4 Affected Environment

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

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

4.1 General Study Area

To describe existing conditions in the Las Vegas 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 November 1, 2016 to October 31, 2017, which was the most recent year of data that is available at the study's inception (noise modeling and other activities for this EA began in November 2017). The General Study Area also captures flight tracks designed for the Proposed Action where 95 percent of departing aircraft leaving the major Study Airport (LAS) are below 10,000 feet Above Ground Level (AGL) and 95 percent of arriving aircraft to the major Study Airport are below 7,000 feet AGL. The threshold for capturing flight tracks at Satellite Airports is set at 85 percent to account for the lower altitudes at which many aircraft operating from these airports tend to fly. The thresholds are set below 100 percent to account for outlier operations which may not reach the prescribed altitudes within a reasonable distance of the Study Airports or at all. By excluding the flight tracks for these kinds of operations, potential distortion of the lateral boundary can be avoided, and the General Study Area is kept to a reasonable size. The FAA requires consideration of impacts of airspace actions from the surface to 10,000 feet AGL if the study area is larger than the immediate area around an airport or involves more than one airport or up to 18,000 feet AGL if the proposed action or alternative(s) are over a national park or wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.[38,39] Due to the presence of National Parks and wildlife refuges within the General Study Area, radar flight tracks were also used to evaluate and model flight routes in areas beyond the General Study Area boundary where IFR aircraft operate at or below 18,000 feet AGL (these areas and the General Study Area are hereafter referred to collectively as the 18K Supplemental Boundary Area).

38 Department of Transportation, Federal Aviation Administration, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Appendix B. *Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303)*, Para. B-1.3, *Affected Environment*. July 16, 2015.

39 Department of Transportation, Federal Aviation Administration, *1050.1F Desk Reference*, Ch. 11, *Noise and Noise-Compatible Land Use*, Para 11.2, *Affected Environment*., July 2015.

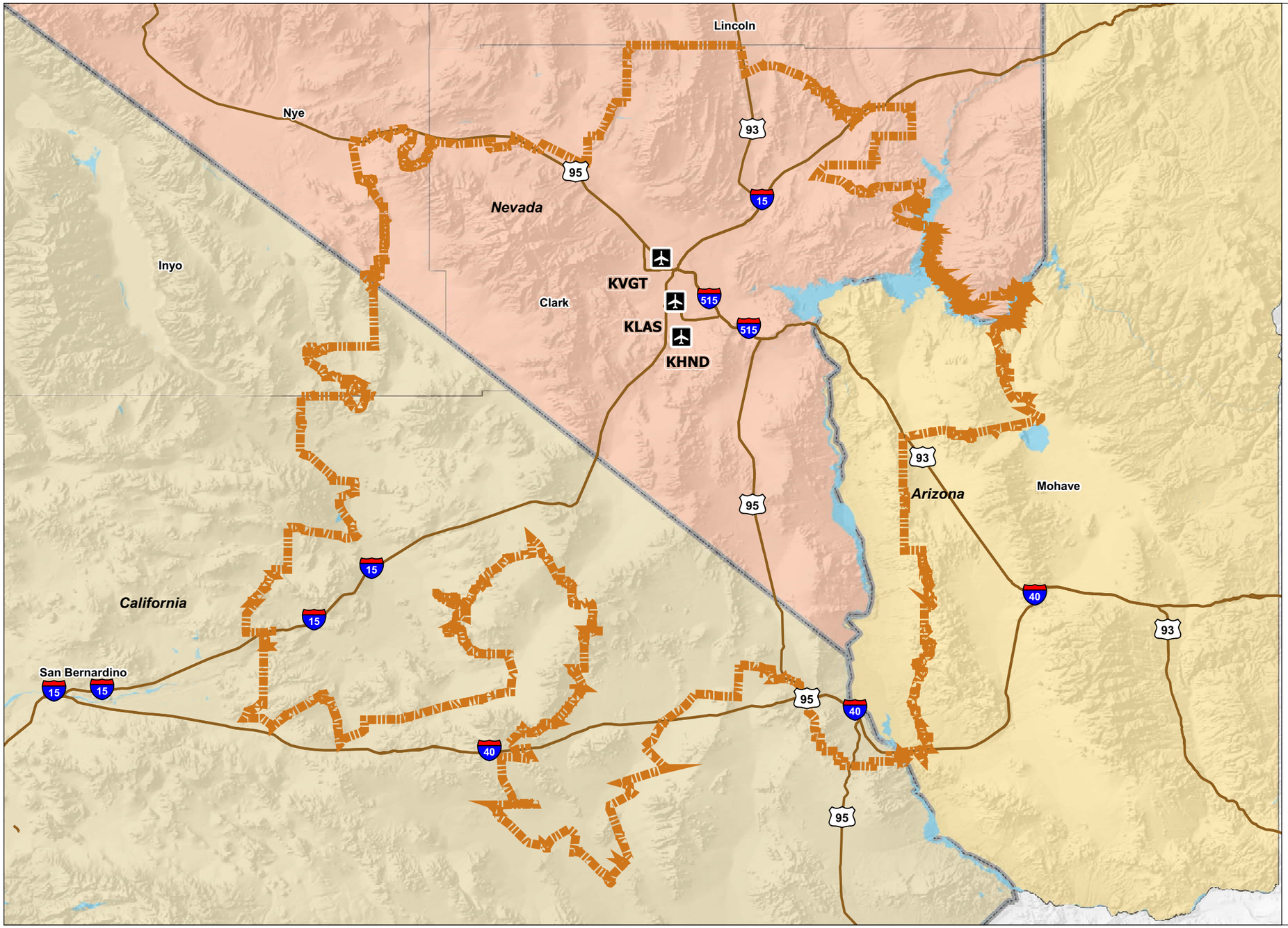
2. The lateral boundary of the General Study Area is defined by U.S. Census tract boundaries where aircraft cross at or below the 10,000/7,000 feet AGL thresholds. This extent is concisely defined to focus on areas of air traffic flow.

Exhibit 4-1 depicts the General Study Area. **Table 4-1** lists the 6 counties included in the General Study Area.

Table 4-1 Counties within General Study Area

Arizona	California	Nevada
Mohave	Inyo	Clark
	San Bernardino	Lincoln
		Nye

Sources: ESRI, U.S. Census Bureau, 2018
Prepared by: ATAC Corporation, October 2018.



LEGEND

- Study Airports
- General Study Area Boundary

Counties in the General Study Area

- Arizona Counties
- California Counties
- Nevada Counties
- US and Interstate Highways
- Water
- State Boundaries

Notes:

KHND Henderson Executive Airport
KLAS Mc Carran International Airport
KVGT North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,394,050

0 5 10 20 Miles

N

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP).
Shaded Relief, 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, May 2019.

Exhibit 4-1

General Study Area

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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 unaffected because the resource either does not exist within the General Study Area or the types of activities associated with the Proposed Action would not affect them. The resource categories or sub-categories are:

- **Coastal Resources**: The Proposed Action would not involve any actions (physical changes or development of facilities) that would be inconsistent with management plans for designated Coastal Barrier Resource System (CBRS) areas, which are not found in the General Study Area. The Proposed Action would not directly affect any shorelines or change the use of shoreline zones and be inconsistent with any NOAA-approved state Coastal Zone Management Plan (CZMP) since there are no shorelines in the General Study Area.
- **Farmlands**: The Proposed Action would not involve the development of any land regardless of use, nor does it have the potential to convert any farmland to non-agricultural uses.
- **Biological Resources (fish and plants only)**: Air traffic airspace and procedure changes do not involve ground disturbance activities. They will not destroy or modify critical habitat for any species. The Proposed Action would not affect habitat for fish or plants, and thus no further analysis is required.
- **Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)**
    - **Wetlands**: The Proposed Action would not result in the construction of facilities and would therefore not encroach upon areas designated navigable waters. Therefore, no further analysis is required.
    - **Floodplains**: The Proposed Action would not result in the construction of facilities. Therefore, it would not encroach upon areas designated as a 100-year flood event area as described by the Federal Emergency Management Agency (FEMA), and thus no further analysis is required.
    - **Surface Waters**: The Proposed Action would not result in any changes to existing discharges to water bodies, create a new discharge that would result in impacts to surface waters, or modify a water body. The Proposed Action would, therefore, not result in any direct or indirect impacts on surface waters.
    - **Groundwater**: The Proposed Action does not involve land acquisition or ground disturbing activities that would withdraw groundwater from underground aquifers or reduce infiltration or recharge to ground water resources through the introduction of new impervious surfaces, and thus, no further analysis is required.
    - **Wild and Scenic Rivers**: The Amargosa River, which covers 26.3 total miles, is the only designated wild and scenic river located within the General Study Area. However, the Proposed Action would not foreclose or downgrade Wild, Scenic, or Recreational river status of a river or river

segment included in the Wild and Scenic River System, and therefore, no further analysis is required.

- **Hazardous Materials, Solid Waste, and Pollution Prevention:** The Proposed Action would not result in any construction or development or any physical disturbances of the ground. Therefore, the potential for impact in relation to hazardous materials, pollution prevention, and solid waste is not anticipated, and no further analysis is required.
- **Historical, Architectural, Archeological, and Cultural Resources – Archeological and Architectural sub-category only**: The Proposed Action would not involve excavation of archaeological resources on Federal and Indian lands or disposition of cultural items. It would not affect the access to or the physical integrity of American Indian sacred sites. The Proposed Action would not result in any construction, development, or physical disturbances of the ground. Therefore, the potential for impact in relation to architectural compatibility with the character of a surrounding historic district or property is not anticipated, and therefore, no further analysis is required.
- **Land Use:** The Proposed Action would not involve any changes to existing, planned, or future land uses within the General Study Area. Therefore, no further analysis is required.
- **Visual Effects – Light Emissions only**: The Proposed Action will not change aviation lighting; therefore, no further analysis is required.
- **Natural Resources and Energy Supply – Natural Resources sub-category only**: The Proposed Action would not require the need for unusual natural resources and materials, or those in short supply. Therefore, no further analysis is required.
- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks** –
    - **Socioeconomic Impacts sub-category**: The Proposed Action would not involve acquisition of real estate, relocation of residents or community businesses, disruption of local traffic patterns, loss in community tax base, or changes to the fabric of the community.
    - **Children's Environmental Health and Safety Risks sub-categories**: The Proposed Action would not affect products or substances that a child would be likely to come into contact with, ingest, use, or be exposed to and would not result in environmental health and safety risks that could disproportionately affect children.

4.3 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 and Compatible Land Use** (Section 4.3.1)
- **Department of Transportation Act, Section 4(f)** (Section 4.3.2)

- **Historic, Architectural, Archeological, and Cultural Resources – Historic and Cultural Resources sub-categories only** (Section 4.3.3)
- **Biological Resources – Wildlife sub-category only** (Section 4.3.4)
- **Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks – Environmental Justice sub-category only** (Section 4.3.5)
- **Natural Resources and Energy Supply – Energy Supply sub-category only (aircraft fuel only**) (Section 4.3.6)
- **Air Quality** (Section 4.3.7)
- **Climate** (Section 4.3.8)
- **Visual Effects (Visual Resources / Visual Character Only)** (Section 4.3.9)

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

4.3.1 Noise and Compatible Land Use

Aircraft noise is often the most noticeable environmental effect associated with any air traffic project. This section discusses FAA guidance on conducting noise analyses, noise model input development, and existing aircraft noise conditions. **Appendix 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 *Noise Technical Report*, Appendix I.

4.3.1.1 Noise Modeling Methodology

To comply with NEPA requirements, the FAA has issued policies and procedures for assessing aircraft noise in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. That Order requires that aircraft noise analysis use the yearly Day-Night Average Sound Level (DNL) metric. The DNL metric is a single value representing the aircraft sound level over a 24-hour period and includes all of the sound energy generated within 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 1050.1F also requires the FAA to evaluate aircraft noise using the current FAA-approved computer model at the beginning of the environmental analysis process. In accordance with this requirement, the FAA used the Aviation Environmental Design Tool Version 2d (AEDT 2d), the current version in November 2017 when FAA commenced the EA process, 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 air traffic control (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 2020 (the proposed first year of implementation) and 2025 (five years after implementation) for either the Proposed Action or the No Action Alternative. Therefore, VFR aircraft were not included in the analysis.

AEDT 2d requires a variety of inputs, including local environmental data temperature and humidity, runway layout, number and type of aircraft operations, runway use, and flight tracks. Accordingly, the FAA assembled detailed information on aircraft operations for the Study Airports for input into AEDT 2d. 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 447,403 IFR-filed flights to and from the Study Airports between November 1, 2016 and October 31, 2017 (hereafter referred to as 2017). 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 AEDT 2d. More detailed information about the AEDT 2d input for Existing Conditions can be found in the *Noise Technical Report*, **Appendix I**.

The PDARS data provided tracks for each flight that occurred during 2017. The FAA used the data to define the Average Annual Day (AAD) track locations and use as 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 all the typical flight routings within the General Study Area for an AAD.[40] AEDT 2d tracks are then developed based on the group of radar tracks representing each flow.

The AEDT 2d model was used to calculate noise levels for the following specific locations on the ground:

Census Block Population Centroids: The AEDT 2d model was used to calculate DNL at the geographic centers (centroids) of census blocks to estimate the population exposed to varying levels of aircraft noise. This EA analyzed population within the General Study Area using 2010 U.S. Census block geometry (the most current available). A census block is the smallest geographical unit that the United States Census uses to collect data. The census block population centroid DNL represents the DNL for the total maximum potential population within that census block. Because noise levels are analyzed only at the centroid point and applied to the entire census block area population, and because the area represented by each centroid varies depending on the density of population, the actual noise exposure level for individuals will vary from the reported level based on their proximity to the geographic centroid.

Grid Points: The AEDT 2d model calculated noise exposure at evenly spaced grid points. This EA covered the General Study Area with a grid of noise receptor points spaced evenly

40 *Flight Schedules Technical Report*, Appendix H.

at 0.5 nautical mile (NM) intervals. Noise at regular intervals was calculated for these grid points throughout the General Study Area. In addition, these grid points were evaluated for noise at any Section 4(f) resource or historic property not captured using unique points as described below.

Unique Points – Section 4(f) and Historical and Cultural Resources: The AEDT 2d model analyzed 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 listed on the National Register of Historic Places (such as individual buildings).[41] See Section 4.3.2 for a discussion of what constitutes a Section 4(f) resource and Section 4.3.3 for a discussion of historic properties in the General Study Area.

Unique Points – Noise Sensitive Areas and Uses: In addition to the unique points identified for individual Section 4(f) resources and specific listed historic sites, the AEDT 2d model was used to analyze noise at noise sensitive areas and uses generally exposed to existing noise of DNL 65 dB and above. These locations are further discussed in Section 4.3.1.3 and disclosed in **Appendix I:** *Noise Technical Report*, Table A7.1.

In total, noise exposure levels were calculated at 20,070 census block population centroids, 94,693 grid points, and 58,076 unique points throughout the General Study Area.

4.3.1.2 Existing Aircraft Noise Exposure

Table 4-2 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 5 dB bands, of existing noise exposure based on radar data collected for 2017 within the General Study Area. Each point on the exhibit represents a Census block population centroid. As shown in **Exhibit 4-2**, areas exposed to higher DNL are generally aligned with Study Airport runways and areas with existing aircraft traffic.

Table 4-2 Population Exposed to Aircraft Noise (DNL) within the General Study Area

DNL Range (dB)	Population
DNL 45 dB to DNL 60 dB	1,146,582
DNL 60 dB to less than DNL 65 dB	30,553
DNL 65 dB and higher	4,481
Total above DNL 45 dB	1,181,616

Sources: AEDT version 2d; US Census Bureau, 2014 Tracts and American Community Survey Selected Economic Characteristics, 2010-2014.
Prepared by: ATAC Corporation, April 2020.

4.3.1.3 Noise Sensitive Areas and Uses

Appendix B to FAA Order 1050.1F, paragraph B-1.3, *Affected Environment,* requires the FAA to identify the location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) that could be significantly impacted by noise. As defined in Paragraph 11-5.b(10) of FAA Order 1050.1F, a noise sensitive area is "[a]n area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and

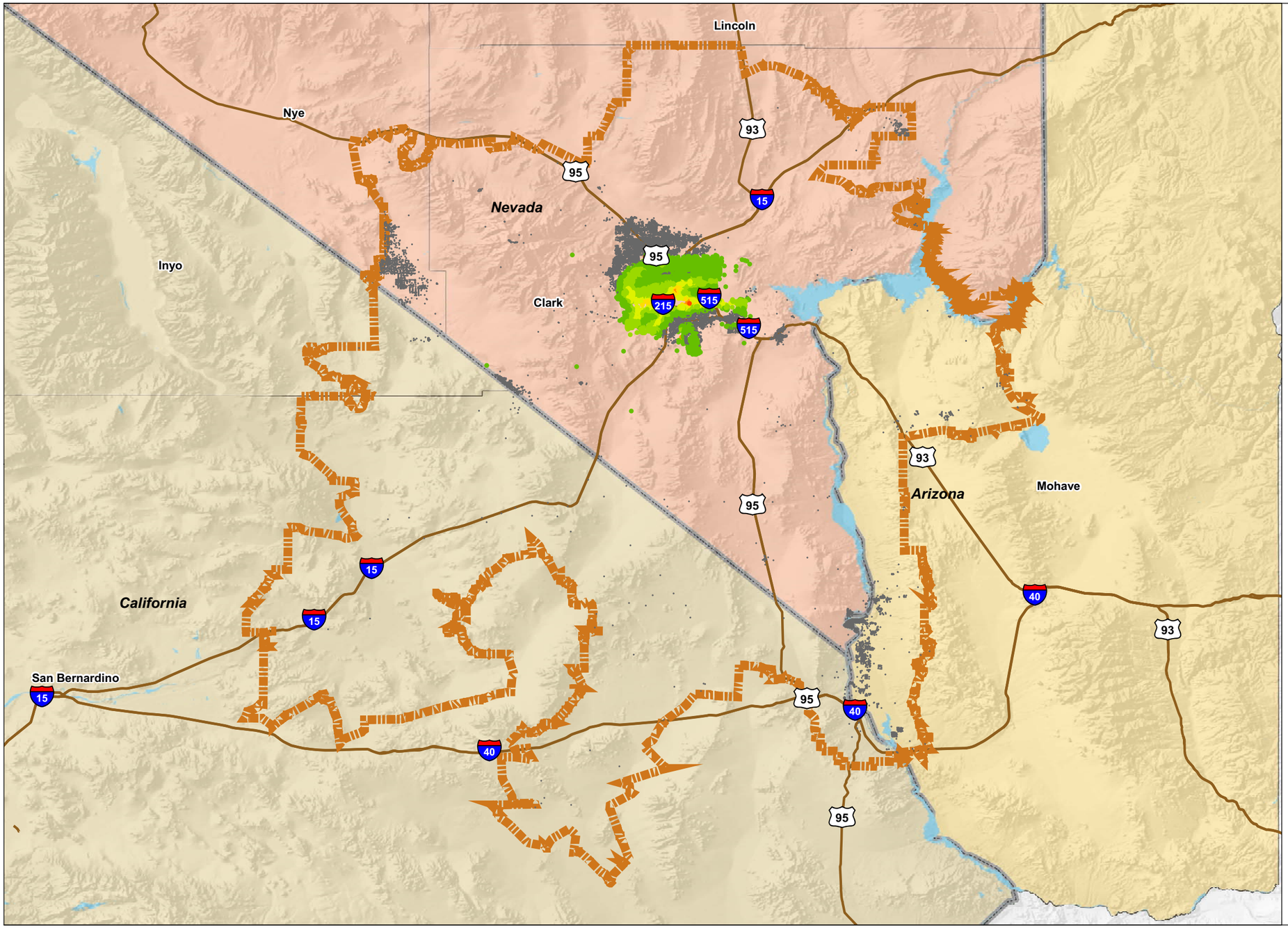
41 *Noise Technical Report*, Appendix I.

historical sites." Potential impacts to residential population are considered using US Census block population centroids as described in Section 4.3.1.2. Parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites are further discussed in Sections 4.3.2 and 4.3.3, below. **Appendix I:** *Noise Technical Report*, Table A7.1 lists those locations identified as noise sensitive in the General Study Area and reports the noise values associated with each location.

4.3.1.4 Compatible Land Use

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

Existing land use in the General Study Area is depicted in **Exhibit 4-3**. It is characterized using generalized land coverage data from the USGS National Land Cover Database 2011 (NLCD 2011) which is most closely aligned to the 2010 census geometries used in this study. As depicted in Exhibit 4-3, the majority of the General Study Area is dominated by shrub/scrub, while portions of the northeastern area are dominated by deciduous forest. Open water is found in the northeast and eastern portions of the General Study Area. The majority of urban development lies in the north central part of the General Study Area, predominantly characterized by areas of low-, medium-, and high-density urban development around the Las Vegas, Henderson, and Paradise areas. The General Study Area also includes numerous large parks, recreational areas, wilderness areas, and other types of resources managed by local, state, and federal agencies. These resources are further discussed in Section 4.3.2.



LEGEND

Noise Levels (DNL)

- <45 dB
- 45-50 dB
- 50-55 dB
- 55-60 dB
- 60-65 dB
- 65-70 dB
- 70-75 dB
- >75 dB
- General Study Area Boundary

Counties in the General Study Area

- Arizona Counties
- California Counties
- Nevada Counties
- US and Interstate Highways
- Water
- State Boundaries

Notes:

KHND	Henderson Executive Airport
KLAS	Mc Carran International Airport
KVGT	North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,394,050

N

0 5 10 20 Miles

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). Shaded Relief, 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, May 2019.

Exhibit 4-2

2017 Baseline DNL - Noise Exposure by Census Block

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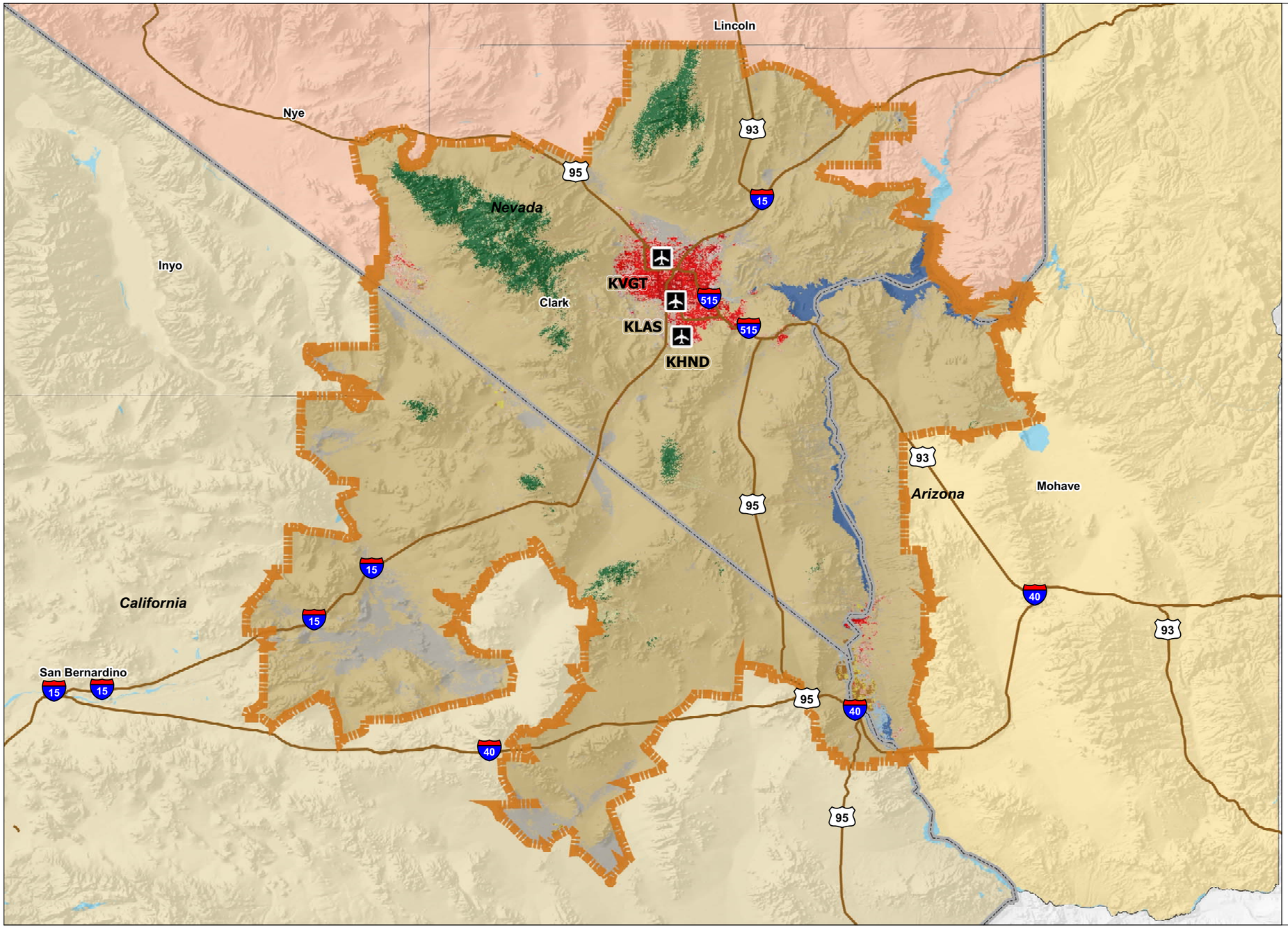

LEGEND

- General Study Area Boundary
- Study Airports
- US and Interstate Highways
- State Boundaries
- Water

General Study Area Counties

- Arizona Counties
- California Counties
- Nevada Counties

National Land Cover Data

- Open Water
- Developed, open space
- Developed, low intensity
- Developed, medium intensity
- Developed, high intensity
- Barren Land
- Deciduous forest
- Evergreen forest
- Mixed forest
- Grassland / herbaceous
- Grassland / herbaceous
- Pasture hay
- Cultivated crops
- Woody wetlands
- Emergent herbaceous wetlands

Notes:

KHND Henderson Executive Airport
KLAS Mc Carran International Airport
KLSV Nellis Air Force Base
KVGT North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,394,002

0 5 10 20 Miles

N

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). Shaded Relief, 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, May 2019.

Exhibit 4-3

Land Coverage in the General Study Area

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4.3.2 Department of Transportation Act, Section 4(f)

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

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

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

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

4.3.2.1 Section 4(f) Resources

The FAA used data from federal and state sources to identify 57,968 Section 4(f) resources within the 18K Supplemental Boundary Area. **Exhibit 4-4** depicts the locations of Section 4(f) resources, other than those listed or eligible for listing in the National Register of Historic Places (NRHP). The locations of Section 4(f) resources that are listed or eligible for listing in the NRHP are discussed in Section 4.3.3 and depicted in **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 *Noise Technical Report,* **Appendix I**.

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

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

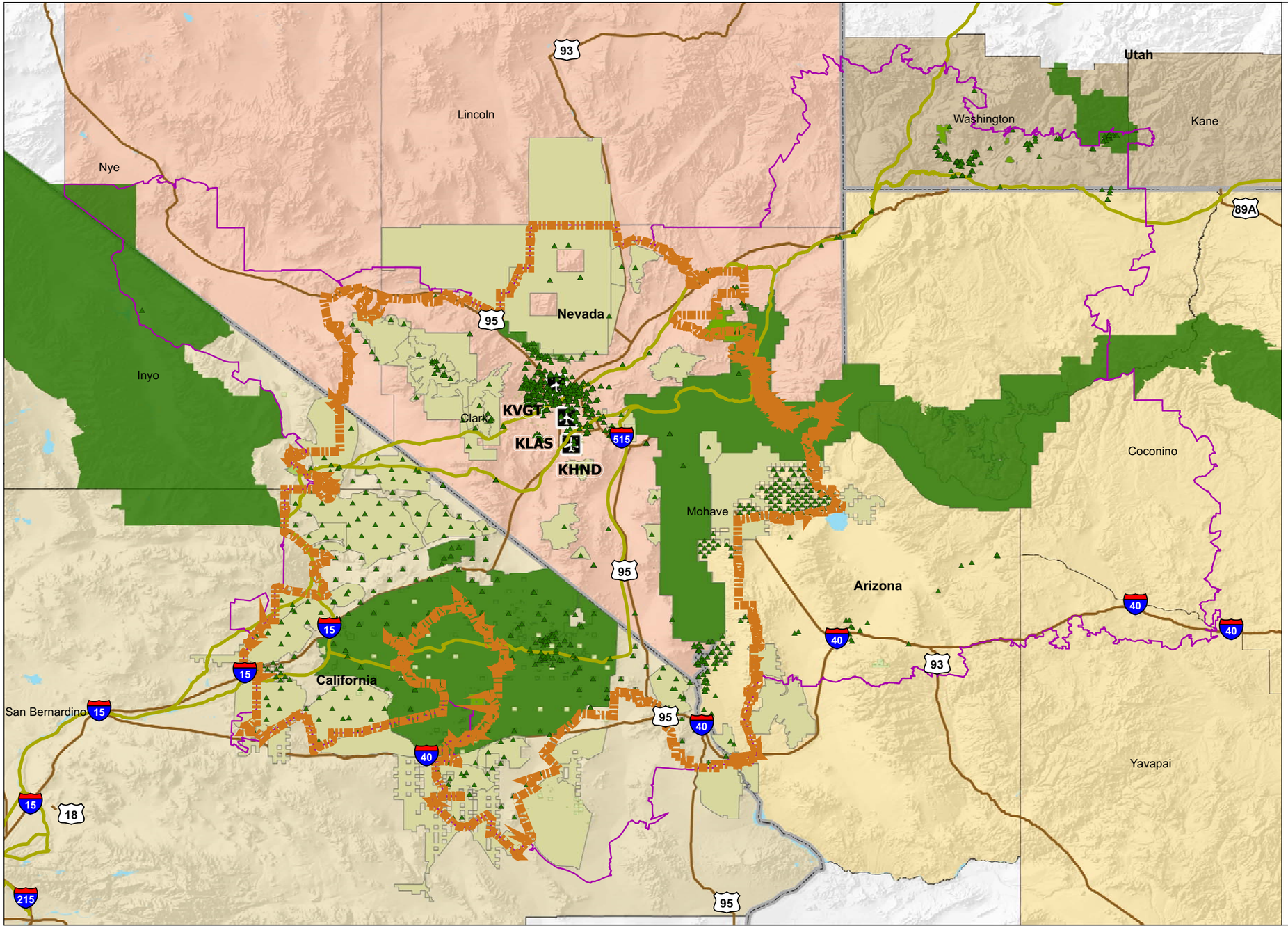
Consistent with Section 106, this EA defines "historic property" as "…any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria."[42] As noted in Section 4.2, the Proposed Action does not involve ground disturbance that could physically impact archaeological or architectural resources. The Proposed Action is located above the ground and does not involve the construction, disturbance, or alteration of any physical structure on, in, or emanating from the ground. Thus, the EA does not further discuss these resources.

4.3.3.1 Historic Properties in the Area of Potential Effect, the General Study Area, and the 18K Supplemental Boundary Area

Federal regulations require the FAA to define an area of potential effect (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.[43] The FAA initially defined the APE for the Proposed Action as coterminous with the General Study Area boundary. As explained in Section 5.3.2, the FAA subsequently redefined the APE as the area in which the FAA's noise modeling analysis shows the Proposed Action would result in reportable noise increases (see Section 5.1.3).

Exhibit 4-5 shows the location of historic properties the FAA initially identified in the General Study Area and 18K Supplemental Boundary Area. A total of 143 NRHP-listed properties were identified. Consultations to identify other listed or eligible resources resulted in the identification of 243 NRHP-eligible or potentially NRHP-eligible sites within the redefined APE. A list of the historic and cultural resources identified in the General Study Area (other than those listed on the restricted site of the Nevada Cultural Resource Information System), the county in which they are located, and DNL calculated for each resource under existing conditions is included in the *Noise Technical Report*, **Appendix I**.

42 36 C.F.R. § 800.16(l)(1).
43 36 C.F.R. § 800.16(d).



LEGEND

- General Study Area Boundary
- 18K Supplemental Boundary Area
- Parks/Trails
- Old Spanish Trail

Section 4(f) Resources

- National Park or Forest
- State Park or Forest
- County Park
- Regional Park
- Local Park
- Other Section4(f) Resources
- US and Interstate Highways
- State Boundaries
- Water

18K Supplemental Area Counties

- Arizona Counties
- California Counties
- Nevada Counties
- Utah Counties

Notes:

KHND Henderson Executive Airport
KLAS Mc Carran International Airport
KVGT North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,852,019

0 5 10 20 Miles

N

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). FAA, Aeronautical Information Services, Airspace Boundaries Shaded Relief, ESRI 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, September 2019.

Exhibit 4-4

Section 4(f) Resources in the 18K Supplemental Boundary Area

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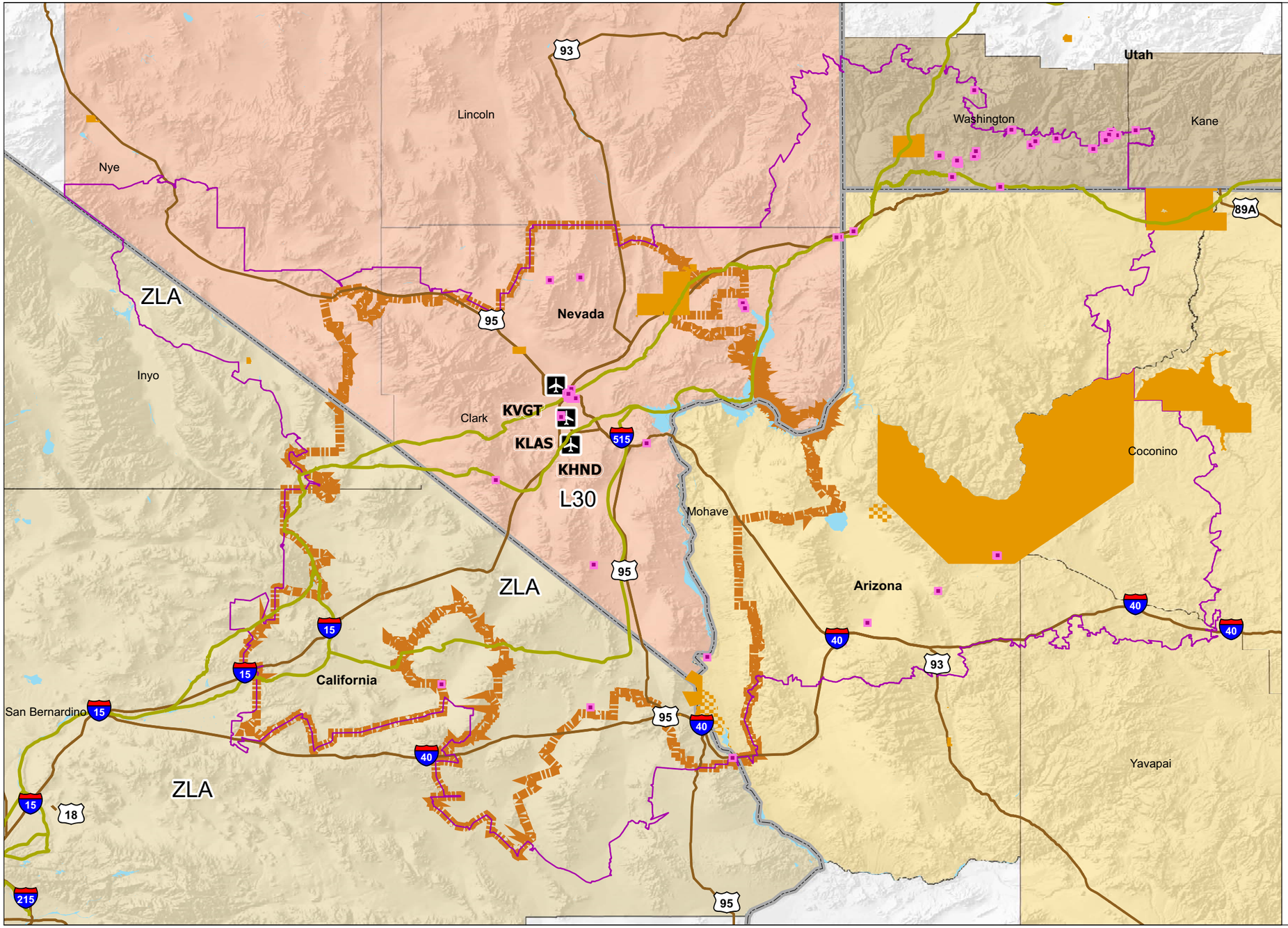

LEGEND

- General Study Area Boundary
- 18K Supplemental Boundary Area
- Study Airports
- Historic Resources
- Old Spanish Trail
- Tribals Lands
- US and Interstate Highways
- State Boundaries
- Water

18K Supplemental Area Counties

- Arizona Counties
- California Counties
- Nevada Counties
- Utah Counties

Notes:

KHND Henderson Executive Airport
KLAS Mc Carran International Airport
KVGT North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,850,412

0 5 10 20 Miles

N

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). FAA, Aeronautical Information Services, Airspace Boundaries Shaded Relief, ESRI 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, September 2019.

Exhibit 4-5

Historic and Cultural Resources in the 18K Supplemental Boundary Area

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4.3.4 Biological Resources – Wildlife Sub-Category

This section discusses the existing wildlife resources within the General Study Area. The Proposed Action involves redesigning standard instrument arrival and departure procedures and the supporting airspace management structure serving the Study Airports. Accordingly, the discussion is limited to avian and bat species that may be present within the General Study Area.

4.3.4.1 Threatened and Endangered Species and Migratory Birds

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

4.3.4.2 Migratory Birds

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

Birds migrate along four main routes or flyways in North America: the Atlantic, the Central, the Mississippi, and the Pacific flyways, which are loosely delineated in these geographic regions. The General Study Area is located within the 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, and geographic position and latitude of the breeding and wintering grounds. Hundreds of bird species make the round-trip each year along the Pacific Flyway from their breeding grounds in the Arctic tundra and northern United States to wintering grounds found in western Mexico.

Table 4-3 lists the bat and bird species of concern that are found within the General Study Area by county where they occur.

Table 4-3 Federally Listed Bird & Bat Species Potentially Found in the General Study Area

Status	Species	Type	County of Occurrence within the General Study Area
Endangered	Condor, California U.S.A. only, except where listed as an experimental population (*Gymnogyps californianus*)	Bird	Mohave, Inyo, San Bernardino
Threatened	Cuckoo, yellow-billed Western U.S. DPS (*Coccyzus americanus*)	Bird	Mohave, Lincoln, Nye
Endangered	Flycatcher, southwestern willow Wherever found (*Empidonax traillii extimus*)	Bird	Mohave, Inyo, San Bernardino, Lincoln, Nye
Threatened	Owl, Mexican spotted Wherever found (*Strix occidentalis lucida*)	Bird	Mohave
Endangered	Rail, Yuma clapper Wherever found (*Rallus longirostris yumanensis*)	Bird	Mohave, San Bernardino
Endangered	Tern, California least Wherever found (*Sterna antillarum browni*)	Bird	Mohave
Threatened	Gnatcatcher, coastal California Wherever found (*Polioptila californica californica*)	Bird	San Bernardino
Threatened	Plover, western snowy Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) (*Charadrius nivosus nivosus*)	Bird	Inyo, San Bernardino
Threatened	Towhee, Inyo California Wherever found (*Pipilo crissalis eremophilus*)	Bird	Inyo, San Bernardino
Endangered	Vireo, least Bell's Wherever found (*Vireo bellii pusillus*)	Bird	Inyo, San Bernardino

Sources: US Fish and Wildlife Service, http://www.fws.gov/endangered/; Accessed October 2018. U.S. Department of the Interior, Fish and Wildlife Service, https://ecos.fws.gov/ecp0/reports/species-listed-by-state- report?state=NV&status=listed (accessed June 14, 2019).
Prepared by: ATAC Corporation, November 2019.

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

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

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

The socioeconomic and racial characteristics of the population within the General Study Area are based on data from the U.S. Census, 2010-2014 American Community Survey (ACS) 5-Year Data Release. Minority and low-income populations for each census block group within the General Study Area are identified using the AEDT 2d model and depicted in **Exhibit 4-6**

using geographical information systems (GIS).[44] This analysis defines and identifies minority population and low-income population as follows:

- A **minority census block group** is a census block group with a minority population percentage greater than the average minority population percentage of the overall General Study Area. Based on U.S. Census data, the average percentage of minority population residing in the General Study Area was 29.42 percent. Therefore, every census block group with a percentage of minority population greater than 29.42 percent is designated a census block group of environmental justice concern.
- A **low-income population census block group** is a census block group with a greater percentage of low-income population than the average percentage of low-income population in the overall General Study Area. The average percentage of low-income population residing in the overall General Study Area was 19.13 percent. Therefore, every census block group with a low-income population greater than 19.13 percent is designated a census block group of environmental justice concern.

Exhibit 4-6 depicts areas of environmental justice concern in the General Study Area. **Table 4-4** presents minority and low-income populations by county within the General Study Area.

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

County	Population	Minority	% of Total	Low Income	% of Total
Clark County	1,984,333	1,066,728	53.76%	309,091	15.58%
Inyo County	479	50	10.44%	112	23.38%
Mohave County	79,312	20,301	25.60%	13,850	17.46%
Nye County	30,018	6,595	21.97%	5,274	17.57%
San Bernardino County	8,537	3,507	41.08%	1,890	22.14%

Source: US Census Bureau, 2010-2014 American Community Survey (ACS) 5-Year Estimate.
Prepared by: ATAC Corporation, March 2019.

44 All GIS work was conducted using ESRI ArcGIS version 10.8, Manifold Release 9.0, and prior release versions.

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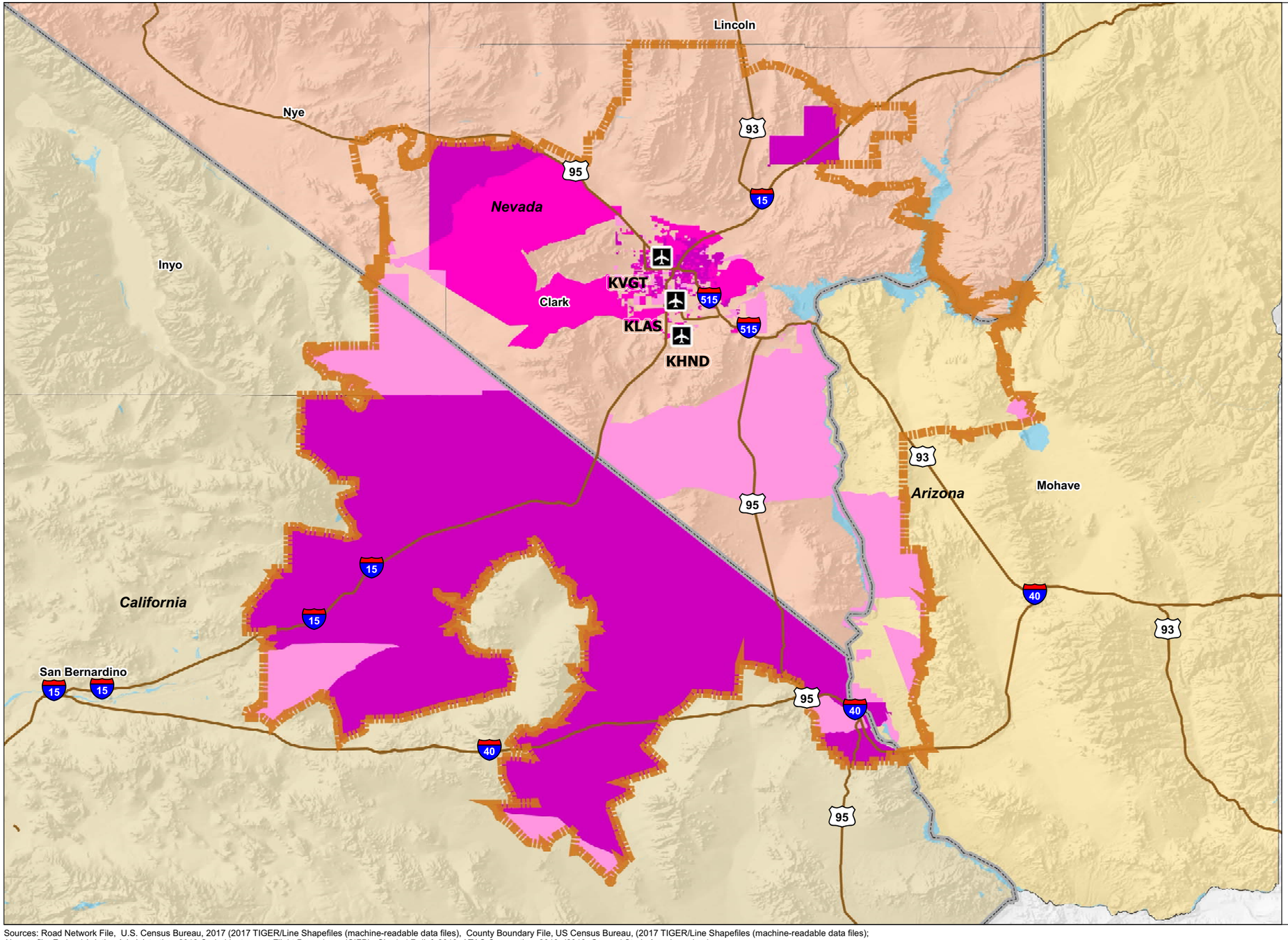

LEGEND

- General Study Area Boundary
- Study Airports
- US and Interstate Highways
- State Boundaries
- Low Income Population
- Minority Population
- Low Income/Minority Population
- Water

General Study Area Counties

- Arizona Counties
- California Counties
- Nevada Counties

Notes:

KHND Henderson Executive Airport
KLAS Mc Carran International Airport
KLSV Nellis Air Force Base
KVGT North Las Vegas Airport

Coordinate System: GCS WGS 1984
Datum: WGS 1984

Scale: 1:1,392,546

N

0 5 10 20 Miles

Sources: Road Network File, U.S. Census Bureau, 2017 (2017 TIGER/Line Shapefiles (machine-readable data files), County Boundary File, US Census Bureau, (2017 TIGER/Line Shapefiles (machine-readable data files); Airports file, Federal Aviation Administration, 2018 Coded Instrument Flight Procedures (CIFP). Shaded Relief, 2018. ATAC Corporation, 2018, (2018 General Study Area boundary).
Prepared by: ATAC Corporation, May 2019.

Exhibit 4-6

Environmental Justice Communities in the General Study Area

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4.3.6 Energy Supply (Aircraft Fuel)

This section describes fuel consumption by IFR aircraft arriving at and departing from the Study Airports. Using the AEDT 2d noise model, the FAA calculated aircraft fuel burn to estimate fuel consumption associated with air traffic flows under existing conditions. AEDT 2d calculates fuel burn using the same input used for calculating noise. (See Section 4.3.1.1 for a discussion of AEDT 2d model inputs.) Based on the AEDT 2d calculation, IFR aircraft arriving at and departing from the Study Airports burn approximately 291,824 gallons of fuel[45] on an annual average day within the 18K Supplemental Boundary Area.

4.3.7 Air Quality

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

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

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

Pollutant	Status	Area
Ozone (O_3) – (8-Hour Standard [2015])	Nonattainment (Extreme)	San Bernardino County (West Mojave Desert), CA Los Angeles-South Coast Air Basin, CA (San Bernardino)
Ozone (O_3) – (8-Hour Standard [2015])	Nonattainment (Moderate)	Clark County
Carbon Monoxide	Maintenance	San Bernardino County Clark County
PM-2.5 (2012 Standards)	Nonattainment (Moderate)	San Bernardino County

45 For fuel burn purposes, jet fuel is calculated at 6.7 pounds per gallon. Approximately 1,943,547.84 lbs. of fuel are burned by IFR aircraft arriving and departing the Study Airports on an annual average day.

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

Pollutant	Status	Area
PM-10 (1987 Standards)	Maintenance	Mohave County Inyo County San Bernardino County Clark County
Nitrogen Dioxide (1971 Standard)	Maintenance	Los Angeles-South Coast Air Basin, CA (San Bernardino)

Source: US Environmental Protection Agency Green Book [http://www.epa.gov/airquality/greenbook/ancl.html] Accessed September 2019.
Prepared by: ATAC Corporation, September 2019.

Both the EPA and the FAA have determined that aircraft operations at or above a mixing height of 3,000 feet AGL have a very small effect on pollutant concentrations at ground level.[46,47,48] 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.[49] Mixing heights will vary based on a variety of factors including topography, time of day, temperature, wind, and season. A mixing height of 3,000 feet AGL represents the annual national average mixing height. While 3,000 feet AGL is the threshold established by the EPA and the FAA, FAA research on mixing heights indicates that changes in air traffic procedures above 1,500 ft. AGL and below the mixing height would have little if any effect on emissions and ground concentrations.[50] The FAA has determined that emissions from air traffic actions below the mixing height are *de minimis* when the actions are designed to enhance operational efficiency.[51]

4.3.8 Climate

Greenhouse gases (GHGs) are naturally occurring and man-made gases that trap heat in the earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). According to the EPA, domestic aviation contributed approximately three percent of total national CO_2 emissions.[52]

In December 2014, the CEQ issued revised draft NEPA guidance for considering effects of climate change and GHG emissions. The guidance recommended consideration of potential effects of a proposed action or its alternatives on climate change as indicated by GHG emissions, and the implications of climate change for the environmental effects of a proposed action or its alternatives.

46 Wayson, Roger, and Fleming, Gregg, "Consideration of Air Quality Impacts by Airplane Operations at or Above 3000 feet AGL," Volpe National Transportations Systems Center and FAA Office of Environment & Energy, FAA-AEE-00-01-DTS-34, September 2000. (http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/)

47 40 C.F.R. § 93.150(c)(2) (xxii).

48 72 Fed. Reg. 6641 (February 12, 2007).

49 U.S. Department of Transportation, Federal Aviation Administration, *Air Quality Procedures For Civilian Airports & Air Force Bases*, April 1997.
(http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Handbook.PDF)

50 Report on ''Consideration of Air Quality Impacts by Airplane Operations At or Above 3,000 feet AGL,''FAA–AEE–00–01, September 2000, p. 5.

51 72 Fed. Reg. 41578 (July 30, 2007).

52 U.S. Environmental Protection Agency. https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-aircraft. Accessed April 2019.

This EA calculated total MT of CO_2 within the 18K Supplemental Boundary Area, reported as MT CO_2e, using AEDT 2d estimates of the amount of fuel burned by IFR aircraft arriving and departing from the Study Airports in the General Study Area for the No Action and applying accepted Environmental Protection Agency factors to calculate CO_2e. Fuel burn calculations are discussed in Section 4.3.6, *Energy Supply*.

4.3.9 Visual Effects (Visual Resources / Visual Character Only)

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

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