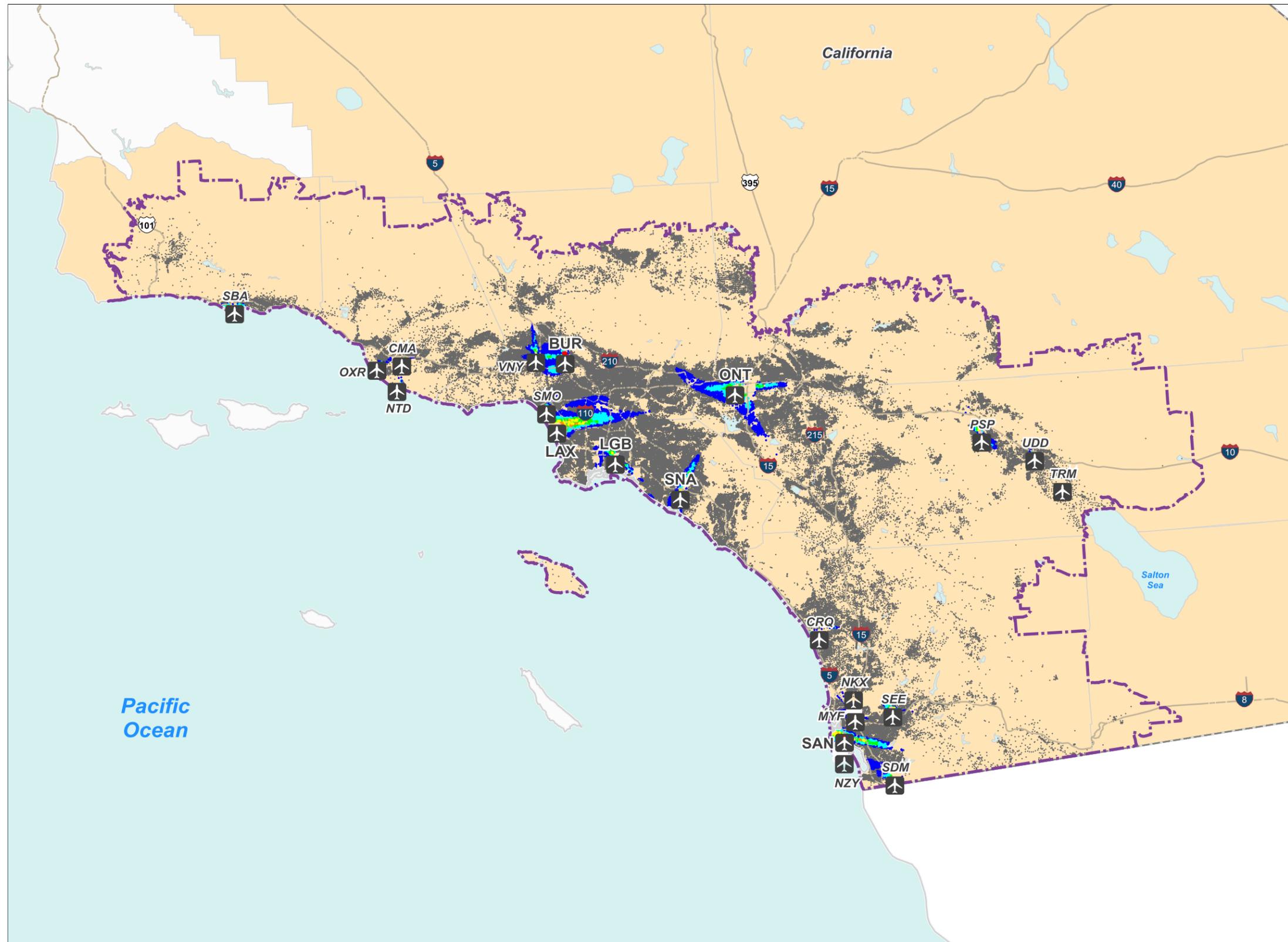
| DNL Range (dB)                   | Population |
|----------------------------------|------------|
| DNL 45 dB to DNL 60 dB           | 3,378,170  |
| DNL 60 dB to less than DNL 65 dB | 133,231    |
| DNL 65 dB and higher             | 51,202     |
| Total Above DNL 45 dB            | 3,562,603  |

Sources: NIRS Version 7.0b3; US Census Bureau, 2010 Tracts and American Community Survey Selected Economic Characteristics, 2010.

Prepared by: ATAC Corporation, July 2014.

### 4.3.2 Compatible Land Use

Existing land use in the General Study Area is depicted on **Exhibit 4-3**. It is characterized using generalized land coverage data from the USGS National Land Cover Database 2006 (NLCD 2006). The exhibit shows that a majority of urban development lies in the western half of the General Study Area. Land use in the General Study Area includes medium- and high-density urban development in the Los Angeles basin, Orange County, and the City of San Diego. Smaller areas of medium- and high-density urban development mixed with low-density urban development and open space are found in Santa Barbara County, Ventura County, the Inland Empire (Riverside and San Bernardino Counties), southern Orange County, and northern San Diego County. Large areas of shrub/scrub are found outside the urban development, with evergreen forests located in the mountain ranges. The General Study Area also includes numerous large parks, recreational areas, wilderness areas, forests, and other types of resources managed by federal and state agencies. These resources are further discussed in Section 4.3.3.



**LEGEND**

- General Study Area
- California County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water

**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

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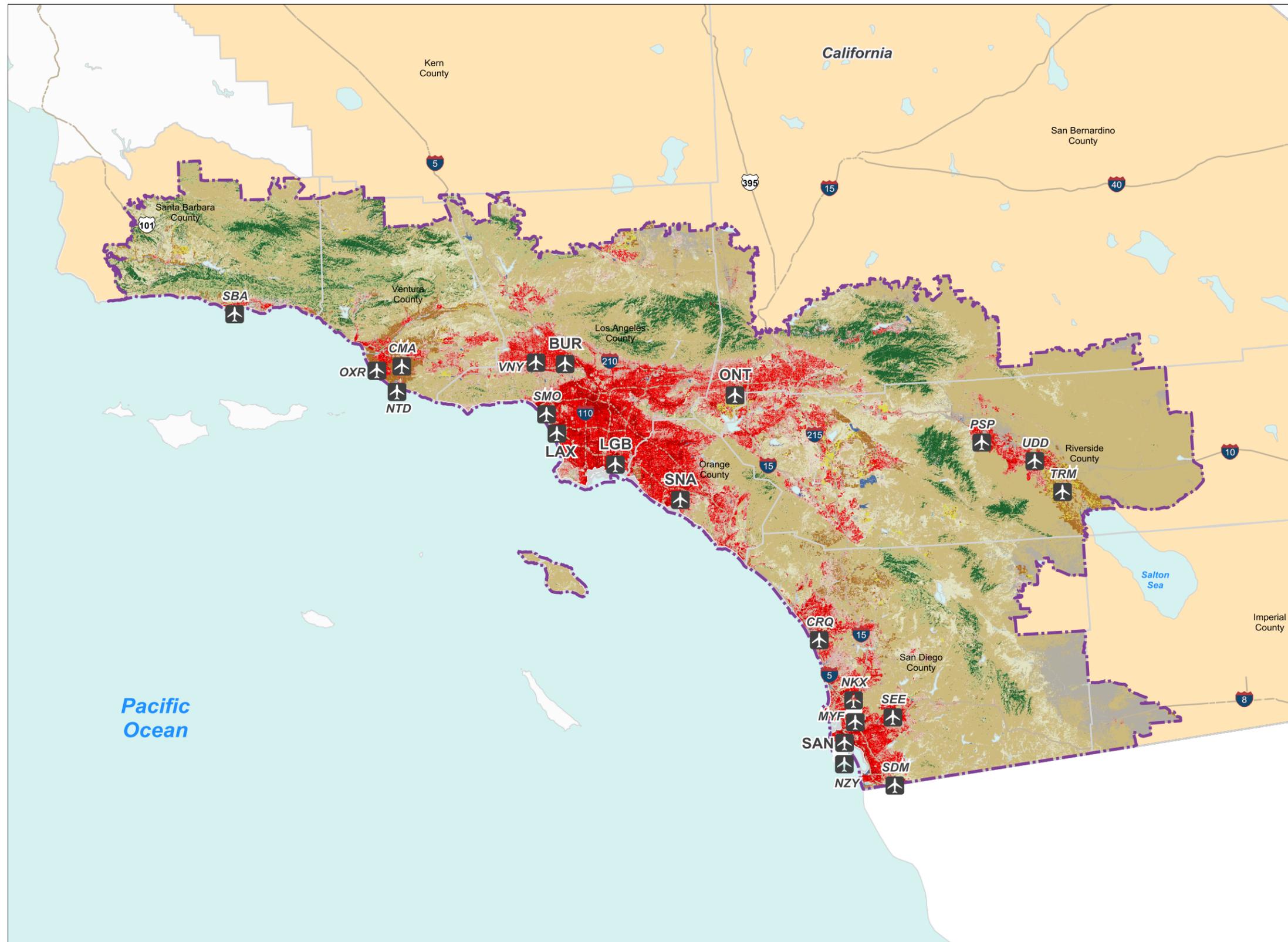
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Sources: National Atlas of the United States of America: U.S. County Boundaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport and Runway databases, 2012; ATAC Corporation: Study Area Boundary, 2012, and Noise Levels, 2013.  
Prepared by: ATAC Corporation, August 2016.

Exhibit 4-2

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**LEGEND**

- General Study Area Boundary
- Study Airport
- California County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water

**National Land Cover Data**

- Open Water
- Perennial ice/snow
- Developed, open space
- Developed, low intensity
- Developed, medium intensity
- Developed, high intensity
- Barren land
- Deciduous forest
- Evergreen forest
- Mixed forest
- Shrub/scrub
- Grassland/herbaceous
- Hay/pasture
- Cultivated crops
- Woody wetlands
- Herbaceous wetlands

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Prepared by: ATAC Corporation, August 2016.

Exhibit 4-3

**Land Use in the General Study Area**

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### 4.3.3 Department of Transportation Act, Section 4(f) Resources

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

... [the] Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park; recreation area; or wildlife and waterfowl refuge of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land...and [unless] the project includes all possible planning to minimize harm resulting from the use.

The term “use” includes both physical and indirect or “constructive” impacts to Section 4(f) properties. Direct use is the physical occupation or alteration (direct use) 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 an 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.

Many Section 4(f) properties are also subject to Section 6(f) of the Land and Water Conservation Fund Act of 1965 (LWCF) (16 U.S.C. § 4601–4 *et seq.*). Section 6(f) states that no public outdoor recreation areas acquired or developed with LWCF assistance can be converted to non-recreation uses without the approval of the Secretary of the Interior. The Secretary of the Interior may only approve conversions if they are in accordance with the comprehensive statewide outdoor recreation plan and if other recreation lands of reasonably equivalent usefulness and location will replace the converted areas.

#### 4.3.3.1 Section 4(f) Resources in the General Study Area

The FAA used data from federal and state sources to identify 7,422 Section 4(f) resources within the General Study Area. **Exhibit 4-4** depicts the locations of these resources. The locations of historic and cultural resources, also considered Section 4(f) resources, are discussed in Section 4.4 and depicted on **Exhibit 4-5**. 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 *Aircraft Noise Technical Report*, available on the Project website (<http://www.metroplexenvironmental.com>).

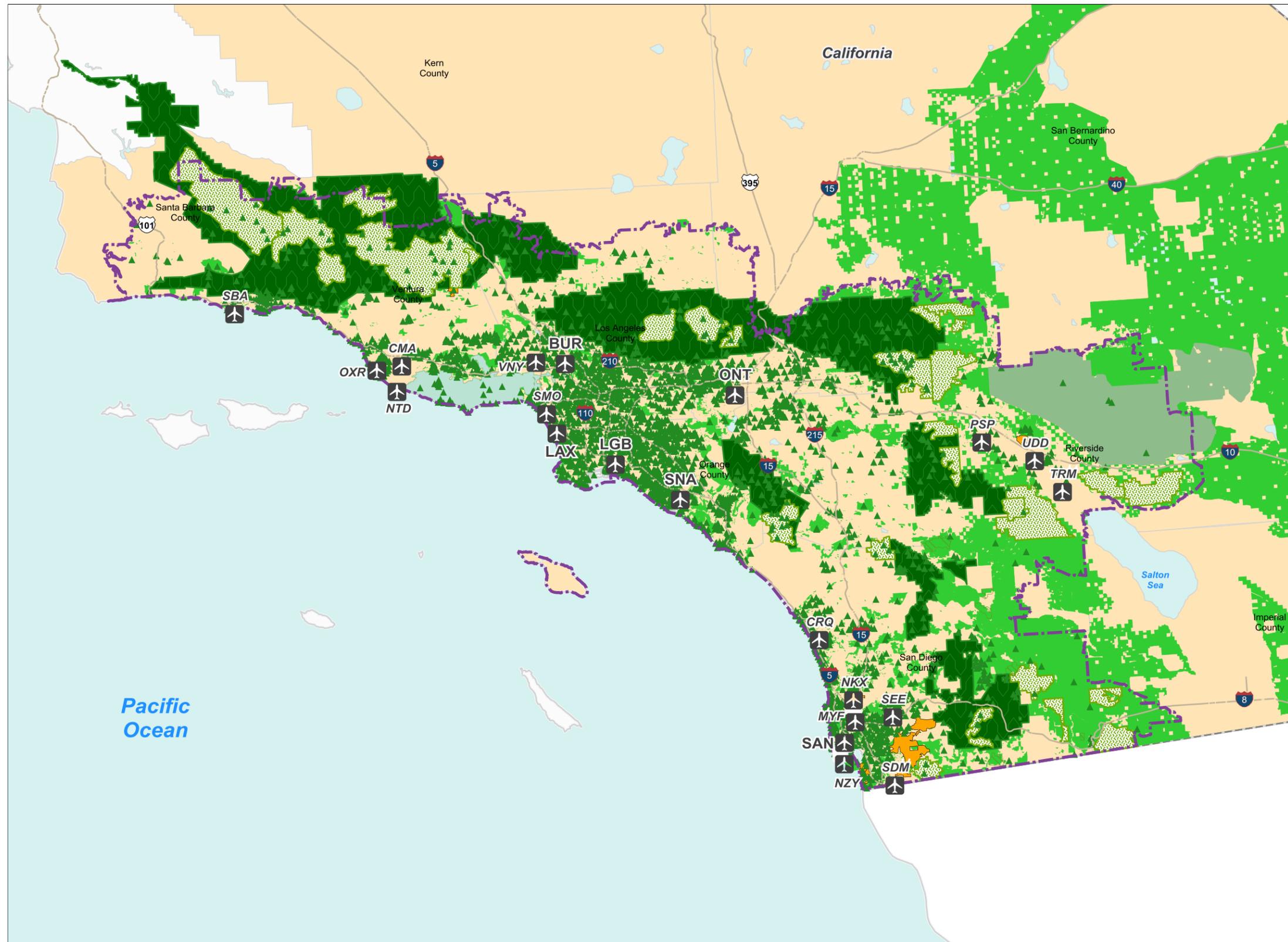
#### 4.3.4 Historic, Architectural, Archeological, and Cultural Resources – Historic and Cultural Resources Sub-Categories

The National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. § 300101 *et seq.*, as amended) requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the National Register of Historic Places (NRHP). Compliance requires consultation with the Advisory Council on Historic Preservation, State Historic Preservation Officers (SHPO), and/or the Tribal Historic Preservation Officers (THPO).

This EA defines historic properties as resources that are listed or eligible for listing in the NRHP or relevant SHPO listings, or that have been identified through tribal consultation for values other than their archaeological qualities. It is possible that changes in aircraft flight routes associated with the Proposed Action could introduce or increase aircraft routing over historic resources and result in potential adverse noise impacts. However, as noted in Section 4.2, the Proposed Action does not involve ground disturbance that could potentially impact archaeological or architectural resources. Thus, the EA does not further discuss these resources.

##### 4.3.4.1 Historic and Cultural Resources in the General Study Area

**Exhibit 4-5** shows the location of historic and cultural resources identified in the General Study Area. A total of 760 NRHP listed properties and sixty tribal properties were identified. Historic properties are representative of every period in California history, including the Spanish colonial, Mexican, and American periods and include some of the nation's most important historic and cultural resources. A list of the historic and cultural resources identified in the General Study Area, the county in which they are located, and DNL calculated for each resource under existing conditions is included in the *Aircraft Noise Technical Report*, available on the Project website: (<http://www.metroplexenvironmental.com>).



**LEGEND**

- General Study Area Boundary
  - Study Airport
  - California County in Study Area
  - State Boundary
  - U.S. and Interstate Highways
  - Water
- Potential Section 4(f) Resources**
- National Forest
  - National Park
  - National Recreation Area
  - National Preserve
  - National Wildlife Refuge
  - National Wilderness Areas
  - National Wilderness Study Areas
  - State/Local Park
  - Park/Trail

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Scale: 1,750,000

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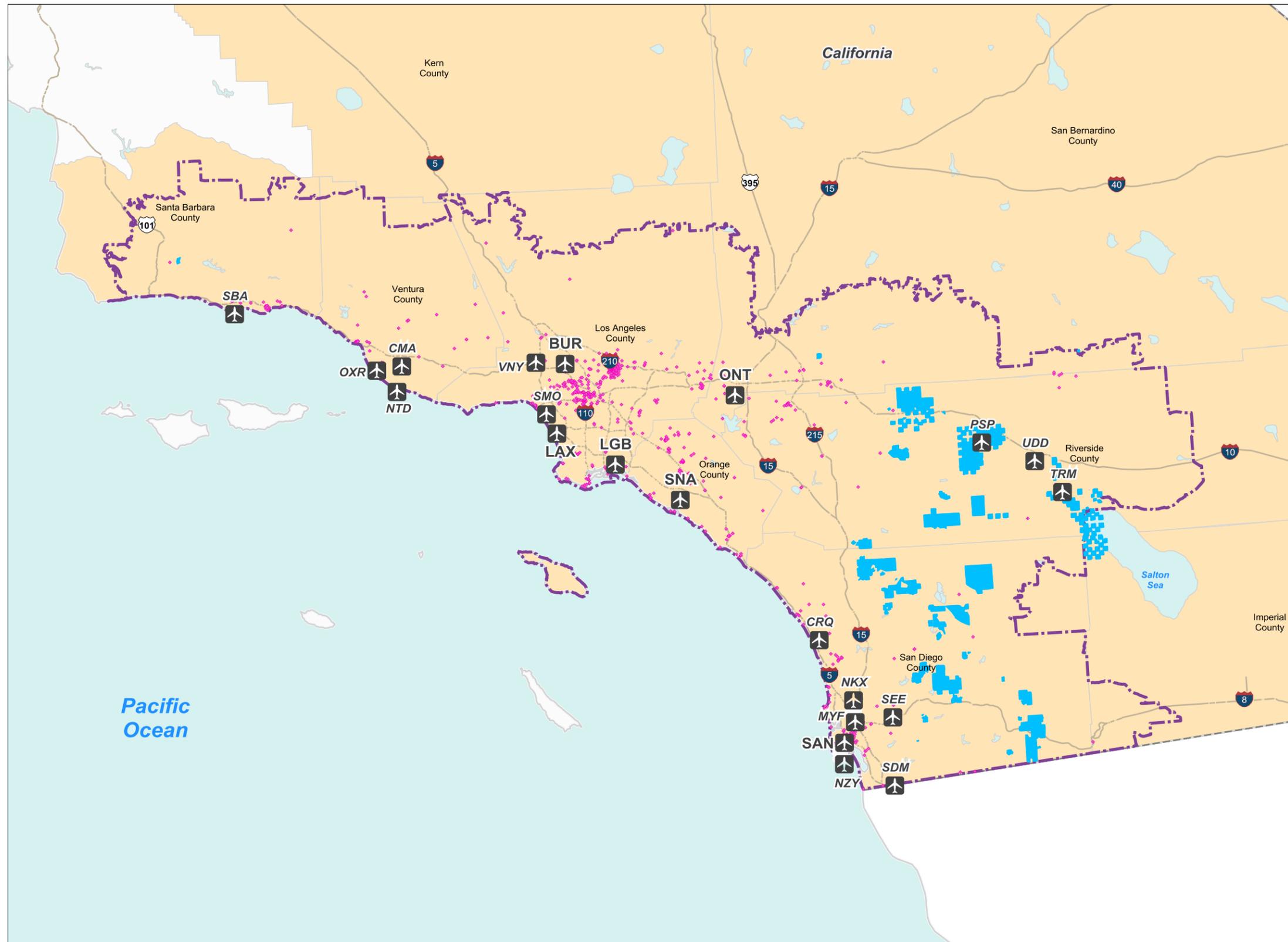
Sources: National Atlas of the United States of America: U.S. County Boundaries, 2005; U.S. State Boundaries, 2005; Water Bodies, 2005; and Federal Lands, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDCA Airport database, 2014; National Park Service: Register of Historic Places, 2012; U.S. Geological Survey: Geographic Names Information System (state and local parks/trails), 2013; GreenInfo Network: California Public Lands Database, 2013; ATAC Corporation: Study Area Boundary, 2014.

Prepared by: ATAC Corporation, August 2016.

Exhibit 4-4

**Section 4(f) Resources  
in the General Study Area**

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**LEGEND**

- General Study Area Boundary
- Study Airport
- California County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Historic Resources
- Tribal Lands

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Prepared by: ATAC Corporation, August 2016.

Exhibit 4-5

**Historic and Cultural Resources in the General Study Area**

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### 4.3.5 Fish, Wildlife, and Plants – Wildlife and Migratory Bird 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 General Study Area.

#### 4.3.5.1 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, 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 federally- and state-listed avian and bat species was assessed based on agency lists and reports. Data from the USFWS were used to identify potential federally-listed species.

#### 4.3.5.2 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 Pacific 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, geographic position and latitude of the breeding, and wintering grounds. The Pacific Flyway includes multiple primary migration routes throughout these areas and connects to other primary flyway routes.

The most frequently traveled migration routes conform very closely to major topographical features that lie in the general north-south movement of migratory bird flyways. Therefore,

the lanes of heavier concentration in the General Study Area follow principal valleys (e.g., Central Valley) and mountain ranges (e.g. Sierra Nevada).

**Table 4-2** lists the avian species of concern that are found within the General Study Area by county where they occur. No federally-listed bat species are found within the General Study Area.

**Table 4-2 Federally-Listed Avian Species Potentially Found in the General Study Area**

| Status     | Species  | Type  | County of Occurrence  |
|------------|--|-------|---|
| Endangered | California clapper rail ( <i>Rallus longirostris obsoletus</i> )             | Avian | Kern  |
| Endangered | California condor ( <i>Gymnogyps californianus</i> )                         | Avian | Kern, Los Angeles, San Bernardino, Santa Barbara, Ventura   |
| Endangered | California least tern ( <i>Sterna antillarum browni</i> )                    | Avian | Los Angeles, Orange, San Diego, Santa Barbara, Ventura  |
| Threatened | Coastal California gnatcatcher ( <i>Polioptila californica californica</i> ) | Avian | Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura                                |
| Endangered | Least Bell's vireo ( <i>Vireo bellii pusillus</i> )                          | Avian | Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura |
| Endangered | Light-footed clapper rail ( <i>Rallus longirostris levipes</i> )             | Avian | Los Angeles, Orange, San Diego, Santa Barbara, Ventura  |
| Threatened | Marbled murrelet ( <i>Brachyramphus marmoratus</i> )                         | Avian | Los Angeles, Santa Barbara, Ventura   |
| Endangered | San Clemente loggerhead shrike ( <i>Lanius ludovicianus mearnsi</i> )        | Avian | Los Angeles   |
| Threatened | San Clemente sage sparrow ( <i>Amphispiza bellii clementeae</i> )            | Avian | Los Angeles   |
| Endangered | Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> )         | Avian | Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura |
| Threatened | Western snowy plover ( <i>Charadrius alexandrinus nivosus</i> )              | Avian | Los Angeles, Orange, Riverside, San Diego, Santa Barbara, Ventura                                 |
| Candidate  | Xantus's Murrelet ( <i>Synthliboramphus hypoleucus</i> )                     | Avian | Santa Barbara, Ventura  |
| Endangered | Yuma clapper rail ( <i>Rallus longirostris yumanensis</i> )                  | Avian | Imperial, Orange, Riverside, San Bernardino, San Diego  |

Sources: US Fish and Wildlife Service, <http://www.fws.gov/endangered/> Accessed March 2014.

Prepared by: ATAC Corporation, March 2015.

**Table 4-3** provides a listing of California state-listed threatened and endangered species.

**Table 4-3 State-Listed Threatened and Endangered Bird Species in California (1 of 2)**

|   |   |
|---|---|
| Arizona Bell's vireo ( <i>Vireo bellii arizonae</i> ) <sup>3</sup>                          | Bald eagle ( <i>Haliaeetus leucocephalus</i> ) <sup>3</sup>                           |
| Bank swallow ( <i>Riparia riparia</i> ) <sup>4</sup>  | Belding's savannah sparrow ( <i>Passerculus sandwichensis beldingi</i> ) <sup>3</sup> |
| California black rail ( <i>Laterallus jamaicensis coturniculus</i> ) <sup>4</sup>           | California clapper rail ( <i>Rallus longirostris obsoletus</i> ) <sup>1,3</sup>       |
| California condor ( <i>Gymnogyps californianus</i> ) <sup>1,3</sup>                         | California least tern ( <i>Sterna antillarum browni</i> ) <sup>1,3</sup>              |
| Coastal California gnatcatcher ( <i>Polioptila californica californica</i> ) <sup>3,5</sup> | Elf owl ( <i>Micrathene whitneyi</i> ) <sup>3</sup>                                   |

**Table 4-3 State-Listed Threatened and Endangered Bird Species in California (2 of 2)**

|   |  |
|---|--|
| Gila woodpecker ( <i>Melanerpes uropygialis</i> ) <sup>3,5</sup>                      | Gilded northern flicker ( <i>Colaptes auratus chrysoides</i> ) <sup>3</sup>          |
| Great gray owl ( <i>Strix nebulosa</i> ) <sup>3</sup>                                 | Greater sandhill crane ( <i>Grus canadensis tabida</i> ) <sup>4</sup>                |
| Inyo California towhee ( <i>Pipilo crissalis eremophilu</i> ) <sup>1,4,5</sup>        | Least Bell's vireo ( <i>Vireo bellii pusillus</i> ) <sup>1,3</sup>                   |
| Light-footed clapper rail ( <i>Rallus longirostris levipes</i> ) <sup>1,3,5</sup>     | Marbled murrelet ( <i>Brachyramphus marmoratus</i> ) <sup>2,3</sup>                  |
| Mountain plover ( <i>Charadrius montanus</i> )  | Northern spotted owl ( <i>Strix occidentalis caurina</i> ) <sup>2,5</sup>            |
| San Clemente sage sparrow ( <i>Amphispiza belli clementeae</i> ) <sup>2,5</sup>       | San Clemente loggerhead shrike ( <i>Lanius ludovicianus mearnsi</i> ) <sup>1,5</sup> |
| Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> ) <sup>1,3</sup>   | Short-tailed albatross ( <i>Phoebastria (=Diomedea) albatrus</i> ) <sup>1,5</sup>    |
| Willow flycatcher ( <i>Empidonax traillii</i> ) <sup>3</sup>                          | Swainson's hawk ( <i>Buteo swainsoni</i> ) <sup>4</sup>                              |
| Yuma clapper rail ( <i>Rallus longirostris yumanensis</i> ) <sup>1,4,5</sup>          | Western snowy plover ( <i>Charadrius alexandrinus nivosus</i> ) <sup>2</sup>         |
| Western yellow-billed cuckoo ( <i>Coccyzus americanus occidentalis</i> ) <sup>3</sup> |  |

Notes:

1/ Federally listed as Endangered

2/ Federally listed as Threatened

3/ State listed as Endangered

4/ State listed as Threatened

5/Unlikely to be found in the General Study Area

Source: U.S. Fish and Wildlife Service, Threatened & Endangered Species, Listings and occurrences for California ([http://ecos.fws.gov/tess\\_public/pub/stateListingAndOccurrenceIndividual.jsp?state=CA&s8fid=112761032792&s8fid=112762573902](http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=CA&s8fid=112761032792&s8fid=112762573902); accessed March 2014); California Department of Fish and Game, Threatened and Endangered Birds ([http://www.dfg.ca.gov/wildlife/nongame/t\\_e\\_spp/bird.html](http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/bird.html); accessed March 2014).

Prepared by: ATAC Corporation, March 2015.

#### 4.3.5.3 Existing Wildlife Strikes

The aviation community has long recognized that the threat of aircraft collision with wildlife is real and increasing. Globally, wildlife strikes have killed more than 229 people and destroyed over 210 aircraft since 1988. Contributing factors to this threat include an increase in large bird populations, as well as an increase in air traffic operations by quieter, turbofan-powered aircraft. According to the FAA National Wildlife Strike Database, since 1990 the majority of aircraft collisions with wildlife (92 percent) have occurred below 3,000 feet AGL.

Wildlife strike reports from 2013 (the most recent calendar year available) were collected from the FAA National Wildlife Strike Database for each civil Study Airport (military airfield data was unavailable). According to the wildlife strike reports, Study Airports accounted for three percent of the 2013 national wildlife strike total<sup>35</sup> and 3.1 percent of the 2013 national avian/bat strike total. **Table 4-4** summarizes wildlife and avian/bat strikes at each of the Study Airports for 2013. Of the 342 avian/bat strikes reported at the Study Airports for 2013,

<sup>35</sup> U.S. Department of Transportation, Federal Aviation Administration, Wildlife Strikes to Civil Aircraft in the United States 1990-2013, July 2014.

189 included information on the altitude at which the strike took place. A total of 26 of the 342 bird strikes reported occurred at altitudes at/above 3,000 feet.

**Table 4-4 2013 Civilian Study Airports Wildlife and Avian/Bat Strike Summary**

| Airport | Strikes   |                |       |
|---------|-----------|----------------|-------|
|         | Avian/Bat | Other Wildlife | Total |
| BUR     | 23        | 0              | 23    |
| CMA     | 2         | 0              | 2     |
| CRQ     | 1         | 0              | 1     |
| LAX     | 111       | 1              | 112   |
| LGB     | 59        | 0              | 59    |
| MYF     | 0         | 0              | 0     |
| NKX     | 0         | 0              | 0     |
| NTD     | 0         | 0              | 0     |
| NZY     | 0         | 0              | 0     |
| ONT     | 52        | 0              | 52    |
| OXR     | 3         | 0              | 3     |
| PSP     | 3         | 0              | 3     |
| SAN     | 20        | 0              | 20    |
| SBA     | 17        | 0              | 17    |
| SDM     | 0         | 0              | 0     |
| SEE     | 0         | 0              | 0     |
| SMO     | 4         | 0              | 4     |
| SNA     | 25        | 0              | 25    |
| TRM     | 1         | 0              | 1     |
| UDD     | 0         | 0              | 0     |
| VNY     | 19        | 0              | 19    |
| Total   | 341       | 1              | 342   |

**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: US Department of Transportation, Federal Aviation Administration, *Wildlife Strike Database* <http://wildlife-mitigation.tc.faa.gov/wildlife/database.aspx>, Accessed March 11, 2015.

Prepared by: ATAC Corporation, March 2015.

#### 4.3.6 Socioeconomic Impacts, 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.

FAA Order 1050.1E 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 5610.2, *Environmental Justice*, 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 2010 U.S. Census. Minority and low-income populations for each census tract within the General Study Area are identified using Geographical Information System (GIS). This analysis defines and identifies minority population census tracts and low-income population census tracts as follows:

- A **minority census tract** is a tract with a minority population percentage greater than the average minority population percentage of the overall General Study Area. Based on 2010 Census data, the average percentage of minority population residing in the General Study Area was 40.5 percent. Therefore, every census tract with a percentage of minority population greater than 40.5 percent is designated a census tract of environmental justice concern.
- A **low-income population census tract** is a tract with a greater percentage of low-income population than the average percentage of low-income population in the overall General Study Area. Based on the 2010 Poverty Guidelines identified by the Department of Health and Human Services (HHS), the poverty threshold for a household of three people is \$18,310 for the 48 contiguous states. The FAA used this threshold to identify low-income population census tracts. The average percentage of low-income population residing in the overall General Study Area was 11.7 percent. Therefore, every census tract with a low-income population greater than 11.7 percent is designated a census tract of environmental justice concern.

**Exhibit 4-6** depicts areas of environmental justice concern in the General Study Area. **Table 4-5** shows the total population, minority population, and low income population for each county in the General Study Area as reported by the 2010 Census.

**Table 4-5 Selected Populations in the General Study Area**

| County                | Population | General Study Area Population |            |            |            |
|-----------------------|------------|-------------------------------|------------|------------|------------|
|                       |            | Minority                      | % of Total | Low Income | % of Total |
| Imperial County       | 3,111      | 1,971                         | 63.4%      | 222        | 7.1%       |
| Kern County           | 232        | 26                            | 11.2%      | 9          | 3.9%       |
| Los Angeles County    | 9,598,714  | 4,592,056                     | 47.8%      | 1,314,277  | 13.7%      |
| Orange County         | 2,989,948  | 1,137,035                     | 38.0%      | 250,659    | 8.4%       |
| Riverside County      | 2,132,765  | 724,089                       | 34.0%      | 244,696    | 11.5%      |
| San Bernardino County | 1,593,026  | 656,946                       | 41.2%      | 197,157    | 12.4%      |
| San Diego County      | 3,069,196  | 880,555                       | 28.7%      | 300,190    | 9.8%       |
| Santa Barbara County  | 269,246    | 66,017                        | 24.5%      | 21,501     | 8.0%       |
| Ventura County        | 813,211    | 237,240                       | 29.2%      | 64,302     | 7.9%       |

Source: US Census Bureau, 2010 Tracts and American Community Survey Selected Economic Characteristics, 2010.

Prepared by: ATAC Corporation, March 2015.

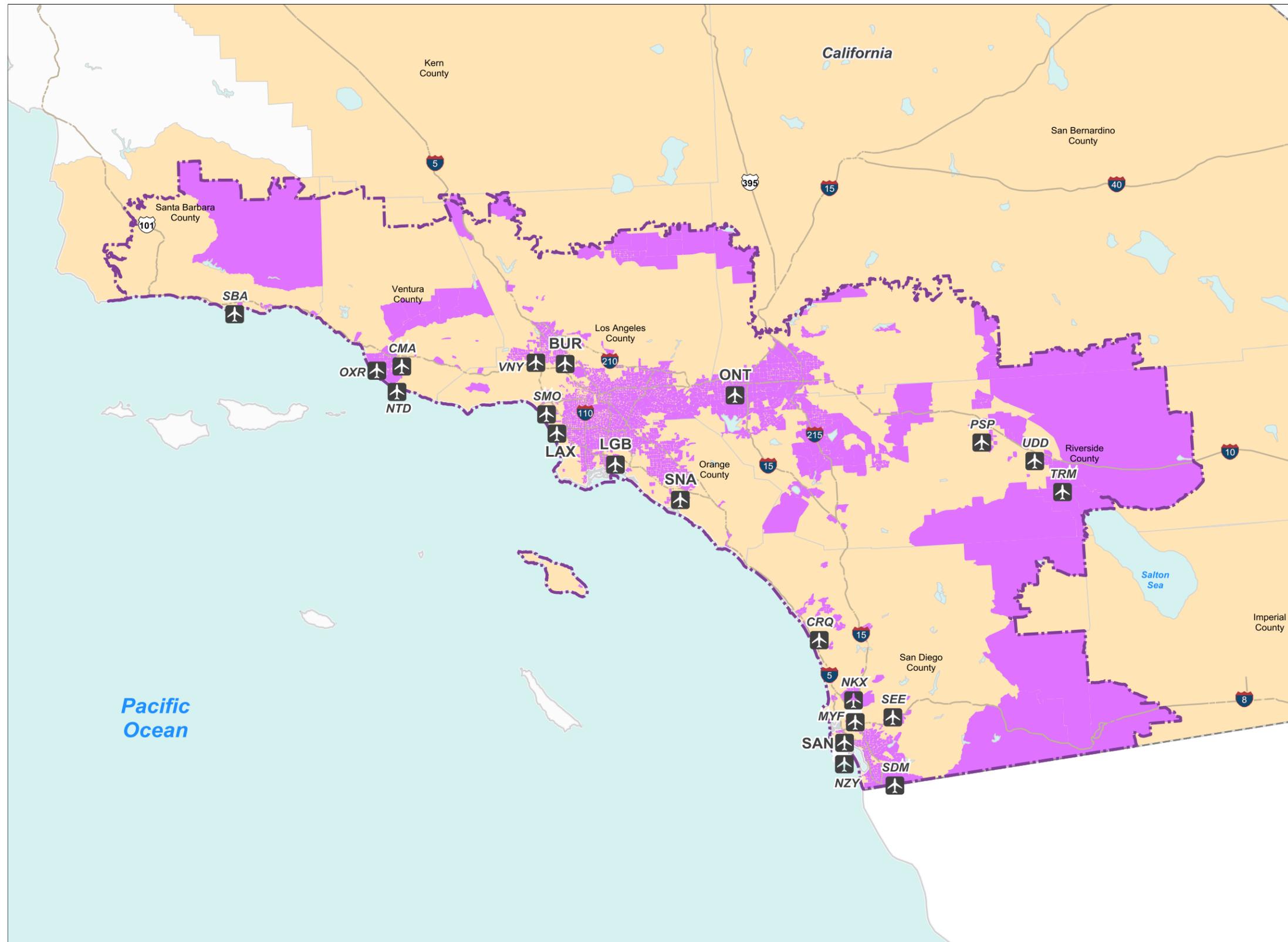
### 4.3.7 Energy Supply (Aircraft Fuel)

This section describes fuel consumption by IFR aircraft arriving at and departing from the Study Airports. Using the NIRS model, the FAA calculated aircraft fuel burn to estimate aircraft fuel consumption associated with air traffic flows under existing conditions. NIRS calculates fuel burn using the same input used for calculating noise (see Section 4.3.1.1 for a discussion of NIRS model inputs). Based on the NIRS calculation, IFR aircraft arriving at and departing from the Study Airports burn approximately 2,414.67 metric tons of fuel on an annual average day.

### 4.3.8 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<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>). PM standards have been established for inhalable coarse particles ranging in diameter from 2.5 to 10 micrometers (µm) (PM<sub>10</sub>) and fine particles less than 2.5 µm (PM<sub>2.5</sub>) 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 4-6** identifies those counties that are in nonattainment or maintenance for these pollutants.



**LEGEND**

- General Study Area Boundary
- Study Airport
- California County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Environmental Justice Community

**Notes:**

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

Projection: Lambert Conformal Conic  
Scale: 1,750,000



Sources: National Atlas of the United States of America: U.S. County Boundaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport database, 2014; U.S. Census Bureau: 2010 Tracts, Profile of General Population and Housing Characteristics, and American Community Survey Selected Economic Characteristics; ATAC Corporation: Study Area Boundary, 2014.

Prepared by: ATAC Corporation, August 2016.

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The FAA has determined that aircraft operations at or above the “annual average mixing height” in the contiguous United States of 3,000 feet AGL have a very small effect on pollutant concentrations at ground level.<sup>36</sup> 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.<sup>37</sup>

**Table 4-6 NAAQS Attainment Areas in the General Study Area (1 of 2)**

| Pollutant  | Status                           | Area  |
|--|----------------------------------|---|
| Ozone (O <sub>3</sub> ) – (8-Hour Standard [2008]) | Nonattainment (Extreme)          | Los Angeles-South Coast Air Basin   |
|  | Nonattainment (Severe 15)        | Los Angeles-San Bernardino Counties (West Mojave Desert)                                      |
|  | Nonattainment (Serious)          | Riverside County (Coachella Valley)<br>Ventura County   |
|  | Nonattainment (Moderate)         | Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation                          |
|  | Nonattainment (Marginal)         | Imperial County<br>Kern County<br>San Luis Obispo County<br>San Diego County                  |
| Ozone (O <sub>3</sub> ) – (8-Hour Standard [1997]) | Nonattainment (Extreme)          | Los Angeles-South Coast Air Basin   |
|  | Nonattainment (Severe 17)        | Morongo Band of Mission Indians   |
|  | Nonattainment (Severe 15)        | Los Angeles-San Bernardino Counties (W Mojave Desert)<br>Riverside County. (Coachella Valley) |
|  | Nonattainment (Serious)          | Ventura County  |
|  | Nonattainment (Moderate)         | Imperial County<br>Kern County  |
| Carbon Monoxide (CO)                               | Maintenance (Serious)            | Los Angeles-South Coast Air Basin   |
|  | Maintenance (Moderate ≥ 12.7PPM) | San Diego County  |
| Nitrogen Dioxide (NO <sub>2</sub> )                | Maintenance                      | Los Angeles-South Coast Air Basin, CA (Primary)   |
|  |                                  | Los Angeles County (P)  |
|  |                                  | Orange County   |
|  |                                  | Riverside County (P)  |
|  |                                  | San Bernardino County (P)   |
| PM <sub>10</sub>                                   | Nonattainment (Serious)          | Coachella Valley<br>Imperial Valley   |
|  | Nonattainment (Moderate)         | San Bernardino County   |

<sup>36</sup> Wayson, Roger, and Fleming, Gregg, “Consideration of Air Quality Impacts by Airplane Operations at or Above 3000 feet AGL,” Volpe National Transportation 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/](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/)); and Federal Presumed to Conform Actions under General Conformity, 72 Fed. Reg. 41565 (July 30, 2007).

<sup>37</sup> Department of Transportation, Federal Aviation Administration, *Aviation Emissions and Air Quality Handbook – Version 3, Update 1*, January 2015. ([http://www.faa.gov/regulations\\_policies/policy\\_guidance/envir\\_policy/airquality\\_handbook/](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/))

**Table 4-6 NAAQS Attainment Areas in the General Study Area (2 of 2)**

| Pollutant                          | Status        | Area   |
|------------------------------------|---------------|--|
| PM <sub>2.5</sub> (2006 Standards) | Nonattainment | Imperial County<br>Los Angeles-South Coast Air Basin |
| PM <sub>2.5</sub> (1997 Standards) | Nonattainment | Los Angeles-South Coast Air Basin                    |
| Lead (2008 Standards)              | Nonattainment | Los Angeles-South Coast Air Basin                    |

Sources: US Environmental Protection Agency *Green Book* [<http://www.epa.gov/oaqps001/greenbk/>]. Accessed June 2014.

Prepared by: ATAC Corporation, June 2014.

### 4.3.9 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<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). According to the EPA, the General Accounting Office (GAO) in 2009 reported that domestic aviation contributed approximately three percent of total national CO<sub>2</sub> emissions. Similarly, in its 2010 Environmental Report, the International Civil Aviation Organization (ICAO) estimated that aviation accounted for approximately three percent of all global CO<sub>2</sub> emissions resulting from human activity. The FAA considers CO<sub>2</sub> emissions from aircraft to be the primary GHG of concern.

In October 2010, the Council on Environmental Quality (CEQ) issued the Federal GHG Accounting and Reporting Guidance, which established requirements for Federal agencies to calculate and report GHG emissions associated with their operations. The federal guidance also established a single metric for reporting all GHGs in metric tons (MT) of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) or MTCO<sub>2</sub>e.

This EA calculated total MT of CO<sub>2</sub>, reported here as MTCO<sub>2</sub>e, using NIRS estimates of the amount of fuel burned by IFR aircraft arriving and departing from the Study Airports in the GSA. Fuel burn calculations are discussed in Section 4.3.7, Energy Supply. **Table 4-7** presents the total estimated MTCO<sub>2</sub>e along with estimates of all national and global emissions of MTCO<sub>2</sub>e.

**Table 4-7 CO<sub>2</sub>e Estimates – Existing Conditions**

| General Study Area      | National                 | Global                  |
|-------------------------|--------------------------|-------------------------|
| 0.0076 MMT <sup>1</sup> | 5,383.2 MMT <sup>2</sup> | 50,100 MMT <sup>3</sup> |

Notes:

1) 2013 Calculation

2) 2010 estimate

3) 2012 total

MMT=Million Metric Tons

Source: ATAC Corporation, March 2014; U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012 (EPA 430-R-14-003), April 12, 2014; United Nations Environment Programme, The Emissions Gap Report 2013, November 2013.

Prepared by: ATAC Corporation, February 2015.