AICUZ

Air Installations Compatible Use Zones Study 2020 Update

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EXECUTIVE SUMMARY

The 2020 Marine Corps Air Station (MCAS) Miramar Air Installations Compatible Use Zones (AICUZ) study, (AICUZ 2020), has been prepared in accordance with federal regulations and United States (U.S.) Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C and Marine Corps Order (MCO) 11010.16 (U.S. Marine Corps [USMC] 2008). AICUZ 2020 is an update of AICUZ 2005 (USMC 2005) and has been prepared to address changes in the mission, aircraft, and projected operational levels that are expected to occur between 2020 and 2032.

ES.1 PURPOSE OF AN AICUZ

The AICUZ Program exists to promote compatible land use near military airfields. The objectives of the AICUZ Program are to:

- Protect the health, safety, and welfare of civilians and military personnel by encouraging land use that is compatible with aircraft operations;
- Protect USMC installation investments by safeguarding the installation's operational capabilities;
- Reduce noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements both on and in the vicinity of air installations; and
- Inform the public and seek cooperative efforts to minimize noise and aircraft accident impacts by promoting compatible development.

Under the AICUZ Program, the Department of the Navy (DON) identifies noise contours and Accident Potential Zones (APZs) to be published in an AICUZ that provides a land use planning tool for local planning agencies. To implement the AICUZ Program at the local level, each DON and USMC air installation is required to prepare and maintain an AICUZ. Each AICUZ is prepared as a planning resource for local planners, developers, governments, and other interested parties to provide land use recommendations surrounding each installation. The AICUZ footprint of an air station – comprised of noise contours and APZs - defines the minimum acceptable area in which land use control measures are recommended in order to prevent development that is incompatible with airfield operations.

ES.2 MCAS MIRAMAR

MCAS Miramar is centrally located in the County of San Diego, California, approximately 11 miles north of downtown San Diego and 4 miles inland from the Pacific Ocean. It sits within the San Diego International Class B controlled airspace and operates a secure Class B airfield with two parallel bi-directional runways and five helicopter pads, a helicopter landing strip, and maintains installation facilities, equipment, and properties in support of tenant organizations and external units. The primary flying tenant command is the 3rd Marine Aircraft Wing, comprised of Marines, Sailors, and civilians who deploy all over the world in support of our nation's contingency operations. The installation has a workforce of over 12,000 service members and civilians (San Diego Association of Governments [SANDAG] 2018a).

ES.3 AIRCRAFT OPERATIONS

Aircraft operations for AICUZ 2020 are projected for 2032 and include all known and anticipated changes to the MCAS Miramar operational environment, as presented in Table ES-1. This includes aircraft operations by F-35B, F-35C, KC-130, CH-53K, and MV-22B. The C-12 and UC-35 operations will continue largely unchanged. Flight tracks and current operations levels used at MCAS Miramar are based on the 2010 F-35 Environmental Impact Statement conditions, as refined to reflect two F-35C squadrons in

lieu of two F-35B squadrons, and were updated based on interviews with air traffic control and based squadron personnel to reflect conditions anticipated for 2032 to allow a sufficient time period for local planning considerations.

Table ES-1. MCAS Miramar AICUZ 2032 Scenario - Annual Aircraft Operations

Squadron Name	Day (7 a.m. – 7 p.m.)	Evening (7 p.m. – 10 p.m.)	Night (10 p.m. – 7 a.m.)	Total
BASED AIRCRAFT				
F-35B	26,089	4,294	254	30,637
F-35C	9,854	2,245	157	12,256
KC-130	6,424	1,985	640	9,049
C-12 / UC-35	434	59	24	517
CH-53K [1]	10,709	1,748	896	13,353
MV-22B	25,573	11,480	2,389	39,442
Based Subtotal	***79,083***	***21,811***	***4,360***	***105,254***
TRANSIENT AIRCRAFT				
Air Carrier	1,782	170	54	2,006
Heavy Transport	44	2	2	48
Military Fixed-Wing	5,108	488	144	5,740
Military Rotary-Wing	5,092	1,388	668	7,148
Transient Subtotal	***12,026***	***2,048***	***868***	***14,942***
TOTALS	**91,109**	**23,859**	**5,228**	**120,196**

Note: [(1)] CH-53E noise data used as an appropriate substitute for CH-53K, which is not yet available

ES.4 AIRCRAFT NOISE

Aircraft noise is a concern to many communities surrounding airports. The impact of aircraft noise is also a factor in the planning of future compatible land use near air facilities. Because noise from airport operations can affect surrounding land uses, the USMC has defined certain noise zones and provided associated recommendations regarding compatible land use in the AICUZ Program guidance. CH-53E noise data was modeled as an appropriate substitute for CH-53K data, which is not yet available, because fixed wing operations are the dominant influence on noise contours.

This study presents Community Noise Equivalent Level (CNEL) noise contours, identified as AICUZ 2020, based on flight operations projected through 2032. This helps ensure the future operational capability of MCAS Miramar and allows local communities a longer planning period. AICUZ 2020 contours reflect changes since AICUZ 2005 as well as the projected 2032 operations. Figure ES-1 presents a comparison of the AICUZ 2020 contours to the AICUZ 2005 contours.

ES.5 AIRFIELD SAFETY

MCO 11010.16 requires safety zone designation for areas in the vicinity of the airfield surface at increased risk for aircraft mishap impacts, based on historical accident data. There are three types of safety zones: clear zone (CZ), APZ-I, and APZ-II. These zones are defined by the AICUZ Program policy and are described within the MCO referenced above. There are two major divisions in the types of safety zones: fixed-wing and rotary-wing. As directed in MCO 11010.16, all runways will need CZs, and only those flight tracks that have over 5,000 annual military arrival or departure operations are required to have APZs.

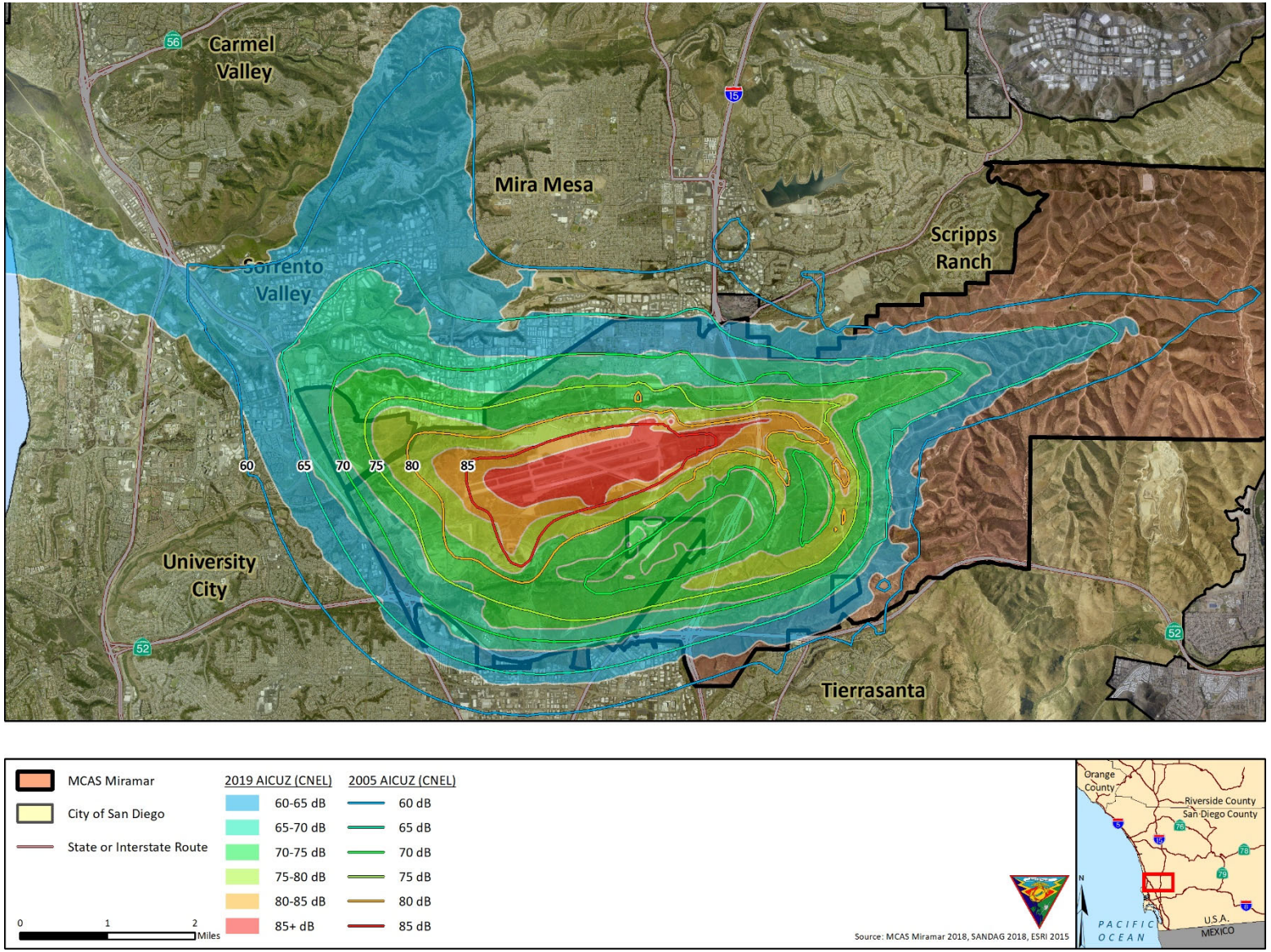

Figure ES-1. Comparison of 2020 CNEL Noise Contours to AICUZ 2005

Table ES-2 shows the summary of the number of operations for each runway at MCAS Miramar (computed by totaling operations for the applicable flight tracks). Based on projected 2032 operations for AICUZ 2020, there is justification for CZs and APZs at MCAS Miramar because both Runway 24L and 24R include greater than the 5,000 annual operations threshold for fixed-wing aircraft. Approaches and departures are established for Runway 06 (i.e., operations in the reverse direction from Runway 24), but Runway 06 operations are infrequent and annual totals are far below the 5,000 operation threshold for APZs. The criteria for rotary-wing APZ designation describes landing pads or runways that support daily training and operational missions, which applies to the helicopter strip and heli-pads identified in Table ES-2.

Figure ES-2 compares the updated CZs and APZs with the AICUZ 2005 safety zones. The differences are primarily due to inclusion of operational helicopter pad CZs, which are entirely within the installation, and adjustments to flight tracks, which are primarily within the installation. Although the APZs represent the areas at greatest risk of aircraft mishaps, aircraft may be authorized to operate anywhere within the Class B airspace that encompasses most of the City of San Diego.

Table ES-2. Summary of Annual Operations by Runway

Runway	Departures	Arrivals	CZ	APZ-I	APZ-II
24L	10,466	11,695	Yes	Yes	Yes
24R[1]	38,048	37,660	Yes	Yes	Yes
Helicopter Strip	3,250	3,250	Yes	Yes	No
Pads	**Departures**	**Arrivals**	**CZ**	**APZ-I**	**APZ-II**
1	3,450	3,450	Yes	Yes	No
5	2,354	2,049	Yes	Yes	No
24/06	2,527	1,997	No	No	No

Note: (1) Operations include MV-22 arrivals and departure to pads 24/6 located on Runway 24R/6L.

ES.6 LAND USE COMPATIBILITY

The APZs and noise contours at and above 65 decibel CNEL comprise the AICUZ footprint for MCAS Miramar, the minimum area within which land use controls are recommended to protect the public health, safety, and welfare while preserving the military mission. Figure ES-3 provides the AICUZ 2020 footprint for MCAS Miramar, including the noise contours and APZs.

MCO 11010.16 establishes land uses and associated compatibility for noise and safety zones.

Figure ES-4 provides an analysis of those areas of conditional compatibility and incompatibility within the updated noise contours based upon city general plans and zoning data while Figure ES-5 illustrates those areas within the updated APZs. Compatibility analysis in this study focuses on land uses occurring outside of the MCAS Miramar installation boundary.

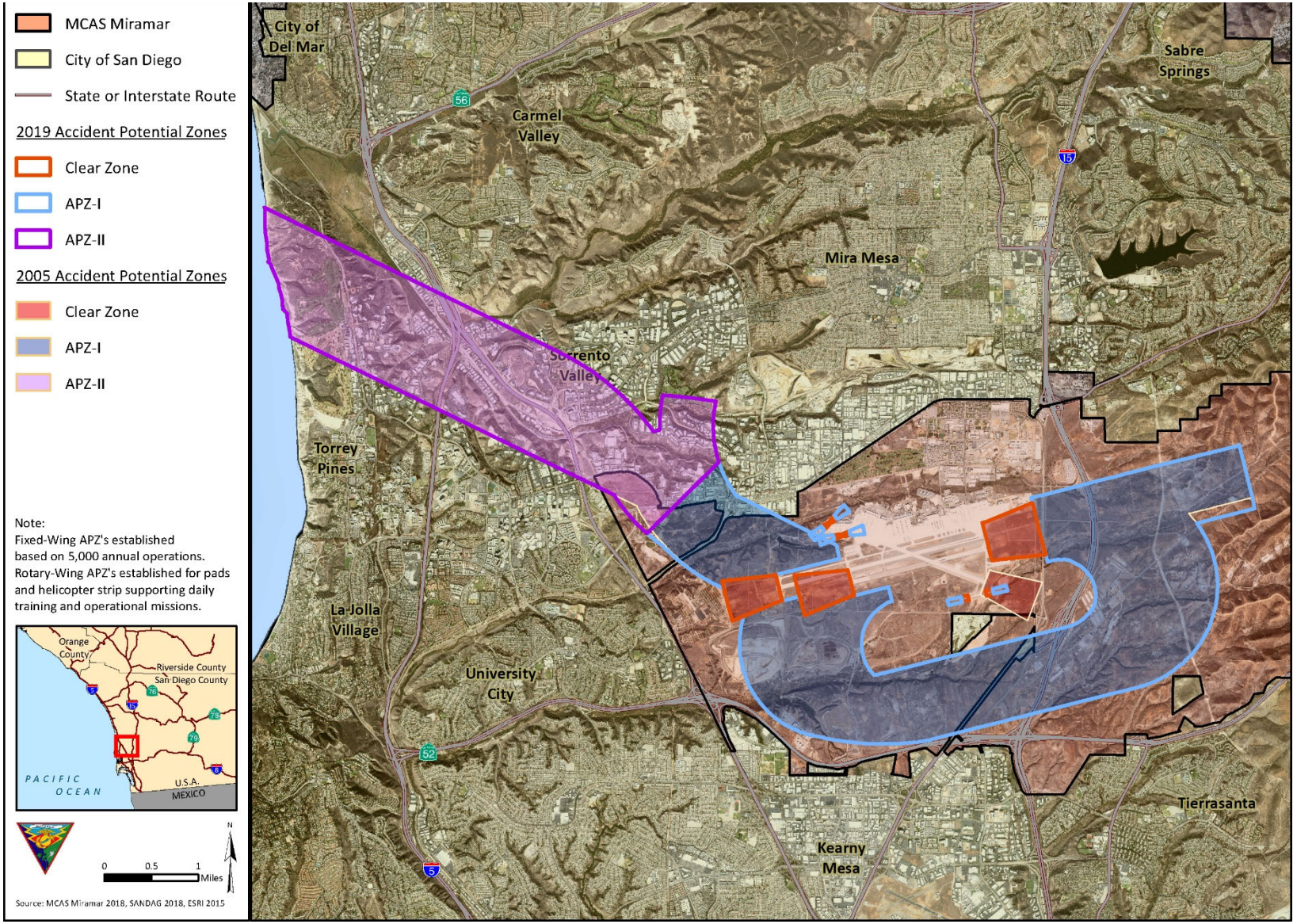

Figure ES-2. Comparison of 2020 APZs with AICUZ 2005 APZs

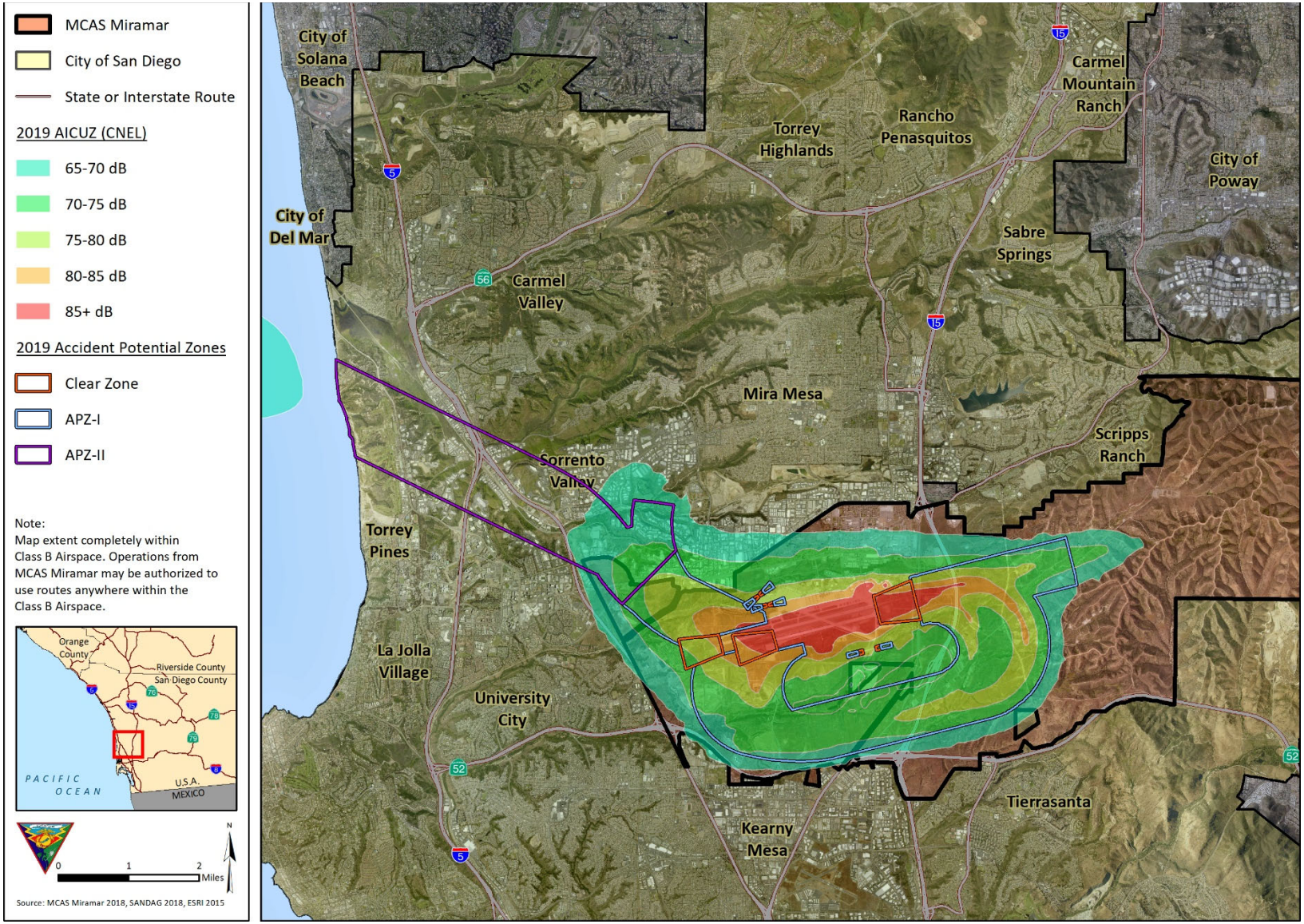

Figure ES-3. MCAS Miramar AICUZ 2020 Footprint

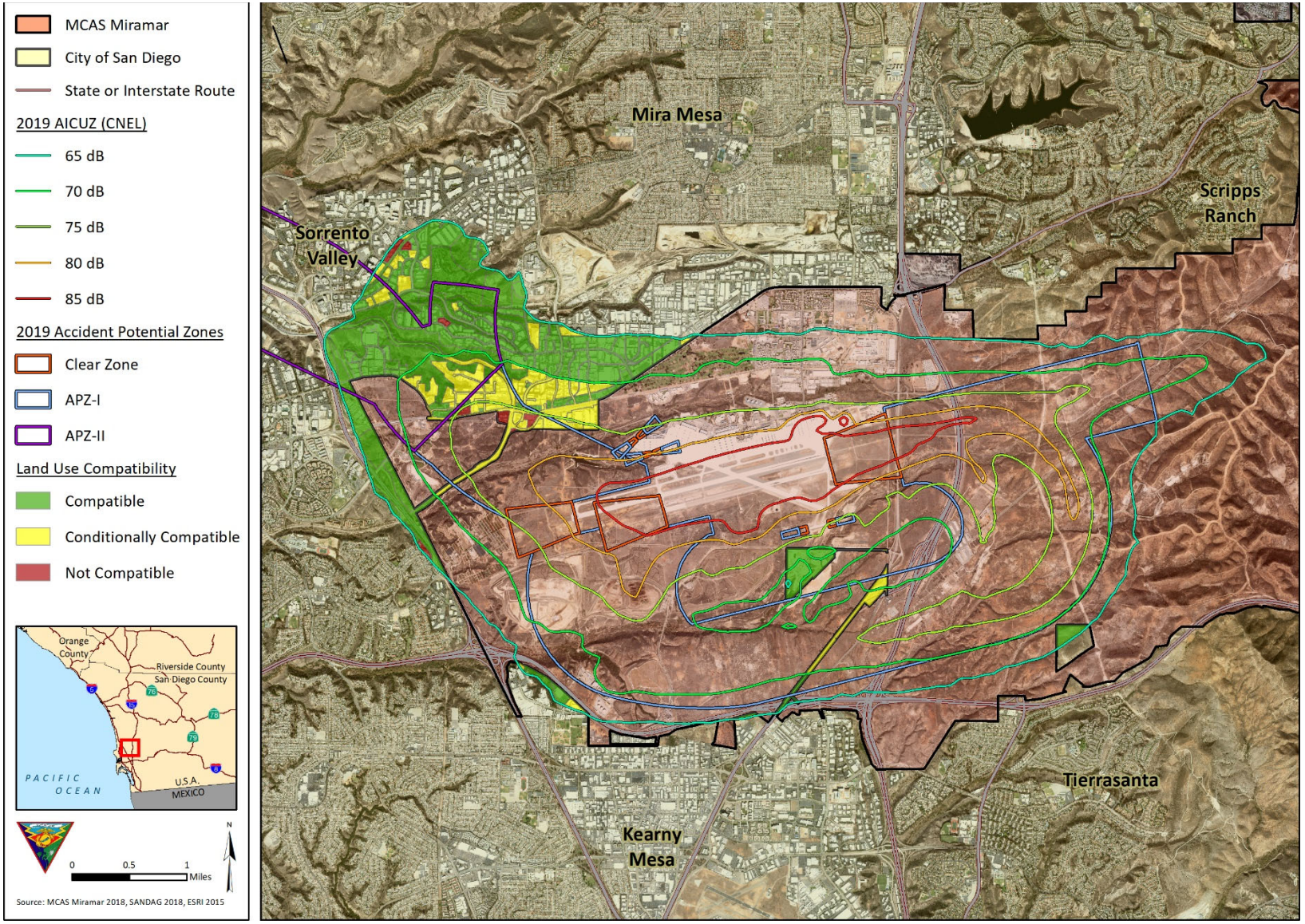

Figure ES-4. 2020 CNEL Noise Contours and Land Use Compatibility Analysis

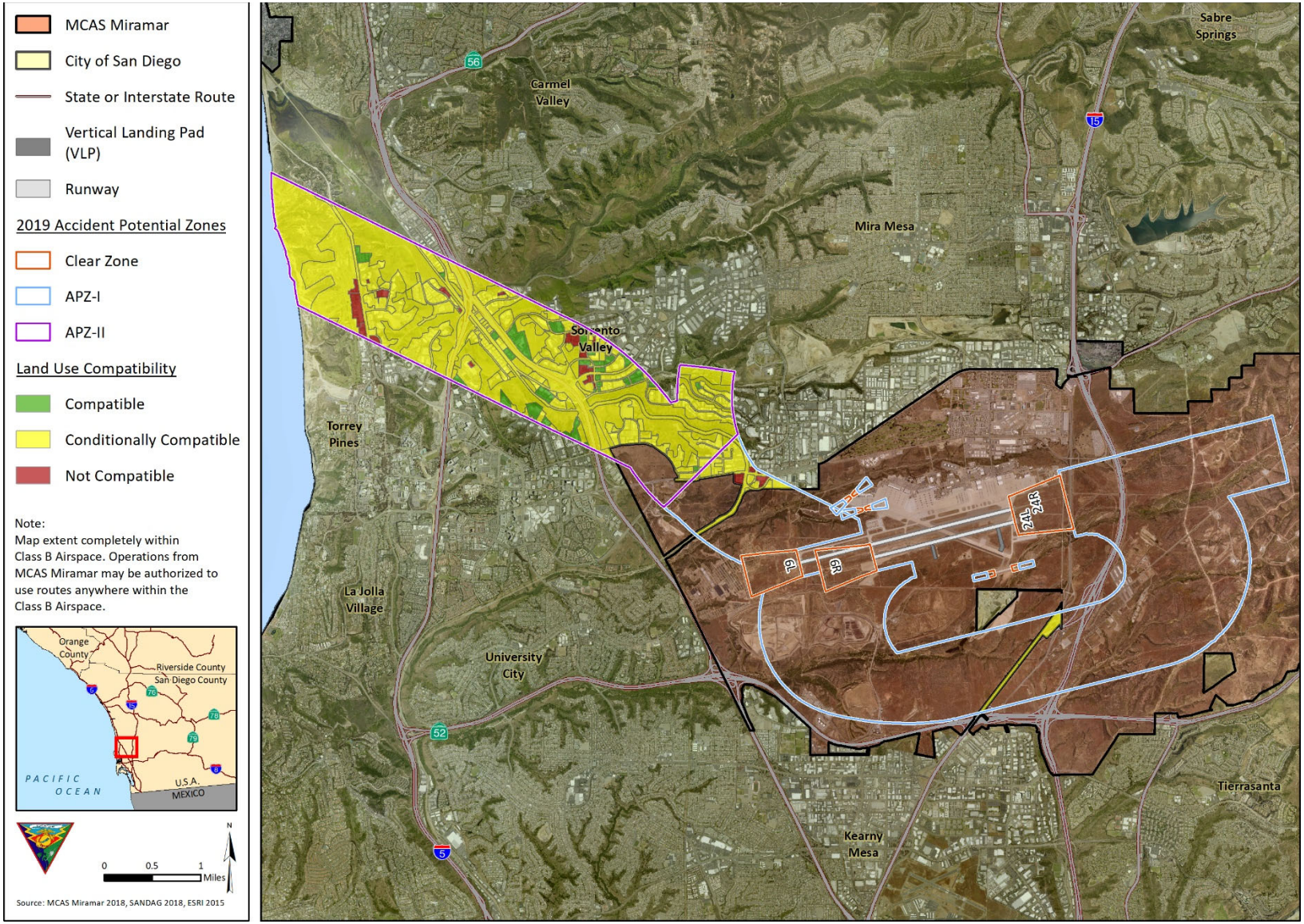

Figure ES-5. 2020 APZs and Land Use Compatibility Analysis

ES.7 RECOMMENDATIONS AND STRATEGIES

This section contains a summary of tools and recommendations that, when implemented, will continue to advance MCAS Miramar's mission. This includes working with community partners to achieve the shared goal stated in MCO 11010.16, "to protect the health, safety, and welfare of those living near military airfields, while preserving the defense flying mission (USMC 2008)."

- **Continue community outreach and engagement –** the MCAS Miramar Community Plans and Liaison Officer (CPLO) will continue to conduct outreach, education, and engagement with local and regional stakeholders, including state legislators and other state agencies, local and regional governments, realtors, developers, citizen groups, and the public.
- **Continue to engage in local planning processes –** the CPLO will continue to be active and engaged with comprehensive and other local planning efforts to ensure compatible land uses within the AICUZ footprint.
- **Actively participate in partnerships –** MCAS Miramar will continue to develop collaborative partnerships to coordinate efforts in managing urban growth, energy, water, transportation, and other cross-jurisdictional and regional issues to consider and mitigate impacts to the military mission.
- **Continue noise inquiry, monitoring, and response system –** MCAS Miramar will continue to record all noise complaints and periodically review them to identify whether there are locational trends in the complaints.

Detailed recommendations, land use tools, and alternative techniques can be found in Chapter 6.

ES.8 APPENDICES

The MCO 11010.16 Compatibility Guidance is provided as reference at the end of AICUZ 2020:

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ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
AIA	Airport Influence Area
AICUZ	Air Installations Compatible Use Zones
ALUC	Airport Land Use Commission
ALUCP	Airport Land Use Compatibility Plan
APZ	accident potential zone
ATC	air traffic control
BASH	bird aircraft strike hazard
CNEL	Community Noise Equivalent Level
CPLO	Community Plans and Liaison Officer
CZ	Clear Zone
dB	decibel
dBA	A-weighted decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DON	Department of the Navy
EIS	Environmental Impact Statement
EMI	electromagnetic interference
FAA	Federal Aviation Administration
FCLP	Field Carrier Landing Practice
ft	feet
I-	Interstate
IFR	Instrument flight rules
LHD	Landing Helicopter Deck
MAG	Marine Aircraft Group
MAW	Marine Aircraft Wing
MCAS	Marine Corps Air Station
MCIWEST	Marine Corps Installations West
MCO	Marine Corps Order
MSL	mean sea level
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
OPNAVINST	Office of the Chief of Naval Operations Instruction
SANDAG	San Diego Association of Governments
SDCRAA	San Diego County Regional Airport Authority
STOVL	short takeoff and vertical landing
UFC	Unified Facilities Criteria
USMC	U.S. Marine Corps
U.S.	United States
VFR	visual flight rules
VLP	vertical landing pad

CHAPTER 1
INTRODUCTION

1.1 AICUZ PROGRAM

The Department of Defense (DoD) initiated the Air Installations Compatible Use Zones (AICUZ) Program in 1973 to assist local governments and communities in identifying and planning for compatible land use and development in the vicinity of military air installations. The goal of this program is to protect the health, safety, and welfare of the public while also protecting military operational capabilities. This goal is accomplished by working to achieve compatible land use around the air installation.

The Department of the Navy (DON) and United States (U.S.) Marine Corps (USMC) AICUZ Program recommends that noise exposure contours, Accident Potential Zones (APZs), height and obstruction requirements, and associated land use recommendations be incorporated into local community planning to the extent possible in order to minimize the impacts to the mission and residents in the surrounding community. Mutual cooperation between the military installation and its neighbors is a key component of the AICUZ Program. As the communities surrounding an airfield grow and develop, the USMC has the responsibility to communicate and collaborate with local governments on land use planning, zoning, and associated mission impacts.

This study, AICUZ 2020, is an update of Marine Corps Air Station (MCAS) Miramar's previous study, AICUZ 2005, and has been prepared to address changes in mission, aircraft, and projected operational levels that are expected to occur by 2032. This planning horizon is somewhat longer than usual in order to reflect the planned complete transition of two major aircraft platforms at MCAS Miramar: transition from the F/A-18 Hornet to the F-35 Lightning II (2020-2032), and transition from the CH-53E to the CH-53K (2025-2029). AICUZ 2020 is prepared in accordance with Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C and Marine Corps Order (MCO) 11010.16 (USMC 2008).

Chapter 1 provides background information on the AICUZ Program, including purpose, scope, and authority. Chapter 2 describes the air installation, its mission, and the economic impact it has on the surrounding community. Chapter 3 discusses current aircraft operations and airspace. Chapter 4 presents prospective aircraft noise exposure contours and changes that have occurred since AICUZ 2005. Chapter 5 discusses airfield safety issues, including APZs and other land use issues that could affect pilot safety. Chapter 6 evaluates the compatibility of surrounding land uses and aircraft operations, and recommendations for promoting land use compatibility consistent with the goals of the AICUZ Program. Finally, Chapter 7 provides a list of references used to prepare this report.

The AICUZ Program was established in 1973 by the DoD in response to growing incompatible development (encroachment) around military airfields. The purpose of the AICUZ Program is to promote compatible development between air installations and neighboring communities by:

- Protecting the health, safety, and welfare of those living and working near military air installations;
- Protecting USMC installation investment by safeguarding the installation's operational capabilities;
- Minimizing noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements on and in the vicinity of the air installation; and

- Informing the public about the AICUZ Program and seeking cooperative efforts to minimize noise and aircraft accident potential, and promote land uses that are compatible with aircraft operations.

APZ maps reflect where most departures, arrivals, and other operations occur on and around MCAS Miramar; APZs do not prescribe or otherwise control where such operations may occur. Aircraft properly operate in other areas of the airspace as directed by or consistent with air traffic control, course rules, and flight safety considerations.

Under the AICUZ Program, the USMC identifies noise zones as a land use planning tool for local planning agencies. The USMC also identifies APZs as a planning tool for local planning agencies. APZs are areas where an aircraft mishap is most likely to occur if it were to occur. Based on USMC nationwide historical records of accidents, aircraft mishaps are more likely to occur in close proximity to an airfield.

The AICUZ footprint of an air station – comprised of noise contours and APZs - defines the minimum acceptable area in which land use control measures are recommended in order to prevent development that is incompatible with airfield operations.

1.2 PURPOSE, SCOPE, AND AUTHORITY

The AICUZ Program recommends land uses that will be compatible with aircraft noise, accident potential, and obstruction clearance criteria associated with military airfield operations. To implement the AICUZ Program at the local level, each USMC air installation is required to prepare and maintain an AICUZ. Each AICUZ is prepared as a planning resource for local planners, developers, governments, and other interested parties to help them anticipate, identify, and implement appropriate land use regulations and other actions to prevent development that is incompatible with airfield operations.

The scope of the AICUZ includes a detailed analysis of the following:

- annual aircraft operations
- aircraft noise and accident potential
- land use compatibility
- strategies or recommendations to address existing and potential incompatible development in the vicinity of the air installation

Successful implementation of the AICUZ recommendations requires the active involvement of the installation in the surrounding community, and the cooperation of local, state, federal, and community leaders to encourage compatible development adjacent to the military airfield.

The authority for the establishment and implementation of the MCAS Miramar AICUZ Program is derived from the following:

- DoD Instruction 4165.57, *Air Installations Compatible Use Zones*, May 2, 2011
- OPNAVINST 11010.36C and MCO 1010.16, *Air Installations Compatible Use Zones Program*, October 9, 2008
- Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design*, November 17, 2008
- Naval Facilities Engineering Command (NAVFAC) P-80.3, *Facilities Planning Factor Criteria for DON and USMC Shore Installations: Airfield Safety Clearances*, January 1982
- U.S. Department of Transportation, Federal Aviation Administration (FAA) Regulations, Code of Federal Regulations, Title 14, Part 77, *Objects Affecting Navigable Airspace*

- UFC 4-420-01, *Ammunition and Explosives Storage Magazines*, May 1, 2015

1.3 RESPONSIBILITY FOR COMPATIBLE LAND USE

Military bases are often critical to state and local economies, generating thousands of jobs and millions of dollars in economic activity for cities, counties, and states in which they are located. Despite these benefits, military installations are under increasing pressure to modify operations, relocate, or even close due to encroachment and perceived noise- and safety-related impacts. Preserving the operational mission and economic benefits of the installation, preventing encroachment, and implementing the AICUZ Program at the local level is the shared responsibility of many, including the USMC, local governments, private citizens, real estate professionals, and land use developers. Military installations and local government agencies with planning and zoning authority, in particular, share the responsibility for preserving land use compatibility near the military installation. However, cooperative action by all parties is essential to prevent land use incompatibility, implement the AICUZ recommendations, protect public health and safety, and safeguard the military flying mission. Control of land use outside the air installation, which is critical to limiting the number of people exposed to excessive noise and the potential for accidents, is under the exclusive control of state and local governments. Local military commands act only in an informational role for land use recommendations outside of the installation boundary and hold no jurisdiction over non-military property, except in instances where federal easements have been acquired.

The FAA and USMC also encourage local communities to restrict development or land uses that could endanger aircraft in the vicinity of the airfield, including the following as appropriate:

- Lighting (direct or reflected) that would impair pilot vision;
- Towers, tall structures, and vegetation that could penetrate navigable airspace or are planned for construction near the airfield;
- Uses that would generate smoke, steam, or dust;
- Uses that would attract birds, especially waterfowl; and
- Electromagnetic interference with aircraft communications, navigation, or other electrical systems.

Table 1-1 identifies some of the responsibilities of various community stakeholders.

Table 1-1. Responsibility for Compatible Land Use

USMC	• Periodically examine air mission for operational changes that could reduce impacts • Conduct noise and APZ studies as appropriate • Develop AICUZ map • Update AICUZ studies, as required • Examine local land uses and growth trends • Make land use recommendations • Release AICUZ to the public • Work with local governments and private citizens • Monitor operations and noise complaints
FAA	• Apply regulations at 14 Code of Federal Regulations Part 77 to prevent hazards to aviation presented by airspace obstructions or interference with communications

Table 1-1. Responsibility for Compatible Land Use	
Local Government	• Incorporate AICUZ recommendations into comprehensive development plans and municipal zoning ordinances • Coordinate planning reviews with military ad hoc members
Private Citizens	• Become familiar with the installation's AICUZ Program • Identify AICUZ considerations in all property transactions • Understand AICUZ effects and military operational impacts before buying, renting, leasing, or developing property
Real Estate Professionals	• Ensure potential buyers and lessees receive and understand AICUZ information on affected properties • When working with builders/developers, ensure an understanding and evaluation of the installation's AICUZ Program • As required under state and local laws, ensure residential real estate transactions disclose that the property is located within the MCAS Miramar Airport Influence Area
Developers	• Develop properties in a manner that appropriately protects the health, safety, and welfare of the community by considering and promoting facilities that are compatible with aircraft operations (e.g., sound attenuation, densities, and occupations)

MCAS Miramar works with state, county, and local planning officials, as appropriate, to encourage any pertinent local community implementation of AICUZ recommendations and strives to educate and inform the local civilian community of the mutual benefits of compatible land use.

1.4 PREVIOUS AICUZ EFFORTS AND RELATED STUDIES

Naval Air Station (NAS) Miramar AICUZ 1992

AICUZ 1992 provided an update to the first AICUZ that was prepared for NAS Miramar in 1976. Between 1976 and this update, the aircraft mix at the installation changed to introduce the F-14A and F-16 and phased out the F-4 and the F-8. The study also captured changes in the operational tempo, flight patterns, and procedures that accompanied these new aircraft. Operational changes included a wider aircraft distribution across the Lakee departure corridor, the closure of Runway 10, the use of Runway 28 for emergencies only, and the updated flight tracks in the Field Carrier Landing Practice pattern. AICUZ 1992 noted that aircraft noise remained a primary concern for the communities surrounding the installation, even though the noise footprint was slightly smaller than had been for AICUZ 1976 (NAVFAC Southwest 1992).

MCAS Miramar AICUZ Update March 2005

The most recent AICUZ update, AICUZ 2005, was approved in 2005 subsequent to the migration of USMC aviation units to Miramar from Orange County, California as directed by the Defense Base Closure and Realignment Commission. In 1996, an Environmental Impact Statement (EIS) was prepared addressing the realignment of NAS Miramar into MCAS Miramar and analyzing the co-location of fixed- and rotary-wing aircraft at the installation. A lawsuit was filed in U.S. district court in 1997 that challenged the adequacy of the EIS, and AICUZ 2005 was required as part of the settlement agreement to this lawsuit. AICUZ 2005 addressed changes to the aircraft types and operational procedures that had occurred since AICUZ 1992 was published, including the addition of helicopters, the transition to F/A-18 aircraft from F-14 aircraft, and the presence of a refueling cargo squadron to support the I Marine Expeditionary Force at the installation (USMC 2005).

MV-22 West Coast Home-Basing EIS 2009

The 2009 MV-22 West Coast Home-Basing EIS included the basing of up to 10 squadrons (120 aircraft) of MV-22s on the West Coast that will conduct MV-22 readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the MV-22. The proposed action replaced nine helicopter squadrons (114 aircraft) then-authorized for basing on the West Coast with the following basing alternatives:

1. full basing alternative at MCAS Miramar
2. partial basing split between MCAS Miramar and MCAS Camp Pendleton
3. partial basing split between MCAS Yuma and MCAS Camp Pendleton
4. partial basing at MCAS Miramar and MCAS Yuma

The Record of Decision signed later that year selected the Preferred Alternative that entails basing eight MV-22 squadrons at MCAS Miramar and two MV-22 squadrons at MCAS Camp Pendleton (USMC 2009).

F-35B West Coast Operational and Training Basing EIS 2010

The 2010 F-35B West Coast Operational and Training Basing EIS considered the basing of 11 operational F-35B Joint Strike Fighter squadrons (up to 16 aircraft per squadron, for a total of 176 aircraft), and 1 F-35B Operational Test and Evaluation squadron (8 aircraft) on the West Coast of the U.S. (DON 2010a). The alternatives included various split basing options across MCAS Yuma and MCAS Miramar. Ultimately, the DON selected to implement Alternative 1 (DON 2010b), the Preferred Alternative, which includes basing six F-35B operational squadrons at MCAS Miramar, and five operational squadrons plus one Operational Test and Evaluation squadron at MCAS Yuma in Arizona. Each operational squadron will consist of up to 16 F-35B aircraft.

The F-35B/C aircraft will replace 126 legacy F/A-18A/B/C/D Hornet and 56 AV-8B Harrier aircraft in the 3rd and 4th Marine Aircraft Wing (MAW).

1.5 CHANGES THAT REQUIRE AN AICUZ UPDATE

The projections for AICUZ 2020 were developed through interviews with the air operations manager and representatives of the based squadrons at MCAS Miramar. The interviews were designed to capture current aircraft operations, as well as any potential future operations that may occur by the 2032 target date. This information was used in conjunction with the 2018 USMC Aviation Plan to develop the 2032 projections.

1.5.1 Change in Operations Levels, Aircraft Mix, Flight Tracks, and Procedures

Subsequent to AICUZ 2005, the following changes have occurred to aircraft stationed at MCAS Miramar:

- retirement of the CH-46E
- stand-up of the MV-22B
- KC-130 variant now uses the "J" model

Additional changes in process anticipated to be completed by 2032 include the planned transition from FA-18C/D to the F-35B (DON 2010a).

Since the publication of the F-35B EIS in 2010 and after F-35B aircraft have begun to operate at other airfields, the following changes to the original 2010 EIS assumptions have been identified and addressed in AICUZ 2020:

- F-35B utilizes afterburner less frequently on departure (afterburner versus non-afterburner power ratio changed)
- F-35B landing types usage rates (conventional, slow landing, rolling vertical landing, and vertical landing)
- number of F-35B patterns operations
- location of vertical landing pads (VLPs)
- USMC purchase of the F-35C and basing up to two 10-aircraft F-35C squadrons in lieu of two F-35B squadrons at MCAS Miramar

To determine the combined effect of these changes, MCAS Miramar completed a noise study in 2019, which computed updated Community Noise Equivalent Level (CNEL) contours for the 2032 projected conditions. AICUZ 2020 incorporates the relevant results from the 2019 noise study.

1.5.2 Changing Population

The San Diego region has continued to experience rapid population growth since the AICUZ 2005 was published. The regional planning agency, San Diego Association of Governments (SANDAG), projects that between 2013 and 2050 the population of the region will grow by nearly one million people (SANDAG 2018b). As part of this growth, SANDAG anticipates there will be an intensification of existing land uses within urbanized areas, especially along key transportation corridors, including Interstate (I-) 805 and I-15, which border MCAS Miramar.

1.5.3 Updated Land Use within the Noise Zones and APZs

MCAS Miramar is located in a densely populated area of San Diego, especially along the northern, western, and southern borders of the installation. The area currently supports a number of land uses, including commercial, industrial, and residential uses directly to the north and west of the installation. Increasing residential land use is projected in the future, particularly to the east of the installation, which is largely undeveloped. Additionally, the San Diego region has a very complex airspace environment, which is described in Section 3.2, *Airspace Description*, which adds to the complexity of identifying what land uses are impacted by military versus other types of overflights.

CHAPTER 2
INSTALLATION

2.1 LOCATION AND HISTORY

Photo 1. MCAS Miramar Gate Sign

MCAS Miramar is a proud member of the San Diego community with a workforce of over 12,000 service members and civilians (SANDAG 2018a). The station is located approximately 11 miles north of downtown San Diego and 4 miles east of the Pacific Ocean. The MCAS Miramar property is about 12 miles long from east to west and about 4 miles long from north to south – encompassing 23,065 acres. State Route 52 and I-805 form the installation's southern and western boundaries. I-15, State Route 163, and Kearny Villa Road bisect the Station into east and west. The western portion (the Main Station/West Miramar) supports the military need for commercial, administrative, operational, and residential facilities. The eastern portion (East Miramar) is primarily undeveloped and is used for military training and operational exercises, warehousing, and supports the need for encroachment buffering and access control.

MCAS Miramar operates a secure Class B airfield and maintains installation facilities, equipment and properties in support of tenant organizations and external units. Developed areas within MCAS Miramar cover about 4,088 acres and include aircraft operation and maintenance facilities, administrative and residential buildings, storage and supply facilities, recreation areas, and civilian out-leases. Undeveloped land makes up the remainder of the area within MCAS Miramar. Most of these lands remain undeveloped to support the need for encroachment buffering and access control by segregating land uses that may be incompatible because of noise levels and safety considerations. Undeveloped lands within MCAS Miramar form one of the largest parcels of contiguous natural area in the rapidly developing San Diego area.

Communities adjacent or in close proximity include Mira Mesa, Scripps Ranch, and the City of Poway to the north; Clairemont Mesa, Kearny Mesa, and Tierrasanta to the south; the City of Santee to the east; and Sorrento Valley and University City to the northwest and west. Figure 2-1 presents the location of MCAS Miramar in the greater San Diego region.

Military use of the property began during World War I, when a U.S. Army infantry training center called Camp Kearny was established on the location of present day MCAS Miramar. In 1917, the Army leased about 8,000 acres for Camp Kearny and added another 5,000 acres for training activities. Approximately 5,000 men and 20,000 horses and mules were housed at Camp Kearny. An estimated 1,262 buildings were constructed over a five-year period, most of which were demolished when Camp Kearny closed in 1922. By the time the war ended, the strategic importance of aviation for the military and Miramar area as an aircraft launching site was secured. Between the two World Wars, the property was operated briefly as a dirigible base, and was known as Army Infantry Training Center Camp Kearny.

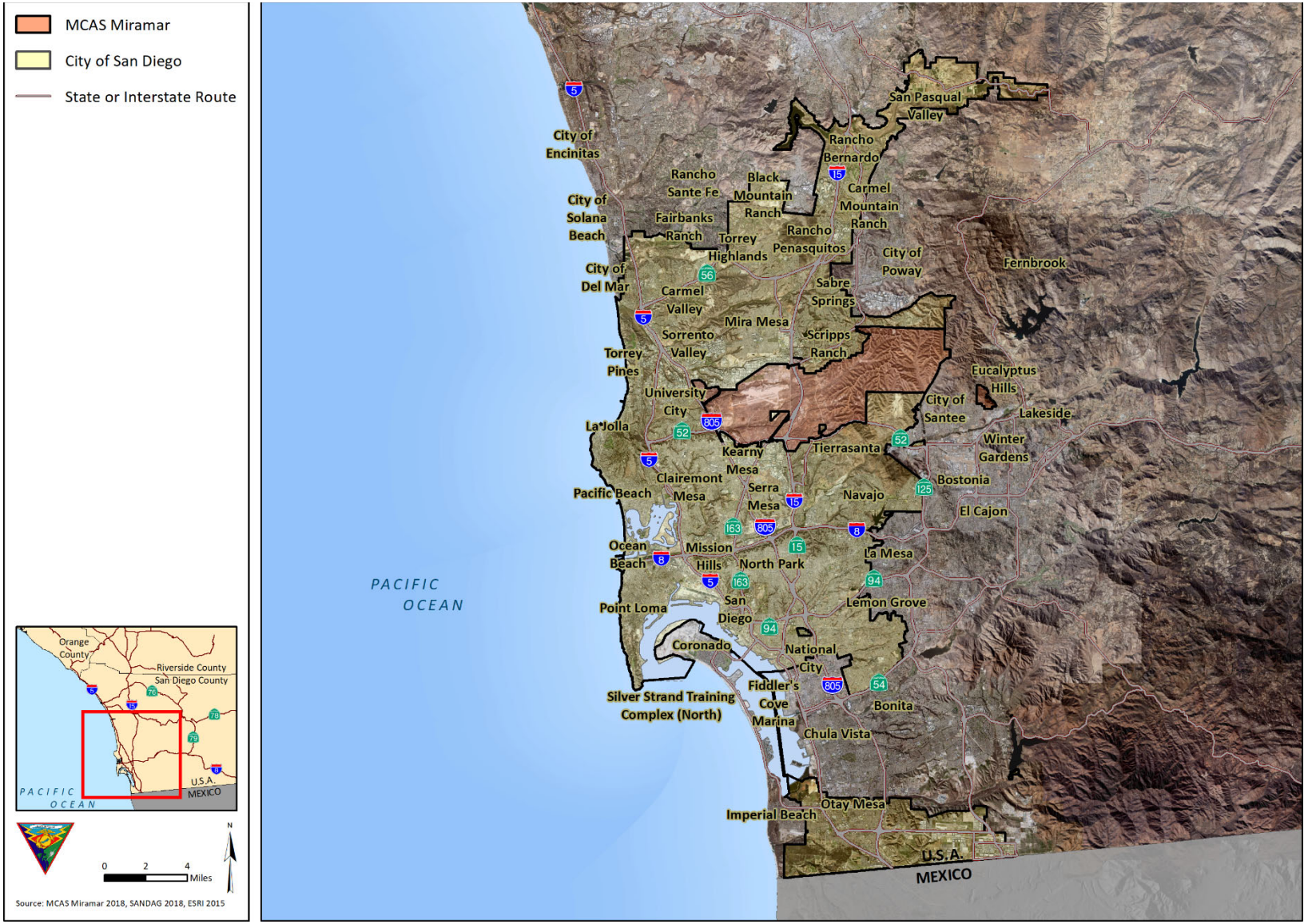

Figure 2-1. MCAS Regional Location

The primary flying tenant command is the 3rd MAW, originally commissioned on the 167th anniversary of the USMC, November 10, 1942, at MCAS Cherry Point, North Carolina. The Wing's combat history began with multiple World War II deployments followed by support actions in Hawaii from 1944 until a year later when the Japanese surrendered. The 3rd MAW was decommissioned shortly thereafter and reactivated at Cherry Point to support the Korea War. In 1955, the Wing relocated to MCAS El Toro, California and was rebuilt with the addition of Marine Aircraft Group (MAG)-15, followed by MAG-36. Wing squadrons were detached and deployed to Vietnam as combat action in Southeast Asia intensified. At the end of the Vietnam War, several units were brought back to the U.S. and deactivated or re-designated, creating the 3rd MAW of today.

2.2 MISSION

The 3rd MAW's mission is to provide combat ready expeditionary aviation forces capable of short notice worldwide deployment to Marine Air Ground Task Force, fleet, and unified commanders. The Wing is comprised of Marines, Sailors and civilians with a focus to make the combat organization greater than the sum of its individual parts.

Marines and Sailors from the 3rd MAW continue to deploy throughout the world in support of the United States' contingency operations. MCAS Miramar's strategic location and mission are essential elements in the preparation of these young Marines and Sailors for combat. MCAS Miramar is located in the center of a constellation of Marine and DoD installations and ranges in the southwestern U.S., as depicted in Figure 2-2. This ideal location allows for unimpeded access to the training needed to succeed in combat. The Marines pride themselves on being ready when the nation needs them, their ability to train, and the lethality of the Marine Air Ground Task Force's air combat power. These abilities must never be compromised (USMC 2018).

2.3 INSTALLATION ACTIVITIES

2.3.1 Aircraft Types

MCAS Miramar currently operates based CH-53E, MV-22B, KC-130J, and F/A-18 aircraft generating the majority of the flight activity at the airfield. The F/A-18 will be replaced by F-35B/C and the CH-53E will be replaced by CH-53K.

The F-35 comprises a family of single-seat, single-engine, and all-weather stealth multirole fighters. Designed to perform ground-attack and air-superiority missions, the 5th generation combat aircraft includes three main models:

- the F-35A conventional takeoff and landing variant (not used at MCAS Miramar)
- the F-35B short takeoff and vertical landing (STOVL) variant
- the F-35C carrier-based catapult-assisted takeoff but arrested recovery variant

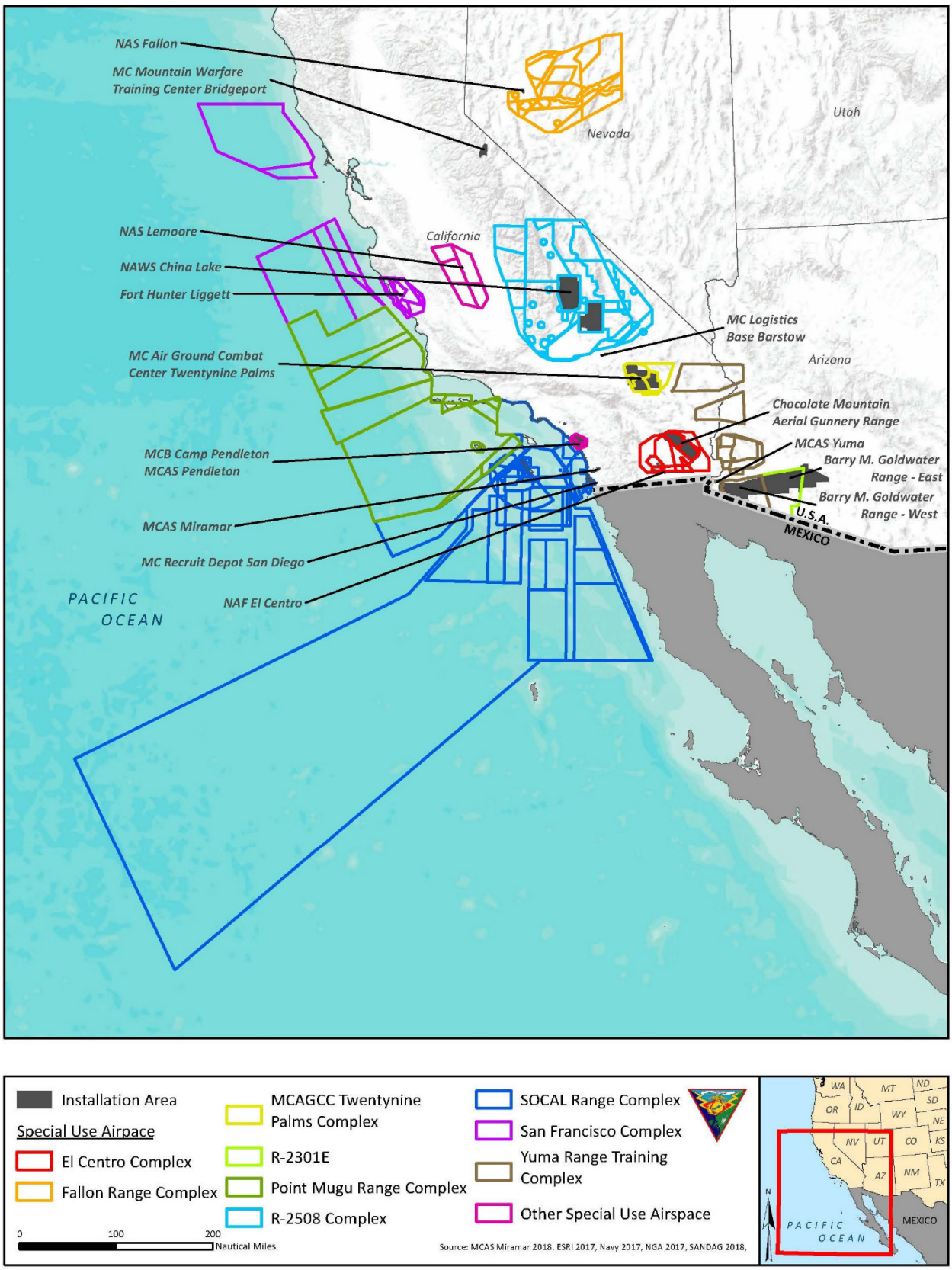

Figure 2-2. Southwestern Regional Range Complex

The F-35B STOVL variant is the world's first supersonic STOVL stealth aircraft designed to operate from austere bases and air-capable ships near front-line combat zones. It can also take off and land conventionally from longer runways on major bases made possible through the shaft-driven lift fan propulsion system and an engine that can swivel 90 degrees when in short takeoff/vertical landing mode. The USMC's first F-35B squadron reached initial operational capability in 2015. F-35B aircraft have been delivered to the USMC at MCAS Beaufort, South Carolina and MCAS Yuma, Arizona with one squadron transferred to MCAS Iwakuni, Japan. USMC plans to bring four squadrons of F-35B to MCAS Miramar by 2032.

Photo 2. The F-35B Short Takeoff and Vertical Landing Variant

The F-35C carrier variant is the world's only 5th Generation, long-range stealth strike fighter designed and built explicitly for carrier operations. The F-35C has larger wings and more robust landing gear than the other variants, making it suitable for catapult launches and fly-in arrestments aboard naval aircraft carriers. Its wingtips also fold to allow for more room on the carrier's deck while deployed. The U.S. Navy is the largest customer receiving F-35Cs, with the USMC also planning to acquire the carrier variant. The USMC plans to add two squadrons of F-35C aircraft at MCAS Miramar in the next few years. Aircraft carriers remain at the forefront of U.S. military power, and the backbone of any carrier strike group is the aircraft it brings to the fight.

Photo 3. The F-35C Carrier Variant

The KC-130J operated by the USMC, is an extended range aerial refueling tanker based upon the C-130 Hercules transport aircraft design. It employs four turboprop engines with a range of over 4,000 nautical miles. The two wing-mounted hose and drogue refueling pods each transfer up to 300 gallons per minute to two aircraft simultaneously allowing for rapid cycle times of multiple-receiver aircraft formations (a typical tanker formation of four aircraft in less than 30 minutes). The KC-130J can offload nearly 60,000 pounds of fuel, when external tanks are employed, and can provide for the rapid ground refueling of helicopters, vehicles and fuel caches at over 4,000 pounds per minute.

Photo 4. The KC-130J

The CH-53 is the most powerful helicopter in the DoD. The CH-53K is a new-build helicopter, the USMC's heavy lift replacement for the CH-53E, that will expand the fleet's ability to move increasing amounts of material more rapidly throughout the area of responsibility using proven and mature technologies. Designed to lift 27,000 pounds at a mission radius of 110 nautical miles, in high or hot environments, the CH-53K is designed to provide triple the baseline CH-53E lift capability with an equivalent logistics shipboard footprint, lower operating costs per aircraft, and reducing direct maintenance man hours per flight hour. The USMC plans to begin MCAS Miramar's transition from the CH-53E to the CH-53Ks in 2025.

Photo 5. The CH-35K

The MV-22B Osprey is the USMC version of the joint service multirole combat aircraft utilizing tilt-rotor technology to combine the vertical performance and maneuverability of a helicopter with the speed and range of a fixed-wing turboprop aircraft able to carry 24 Marine combat troops twice as fast and five times farther than previous helicopters. With its rotors in vertical position, it can take off, land, and hover like a helicopter. Once airborne, it can convert to a turboprop airplane capable of high-speed, high-altitude flight. This combination results in global reach capabilities that allow the MV-22 to fill an operational niche unlike any other aircraft.

Photo 6. The MV-22B Osprey

The C-12 Huron is a military variant of the Beechcraft Super King Air twin-engine turboprop aircraft. The DON designated it the UC-12B for logistics support between DON and USMC stations for operation support airlift. The aircraft cabin can accommodate cargo, passengers, or both.

The UC-35 is the military variant of the Cessna Citation V twin-engine turboprop aircraft. The UC-35A is a medium range executive and priority cargo jet aircraft that replaces older and more expensive C-12s and can carry up to eight passengers. The UC-35A possesses similar landing characteristics of a C-12 and is able to take off and land at most military airfields, many of which are in remote areas not served directly by civilian airline services.

Photo 8. The UC-35

The F/A-18 aircraft is a multirole combat jet employing twin-engines capable of supersonic, all-weather flight and carrier operation. The aircraft is designated as both a fighter and attack aircraft. The USMC operates legacy F/A-18C and F/A-18D Hornets; unlike the U.S. Navy, the USMC did not acquire the more advanced F/A-18E or F/A-18F Super Hornets. The USMC plans to replace the F/A-18C and F/A-18D legacy Hornets at Miramar with the F-35B and F-35C. The F/A-18E single-seat and F/A-18F tandem-seat Super Hornets are larger and more advanced derivatives of the F/A-18C, and D legacy Hornet operated by the Navy. USMC plans to begin replacing the current F/A-18 squadrons with F-35 squadrons in 2020 and that transition is scheduled to continue through 2032.

Photo 9. The F/A-18 Aircraft

2.3.2 Installation Loading

AICUZ 2020 is based on projected installation loading in 2032, which will be after MAG-11 has completed transition from the F/A-18 Hornet to four squadrons of F-35B and two squadrons of F-35C. Other resident aircraft will include those assigned to the 3rd MAW, such as the MV-22B and CH-53E. The CH-53E will be replaced by the CH-53K variant by 2032. The noise analysis also included transient aircraft from throughout the USMC and other military services that have historically utilized MCAS Miramar.

2.4 ECONOMIC IMPACTS

MCAS Miramar provides constant contributions to the local and regional economy throughout the year and is not influenced by seasonal fluctuations like private industries. In 2015, MCAS Miramar had an estimated

annual economic impact of nearly $650 million (Western Regional Partnership 2016). These contributions occur in the forms of military construction, contract services, civilian employment, and local spending by military employees and base visitors. Marine Corps Installations West (MCIWEST) estimates that for each $1 million in defense spending, an additional 12.1 jobs are supported through direct employment or its ripple effect throughout the region. Contracts for construction are predominantly awarded to local construction firms with goals established for small businesses relying in turn on local skilled labor. In fiscal year 2018, the National Defense Authorization Act authorized almost $48 million for military construction projects for MCAS Miramar (National Defense Authorization Act 2018).

Major events, such as the world famous Miramar Air Show, have a significant impact on the local economy enhancing the "tourist destination" profile of the region. In addition, many families plan their vacations to the area around their Marine's graduation from recruit training at the USMC Recruit Depot in San Diego (MCIWEST 2017).

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CHAPTER 3
AIRCRAFT OPERATIONS

This chapter discusses aircraft types, a number of operations, including projected operations for calendar year 2032, and flight tracks for MCAS Miramar. Projected MCAS Miramar operations are dominated by six F-35B/C squadrons and six MV-22B squadrons accounting for 36 and 33 percent, respectively of total Station operations. Four based squadrons of CH-53K and one squadron of KC-130J also contribute to the projected regular operational environment. Transient aircraft (from other installations) have some impact primarily composed of fighter and rotary-wing aircraft comprising approximately 12 percent of MCAS Miramar flight operations.

Aircraft operations constitute the primary source of noise associated with the installation. The level of noise exposure is related to a number of variables including, aircraft types, aircraft operations, flight tracks, aircraft profiles (power, airspeed, altitude), time of day, engine maintenance (number and duration of engine run-ups), and temperature, humidity, and wind conditions.

These variables, as they relate to MCAS Miramar, are discussed below.

3.1 AIRFIELD DESCRIPTION

MCAS Miramar (Joe Foss Field) has a field elevation of 477 feet (ft) above mean sea level (MSL). MCAS Miramar includes two Class B parallel bi-directional runways used almost exclusively in their westerly flow direction. A bi-directional runway consists of a single physical paved surface supporting operation in either directions. Each of the operational directions have unique names are considered separate entities. The longer of the two bi-directional runways, Runway 24R/6L, located on the north, spans 12,000 ft in length while the southern runway, Runway 24L/6R, spans 8,001 ft.

MCAS Miramar also includes three helicopter pads located north of the main runways used primarily by helicopters and two to the south, as shown in Figure 3-1. Helicopters and the MV-22 tilt-rotor also operate at the 1,000 ft long Landing Helicopter Deck (LHD), published as the "Helicopter Strip (LHD)" by the FAA, located south of the primary runways. The F-35B performs vertical landing arrivals to the VLPs (East VLP and West VLP), located approximately 500 ft south of Runway 24L/6R. MCAS Miramar supports both visual flight rules (VFR) and instrument flight rules (IFR) flight activity.

3.2 AIRSPACE DESCRIPTION

MCAS Miramar operates within the congested airspace of the County of San Diego where military aircraft must navigate between general aviation traffic from nearby Montgomery Field and commercial aircraft going into and out of San Diego International Airport. Figure 3-2 provides a diagram of the major flight corridors associated with MCAS Miramar in a regional context. MCAS Miramar jet aircraft frequently utilize the over-water training ranges by way of the Seawolf corridor, which often requires a "holddown" to avoid conflict with general aviation or commercial traffic transiting north or south along the coast.

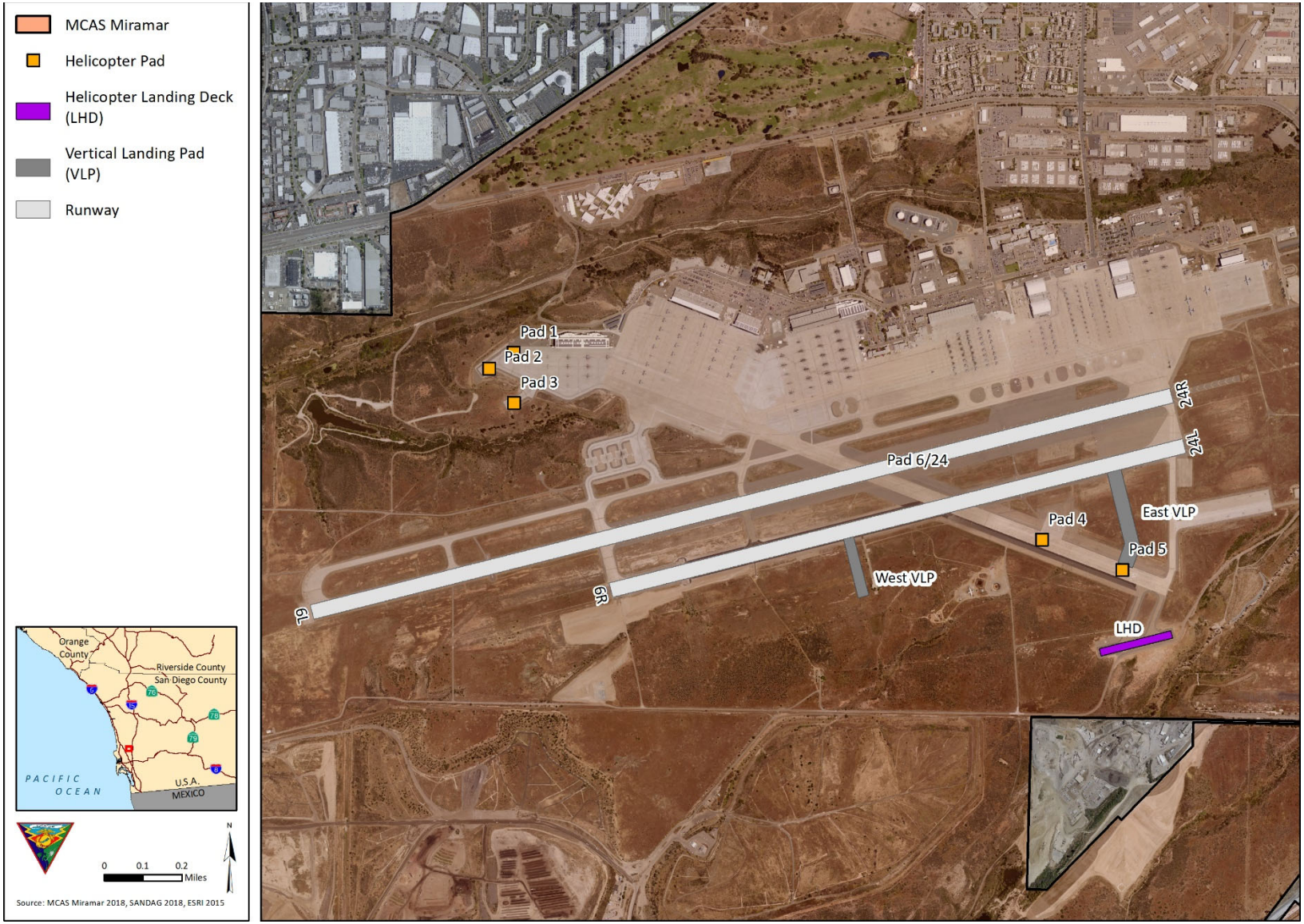


Figure 3-1. MCAS Miramar Runway Orientation and Pad Locations

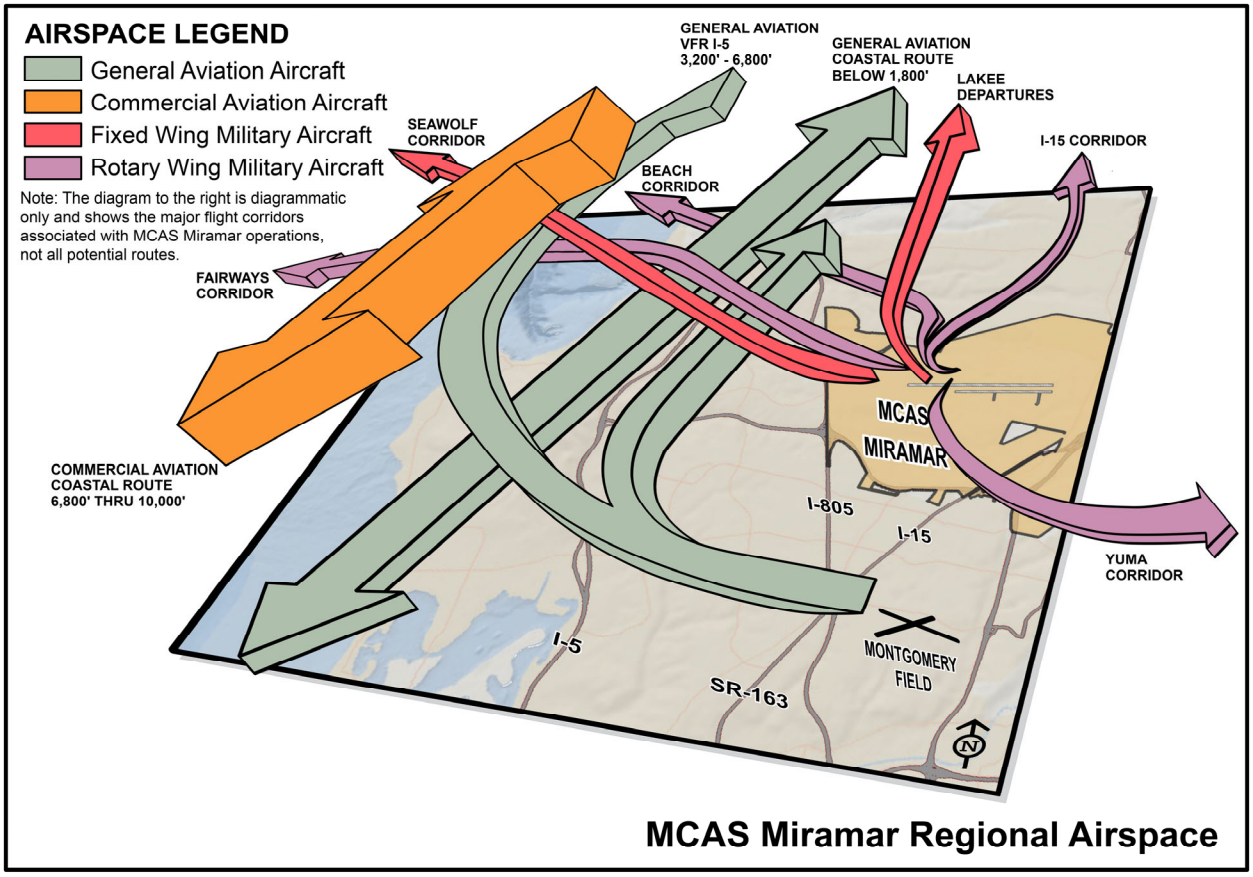


Figure 3-2. Regional Airspace Illustration

Airports within the southern California region nearby MCAS Miramar, as depicted in Figure 3-3 include:

- San Diego International Airport
- Montgomery-Gibbs Executive Airport
- NAS North Island
- NOLF Imperial Beach
- Gillespie Field
- Brown Field Municipal
- Ramona Airport
- Palomar Airport

MCAS Miramar is located entirely within the boundaries of the Class B airspace, as shown in Figure 3-3. Class B airspace is individually tailored for each of the busiest airports and requires all aircraft operating in the area to obtain air traffic control (ATC) clearance. The outer Class B boundary, controlled by San Diego International Airport, covers nearly all of the area in Figure 3-3 extending up to 10,000 ft MSL as well as a series of shelves of airspace for the Class B floors stepping down closer to the airport.

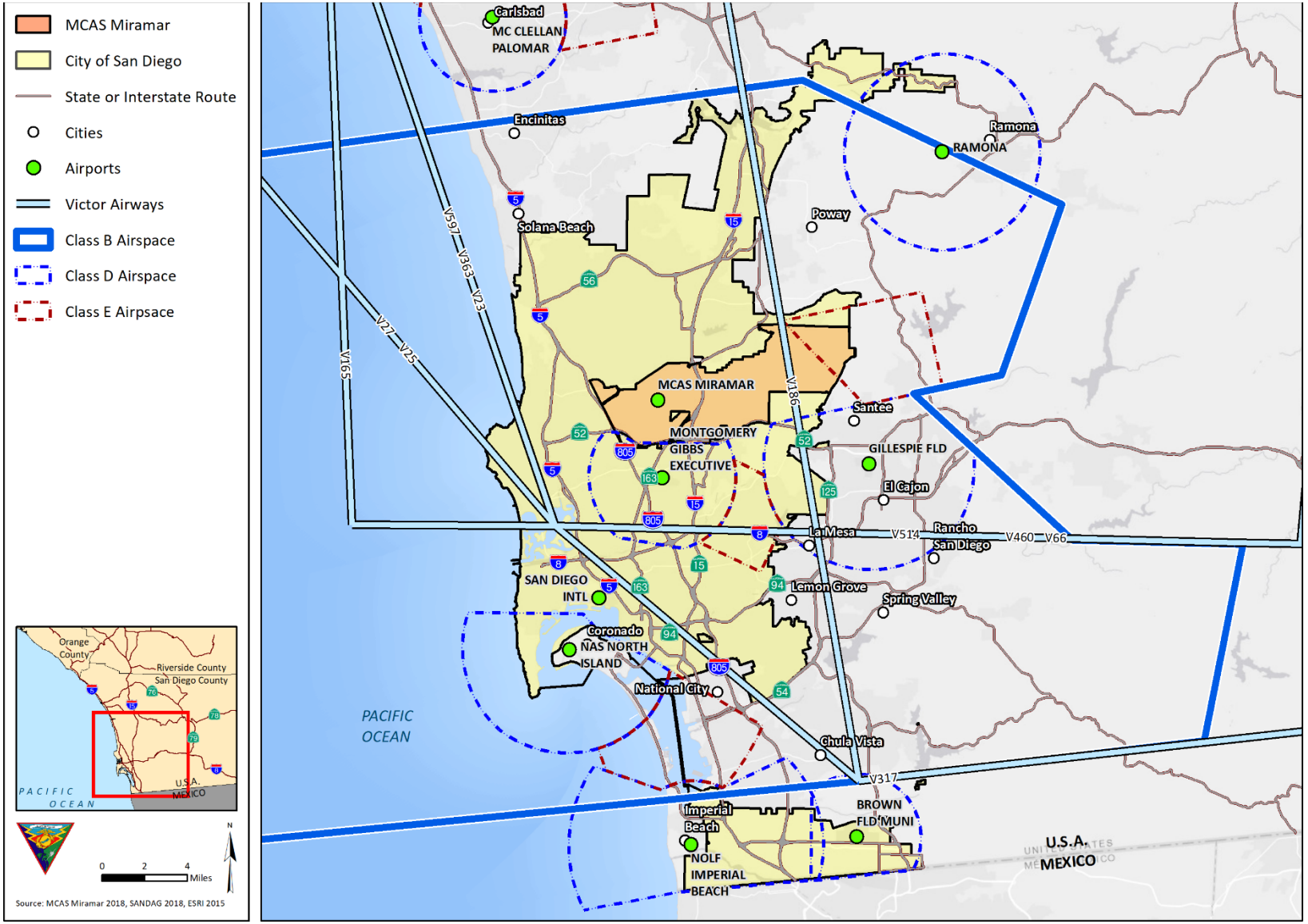


Figure 3-3. Local Airspace around MCAS Miramar

Montgomery-Gibbs Executive Airport and Gillespie Field are each surrounded by Class D airspace that abuts the MCAS Miramar southern boundary and southeast, respectively. Class D airspace is typically established at airports with a control tower and without scheduled commercial passenger service, which requires aircraft to maintain two-way communication with ATC prior to entering.

Various Victor Airways in the region provide straight line routes between navigation stations for air traffic to transit through the airspace. As shown in Figure 3-3, Victor Airways route air traffic into and out of the greater San Diego area and apply to flight below 18,000 ft MSL generally down to 1,200 ft above the ground.

3.3 AIRCRAFT FLIGHT OPERATIONS

The main noise sources at MCAS Miramar are aircraft flight operations, including flight arrivals, departures, pattern work, and low-level activities (e.g., hovers). Rotary-wing, tilt-rotor, and fixed-wing flight operations occur at MCAS Miramar.

3.3.1 Types of Operations

Aircraft operating at MCAS Miramar often train in the special use airspace W-291 over the ocean approximately 20 miles offshore. The Chocolate Mountain Aerial Gunnery Range, located in Imperial and Riverside counties in southeastern California, provides continued and future readiness training of the air and ground forces of the Navy and USMC. The Barry M. Goldwater Range, located in southwestern Arizona, provides air-to-ground bombing practice for Air Force, Navy and USMC aircraft. The relative location of MCAS Miramar allows use of all three of these airspace complexes to support USMC training. Flights that use the ranges, whether for pilot training or support for other Marine units training in the airspace, will often takeoff and land just once for that particular flight. Other flights may be flown for pilot proficiency or other types of training (for instance to practice various types of landings) and may involve multiple takeoffs and landings on the same flight (hence multiple "airfield operations"). Squadrons based at MCAS Miramar must maintain proficiency in a wide variety of skills, operating in various weather conditions, and during both day and night. Many of these skill sets are practiced in training areas, but the airfield is used for the departure/takeoff and arrival/landing portions of the flights.

3.3.2 Current and Future Operations

In order to determine the impacts of aircraft noise on the surrounding area, the current operations as well as foreseeable future operations needed to be taken into account prior to the noise modeling effort associated with AICUZ 2020. A planning horizon of 2032 is most appropriate because anticipated actions affecting aircraft operations will be implemented by that time period.

Operations levels were determined using the 2010 F-35B EIS accepted Alternative 1 conditions, which included the complete transition from CH-46E to MV-22B and from F/A-18A/B/C/D to F-35B. Since then, the USMC has decided to add F-35C to its inventory, and the AICUZ 2020 projection incorporates updated air quality and noise analysis for the two F-35C squadrons based at MCAS Miramar, which are assumed to conduct Field Carrier Landing Practice (FCLP) operations at the installation. The AICUZ Scenario includes:

- Four squadrons of F-35B
- Two squadrons of F-35C
- One squadron of KC-130J
- Six squadrons of MV-22B
- Four squadrons of CH-53K

These operational projections represent the current plan at the time of analysis, but such forecasts are moving targets which may change as DoD policy evolves.

3.4 MODELING DATA

Based on existing flight schedules, the breakdown of aircraft operations by aircraft type/model/series is as follows:

- MV-22B – 33 percent
- F-35B – 25 percent
- F-35C – 10 percent
- CH-53K – 11 percent
- KC-130 – 8 percent
- C-12 and UC-35 – less than 1 percent
- Transients – 12 percent

Table 3-1 shows the future operations modeled for noise impacts. The operations totals were based on the factors listed above and represent the expected annual operations in the year 2032. The operation types include departures, arrivals, and closed patterns defined as:

Departure. An aircraft taking off from a runway or pad to a local training area, a non-local training area, or as part of a training maneuver at the airfield. Due to the local air traffic and airspace in the vicinity of MCAS Miramar, departing aircraft not executing an unrestricted climb may perform one of several procedures.

Aircraft headed for W-291, the warning area over the ocean 20 miles from shore, will follow the SWOLF (aka “Seawolf”) departure procedures by climbing to 2,000 ft MSL soon after leaving the runway. That altitude will be maintained until after the aircraft is over the ocean and beyond the Seawolf waypoint, after which the aircraft will resume climbing.

Aircraft headed north or east may use Lakee departure procedure by turning north to a 360 degree heading soon after takeoff, climb up to but not beyond 6,000 ft MSL before crossing the HELSI waypoint, near the Peñasquitos Creek. Aircraft continue climbing to reach 7,000 ft MSL or above by the GERNE waypoint, approximately one mile east of Fairbanks Ranch.

Aircraft may execute a Standard Instrument Departure or depart using radar vectors.

Table 3-1. Annual Flight Operations for AICUZ 2020 at MCAS Miramar - Projected 2032

Group	Squadron Name	Departures				Arrivals			
		Day	Eve	Night	Total	Day	Eve	Night	Total
Based	F-35B	11,298	1,415	126	12,839	11,296	1,413	128	12,837
	F-35C[1]	3,531	442	39	4,012	3,530	442	40	4,012
	KC-130	663	51	7	721	596	80	46	722
	C-12 / UC-35[2]	259	-	-	259	175	59	24	258
	CH-53K[3]	2,532	392	91	3,015	2,384	392	241	3,017
	MV-22	9,734	5,400	1,193	16,327	9,734	5,401	1,196	16,331
Transient	Air Carrier[2]	891	81	30	1,002	891	89	24	1,004
	Heavy Transport[5]	22	1	1	24	22	1	1	24
	Military Fixed-Wing (e.g., F-16, F-18)	2,546	247	77	2,870	2,562	241	67	2,870
	F-35B	-	-	-	-	-	-	-	-
	F-35C	-	-	-	-	-	-	-	-
	Military Rotary-Wing[4]	270	76	51	397	270	76	51	397
Based		28,017	7,700	1,456	37,173	27,715	7,787	1,675	37,177
Transient		3,729	405	159	4,293	3,745	407	143	4,295
Not Modeled		7,932	7,932	7,932	7,932	23,796	23,796	23,796	23,796
TOTAL		**31,746**	**8,105**	**1,615**	**41,466**	**31,460**	**8,194**	**1,818**	**41,472**

Group	Squadron Name	Closed Patterns				Total			
		Day	Eve	Night	Total	Day	Eve	Night	Total
Based	F-35B[1]	3,495	1,466	-	4,961	26,089	4,294	254	30,637
	F-35C	2,793	1,361	78	4,232	9,854	2,245	157	12,256
	KC-130	5,165	1,854	587	7,606	6,424	1,985	640	9,049
	C-12 / UC-35[2]	-	-	-	-	434	59	24	517
	CH-53K	5,793	964	564	7,321	10,709	1,748	896	13,353
	MV-22	6,105	679	-	6,784	25,573	11,480	2,389	39,442
Transient	Air Carrier[2]	-	-	-	-	1,782	170	54	2,006
	Heavy Transport	-	-	-	-	44	2	2	48
	Mil Fixed-Wing (e.g., F-16, F-18)	-	-	-	-	5,108	488	144	5,740
	F-35B	-	-	-	-	-	-	-	-
	F-35C	-	-	-	-	-	-	-	-
	Military Rotary-Wing[4]	4,552	1,236	566	6,354	5,092	1,388	668	7,148
Based		23,351	6,324	1,229	30,904	79,083	21,811	4,360	105,254
Civil		-	-	-	-	-	-	-	-
Transient		4,552	1,236	566	6,354	12,026	2,048	868	14,942
TOTAL		**27,903**	**7,560**	**1,795**	**37,258**	**91,109**	**23,859**	**5,228**	**120,196**

Notes: [1] F-35C modeled with A variant acoustical data and C variant flight profiles because the F-35A and F-35C engines differ only in the use of special salt corrosion prevention material for aircraft carrier operations.
[2] C-12 and UC-35 operations are not modeled.
[3] CH-53E noise data used as an appropriate substitute for CH-53K, which is not yet available.
[4] H-60 and other helicopters modeled as CH-53E.
[5] Heavy Transport modeled as C-17.

Arrival. An aircraft lines up on the runway centerline, descends gradually, and either lands or performs a low approach without stopping. Arrivals at MCAS Miramar approach almost exclusively from the east.

Overhead Break Arrival. An expeditious type of arrival using VFR allowing multiple aircraft flying together to land in quick precession by performing a roughly racetrack-shaped descending loop. Aircraft first proceed to the initial point, approximately 6.4 miles east of the MCAS Miramar runways at or above 3,000 ft MSL, then descend to the break altitude of 2,100 ft MSL approximately 2 miles before the runway where the aircraft intends to land. If multiple aircraft are arriving at the airfield, the first will generally break from the group when passing over the start of the runway at 2,100 ft MSL, by performing a 180 degree banked turn to head east 1 to 2 miles abeam of the runway and descend to the prescribed pattern altitude of 1,600 ft MSL. After traveling 1 to 2 miles east of the start of the runway, the aircraft will perform another 180 degree banked turn to line up with the runway and descend to land. The remaining aircraft in the group will break away in a similar manner as the first but do so several seconds later farther down the runway to provide sufficient spacing for all aircraft to land safely.

Carrier Break Arrival. Similar to the Overhead Break Arrival except the break altitude is lowered to 1,600 ft MSL and the pattern altitude is 1,100 ft MSL to more closely simulate the flight path utilized to land on an aircraft carrier.

Closed Pattern. An aircraft event comprised of a takeoff from a runway, pad, or landing strip followed by landing, often to the same location as the takeoff. ATC counts any low approach landing or takeoff as an "airfield operation." Using this definition, a "touch-and-go" pattern is counted as two airfield operations. Several different types of closed patterns are performed at MCAS Miramar, which vary in size from nearly contained within the station boundary to extending up to 15 miles, or more, from the station.

Ground Controlled Approach Pattern. Air traffic controllers guide aircraft to a safe landing, based primarily on radar images, through verbal commands. This maintains the landing aircraft on both glide path and approach centerline to ensure the pilot will arrive precisely over the runway's touchdown zone. The Ground Controlled Approach is commonly flown at the conclusion of a closed pattern that begins with a departure to 4,000 ft MSL at least 5 miles from the airfield to simulate the conditions of an arriving aircraft.

Touch-and-Go Pattern. Aircraft begin this pattern either by taking off from a MCAS Miramar runway (24L or 24R) or from a low approach heading west. The aircraft begins climbing immediately and soon initiates a 180 degree banked turn near the end of the runway to reach the prescribed pattern altitude of 1,600 ft MSL. The aircraft will maintain the pattern altitude while traveling east and parallel to Runways 24L/24R in the same manner as the overhead break arrival. After passing 1 to 2 miles beyond the start of the runway the aircraft will perform a banked 180 degree turn to align with the runway heading while descending. The pattern will either conclude with a landing to a full stop or a low approach, which can be followed with additional patterns. Multiple aircraft can operate in the pattern concurrently.

FCLP Pattern. Performed similar to the touch-and-go pattern except the pattern altitude is lowered to 1,100 ft MSL to replicate a flight path that aircraft utilize when landing on an aircraft carrier. Multiple closed loop patterns may be flown back to back to allow the pilot to gain additional landing practice.

3.5 FLIGHT TRACKS AND RUNWAY ORIENTATION

3.5.1 Flight Tracks

Flight tracks used at MCAS Miramar were based upon the 2010 F-35 EIS noise study and updated based on interviews with ATC personnel, as well as individual pilots representing the based squadrons. Most fighter aircraft traffic leaving MCAS Miramar departs to the warning area (W-291) 20 miles beyond the shoreline over the ocean by way of the Seawolf 7 Departure procedure. Other flight tracks include routing to and from other training areas, instrument training, and transit to and from other military installations.

A flight track is the projection of an aircraft's path on the ground. The flight tracks modeled in AICUZ 2020 and presented in Figures 3-4 through 3-6 reflect the most common paths taken by aircraft when operating at MCAS Miramar. However, flight tracks depicted do not prescribe the only locations where aircraft may fly. The majority of flight tracks modeled in AICUZ 2020 remain unchanged from AICUZ 2005 except departure flight tracks to the west. Additional flight tracks were added to account for instances when westerly departing heavy transport aircraft, such as the C-17, perform a turn to the north further west than had been captured in the prior AICUZ.

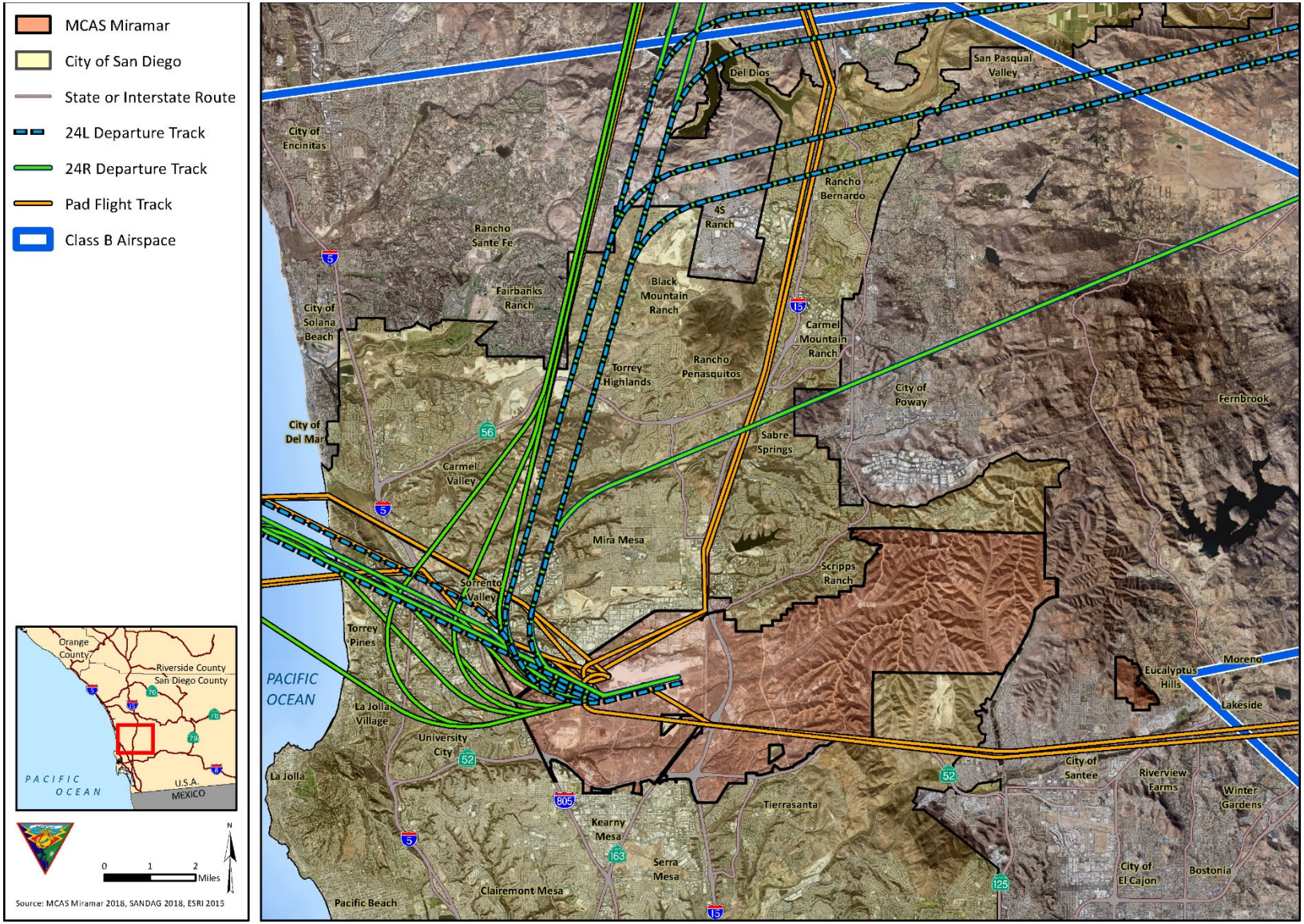


Figure 3-4. Departure Tracks

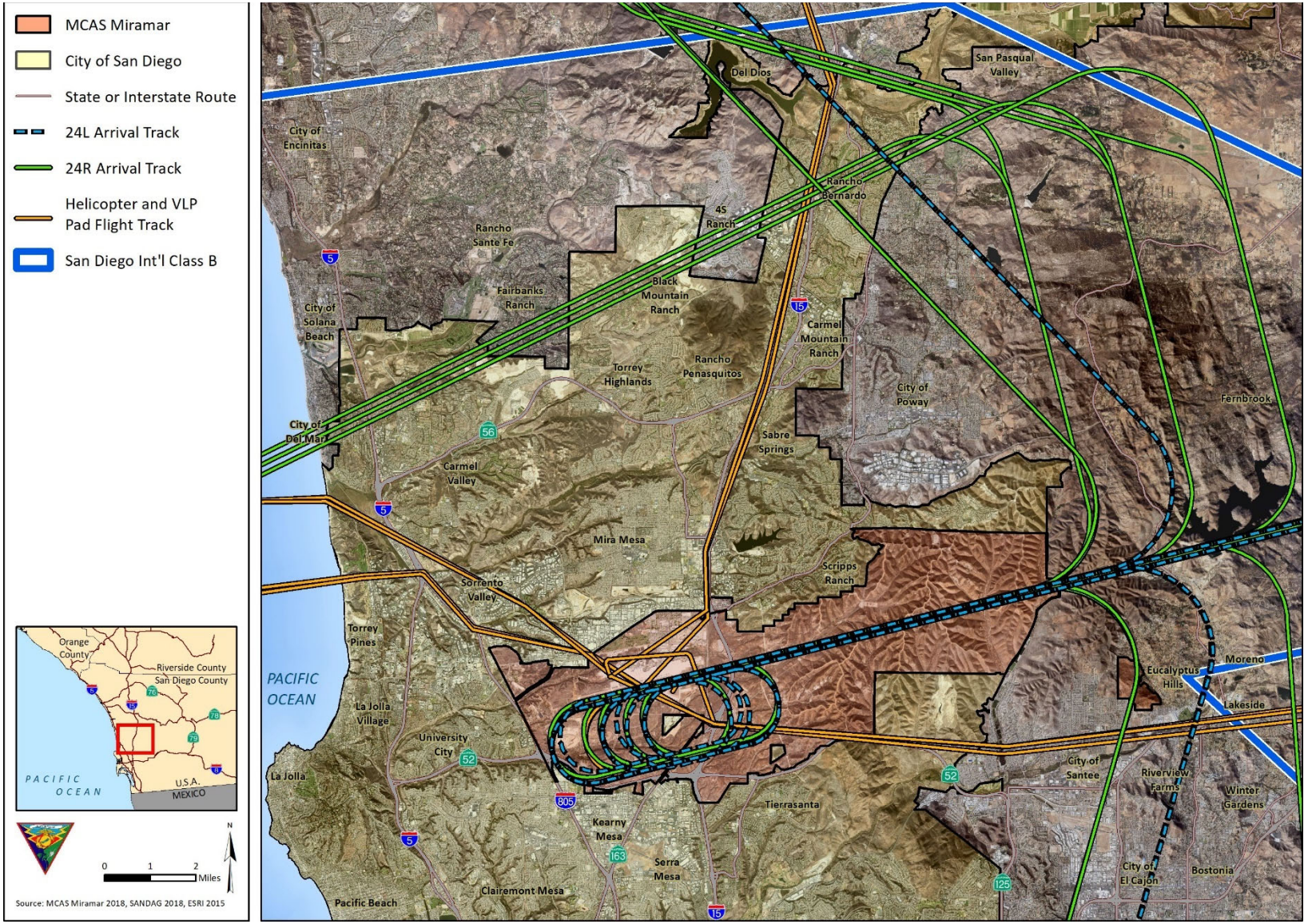


Figure 3-5. Arrival Tracks

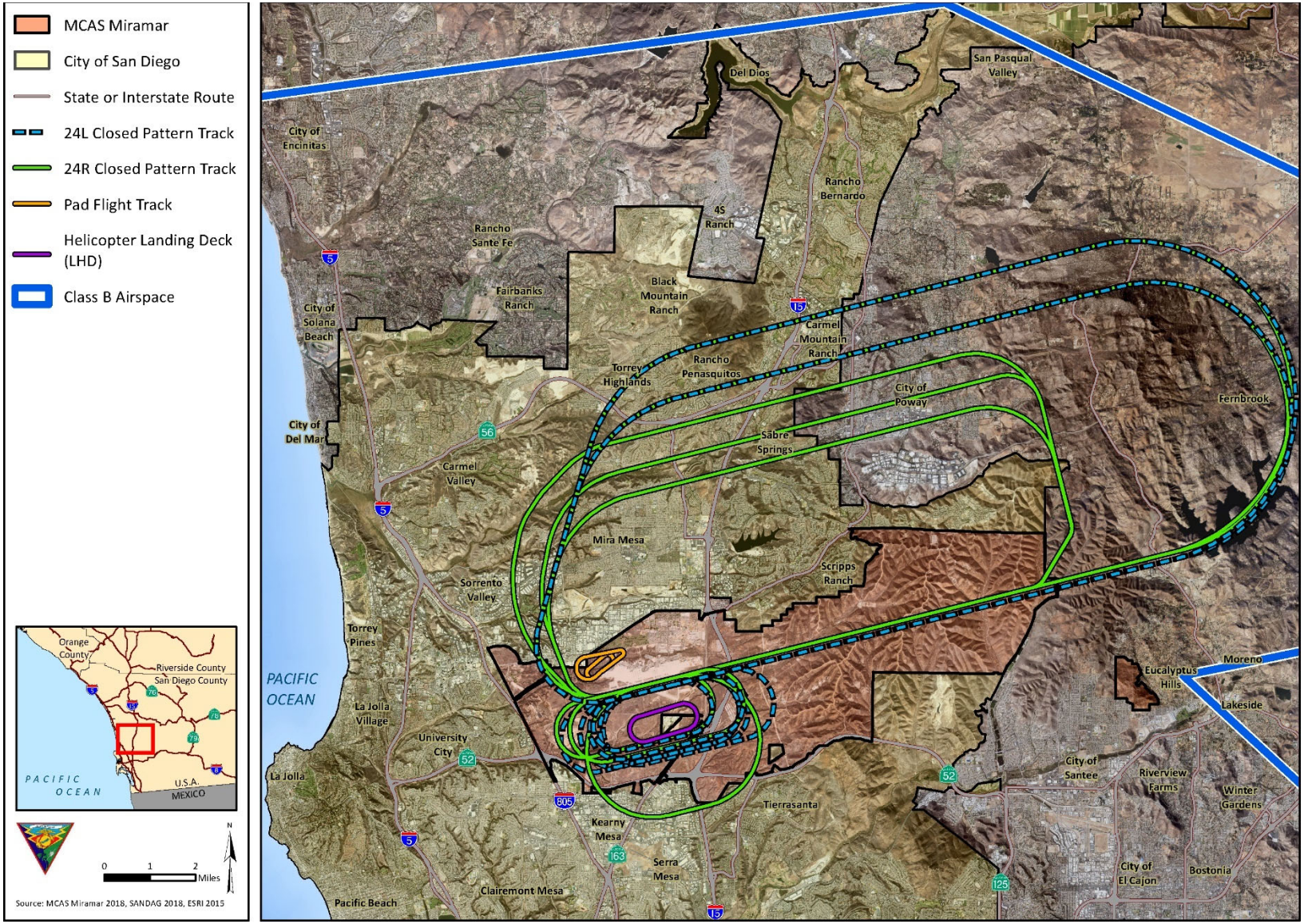


Figure 3-6. Closed Pattern Tracks

CHAPTER 4
AIRCRAFT NOISE

The identification of areas impacted by aircraft noise is a critical factor when planning land uses in the vicinity of air facilities. Because the noise from aircraft operations can impact areas surrounding an installation, MCAS Miramar has prepared noise exposure contours that define land areas adjacent to the airfield that may experience noise impacts. This section discusses these noise contours and compares them to the contours identified in AICUZ 2005.

4.1 WHAT IS NOISE/SOUND?

Sound is a physical phenomenon consisting of minute vibrations that travel through air and are sensed by the ear. The interpretation of that sound depends largley on the listener's current activity, past experience, and attitude toward the source sound. Sound becomes noise when it becomes invasive and/or unwanted and interferes with normal activities such as sleep or conversation.

The measurement and human perception of sound involves three basic physical characteristics—intensity, frequency, and duration. Intensity is a measure of the acoustic energy of the sound vibrations. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound. Frequency is rate that the air vibrates or oscillates per unit of time, most frequently quantified with the unit hertz defined as the number of cycles per second. Low-frequency sounds are characterized as rumbles or roars, while sirens or screeches are examples of high-frequency sounds. Duration is the length of time the sound can be detected. The physical characteristics of the material through which sound propagates heavily influences the way sound travels. Changes in atmospheric conditions (temperature, relative humidity, and barometric pressure) affect sound levels heard from aircraft operations.

A logarithmic unit known as decibel (dB) is used to represent the intensity of sound, compared to other levels. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort and above 140 dB as pain. Additionally, human senstivity to noise varies by frequency. A-weighted dB (dBA) emphasizes this sensitive range and de-emphasizes very low and very high frequencies. All dB used throughout this AICUZ reflect A-weighting.

4.2 AIRFIELD NOISE METRICS AND NOISE MODELING

4.2.1 Noise Metrics

Noise metrics quantify sounds to allow comparison and to analyze their effects in a standardized way. California law (California Code of Regulations Title 21, Public Works) prescribes use of the Community Noise Equivalent Level (CNEL) as the metric for measuring cumulative noise to account for all noise events occurring over a 24-hour period and to assess community noise impacts. CNEL, a variation of the Day-Night Average Sound Level (DNL) otherwise prescribed by the U.S. Government, utilizes three time periods: daytime 7:00 A.M. to 7:00 P.M., evening 7:00 P.M. to 10:00 P.M., and nighttime 10:00 P.M. to 7:00 A.M. local time. Events occurring during the evening and nighttime periods receive 5 and 10 dB adjustments, respectively to account for the increased intrusiveness and higher annoyance rates to people during those portions of the day. DNL follows the same nighttime weighting methodology but does not

include an evening period and the associated penalty utilized by CNEL. By definition, CNEL will produce levels equal to or greater than DNL; therefore, it conforms to both the U.S. Government and State of California standards. Note that "daytime," "evening," and "nighttime" in calculation of CNEL are sometimes referred to as "acoustic day" and "acoustic night" and always correspond to the times given above. This is different from the "day" and "night" used commonly by military aviators, which are directly related to the times of sunrise and sunset and vary throughout the year with the seasonal changes. It is possible for acoustic evening operations to occur prior to the actual sunset, or for acoustic day operations to occur after sunset, depending on the season.

CNEL in AICUZ 2020 analyzes an average day of aircraft operations calculated by dividing the total annual airfield operations by 365 days. While annual operations will vary from year to year, assuming other variables (aircraft type, location of flight paths, altitudes, times of day, power settings, etc.) remain the same, a doubling of annual operations would result in an approximate 3 dB increase in CNEL.

Noise levels of the loudest aircraft operations significantly influence the 24-hour average. For example, if one daytime aircraft overflight measuring 100 A-Weighted decibels for 30 seconds occurs within a 24-hour period in a 50-A-Weighted decibels noise environment, the CNEL will be 65.5. If ten such 30-second aircraft overflights occur in daytime hours in the 24-hour period, the CNEL will be 75.4. Therefore, a few maximum sound events occurring during a 24-hour period will have a strong influence on the 24-hour CNEL, even though lower sound levels from other aircraft between these flights could account for the majority of the flight activity.

The accumulation of noise computed in this manner provides a quantitative tool for comparing overall noise environments and for use in developing compatible land use plans and zoning regulations in the airfields' environs. The AICUZ Program divides noise exposure into three categories:

- Noise Zone 1: Less than 65 dB CNEL; low or no noise impact
- Noise Zone 2: 65-75 dB CNEL; moderate impact where some land use controls are required
- Noise Zone 3: Greater than 75 dB CNEL; most severely impacted area requiring the greatest degree of land use control

Land use recommendations within these noise zones are provided in Chapter 6. Development of noise contours is discussed below.

4.2.2 Noise Modeling

A computerized noise exposure model, known as NOISEMAP, was used to calculate noise levels due to forecasted military aircraft operations at MCAS Miramar. NOISEMAP is a suite of computer programs and components developed by the DoD to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations. The core program in NOISEMAP is called NMAP and version 7.3 was used for AICUZ 2020.

The steps for computer modeling of noise with the NOISEMAP software suite include determining and building each aircraft's flight tracks (paths over the ground) and flight profiles (which include data such as altitude, airspeed, power settings, and other flight conditions). This is combined with information about the numbers of each type of operation by aircraft/track/profile, local climate, ground terrain surrounding the airfield, and similar data related to ground run-up operations of aircraft engines to sum the total noise energy experienced annually at a grid of points along on the ground in the vicinity of the airfield. Noise exposure is presented in terms of contours (i.e., lines of equal value of CNEL). CNEL contours of 60 to 85 dB,

presented in 5-dB increments, provide a graphical depiction of the overall average aircraft noise environment.

NOISEMAP's ability to account for the effects of sound propagation includes consideration of terrain elevation and ground impedance conditions at MCAS Miramar. This noise modeling does not include the effect of shielding of buildings.

4.3 AICUZ NOISE CONTOURS FOR MCAS MIRAMAR

Noise contours provide MCAS Miramar, local planning agencies, and the general public with maps of the potential noise related impacts of aircraft operations. The ability to view the noise contours with respect to land use creates a useable tool to help understand and assess any potential incompatible land uses and plan future development around the installation.

This study presents CNEL noise contours, identified as AICUZ 2020, based on flight operations projected through 2032. This helps ensure the future operational capability of MCAS Miramar and allows local communities a longer planning period. A full explanation of projected 2032 operations (AICUZ Scenario) can be found in Chapter 3.

Figure 4-1 depicts the noise gradient and noise contours for AICUZ 2020, showing the anticipated operations in 2032 due to MCAS Miramar activity. Note that the AICUZ Program's Noise Zone 2 ranges from 65 to 75 dB CNEL, which is nearly contained within the station boundary to the south and northeast. The 65 dB CNEL contour extends approximately 2 miles beyond the MCAS Miramar boundary to the northwest, primarily due to fighter jet departures on Runways 24L and 24R along the Lakee corridor. Although all land uses are compatible with areas exposed to CNEL less than 65 dB, the 60 dB contour is included to show areas exposed to noise that approach levels at which land use guideline recommendations begin. The 60 dB CNEL contour extends approximately 5 miles north of the installation boundary and all the way to the ocean along the Seawolf corridor, which fighter jet aircraft utilize to access the over ocean ranges. Fighter jet aircraft departures are the primary driver of noise contours in these areas. The noise gradient in Figure 4-1 extends down to 60 dB CNEL to show areas where sound from MCAS Miramar aircraft operations may be heard, but the sound levels and frequency of events are well below the threshold for land use recommendations that begin at 65 dB CNEL. The CNEL due to other noise sources, such as road traffic, tends to dominate beyond the airfield 60 dB CNEL contour and typically range from 45 to 65 dB based on the distances from road surfaces and traffic volumes.

4.4 COMPARISON WITH PREVIOUS AICUZ

This section compares the AICUZ 2020 noise exposure contours to the previous contours published in AICUZ 2005. The comparison helps to identify changes to noise exposure based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate noise impacts.

The AICUZ 2020 noise contours for MCAS Miramar are presented in the following sections along with a detailed description of the noise environment for the airfield. Also provided are comparisons and figure overlays for AICUZ 2005 and AICUZ 2020 noise contours. Land use recommendations within noise zones for the airfield are provided and discussed in Chapter 6.

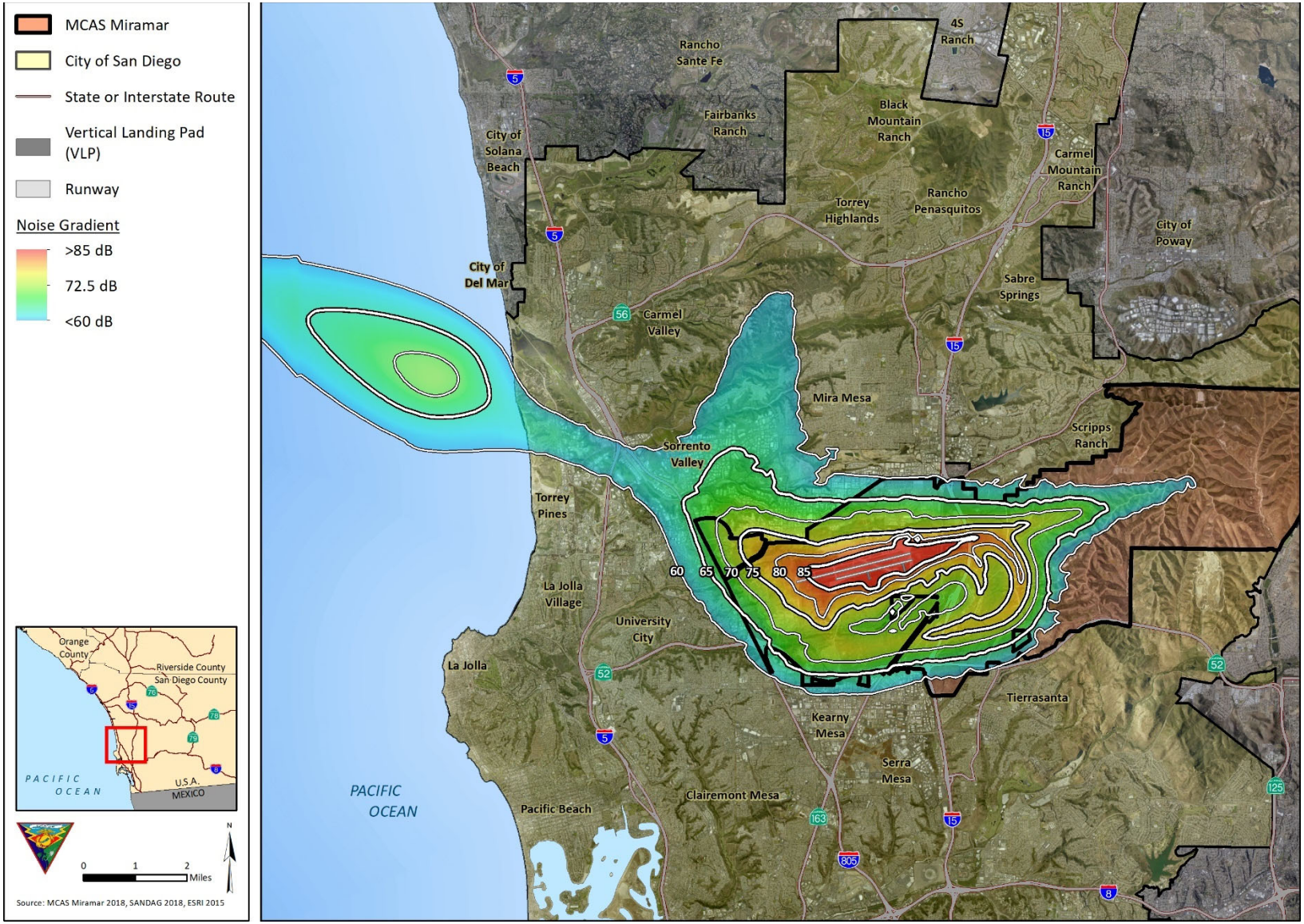


Figure 4-1. AICUZ Scenario (2032) Noise Contours and Noise Gradient–Average Annual Day CNEL

Figure 4-2 shows the resultant 60 to 85 dB CNEL contours (indicated by shading) overlaid with the previous AICUZ 2005 noise contours (indicated by lines). The shaded areas represent CNEL bands between contour lines and are exclusive of their limits (i.e., the 65 dB only applies at the intersection of the 60-65 and 65-70 areas). The AICUZ 2020 65-70 dB CNEL area (light green shading) generally retracts toward the installation boundary on the west, and toward or within the installation boundary on the south. It extends slightly beyond AICUZ 2005 65-70 dB CNEL band in the Sorrento Valley area, but otherwise retracts toward the installation's northern boundary. The blue-shaded 60-65 dB CNEL band expands to the northwest and underneath the Seawolf departure corridor, but all land uses therein are considered compatible land uses for that noise level.

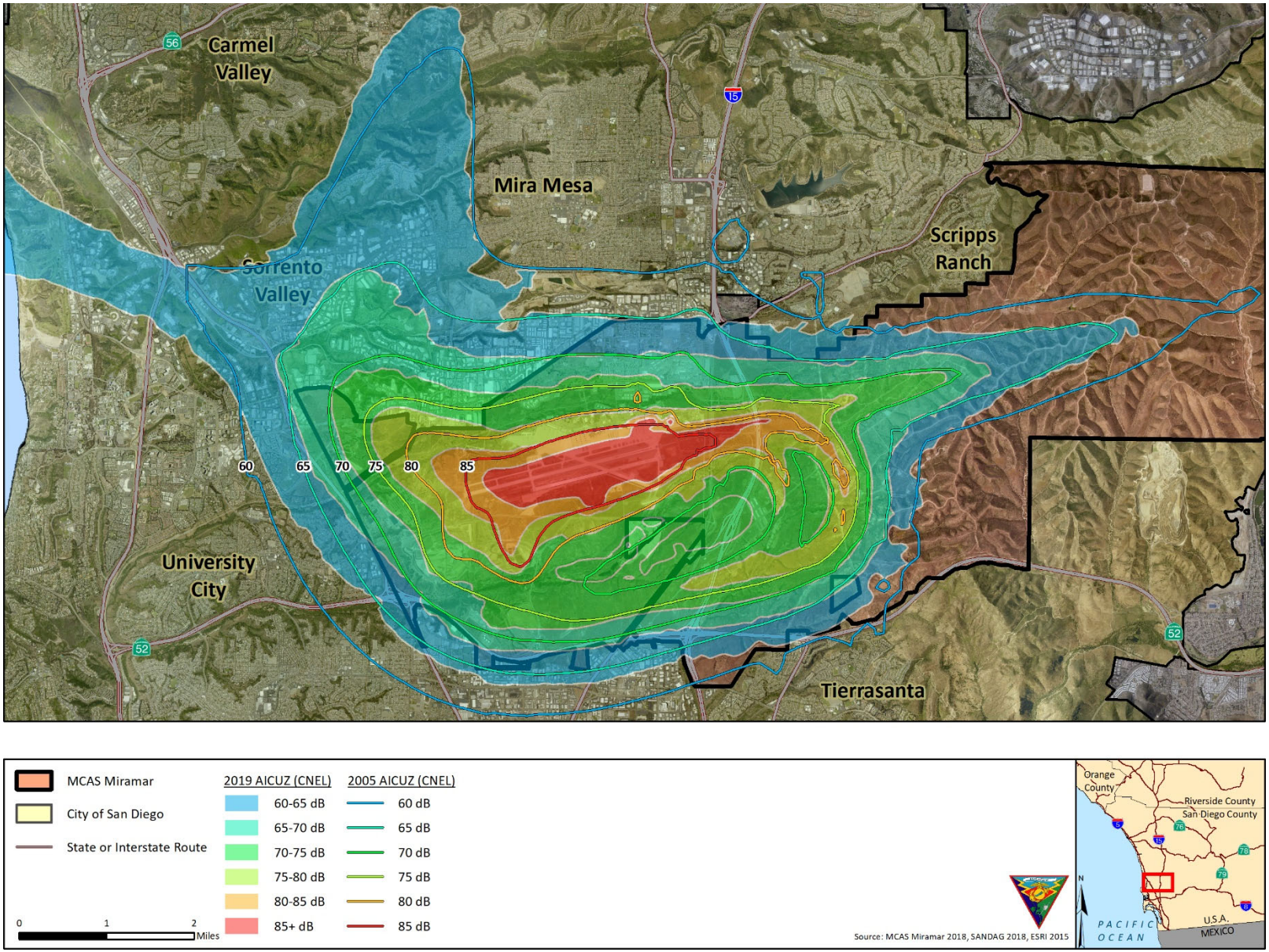


Figure 4-2. Comparison of AICUZ 2020 CNEL Noise Contours to AICUZ 2005

CHAPTER 5
AIRFIELD SAFETY

Community and airfield safety is paramount to the USMC and is a shared responsibility between the USMC and local government agencies with land use planning and zoning authority for communities surrounding MCAS Miramar, each playing a vital role. As such, the USMC has established a flight safety program and identified areas of accident potential around MCAS Miramar to assist preserving health, safety, and welfare of the people living near the airfield. Cooperation between the USMC and surrounding communities results in strategic and effective land use planning and development surrounding military airfields. AICUZ 2020 provides tools to reach the shared safety goal.

Identifying safety concerns assists surrounding communities in developing land use compatible with airfield operations. These issues include hazards around an airfield that obstruct or interfere with aircraft arrivals and departures, pilot vision, communications, or aircraft electronics, and areas of accident potential.

5.1 ACCIDENT POTENTIAL ZONES

The APZ concept describes the areas of highest probability for aircraft impact if a mishap were to occur. Aircraft operations are not limited to areas with APZs and can potentially be routed anywhere within the Class B airspace established around MCAS Miramar. The size and shape of clear zones (CZs) and APZs are defined by runway type and aircraft type, and are based on historical accident data, which determine the size of these zones as well as the suggested land use guidelines for each. MCO 11010.16 establishes three types of AICUZ safety zones: CZ, APZ-I, and APZ-II. Refer to MCO 11010.16 for further detail (USMC 2008). An accident is more likely to occur in APZ-I than in APZ-II and is more likely to occur in the CZ than in APZ-I or APZ-II.

The following subsections define the two major divisions in the types of safety zones: fixed-wing and rotary-wing as described by the AICUZ Program for Class B runways (DoD 2008).

5.1.1 Fixed-wing Clear Zones and Accident Potential Zones

CZs are defined as the area immediately beyond the usual runway threshold. They are areas with the greatest potential for the occurrence of aircraft accidents. CZs should remain undeveloped. For Class B runways, a rectangular CZ is used.

APZ-I is defined as the area immediately beyond the CZ that still possesses a measurable potential for aircraft accidents relative to the CZ. The APZ-I is identified under flight tracks that experience 5,000 or more annual fixed-wing operations (departures or approaches, but not both combined).

APZ-II is defined as the area immediately beyond APZ-I (or CZ if APZ-I is not designated) which has a measurable potential for aircraft accidents relative to APZ-I or the CZ. APZ-II is designated whenever APZ-I is required. If APZ-I is not warranted, APZ-II may be designated if analysis indicated a need.

5.1.2 Rotary-wing Clear Zones and Accident Potential Zones

Rotary-wing aircraft have slightly different requirements for CZs and APZs. The CZ for rotary-wing aircraft will be designated for all VFR landing pads/runways. APZ-I will be designated for VFR landing pads/runways located at air installations that support daily training and operational missions.

CZs at rotary-wing facilities are defined as "takeoff safety zones." This is the area under the VFR approach/departure surface until that surface is 50 ft above the established landing area elevation. The dimensions of the VFR approach/departure surface are found in the UFC (DoD 2008).

APZ-I is an area beyond the CZ for the remainder of the approach/departure zone, which is defined as the area under the VFR approach/departure surface until that surface is 150 ft above the established landing area elevation.

APZ-II is normally not designated for helicopter flight paths unless the local accident history indicates the need for additional protection.

In order to determine the appropriate CZs and APZs for MCAS Miramar, an analysis of the flight operation and flight track data used to develop the CNEL contours provided in the MCAS Miramar Noise Report was undertaken. Each track was screened for the number of operations, and those tracks with more than 5,000 operations per year were used to develop the CZs and APZs for MCAS Miramar.

Figure 5-1 depicts the previous and updated safety zones. MCAS Miramar has maintained optional non-standard APZ-I and APZ-II safety zones to follow the departure corridor to the ocean (Seawolf) or to the northwest of the installation (Lakee). These non-standard safety zones have allowed more accurate designation of areas at increased risk of mishap than the standard straight rectangular zones could provide. APZs extend from the end of the runway but apply to the predominant arrival and departure flight tracks used by the aircraft. Therefore, if an airfield has more than one dominant flight track to or from the runway, APZs can extend in the direction of each flight track, as was done in AICUZ 2005 as shown on Figure 5-1.

As shown in Table 5-1, both Runway 24L and 24R exceed 5,000 operations for both arrivals and departures, which requires the existing APZ-I and APZ-II designations be maintained. The arrival flight tracks to both Runway 24L and 24R are straight for the final portion so the existing straight APZ-I is maintained in AICUZ 2020. The departure flight tracks turn to the north to follow departure procedures prior to the end of the runway and have been modified slightly since AICUZ 2005, necessitating recalibration of the APZ-I and APZ-II areas.

MCAS Miramar has established and approved approach surveillance radar and precision approach radar arrivals procedures for Runway 6, which are used from time to time as weather, wind, or other conditions dictate. Not all aircraft departing 24R or 24L will execute the tight turn that would keep them within the area of the mapped APZs, due to performance characteristics of the aircraft, the particular mission, air traffic considerations, or other safety of flight reasons. These operations, on an annual basis, number well below the 5,000 threshold for APZ designation.

Table 5-1. Runway Summaries of Annual Operations

Runway	Departures	Arrivals	CZ	APZ-I	APZ-II
24L/6R	10,466	11,695	Yes	Yes	Yes
24R/6L[(1)]	38,048	37,660	Yes	Yes	Yes
Helicopter Strip	3,250	3,250	Yes	Yes	No
Pads	**Departures**	**Arrivals**	**CZ**	**APZ-I**	**APZ-II**
1	3,450	3,450	Yes	Yes	No
5	2,354	2,049	Yes	Yes	No
24P/6P	2,527	1,997	No	No	No

Note: [(1)] Operations include MV-22 arrivals and departure to pads 24/6 located on Runway 24R/6L.

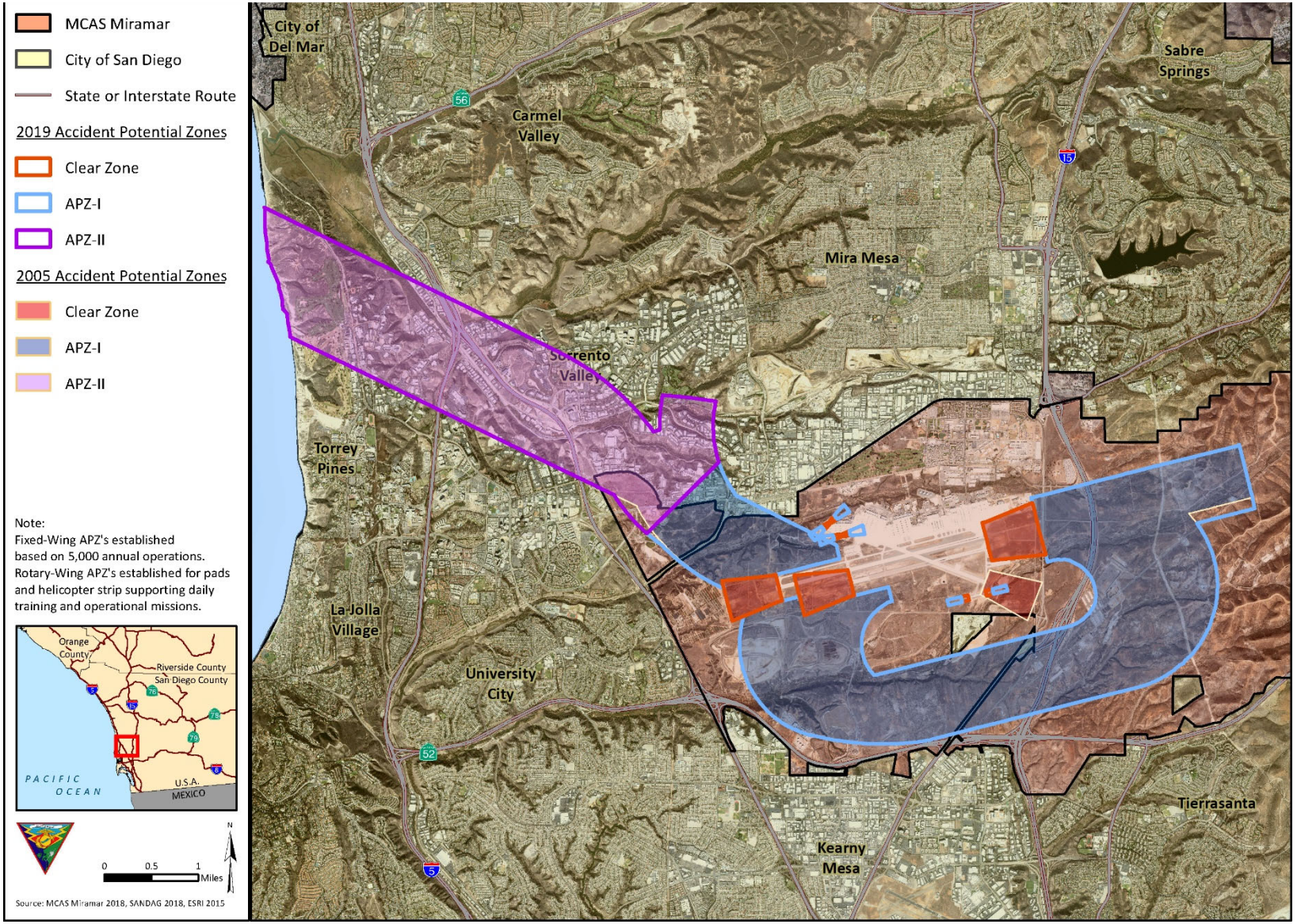


Figure 5-1. Comparison of 2020 APZs with AICUZ 2005 APZs

The boundary along APZ-I and APZ-II to the north of departures from Runway 24R does not change from AICUZ 2005. However, the southern boundary of APZ-I and APZ-II extends a few hundred feet farther due to a shift in flight tracks. It is almost completely within the MCAS Miramar installation boundary except for a small portion over the railroad right-of-way where it intersects the northwestern portion of the MCAS. APZ-I is increased along the arrival end due to a creation of APZ-I on Runway 24L; it is completely contained within the installation boundary.

The helicopter strip does not reach the 5,000-operation threshold for APZ-II but both CZ and APZ-I have been included and are completely contained within the installation's boundary. Helicopter pads 1, 5, 24P and 6P all also require CZs and APZ-I, but not APZ-IIs as none reaches the 5,000-operation threshold. Pads 24P and 6P are within the primary surface; therefore, the primary surface takes precedence and the associated CZ and APZ are not visible in Figure 5-1.

Compatible land uses in CZs are extremely limited and typically encourage reduced or minimal access. For this reason, the Marine Corps' policy, where possible, is to acquire real property interests in land within the CZ to ensure that incompatible development is minimized. MCAS Miramar's CZs are completely within the installation boundary.

Within APZ-I and APZ-II, a variety of land uses are compatible or conditionally compatible; however, people-intensive uses (e.g., schools, apartments) should be restricted because of greater risk in these areas. Existing land uses, compatibility and accomplishments related to land use in the APZs for each runway are discussed in Chapter 6.

5.2 FLIGHT SAFETY

The FAA and DoD maintain a number of programs and requirements to reduce hazards to aircraft operations and aircraft mishaps. Mishaps are classified by the severity of property damage and injuries. The most severe mishap category, Class A, includes at least one of the following conditions: a total cost of damage greater than one million dollars, a destroyed aircraft, fatal injuries, or permanent disability.

Between 1995 and 2018 there have been six Class A mishaps in the vicinity of MCAS Miramar resulting in six destroyed aircraft, which includes four F/A-18 aircraft, one UC-35, and one AH-1 helicopter. Mechanical failures primarily contributed to four of the mishaps while pilot error was responsible for the remaining two, as depicted in Figure 5-2. The 2008 incident involved an F/A-18 aircraft that crashed into a residential area in University City, tragically killing four people, destroying two homes, and damaging others.

The Marine Corps made many changes after the 2008 mishap, including re-organizing ready rooms to improve communication between the aircraft and squadron headquarters and using post-flight maintenance codes for trend analysis and preventive maintenance in a more comprehensive manner. In addition, the 2008 accident is taught and used in case studies at the Naval Safety Center.

MCAS Miramar employs safety procedures to minimize the risk of aircraft mishaps. These procedures include plans for reducing the risks of bird strike and lighting obstructions that could affect pilot visibility.

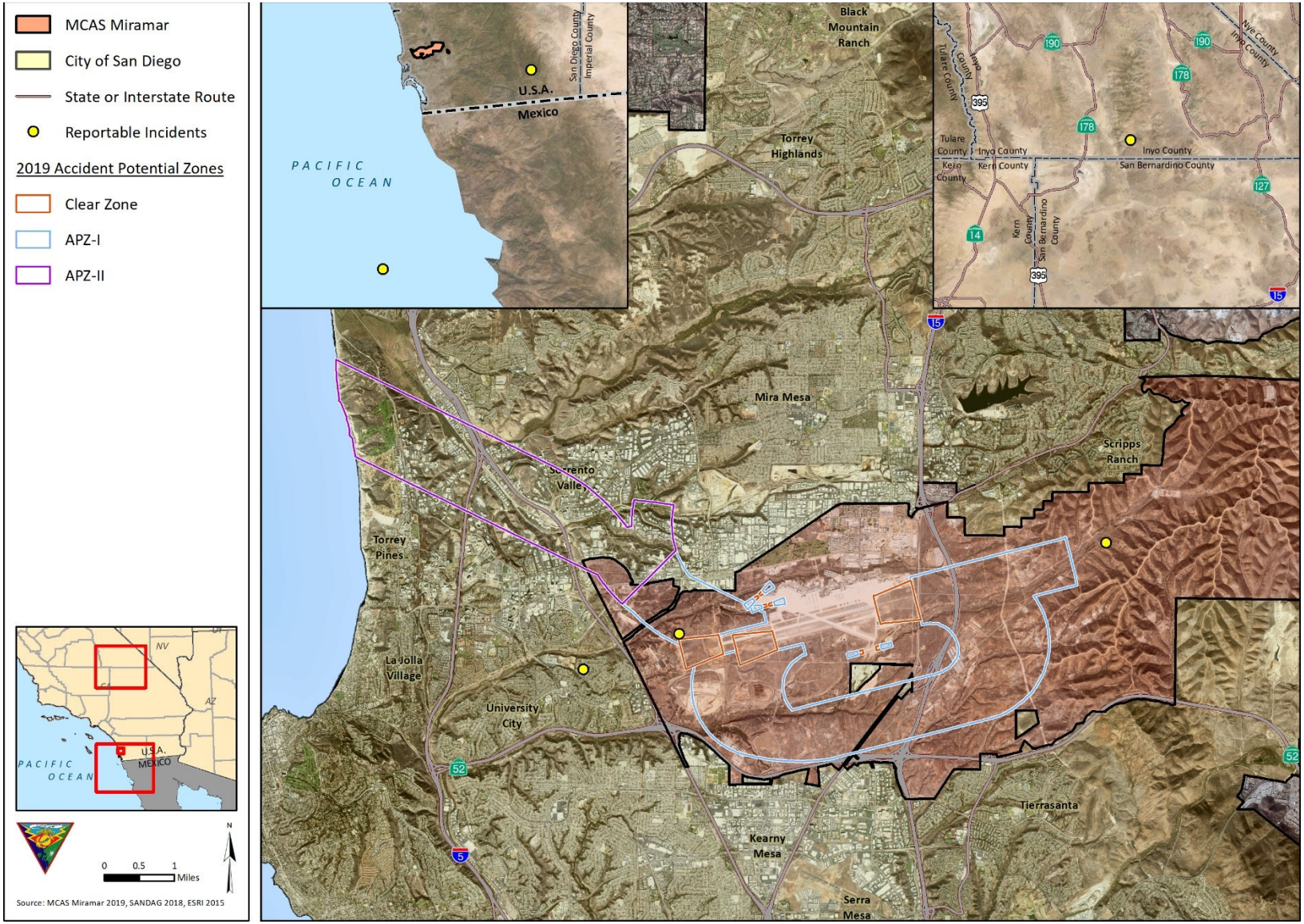


Figure 5-2. Reportable Aircraft Incidents Near MCAS Miramar from 1995 to Present

Bird Aircraft Strike Hazard (BASH)

The BASH program reduces the risk of birds or animals colliding with aircraft by locating habitat and other attractive land uses at least 10,000 ft from active movement areas of airfields. Though bird and animal strikes usually occur at low altitudes and do not typically result in aircraft crashes, they can cause significant structural and mechanical damage to aircraft.

Habitats that attract birds and animals include wetlands, water features, forests, and grassy areas. Certain land uses, such as landfills, wetlands, storm water retention ponds, and transfer stations, also attract birds and animals. These habitats and land uses can be made less hazardous through design modifications. Of particular note, the City of San Diego operates a landfill aboard MCAS Miramar on leased property south of the runways. It implements best management practices and other measures specifically required by the lease to manage the risk of bird strikes.

Lighting

Bright lights or flashes of light can risk operational safety by distracting pilots and/or temporarily inhibiting a pilot's vision. Vision impairments caused by bright lights can last up to 45 minutes; this is a particular hazard at night when it takes longer for the pilot's eyes to adjust to darkness. Vision impairments are most dangerous when they occur during crucial phases of flight, such as landings, takeoffs, and emergency maneuvers.

More recently, visible lasers used in laser pointers and seasonal lighting displays have been known to interfere with flight operations at airfields across the nation. It can be hard for an installation to identify and address the source of the lasers, especially if the source is mobile or temporary.

Smoke, Dust, Steam

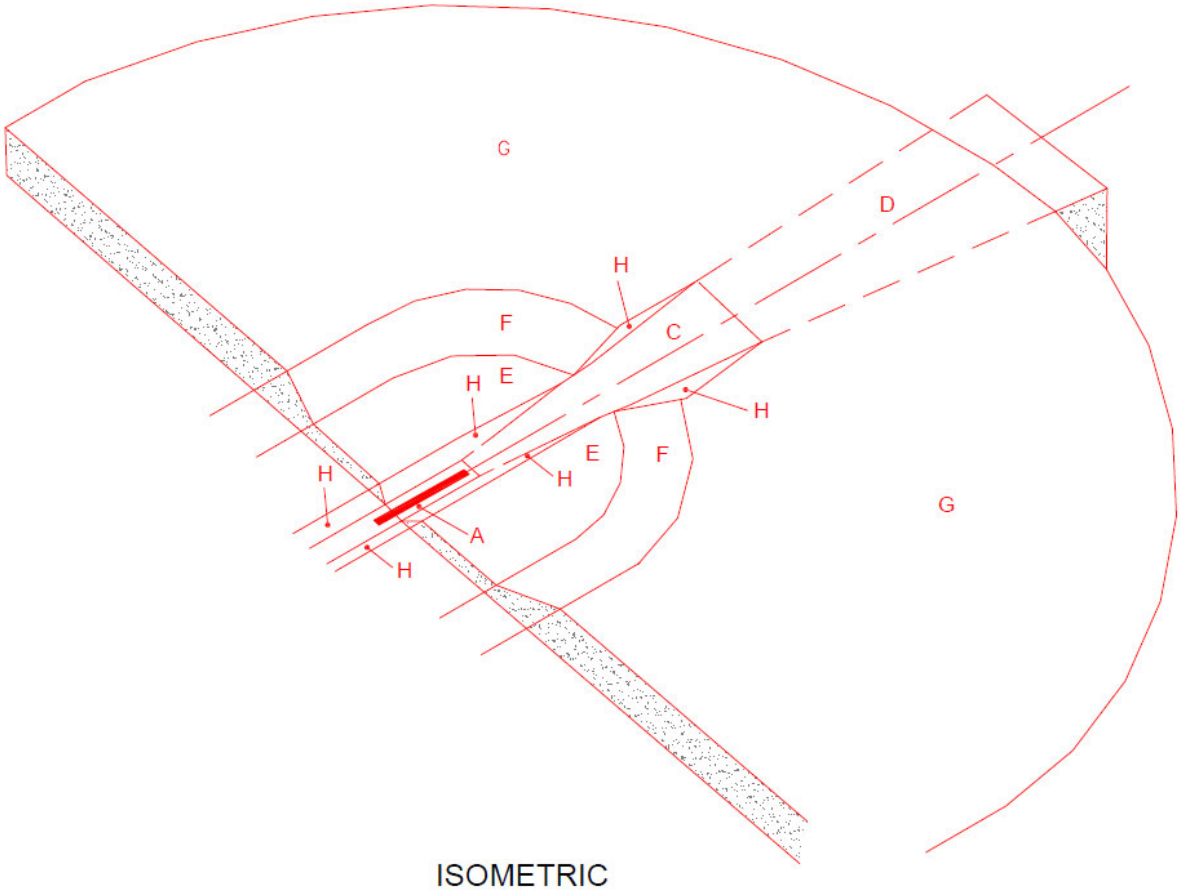
Sources of smoke, dust and steam should not be located near airfields, as they can limit visibility for aircraft operators during low-altitude flight.

Electromagnetic Interference (EMI)

Electromagnetic interference is any electromagnetic disturbance that interrupts or interferes with the performance of electronics/electrical equipment. EMI can be intentional, as in the case of electronic warfare, or unintentional, such as interferences caused by mega-watt wind turbines. Common sources of EMI include television and radio transmissions, vehicles, industrial machinery, and atmospheric phenomena like lighting or solar magnetic storms.

Imaginary Surfaces

Limiting height obstructions of natural features and man-made structures in the area surrounding an airfield reduces the potential for aircraft mishaps during approaches, departures and pattern operations. “Imaginary surfaces” refer to imaginary planes and transition surfaces designated by the FAA in which vertical obstructions like towers, tall buildings, or wind turbines are restricted. Figure 5-3 depicts generic airspace imaginary surfaces for a DON Class B Runway. The FAA also reviews construction proposals in these areas to prevent new vertical obstructions. Imaginary surfaces are assigned to each approach or departure corridor and around the airfield; height restrictions are more stringent closest to the runways and become less stringent moving away from the runways. No aboveground structures may occur in CZs or primary surface zones. The imaginary surfaces for MCAS Miramar’s runways are defined by the UFC 3-260-01, “Airfield and Heliport Planning and Design,” using DON Class B Runway criteria.



A – Primary Surface
B – Clear Zone Surface (Not Shown)
C – Approach Departure Clearance Surface (50:1 Slope Ration)
D – Approach Departure Clearance Surface (Horizontal)
E – Inner Horizontal Surface (45.72 meters [150 ft] Elevation)
F – Conical Surface (20:1 Slope Ratio)
G – Outer Horizontal Surface (152.40 meters [500 ft] Elevation)
H – Transitional Surface (7:1 Slope Ratio)

Source: DoD 2008.

Figure 5-3. Generic Airspace Imaginary Surfaces for DON Class B Runway

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CHAPTER 6
LAND USE COMPATIBILITY ANALYSIS

The APZs and 65 dB and greater CNEL noise contours make up the AICUZ footprint for an air installation. The AICUZ footprint defines the minimum area within which land use controls are recommended to protect the public health, safety, and welfare and to preserve the military flying mission.

6.1 LAND USE COMPATIBILITY GUIDELINES AND CLASSIFICATIONS

Figure 6-1 provides the AICUZ composite footprint for the installation, with the combination of noise contours and APZs overlaid onto a map showing the City of San Diego and associated neighborhoods.

6.1.1 Estimated Population within the AICUZ Footprint

The population estimated to be within the MCAS Miramar AICUZ 2020 footprint is 6,238 (Table 6-1) as of 2016. This estimate was calculated using the most recent U.S. Census Bureau American Community Survey (ACS) data. The ACS is conducted every year to provide up-to-date information about the social and economic needs of a community. The U.S. Census is conducted once every 10 years to provide an official count of the entire U.S. population to Congress. For estimating population, the 2016 ACS data will provide a more up-to-date source than the 2010 U.S. Census.

Table 6-1. Population and Noise Zones, Miramar, California

CNEL dB Noise Zone	Acres	Population (2016)
65 to 70 dB CNEL	4,719	3,028
70 to 75 dB CNEL	4,552	1,768
Greater than 75 dB CNEL	4,221	1,442
TOTAL	**13,492**	**6,238**

Source: U.S. Census Bureau 2016.

6.1.2 Changes Since the Last AICUZ Update

Changes since 2005 warranting an update to the AICUZ are described in Section 1.5, *Changes that Require an AICUZ Update*. The AICUZ 2020 footprint is depicted in Figure 6-1.

6.2 AFFECTED AREAS

6.2.1 Noise

The noise contours have contracted as compared to AICUZ 2005. Areas to the west and north of the installation show some increase off base in the 65 dB CNEL. Areas in the south and southwest are within AICUZ 2005 contours. Refer to Section 4.3 for a more detailed discussion of the changes to the noise contours between 2020 and 2005. Figure 6-2 depicts a comparison between the 2005 and 2020 contours (previously presented in Chapter 4). The 60 dB CNEL is not presented in Figure 6-2 because land use controls do not exist below 65 dB.

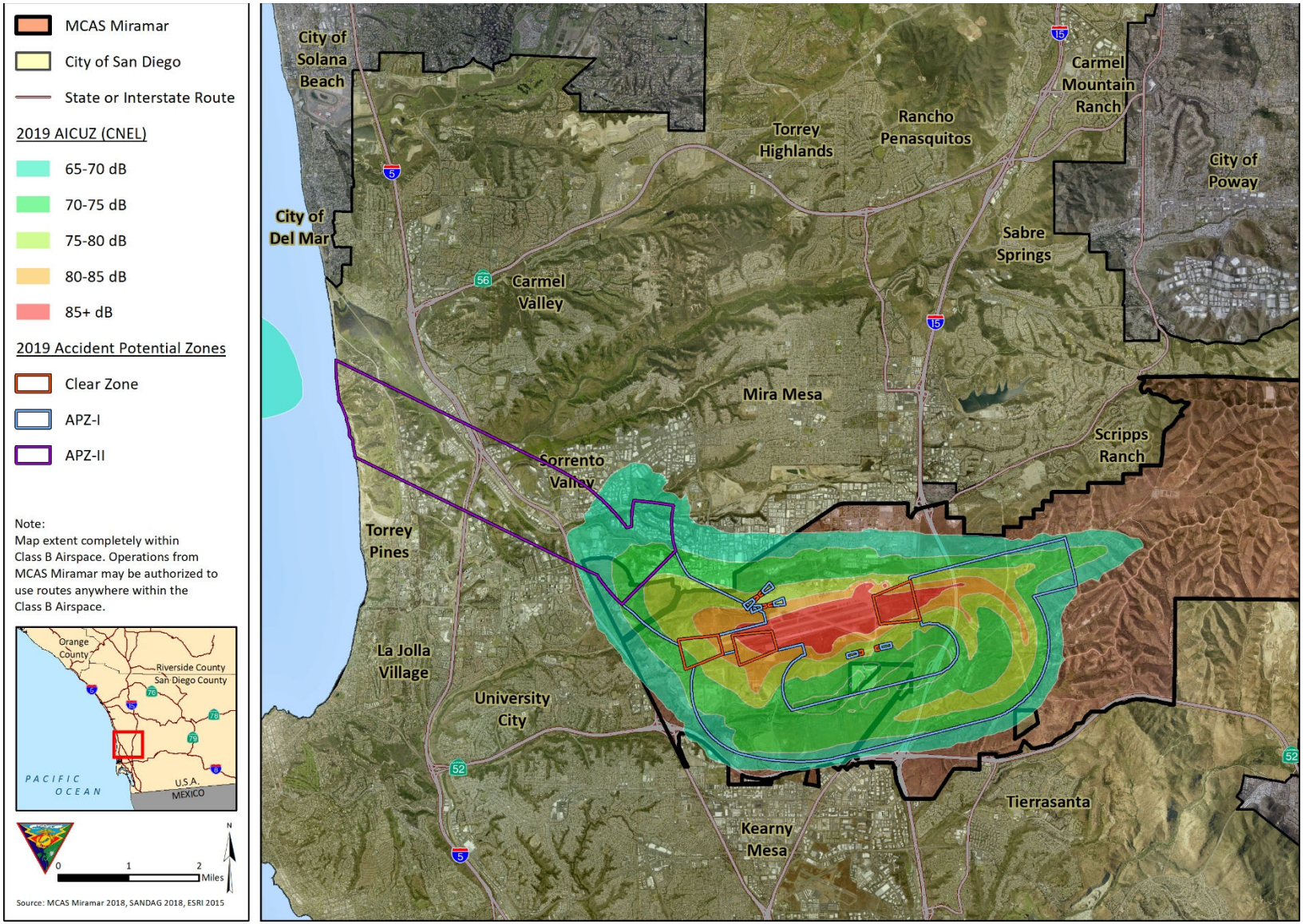

Figure 6-1. MCAS Miramar AICUZ 2020 Footprint

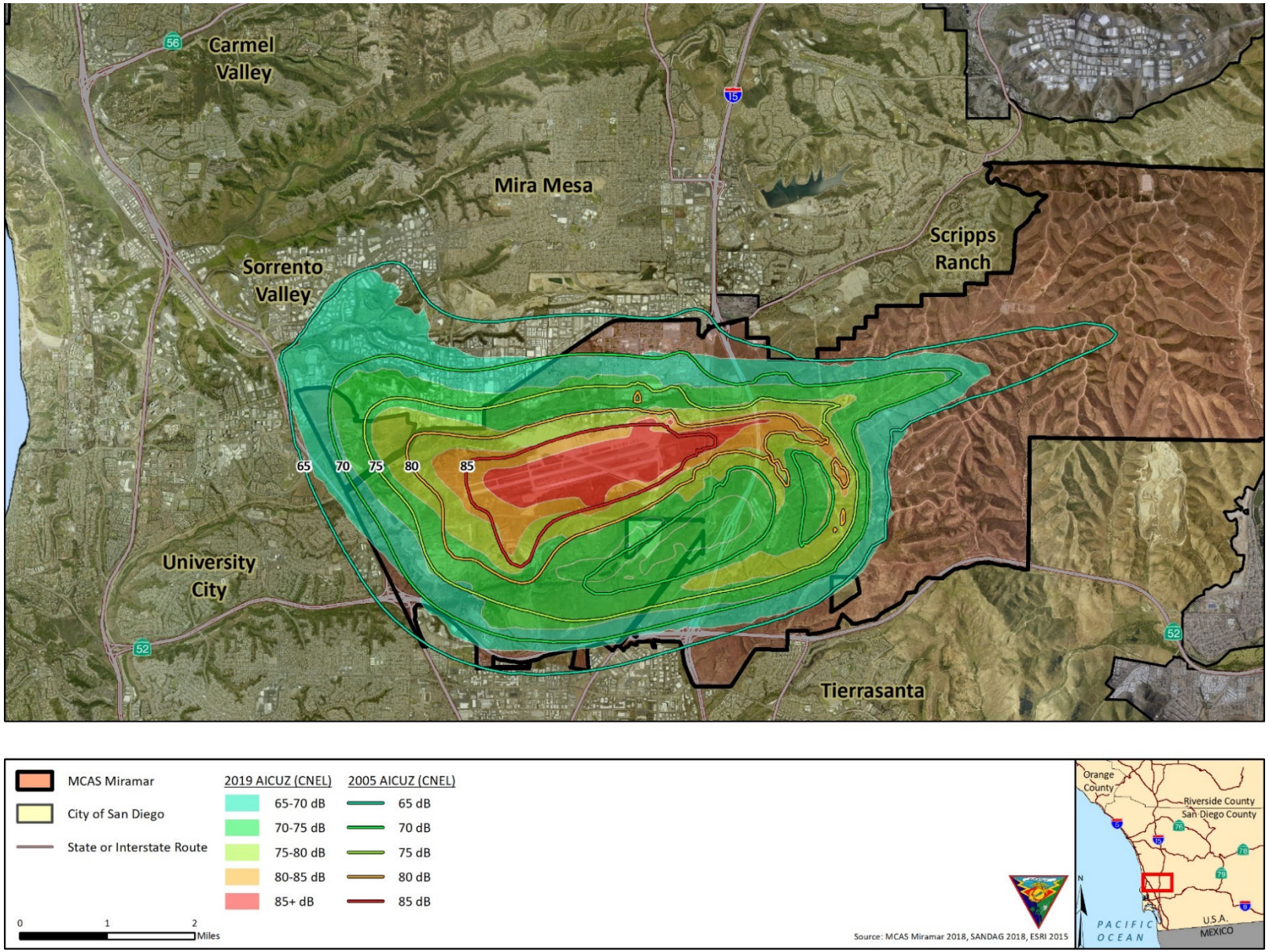

Figure 6-2. Comparison of 2020 CNEL Noise Contours to AICUZ 2005 Contours

6.2.2 Accident Potential Zones

The APZs for AICUZ 2020 are substantially similar to AICUZ 2005 (Figure 6-3). The extended non-standard APZs for both APZ-I and APZ-II are maintained. APZ-I extends slightly farther south at its eastern-most extent, in an area entirely within the installation. Similarly, APZ-II extends slightly farther southwest where it joins APZ-I aboard the northwest portion of the installation. The entire FCLP loop remains APZ-I for 24L/6R.

The CZ for Runway 29 has been removed, as the runway is closed. New rotary-wing CZs and APZ-Is are established for helicopter pads. The LHD also has a CZ and APZ-I established for AICUZ 2020.

6.3 PLANNING AUTHORITIES

It is important to encourage local, state, and regional entities to collaborate and coordinate encroachment mitigation efforts that discourage incompatible development around the installation and training areas. The next section describes the various planning authorities with which MCAS Miramar interacts for this purpose.

6.3.1 Local and State/Regional Government

6.3.1.1 City of San Diego

The City of San Diego's General Plan was comprehensively updated in 2008. It does not change land use designations or zoning on individual properties, but rather provides policy direction for future community plan updates, discretionary project review, and implementation programs.

Individual community plans are a part of the Land Use Element of the General Plan. Community plans provide more detailed land use designations and site-specific policy recommendations than is practical at the city-wide level. Community plans typically address community issues such as the local street and transit network; distinctive environmental characteristics; community landmarks; location, prioritization, and provision of public facilities; community urban design guidelines; and identification of gateways.

Together, the General Plan and the community plans seek to guide future growth and development to achieve city-wide and community level goals. All of the adopted land use plans must be consistent with the goals and policies of the General Plan.

The City of San Diego is comprised of many different communities, formally outlined and identified in individual community planning areas. Community planning groups play a critical role in providing community-based input and recommendations to the City of San Diego's Planning Department on projects within their planning areas. Depending upon the scope of the project and existing land use entitlements, the approval process for land use actions vary greatly and can take place at the ministerial level or can require a vote of the San Diego Planning Commission or City Council.

The Airport Land Use Commission (ALUC) conducts a consistency determination for development projects and actions that occur within the adopted Airport Influence Area (AIA) around airports in San Diego. If the ALUC determines a project is inconsistent, the San Diego City Council may overrule this determination with a two-thirds vote and make specific findings for the project to proceed in accordance with Municipal Code Section 132.1555 (City of San Diego 2012).

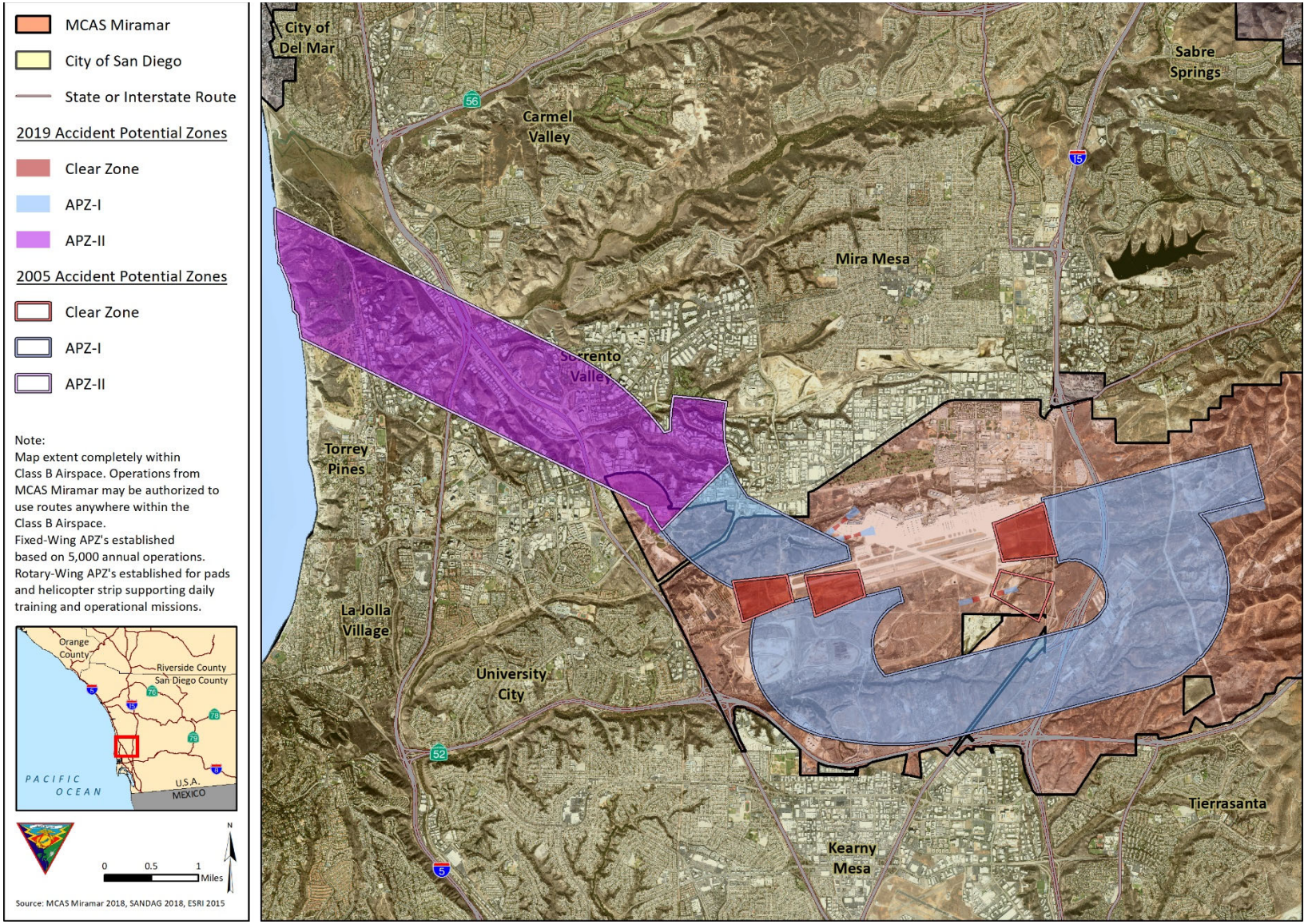

Figure 6-3. Comparison of 2020 APZs to AICUZ 2005 APZs

6.3.1.2 San Diego Association of Governments

San Diego Association of Governments (SANDAG) is a regional planning agency, comprised of cities and county governments within San Diego County. SANDAG builds consensus; makes strategic plans; obtains and allocates resources; plans, engineers, and builds public transportation; and provides information on a broad range of topics pertinent to the region's quality of life and provided data for this AICUZ.

SANDAG is governed by a Board of Directors composed of mayors, councilmembers, and county supervisors from the region's local governments. Supplementing these voting members are advisory representatives from Imperial County, the DoD, Caltrans, San Diego Unified Port District, Metropolitan Transit System, North County Transit District, San Diego County Water Authority, Southern California Tribal Chairmen's Association, and Mexico. Policy Advisory Committees assist the Board of Directors in carrying out the agency's work program (SANDAG 2018c).

6.3.1.3 San Diego County Regional Airport Authority

The San Diego County Regional Airport Authority (SDCRAA) is an independent agency established by Assembly Bill 93 (2001). The SDCRAA is a regional government entity responsible for operating San Diego International Airport and planning for the long-term air transportation needs of the San Diego region. The SDCRAA also serves as the county's Airport Land Use Commission (ALUC). The ALUC is responsible for protecting public health and safety near San Diego's airports through adoption of land use measures that minimize the public's exposure to noise and safety hazards from airport operations. These land use measures are contained in the Airport Land Use Compatibility Plan (ALUCPs) adopted by the ALUC for the public use and military airports in the San Diego region. While the SDCRAA is responsible for the day-to-day operations of the San Diego International Airport, the ALUC has "no jurisdiction over the operation of airports or over existing land uses, regardless of whether or not such uses are incompatible with airport activities" (SDCRAA 2019). However, local agencies with land located in an AIA as defined in the ALUCP must amend their planning documents to conform to the applicable adopted ALUCP. Each AIA is defined in accordance with guidance from the California Airport Land Use Planning Handbook (Caltrans 2011), and includes considerations of noise, safety, airspace protection, and overflight factors (SDCRAA 2019). The SDCRAA is governed by a board of nine appointed members who serve three-year terms, along with three *ex officio* members from the community, including a DON representative. The composition of the board is defined in Assembly Bill 93 and includes mayors or their appointees from the City and County of San Diego, and representatives from the North County Inland area, North County Coastal area, and South County area of greater San Diego County.

6.4 EXISTING LAND USE

6.4.1 Land Use Compatibility Guidelines

MCO 11010.16 establishes recommended land uses and associated compatibility for noise and safety zones (see Appendix A for the compatibility guidance tables). In determining land use compatibility within MCAS Miramar's noise zones and APZs, existing land uses near the airfield were examined to analyze whether existing land use is compatible with current aircraft operations (Figure 6-4). Appendix A provides the Marine Corps land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from MCO 11010.16.

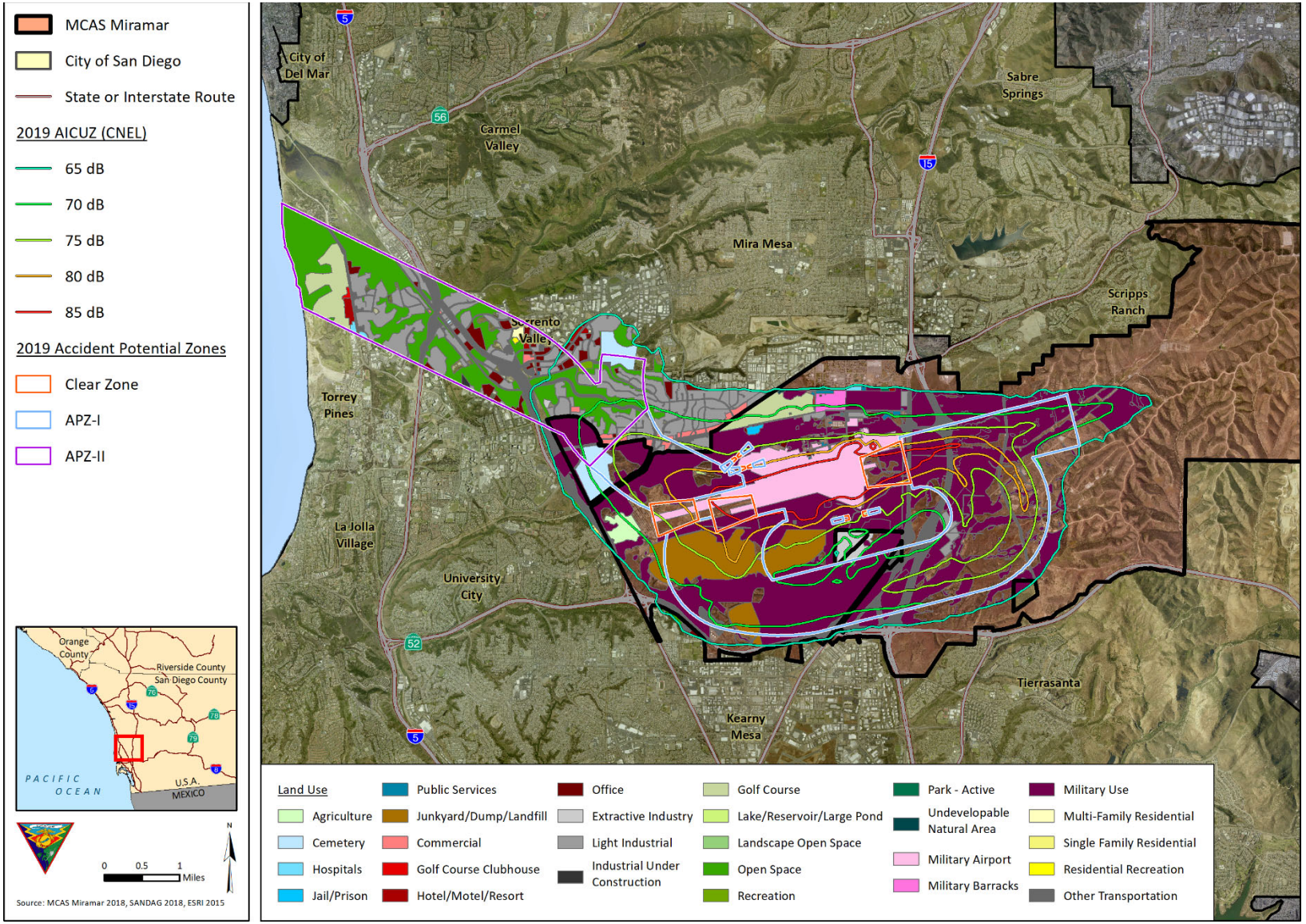

Figure 6-4. Existing Land Use in AICUZ 2020 Footprint

6.5 FUTURE LAND USE AND ZONING

The proposed land uses addressed in this chapter are based on adopted community plans and general plans associated with each city or unincorporated area as documented by SANDAG. The 2018 Regional Economic Growth Forecast prepared by SANDAG projects region-wide totals for population, housing and employment for a 30-year period (out to 2050). Figure 6-5 illustrates the future land uses within the AICUZ 2020 footprint.

6.6 COMPATIBILITY OVERVIEW

6.6.1 Safety Zones

Figure 6-6 displays the compatibility analysis for the AICUZ 2020 safety zones. There are incompatibility concerns in the APZs of Runways 24L and 24R. Areas of safety incompatibility depicted on Figure 6-6 fall into three categories:

1) long-standing land uses that predate the Marine Corps arrival at MCAS Miramar.
2) land uses that were not described in a manner that would trigger appropriate review during the city's permitting process; or
3) land uses that the SDCRAA determined were incompatible, but the San Diego City Council overrode the determination under its authority in California Public Utilities Code 21675.1(d).

All CZs are within the installation boundary and there are no land use compatibility concerns. APZ-I for Runway 24R contains certain incompatible uses (commercial, and high and low intensity recreational activities), with the vast number of parcels categorized as conditionally compatible.

6.6.2 Noise Zones

Figure 6-2 presents noise contour changes for AICUZ 2020 compared to AICUZ 2005. Contours have generally contracted with the exception of the 60 dB CNEL contour, but growth in that contour is not a compatibility issue because that contour is not associated with land use recommendations.

Figure 6-7 shows land use compatibility for noise contours that are within the AICUZ 2020 footprint (i.e., 65 dB CNEL and greater). Non-compatible commercial uses are located within the 75 dB CNEL contour. Hotel/resort and single-family residences are non-compatible land uses currently found within the 65 dB CNEL contour. These are areas that would have been considered non-conforming with the AICUZ 2005 contours and are not new for AICUZ 2020.

The land use compatibility for noise zones and APZs has been combined to reflect the highest non-conforming (most incompatible designation) of the two, as depicted in Figure 6-8. All conditionally compatible uses occur to the northwest of MCAS Miramar due to departure aircraft traffic to the west and north. The majority of conditionally compatible areas are commercial development within the APZ-II.

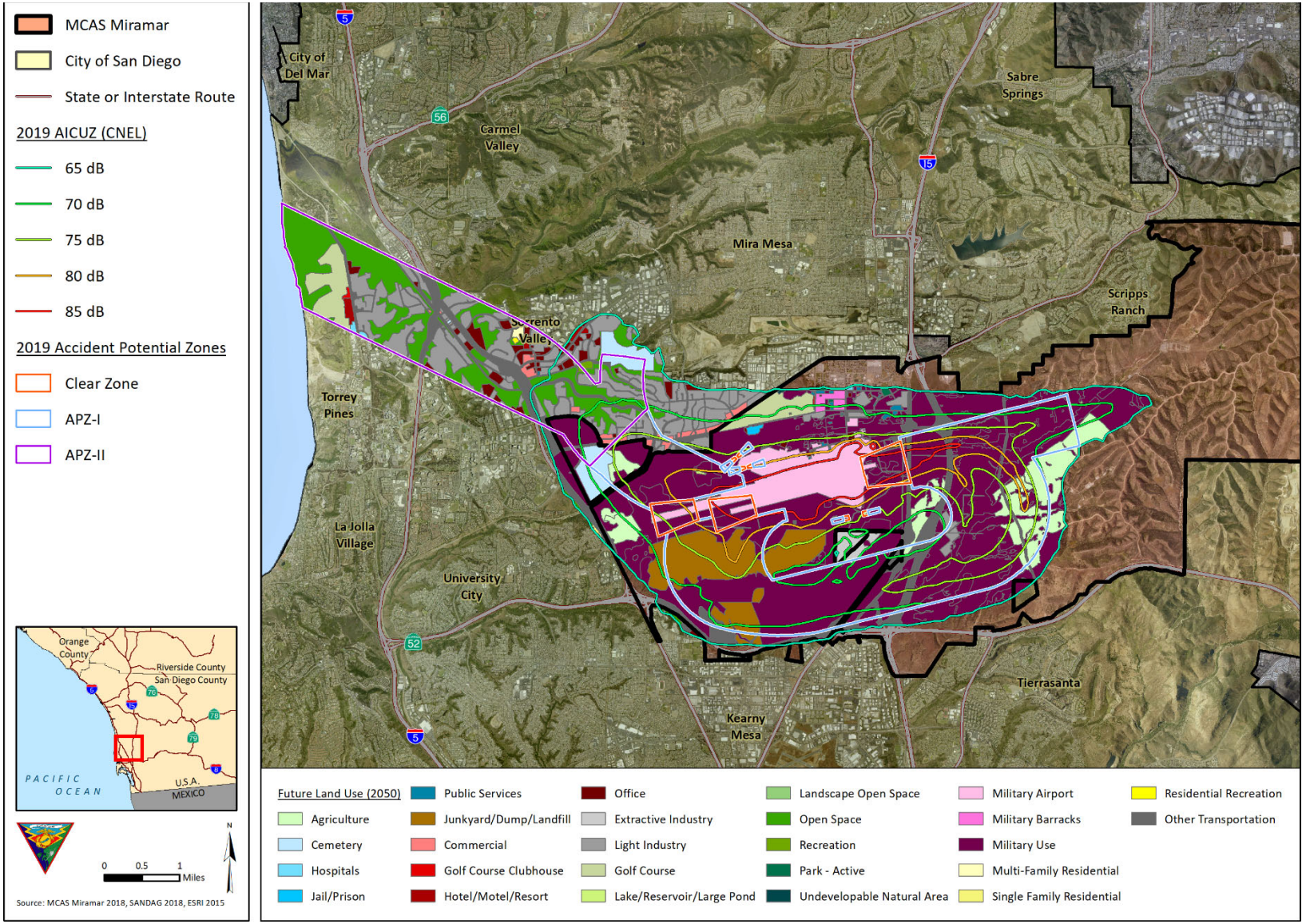

Figure 6-5. Future Land Use in the AICUZ 2020 Footprint

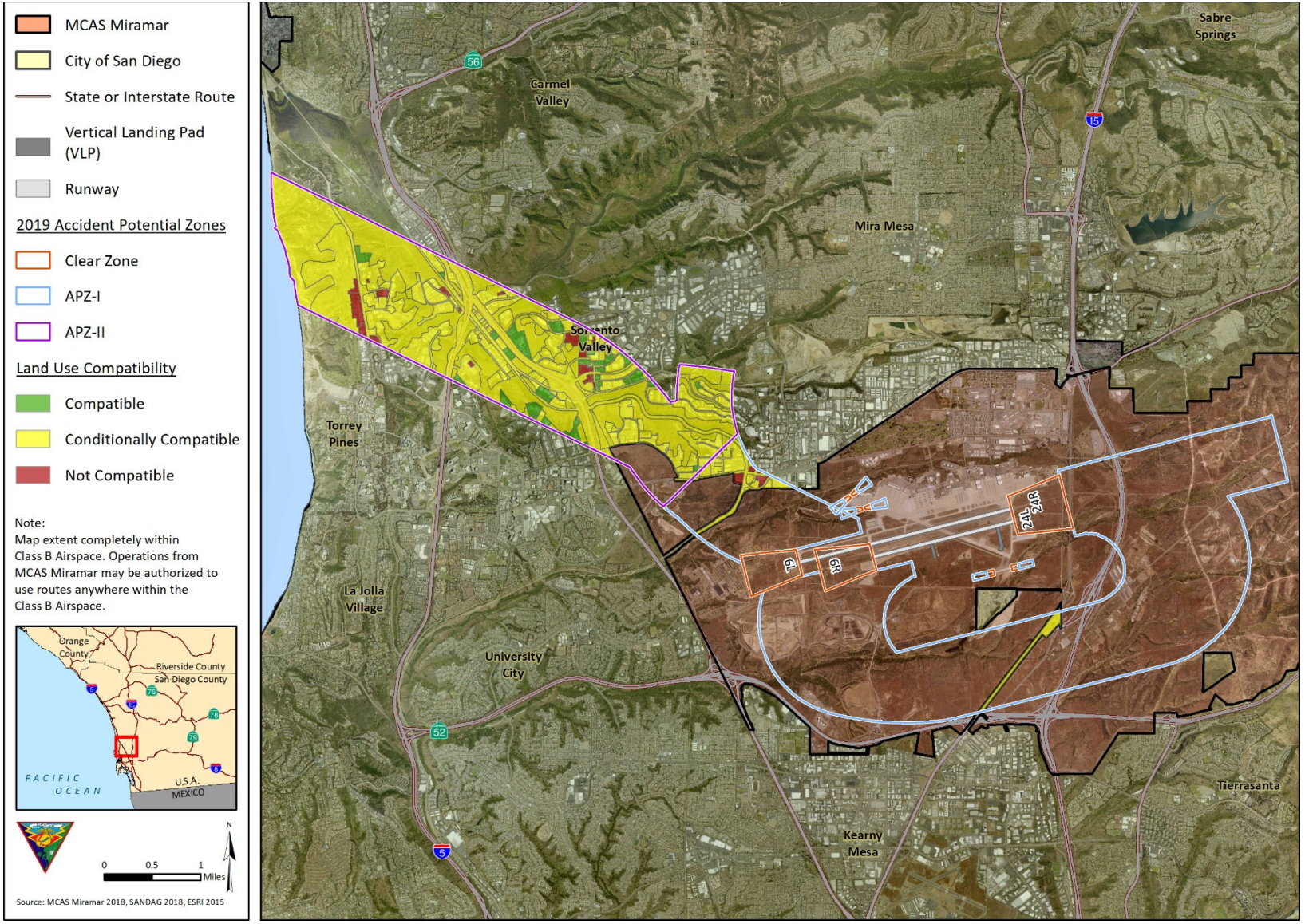

Figure 6-6. 2020 APZs and Land Use Compatibility Analysis

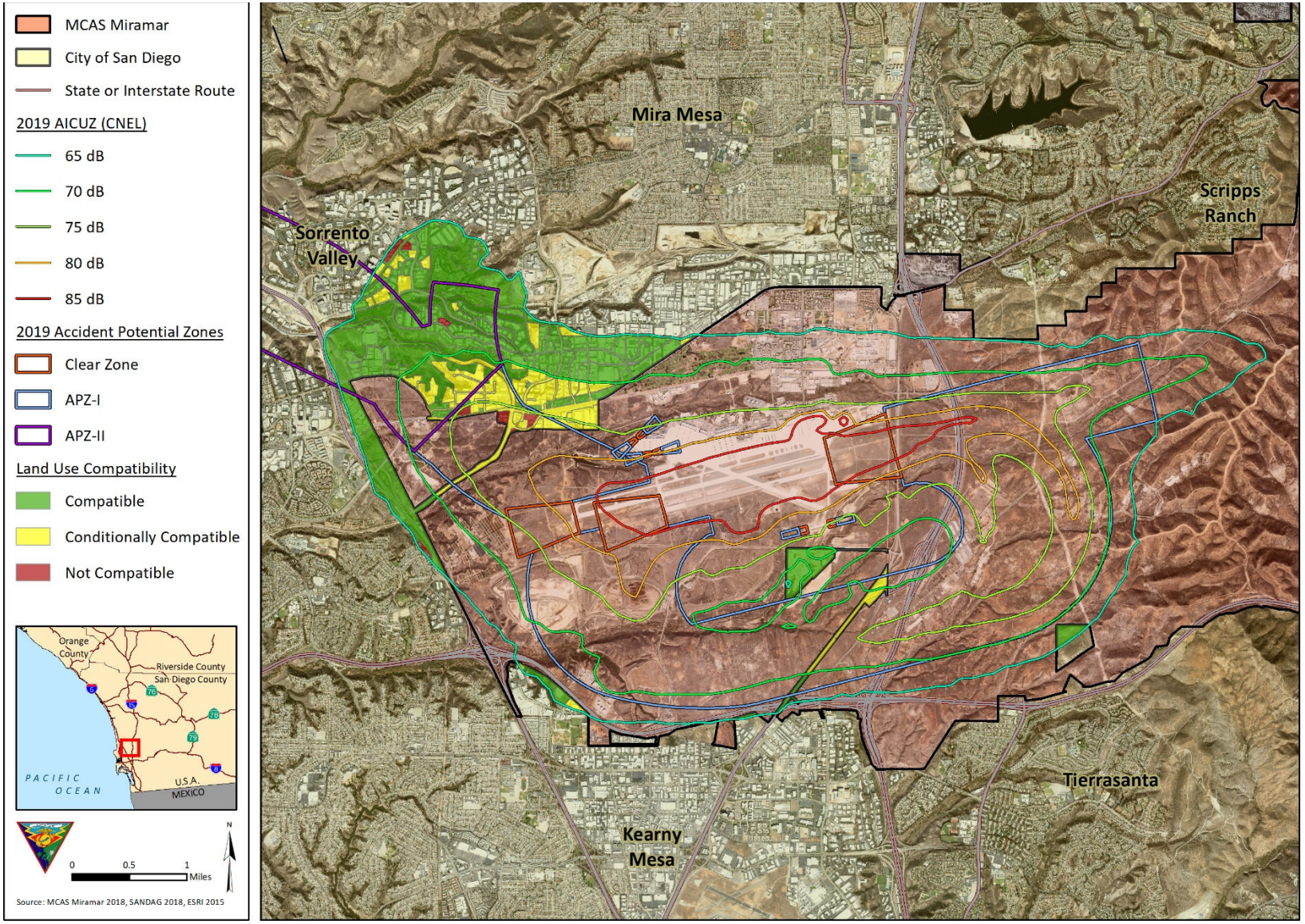

Figure 6-7. 2020 CNEL Noise Contours and Land Use Compatibility Analysis

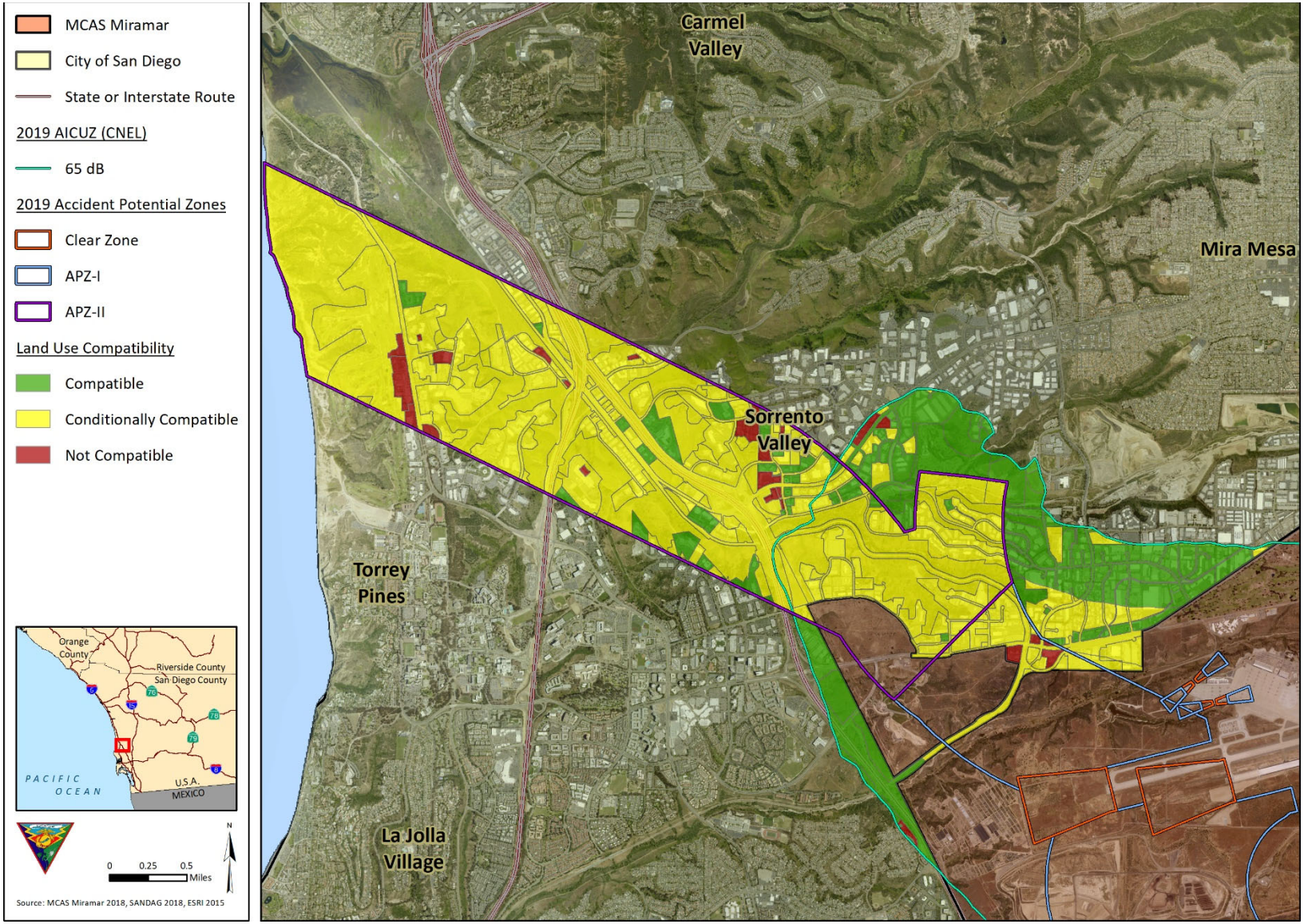

Figure 6-8. Combined 2020 Noise Zone and Accident Potential Zone Compatibility

6.6.3 Potential Future Incompatible Development Threats

From a noise perspective, the risk of future incompatible development is within the relatively small area where the 65 dB CNEL contour lies outside MCAS Miramar boundaries. The City of San Diego implemented the ALUCP which incorporated compatibility standards consistent with AICUZ 2005. These documents have proven generally effective at preventing incompatible development.

The San Diego City Council has the authority to override a consistency determination with a two-thirds vote and has exercised that authority on several occasions since 1998.

6.7 RECOMMENDATIONS

6.7.1 Continue Community Outreach and Engagement

The MCAS Miramar CPLO has long-standing experience conducting outreach and educating and engaging local and regional stakeholders. The CPLO will continue these efforts at every opportunity. These stakeholders include state legislators and other state agencies, as well as local and regional governments, realtors, developers, citizen groups and the public. The MCAS Miramar CPLO will continue to make pertinent presentations to local governments including the planning and zoning agencies. Appropriate subject matter includes the following:

- AICUZ Program
- requirements of military aviation
- air installation operations
- efforts underway and planned to ensure compatible development
- local Command's position on specific land use issues

6.7.2 Continue to Engage in Local Planning Processes

The MCAS Miramar CPLO will continue to be active and engaged with comprehensive and other local planning efforts to have full discussions and, to the extent possible, ensure compatible land uses within the AICUZ footprint. Providing input does not guarantee that it is accepted or agreed to; however, the potential for any mutual collaboration is much improved with participation.

6.7.2.1 MCAS Miramar ALUCP and Airport Influence Area

In accordance with Division 9, Part 1, Chapter 4, Article 3.5, Section 21670 of the California Public Utilities Code, the City and County of San Diego are required to implement an ALUCP for MCAS Miramar. The MCAS Miramar ALUCP was adopted in October 2008 and amended in 2011. The plan was prepared by the SDCRAA and is consistent with the AICUZ 2005 (MCAS Miramar ALUCP 2011). Although AICUZ 2020 results in minor changes to the 65 dB CNEL noise contour and to APZ-II, the adopted ALUCP remains protective and consistent with the AICUZ and USMC does not recommend any changes to the ALUCP at this time.

An important part of the ALUCP is the establishment of an AIA. An AIA is the area in which existing or future airport-related noise, overflight, safety and/or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses.

Figure 6-9 depicts the current MCAS Miramar AIA. The MCAS Miramar AIA includes lands within four general land use jurisdictions: the County of San Diego and the Cities of Poway, San Diego, and Santee. The ALUCP applies not just to the county and cities, but also to other local agencies when these entities consider the siting and design of new facilities or expansion of existing ones. Private parties are subject to the provisions of the ALUCP either directly or as implemented in the plans and zoning of the local agencies (ALUCP 2011).

The City of San Diego Municipal Code 132.1501 *et seq.* provides the regulations for the Airport Environs Overlay District that is consistent with the ALUCP and the state code. The San Diego County Airport Land Use Compatibility Overlay Zone regulates existing use and future development generally in accordance with AICUZ standards (ALUCP 2011).

The county and city regulations limit infill development within the MCAS Miramar AIA, and a real estate disclosure is required of all residential real estate transactions to acknowledge that the property for sale is within the AIA. Projects are required to meet density requirements, which includes providing a deed restriction for maximum intensity on any conditional use proposals.

6.7.3 Actively Participate in Partnerships

The AICUZ process actively seeks to develop collaborative partnerships with the intention of working to mitigate or minimize encroachment impacts to the military mission. This is in addition to any real estate focused acquisition strategies. These partnerships can include local, state, and regional efforts to cooperate and coordinate in managing urban growth, energy, water, transportation, and other cross-jurisdictional or regional issues to consider and mitigate impacts to the military mission.

6.7.4 Continue Noise-Inquiry-Monitoring and Response System

MCAS Miramar maintains a noise complaint hotline and reviews the location and other pertinent details of matters giving rise to the complaints. This review facilitates determination of whether applicable procedures were followed and responsibility for any deviations; identification of trends; and improvement of communication strategies where appropriate.

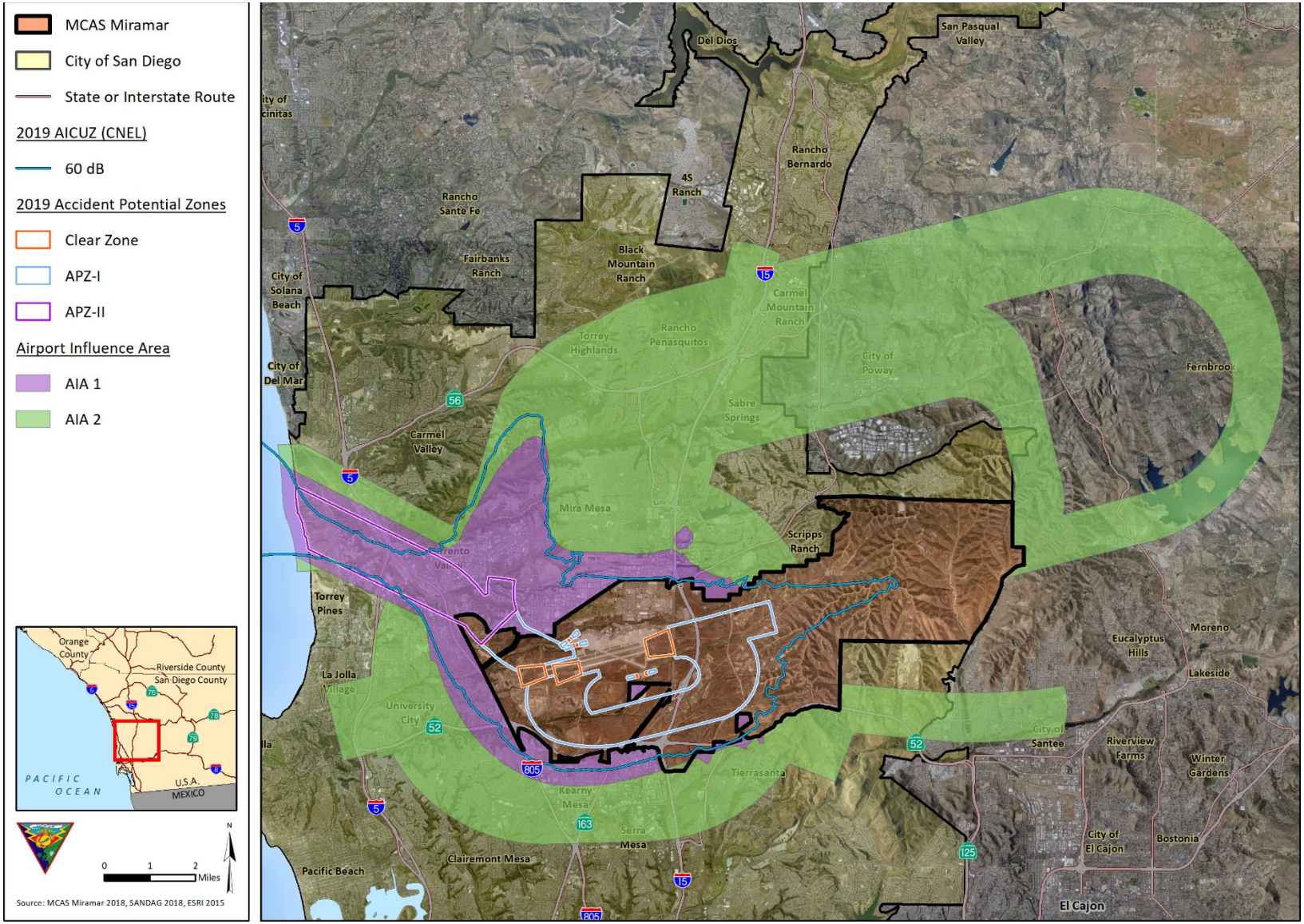

Figure 6-9. Airport Influence Area

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CHAPTER 7
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APPENDIX A
COMPATIBILITY GUIDANCE

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TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
10	***Residential***							
11	Household Units	Y	Y[1]	N[1]	N[1]	N	N	N
11.11	Single units: detached	Y	Y[1]	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	Y	Y[1]	N[1]	N[1]	N	N	N
11.13	Single units: attached row	Y	Y[1]	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	Y	Y[1]	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	Y	Y[1]	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	Y	Y[1]	N[1]	N[1]	N	N	N
11.32	Apartment: elevator	Y	Y[1]	N[1]	N[1]	N	N	N
12	Group quarters	Y	Y[1]	N[1]	N[1]	N	N	N
13	Residential Hotels	Y	Y[1]	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	Y	Y[1]	N	N	N	N	N
15	Transient lodgings	Y	Y[1]	N[1]	N[1]	N[1]	N	N
16	Other residential	Y	Y[1]	N[1]	N[1]	N	N	N
20	***Manufacturing***							
21	Food & kindred products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N

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TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
30	***Manufacturing (continued)***							
31	Rubber and misc. plastic products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	Y	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
40	***Transportation, communication and utilities***							
41	Railroad, rapid rail transit, and street railway transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
43	Aircraft transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
46	Automobile parking	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
47	Communication	Y	Y	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	Y	Y	25[5]	30[5]	N	N
50	***Trade***							
51	Wholesale trade	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade - building materials, hardware and farm equipment	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
53	Retail trade - shopping centers	Y	Y	Y	25	30	N	N
54	Retail trade - food	Y	Y	Y	25	30	N	N
55	Retail trade - automotive, marine craft, aircraft and accessories	Y	Y	Y	25	30	N	N
56	Retail trade - apparel and accessories	Y	Y	Y	25	30	N	N

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TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
57	Retail trade - furniture, home, furnishings and equipment	Y	Y	Y	25	30	N	N
58	Retail trade - eating and drinking establishments	Y	Y	Y	25	30	N	N
59	Other retail trade	Y	Y	Y	25	30	N	N
60	***Services***							
61	Finance, insurance and real estate services	Y	Y	Y	25	30	N	N
62	Personal services	Y	Y	Y	25	30	N	N
62.4	Cemeteries	Y	Y	Y	Y[2]	Y[2]	Y[2,11]	Y[2,11]
63	Business services	Y	Y	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y	Y	Y[2]	Y[2]	Y[2]	N
64	Repair Services	Y	Y	Y	Y[2]	Y[2]	Y[2]	N
65	Professional services	Y	Y	Y	25	30	N	N
65.1	Hospitals, other medical fac.	Y	Y[1]	25	30	N	N	N
65.16	Nursing Homes	Y	Y	N[1]	N[1]	N	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Government Services	Y	Y[1]	Y[1]	25	30	N	N
68	Educational services	Y	Y[1]	25	30	N	N	N
69	Miscellaneous	Y	Y	Y	25	30	N	N
70	***Cultural, entertainment and recreational***							
71	Cultural activities (& churches)	Y	Y[1]	25	30	N	N	N
71.2	Nature exhibits	Y	Y[1]	Y[1]	N	N	N	N
72	Public assembly	Y	Y[1]	Y	N	N	N	N
72.1	Auditoriums, concert halls	Y	Y	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	Y	Y[1]	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y	Y	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	Y	Y	N	N	N
74	Recreational activities (include golf courses, riding stables, water rec.)	Y	Y[1]	Y[1]	25	30	N	N
75	Resorts and group camps	Y	Y[1]	Y[1]	Y[1]	N	N	N
76	Parks	Y	Y[1]	Y[1]	Y[1]	N	N	N
79	Other cultural, entertainment and recreation	Y	Y[1]	Y[1]	Y[1]	N	N	N
80	***Resource Production and Extraction***							
81	Agriculture (except live stock)	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]

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TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
81.5 81.7	Animal breeding	Y	Y	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry Activities	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing Activities	Y	Y	Y	Y	Y	Y	Y
85	Mining Activities	Y	Y	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y	Y	Y

KEY TO TABLE 1 - SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

SLUCM	Standard Land Use Coding Manual, U.S. Department of Transportation
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
Y[x] (Yes with Restrictions)	The land use and related structures are generally compatible. However, see note(s) indicated by the superscript.
N[x] (No with exceptions)	The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
NLR (Noise Level Reduction)	NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	The numbers refer to NLR levels. Land Use and related structures generally compatible however, measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.
DNL	Day Night Average Sound Level.
CNEL	Community Noise Equivalent Level (normally within a very small decibel difference of DNL)
Ldn	Mathematical symbol for DNL.

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NOTES FOR TABLE 1 - SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES

1. General

a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65 to 69 and strongly discouraged in DNL 70 to 74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.

b. Where the community determines that these uses must be allowed measures to achieve and outdoor to indoor NLR of at least 25 Decibels (dB) in DNL 65 to 69 and NLR of 30 dB in DNL 70 to 74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75 to 79.

c. Normal permanent construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design and use of berms and barriers can help mitigate outdoor noise exposure NLR particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the

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public is received, office areas, noise sensitive areas or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. No buildings.

7. Land use compatible provided special sound reinforcement systems are installed.

8. Residential buildings require a NLR of 25

9. Residential buildings require a NLR of 30.

10. Residential buildings not permitted.

11. Land use not recommended, but if community decides use is necessary, hearing protection devices should be worn.

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TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1]

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
10	[illegible]				
11	Household Units				
11.11	Single units: detached	N	N	Y[2]	Max density of 1-2 Du/Ac
11.12	Single units: semidetached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential Hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	[illegible]				
21	Food & kindred products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
22	Textile mill products; manufacturing	N	N	Y	Same as above
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Same as above
26	Paper and allied products; manufacturing	N	Y	Y	Same as above
27	Printing, publishing, and allied industries	N	Y	Y	Same as above
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	[illegible] (continued)				

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TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1]

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
31	Rubber and misc. plastic products; manufacturing	N	N	N	
32	Stone, clay and glass products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Same as above
34	Fabricated metal. products; manufacturing	N	N	Y	Same as above
35	Professional scientific, & controlling instrument; photographic and optical goods; watches & clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
40	Transportation, communication and utilities [2]				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[5]	Y	Same as above.
42	Motor vehicle transportation	N	Y[5]	Y	Same as above
43	Aircraft transportation	N	Y[5]	Y	Same as above
44	Marine craft transportation	N	Y[5]	Y	Same as above
45	Highway and street right-of-way	N	Y[5]	Y	Same as above
46	Auto parking	N	Y[5]	Y	Same as above
47	Communication	N	Y[5]	Y	Same as above
48	Utilities	N	Y[5]	Y	Same as above
485	Solid waste disposal (Landfills, incineration, etc.)	N	N	N	
49	Other transport, comm. and utilities	N	Y[5]	Y	See Note 5 below
50	Trade				
51	Wholesale trade	N	Y	Y	Max FAR of 0.28 in APZ I. & .56 in APZ II.
52	Retail trade - building materials, hardware and farm equipment	N	Y	Y	See Note 6 below
53	Retail trade - Shopping centers, Home Improvement Store, Discount Club, Electronics Superstore	N	N	Y	Max FAR of 0.16 in APZ II
54	Retail trade - food	N	N	Y	Max FAR of 0.24 in APZ II

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TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1]

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
55	Retail trade - automotive, marine craft, aircraft and accessories	N	Y	Y	Max FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade - apparel and accessories	N	N	Y	Max FAR 0.28 in APZ II
57	Retail trade - furniture, home, furnishings and equipment	N	N	Y	Same as above
58	Retail trade - eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Max FAR of 0.16 in APZ II
[illegible]	[illegible]				
61	Finance, insurance and real estate services	N	N	Y	Max FAR of 0.22 for "General Office/Office park" in APZ II
62	Personal services	N	N	Y	Office uses only. Max FAR of 0.22 in APZ II.
62.4	Cemeteries	N	Y[9]	Y[9]	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Max FAR of 0.22 in APZ II
63.7	Warehousing and storage services	N	Y	Y	Max FAR 1.0 APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Max FAR of 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Max FAR of 0.24 in APZ II
68	Educational services	N	N	N	
69	Miscellaneous	N	N	Y	Max FAR of 0.22 in APZ II
70	Cultural, entertainment and recreational				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[10]	Y[10]	
72	Public assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	

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TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES
SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES [1]

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements - fairgrounds, miniature golf, driving ranges; amusement parks, etc	N	N	Y	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[10]	Y[10]	Max FAR of 0.11 APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[10]	Y[10]	Same as 74
79	Other cultural, entertainment and recreation	N	Y[9]	Y[9]	Same as 74
80	[illegible]				
81	Agriculture (except live stock)	Y[4]	Y[11]	Y[11]	
81.5, 81.7	Livestock farming and breeding	N	Y[11,12]	Y[11,12]	
82	Agriculture related activities	N	Y[11]	Y[11]	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
83	Forestry Activities [13]	N	Y	Y	Same as Above
84	Fishing Activities [14]	N[14]	Y	Y	Same as Above
85	Mining Activities	N	Y	Y	Same as Above
89	Other resource production or extraction	N	Y	Y	Same as Above
90	Other				
91	Undeveloped Land	Y	Y	Y	
93	Water Areas	N[15]	N[15]	N[15]	

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KEY TO TABLE 2 - SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES

SLUCM -	Standard Land Use Coding Manual, U.S. Department of Transportation
Y (Yes) -	Land use and related structures are normally compatible without restriction.
N (No) -	Land use and related structures are not normally compatible and should be prohibited.
Yx - (Yes with restrictions)	The land use and related structures are generally compatible. However, see notes indicated by the superscript.
Nx - (No with exceptions)	The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
FAR - Floor Area Ratio	A floor area ratio is the ratio between the square feet of floor area of the building and the site area. It is customarily used to measure non-residential intensities.
Du/Ac - Dwelling Units per Acre	This metric is customarily used to measure residential densities.

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NOTES FOR TABLE 2 - SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES

The following notes refer to Table 2.

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ I, and 50 per acre in APZ II are the range of occupancy levels, including employees, considered to be low density. Outside events should normally be limited to assemblies of not more that 25 people per acre in APZ I, and Maximum (Max) assemblies of 50 people per acre in APZ II.

2. The suggested Max density for detached single-family housing is one to two Du/Ac. In a Planned Unit Development (PUD) of single family detached units where clustered housing development results in large open areas, this density could possibly be increased provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.

3. Other factors to be considered: labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting), buildings or aboveground utility/communications lines should normally be located in clear zone areas on or off the installation. The clear zone is subject to severe restrictions. See UFC 3-260-01, "Airfield and Heliport Planning and Design" dated 10 November 2001 for specific design details.

5. No passenger terminals and no major above ground transmission lines in APZ I.

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6. Within SLUCM Code 52, Max FARs for lumber yards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-II. For hardware/paint and farm equipment stores, SLUCM Code 525, the Max FARs are 0.12 in APZ-I and 0.24 in APZ-II.

7. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super regional facilities anchored by small businesses, supermarket or drug store, discount retailer, department store, or several department stores, respectively. Included in this category are such uses as big box discount clubs, home improvement superstores, office supply superstores, and electronics superstores. The Max recommended FAR for SLUCM 53 should be applied to the gross leasable area of the shopping center rather than attempting to use other recommended FARs listed in Table 2 under "Retail" or "Trade."

8. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc., are not recommended.

9. No chapels are allowed within APZ I or APZ II.

10. Facilities must be low intensity, and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc. are not recommended.

11. Includes livestock grazing, but excludes feedlots and intensive animal husbandry. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

12. Includes feedlots and intensive animal husbandry.

13. Lumber and timber products removed due to establishment, expansion, or maintenance of clear zones will be disposed of in accordance with appropriate DoD Natural Resources instructions.

14. Controlled hunting and fishing may be permitted for the purpose of wildlife management.

15. Naturally occurring water features (e.g., rivers, lakes, streams, (wetlands) are compatible.

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