

**FINAL
Air Installations
Compatible Use Zones Study
Naval Air Weapons Station
China Lake, California**



April 2011

Prepared for:

UNITED STATES DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command, Southwest
San Diego, California

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Executive Summary

The issue of incompatible land use adjacent to military air installations is a growing concern to the Navy. The increase of incompatible land use and development around airfields, generally referred to as encroachment, has the potential to seriously constrain an installation's mission capability.

At the Naval Air Weapons Station China Lake (NAWS), land development in areas adjacent to Armitage Airfield has increased in recent years. Fortunately, this growth has not yet resulted in serious constraints on the NAWS mission. The opportunity still exists to proactively manage surrounding land use development to meet the growth needs of local communities and protect the sustainability of the NAWS mission through the implementation and maintenance of compatible land use policies and practices.

This Air Installations Compatible Use Zones (AICUZ) Study highlights this opportunity and offers recommended strategies and planning tools that can be applied by local agencies to promote compatible land use development before encroachment becomes a serious problem at NAWS. The study examines various planning parameters related to aircraft operations, noise, and safety, and provides an analysis of land use compatibility in both on- and off-base properties.

An AICUZ study was prepared and approved for NAWS in 1977 and updated in 2007. Kern County and the City of Ridgecrest evaluated the AICUZ recommendations and enacted compatible land use provisions into their zoning ordinances and General Plan documentation. NAWS maintains a positive relationship with local agencies and anticipates being able to work with local authorities to accomplish similar coordination and adoption of the results and recommendations of this 2011 AICUZ study update.

AICUZ studies should be updated when an air installation mission is modified, has a significant change in aircraft operations (i.e., the number of take-offs and landings), a change in the type of aircraft stationed and operating at the installation, or changes in flight paths or procedures. The 2007 AICUZ study adopted a shift of departure tracks 14D1, 21D1, 26D1 and 32D1 west of the Jacks Ranch Road “consolidated departure alternative.” Since the 2007 AICUZ study was completed, the aircraft mix projected to be stationed at NAWS, noise modeling assumptions, and operations modeled for their contribution to noise at NAWS have changed. Both the 2007 AICUZ and the 2011 AICUZ study update model

the operational tempo—a 25% increase in airfield and range flight operations—as the preferred operational scenario analyzed in NAWS' *Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans*, completed in 2004 (hereafter referred to as the 2004 EIS). Since the 2007 AICUZ was completed, several noise studies have modeled operational changes at NAWS.

- A November 2008 noise study modeled Baker Range sorties, one-to-one replacement of the EA-6B Prowler with the EA-18G Growler, the introduction of the F-35 Lightning II (JSF) aircraft, a reduction of FA-18C/D “Legacy” Hornet and AV 8B Harrier aircraft operations, as well as a 25% increase in Armitage Airfield flight operations. This noise study also modeled the ground around NAWS as “acoustically hard” in order to more accurately reflect the desert surrounding the airfield. The hard-packed desert terrain/ground in the vicinity of Armitage Airfield is closer in impedance to the “acoustically hard” than “acoustically soft” impedance model setting. Soft impedance is primarily for grass-covered ground.
- The August 2009 noise study incorporated the changes modeled in the November 2008 noise study as well as the updated noise profiles for the F-35 aircraft and updated flight profiles and also modeled noise dispersion around departure flight tracks and noise at more points surrounding NAWS.

The currently adopted 2007 AICUZ study requires updating because of the changes modeled by the November 2008 and August 2009 noise studies and the updated F-35 Lightning II noise profiles and altered flight tracks. The changes in aircraft type and numbers, noise modeling assumptions, and operations influence the noise contours and accident potential zones (APZs) of NAWS.

Baker Range covers 121 square miles (313 square kilometers) in the western portion of North Range. Baker Range is used primarily for test and evaluation (T&E) and training for air-to-surface weapon systems (e.g., rockets, bombs, guns), but also supports weapons system software validation, weapons ballistics, fuse functioning, and pilot proficiency in air-to-surface weapons delivery. Most bombs, rockets, and gunnery used on Baker Range are inert; however, high explosive (HE) ordnance can be dropped on B1-A and B-2 target areas.

ES.1 Safety

This 2011 AICUZ study defines standard APZs and evaluates other key issues associated with flight safety in and around Armitage Airfield. In addition to the traditional APZs immediately surrounding the runways, the study addresses safety concerns within the flight route corridors used by aviators for approaches and departures to and from the airfield (defined as the Military Influence Area [MIA]) and the Baker Range sorties.

ES.2 Noise

The 2011 AICUZ study update reports the results of the February 2010 Wyle Noise Report, WR 08-08R (Wyle Laboratories, Inc. 2010). The 2010 noise study was initiated to investigate the noise contributions of the F-35 and to evaluate the technical modeling assumptions of the noise analysis presented in the 2007 AICUZ study.

This AICUZ study update includes noise modeled from Baker Range sorties and modeling assumptions that include terrain, ground impedance, and departure dispersion that more accurately reflect the noise generated from aircraft operations. Noise from Baker Range aircraft operations is included within this AICUZ study because departures from Baker egress sorties over-fly private land within Kern County at relatively low altitudes. Modeling assumptions for the 2011 AICUZ study update capture noise exposure that results from terrain surrounding NAWS (i.e., elevation gains and losses), attenuation of noise on vacant desert (referred to as ground impedance), and a greater number of dispersed flight tracks along primary departure corridors to more accurately reflect the way pilots fly.

The increase in noise exposure from the 2007 AICUZ study to the 2011 AICUZ study update is primarily attributed to incorporating Baker Range sorties as well as the terrain and ground impedance in the noise model for this report (Wyle Laboratories Inc. March 30, 2010). This 2011 AICUZ study update has been prepared in consideration of expected changes in mission, the number and type of aircraft, operational levels, and other aspects that will occur within the next five- to ten-year planning period (i.e., a 2015 to 2020 planning horizon). The projected scenario presented in this AICUZ study update is defined as the operational conditions expected to occur within the next five- to ten-year planning period, as described above. The 2011 AICUZ noise contours represent the noise environment at NAWS under the projected scenario.

ES.3 Land Use Compatibility

This study defines two different AICUZ planning areas surrounding Armitage Airfield. These include the AICUZ footprint and the MIA. The 2011 AICUZ footprint defines airfield and range operations noise and the accident potential footprint based on projected operations. The MIA, as defined in land use maps of the City of Ridgecrest 2010 General Plan Update, more thoroughly addresses regional safety issues. Using accepted Navy guidelines, current zoning designations in the 2011 AICUZ footprint are evaluated for land use compatibility. The results of the analysis show that several areas of concern are currently zoned to allow development of incompatible land uses.

ES.4 Recommendations

The following recommendations promote continued compatible development and seek to limit or prevent future incompatible development and potential encroachment resulting from changes in land use controls/zoning regulations.

Recommendations for NAWS Action

1. Amend NAWS Comprehensive Land Use Management Plan (CLUMP) to incorporate AICUZ operational profiles and noise and safety conditions into existing land management practices, including the site approval process, environmental review process, and Capital Improvements Program.
2. Maintain and enhance NAWS community information programs and AICUZ outreach efforts to address agency and public information needs.
3. Continue the implementation of the NAWS noise complaint response program to address and respond to public inquiries regarding NAWS air operations.
4. Continue implementation of the NAWS air operations noise abatement and aircrew education programs to minimize noise and flight safety impacts on and off-base.
5. Formalize flight safety incident database. Maintain database in accordance with Secretary of the Navy Instruction 5720.42F.

Recommendations for City and County Action

1. Continue to provide California Environmental Quality Act (CEQA) notifications to NAWS for review and comment on city and county discretionary land use actions, including General/Specific Plan amendments, Zone Changes, Tract Maps, Parcel Maps, Specific Development Plans, and Conditional Use Permits.
2. Amend and adopt the existing Kern County Airport Land Use Compatibility Plan (ALUCP) – Military Aviation Section for NAWS, to include specific criteria, policies, and maps for use in evaluating projects, and provide a copy of the amended ALUCP to Cal Trans Department of Aeronautics, School Districts, and Special Districts.
3. The 2007 AICUZ study MIA and land use compatibility recommendations have been adopted by the 2010 Ridgecrest General Plan Update. City and county planners are encouraged to maintain the MIA as a valid planning tool to ensure future mission compatibility and to consider the most recent AICUZ study during plan updates. Salient components of this AICUZ study should be added to the Military Sustainability Element of the Kern County General Plan and the proposed Indian Wells Valley Specific Plan. Planners are encouraged to develop and adopt specific policies and procedures to address compatible land uses (type, density, etc.) and air operations safety considerations (height obstructions, glare and smoke, electronic emissions, bird attractants, etc.), and to identify appropriate densities of new residential development and minimize sensitive types of land use within the flight corridors and areas of increased risk.

4. Develop and implement a policy requiring a site-specific evaluation for any proposed General Plan Amendments or zoning changes that would create residential projects or increase allowable density of existing designated residential development in an area identified as impacted by noise or safety concerns and require appropriate notification of potential aircraft noise and flight safety risk to realtors, buyers, sellers, and residents of land within the MIA and the 2011 ACIUZ footprint.
5. Create specific policies for the General/Specific Plan that address restrictions on the location of sensitive receptors such as schools, day care centers, apartments, hospitals, nursing homes, and senior living facilities in relation to noise contours.

Recommendations for Bureau of Land Management Action

Incorporate appropriate elements of this AICUZ study into the next amendment of the BLM's California Desert Conservation Area Plan. Involve NAWS in planning associated with the development of cooperative agreements, proposed changes to land use type or intensity, and sales and transfers related to excess land parcels located within or adjacent to the MIA.

Recommendations for all AICUZ Participants

Work with local and regional governments to implement the R-2508 Joint Land Use Study (JLUS). The R-2508 Airspace Complex JLUS identifies viable strategies to promote mutually compatible land use in proximity to NAWS and within the R-2508 airspace to reduce potential conflicts with the DoD military mission, sustain regional economic health, and protect public health and safety in the region.

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List of Abbreviations and Acronyms

AB	Assembly Bill
ABD	average busy day
AEA	airborne electronic attack
agl	above ground level
AICUZ	Air Installations Compatible Use Zones
AIMD	Aircraft Intermediate Maintenance Division
ALUCP	Airport Land Use Compatibility Plan
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANSI	American National Standards Institute
APCD	Air Pollution Control District
APZ	accident potential zone
ASO	Air Safety Officer
ATCAA	Air Traffic Control Assigned Airspace
BASH	Bird/Aircraft Strike Hazard
BHC	Bird Hazard Condition
BHWG	Bird Hazard Working Group
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNIC	Commander Naval Installations Command
CLUMP	Comprehensive Land Use Management Plan
CNEL	Community Noise Equivalent Level

List of Abbreviations and Acronyms (cont.)

CZ	clear zone
DNL	day-night average sound level
dB	decibel
DoD	Department of Defense
DON	Department of the Navy
DPZ	drop potential zone
EIS	Environmental Impact Statement
EMCON	Emission Control
EMI	electromagnetic interference
EPMD	Environmental Planning and Management Department
FAA	Federal Aviation Administration
FAR	Floor Area Ratio
FAS	Federation of American Scientists
FCLP	Field Carrier Landing Practice
FLOLS	Fresnel Lens Optical Landing System
GP	General Plan
GPS	global positioning system
HARM	High-Speed Anti-Radiation Missile
HE	high explosive
HERO	Hazards of Electromagnetic Radiation to Ordinance
HIRL	High-Intensity Runway Light
IFR	Instrument Flight Rules
JDAM	Joint Direct Attack Munitions
JLUS	Joint Land Use Study
JSOW	Joint Standoff Weapon
MIA	Military Influence Area

List of Abbreviations and Acronyms (cont.)

MOA	Military Operations Area
msl	mean sea level
NAVAIR	Naval Air Systems Command
NAVFAC	Naval Facilities Engineering Command
NAWCWD	Naval Air Warfare Center Weapons Division
NAWS	Naval Air Weapons Station China Lake
NAWSINST	Naval Air Weapons Station Instruction
NLR	noise-level reduction
NM	nautical miles
NTC	National Training Center
OPNAVINST	Chief of Naval Operations Instruction
OPR	Office of Planning and Research
PAPI	Precision Approach Path Indicator
RA	Restricted Area
RDM	Runway Distance Marker
RDT&E	Research, Development, Test, and Evaluation
RSP	recreation, schools, and public use
SB	Senate Bill
SEL	sound exposure level
SUA	special use air space
TACAN	Tactical Air Navigation
TERPS	Terminal Instrument Procedures
TJS	Tactical Jamming System
UFC	Unified Facilities Criteria
U.S.C.	United States Code
V/STOL	Vertical/Short Takeoff and Landing

List of Abbreviations and Acronyms (cont.)

WSSA Weapon System Support Activity

1

Introduction

Throughout the history of U.S. military aviation, airfields have often been located in relatively isolated areas surrounded by agricultural or other undeveloped land areas. As such, military aircraft test and training operations were able to accommodate evolving mission requirements with a minimum of constraint. This situation began to change during the post-World War II era as rapid population growth and economic development fueled the creation and expansion of civilian communities in closer proximity to military installations. As these communities grew, they increasingly encroached upon the once-isolated airfields. The problem of encroachment is a serious concern for the Navy because of potential impacts to established operational capabilities. Incompatible land use development in close proximity to military aircraft operations increases the safety risk and level of annoyance experienced by civilian populations. Navy experience has demonstrated that the presence of these factors invariably result in restrictions being imposed on the conduct of military operations, thereby adversely impacting the ability of an installation to fulfill its assigned mission. As a means to prevent these conditions, the Department of Defense (DoD) and the Navy have implemented the Air Installations Compatible Use Zones (AICUZ) program. The AICUZ program is intended to promote compatible land use at military installations and in surrounding communities and to protect the health, safety, and welfare of civilians and military personnel in areas adjacent to military airfields.

At Naval Air Weapons Station China Lake (NAWS), maintaining established operational capabilities at Armitage Airfield and Baker Range remains a high priority. Historically, off-base land uses in proximity to the airfield and related operational areas have not constrained the NAWS mission. However, the potential for significant increases in residential and commercial development throughout the Indian Wells Valley highlights the need to continue to manage growth in a manner that is compatible with the respective needs of the local communities and NAWS. By addressing land-use compatibility issues through local agency land use planning and decision processes, local agency officials and business leaders have an opportunity to plan for and manage future growth in a manner that will sustain the operational mission of NAWS, and accommodate the growth needs of local communities. In compliance with AICUZ program requirements, NAWS has prepared this AICUZ study update in a proactive effort to encourage and focus the development and application of community planning strategies to achieve mutually beneficial results for local communities and the installation.

The NAWS AICUZ study should be updated when there are significant changes in aircraft operations, a change in the type of aircraft, or changes in flight patterns or procedures. Noise studies are typically conducted to determine if minor changes in flight operations (e.g., changes in aircraft operations and bed-down scenarios) affect a community's exposure to noise, or to determine if a full AICUZ study is required. In the 2007 AICUZ study the preferred alternative and no action alternative in the *Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans*, completed in 2004 (henceforth referred to as the "2004 EIS"), were modeled as the "prospective" and "baseline" conditions. The 2007 AICUZ study modeled the FA-18C/D "Legacy" Hornet, FA-18-E/F Super Hornet, EA-6B Prowler, and AV-8B Harrier aircraft and adopted a consolidated departure track west of Jacks Ranch Road for routes 14D1, 21D1, 26D1, and 32D1 (see Section 3.4 and Figure 3-1 for further discussion of departure flight routes). The consolidated departure track includes a "heavy leg" associated with departure track 14D1 for when high temperatures degrade the ability of aircraft to conform to the consolidated departure track. Additionally, a proposed six-degree shift of the tactical air navigation (TACAN)/instrument approach route was evaluated by NAWS Air Operations and Safety personnel. NAWS determined that the proposed six-degree shift would present increased and unacceptable safety risks; therefore, the proposed shift was not adopted (NAWS 2007).

Since the 2007 AICUZ was completed, additional noise studies were conducted in 2008 and 2009. The November 2008 noise study prospective scenario modeled Baker Range sorties that had not been included in the 2007 AICUZ study as well as changes in aircraft and flight operations. Changes in aircraft and flight operations included the one-to-one replacement of the EA-6B Prowler for the EA-18G Growler, the introduction of the F-35 Lightning II (JSF) aircraft, a reduction of FA-18C/D "Legacy" Hornet and AV-8B Harrier aircraft operations, and a 25% increase in Armitage Airfield flight operations. Additionally, the November 2008 noise study modeled the ground surrounding NAWS as acoustically "hard" in order to more accurately reflect vacant desert. Acoustically "soft" ground is primarily for grass-covered ground (see the Wyle Noise Report WR 08-08 for more information on the 2008 noise study [Wyle Laboratories, Inc. 2008]).

The August 2009 noise study altered the modeling assumptions used for the November 2008 noise study. Changes in the noise model include dispersion around departure flight tracks as well as noise modeled at more points surrounding NAWS. Additionally, noise profiles for the F-35 Lightning II aircraft were updated, and flight profiles were altered to more accurately reflect the way pilots at NAWS fly. The results of the August 2009 noise study triggered the need for the 2011 AICUZ study update. (For more information on the August 2009 noise study see Wyle Noise Report WR 08-08R [Wyle Laboratories, Inc. August 2009]). Updated flight profiles, altered flight tracks, and changes modeled in the 2008 and 2009 noise reports were incorporated into a February 2010 noise report which is the basis of the 2011 AICUZ study update. The 2010 noise study was

initiated to investigate the noise contributions of the F-35 and to evaluate the technical modeling assumptions of the noise analysis presented in the 2007 AICUZ study. (For more information on noise modeling for the 2010 AICUZ study update see Wyle Noise Report WR 08-08R [Wyle Laboratories, Inc. February 2010].)

This study analyzes operational conditions of the 2007 AICUZ study and projected scenario. The projected scenario is defined as the mission, aircraft, operational levels, and other aspects expected to be incorporated into NAWS operations within the next five- to ten-year planning period. The 2007 AICUZ and projected scenario presented in this AICUZ study update include the 2007 AICUZ and projected Armitage Airfield flight operations and current and projected Baker Range sorties, and evaluates the noise and safety considerations associated with these operations. Noise from Baker Range aircraft operations are included within this AICUZ study due to low altitude over-flights of private land within Kern County associated with Baker egress sorties. This study defines an airfield and range operations noise and accident potential footprint—“AICUZ footprint”—based on projected operations. Land-use compatibility within each of these planning areas is then evaluated. The AICUZ study update concludes by presenting recommended strategies to encourage compatible development and avoid or mitigate incompatible development in the vicinity of NAWS.

This first section of the document introduces the background of the Navy AICUZ Program and the scope of this AICUZ study update. Section 2 provides an overview of the installation, Armitage Airfield, Baker Range, and associated military airspace. Section 3 presents a description of 2007 AICUZ and projected aircraft operations. Section 4 focuses on key safety issues associated with airfield operations, including obstruction clearance requirements, accident potential zones, and other elements of airfield safety. Section 5 describes the results of noise modeling conducted in support of this AICUZ study update, including 2007 AICUZ and projected noise conditions associated with established flight routes and current and projected noise associated with range sorties. Section 6 assesses land-use compatibility within the 2011 AICUZ footprint. Section 7 presents recommendations for specific planning strategies and other measures that can be implemented to encourage and preserve land-use compatibility consistent with the goals of the AICUZ Program.

1.1 Background

1.1.1 The AICUZ Program

In the early 1970s, the DoD established the AICUZ Program to protect the public’s health, safety, and welfare and to prevent encroachment from degrading the operational capability of military air installations in meeting national security missions. The program also strives to protect the Navy’s investment in air installations by safeguarding operational capabilities and pursuing cooperative efforts to minimize the effects of noise and accident potential by promoting compatible development on-base and in the communities located in the vicinity of air installations. The foundation of the AICUZ program is an active local command effort to

work with local, state, regional, other federal agencies, and the public to encourage compatible development of land adjacent to military airfields.

Under the AICUZ Program, noise exposure zones are generated from computer models that account for the types and tempo of aircraft operations, flight routes and profiles, and other operational characteristics that influence the noise produced in the airfield environment. These noise zones are displayed on noise contour maps that are used as a planning tool to show the potential level of noise exposure in the surrounding communities.

The AICUZ Program also identifies accident potential zones (APZs) as a planning tool for installation planners and local government agencies. APZs are areas where an aircraft-related mishap is most likely to occur if one occurs—they are not predictors of accidents. APZs encompass a portion of departure, arrival, and pattern flight routes flown by aircraft at NAWS. The identification of these areas is based on an analysis of historic operational data. APZs are determined according to standard criteria that focus on accident potential in the immediate vicinity of runways. As appropriate, AICUZ studies may also focus on flight safety issues in other nearby areas beyond the boundaries of traditional APZs, as determined by experiences of flight safety personnel at an air installation. This AICUZ study acknowledges safety risks associated with aircraft and weapons systems testing and related flight training operations conducted beyond the areas identified as traditional APZs.

In addition to encouraging land uses that are compatible with aircraft-related noise impacts and public health and safety considerations, the Federal Aviation Administration (FAA) and DoD also encourage military planners and local communities to prevent development or land uses that could endanger aircraft in the vicinity of the airfield. Accordingly, this AICUZ study also addresses the following considerations:

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

The authority for implementation of the AICUZ Program at NAWS is derived from:

- U.S. DoD. *Instruction 4165.57, Air Installations Compatible Use Zones*, November 8, 1977
- U.S. DoD. *Instruction 4715.13 Department of Defense Noise Program*. November 15, 2005
- Chief of Naval Operations Instruction (OPNAVINST) 11010.36C, *Air Installations Compatible Use Zones Program*. October 9, 2008
- Secretary of the Navy *Instruction (SECNAVINST) 11011.47A, Acquisition, management, and disposal of real property and real property interests by the DoN*, February 23, 2006
- U.S. DoD. Unified Facilities Criteria (UFC) 3-260-01 Airfield and Heliport Planning and Design. November 17, 2008
- NAWS Instruction 3710.1D, “Air Operations Manual, Naval Air Weapons Station China Lake, California.” August 16, 2007
- U.S. Department of Transportation. FAA Regulations, Code of Federal Regulations (CFR), Title 14, Part 77, Objects Affecting Navigable Airspace, 1992
- Code of Federal Regulations (CFR) Title 47, Chapter 102, *Federal Management Regulations*. July 1 2009 revision

1.1.2 Previous AICUZ Studies at NAWS China Lake

The first NAWS AICUZ Study was completed in 1977. The 1977 AICUZ Study analyzed several airfield operational scenarios and quantified noise and APZs for a preferred operational profile that established historical NAWS airfield flight patterns and air corridors. This study also addressed flight operations on the North Range and identified potential areas of noise and safety impacts called drop potential zones (DPZs). The 1977 AICUZ analyzed land-use compatibility within the AICUZ footprint, DPZs, and associated operational areas, and provided recommended land use strategies for minimizing incompatibilities with airfield and range flight operations.

The most recent NAWS AICUZ study was completed in May 2007. The AICUZ study analyzed the 2004 EIS preferred alternative as the baseline condition and adopted a consolidated departure track west of Jacks Ranch Road as the projected Armitage airfield flight operations scenario. No Baker range sorties were modeled in the 2007 AICUZ study. The 2007 study analyzed then current and projected noise impacts and flight safety considerations within the AICUZ footprint and for areas beyond the associated noise contours where mission-compatible land-use controls were considered necessary (Military Influence Area [MIA]).

1.1.3 2004 Environmental Impact Statement

This AICUZ study update provides an analysis of noise and safety issues associated with both the 2007 AICUZ and the projected operational tempo at NAWS. Both sets of operational conditions are described in detail in Section 3.0 and both are consistent with operational tempos analyzed in the base's 2004 EIS. The 2004 EIS evaluated three operational scenarios and identified a 25% increase in airfield and range flight operations as the preferred alternative.

1.2 Purpose and Scope of the 2011 AICUZ Study

This 2011 AICUZ study update implements the Navy's AICUZ Program at NAWS and is intended to replace the 2007 AICUZ study. This current study has been prepared in accordance with Navy AICUZ Program guidelines per OPNAVINST 11010.36C and addresses the 2007 AICUZ and projected noise impacts and flight safety considerations associated with Armitage Airfield flight operations and current and projected noise associated with Baker range sorties. Compatibility with other flight test and training operations by NAWS or its tenant commands (Naval Air Systems Command/Weapons Division, Marine Air Detachment, etc.) will be addressed through other planning efforts.

The purpose of this AICUZ study update is to promote compatibility between NAWS airfield operations and neighboring communities by:

- Protecting the health, safety, and welfare of civilians and military personnel by encouraging land use that is compatible with aircraft operations;
- Protecting the Navy's installation investment and NAWS mission support capabilities to meet current and evolving mission requirements;
- Reducing noise impacts and safety risks associated with aircraft operations;
- Informing the public and neighboring land management agencies about the AICUZ program and seeking cooperative efforts to minimize noise and safety effects by promoting compatible development in the vicinity of NAWS.

1.3 Responsibility for Land Use Compatibility

NAWS and local government agencies with planning and zoning authority share the responsibility for achieving and maintaining land use compatibility near the installation. Cooperative and proactive action by all parties is essential in order to achieve the goals of mutual long-term sustainability for NAWS and the surrounding communities.

NAWS has a responsibility to coordinate with local jurisdictions and stakeholders to facilitate a common understanding and appreciation for the issues contained in this AICUZ study update. The installation is also responsible for responding to any questions or concerns from the public associated with the contents or objectives of the 2011 AICUZ study update. In order to help implement proper planning actions so that impacts do not occur, the Navy has the responsibility to in-

form and cooperate with the planning departments of Kern, San Bernardino, and Inyo Counties and the City of Ridgecrest. New to this AICUZ study update, portions of Inyo County are identified as encumbered by noise contours from Armitage Airfield operations. However, the areas experiencing noise levels of 60 dB CNEL (community noise equivalent level) or greater are located entirely on-base and do not extend into the county. Should the information in this study become outdated (e.g., a significant change occurs in aircraft type or airfield operations), it is the responsibility of NAWS to update this AICUZ study.

Local government officials have the responsibility to protect the health, safety, and welfare of their residents. Accordingly, a strong focus on planning, zoning, and other land use management strategies to encourage and maintain compatibility with NAWS operations would represent a cost-effective and productive mechanism to protect the health and safety of local residents. Currently the City of Ridgecrest has adopted the MIA in land use maps of the 2010 General Plan Update. Additionally a Joint Land Use of the R-2508 Complex special use airspace (SUA) was completed in May 2008. The R-2508 Complex includes NAWS, Edwards Air Force Base (AFB), and Fort Irwin National Training Center (NTC).

The California Legislature recently passed several key bills creating new partnerships between state and local governments and military installations to seek solutions to minimize encroachment constraints imposed by incompatible land use. These bills address two parallel but complementary land use planning areas: long-term planning through the General Plan (GP) law and individual project review through both the California Environmental Quality Act (CEQA) and the California planning law. Specific legislation includes Senate Bills (SB) 1468, 1462, 926, and 375, and Assembly Bill (AB) 1108.

Both SB 1468 and SB 926 established requirements for city and/or county agencies to include analysis of potential impacts to military installations and airports (airfields) in the revision or update of their respective General Plans. General Plan updates must include revisions to the following elements: land use, open space, circulation, conservation, and noise and safety. Updates in the GP must consider the potential impacts of new growth on military readiness activities and are required to provide equal treatment of military airfields in their implementation of the Public Utility Code's land use compatibility requirements.

AB 1108 amended the CEQA to provide military agencies with CEQA notices during scoping from projects that require a general plan amendment and are of area-wide significance, adjacent to an installation or under a military impact area or special use airspace, or are required to be referred to an airport land use commission.

SB 1462 amended the Planning and Zoning Law and established the requirement for city and county agencies to create or amend their project review and approval processes to include the analysis of potential impacts of a proposed action on military installation activities, and to provide notice to the military installation

prior a legislative body approving or amending its GP. This bill requires local governments to revise their permit application forms and notify applicable branches of the military when proposed general plan actions and amendments and individual development projects may have an impact on military facilities and their operations. The notification requirements are triggered when projects and actions in the community would be located within 1,000 feet of a military installation, beneath a low-level flight path, or within special use airspace (described further in Section 2.5), which, in the case of NAWS, involves all land areas within the Indian Wells Valley. The Governor's Office of Planning and Research (OPR) and the California Resources Agency have developed an online planning tool to assist in that process.

SB 375 sets planning requirements for transportation commissions, planning departments, agencies, plans, and projects, and requires that preferred growth scenarios be taken into account in CEQA environmental reviews. The aim of SB 375 is to support the Clean Air Act by reducing greenhouse gas emissions through improved transportation policy choices, compact development, and expanded transit services. This bill may encourage farmland conversion to create more compact development. NAWS can encourage local communities to develop in ways compatible with SB 375 and the AICUZ program.

Additionally, local government officials, real estate professionals, and prospective sellers of real property in areas affected by NAWS operations have a responsibility to disclose to prospective buyers, developers, and residents of such properties that the land is subject to aircraft operations, including over-flights, varying levels of aircraft noise, and flight safety considerations.

1.4 Community Land Use Authority

The successful implementation of an AICUZ study depends on a community's willingness to implement and maintain management actions that promote mission compatible land uses. The authority to exercise control over land use and development resides with local governments in accordance with the California Government Code. Sections 65103 and 65800 of the Code provide the authority under which the City of Ridgecrest and the Counties of Kern and San Bernardino may implement planning policies and adopt zoning ordinances. Section 65103(b) of the Code specifies that planning agencies shall "implement the general plan through actions including, but not limited to, the administration of specific plans and zoning and subdivision ordinances." Section 65800 provides guidance regarding the scope of the authority of planning agencies in noting that the intention of the code is to "provide only a minimum of limitation in order that counties and cities may exercise the maximum degree of control over local zoning matters."

2

NAWS China Lake and Associated Airspace

This section provides an overview of the NAWS mission and the positive influence it has on the regional economy. Also described in this section are the characteristics of Armitage Airfield, Baker Range and the local and regional airspace used by military aircraft for test and training operations.

2.1 Location

NAWS is located in the upper Mojave Desert of southeastern California (Figure 2-1), approximately 150 miles northeast of Los Angeles. The base consists of two major land areas: the North Range, encompassing 950 square miles (606,926 acres), and the South Range, encompassing 760 square miles (503,510 acres). The North Range lies in portions of Inyo, Kern, and San Bernardino counties and the South Range is located entirely within San Bernardino County. The eastern perimeter of the South Range borders National Training Center (NTC) Fort Irwin and the National Aeronautics and Space Administration Goldstone Complex, and the northeast corner abuts National Park property. Bureau of Land Management (BLM) lands, including wilderness areas, are located adjacent to the NAWS boundary (North and South Ranges) and to the west, south and east of private land holdings in the Indian Wells Valley.

NAWS consists primarily of remote, unpopulated desert land. In addition to the extensive test and training areas, the base also contains approximately 75 square miles of developed areas, including Armitage Airfield, Mainsite, Propulsion Laboratories, and geothermal development, all of which are located in the North Range. The Mainsite and Headquarters areas are located in the southern portion of North Range (Figure 2-2). NAWS aircraft operations originate primarily from Armitage Airfield, located at the northern end of Mainsite. In addition to three runways, Armitage Airfield contains aircraft maintenance facilities, aircraft hangars, ordnance handling and storage facilities, ground support equipment maintenance facilities, and extensive research, development, test, and evaluation (RDT&E) facilities. Baker Range covers approximately 121 square miles along the western end of the North Range and is used primarily for military test and evaluation and training for air-to-surface weapon systems (e.g., rockets, bombs, guns) (NAWS February 2004). The southern portion of Baker Range is identified in Figure 2-2. Communities in the vicinity of Armitage Airfield and southern portions of the Baker Range include the incorporated City of Ridgecrest and unincor-

porated China Lake Acres (adjoining the southern boundary of North Range) as well as the unincorporated community of Inyokern (10 miles [16 kilometers] west of Mainsite). Ridgecrest is the population center for the northern part of the upper Mojave Desert and a major commercial center for the surrounding desert communities. This AICUZ study focuses on Ridgecrest and surrounding unincorporated portions of Kern and San Bernardino Counties.

2.2 Mission and Vision

The mission of NAWS is to provide the highest quality facilities, products and services to the Naval aviation air weapons RDT&E, acquisition, and training communities to meet current and evolving Navy and related DoD mission requirements. NAWS is part of Navy Region Southwest, San Diego, under the Commander Naval Installations Command (CNIC) and is the host for Naval Air Warfare Center Weapons Division (NAWCWD) under the Naval Air Systems Command (NAVAIR), along with other assigned tenants, activities, and transient units. Testing and training functions performed on-base include munitions delivery, tactics, electronic warfare, and Special Forces training. NAWS operates and maintains the base's facilities and provides support services, including airfields, and is responsible for managing all lands within the base's boundaries to support the mission of NAWCWD and other activities, maintaining environmental compliance, exercising responsible stewardship of public lands, providing safety and security services, and implementing the Navy's AICUZ program.

NAWS' vision for this AICUZ study update is to ensure the continued ability of NAWS to support current and evolving mission requirements while promoting the compatible growth and development of the surrounding community. The Navy refers to this condition as "sustainable readiness" and cites the following reasons for continued use of Armitage Airfield and Baker Range:

- The world remains a dangerous place and the nation needs forces at a high state of readiness;
- Readiness is maintained with continual development and acquisition of superior weapons systems, and the ready availability of high-quality test and training opportunities; and
- Forces require the weapons, support systems, and operational areas to "train as they fight."

2.3 Demographics and Regional Economic Influence

With an estimated 2009 population of 28,353 (including NAWS residents), Ridgecrest is currently the third largest city in Kern County (California Department of Finance 2009). From July 1, 2000 to July 1, 2008 the city population is estimated to have increased by 2.9%, thereby reversing a trend of declining population throughout the latter half of the 1990s (Table 2-1) (U.S. Census Bureau 2000). The regional economy in the Ridgecrest area is anchored by NAWS. With 4,298 civilian and 598 military employees, the installation is the largest

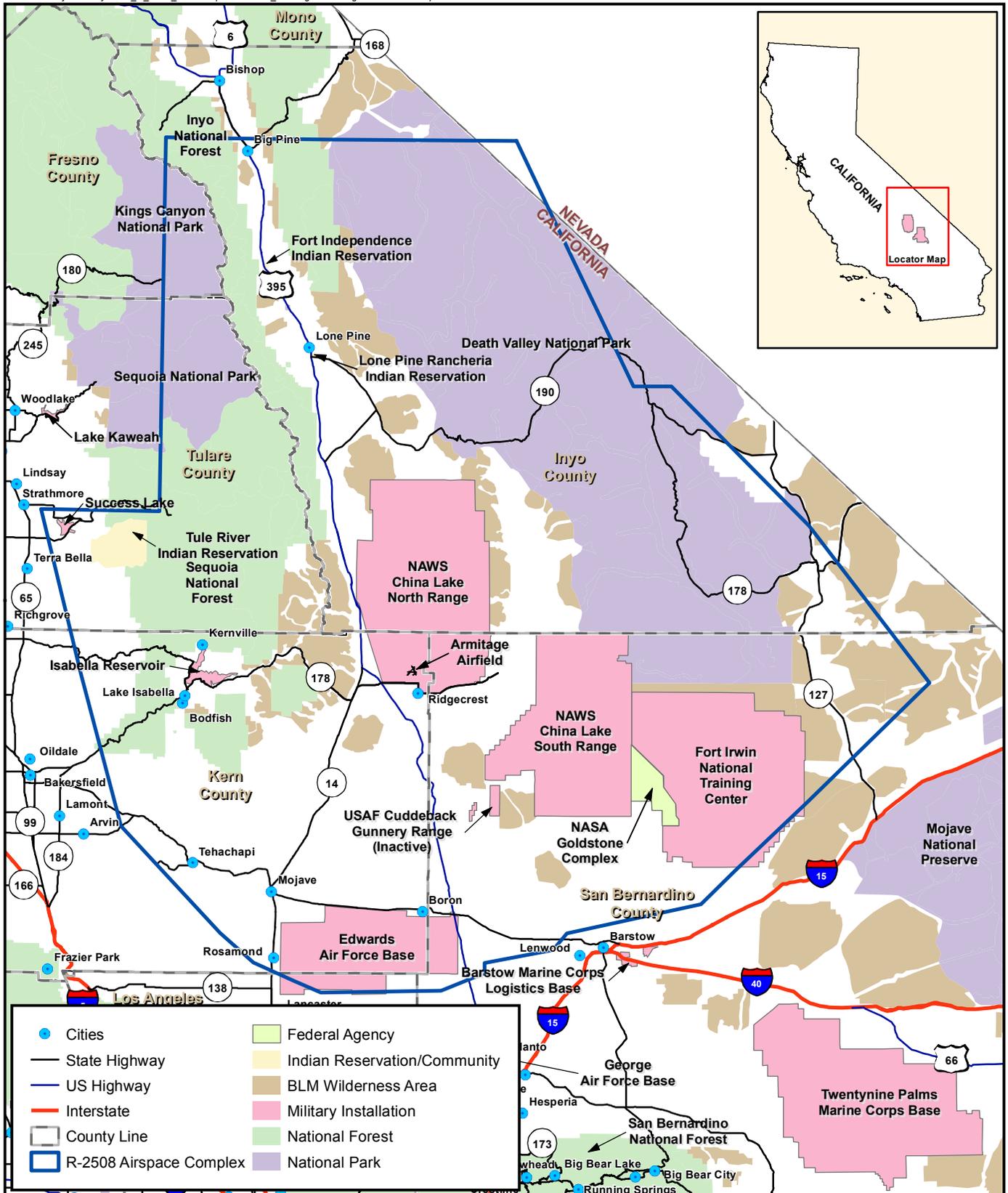
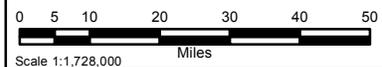
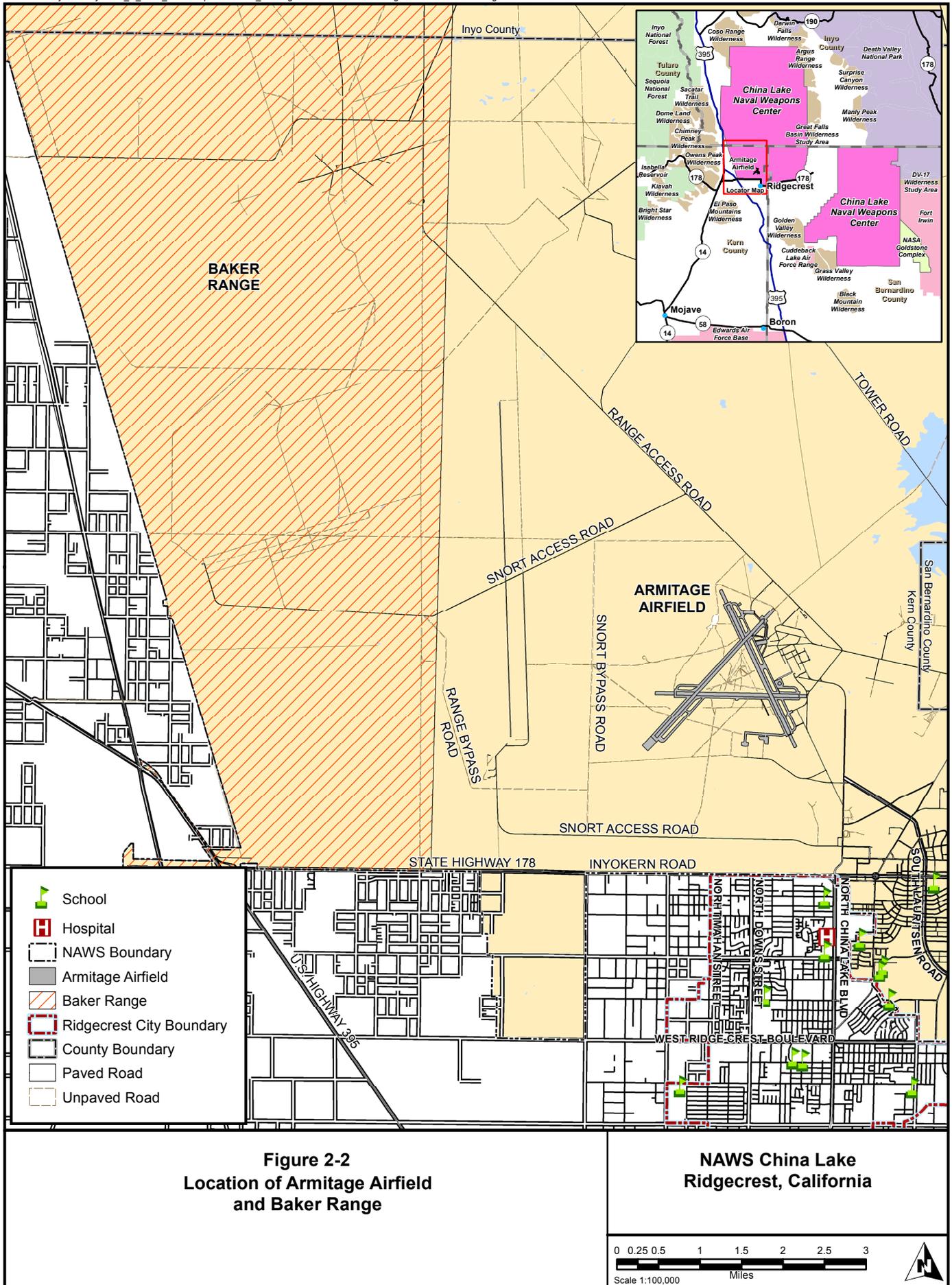


Figure 2-1
Regional Location Map
of NAWS China Lake

NAWS China Lake
Ridgecrest, California





2 NAWS China Lake and Associated Airspace

employer in the area (Table 2-2) (Ridgecrest Chamber of Commerce 2010; NAWS April 29, 2010). The next largest employer is Searles Valley Minerals with 625 employees. The positive influence of NAWS on the local economy is also reflected in occupation and income data from the American Community Survey (U.S. Census Bureau 2006-2008a and 2006-2008b). According to the American Community Survey three-year estimates from 2006 to 2008, the median annual family income in Ridgecrest was \$58,231, compared with a median of \$50,819 countywide, while more than 58.7% of Ridgecrest families had incomes of \$50,000 or more, compared with only 50.8% of families countywide.

Table 2-1 City of Ridgecrest Population Change (July 1, 2000 – 2008)

Year	Population	Percent Change
2000	24,926	--
2001	25,005	+0.3
2002	25,301	+1.2
2003	25,463	+0.6
2004	25,610	+0.6
2005	25,690	+0.3
2006	25,535	-0.6
2007	25,352	-0.7
2008	25,638	+1.1

Source: U.S. Census Bureau 2000.

Table 2-2 City of Ridgecrest Ten Largest Employers

Employer	Type of Business	No. of Employees
Naval Air Weapons Station China Lake & Tenant Commands	Defense RDT&E	4,298 (Civilian) 598 (Military)
Searles Valley Minerals	Soda Ash Products	625
Sierra Sands Unified School Dist	Education	620
Ridgecrest Regional Hospital	Acute-Care Hospital	340
Wyle Laboratories	Defense Contractor	280
SA-Tech (Systems Applic. & Tech)	Defense Contractor	187
Wal-Mart	Discount Dept Store	184
Cerro Coso Comm. College	Education	175
DART (Desert Area Resources & Trg)	Training and Social Services	164
AltaOne Federal Credit Union	Credit Union	161

Source Ridgecrest Chamber of Commerce 2010; NAWS April 29, 2010.

Military personnel who live on-base spend approximately 40% of their income in the local community. Those living off-base have higher spending levels due to rent, mortgage, and utility payments. Payroll expenditures at NAWS in 2005 totaled \$359 million (NAWS 2005). Due to the lack of major cities in the vicinity, it is assumed that NAWS employees spend a majority of their income in the local community.

2.4 Airfield Description

This section presents a detailed description of airfield facilities and provides additional information related to operations conducted at Armitage Airfield.

2.4.1 Physical Setting and Features

- **Location.** The specific geographical location for Armitage Airfield is latitude 35° 28’N and longitude 117° 43’W. The airfield is situated approximately 4 nautical miles (NM) northwest of the City of Ridgecrest.
- **Hours of Operation.** The airfield is normally in operation from 6:00 a.m. to 10:30 p.m. (0600 to 2230) on most weekdays, but is closed every other Friday. The airfield normally does not operate on Saturdays and operations on Sundays do not begin until 3:00 p.m. (1500). Specific test or operational requirements may result in the airfield being opened outside of normal hours. Airfield operations may be suspended or curtailed temporarily by the Commanding Officer or designated representatives based on the following factors:
 - Condition of landing area and airfield repairs
 - Availability of crash and rescue equipment
 - Weather conditions hazardous to flight
 - Status of the navigational aid
- **Navigational Aid.** A Tactical Air Navigation (TACAN), NID Channel 53, is located on the airfield.
- **Airfield Elevation.** Field elevation is 2283 feet above mean sea level (msl), as measured at the approach end of Runway 03.
- **Runways.** The landing area consists of three runways.

	Runway 08/26	Runway 03/21	Runway 14/32
Length:	7,702 feet	9,993 feet	9,013 feet
Width:	200 feet	200 feet	200 feet
Magnetic headings:	077/257 (08/26)	028/208 (03/21)	140/320 (14/32)
Overruns:	1,000/1000 feet (08/26)	1,000/1,000 feet (03/21)	1,000/1,000 feet (14/32)

- **Helicopter Takeoff/Landing Areas.** Any runway or taxiway surface may be used for helicopter takeoffs and landings. Additionally, several helicopter pads are marked on the North West ramp area near Hangar 1. The compass rose may be used when traffic condition warrants, daylight only (unlighted).
- **Taxiways.** All taxiways are available for aircraft or ground vehicles, depending on their condition or on surface deterioration.

2 NAWS China Lake and Associated Airspace

- **Runway/Taxiway Marking.** Runways and taxiways are marked following standard criteria as outlined in NAVAIR Manual 51-50AAA-2. A standard simulated carrier deck as defined in NAVAIR 51-50 AAA-2 is located approximately 310 feet from the approach end of Runway 21, left side.
- **Arresting Gear.** E-28 bi-directional arresting gear is installed on each runway.

2.4.2 Airfield Lighting System

- **Runway Lighting.** Variable high-intensity runway lights (HIRLs) are available for approach on all runways. The lights are operated by the control tower, simultaneously with the runway distance marker.
- **Fresnel Lens Optical Landing System (FLOLS).** MK-8/MOD 1 FLOLS are installed on the left side of Runways 28, 32, 14, and 21, approximately 1,000 feet from the threshold. Maintenance is done by the NAWS Air Operations Flight Support Branch in accordance with NAVAIR Manual 51-40ABA-14 (dated 15 Jan 96).
- **Precision Approach Path Indicator (PAPI).** A PAPI system is located 1000' from the approach end of Runways 08 and 26.
- **Arresting Gear Lighting.** E-28 arresting gear locations are identified by internally lit arresting gear markers.
- **Runway Distance Remaining Markers (RDM).** All runways have RDM located on either side. Each sign has a number (usually 1 thru 9) indicating how many feet of runway is remaining from the aircraft's current location. All signs are bi-directional.
- **Taxiway Lighting.** Standard variable-intensity blue taxiway edge lights are used on all taxiways.
- **Rotating Beacon.** A standard dual-peaked white and green rotating beacon is located atop the Beacon Tower; the beacon is operated continuously from sunset to sunrise, and during day light hours when the airfield is under Instrument Flight Rules (IFR).
- **Obstruction Lighting.** Obstructions in the vicinity of the airfield are marked with standard red lights.

2.4.3 Service Facilities and Capabilities

- **Maintenance Facilities.** The Aircraft Intermediate Maintenance Division (AIMD) is part of FRC West. The AIMD is located at various buildings at the airfield and is capable of performing intermediate-level maintenance functions

2 NAWS China Lake and Associated Airspace

for tenant and transient units. Functions provided include emergency calibrations support, ground support equipment, tire and wheel build-up, and precision measuring equipment. A transient line crew assigned to NAWS Airfield Operations Department is available to assist in parking and routine servicing of transient aircraft.

- **Hangars.** Five hangars are located at Armitage Airfield; these are used for Test and Evaluation missions by VX-9, VX-31, FA-18 Weapon System Support Activity (WSSA), foreign military sales (FMS), and visiting squadrons and detachments.
- **Maintenance Run-up Areas.** The high-power run-up area is located off the parallel taxiway near the approach end of Runway 14. It is equipped with type X111 hold back fitting tested as per Military Handbook 1021-4. Lower power run-ups take place in several locations along the flight line.
- **Magnetic Compass Swing Sites.** The primary magnetic compass swing site is located at the compass rose on the south side midfield of Runway 26.
- **TACAN Checkpoints.** Six TACAN checkpoints are available at the approach end of each runway, on the taxiway prior to the hold short marker.
- **Windsocks.** Windsocks are located at the approach end of all runways. Additional windsocks are located atop Hangars 1 and 2.
- **Fuel, Oil, and Oxygen.** Refueling and oxygen servicing facilities are available for most military aircraft. Hot pit refueling is conducted on the diagonal taxiway near the approach of Runway 21 adjacent to Taxiway Echo.
- **Aircraft Wash Rack Area.** A wash rack is located south of the air terminal area near Taxiway 26.

2.5 Baker Range

- **Location.** Baker Range encompasses approximately 121 square miles along the western edge of the Northern Range. Baker Range includes areas under the F/A-18C/D Hornet, F/A-18E/F Super Hornet, and AV-8B Harrier Baker Range flight tracks. The area above Baker Range is restricted airspace (see Section 2.6.2, Restricted Areas, for more information).
- **Target areas.** Baker Range includes eight target areas located approximately 7 miles northwest of Runway 14/32. Baker Range target areas include B-1, B1-A, B1-D, B1-F, B-2, B-3 (two targets), and LB. Most bombs, rockets, and gunnery used on Baker Range are inert; however, high explosive (HE) ordnance can be dropped on B1-A and B-2 target areas.

- **Hours of Operation.** Baker range may be used during the hours Armitage Airfield is in operation, from 6:00 a.m. to 10:30 p.m. (0600 to 2230) on most weekdays, closed on Saturdays, and operating from 3:00 p.m. to 10:30 p.m. (1500 to 2230) on Sundays. Operational or test requirements may dictate airfield operations outside of normal hours and on weekends.

2.6 Airspace

Military airspace in the vicinity of NAWS includes three separate components: Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAA). The complex of military airspace is collectively referred to as the R-2508 Complex (Figure 2-3). The R-2508 Complex covers approximately 20,000 square miles (51,800 square kilometers) and includes all airspace and associated land currently owned by DoD installations in the Upper Mojave Desert region.

The R-2508 Complex is managed by the R-2508 Joint Policy and Planning Board, which consists of the commander of the NAWCWD, the Air Force Flight Test Center at Edwards AFB, and NTC Fort Irwin. The responsibilities of the Board include overall operational policy and joint management and control of military activities within the Complex.

2.6.1 Military Operations Areas (MOAs)

MOAs are areas of airspace used to conduct non-hazardous aviation training activities and RDT&E of weapon systems technology. Low altitude navigation training, aerial refueling, formation and tactics training, air combat maneuvering, air-to-air intercepts, simulated close air support, and forward air controller training are representative of the type of activities typically conducted in MOA airspace. MOAs may be used by aircraft as staging areas for test or training activities before entering restricted airspace on approach to ground targets.

There are five MOAs located within the R-2508 Complex, and six MOAs located on the periphery. The five MOAs located within R-2508 are Saline, Panamint, Isabella, Owens, and Bishop. MOAs on the periphery of the Complex include Shoshone, Barstow, Buckhorn, Bakersfield, Porterville, and Deep Springs. The floor of the MOAs in the R-2508 Complex is 200 feet (61 meters) above ground level (agl) and the ceiling is at 18,000 feet (5,486 meters) msl.

2.6.2 Restricted Areas (RAs)

RAs are three-dimensional areas of airspace established by the FAA to support special aircraft flight activities. Typically, RAs support such activities as military aviation training and other military-related operations, including air-to-ground and ground-to-ground ordnance training. RAs separate and segregate these activities from other, non-participating aircraft. RAs are used only by permitted military aircraft during scheduled hours. Other military air traffic, along with civilian air traffic, is not authorized to enter the RA when it is in use. There are seven RAs within the Complex, including the shared-use R-2508.

Armitage Airfield and Baker Range are located in R-2505, one of the seven restricted airspace areas in the R-2508 Complex. R-2505 contains an airfield, aerial bombing ranges, a guided missile range, and a number of ground ranges and other specialized areas. R-2505 airspace is scheduled through the NAWCWD Land Range Test Planning Office. All aircraft utilizing R-2505 are required to coordinate with the NAWCWD Airspace Surveillance Center. The Center informs the aircraft to contact the appropriate test conductor and continues to monitor the frequency and radar.

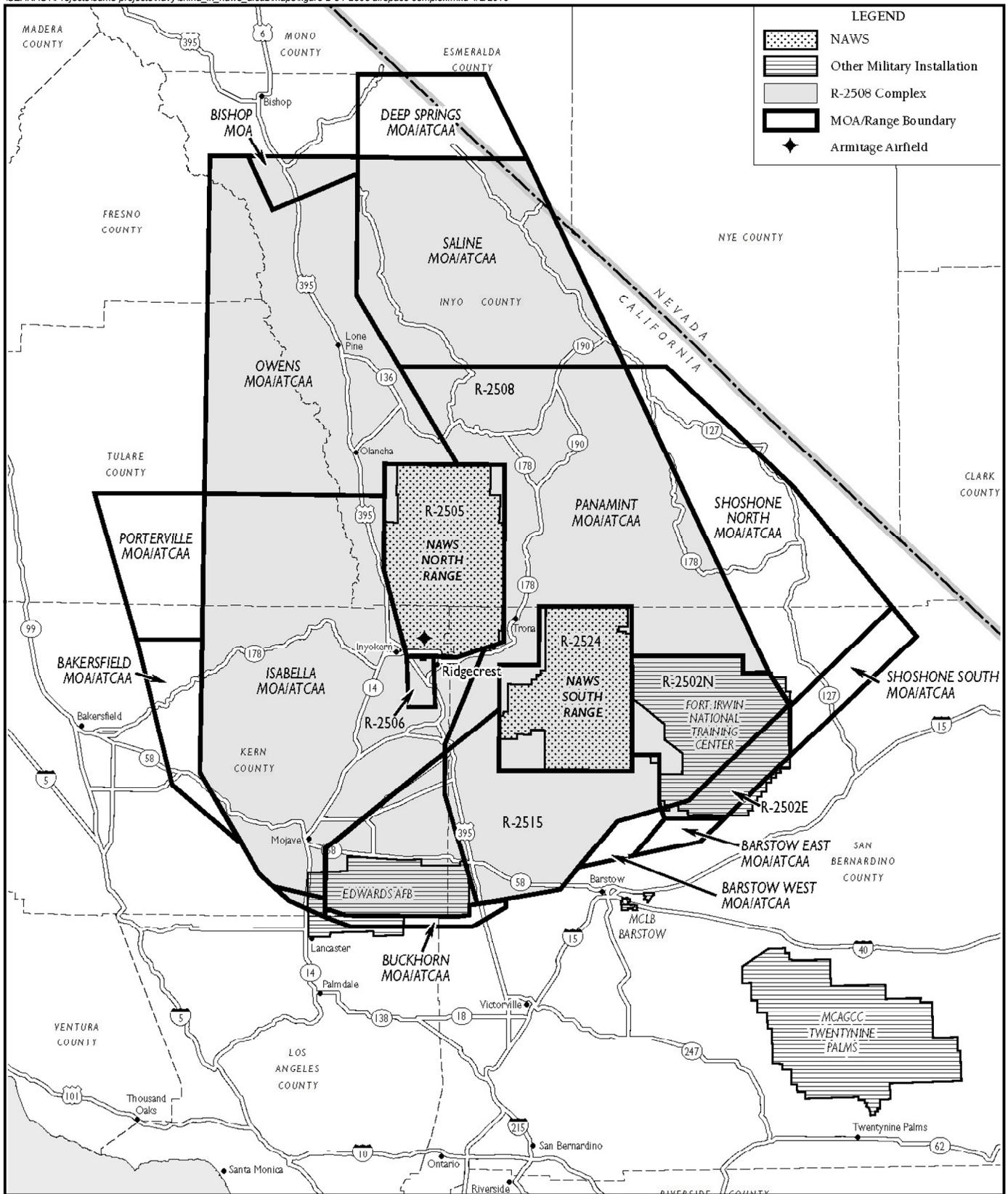
2.6.3 Air Traffic Control Assigned Airspace (ATCAA)

The ATCAA is the airspace between the top of the MOAs and the base of the R-2508 Complex. ATCAAs are also located above most of the peripheral MOAs to allow additional areas for segregation of military operations from Instrument Flight Rule traffic. Isabella and Panamint ATCAAs are set up within the boundaries of several RAs to be used as an air traffic control aid when the RAs are not active.

2.6.4 Civilian Airspace

In addition to military uses, civilian airports and commercial jet routes are also located within and in the vicinity of the R-2508 Complex. Commercial and general aviation aircraft operate under Visual Flight Rule conditions in the Complex's MOAs while remaining clear of RAs. Certain operators (such as Inyokern Airport) operate within the Complex on a non-interference basis. Other air carriers and civilian aircraft flying under Instrument Flight Rule conditions normally operate on structured routes on all sides of the R-2508 Complex. These routes include the main east-west high altitude structure entering the Los Angeles basin south of the Complex and a major north-south structure to the west. Real time coordination of the various airspace users allows daily use of the airspace without impacting NAWS mission requirements.

Twenty-five civilian airports are located either within or in the vicinity of the R-2508 Complex. Inyokern and Trona airports are located nearest Armitage Airfield. The Inyokern Airport provides commercial service and has three paved runways, the longest of which is approximately 7,100 feet (2,164 meters). The airport is located within the Isabella MOA, just to the west of R-2505 and R-2506. The Trona Airport is a general aviation airport that has a single paved runway approximately 4,300 feet (1,311 meters) long; it is located in the Panamint MOA between R-2505 and R-2524. There are no active operational agreements between NAWS and the Inyokern or Trona airports. However, there is a transition area for approaches and departures from Inyokern Airport. This transition area, known as the Inyokern Transition Area, was established by the FAA to segregate military users of the R-2508 Complex from the civilian aircraft operating out of Inyokern Airport. The Inyokern Transition Area is activated on a daily schedule and requires military aircraft to fly above it when activated.



LEGEND	
	NAWS
	Other Military Installation
	R-2508 Complex
	MOA/Range Boundary
	Armitage Airfield

Figure 2-3
R-2508 Airspace Complex

NAWS China Lake
Ridgecrest, California

3

Aircraft Operations

This section describes the primary aircraft types operating at NAWS, the type and number of operations conducted by these aircraft, and the runways and flight routes used to conduct routine operations. Detailed operational data are presented for the 2007 AICUZ study and for projected operational conditions. Operational tempo is consistent with the 2004 EIS preferred alternative (NAWS February 2004). Aircraft arrival and departure flight routes and flight patterns are illustrated to identify the general location and configuration of aircraft operations. The 2007 AICUZ operational conditions include the consolidation and westward shift as well as the “heavy leg” departure flight tracks that were incorporated in the 2007 AICUZ projected scenario (NAWS May 2007).

3.1 Aircraft Types

The 2007 AICUZ and projected aircraft operations at Armitage Airfield are predominantly conducted by F-35, F/A-18C/D, F/A-18E/F, EA-6B, EA-18G, and AV-8B aircraft types and Other Military (OM) Jets, consisting of the F-16, T-39, and T-38. Other propeller, helicopter, general aviation, and heavy aircraft also use the airfield on a recurring basis, but such aircraft represent a much smaller proportion of total annual operations and do not contribute significantly to the airfield noise environment. Accordingly, only the six primary aircraft types and OM Jets have been analyzed in the 2007 AICUZ and projected scenario of this AICUZ study. Details about each of the primary aircraft types are provided below

3.1.1 F-35C Lightning II (Joint Strike Fighter)

The F-35C is the carrier variant of the F-35 Lightning II Joint Strike Fighter. The carrier variant incorporates stronger internal structure, larger landing gear, and larger wings for pilot control during carrier take-off and landings, as well as rugged exterior materials to reduce maintenance. All the F-35 variants are capable of air-to-air combat, advanced stealth to avoid detection, and sensor packages that make the F-35 able to locate and eliminate threats before its presence is known. The F-35C is expected to replace the FA-18C/D Hornet aircraft.

**F-35C Lightning II
(Joint Strike Fighter)**



- **Manufacturer:** Lockheed Martin
- **Engines:** One P&W F135 or GE F136
- **Thrust:** 40,000 pounds (with after burner).
- **Length, Height, and Wing Span:** 51.5 feet, 14.9 feet, and 43 feet, respectively.
- **Speed:** Mach 1.6 (approximately 1,200 mph)
- **Armament:** A standard weapons load includes two AIM-120C air-to-air missiles and two 2,000-pound GBU-31 JDAM guided bombs (Lockheed Martin 2009).

3.1.2 F/A-18C/D Hornet

The F/A-18C/D "Hornet" is a twin engine, multi-mission fighter/attack aircraft that can operate from either aircraft carriers or land bases. The F/A-18C is a single-seat aircraft and the F/A-18D is the two-seat version. The F/A-18 Hornet fulfills a variety of roles: air superiority, fighter escort, suppression of enemy air defenses, reconnaissance, forward air control, close and deep air support, and day and night strike missions. The F/A-18 replaced the F-4 Phantom II fighter and A-7 Corsair II light attack jet, and also replaced the A-6 Intruder as these aircraft were retired during the 1990s.

F/A-18C/D Hornet



- **Manufacturer:** Boeing [McDonnell Douglas Aerospace]
- **Engines:** Two General Electric F404-GE-402 turbofan engines.
- **Thrust:** 36,000 pounds.
- **Length, Height, and Wing Span:** 56 feet, 15.3 feet, and 40.4 feet, respectively.
- **Speed:** Maximum - more than Mach 1.8; Cruise - more than Mach 1.0.
- **Armament:** 20 mm Vulcan cannon M61A1, Sidewinders, and Sparrow Advanced Medium Range Air-to-Air Missile (AMRAAM) (Federation of American Scientists 2006).

3.1.3 F/A-18E/F Super Hornet

The F/A-18E/F "Super Hornet" is a single-seat (E) or two-seat (F), twin engine, multi-mission fighter/attack aircraft that fulfills the same types of roles as the C/D models. The F/A-18 Super Hornet, however, is 4.2 feet longer than earlier Hornets, has a 25% larger wing area, and carries 33% more internal fuel, which effectively increases mission range by 41% and endurance by 50%. The Super Hornet also incorporates two additional weapons stations, for a total of 11.

F/A-18F Super Hornet



- **Manufacturer:** Boeing [McDonnell Douglas Aerospace].
- **Engines:** Two General Electric F414-GE-400 turbo-fan engines.
- **Thrust:** 44,000 pounds.
- **Length, Height, and Wing Span:** 60.3 feet, 16.0 feet, and 44.7 feet, respectively.
- **Speed:** Maximum - more than Mach 1.8.
- **Armament:** 20 mm Vulcan cannon M61A1, Sidewinders, Sparrow AMRAAM, Maverick air-to-ground missile, as well as a complete complement of “smart” weapons, including the Joint Direct Attack Munitions (JDAM) and the Joint Standoff Weapon (JSOW) (FAS 2006).

3.1.4 EA-6B Prowler

The EA-6B “Prowler” is designed for suppression of enemy air defenses in support of strike aircraft and ground troops by interrupting enemy electronic activity and obtaining tactical electronic intelligence within the combat area.

- **Manufacturer:** Grumman Aircraft Corporation.
- **Engines:** Two Pratt & Whitney J52-P408 turbofan engines.
- **Thrust:** 22,400 pounds.
- **Length, Height, and Wing Span:** 59 feet, 15 feet, and 53 feet, respectively.
- **Speed:** Maximum Mach 0.99.
- **Armament:** ALQ-99 Tactical Jamming System (TJS), High-Speed Anti-Radiation Missile (HARM) (FAS 2006).

EA-6B Prowler



3.1.5 EA-18G Growler

The EA-18G “Growler” is a naval airborne electronic attack (AEA) aircraft designed for non-traditional electronic attack operations and suppression of enemy air defenses. The EA-18G capabilities include critical strike as well as preemptive, reactive, and escort tactical jamming systems and precision airborne electronic attack capabilities. The EA-18G will replace the Navy version of the EA-6B.

- **Manufacturer:** Boeing- Integrated Defense Systems.
- **Engine:** Two F414-GE-400 engines.
- **Thrust:** 44,000 pounds of thrust.
- **Length, Height and Wing Span:** 60.2 feet, 16 feet, and 44.9 feet, respectively.

EA-18G Growler



- **Armament:** Nine weapons stations provide unique flexibility for carriage of weapons (Boeing 2009).

3.1.6 AV-8B Harrier

A Marine Corps aircraft, the AV-8B “Harrier” is a Vertical/Short Takeoff and Land (V/STOL) aircraft that was designed to replace the AV-8A and the A-4M light attack aircraft. Combining tactical mobility, responsiveness, reduced operating cost, and basing flexibility both afloat and ashore, V/STOL aircraft are particularly well-suited to the special combat and expeditionary requirements of the Marine Corps. The Harrier is scheduled to be replaced by the F-35B short-takeoff/vertical-landing variant of the Lightning II Joint Strike Fighter.



- **Manufacturer:** McDonnell Douglas Aircraft.
- **Engine:** One Rolls Royce Pegasus F402-RR-408A turbofan engine.
- **Thrust:** 22,200 pounds of thrust.
- **Length, height and Wing Span:** 46.3 feet, 11.6 feet, and 30.3 feet, respectively.
- **Speed:** Maximum Mach 0.98.
- **Armament:** One fuselage-mounted 25 mm gun system, Standard Air-to-Ground load: Six Mk 82, 500 pound bombs, Standard Air-to-Air load: Four Sidewinder missiles. Provisions for carrying up to 9,000 pounds of ordnance on seven stations (Federation of American Scientists 2006, GlobalSecurity.org 2006).

3.2 Armitage Airfield Flight Operations

3.2.1 Types and Timing of Armitage Airfield Operations

An airfield operation is any takeoff or landing at an airfield. The takeoff and landing may be part of a training maneuver (or “pattern”) in the vicinity of the runways or may simply be a departure or arrival of an aircraft. Several basic flight operations conducted at Armitage Airfield are described below:

- **Departure.** An aircraft taking off from a runway.
- **Straight In Arrival.** An aircraft landing on a runway.
- **Overhead Arrival.** An expeditious arrival using visual flight rules. An aircraft generally approaches the runway 800 feet above ground level. Approximately halfway down the runway, the aircraft performs a 180-degree descending left turn to enter the landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and performs a 180-degree descending left turn to land on the runway.

- **Carrier Break Arrival.** The maneuver is the same as the Overhead Arrival, except it is performed at 800 feet - simulating the standard approach made to an aircraft carrier.
- **TACAN Arrival.** The TACAN approach is flown using instruments in the cockpit that receive bearing and distance information from a ground unit.
- **Touch and Go.** An aircraft lands and takes off on a runway without coming to a full stop. After touching down, the pilot immediately goes to full power and takes off again.
- **Field Carrier Landing Practice (FCLP).** A touch and go maneuver conducted within the carrier box outlined on a runway. FCLPs are required training for all naval aviators before landing on a carrier. Although FCLP operations have historically occurred at NAWS, no FCLP operations have been performed in the past two years and therefore are not analyzed in the projected scenario (Wyle Laboratories, Inc. 2010a).

Airfield operations that occur at night are potentially more annoying than daytime operations. Accordingly, the time of day in which operations occur is an important parameter in the evaluation of aircraft operations data and in the modeling of the resulting noise exposure. Operations data are typically differentiated according to three daily time periods: day, evening, and night. Daytime operations are flown between the hours of 7:00 a.m. and 7:00 p.m., evening operations occur between 7:00 p.m. and 10:00 p.m., and night operations are flown between 10:00 p.m. and 7:00 a.m. Currently, less than 10 % of projected flight operations conducted at Armitage Airfield occurs in the evening or at night.

3.2.2 2007 AICUZ Armitage Airfield Operations

As analyzed in the 2004 EIS, the 2007 AICUZ operational conditions at Armitage Airfield comprise approximately 33,750 total annual airfield operations, which represent a 15-year average of annual flight operations. Approximately 98 % of these operations are flown by the FA-18C/D, F/A-18E/F, EA-6B, and AV-8B aircraft types described above. Based on their predominant contribution to the noise environment as compared with other aircraft, only the F/A-18C/D, F/A-18E/F, EA-6B, and AV-8B were included in the modeling of aircraft noise in the 2007 AICUZ (see Section 5). The remaining aircraft types that use Armitage Airfield do not contribute significantly to the noise environment (NAWS May 2007). In Table 3-1, annual operations data used in the AICUZ noise analysis are presented by type of operation and time of day for each of the four 2007 AICUZ aircraft types. As shown in Table 3-1, the four aircraft types conduct 33,169 annual flight operations under 2007 AICUZ conditions, of which more than 91 % occur during daytime.

Table 3-1 2007 AICUZ Modeled Annual Flight Operations¹ at Armitage Airfield

Aircraft	Operation Type	Day	Evening	Night	Total
F/A-18C/D	Departures	3,224	177	88	3,489
	Straight In Arrivals	528	76	3	607
	Overhead Arrivals	1,305	67	3	1,375
	Carrier Break Arrivals	878	46	3	927
	TACAN Arrivals	634	37	21	692
	Touch & Go	3,764	440	80	4,284
	FCLP	384	86	0	470
	Total	10,717	929	198	11,844
F/A-18E/F	Departures	3,489	189	92	3,770
	Straight In Arrivals	689	98	12	799
	Overhead Arrivals	1,705	88	12	1,805
	Carrier Break Arrivals	1,147	58	9	1,214
	TACAN Arrivals	70	3	3	76
	Touch & Go	4,080	470	86	4,636
	FCLP	518	0	0	518
	Total	11,698	906	214	12,818
EA-6B	Departures	939	6	6	951
	Straight In Arrivals	70	37	0	107
	Overhead Arrivals	543	46	0	589
	Carrier Break Arrivals	369	34	3	406
	TACAN Arrivals	101	6	3	110
	Touch & Go	2,550	250	6	2,806
	FCLP	500	280	6	786
	Total	5,072	659	24	5,755
AV-8B	Visual Flight Rule Departures	866	49	27	942
	Straight In Arrivals	37	0	3	40
	Overhead Arrivals	372	18	12	402
	Carrier Break Arrivals	134	6	3	143
	TACAN Arrivals	177	9	3	189
	Touch & Go	964	54	18	1,036
	FCLP	0	0	0	0
	Total	2,550	136	66	2,752
Total	30,342	2,631	502	33,169	

Source: Wyle Laboratories, Inc. March 23, 2010. Extrapolated from Wyle Laboratories, Inc. 2004.

Note:

¹ Patterns counted as one operation.

² Includes only F/A-18C/D, F/A-18E/F, EA-6B, and AV-8B flight operations.

3.2.3 Projected Armitage Airfield Operations

Annual modeled projected flight operations would total 22,763 (see Table 3-2). Similar to Table 3-1, Table 3-2 presents annual operations data used for the 2011 AICUZ. The projected aircraft mix includes the aircraft discussed in Section 3.1, Aircraft Types, excluding the EA-6B Prowler. Approximately 62 % of the mod-

3 Aircraft Operations

eled flight operations are F/A-18E/F Super Hornet; 20% are F-35 Lightning II “Joint Strike Fighter”; 9% are F/A-18C/D ”Legacy” Hornet; 4% are AV-8B Harrier; 2% are EA-18G Growler; and 2% are OM Jets. There are no modeled FCLP operations in the projected scenario and the remaining aircraft types that use Armitage Airfield do not contribute significantly to the noise environment (Wyle Laboratories Inc. 2010a). Evening and night operations would continue to represent less than 10% of the airfield flight operations.

Table 3-2 Projected Annual Flight Operations at Armitage Airfield

Aircraft	Operation Type	Day	Evening	Night	Total
F-35	Departures	1,831	157	43	2,031
	Straight-In Non-TACAN Arrivals	327	28	7	362
	Overhead Break Arrivals	820	69	19	908
	Carrier Break Arrivals	518	45	12	575
	TACAN Arrivals	165	13	4	182
	Touch & Go	446	37	11	494
	Total	4,107	349	96	4,552
F/A-18C/D	Departures	858	65	21	944
	Straight-In Non-TACAN Arrivals	72	5	1	78
	Overhead Break Arrivals	300	21	8	329
	Carrier Break Arrivals	152	11	4	167
	TACAN Arrivals	303	27	7	337
	Touch & Go	231	18	5	254
	Total	1,916	147	46	2,109
F/A-18E/F	Departures	5,726	508	128	6,362
	Straight-In Non-TACAN Arrivals	1,167	104	26	1,297
	Overhead Break Arrivals	2,655	236	59	2,950
	Carrier Break Arrivals	1,785	159	40	1,984
	TACAN Arrivals	118	10	3	131
	Touch & Go	1,335	119	30	1,484
	Total	12,786	1,136	286	14,208
EA-18G	Departures	181	20	4	205
	Straight-In Non-TACAN Arrivals	16	1	0	17
	Overhead Break Arrivals	89	10	3	102
	Carrier Break Arrivals	60	6	1	67
	TACAN Arrivals	18	3	0	21
	Touch & Go	40	5	1	46
	Total	404	45	9	458
AV-8B	Departures	382	17	14	413
	Straight-In Non-TACAN Arrivals	10	0	0	11
	Overhead Break Arrivals	182	8	6	196
	Carrier Break Arrivals	47	2	2	51
	TACAN Arrivals	177	9	6	192
	Touch & Go	121	6	4	131
	Total	919	42	32	994

Table 3-2 Projected Annual Flight Operations at Armitage Airfield

Aircraft	Operation Type	Day	Evening	Night	Total
OM Jet1	Departures	176	10	6	192
	Straight-In Non-TACAN Arrivals	43	3	1	47
	Overhead Break Arrivals	56	3	1	60
	Carrier Break Arrivals	29	1	1	31
	TACAN Arrivals	48	3	1	52
	Touch & Go	58	2	0	60
	Total	410	22	10	442
Total	20,542	1,741	479	22,763	

Notes:

Day = 7:00 a.m. and 7:00 p.m.

Evening = 7:00 p.m. and 10:00 p.m.

Night = 10:00 p.m. and 7:00 a.m.

Source: Wyle Laboratories Inc. 2010b

¹ OM Jets primarily include F-16, T-39 and T-38, modeled with AV-8B as a surrogate.² Modeled as an F-35A.

3.3 Runway Utilization

Because of prevailing winds in the area, Runway 21 is the primary runway used at Armitage Airfield. Runway 32 is designated as the primary instrument runway and is the only runway used for the TACAN arrival pattern. Designation of Runway 32 as the primary instrument runway is in response to a need for simultaneous range and airfield operations and off-base development. Runway 26 is used by aircraft that cannot roll over arresting gear (such as the AV-8B, T-39 D, and Metro III). Runway 14 is used when winds are out of the southeast, or when Runway 21 is not available. Runway 08 and Runway 03 are rarely used, do not make up a significant proportion of runway use (less than 1%), and are therefore not included in subsequent discussion.

Under 2007 AICUZ conditions approximately 75% of F/A-18 and 78% of EA-6B aircraft operations occur on Runway 21 (Table 3-3). The majority of AV-8B flight operations (74 %) are conducted on Runway 26. Approximately 12% of F-18 and EA-6B operations and even smaller percentages of EA-6B and AV-8B operations are conducted on Runway 14.

Table 3-3 Runway Utilization by Aircraft: 2007 AICUZ

Runway	Aircraft			
	F/A-18C/D	F/A-18E/F	EA-6B	AV-8B
21	76%	75%	78%	16%
14	12%	12%	11%	8%
32	6%	7%	4%	2%
26	6%	6%	7%	74%
Total	100%	100%	100%	100%

Source: NAWS May 2007.

Under projected conditions, Runway 21 receives the most use by all aircraft, excluding the AV-8B Harrier (Table 3-4). The AV-8B Harrier primarily uses Runway 26. Overall, Runway 14 is used between 19% and 30% of the time by all

modeled aircraft. The F/A-18C/D “Legacy” Hornet uses Runway 14 the least and the EA-18G Growler uses Runway 14 the most. Runway 32 is used 25% or less by modeled aircraft and Runway 26 has a wide range of use, depending on the aircraft. The EA-18G Growler uses Runway 26 5% of the time, whereas Runway 26 is used 39% of the time by the AV-8B Harrier. The primary drivers of changes in runway utilization are prevailing winds and aircraft performance.

Table 3-4 Runway Utilization by Aircraft Projected Conditions

Runway	Aircraft					
	F-35	F/A-18C/D	F/A-18E/F	EA-18G	AV-8B	OM Jets
21	42%	45%	53%	57%	15%	34%
14	27%	19%	26%	30%	20%	28%
32	13%	23%	10%	8%	25%	18%
26	19%	12%	11%	5%	39%	20%
Total	100%	100%	100%	100%	100%	100%

Source: Wyle Laboratories, Inc. 2010.

Note: Figures may not total exactly due to rounding.

3.4 Flight Routes

Established Flight Route Profiles

As discussed above, several different types of flight operations (e.g., arrivals, departures, etc.) are conducted at Armitage Airfield. When conducting these operations, pilots follow one of the established flight routes that have been designated for each type of operation to the best of their ability. For example, aircraft taking off from the airfield will typically follow one of several established departure flight routes shown in Figure 3-1. Departure flight tracks were updated from the 2007 AICUZ report to reflect greater dispersion of departure traffic in order to more accurately reflect the way pilots fly. To model and illustrate dispersion of departure traffic, there are three subtracks (a, b, and c) for each departure track (illustrated by the fanlike dispersions at the bottom of Figure 3-1). Having several authorized flight routes available for each type of operation facilitates air traffic control at the airfield, allows variability in pilot training and flight test profiles, and provides flexibility in response to wind conditions and other factors. The choice of flight route for any given airfield operation will depend upon mission requirements, wind velocity and direction, the presence of other aircraft in the airspace, runway availability due to maintenance and/or construction, and other factors.

A designated flight route is the *predominant* flight path of an aircraft during a particular type of flight operation. The *actual* flight path followed by aviators will vary depending on wind velocity and direction, air density caused by ambient temperature, airspeed, mission load (fuel, ordnance, external configuration, etc.), and individual pilot performance. This potential variability in actual flight paths, which results in the creation of a “flight corridor” centered on each established flight route, is taken into consideration in the City of Ridgecrest adopted MIA (see Section 6.2 for more information).

Figure 3-2 illustrates the flight routes that have been designated for non-break and TACAN arrivals, while Figure 3-3 shows the overhead and carrier break arrival patterns, and Figure 3-4 displays the flight patterns used for Touch and Go operations. Tables 3-5 and 3-6 present the general flight route use for each of the primary aircraft types flown at Armitage Airfield under 2007 AICUZ and projected conditions.

Table 3-5 Flight Route Utilization by Aircraft: 2007 AICUZ

Flight Route	Aircraft			
	F/A-18C/D	F/A-18E/F	EA-6B	AV-8B
Departure	37%	37%	25%	42%
Straight-In Arrival	6%	8%	2%	2%
Overhead Arrival	15%	17%	15%	18%
Carrier Break Arrival	10%	12%	10%	6%
TACAN Arrival	7%	1%	3%	9%
Touch & Go	23%	23%	35%	23%
Field Carrier Landing Practice	2%	2%	10%	0%
Total	100%	100%	100%	100%

Source: NAWS May 2007

Table 3-6 Flight Route Utilization by Aircraft: Projected Conditions

Flight Route	Aircraft					
	F-35	F/A-18C/D	F/A-18E/F	EA-18G	AV-8B	OM Jets
Departures	45%	45%	45%	45%	42%	43%
Straight-In Non-TACAN Arrivals	8%	4%	9%	4%	1%	11%
Overhead Break Arrivals	20%	16%	21%	22%	20%	14%
Carrier Break Arrivals	13%	8%	14%	15%	5%	7%
TACAN Arrivals	4%	16%	1%	5%	19%	12%
Touch & Go	11%	12%	10%	10%	13%	14%
Total	100%	100%	100%	100%	100%	100%

Source: Wyle Laboratories, Inc. February 2010.

3.5 Engine Maintenance Tests

Aircraft ground run-ups are routine aircraft engine maintenance tests that require the operation of an engine at various power settings for several minutes. Idle, the lowest power setting, is used for the longest duration; low power setting is used for an intermediate amount of time; military and afterburner power settings are louder but are used for a very short duration.

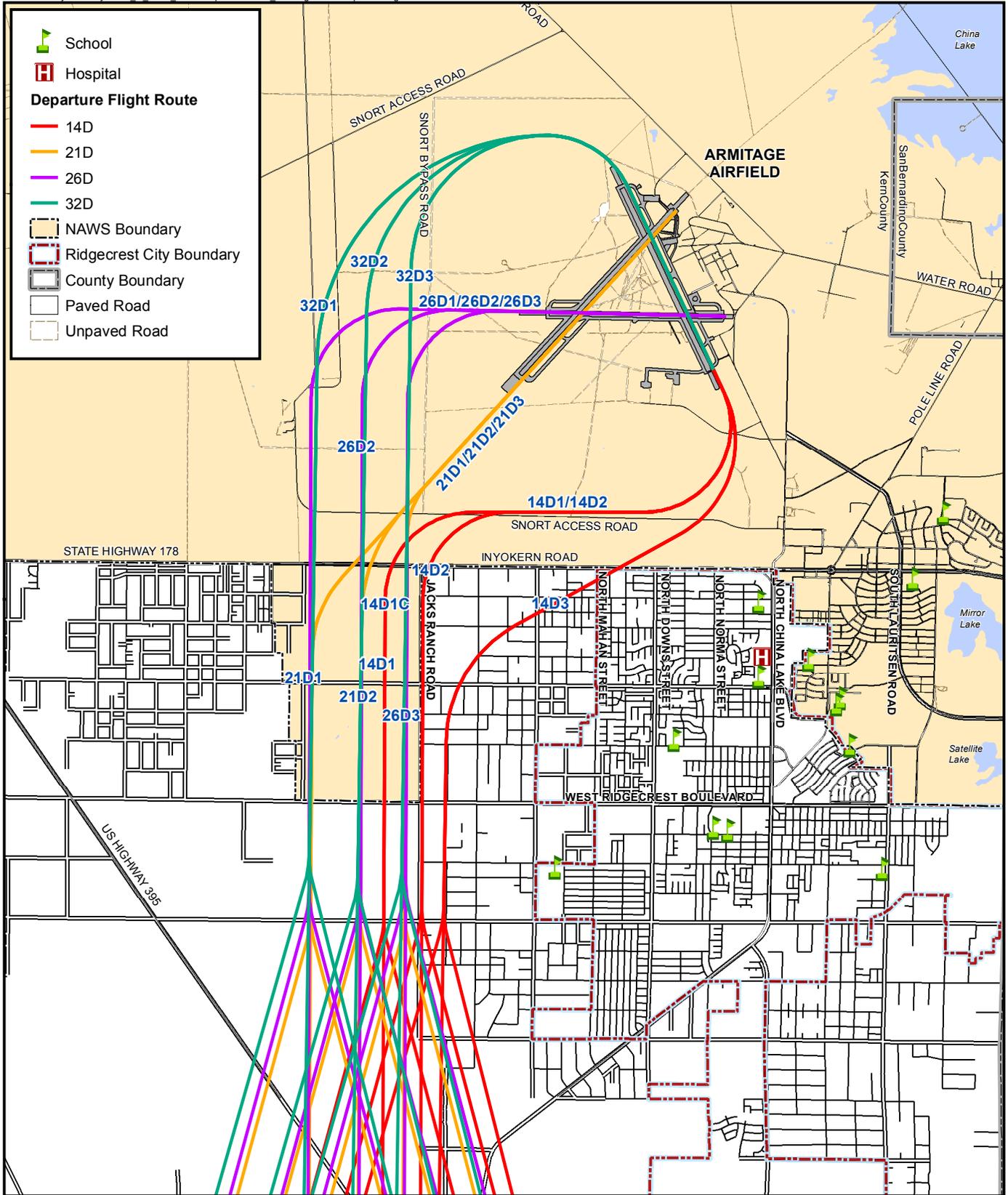
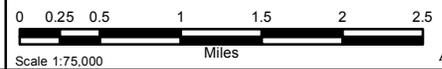


Figure 3-1
Departure Flight Routes

NAWS China Lake
Ridgecrest, California



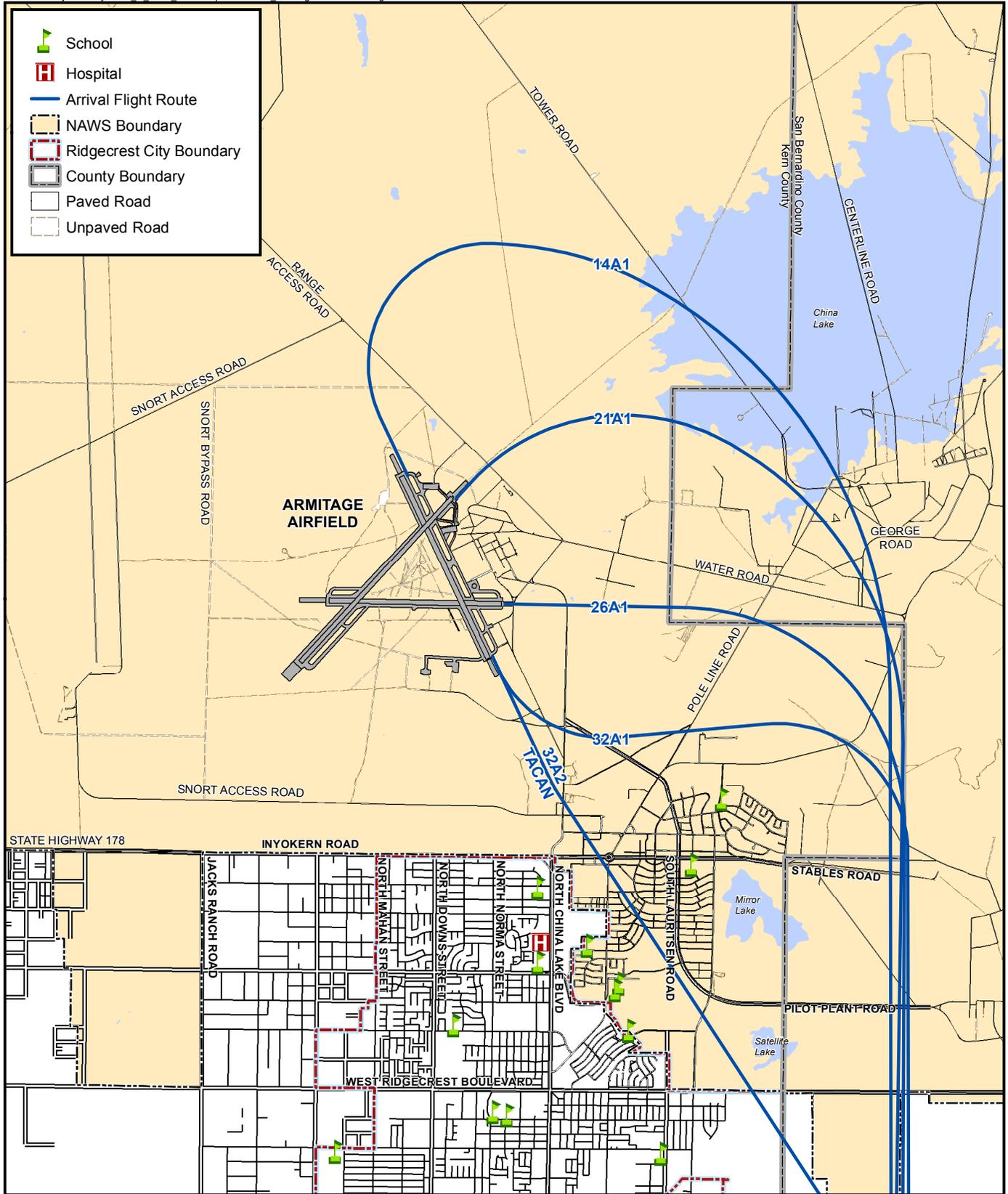
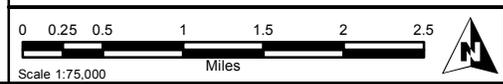
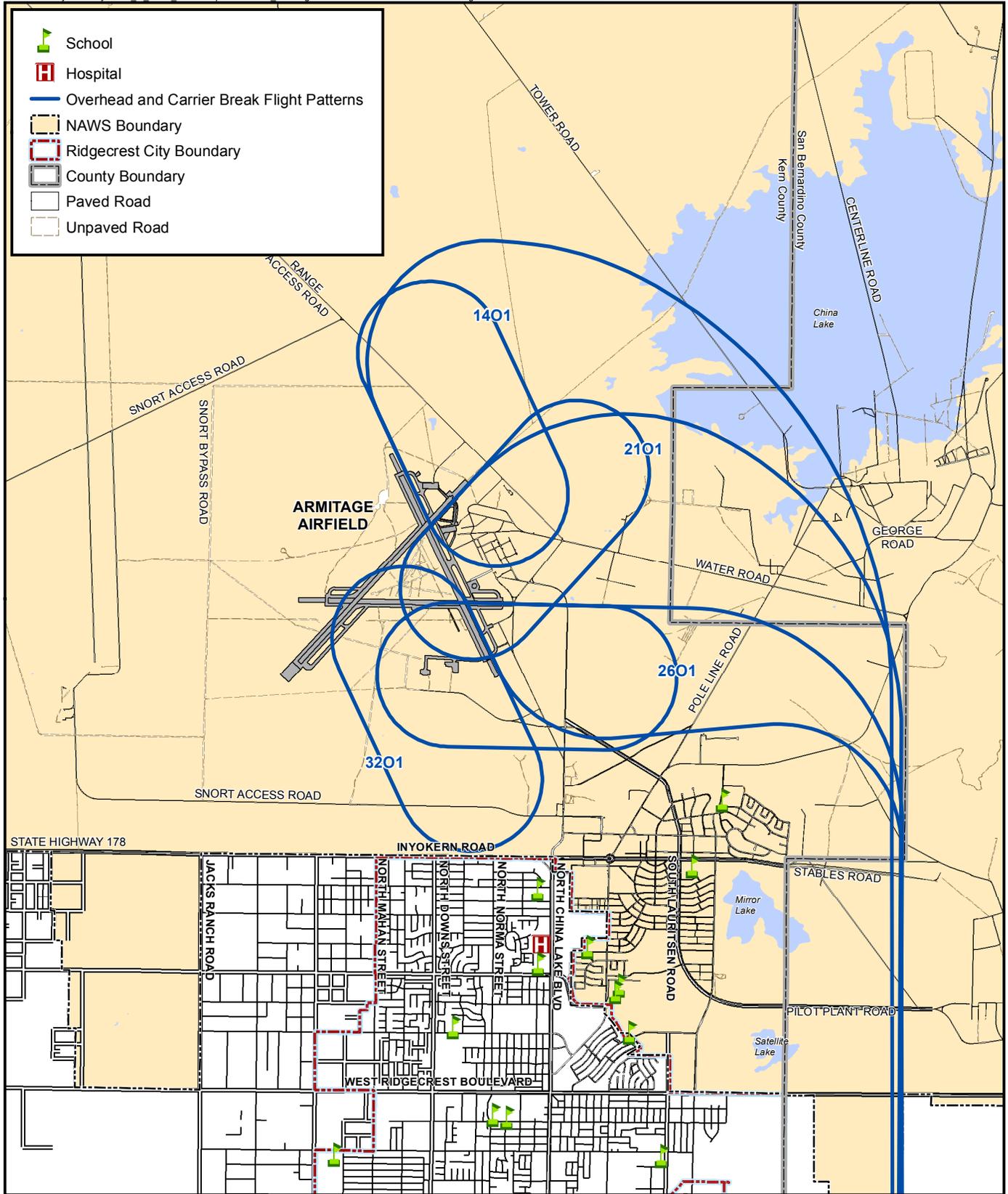


Figure 3-2
Arrival Flight Routes

NAWS China Lake
Ridgecrest, California

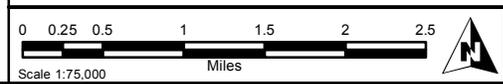




- School
- Hospital
- Overhead and Carrier Break Flight Patterns
- NAWS Boundary
- Ridgecrest City Boundary
- County Boundary
- Paved Road
- Unpaved Road

Figure 3-3
Overhead and Carrier Break
Arrival Flight Patterns

NAWS China Lake
Ridgecrest, California



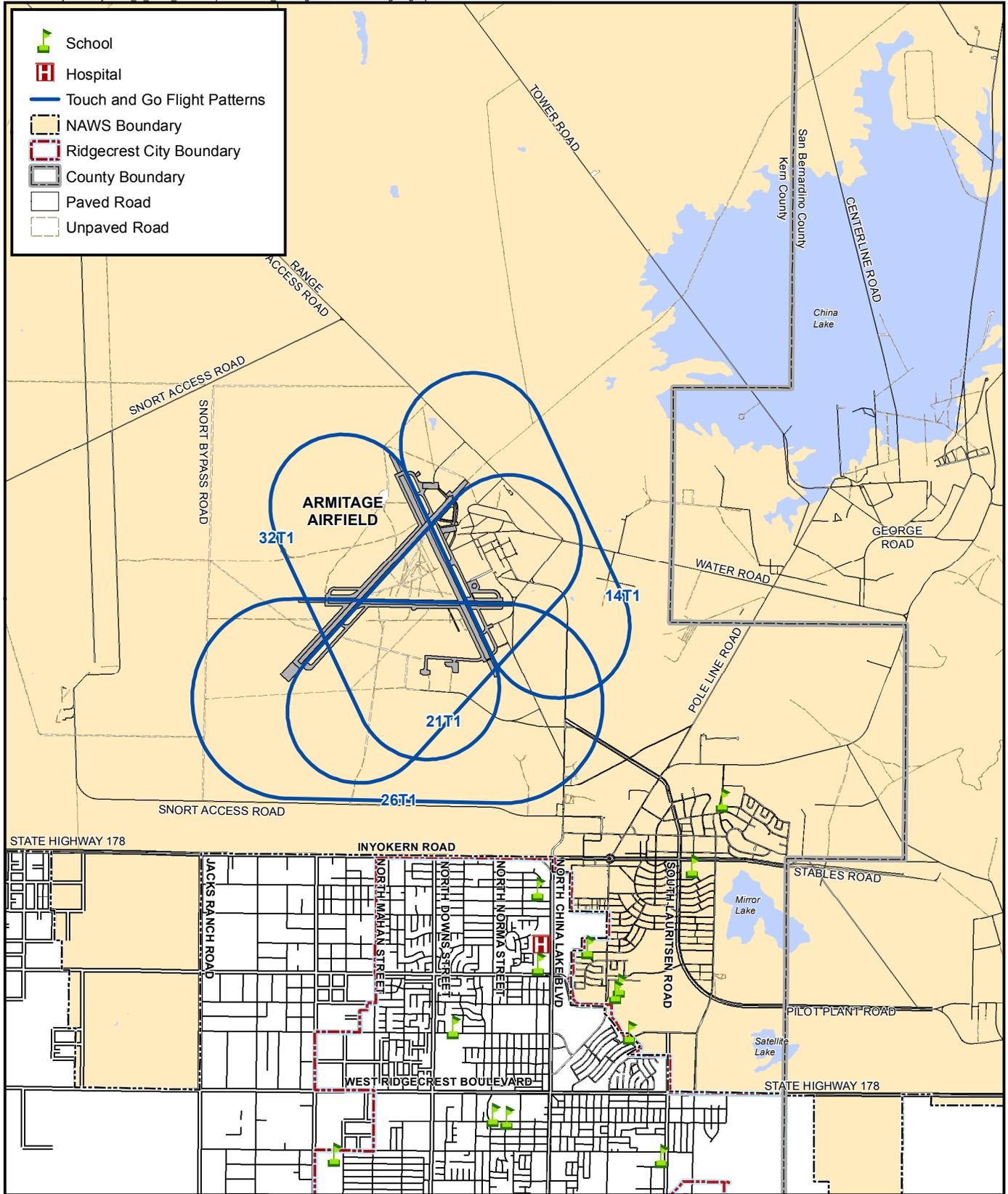
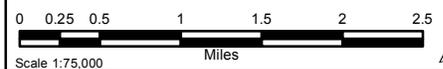


Figure 3-4
Touch and Go
Flight Patterns

NAWS China Lake
Ridgecrest, California



Under the 2007 AICUZ conditions these tests are performed on F/A-18C/D, F/A-18E/F, and EA-6B aircraft at the northern edge of the airfield at location HPTA (Figure 3-5), with the aircraft engine oriented to direct aircraft noise towards unpopulated areas. The 2007 AICUZ conditions include the performance of 18 annual tests on the F/A-18C/D aircraft, 19 on the F/A-18E/F, and 19 on the EA-6B (Table 3-7).

Table 3-7 Engine Maintenance Tests

Aircraft	Power Setting	Duration (minutes)	2007 AICUZ Annual Tests	Projected Annual Tests
F/A-18C/D	Idle	15	18	250
	Low	5	-	250
	Military	2.5	18	205
	Afterburner	2.5	18	205
F/A-18E/F	Idle	15	19	624
	Low	5	-	624
	Military	2.5	19	624
	Afterburner	2.5	19	624
EA-6B	Idle	15	19	-
	Military	2	19	-
E/A-18G	Idle	15	-	20
	Low	5	-	20
	Military	2.5	-	20
	Afterburner	2.5	-	20
F-35	High rpm, low-thrust	30	-	244
	High rpm, low-thrust	1.5	-	18
Total			149	3,748

Source: NAWS May 2007 and Wyle Laboratories Inc. 2010.

NOTE:

Annual engine maintenance tests were estimated for the 2007 AICUZ study conditions. Projected annual engine maintenance tests are based on pilot interviews.

Modeled engine run-ups at Armitage Airfield increased due to revised/updated information gathered during the noise study site visit. Projected conditions include the performance of 250 annual tests on the F/A-18C/D aircraft (125 per the VX-9 and VX-31 squadrons), 624 annual tests on F/A-18E/F aircraft (312 per VX-9 and VX-31 squadrons), 20 annual tests on the E/A-18G aircraft (10 per VX-9 and VX-31 squadrons), as well as 244 30-minute high rpm, low-thrust annual tests and 18 1.5-minute high rpm, low-thrust on the F-35 aircraft. Squadron VX-9 performs tests at Hangar 1 and HPTA and squadron VX-31 performs tests at Hangar 3 and HPTA (Figure 3-5). Tests of the F-35 aircraft will occur at Hangars 1 and 3 as well as HPTA.

3.6 Baker Range Activity

3.6.1 Types and Timing of Operations/Sorties

Modeled aircraft conducting sorties at Baker Range proceed along Hornet and Harrier flight tracks to make multiple passes on target B-1 (see Figure 3-6). For this analysis it was assumed that each aircraft makes 12 passes on the target per sortie. Consistent with airfield operations, the daytime (7:00 a.m. and 7:00 p.m.), evening (7:00 p.m. and 10:00 p.m.), and night time (10:00 p.m. and 7:00 a.m.) percentages of Baker Range operations are 90 %, 8 %, and 2 %, respectively. Aircraft typically begin a target pass on a “run-in” ingress line at a minimum 1,000 feet above ground level (agl); the aircraft descends to a minimum 500 feet agl 1.5 nautical miles from the target and passes over the target at a minimum of 200 feet agl. Once past the target the aircraft makes a left 180 degree turn and climbs to 1,500 feet agl on the downwind leg. On the downwind leg, aircraft occasionally fly outside and west of the Baker Range boundary. The centerline of the Hornet downwind flight track coincides with the western NAWS boundary (see Figure 3-6).

3.6.2 Current Operations

The 2007 AICUZ study did not evaluate Baker Range flight operations. Therefore there is no 2007 AICUZ range activity with which to compare projected range activity. Since the projected scenario predicts range activity for a five- to ten-year planning period (i.e., range activity from 2015 to 2020), current operations are provided for comparison.

Current Baker Range activity includes approximately 3,556 ingress sorties (Table 3-8) that are conducted by AV-8B Harrier, F/A-18C/D “Legacy” Hornet, F/A-18E/F Super Hornet, and EA-6B Prowler aircraft (described in Section 3.1, Aircraft Types). EA-6B aircraft rarely use Baker Range and are not included in Table 3-8. Table 3-8 presents annual ingress sorties by time of day for each of the three primary aircraft. The noise study models Baker Range sorties as distributed on flight patterns: Hornet (small), Hornet (large), and Harrier (see Figure 3-6).

Table 3-8 Current Baker Range Activity

Aircraft	Annual Ingress Sorties ¹			Total
	Day ³	Evening ³	Night ³	
AV-8B	343	30	8	381
F/A-18C/D ²	857	76	19	953
F/A-18E/F ²	2,000	178	44	2,223
Total	3,200	284	71	3,557

Source: Wyle Laboratories, Inc. 2010.

Notes:

Day = 7:00 a.m. and 7:00 p.m.

Evening = 7:00 p.m. and 10:00 p.m.

Night = 10:00 p.m. and 7:00 a.m.

¹ Assumed 12 Bombing Runs (passes or circuits) per ingress sortie

² Assumed split of 30%/70% among Legacy and Super Hornets.

³ Day-Evening-Night split is 90%-8%-2%, based on airfield modeling.

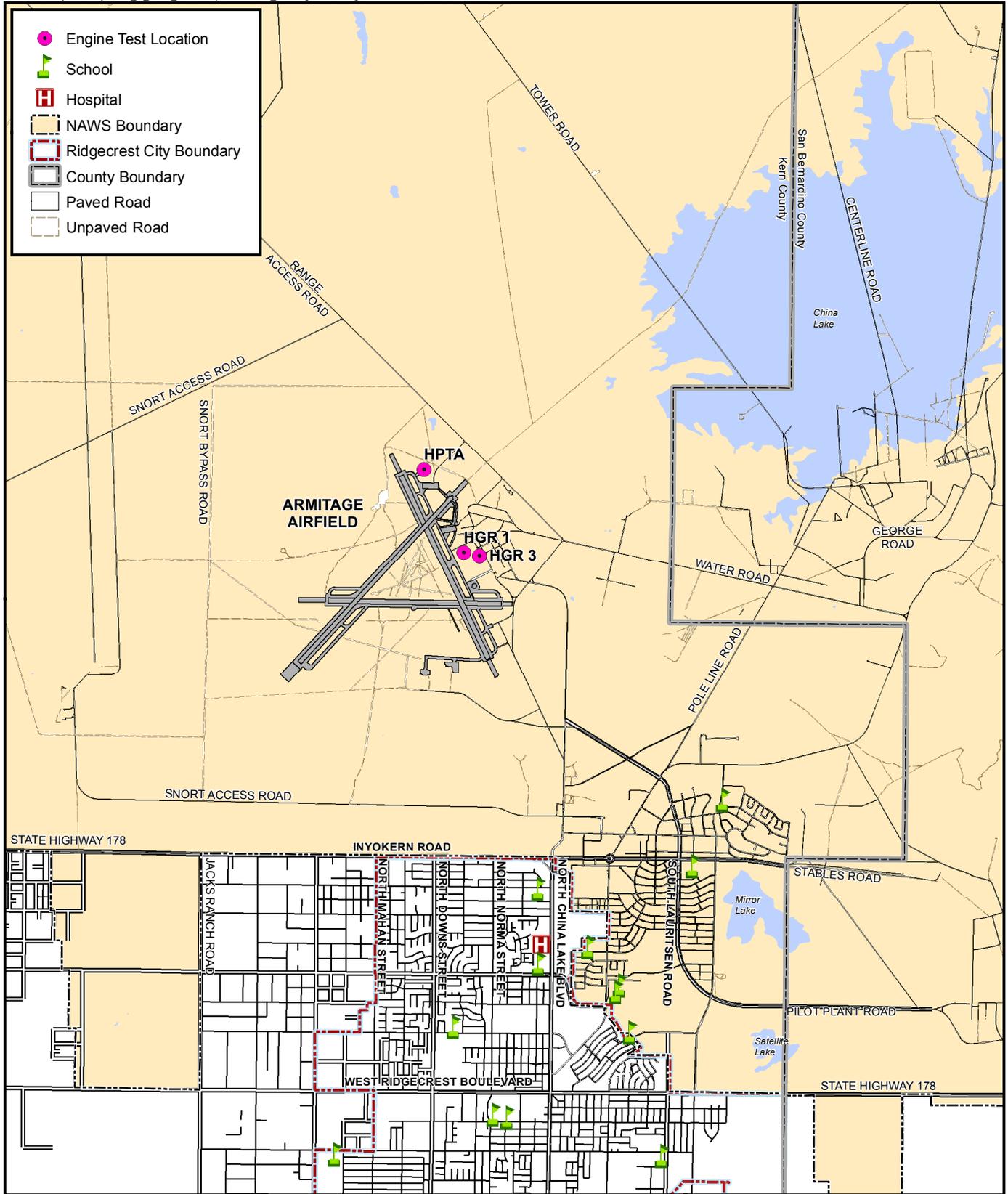
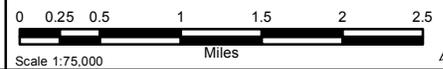


Figure 3-5
Engine Test Locations

NAWS China Lake
Ridgecrest, California



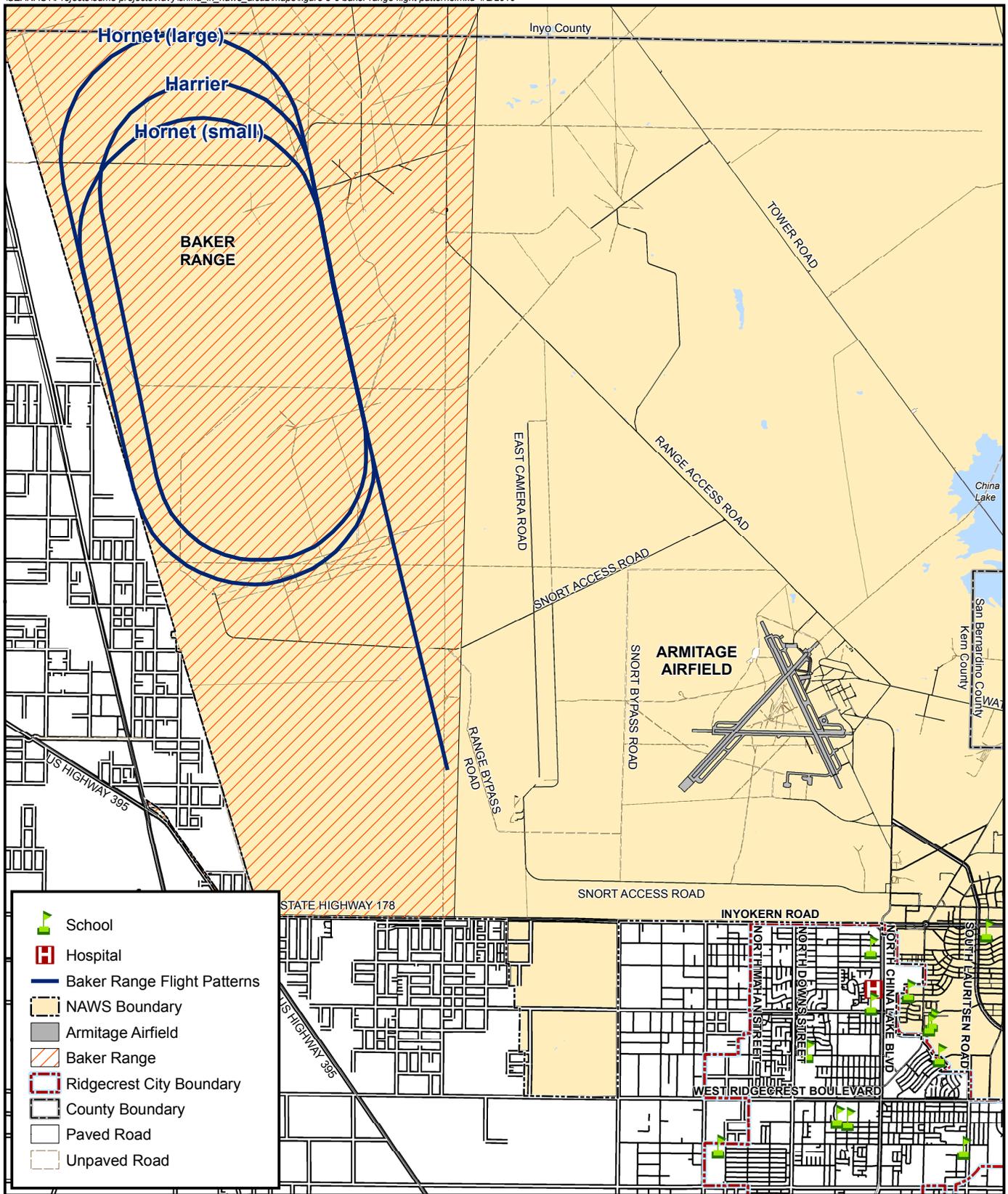
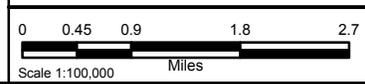


Figure 3-6
Baker Range Flight Patterns

NAWS China Lake
Ridgecrest, California



3.6.3 Projected Operations

Annual modeled projected Baker Range activity would total 4,446 sorties (see Table 3-9). Similar to Table 3-8, Table 3-9 presents annual ingress sorties by time of day for primary aircraft. Projected Baker Range sorties will be conducted by aircraft similar to those currently flown, with the addition of the F-35 Lighting II “Joint Strike Fighter.” Overall projected Baker Range activity would increase by 25% from current conditions. The F-35 sorties would proportionally replace scaled-up AV-8B and F/A-18C/D sorties and comprise approximately 50 % of the total projected Baker Range sorties. AV-8B, F/A-18C/D, and F/A-18E/F would use proportionally similar flight tracks as those described in Section 3.6.1. The F-35 would use Hornet flight tracks for 71% of its sorties and Harrier flight tracks for 29% of its sorties.

Table 3-9 Projected Baker Range Activity

Aircraft	Annual Ingress Sorties ¹			Total
	Day ²	Evening ²	Night ²	
AV-8B	115	10	3	128
F/A-18C/D	244	22	5	271
F/A-18E/F	1,642	146	37	1,825
F-35	2,000	178	44	2,222
Total	4,001	356	89	4,446

Source: Wyle Laboratories, Inc. 2010.

Notes:

Day = 7:00 a.m. and 7:00 p.m.

Evening = 7:00 p.m. and 10:00 p.m.

Night = 10:00 p.m. and 7:00 a.m.

¹ Assumed 12 bombing runs (passes or circuits) per ingress sortie

² Day-evening-night split is 90%-8%-2%, based on airfield modeling.

³ Existing.

4

Safety

Safety is an essential element in AICUZ planning. The Navy has established policies, procedures, and programs to protect the public's safety and to promote compatible land use development in the vicinity of Navy airfields. These efforts focus on minimizing the risks from potential hazards and designating critical safety zones, where land uses that have increased hazard potential should be restricted or avoided. This section provides an overview of the following safety programs and hazard types:

- **Height Restrictions and Imaginary Surfaces.** Restrictions are placed on the height of structures that could obstruct or interfere with arrivals and departures, as illustrated in a series of imaginary surfaces that guide development in the vicinity of the airfield.
- **Accident Potential Zones (APZs).** Specific areas that are designated and controlled near the ends of runways where the potential risk for aircraft accidents and mishaps is higher.
- **Tracking of Aircraft Incidents.** Strict reporting requirements and historical tracking and analysis of aircraft incidents and accidents are used to identify sources of hazards and influence the development of new flight rules and standard operating procedures to increase flight safety.
- **Electromagnetic Interference (EMI) and Hazards of Electromagnetic Radiation to Ordnance (HERO).** Potential sources of electromagnetic radiation that could interfere with the functioning of aircraft systems and ordnance are monitored and restricted in the vicinity of the airfield.
- **Bird/Aircraft Strike Hazard (BASH).** Strategies are developed and implemented to reduce the presence of bird species in the immediate vicinity of the airfield to reduce the likelihood of bird/aircraft collisions.
- **Lighting and Glare.** Planning restrictions and development review efforts are implemented to discourage sources of bright light and glare that can impair a pilot's vision during a flight.

- **Smoke and Dust.** Land use planning and control strategies are developed to discourage land uses that generate large quantities of dust, smoke, or other airborne emissions that can impair visibility in the airfield environment.

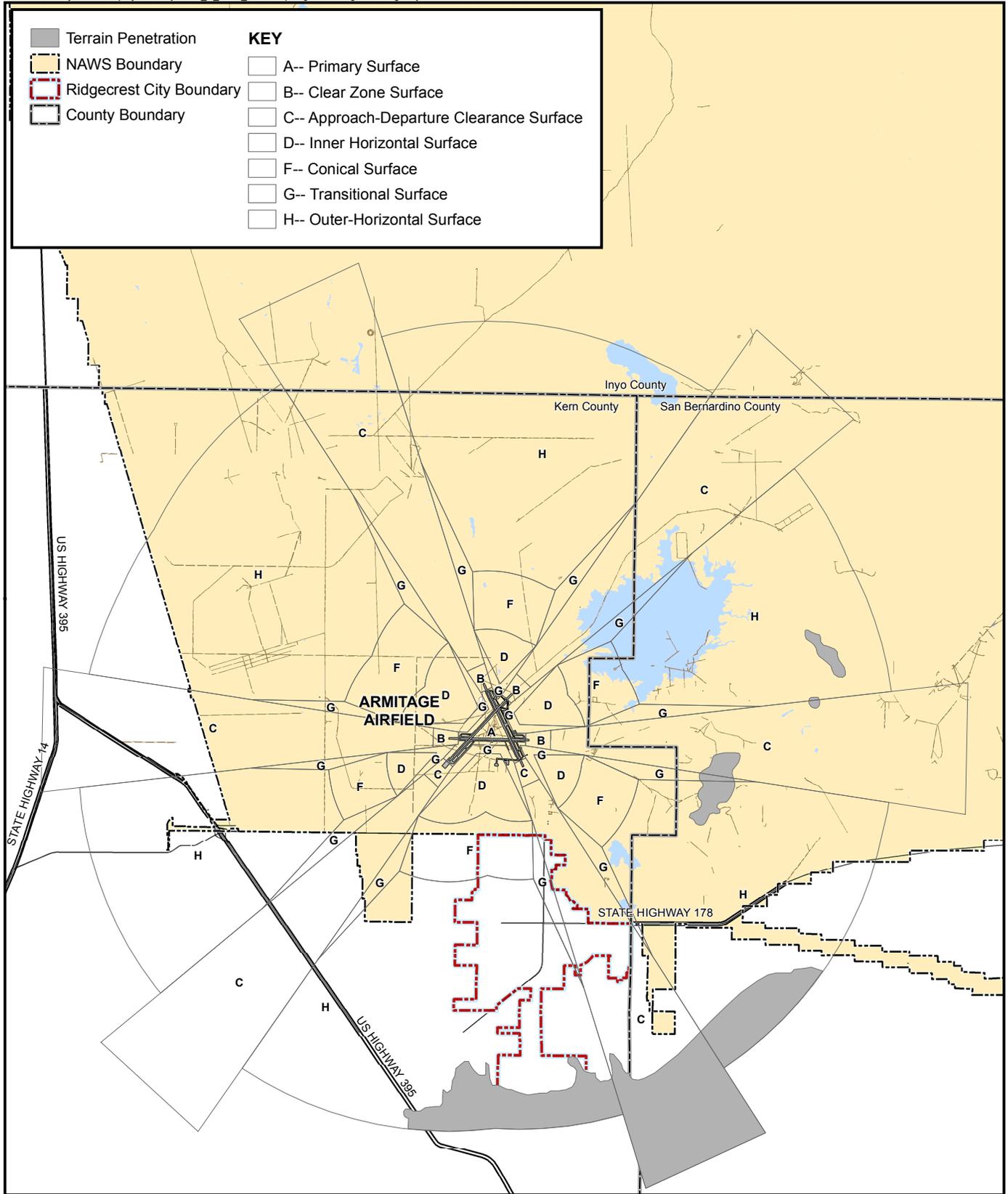
4.1 Height Restrictions and Imaginary Surfaces

Aircraft operations can be constrained by natural terrain and by manmade features such as buildings, towers, poles, and other potential obstructions to navigation. Height restrictions of man-made structures are necessary to ensure that no object will interfere with the safe operations of aircraft transiting the NAWS operating environment. An obstruction-free zone is needed for all runway surfaces and under all weather conditions. The horizontal planes and transitional surfaces of this zone, termed “Imaginary Surfaces,” are defined to ensure that land development in proximity to critical operating areas will not penetrate these transitional surfaces and thereby represent an aviation hazard.

FAA, CFR Title 14, Part 77, Objects Affecting Navigable Airspace (PART 77) outlines a notification procedure for proposed construction or alteration of objects near airports that could affect navigable airspace. Naval Facilities Engineering Command (NAVFAC) Instruction P-80.3 (as well as PART 77) also defines the complex series of Imaginary Surfaces used for siting facilities on and near military airfields and determining obstructions or hazards to air navigation for these airfields. The U.S. standard for Terminal Instrument Procedures (TERPS) for airports is a joint Army, Navy, Air Force, Coast Guard, and FAA publication (OPNAVINST 3722.16C) that provides procedures to be used in analyzing the potential impact a proposed construction or alteration project may have on TERPS for an airfield, and if the proposal would create an obstruction to air navigation if constructed. The early analysis of construction or alteration proposals in areas identified near airfields could identify and help preclude an air navigation obstruction before it occurs.

An “obstruction” or “penetration” is defined as any ground surface, building, or other object that continues above an Imaginary Surface or under an established flight route. The heights of buildings and structures may be increased in proportion to the horizontal distance away from the runway -- as the horizontal ground distance increases, the vertical height along a particular Imaginary Surface may also increase. Man-made obstructions include structures (constructed before height restrictions) and air navigation equipment that is essential to airfield operations. Natural obstructions include vertical terrain such as hills. All obstructions must be approved by a special waiver, have appropriate lighting, and be recorded on all airspace maps. Some of the outlying terrain within the Imaginary Surface envelope is an obstruction because the ground elevation penetrates the Outer Horizontal Surface.

Imaginary Surfaces are defined according to the type of runways that exist at an airfield. The runways at Armitage Airfield are categorized as Class B since they support high-performance or heavier aircraft (such as F/A-18 and EA-6B). Figures 4-1 and 4-2 depict the Imaginary Surfaces that have been established for the



Terrain Penetration	KEY
NAWS Boundary	A-- Primary Surface
Ridgecrest City Boundary	B-- Clear Zone Surface
County Boundary	C-- Approach-Departure Clearance Surface
	D-- Inner Horizontal Surface
	F-- Conical Surface
	G-- Transitional Surface
	H-- Outer-Horizontal Surface

Figure 4-1
 Regional Imaginary Surfaces

NAWS China Lake
 Ridgecrest, California

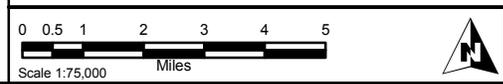
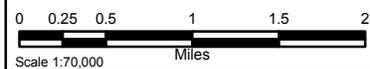




Figure 4-2
 Local Imaginary Surfaces

NAWS China Lake
 Ridgecrest, California



NAWS vicinity and the area surrounding Armitage Airfield. The following describes each Imaginary Surface defined for Class B runways:

- **Primary Surface.** A surface on the ground centered lengthwise on the runway and extending 200 feet (61 meters) beyond each end of the runway. The area beneath the primary surface is required to be free of obstructions. The width of the primary surface is 1,500 feet (457 meters).
- **Clear Zone Surface.** A fan-shaped surface, symmetrical about the runway centerline, adjacent to the runway thresholds and extending 3,000 feet (914 meters) from the runway ends. The clear zone surface starts with an inner width of 1,500 feet (457 meters) (same as that of the primary surface) and parallels the approach-departure clearance surface.
- **Approach-Departure Clearance Surface.** An inclined or combination inclined and horizontal plane symmetrical about the runway centerline. The plane flares outward and upward from the primary surface starting with the centerline elevation at the runway end. The slope of the surface is 50:1 until it reaches an elevation of 500 feet (152 meters) above the established airfield elevation and then extends horizontally to a point 50,000 feet (152,400 meters) from the point of beginning. The outer width is 16,000 feet (4,877 meters).
- **Inner Horizontal Surface.** An oval-shaped plane at a height of 150 feet (46 meters) above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet (2,286 meters) about the runway centerline at each end of each runway and interconnecting these arcs with tangents.
- **Conical Surface.** An inclined plane that extends from the periphery of the Inner Horizontal Surface outward and upward at a 20:1 slope. It extends for a horizontal distance of 7,000 feet (2,134 meters) and a height of 500 feet (152 meters) above the established airfield elevation.
- **Outer Horizontal Surface.** A plane located 500 feet (152 meters) above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet (9,144 meters).
- **Transitional Surface.** Inclined planes that connect the primary surface and the approach-departure clearance surface to the inner horizontal surface, conical surface, outer horizontal surface, or other transitional surfaces. The slope of the plane is 7:1 outward and upward from the primary surface and approach-departure clearance surface, and is at right angles to both the runway centerline and runway centerline extended.

The published Airport Reference Point is utilized for obstruction evaluations of any proposed project in proximity to NAWS flight operations. Any proposed land use that exceeds 200 feet agl or penetrates the 100:1 slope extending 20,000 feet from the nearest point of the closest runway must be submitted to both the

FAA and NAWs for further review. Both agencies advise the local land use authority regarding safety impacts to ensure safety of flight for NAWs operations.

At Armitage Airfield, some of the outlying terrain within the Imaginary Surface is an obstruction because the ground elevation penetrates the Outer Horizontal Surface (see Figure 4-1). The land on the edge of the Outer Horizontal Surface south of the approach end of Runway 32 rises gradually from north to south and the obstruction takes in portions of Rademacher and Spangler Hills. The highest point in this area is approximately 3,100 feet (945 meters) above mean sea level, or about 300 feet (91 meters) above the outer horizontal surface.

Hills and buttes to the east of the airfield (at the approach end of Runway 26) also penetrate the Imaginary Surface. The closest of these is in the Lone Butte area, which rises to approximately 3,800 feet (1,158 meters) above mean sea level. A lighted radio tower is located on the top of this butte. However, these areas are not a major concern since an analysis of all flight routes shows aircraft arriving and departing to Armitage Airfield to the west of the Lone Butte area.

There are also 41 man-made obstructions at Armitage Airfield, although most of them are relatively minor. According to NAVAIR, waivers have been granted to allow their continued presence because the obstructions have either been in place for many years or because they are located near Runways 14/32 and 08/26, which are not used very often. The waivers note that all of the facilities shall be obstruction marked and lighted in accordance with FAA requirements.

4.2 Accident Potential Zones (APZs)

The APZs are areas in the immediate vicinity of airfield runways that warrant extra margins of safety because they have a higher potential for aircraft accidents. Based on historical accident and operations data throughout the military, APZs represent the generalized locations where a higher proportion of aircraft accidents have tended to occur over time. Although the likelihood of an accident at any given time or at any particular location is remote, the Navy recommends that certain land uses that concentrate large numbers of people, such as dense residential developments and schools, not be located within APZs. The designation and control of APZs increases public safety but cannot provide complete protection from aircraft accidents.

Criteria on APZs are found in OPNAVINST 11010.36C. The Navy recognizes three types of APZs for Class B runways: the clear zone, APZ I, and APZ II, defined as follows:

- **Clear Zone.** The trapezoidal area lying immediately beyond the end of the runway and outward along the extended runway centerline for a distance of 3,000 feet. For Navy and Marine Corps installations, the dimensions are 1,500 feet wide at the runway threshold and 2,284 feet wide at the outer edge. The clear zone is required for all active runway ends.

- **APZ I.** The rectangular area beyond the clear zone, which has a measurable potential for aircraft accidents relative to the clear zone. APZ I is provided under flight routes that experience 5,000 or more annual operations (departures or approaches). APZ I is typically 3,000 feet wide by 5,000 feet long and may be rectangular or curved to conform to the shape of the predominant flight route.
- **APZ II.** The rectangular area beyond APZ I (or the clear zone if APZ I is not used), which has a measurable potential for aircraft accidents relative to APZ I or the clear zone. APZ II is always provided where APZ I is required. The dimensions of APZ II are typically 3,000 feet wide by 7,000 feet long and, like APZ I, may be curved to correspond with the predominant flight route.

4.2.1 2007 AICUZ Accident Potential Zones

Figure 4-3 displays the APZs for 2007 AICUZ airfield operations at Armitage Airfield. Three primary surfaces and six clear zones extend over Runways 08/26, 03/21, and 14/32 and their runway ends. One straight APZ I extends from Runway end 03, a curved APZ I extends from Runway end 21, and two APZ Is extend south-eastward from clear zones associated with Runway 03/21. APZ IIs extend from all APZ Is and reflect the predominant flight tracks flown at Armitage Airfield. The closed loop APZ I and IIs extending from Runway 03/21 correspond to an FCLP flight track.

The 2007 AICUZ APZs extend over a total of 4,678 acres located entirely on-base. Approximately 1,564 acres are associated with airfield primary surfaces and clear zones, 1,359 acres are associated with APZ I, and 1,755 acres are associated with APZ II (see Table 4-1).

Table 4-1 Comparison of Accident Potential Zones (acres)

	2007		
	AICUZ	Projected	Change
Primary Surface	1,564	778	-4
Clear Zone		782	(approx. equal)
APZ I	1,359	689	-670
APZ II	1,755	964	-791
Total	4,678	3,213	-1,465

4.2.2 2011 AICUZ Accident Potential Zones

Figure 4-4 displays the APZs for projected airfield operations flown at Armitage Airfield. The APZs include three primary surfaces and six clear zones corresponding to Runways 08/26, 03/21, and 14/32 and their respective runway ends. Extending from Runway end 03, APZ I and APZ II correspond to departure flight operations from Runway 21. APZ I and APZ II extending from Runway end 21 represents non-break arrivals, overhead and carrier break arrivals, and arrivals from touch-and-go operations. The configuration of APZ I and APZ II corre-

sponds to the overhead and carrier break arrival flight track. The 2011 AICUZ APZs have two fewer APZ Is extending southeast from Runway 03/21 and one less closed loop APZ II east of runway 03/21 (see Figure 4-5). Fewer projected APZs are due to reduced total flight operations and elimination of FCLP flight operations (Wyle Laboratories Inc. February 2010).

The 2011 AICUZ APZs extend over a total of 3,213 acres located entirely on-base. Approximately 778 acres are associated with airfield primary surfaces, 782 acres are associated with clear zones, 689 acres are associated with APZ I, and 964 acres are associated with APZ II. The 2011 AICUZ APZs have decreased by 1,465 acres compared with the 2007 AICUZ APZs; APZ I has decreased by 670 acres, APZ II has decreased by 791 acres, and primary surfaces and clear zones have remained approximately equal (see Table 4-1).

4.3 Aircraft Incident History at Armitage Airfield

Military aircraft and weapons test and training operations are inherently dangerous, and various types of aircraft incidents occur occasionally. Aircraft incidents include all reportable accidents associated with aircraft and range from serious events, such as the loss of an aircraft, to less significant events (e.g., the accidental release of a piece of equipment from an aircraft). Between 1958 and 2010, 26 aircraft incidents associated with test and training operations occurred in the vicinity of Armitage Airfield. Table 4-2 describes each incident, and Figure 4-3 identifies the approximate location of each incident relative to the airfield and the established APZs. Of the 26 identified incidents, all but two occurred on NAWS property. Of the two incidents that occurred off-base, one (shown as Incident 23 in Table 4-2 and on Figure 4-3) involved an aircraft crash in the vicinity of what is now Faller School. The other incident (Incident 6 in Table 4-2 and on Figure 4-3) involved an aircraft crash east of County Line Road and south of Kendall Avenue. The cause of both crashes was attributed to engine failure. Of note, emergencies that occur during the takeoff phase of flight are more hazardous due to the aircraft being heavy, full of fuel, and slow airspeed, and if there is an engine failure or malfunction, the aircraft will have a reduced ability to gain altitude.

4.4 Aircraft Incident History at Baker Range

Similar to Armitage Airfield, sorties conducted at Baker Range are inherently dangerous and various types of aircraft mishaps occasionally occur. An historical record of mishaps specific to Baker Range has not been kept. Mishaps that occur are reported to the Safety Center and recorded in association with Armitage Airfield.

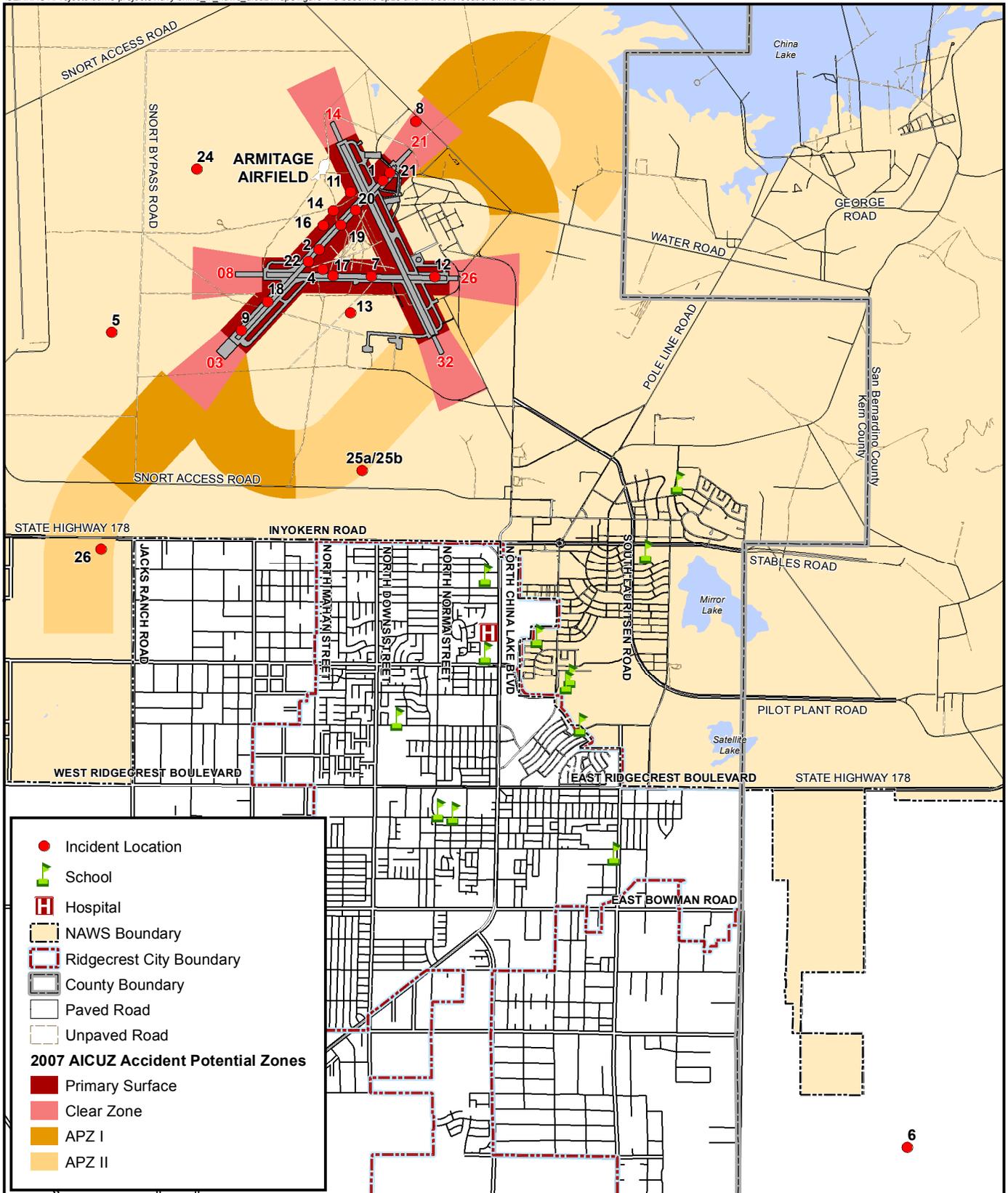
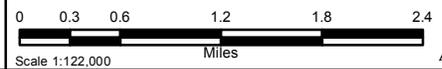


Figure 4-3
 2007 AICUZ Accident Potential Zones
 and Incident Locations

NAWS China Lake
 Ridgecrest, California



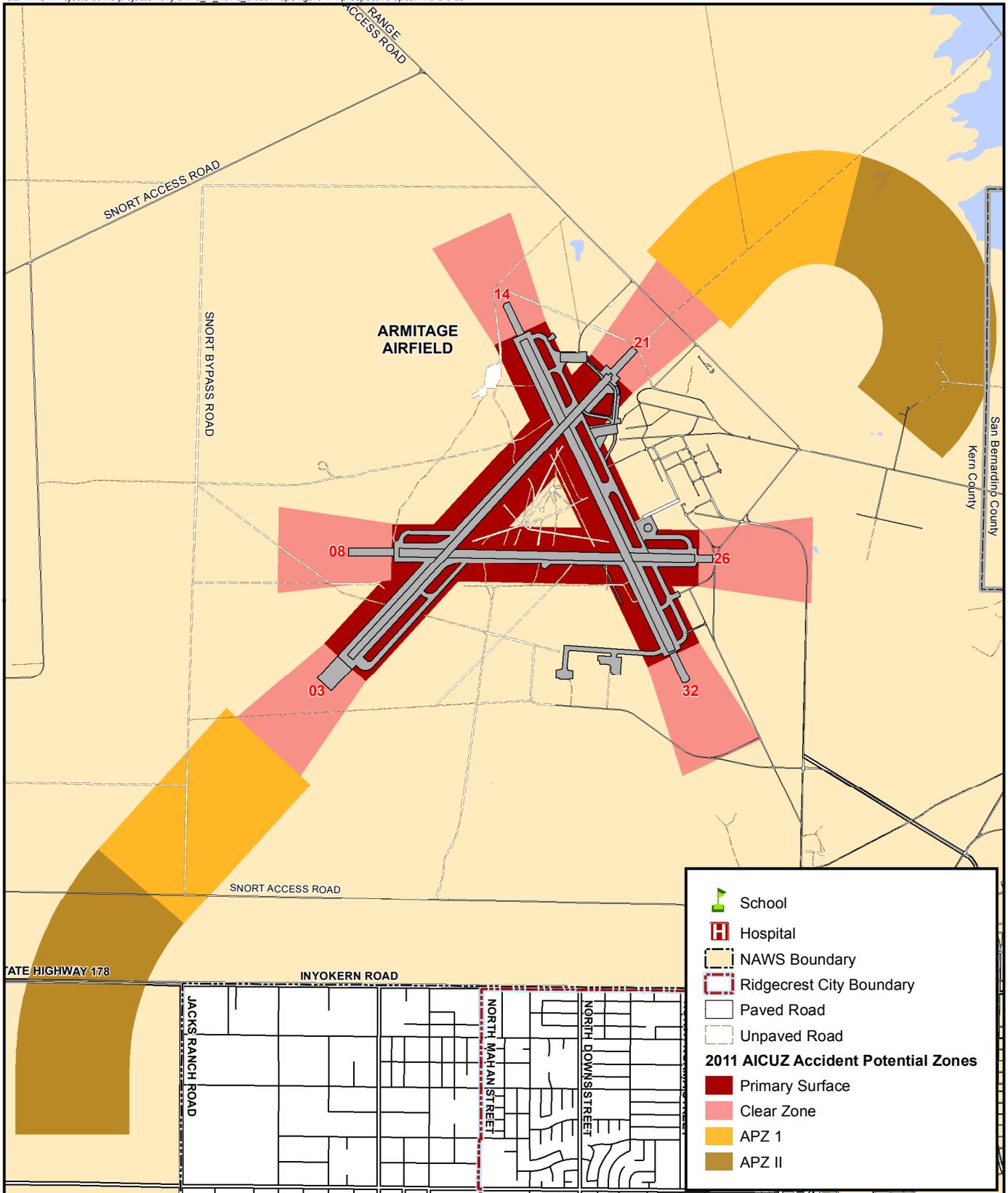
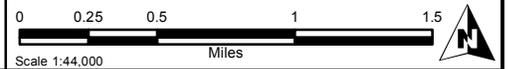
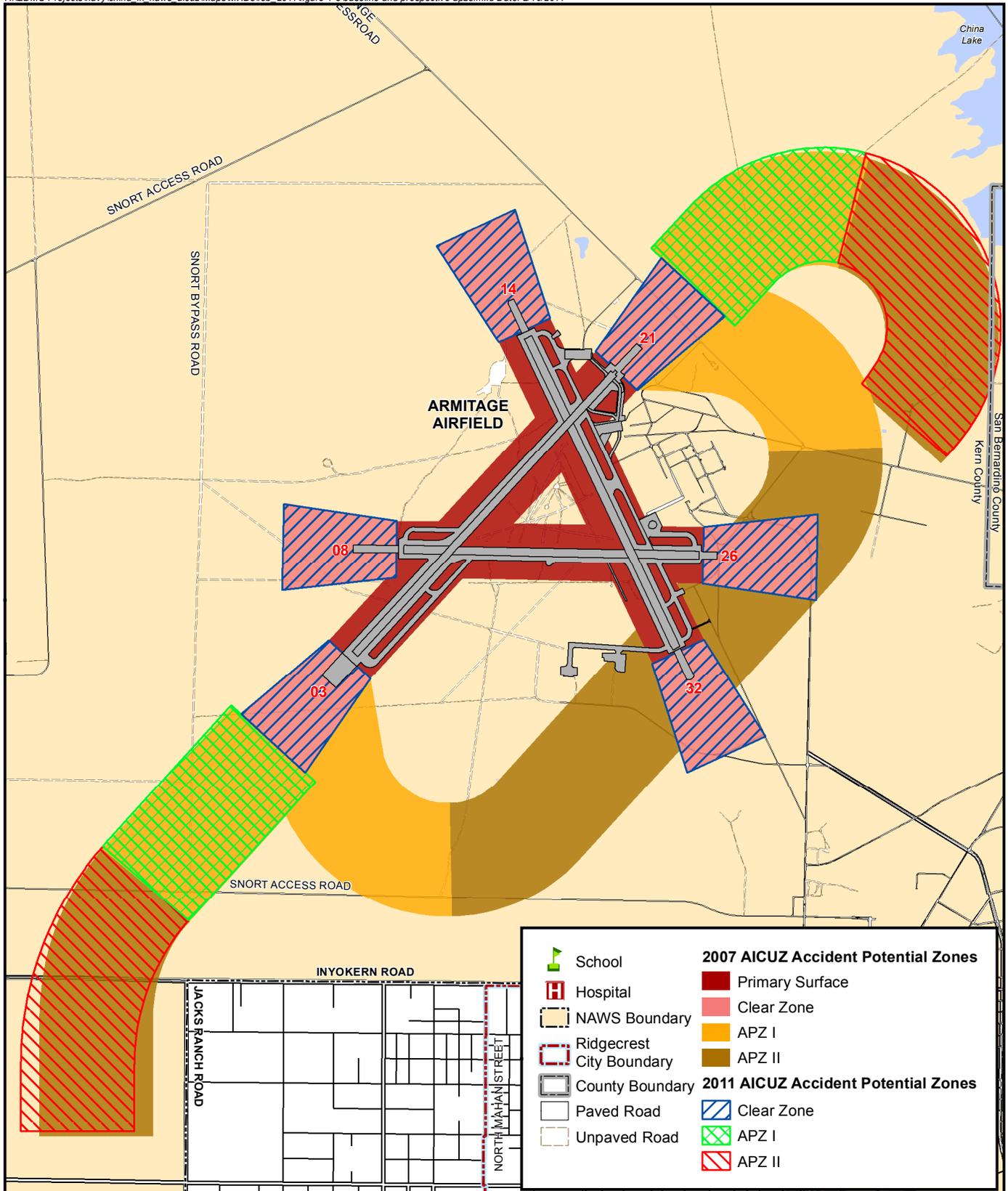


Figure 4-4
2011 AICUZ Accident Potential Zones

NAWS China Lake
Ridgcrest, California





School	2007 AICUZ Accident Potential Zones
Hospital	Primary Surface
NAWS Boundary	Clear Zone
Ridgecrest	APZ I
City Boundary	APZ II
County Boundary	2011 AICUZ Accident Potential Zones
Paved Road	Clear Zone
Unpaved Road	APZ I
	APZ II

Figure 4-5
Comparison of 2007 and 2011 AICUZ
Accident Potential Zones

NAWS China Lake
Ridgecrest, California

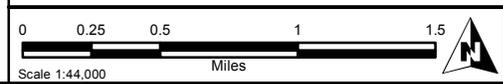


Table 4-2 Class A Mishaps in the Vicinity of Armitage Field

ID#	Aircraft	Date	Description	Location
1	GR-4	April 2008	Aircraft landed with gear up	See Figure 4-3
2	F-18	December 2003	Aircraft departed runway after landing	See Figure 4-3
3	AV-8B	June 1996	Departed controlled flight	Approx. 7-1/2 miles NW
4	F-18D	March 1996	Aircraft departed runway on landing	See Figure 4-3
5	QF-4N	1995	Post-take-off Crash (unmanned)	See Figure 4-3
6	AV-8B	September 1994	Post-takeoff, off-base crash	See Figure 4-3
7	AV-8B	February 1994	Un-commanded jettison of external stores on takeoff ¹	See Figure 4-3
8	F-18C	May 1993	Un-commanded release of test article ¹	See Figure 4-3
9	QF-86F	May 1992	Loss of aircraft component in flight	See Figure 4-3
10	Data not Available	May 1992	In-flight loss of test weapon (inert) component ¹	Approx. 7 miles W
11	QF-86F	April 1992	Departed runway after landing (unmanned)	See Figure 4-3
12	UH-1N	May 1991	Hard landing	See Figure 4-3
13	QF-86F	March 1991	In-flight loss of aircraft component ¹	See Figure 4-3
14	QF-4N	January 1991	Departed runway during take off (unmanned)	See Figure 4-3
15	F-18C	January 1991	Un-commanded in-flight release of ordnance (inert) ¹	Approx. 9 miles NW
16	QF-4N	September 1990	Departed runway during take off (unmanned)	See Figure 4-3
17	UH-1N	September 1990	Hard landing	See Figure 4-3
18	F-18	July 1990	In-flight loss of weapon (inert) component ¹	See Figure 4-3
19	AV-8B	September 1989	Electrical failure, gear-up landing	See Figure 4-3
20	A-7E	August 1985	Nose gear failure on landing	See Figure 4-3
21	QF-86F	October 1984	Landed short of runway (unmanned)	See Figure 4-3
22	A-4/A-4	1984	Collision on the runway, post-landing	See Figure 4-3
23	QF-86F	August 1979	Post-takeoff off-base crash	See Figure 4-3
24	QT-33	June 1976	Departed controlled flight (unmanned)	See Figure 4-3
25a/ 25b	A-6/A-7	June 1976	Landing pattern mid-air collision	See Figure 4-3
26	Data not Available	June 1958	Loss of test weapon (inert) after takeoff ¹	See Figure 4-3

Source: NAWS Air Operations 2006; NAWS 2010b

Notes:

¹ Equipment “drop.”

4.5 Electromagnetic Interference and Radiation

New generations of military aircraft are highly dependent on complex electronic systems to perform critical flight and mission-related functions. This dependence on digital electronics, combined with higher clock rates, power-conserving signal levels, increased use of composite materials, onboard radar, communications transmitters, and lasers, increases the susceptibility of aircraft communication, navigation, and other electrical systems to electromagnetic interference (EMI). EMI is defined by the American National Standards Institute (ANSI) as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits

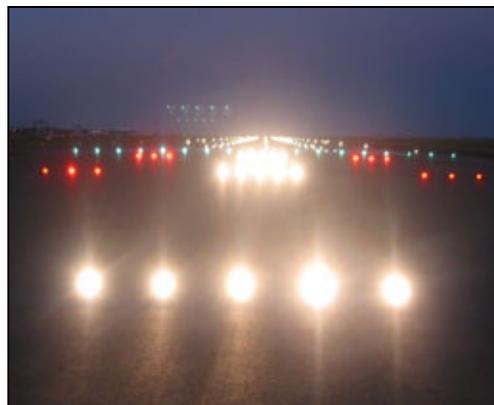
the effective performance of electronics/electrical equipment. It can be induced intentionally, as in forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, such as high-tension power line leakage. EMI may also be caused by atmospheric phenomena, such as lightning and precipitation static, and non-telecommunications equipment, such as vehicles and industrial machinery. EMI may also affect aircraft weapons systems, which often include a myriad of digital electronics.

Hazards of electromagnetic radiation to ordnance (HERO) are also of concern. The HERO Assessment of NAWS China Lake (April 2006) addresses the effects of electromagnetic environments created by stationary and mobile/portable antenna/transmitter systems located in the vicinity of ordnance operations such as transportation, assembly, and loading operation areas. Analysis of the operating parameters of aircraft supported by NAWS indicates that they can produce electromagnetic environments that exceed the HERO susceptible and HERO unsafe/unreliable ordnance maximum allowable environments on the flight line and in the hangars. Details regarding the ordnance's susceptibility and the corresponding maximum allowable environments for given frequency ranges and ordnance operations are contained in Electromagnetic Radiation Hazards (Hazards to Ordnance) (NAVSEA 2005). The HERO Assessment report also provides HERO emission control (EMCON) guidance for operations involving HERO susceptible and HERO unsafe/unreliable ordnance. HERO EMCON or ordnance handling restrictions apply to all HERO susceptible ordnance operations and when HERO unsafe/unreliable ordnance is exposed to electromagnetic environments, EMCON is necessary.

4.6 Lighting and Glare

Bright lights, either directed or reflected, in the vicinity of an airfield can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot or "halo" to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous at night when the flash can destroy the eye's adaptation to darkness, typically requiring 40 to 45 minutes for total recovery. Spotlights and reflected light from glass-exterior buildings, as well as solar facilities that produce glare such as solar troughs, can

also impair pilot vision. According to personnel at NAWS, there are no existing or expected major issues related to off-installation lighting in the vicinity of or on approach and departure routes to the airfield. While the effects of existing light sources and glare are not currently a significant operational concern, initiatives should be pursued on- and off-base to ensure that future sources are developed in



Bright lighting in the vicinity of an airfield can impair a pilot's vision and impact the approaches to lit runways such as the one shown above.

a manner that minimizes the potential for impacts to NAWS' test and training operations.

4.7 Smoke and Dust

Uncontrolled land uses around airfields that emit smoke, dust, or other air pollutants can impair visibility in the vicinity of the airfield, interfere with the safe operation of aircraft, and endanger the landing, takeoff, or maneuvering of aircraft at the airfield. The control of on- and off-base smoke and dust sources remains an important safety concern for airfield flight operations at NAWS.

Activities that generate smoke and dust off-base are controlled by the Air Pollution Control Districts (APCD) of Kern and San Bernardino Counties. Kern County Air Pollution Control District Rule 402 and Mojave Desert Air Pollution Management District Rule 403 require the implementation of dust control measures at construction and demolition sites and for other fugitive dust-producing activities both on- and off-base. Off-base smoke and dust emissions have not been a significant issue to airfield operations in the past. The continued implementation of emissions controls programs by the Kern County APCD is expected to maintain this situation.

Military events that create significant amounts of smoke near the airfield are sporadic and occur primarily during firefighter training exercises. These exercises are conducted on the weekends to minimize conflict with airfield operations. Range operations that produce dust and/or smoke are typically conducted at more remote locations and are associated with scheduled test or training events. Therefore, smoke and dust emissions from range operations are not currently a significant issue at Armitage Airfield. Continued diligence will be necessary to ensure that airfield operations are not impacted in the future by dust- and smoke-producing activities.

4.8 Bird Aircraft Strike Hazard (BASH)

Bird/Animal Aircraft Strike Hazard (BASH) plans are required by the DoD for military installations where there is a potential for conflict between military activity and wildlife. BASH plans contain installation-specific information and guidelines to minimize the potential for collisions between aircraft and birds or other animals. In September 2002, NAWS developed and formally implemented a BASH plan for air operations at Armitage Airfield. The plan complies with DoD and Navy directives, and is implemented through NAWS Instruction (NAWSINST) 3750.2. The program is designed to control birds, alert aircrew and operations personnel, and to provide increased levels of flight safety, especially during the critical phases of flight. This plan establishes specific procedures to reduce known and potential bird hazards on and around NAWS. The NAWS BASH program is designed to:

- Establish a Bird Hazard Working Group (BHWG) and designate responsibilities to its members.

- Establish training for appropriate base members concerning responsibilities and actions.
- Establish procedures to identify high hazard situations and to aid supervisors and aircrews in altering/discontinuing flying operations when required.
- Establish aircraft and airfield operating procedures to avoid high hazard situations.
- Provide a method for issuing information to all tenant and transient aircrews on bird hazards and procedures for bird avoidance.
- Establish passive techniques to decrease airfield attractiveness to birds.
- When necessary, establish active/static techniques to disperse birds from the airfield.
- Establish procedures for reporting damaging/non-damaging bird strikes.
- Establish procedures for collecting bird strike remains.

As noted above, a BHWG has been established and is responsible for organizing, implementing, monitoring, and updating the BASH Plan. The BHWG also reviews actual strike data, and prepares airfield operations for seasonal bird migration trends. It allows base offices affected by BASH risks the opportunity to meet and discuss possible solutions. The BHWG meets regularly with representatives from each organization concerned with bird hazards to share current BASH information and address BASH-related issues as they develop.

The most critical aspect of the BASH program is the aircrew notification and warning system. This system establishes procedures for the exchange of information between ground agencies and aircrews concerning the existence and location of birds that pose a hazard to flight safety. A standardized Bird Hazard Condition (BHC) is to be used at NAWS to warn aircrew and support personnel of the current bird threat to operations. These codes are identical to codes utilized by the United States Air Force.

Means for tracking BASH incidents is provided through adherence to bird strike reporting procedures. The procedures include reporting of bird strikes by aviators, completion of a Bird/Animal Strike Hazard Report, and notification of the Environmental Management Division (939-3238) or the NAWS Air Operations Air Safety Officer (ASO) once the form has been submitted to the Navy Safety Center. Bird strike information accumulated in the database allows for more accurate predictions to aviators regarding when the probability for bird activity is highest.

5

Noise

This section presents an overview of aircraft-related noise, including a description of the metrics and methodologies used to represent and evaluate noise in the vicinity of airfields. The section also describes the characteristics of the noise environment at Armitage Airfield and Baker Range, including the definition of the noise “footprint” associated with airfield and range operations (shown in the form of noise contour lines and noise zones plotted on a map). Also summarized is the history of noise complaints in the vicinity of Armitage Airfield and Baker Range, and the noise abatement procedures used to reduce the impact of aircraft noise.

5.1 What is Noise?

Noise is generally defined as unwanted sound. Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the ear. Whether sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammers) depends largely on the listener's current activity, past experience, and attitudes toward the source of the sound. Sound is all around us; it is generally thought of as noise when it interferes with normal activities such as sleep and conversation. Individual responses to different sound levels can be influenced by many factors, including the following:

- Activity the individual is engaged in at the time of the event
- General sensitivity to sound
- Time of day
- Length of time an individual is exposed to a sound
- Predictability of sound
- Average temperature, inversions, and other weather phenomena.

Aircraft-related sound is often categorized as noise in communities surrounding airfields. The impact of aircraft noise is therefore a factor in the planning of future land use near airfields. Because the noise from military aircraft operations may impact surrounding land use, the Navy has defined noise zones and provided associated recommendations regarding compatible land use in the AICUZ program instruction. For the purposes of this study land uses encumbered by noise from Baker Range will be analyzed in accordance with Navy AICUZ Instruction (OPNAVINST) 11010.36C, Air Installations Compatible Use Zones Program, October 9, 2008.

The main sources of noise at air installations are generally related to in-flight operations and pre-flight and maintenance run-up operations. Computer models are used to develop noise contours for land use planning purposes based on information about these operations, including the following factors:

- Type of operation (e.g., arrival, departure, pattern)
- Number of operations per day
- Time of operation
- Flight route used
- Aircraft power settings, speeds, and altitudes
- Number and duration of maintenance run-ups
- Environmental data (temperature, humidity, and cloud cover)
- Topographical features of the area.

5.2 Characteristics of Sound

5.2.1 General Sound Measurement

The measurement of sound involves three basic physical characteristics: intensity, frequency, and duration. Intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder the perception of that sound. Frequency is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while sirens or screeches typify high-frequency sounds. Duration is the length of time the sound can be detected.

A logarithmic unit known as a decibel (dB) is used to represent the intensity of sound. Such a representation is called a sound level. A sound level of 10 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. Figure 5-1 illustrates the sound levels of typical human activities and noise sources.

Because of the logarithmic nature of the decibel unit, sound levels associated with different events cannot simply be added or subtracted. The combined sound level produced by two sounds of different intensity levels is only slightly higher than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB}$$

And if two sounds of equal intensity are added, the sound level increases by 3 dB. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB}$$

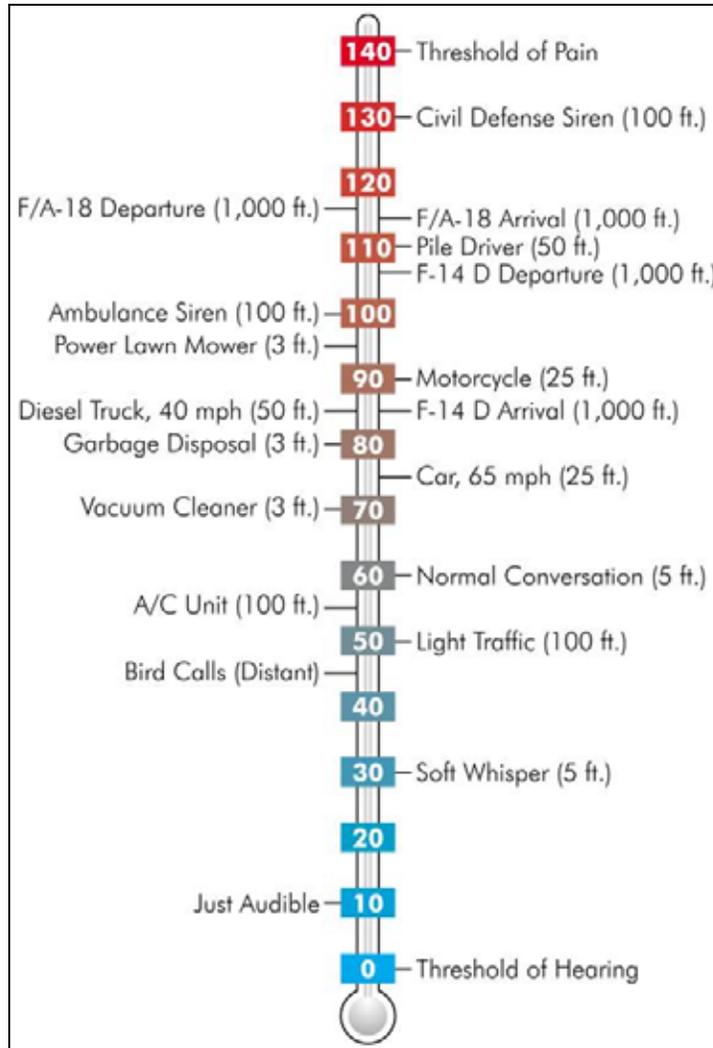


Figure 5-1 Sound Levels of Typical Sources and Environments

A change of 3 dB is the smallest change detected by the average human ear. An increase of about 10 dB is usually perceived as a doubling of loudness. This applies to sounds of all volumes. A small change in dB will not generally be noticeable. As the change in dB increases, the individual perception is greater, as shown in Table 5-1.

Table 5-1 Subjective Responses to Changes in Sound Levels

Change	Change in Perceived Loudness
1 dB	Requires close attention to notice
3 dB	Barely perceptible
5 dB	Quite noticeable
10 dB	Dramatic, twice or half as loud
20 dB	Striking, fourfold change

Source: NAWS May 2007.

Aircraft noise is expressed in terms of A-weighted sound levels, in units of A-weighted decibels, or dBA. A-weighting is a method of adjusting the frequency content of a sound event to closely resemble the way the average human ear responds to aircraft sound. The A-weighting scale is therefore considered to provide a good indication of the impact of noise produced by aircraft operations. All dB measurements throughout this AICUZ study update are in terms of A-weighted decibels.

5.2.2 Cumulative Noise Metrics

The sound environment around an air installation is typically described using a measure of cumulative exposure that results from all aircraft operations. The DoD-specified metric used to account for this is the day-night average sound level (DNL). In general, DNL (sometimes also denoted as L_{dn}) can be thought of as an accumulation of all of the sound produced by individual events that occur throughout a 24-hour period. The sound of each event is accounted for by an integration of the changing sound level over time. This integrated sound level metric for individual events is called the sound exposure level (SEL). The logarithmic accumulation of the SELs from all operations during a 24-hour period determines the DNL for the day at that location. DNL also takes into account the time of day the events occur. The measure recognizes that events during the nighttime hours may be more intrusive, and therefore more annoying, than the same events during daytime hours, when background sound levels are higher. To account for this additional annoyance, a penalty of 10 dB is added to each event that takes place during “acoustic” nighttime hours, defined as 10:00 p.m. to 7:00 a.m.

The State of California has developed a standard measure for describing environmental noise called the Community Noise Equivalent Level (CNEL). Like the DNL metric, the CNEL represents an accumulation and an averaging of all the noise produced by individual events occurring during a 24-hour period. The noise of each event is accounted for by integrating the changing sound level over time, such as when an aircraft approaches, flies overhead, and then continues off into the distance. The CNEL noise descriptor also takes into account the time of day the event occurs; however, in addition to applying a 10-db CNEL penalty to nighttime operations, the CNEL also weights those events taking place in the evening period (7:00 p.m. to 10:00 p.m.) as if they were 5 dB CNEL louder than daytime events.

Like the DNL metric, CNEL values around an airfield are presented for a 24-hour period referred to as an “average busy-day.” Average busy-day operations are calculated by dividing the annual operations by the number of annual average busy-days. This averaging is done to obtain a stable representation of the noise environment free of fluctuations in wind direction, runway use, temperature, aircraft performance, and total airfield operations, any one of which could significantly influence individual SELs from one day to the next. The accumulation of noise computed in this manner provides a quantitative tool for comparing overall noise environments and developing compatible land use plans. The dB CNEL

values are represented as contours connecting points of equal dB CNEL value, usually in 5-dB CNEL increments from 60 dB CNEL up to the highest contour values. Because NAWS is located in California, the CNEL metric is used in this AICUZ study update instead of the DNL. CNEL represents a slightly more conservative measure of potential noise exposure than the DNL because of the additional dB penalty associated with evening operations.

Noise levels of the loudest aircraft operations significantly influence the 24-hour average. For example, if one daytime aircraft overflight measuring 100 dB for 30 seconds occurs within a 24-hour period in a 50-dBA 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.

Individuals do not "hear" CNEL. The CNEL contours used in this AICUZ study update are intended for land use planning, not to describe what someone hears when a single event occurs. As described above, single-event noise is described in terms of the SEL in units of dB (A-weighted). SEL is a metric that takes into account the amplitude of a sound and the length of time during which each noise event occurs. It thus provides a direct comparison of the relative intrusiveness among single noise events of different intensities and durations of aircraft over flights. Table 5-2 lists SEL values that indicate what a person on the ground would hear at representative distances from an aircraft flying overhead performing departure, break arrival, non-break arrival, and touch-and-go operations. Aircraft used for projected operations are provided in Table 5-2 for comparison.

Table 5-2 SEL Values for Representative Projected Flight Conditions at NAWS

Condition ⁽²⁾	Projected Modeled Aircraft			
	F/A-18C/D	F/A-18E/F and EA-18G	F-35 ⁽¹⁾	AV-8B
Departure crossing Inyokern Rd 4000 ft msl ⁽³⁾	111 dB	107 dB	110 dB	102 dB
Break Arrival at 4000 ft msl (1/4 mile north of Inyokern Rd)	89 dB	97 dB	90 dB	90 dB
Non-break Arrival at 4000 ft msl, gear down (1.8 miles south of Inyokern Rd)	98 dB	101 dB	92 dB	86 dB
Touch and Go at 1000 ft agl, gear down	105 dB	110 dB	108 dB	99 dB

Source: Wyle Laboratories 2010c.

Notes:

- 1) Modeled with F-35A (Edwards AFB data 2008).
- 2) 45 deg F, 48%RH, 30.10 in Hg; 2283 ft msl field elevation.
- 3) F/A-18E/F and EA-18G at 5000 ft msl; no afterburner for all aircraft.

Key:

- agl = Above ground level.
- msl = Mean sea level.

5.2.3 Noise Modeling Methodology

The Navy periodically conducts noise studies to assess the potential noise impacts of aircraft operations. The need to conduct a noise study is generally prompted by a change in aircraft operations; such changes may involve the number of operations, the number and type of aircraft using the airfield, or the flight routes used for airfield departures and arrivals. A noise study is also normally conducted as a part of an AICUZ study or an AICUZ study update. The Navy used NOISEMAP, MR_NMAP, and NMPlot computer models to generate noise contours around Armitage Airfield and Baker Range.

NOISEMAP Version 7 was used to calculate dB CNEL contours for airfield operations, based on variables such as **average busy day (ABD)** flight operations by aircraft type; flight tracks; acoustical periods of day, evening, and night; runway and flight route utilization; and flight profiles for each aircraft type (e.g., power settings, airspeed, use of flaps, etc.). These parameters, as well as pre-flight and maintenance run-up operations, and noise modeling assumptions establish the shape of the noise contours. Radar data, air traffic control (ATC) logs and interviews with ATC personal and pilots were used to update aircraft operations information for this AICUZ study. Departure flight tracks were also updated to more accurately reflect dispersion of departure traffic (see Figure 3-1). Noise modeled from dispersed flight tracks tends to be of lower intensity (dB CNEL) and extend a greater distance perpendicular to the flight track.

Average busy day (ABD)

ABD operations are calculated by dividing the annual operations by the number of annual ABDs. ABD is modeled because NAWS experiences variable periods of high- and low- operational use, corresponding to high- and low-noise levels. ABD reflects noise at NAWS during high-use periods.

For this AICUZ study update 213 ABDs were modeled.

Other inputs such as topography also affect the noise contours generated by computer model. Modeling inputs that change from the 2007 AICUZ study include terrain modeling and ground impedance.

- **Terrain Modeling.** This AICUZ study models the terrain rising to the south of the airfield by approximately 1,400 feet and decreasing by approximately 100 feet to the north relative to the airfield's elevation. This AICUZ study captures a 4 dB CNEL greater exposure in areas south of the airfield due to rising terrain.
- **Ground Impedance.** This AICUZ study models the ground impedance as acoustically "hard" to more accurately reflect the vacant desert in the vicinity of NAWS. This AICUZ study captures a 2 dB CNEL greater exposure for noise emitted from the main departure and arrival flight tracks due to "hard" ground impedance. Modeling "hard" ground impedance also contributes to an approximately 10 to 15 dB CNEL increase in noise exposure north of the airfield relative to the 2007 AICUZ study.

The MR_NMAP Version 2.2 computer model was used to calculate dB CNEL contours resulting from Baker Range sorties. For NAWS, Baker Range sorties were modeled along specific Hornet and Harrier flight tracks (see Section 3.6.1 and Figure 3-6). Airspace information, flight tracks, flight profiles (average power settings, altitude distributions, and speeds), and number of sorties by time period are the basis of dB CNEL contours for Baker Range. The MR_NMAP program does not support topography modeling inputs such as the terrain and ground impedance used in the airfield modeling. The NMPlot computer model was used to logarithmically add the noise contours generated by NOISEMAP for Armitage Airfield operations and MR_NMAP for Baker Range sorties to create a single set of noise contours for this AICUZ study update. Inclusion of the Baker Range sorties into the noise model correspond to the 60 dB CNEL lobe and 65 dB CNEL contour of captured noise exposure northwest of the airfield extending into Kern County.

Noise modeled for the 2011 AICUZ study is substantially greater than that modeled in the 2007 AICUZ study (see Section 5.3.3, Comparison of 2007 AICUZ and 2011 AICUZ Noise Contours). The increased area encumbered by noise contours is primarily attributed to inclusion of Baker Range sorties as well as terrain and ground impedance noise model inputs. Baker Range sorties correlate to noise exposure captured northwest of the airfield, rising terrain south of the airfield correlates to a 4 dB CNEL increase in captured noise exposure in that area, and “hard” ground impedance contributes to a 10 to 15 dB CNEL increase in captured noise exposure north of the airfield. For comparison purposes, a theoretical doubling of all airfield and Baker Range operations would only correlate to a 3 dB CNEL increase in overall noise exposure.

Noise modeled by this 2011 AICUZ study update reflects the accumulation of aircraft; noise model, and operations changes reflected in the November 2008, August 2009, and February 2010 supplemental noise studies. Baker Range sorties, terrain, and “hard” ground impedance were not modeled in the 2007 AICUZ. The noise model used for the 2011 AICUZ study update more accurately reflects the noise environment at NAWS (Wyle Laboratories Inc. March 30, 2010).

5.3 Noise Zones

At a minimum, the DoD requires that noise contours in AICUZ studies be plotted for values of 60 dB CNEL and above (in 5 dB CNEL increments). Three general noise exposure zones are defined in the AICUZ program: Noise Zone 1 includes areas with less than 65 dB CNEL; Noise Zone 2 encompasses areas between 65 and 74 dB CNEL; and Noise Zone 3 covers areas exposed to 75 dB CNEL and higher. For the purposes of this AICUZ study, Noise Zone 1 is depicted as the area between the 60 and 65 dB CNEL contours, rather than including all lands outside (i.e., below) the 65 dB CNEL threshold.

5.3.1 2007 AICUZ Noise Contours

Figure 5-2 displays the noise contours and noise zones computed for the 2007 AICUZ study airfield operations flown on established flight routes at Armitage

Airfield. These contours include noise levels ranging from 60 dB CNEL (quietest) to more than 85 dB CNEL (loudest), with intermediate contours expressed in increments of 5 dBs CNEL. Figure 5-2 and Table 5-3 illustrate that the majority of 2007 AICUZ noise contours (modeled using the average busy day flight operations extrapolated from annual operations [Table 3-1]) are contained within the NAWS boundary. The highest noise levels occur in the immediate vicinity of the airfield primarily extending northeast and southwest from Runway 03/21. In general, noise steadily decreases with increasing distance from the airfield and associated flight routes. As shown in Figure 5-2, Noise Zone 3 is located entirely within NAWS boundaries. The 70 dB CNEL contour line extends off-base to include 31 acres of Kern County land immediately south of Inyokern Road and east of Jacks Ranch Road. The 65 dB CNEL and 60 dB CNEL contour lines cross the NAWS boundary into unincorporated Kern and San Bernardino County land as well as the northwest portion of the City of Ridgecrest.

Table 5-3 2007 AICUZ Noise Contours (acres)

dB CNEL Range	Off-Base	On-Base	Total
60-64	5,650	7,183	12,833
65-69	1,292	7,363	8,655
70-74	31	4,428	4,459
75-79	0	2,275	2,275
80-84	0	922	922
85+	0	776	776
Total	6,973	22,947	29,920

The 2007 AICUZ noise contours extend over 29,920 on- and off-base acres. A total of 5,650 acres of land outside the NAWS boundary is located between the 60 to 64 dB CNEL noise contours; 1,292 acres of land are located between the 65 to 69 dB CNEL noise contours; and 31 acres are located between the 70 to 74 dB CNEL contours (Table 5-3).

5.3.2 2011 AICUZ Noise Contours for Established Flight Routes

Figure 5-3 displays the noise contours and noise zones associated with the projected level of operations (modeled using the ABD flight operations extrapolated from annual operations [Table 3-2]) conducted on the established flight route profiles at Armitage Airfield and Baker Range. Figure 5-4 is also provided to illustrate the change in these 2011 AICUZ noise contours compared with the 2007 AICUZ noise contours depicted in Figure 5-2.

As shown in Figure 5-4, the 2011 AICUZ noise contours vary substantially from the 2007 AICUZ noise contours shown in Figure 5-2. The highest (Noise Zone 3) contours continue to occur primarily within the NAWS boundary. However, a small portion of the Noise Zone 3 (75 dB CNEL) contour extends off-base immediately south of Inyokern Road/ State Road (SR)-178 and east of Jacks Ranch

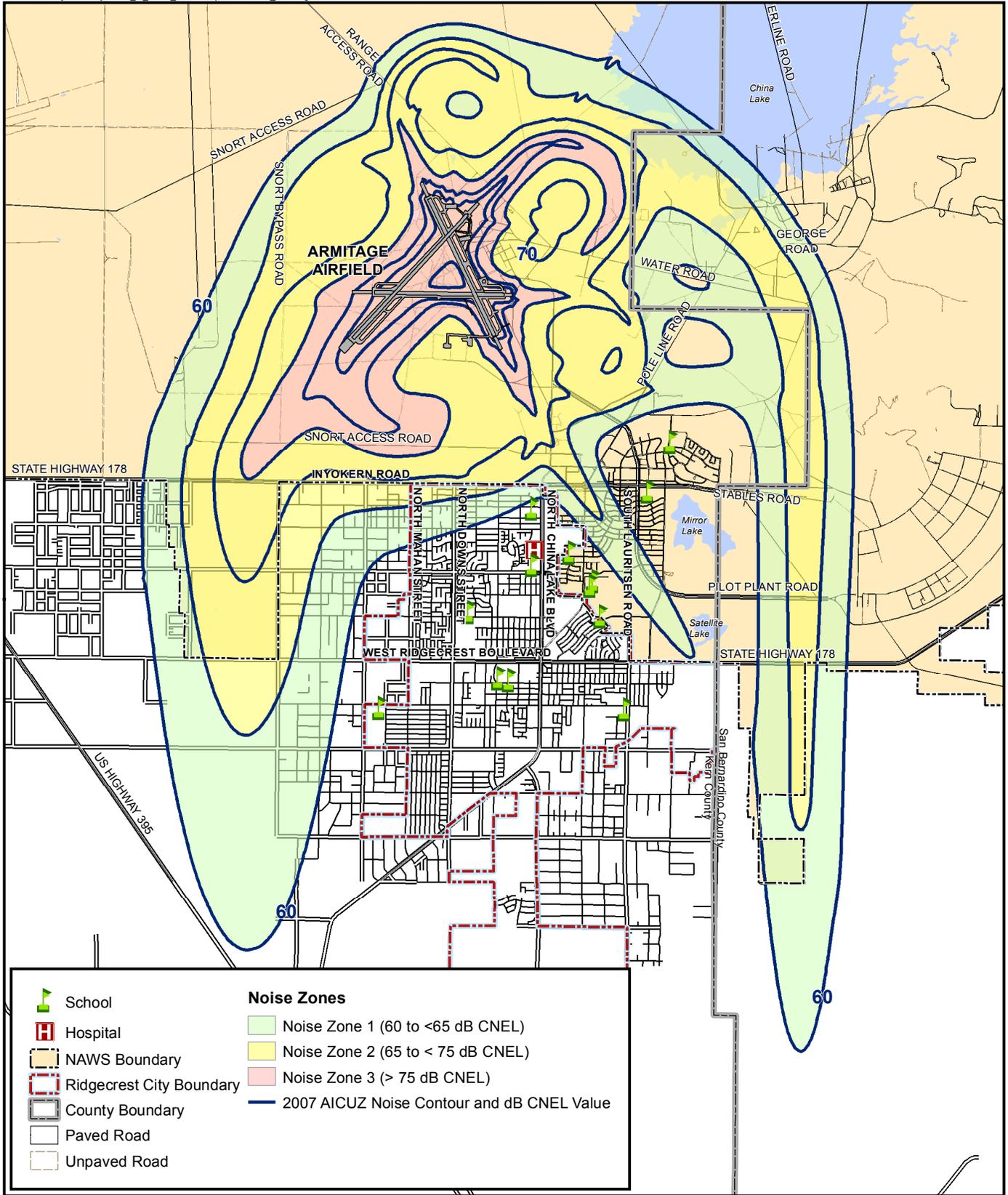
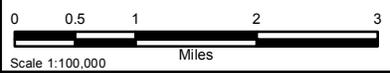


Figure 5-2
2007 AICUZ Noise Environment

NAWS China Lake
Ridgecrest, California



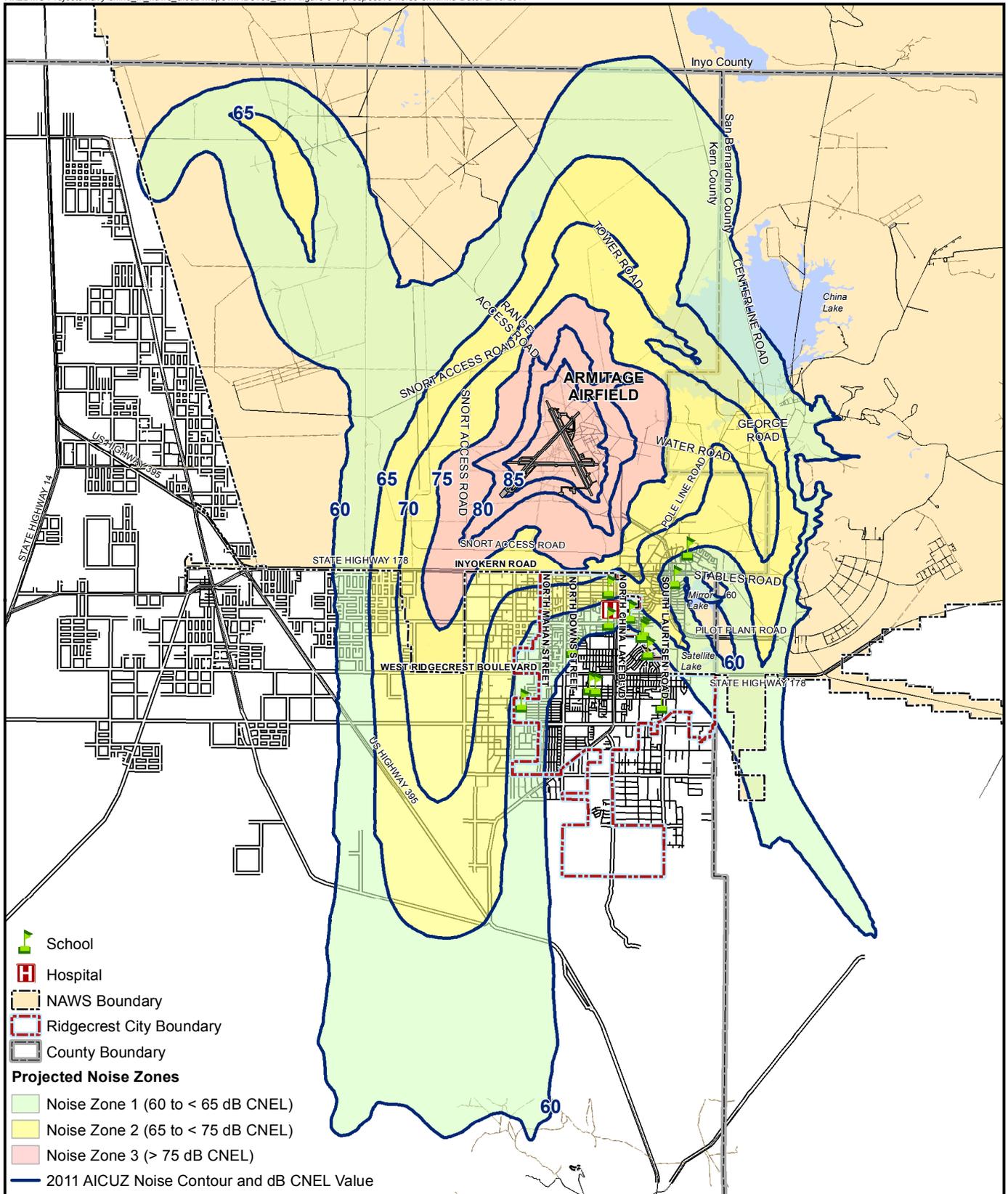


Figure 5-3
2011 AICUZ Noise Environment

NAWS China Lake
Ridgecrest, California



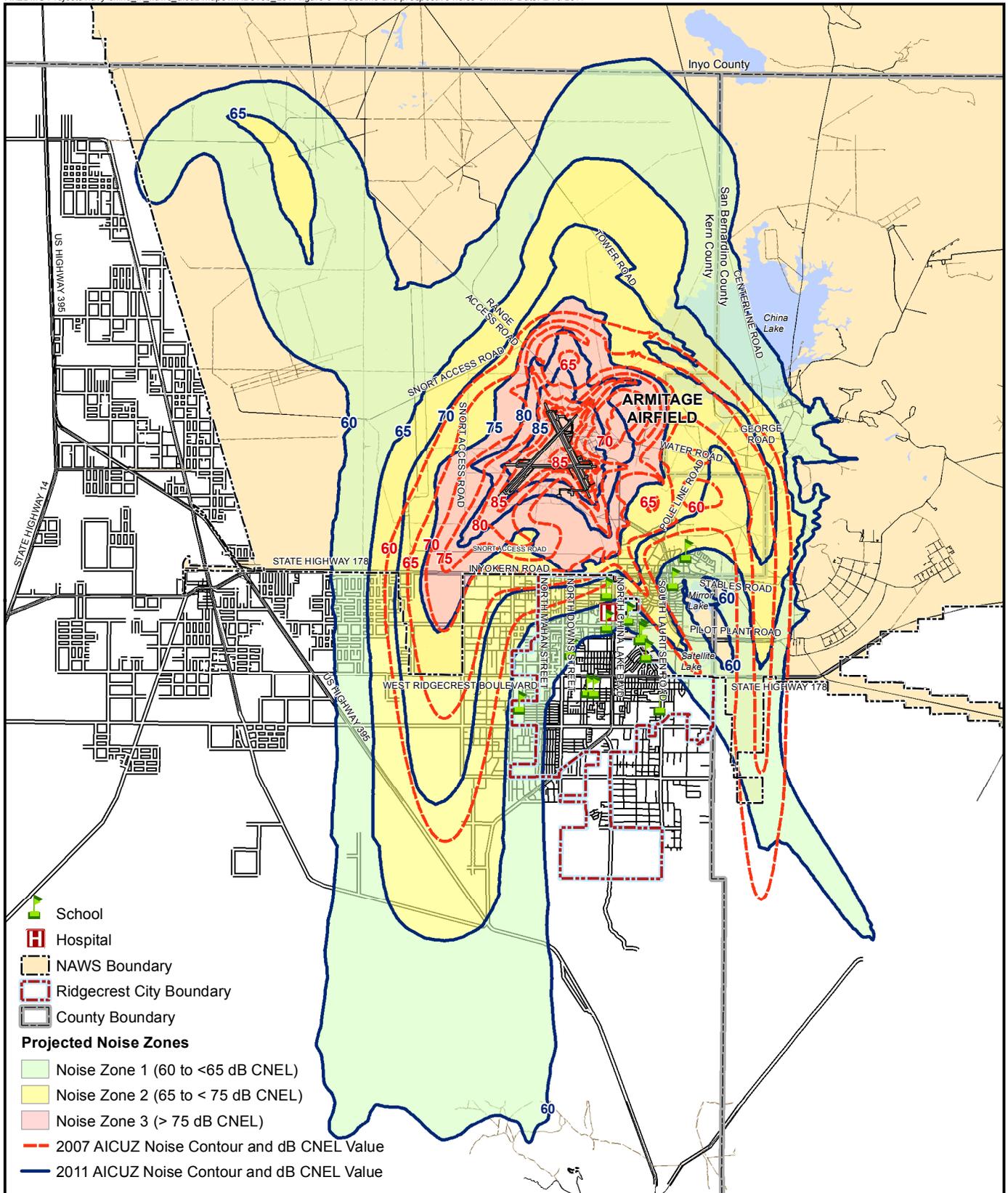


Figure 5-4
Comparison of 2007 and 2011
AICUZ Noise Contours

NAWS China Lake
Ridgecrest, California



Road. The projected scenario captures a 5 dB CNEL increase in this area from 2007 AICUZ conditions. On-base Noise Zone 3 extends farther in all directions, with the exception of a small area south of Runway approach 08 end along Snort Access Road.

Similar to Noise Zone 3, Noise Zone 2 contours extend farther in all directions both on- and off- base, with the exception of one area that decreases along Colin Road south of Inyokern Road/SR- 178; this area is located both within and adjacent to base boundaries in San Bernardino County. With the exception of areas along Colin Road, the projected 65 dB CNEL contour extends across a larger area than the 60 dB CNEL off-base 2007 AICUZ contour. This represents a 5 dB CNEL increase in areas previously modeled within the 60 dB CNEL 2007 AICUZ contour and a greater-than-5 dB CNEL for those areas in the projected 65 dB CNEL contour and outside the 2007 AICUZ 60 dB CNEL contour. On-base, the largest expansions of Noise Zone 2 occur north of the airfield and as a new 65 dB CNEL contour northeast of the airfield that is associated with Baker Range activities. The 65 dB CNEL “Baker Range” contour extends northwest and southeast of target B-1.

Noise Zone 1 (60 dB CNEL contour) extends farther in all directions from the 2007 AICUZ conditions. In Kern County the 60 dB CNEL off-base contour is generally commensurate with the area between Strecker Street in China Lake Acres and Sims Street in Ridgecrest, extending south to the mountains west of Searles. The 60 dB CNEL contour also extends slightly west of the base boundary south and east of Brown Road. In the City of Ridgecrest the off-base 60 dB CNEL contour generally extends west of Sims Street and diagonally north from the intersection of Ridgecrest Blvd and Randall Street to the intersection of Drummond Ave. and China Lake Blvd. In San Bernardino County the off-base 60 dB CNEL contour extends southeast to Trona Road. On-base, a single 60 dB CNEL contour extends outward from the 65 dB CNEL contour and over the airfield and the southern portions of Baker Range. The 60 dB CNEL contour extends in a hook shape west of Baker Range target B-1.

As shown in Table 5-4, a total of 21,195 acres off-base fall within the 60 to 64 dB CNEL noise range, 8,417 acres fall within the 65 to 69 dB CNEL noise range, 3,151 acres are located within the 70 to 74 dB CNEL noise range, and 26 acres are within the 75 to 79-dB CNEL noise range.

Table 5-4 Area under Projected Noise Contours (acres)

dB CNEL Range	Off-Base	On-Base	Total
60-64	21,195	27,542	48,737
65-69	8,417	11,824	20,241
70-74	3,151	9,875	13,027
75-79	26	6,490	6,516
80-84	0	2,424	2,424

Table 5-4 Area under Projected Noise Contours (acres)

dB CNEL Range	Off-Base	On-Base	Total
85+	0	1,934	1,934
Total	32,789	60,089	92,878

5.3.3 Comparison of 2007 AICUZ and 2011 AICUZ Noise Contours

Table 5-5 illustrates the aggregate differences between the 2007 AICUZ and 2011 AICUZ noise contours. The 60 dB CNEL projected noise contours increased by approximately 63,000 acres from the 2007 AICUZ study. As discussed in Section 5.2.3, Noise Modeling Methodology, the 2007 AICUZ study did not model Baker Range sorties or terrain and appropriate ground impedance to which increases in the noise contours are primarily attributed. The hard-packed desert terrain/ground in the vicinity is closer in impedance to "acoustically hard" than "acoustically soft" impedance. This study modeled the ground around NAWS as "acoustically hard" in order to more accurately reflect the desert surrounding the airfield. Therefore the increase in noise contours from the 2007 AICUZ study for the most part reflect the enhanced ability of the noise model to capture the noise environment rather than an increase in noise heard on the ground.

Noise contours in this AICUZ study update reflect the culmination of the number and type of aircraft, aircraft operations, and noise model changes evaluated in the November 2008, August 2009, and February 2010 supplemental noise studies. The modeling used in the 2011 AICUZ study update more accurately reflects the noise environment at NAWS.

Table 5-5 Comparison of Area Encumbered by Noise Contours (acres)

dB CNEL Range	2007 AICUZ	Prospective	Change
60-64	12,833	48,737	+35,904
65-69	8,655	20,241	+11,586
70-74	4,459	13,027	+8,568
75-79	2,275	6,516	+4,241
80-84	922	2,424	+1,502
85+	776	1,934	+1,158
Total	29,920	92,878	+62,958

5.4 Complaints and Noise Abatement Procedures

The Public Affairs Office of the Naval Air Warfare Center Weapons Division (NAWCWD) received 102 total complaints between January 2007 and March 2010 (Table 5-6). Of the 102 complaints received, seven originated from the City of Ridgecrest and six originated from Inyokern. Complaints received by NAWCWD include low-level flight, high noise, and supersonic complaints for the R-2508 Airspace Complex, under which the City of Ridgecrest and Inyokern lie (see Figure 2-3). Noise complaints originating from the City of Ridgecrest and

Inyokern are assumed to be the result of Armitage Airfield and Baker Range flight operations at NAWS.

As part of a coordinated effort to reduce the effects of noise on the community, NAWS participates in a variety of activities to increase public awareness and understanding of its mission. NAWS personnel regularly participate in project planning meetings in Ridgecrest, as well as in other surrounding communities. In addition, when possible, the public is provided with advance notice of testing activities that may generate excessive noise.

Table 5-6 R-2508 Airspace Complex Complaints

	2007	2008	2009	2010 (Jan. - Mar.)	Total
City of Ridgecrest	3	3	1	0	7
Inyokern	0	5	1	0	6
Other Areas	26	18	35	10	89
Total Complaints^{1,2}	29	26	37	10	102
<i>Total Number of Independent Events</i>	14	19	27	10	70

Source: Naval Air Warfare Center Weapons Division 2010

¹ Complaints received by NAWCWD reflect flights from commands stationed at NAWS as well as out-of-area squadrons that fly in the R-2508 airspace complex

² Noise complaints reflect number of calls received by NAWCWD not number of over flights. Multiple noise complaints may refer to a single overflight (see total number of independent events).

Noise abatement procedures are also in place to minimize the effects of noise on the community (NAWS 2000). These procedures include:

- **General Noise Abatement Procedures.** General noise abatement procedures include the following:
 1. Local flight paths avoid populated areas whenever possible,
 2. When possible, aircraft approach the airfield from east of Ridgecrest,
 3. Touch-and-go operations are restricted to the minimum number needed for mission completion,
 4. Engine run-ups are conducted as far away from Ridgecrest as possible.

6

Land Use Compatibility Analysis

This section of the AICUZ study considers the potential noise and safety implications of projected airfield flight operations as a basis for evaluating land use compatibility within defined AICUZ planning areas. The section begins by acknowledging NAWS' adoption of the Consolidated Departure Alternative in the 2007 AICUZ study. The relevant planning areas are then defined, including an "AICUZ footprint" and "Military Influence Area." The section continues with an overview of the land use compatibility guidelines used in the analysis, followed by the results of the analysis for the 2011 AICUZ footprint.

6.1 Definition of the AICUZ Footprint

The AICUZ footprint encompasses noise contours of 60 dB CNEL and higher (i.e., Noise Zones 1, 2 and 3) as well as the primary surface, clear zones, and APZs I and II surrounding an airfield's runways. The AICUZ footprint is further defined as the minimum area within which land use controls are considered necessary to promote compatible land use development and to protect the health, safety, and welfare of those living on or near a military airfield. Figure 6-1 presents the 2011 AICUZ footprint for Armitage Airfield and Baker Range based on the projected level of airfield operations, run-up operations, and Baker Range sorties.

The 2011 AICUZ footprint can be compared with the 2007 AICUZ footprint (see Figures 4-3 and 5-2 for 2007 AICUZ APZs and 2007 AICUZ noise environment) to see how changes in aircraft types, flight route profiles, operations tempo, and other factors have influenced the shape of the footprint over time. Recommendations set forth in the 2007 AICUZ study have been adopted as policy guidance in the City of Ridgecrest's 2010 General Plan. The 2007 AICUZ addresses airfield operations only, whereas the 2011 AICUZ study includes range sorties as well as airfield operations. In general, the 2011 AICUZ footprint has expanded substantially in on- and off-base areas when compared with the 2007 AICUZ footprint.

As illustrated in Figure 6-1, the superimposed noise exposure levels and APZ boundaries create subzones within the AICUZ footprint, representing different combinations of noise and APZ exposure. The 2011 AICUZ footprint includes nine different subzones. The subzones with the highest noise and accident potential include combinations of the primary surfaces, clear zones, and APZ I with Noise Zone 3. APZ II areas at Armitage Airfield have a reduced but still measurable potential for aircraft incidents and occur in conjunction with Noise Zones 2

and 3 only. As shown in Figure 6-1, all of the areas that coincide with both noise zones and APZ areas occur within NAWS boundaries.

The AICUZ footprint also includes three subzones that occur outside the APZs. These subzones correlate with low to high noise exposure in Noise Zones 1, 2 and 3, respectively, but with lower potential for aircraft incidents than is assumed in the clear zones and APZs. Subzones that occur outside APZs are the only subzones that extend off-base. The off-base portion of the AICUZ footprint comprises 21,195 total acres of land associated with Noise Zone 1; 11,568 total acres of land associated with Noise Zone 2; and 26 total acres of land associated with Noise Zone 3. The amount of land within each of the 15 applicable 2011 AICUZ subzones at Armitage Airfield and Baker Range is displayed in Table 6-1.

**Table 6-1 Land Area Within AICUZ Subzones (Acres):
Projected Scenario**

Accident Potential Zones		Noise Zones		
		1 60-64 dB CNEL	2 65-74 dB CNEL	3 75+ dB CNEL
Primary Surface		0	0	778
Clear Zone		0	0	782
APZ I		0	6	683
APZ II		0	24	940
Outside APZs	<i>On-base</i>	55,054	21,689	973
	<i>Off-base</i>	21,195	11,568	26

6.2 Definition of the Military Influence Area

According to the state’s OPR, a MIA is “a formally designated geographic planning area where military operations may impact local communities and, conversely, where local activities may affect the military’s ability to carry out its mission” (State of California 2006). The MIA concept is included in the California Advisory Handbook for Community and Military Compatibility Planning (State of California 2006), where it is acknowledged as a useful planning tool for accomplishing the following purposes:

- Promote an orderly transition between community and military land uses so that land uses remain compatible.
- Protect public health, safety, and welfare.
- Maintain operational capabilities of military installations and areas.
- Promote the awareness of the size and scope of military training areas in order to protect areas separate from the actual military installation (i.e., critical air and sea space) used for training purposes.

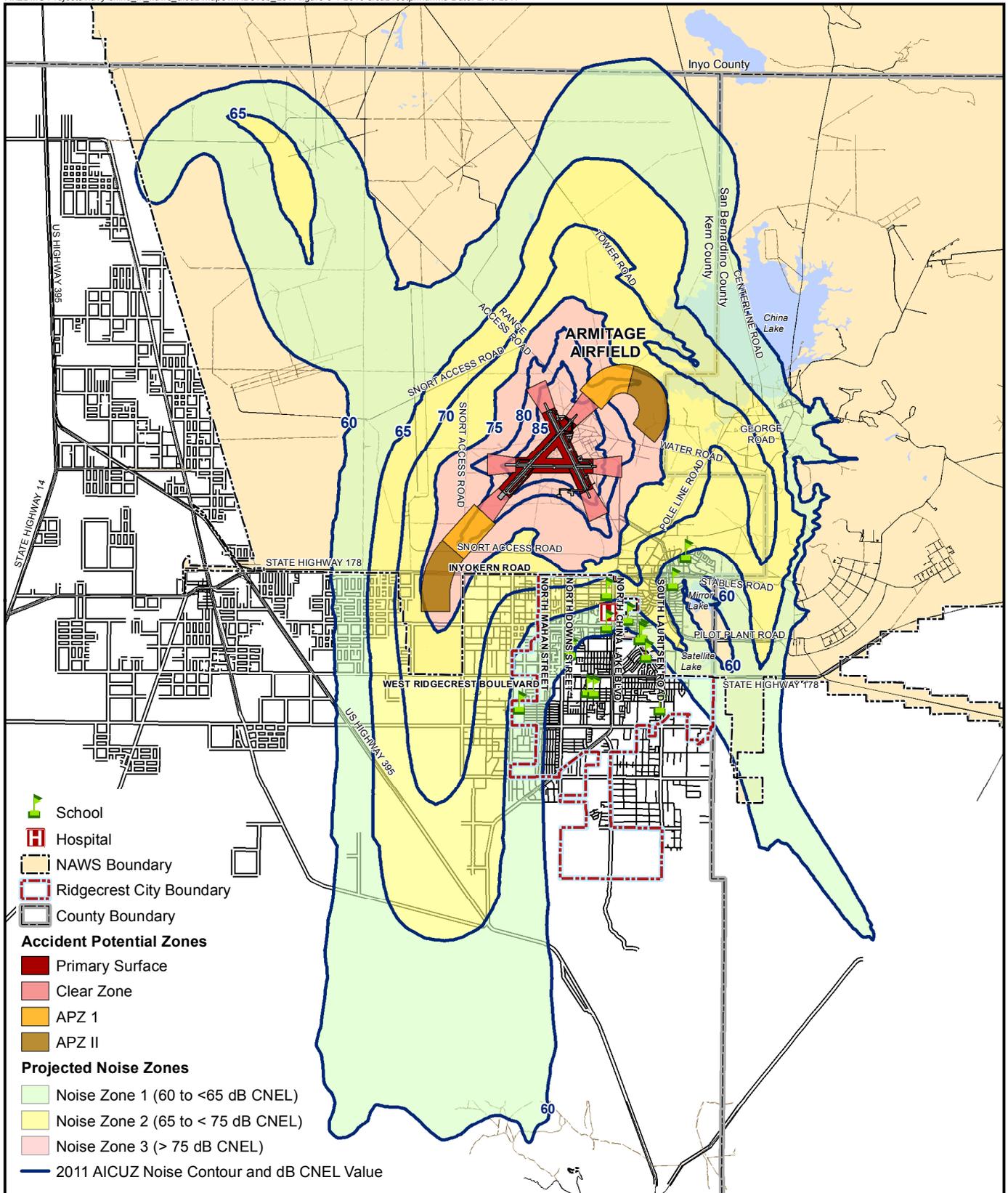


Figure 6-1
2011 AICUZ Footprint

NAWS China Lake
Ridgecrest, California



- Establish compatibility requirements within the designation area, such as requirements for sound attenuation, real estate disclosure, and navigation easements.

According to the OPR, an MIA should be incorporated into the local planning process through a community's general plan and zoning ordinance. NAWS recommends the designation of an MIA that is larger than the traditional AICUZ footprint in order to address flight safety issues beneath flight corridors and to encourage retention of a buffer zone of compatible land use in case of future expansion of the NAWS mission. The designation of an MIA is also consistent with Navy AICUZ Program guidelines as described in OPNAVINST 11010.36C. Figure 6-2 depicts the MIA as adopted in the 2010 City of Ridgecrest General Plan.

The MIA includes the 2007 AICUZ footprint and all land within the primary arrival and departure flight corridors. Noise Zone 1 of the 2007 AICUZ study was used as a proxy for potential expansion of the 2007 noise contours should NAWS experience future increases in operational tempo.

The geographical location and extent of future noise contours depends on the specific nature of future operations (e.g., runway distribution, aircraft type, type of operation, etc.). However, if these variables remained constant and only the number and frequency of operations were to increase, the 65 dB CNEL noise contour would tend to expand toward the 60 dB CNEL contour. Such an expansion could occur, for example, in conjunction with future Base Closure and Realignment (BRAC) initiatives required by Congress.

Land within the 2007 AICUZ primary flight corridors (beyond the standard APZs) was also included in the MIA in an effort to minimize the risks of aircraft accidents that can occur beyond the runway environment. In this area the establishment of criteria that limits the maximum number of dwellings is encouraged as a method of reducing the potential severity of an aircraft accident. Despite NAWS' efforts to establish and conform to specific flight routes that maximize avoidance of developed areas, some variation or deviation from established flight routes should be expected to occur in response to weather conditions, ambient temperature, mission loading of aircraft, and other factors discussed in Section 3.4. The MIA reflects this potential variation. The corridors are included because of the inherent risk of aircraft incidents (e.g., equipment drops, crashes, etc.).

As described in Section 4.3, two aircraft crashes previously occurred off-base, one each under the main departure and arrival corridors. (Although in the latter case the aircraft experienced problems during departure and was attempting to return to Armitage Airfield when it crashed.) These flight corridors represent areas where aircraft operations are concentrated and where accident potential and safety risks are inherently greater than in areas subject to infrequent overflights. Following release of the 1977 AICUZ study, acknowledgment of these increased risks resulted in the acquisition of additional land by NAWS to extend the base boundaries southward under parts of these two corridors. However, due to the inherent

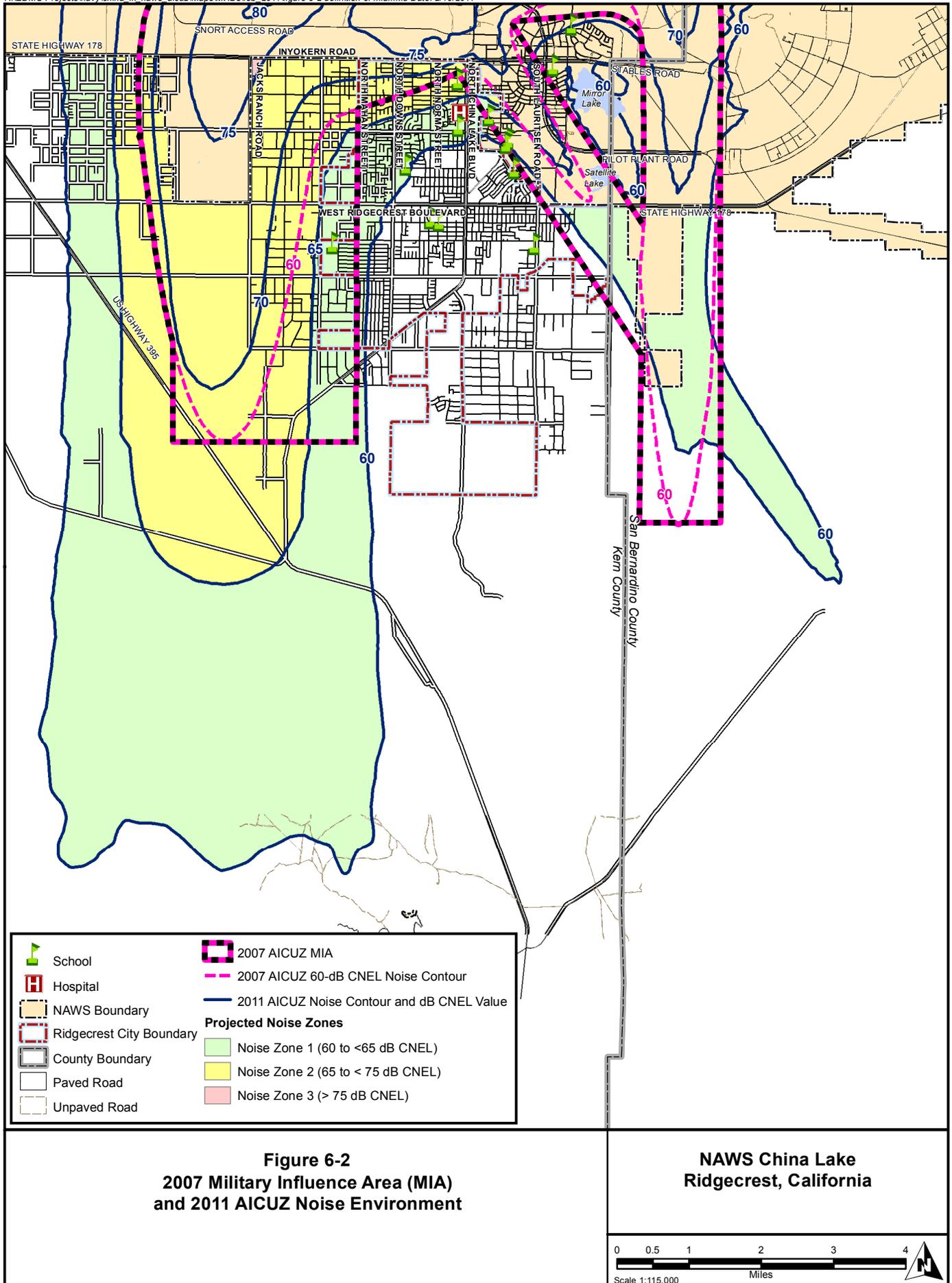
variability of actual aircraft flight paths within each corridor, the area of increased risk remains larger than the area previously acquired and continues to extend off-base. Accordingly, NAWS recommends an MIA that includes larger portions of the primary flight corridors (including the diagonal TACAN corridor), as shown on Figure 6-2.

The MIA is a forward-looking planning designation provided in the hope that planning and development of local communities will seek to minimize future constraints on NAWS operations and to safeguard NAWS' mission capability. NAWS encourages local government planning authorities to:

- Adjust the MIA to meet Kern County, San Bernardino County, and the City of Ridgecrest planning needs.
- Recognize the MIA as an area of increased risk to public health and safety in their General Plans.
- Minimize new residential development within the flight corridor areas and minimize the density of other types of land use within these areas of increased risk.
- Require appropriate notification of aircraft noise and flight safety risk to real estate agents, buyers, sellers and residents of land within the flight corridor areas of the MIA.
- Continue to provide NAWS the opportunity to work with local planners on specific development proposals in the MIA to identify appropriate land use controls that will reduce public safety risks while meeting the growth needs of the community and providing for the long-term sustainability of the NAWS mission.

6.3 Land Use Compatibility Guidelines

The analysis of land use compatibility in AICUZ planning areas is based on federal government guidelines contained in OPNAVINST 11010.36C. These guidelines are used for land use planning and analysis by the Navy and other branches of the Department of Defense, the Environmental Protection Agency, the Department of Housing and Urban Development, and the Veterans Administration. The guidelines address land use compatibility as a function of both noise exposure and accident potential, and are presented in Appendix B.



According to the guidelines for noise exposure, some land use categories (e.g., manufacturing/industrial) are deemed compatible at lower noise exposure levels (less than 70 dB CNEL) and compatible under specific conditions, i.e., “compatible with restrictions,” at higher noise exposure levels. Compatible with restrictions generally requires the incorporation of additional noise attenuation measures in the design and construction of structures to achieve a greater Noise Level Reduction (NLR) than afforded by standard construction materials. These additional measures address noise reduction strategies for internal noise levels only and do not address increased noise exposure levels that may occur outside a dwelling.

Residential land use categories are incompatible with noise exposure levels at or above 75 dB CNEL (Noise Zone 3), incompatible with exceptions in areas within the 65 to 74 dB CNEL contour (Noise Zone 2), and compatible with restrictions within the 60 to 64 dB CNEL contour (Noise Zone 1). Residential uses are discouraged at noise exposure levels of 65-69 dB CNEL and strongly discouraged in areas of 70-74 dB CNEL, unless there is an absence of viable development options and a demonstrated community need could not be met without the development. Where a community determines that the residential development should be allowed, measures to achieve an NLR of at least 25 dB CNEL in areas affected by 65-69 dB CNEL, and an NLR of at least 30 dB CNEL in areas of 70-74 dB CNEL, should be incorporated into building codes and project approval requirements. Common measures used to achieve NLRs include using a higher grade of insulation and double-pane windows. Since normal permanent construction typically provides an NLR of 20 dB CNEL, the reduction requirements are sometimes stated as 5, 10, or 15 dB CNEL over standard construction.

Compatibility guidelines associated with APZ’s are similarly defined. Conditions placed on the compatibility, compatible with restrictions, incompatible with exceptions, and incompatible designations are based on the densities of people and structures, so site-specific evaluation of varying densities may be needed. In order to assist installations and local governments, general suggestions as to floor/area ratios are provided as a guide to density in some categories. In general, land use restrictions that limit commercial, services, or industrial buildings or building occupants to 25 per acre in APZ I and 50 per acre in APZ II are the range of occupancy levels considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ I and maximum (Max) assemblies of 50 people per acre in APZ II.

In general, residential land use is incompatible with the accident potential in the CZ, APZ I, or APZ II; however, detached single-family housing with a maximum density of one to two dwelling units per acre (DU/acre) is compatible with restrictions with accident potential in APZ II.

Compatibility with Navy recommendations should be considered along with specific local land use development criteria by local governments in their decision making processes. The guidelines for suggested land use are also nationwide in scope. Since many air installations are in urban areas, these guidelines assume an

urban environment with higher levels of ambient “background” noise than might exist in rural and suburban areas. These compatibility guidelines are, therefore, sometimes modified at the local government level to address a specific local noise environment.

6.4 Compatibility Analysis for the AICUZ Footprint (Off-Base)

This section evaluates land use compatibility in off-base areas of the AICUZ footprint (on-base land use is addressed below in Section 6.7). Land use surrounding NAWS is represented by zoning designations adopted by the City of Ridgecrest and Kern and San Bernardino Counties. The compatibility of these local zoning designations with the noise and accident potential associated with NAWS operations is assessed based on the AICUZ guidelines contained in OPNAVINST 11010.36C (Appendix B). Zoning has been selected to represent local land use because:

- Zoning designations are required to be consistent with the underlying land use designation of a General Plan, therefore they are considered to be the most accurate indicator of current land use in an area, short of aerial photography and field surveys;
- Zoning designations are a reasonable indicator of intended future land use as they represent the guidelines by which cities and counties approve new development; and
- Compatibility analysis of land use zoning patterns is consistent with Navy AICUZ Program guidance.

Therefore, for the purposes of this land use compatibility analysis, zoning designations will be used for the analysis of off-base land use conditions. The methodology for identifying Navy compatibility guidelines that are equivalent to zoned land uses surrounding NAWS is provided in Appendix A.

6.4.1 Noise Exposure

Table 6-2 identifies the distribution of off-base land within the 2011 AICUZ footprint by land use classification and noise exposure range. The following is a discussion of the land use compatibility of specific areas within each noise range.

6.4.1.1 Kern County

As shown in Table 6-2, most of the off-base lands within the 2011 AICUZ footprint are located in the unincorporated area of Kern County (27,037 acres); 16,613 acres are within the 60 to 64 dB CNEL contour; 7,484 acres are within the 65 to 69 dB CNEL contour; 2,916 acres are within the 70 to 74 dB CNEL contour; and 24 acres are within 75 to 79 dB CNEL contour (Noise Zone 3). Noise Zone 3 only extends off-base in areas of unincorporated Kern County. The 24-acre parcel is located at the intersection of Inyokern Road and Jacks Ranch Road and is zoned for residential use in 2.5-acre estate parcels, as shown in Figure 6-3 and

6 Land Use Compatibility Analysis

6-3b. According to Navy recommendations, residential land use in this area is incompatible with this level of noise exposure and is strongly discouraged. In the event that county authorities determine that residential development in this area should be allowed, it is recommended that measures to achieve an NLR of 30 dB CNEL be incorporated into building codes and be made a condition of individual approvals.

Table 6-2 Off-base Land Use Classifications and Noise Exposure in the 2011 AICUZ Footprint (acres)

	dB CNEL Range					
	60-64	65-69	70-74	75-79	80-84	85+
Kern County Unincorporated						
Agriculture	8,795	581	549	0	0	0
Cultural/ Entertainment/ Rec.	134	593	34	0	0	0
Floodplain Primary	0	2	8	0	0	0
Manufacturing	0	4	108	0	0	0
Open Space	2,798	2,652	1,264	0	0	0
Residential	4,801	3,625	953	24	0	0
Services	85	27	1	0	0	0
Kern Co. Subtotals	16,613	7,484	2,916	24	0	0
City of Ridgecrest						
Cultural/ Entertainment/ Rec.	58	13		0	0	0
Manufacturing	152	46	39	0	0	0
Open Space	35			0	0	0
Residential	1,051	330	62	0	0	0
Services	205	111	35	0	0	0
Ridgecrest Subtotals	1,502	500	136	0	0	0
San Bernardino County Unincorporated						
Cultural/ Entertainment/ Rec.	2,123	0	0	0	0	0
Residential	236	0	0	0	0	0
San Bernardino Co Subtotal	2,359	0	0	0	0	0
Roads						
No Zoning (roads)	721	433	99	3	0	0
Total	21,195	8,417	3,151	26	0	0

Notes: Totals may not sum exactly due to rounding.

The 65 to 74 dB CNEL noise range (Noise Zone 2) overlays 1,130 acres classified as agricultural, 627 acres classified as cultural/entertainment/recreation, 10 acres zoned as floodplain primary, 112 acres classified as manufacturing, 3,916 acres as open space, 4,578 acres as residential, and 28 acres as service. Agricultural, cultural/entertainment/recreation, manufacturing, and service land uses are considered compatible with restrictions within Noise Zone 2. Navy-recommended restrictions for these areas include NLR of 25 to 30 dB CNEL depending on noise exposure for residential and cultural/entertainment/recreation buildings. In areas of 70 to 74 dB CNEL noise exposure, an NLR of 25 is recommended for service and office areas of manufacturing land uses (see Figures 6-3b and 6-3e for more detailed information on land uses). The Navy recommends that residential land uses be classified as incompatible with exceptions within Noise Zone 2. These land uses include areas zoned in ¼-acre to 20-acre estate parcels and mobile home

parks and are generally located east of Clifford Street in China Lake Acres and areas in unincorporated Kern County west of North Mahan Street (directly west from the City of Ridgecrest) and west of Bradley Street (south of the City of Ridgecrest). Residential land uses are strongly discouraged. However, if the county authorities allow residential development in this area a NLR of 30 dB CNEL is recommended. Open space and floodplain primary land uses do not have noise recommendations.

In the 60 to 64 dB CNEL noise exposure range (Noise Zone 1), the 2011 AICUZ footprint includes 16,613 acres in unincorporated Kern County, distributed as shown in Table 6-2, across agriculture, culture/entertainment/recreation, open space, residential, and services land uses. Residential and culture/entertainment/recreation land uses are considered compatible with restrictions within the 60 to 64 dB CNEL noise range. Recommendations for these land uses include outdoor and indoor noise mitigation measures. Residential land uses are generally located between Everett Street and North Calvert Blvd in China Lake Acres extending south from West Inyokern Road as well as areas south of Ridgecrest extending between Bradley Street and Sims Street to south of Highway 395 and includes parcels zoned for ¼-acre to 20-acre estate parcels (Figures 6-3b, 6-3e, and 6-3f). All other identified land uses within Noise Zone 1 are compatible or do not have Navy noise recommendations.

6.4.1.2 City of Ridgecrest

In the City of Ridgecrest the AICUZ footprint overlays areas west of Sims Street and diagonally north from the intersection of Ridgecrest Blvd and Randall Street to the intersection of Drummond Ave. and China Lake Blvd (see Figures 6-3b and 6-3c). This area corresponds to Noise Zone 1 (60 to 64 dB CNEL noise range) and Noise Zone 2 (65 to 74 dB CNEL noise range). Land uses in Noise Zone 2 include 13 acres zoned as cultural/entertainment/recreation, 85 acres zoned as manufacturing, 392 acres zoned as residential, and 146 acres zoned as services. Per the AICUZ compatibility guidelines, residential land use in this area is incompatible with exceptions with this level of noise exposure and is therefore discouraged. However, in the event that city authorities determine that additional residential development in this area should be allowed, it is recommended that measures to achieve an NLR of 30 dB CNEL in areas in the 70 to 74 dB CNEL noise range and an NLR of 25 dB CNEL in areas in the 65 to 69 dB CNEL noise range be incorporated into building codes and be made a condition of individual approvals. Residential land uses include 66 acres zoned medium density residential, the majority of which is located on the southeast block from Inyo Street and West Inyokern Road, the southeast block from West Ward Avenue and Downs Street, and the southwest block from Moyer Avenue and Knox Road. Areas zoned low-density residential (325 acres) are generally interspersed with areas zoned as services and located south of Ward Avenue to the 65 dB CNEL noise contour. Cultural/entertainment/recreation, manufacturing, and services land uses are considered compatible with restrictions with Navy recommendations. Restrictions for these areas are identical to those for similar land uses in Noise Zone 2 in unincorporated Kern County.

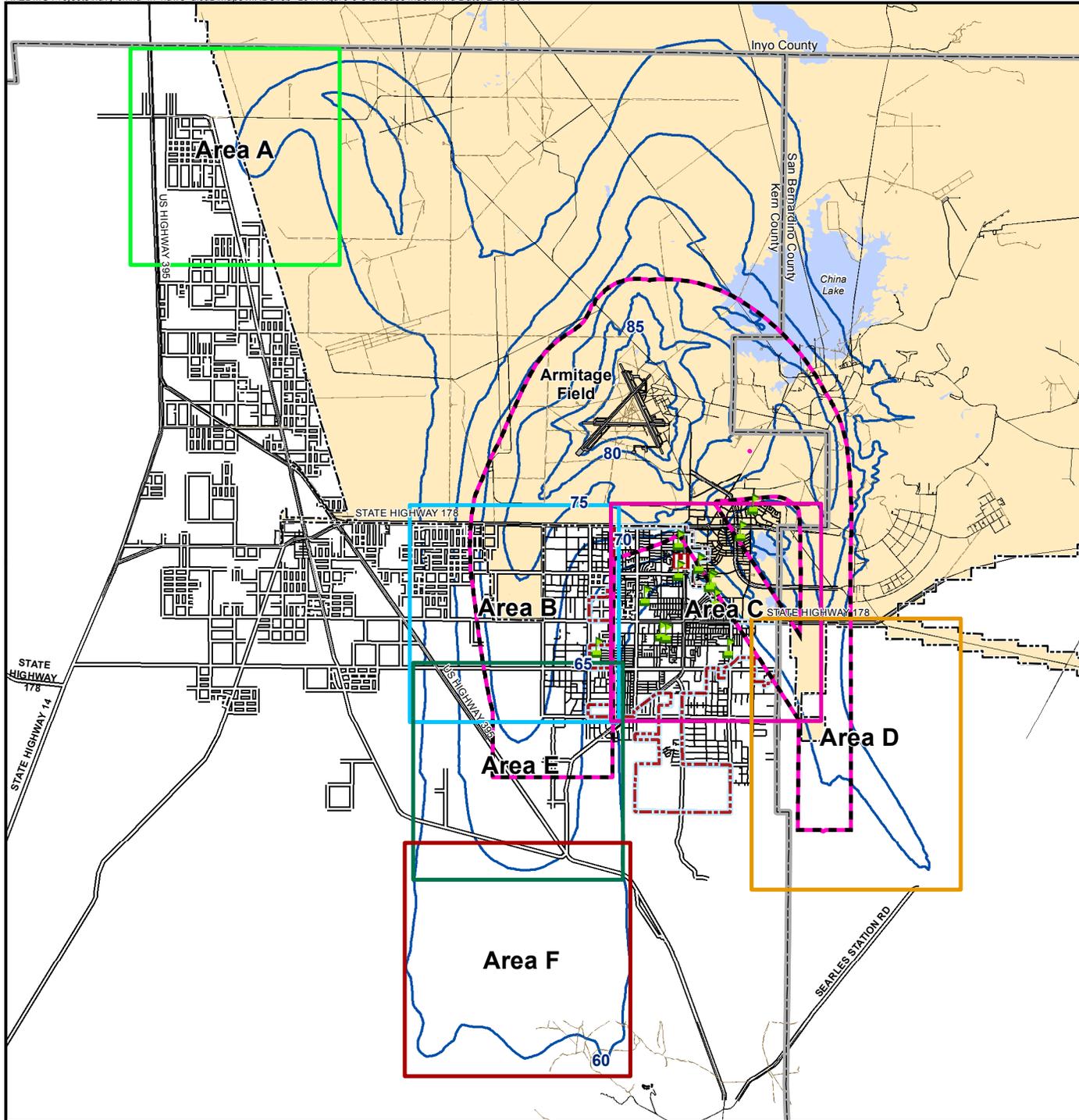


Figure 6-3
Off-Station Land Use
Figure Index

NAWS China Lake
Ridgecrest, California

- School
- Hospital
- 2011 AICUZ Noise Contour and dB CNEL Value
- 2007 Military Influence Area
- NAWS Boundary
- Ridgecrest City Boundary
- County Boundary
- Figure Locator**
- Area A (Figure 6-3a)
- Area B (Figure 6-3b)
- Area C (Figure 6-3c)
- Area D (Figure 6-3d)
- Area E (Figure 6-3e)
- Area F (Figure 6-3f)



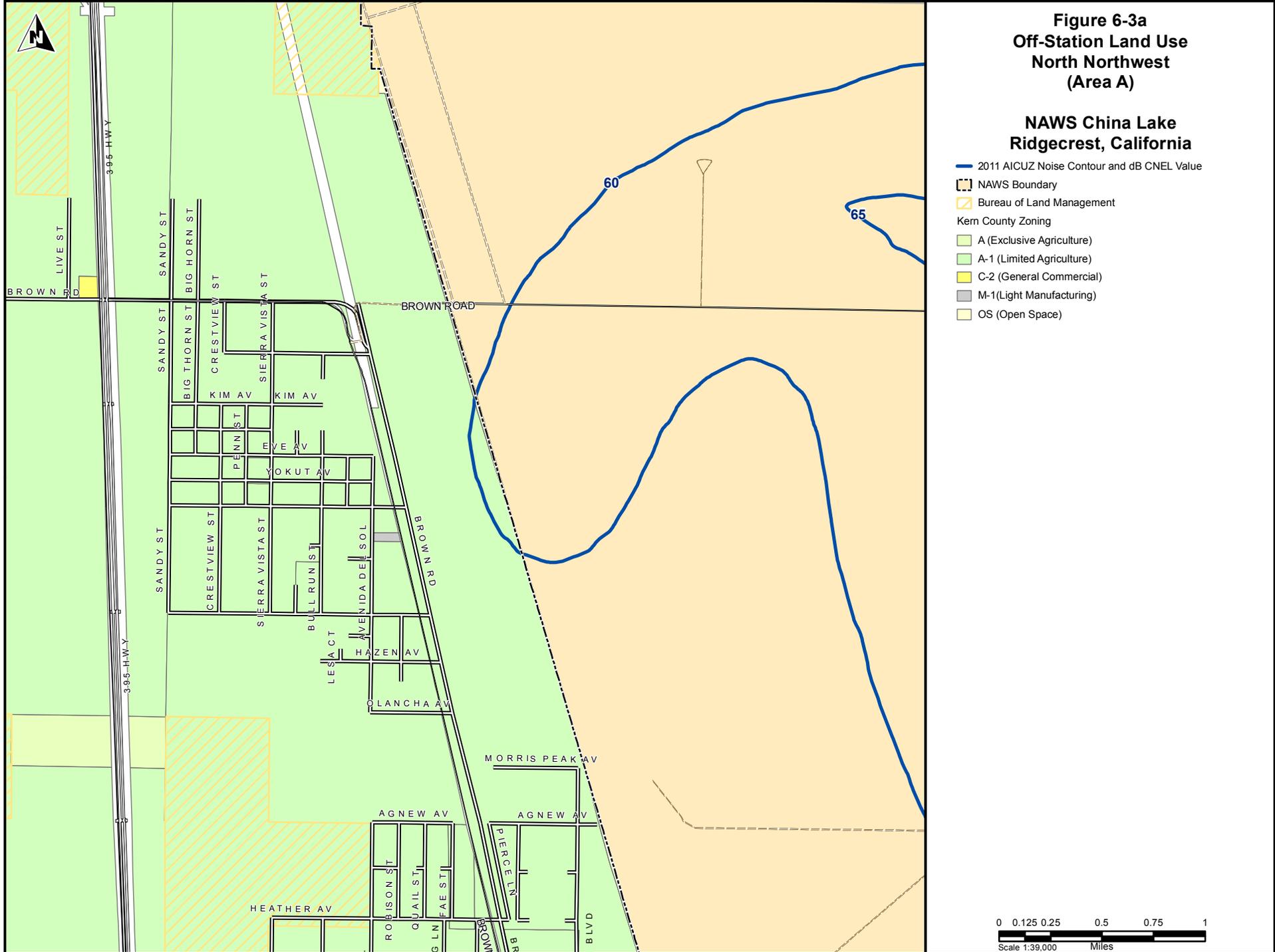
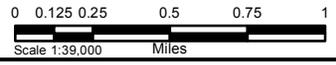
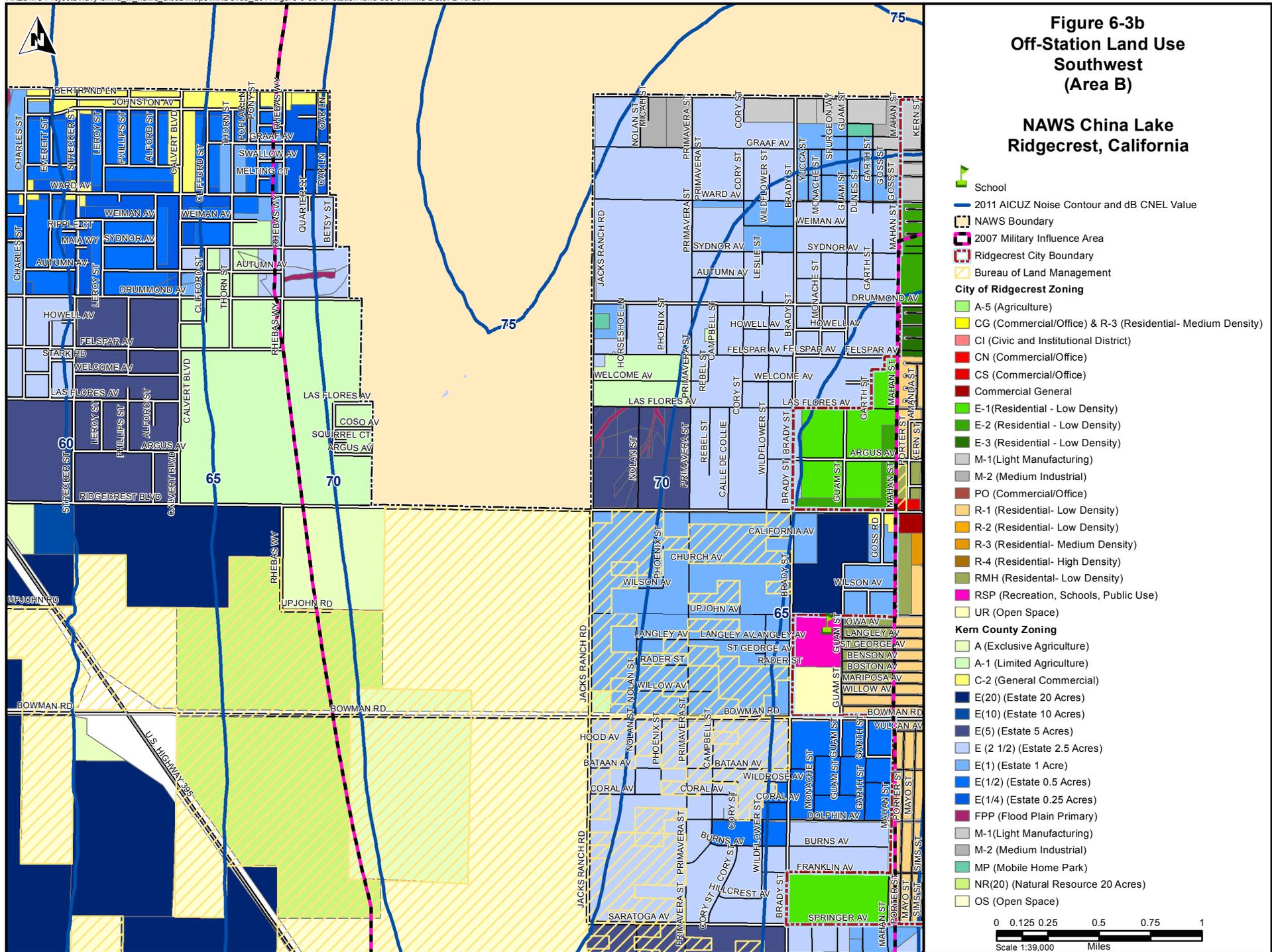


Figure 6-3a
Off-Station Land Use
North Northwest
(Area A)

NAWS China Lake
Ridgecrest, California

- 2011 AICUZ Noise Contour and dB CNEL Value
- NAWS Boundary
- Bureau of Land Management
- Kern County Zoning
- A (Exclusive Agriculture)
- A-1 (Limited Agriculture)
- C-2 (General Commercial)
- M-1 (Light Manufacturing)
- OS (Open Space)





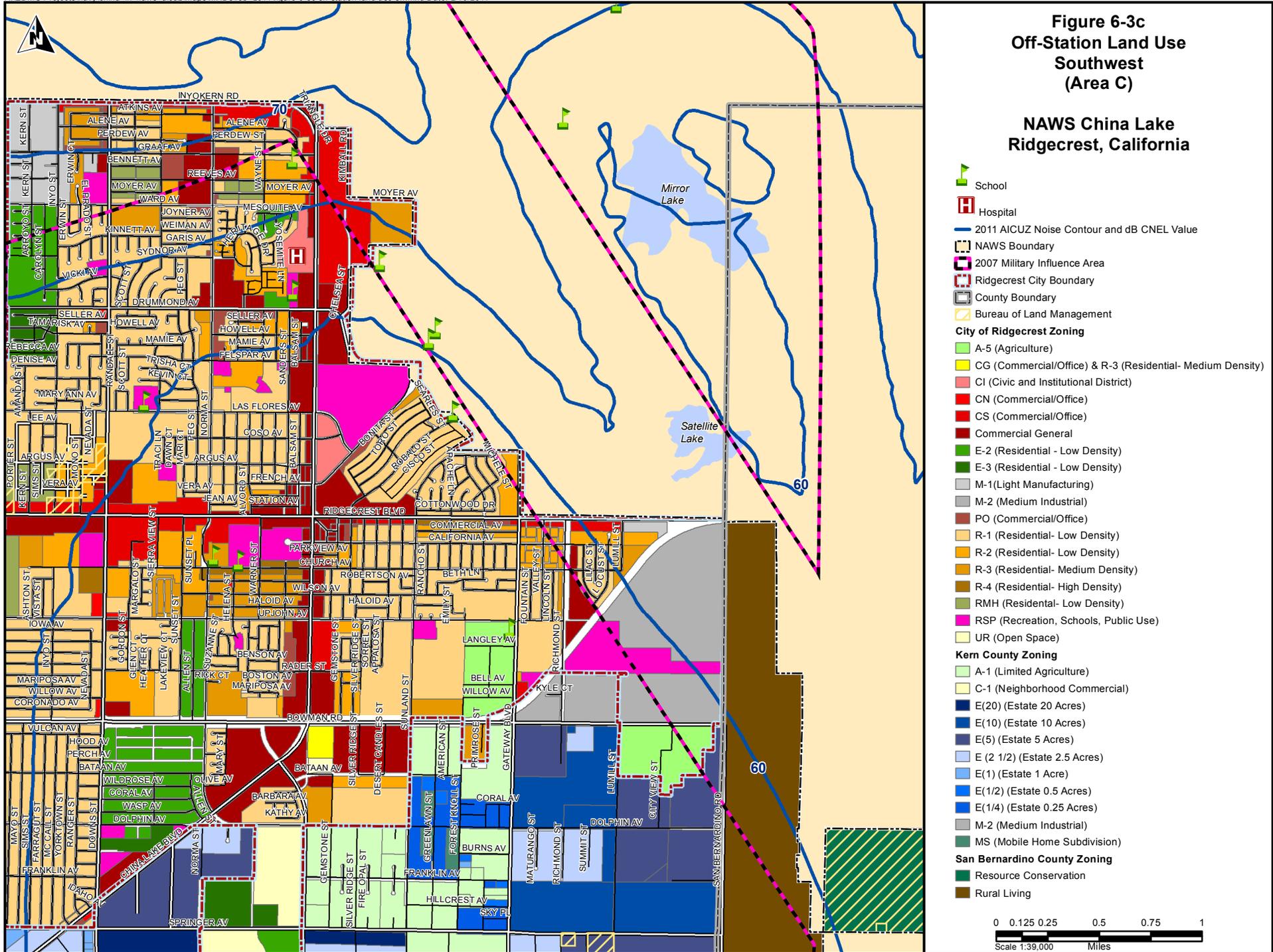


Figure 6-3c
Off-Station Land Use
Southwest
(Area C)
NAWS China Lake
Ridgecrest, California

- School
- Hospital
- 2011 AICUZ Noise Contour and dB CNEL Value
- NAWS Boundary
- 2007 Military Influence Area
- Ridgecrest City Boundary
- County Boundary
- Bureau of Land Management
- City of Ridgecrest Zoning**
 - A-5 (Agriculture)
 - CG (Commercial/Office) & R-3 (Residential- Medium Density)
 - CI (Civic and Institutional District)
 - CN (Commercial/Office)
 - CS (Commercial/Office)
 - Commercial General
 - E-2 (Residential - Low Density)
 - E-3 (Residential - Low Density)
 - M-1 (Light Manufacturing)
 - M-2 (Medium Industrial)
 - PO (Commercial/Office)
 - R-1 (Residential- Low Density)
 - R-2 (Residential- Low Density)
 - R-3 (Residential- Medium Density)
 - R-4 (Residential- High Density)
 - RMH (Residential- Low Density)
 - RSP (Recreation, Schools, Public Use)
 - UR (Open Space)
- Kern County Zoning**
 - A-1 (Limited Agriculture)
 - C-1 (Neighborhood Commercial)
 - E(20) (Estate 20 Acres)
 - E(10) (Estate 10 Acres)
 - E(5) (Estate 5 Acres)
 - E (2 1/2) (Estate 2.5 Acres)
 - E(1) (Estate 1 Acre)
 - E(1/2) (Estate 0.5 Acres)
 - E(1/4) (Estate 0.25 Acres)
 - M-2 (Medium Industrial)
 - MS (Mobile Home Subdivision)
- San Bernardino County Zoning**
 - Resource Conservation
 - Rural Living

0 0.125 0.25 0.5 0.75 1
 Scale 1:39,000 Miles

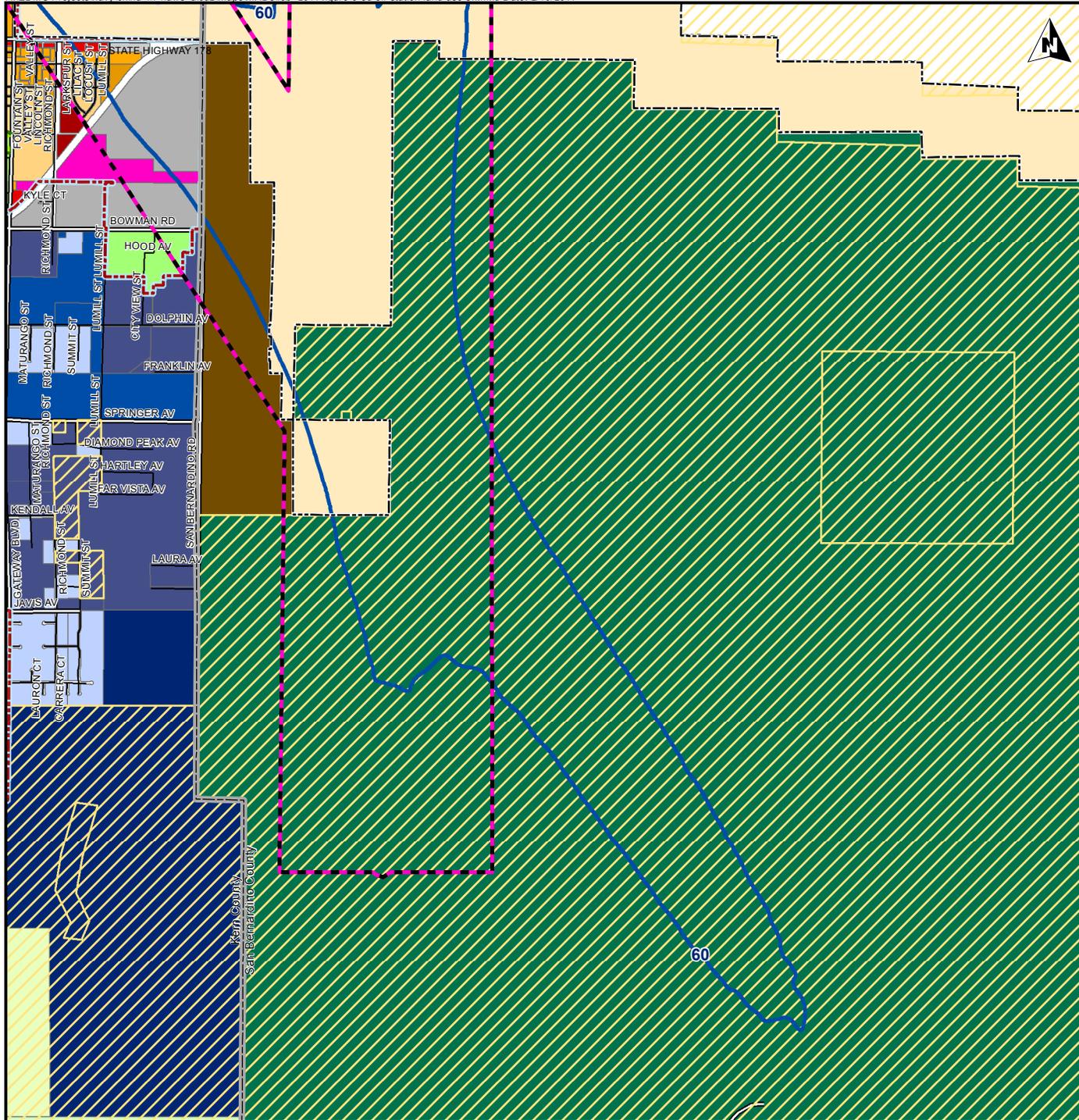
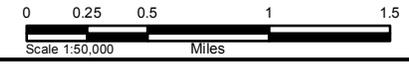


Figure 6-3d
Off-Station Land Use
Southeast
(Area D)

NAWS China Lake
Ridgecrest, California

- School
- Hospital
- 2011 AICUZ Noise Contour and dB CNEL Value
- NAWS Boundary
- 2007 Military Influence Area
- County Boundary
- Ridgecrest City Boundary
- Bureau of Land Management
- City of Ridgecrest Zoning**
- A-5 (Agriculture)
- CS (Commercial/Office)
- Commercial General
- M-1(Light Manufacturing)
- M-2 (Medium Industrial)
- R-1 (Residential- Low Density)
- R-2 (Residential- Low Density)
- R-3 (Residential- Medium Density)
- RSP (Recreation, Schools, Public Use)
- UR (Open Space)
- Kern County Zoning**
- A (Exclusive Agriculture)
- A-1 (Limited Agriculture)
- E(20) (Estate 20 Acres)
- E(10) (Estate 10 Acres)
- E(5) (Estate 5 Acres)
- E (2 1/2) (Estate 2.5 Acres)
- M-2 (Medium Industrial)
- San Bernardino County Zoning**
- Resource Conservation
- Rural Living



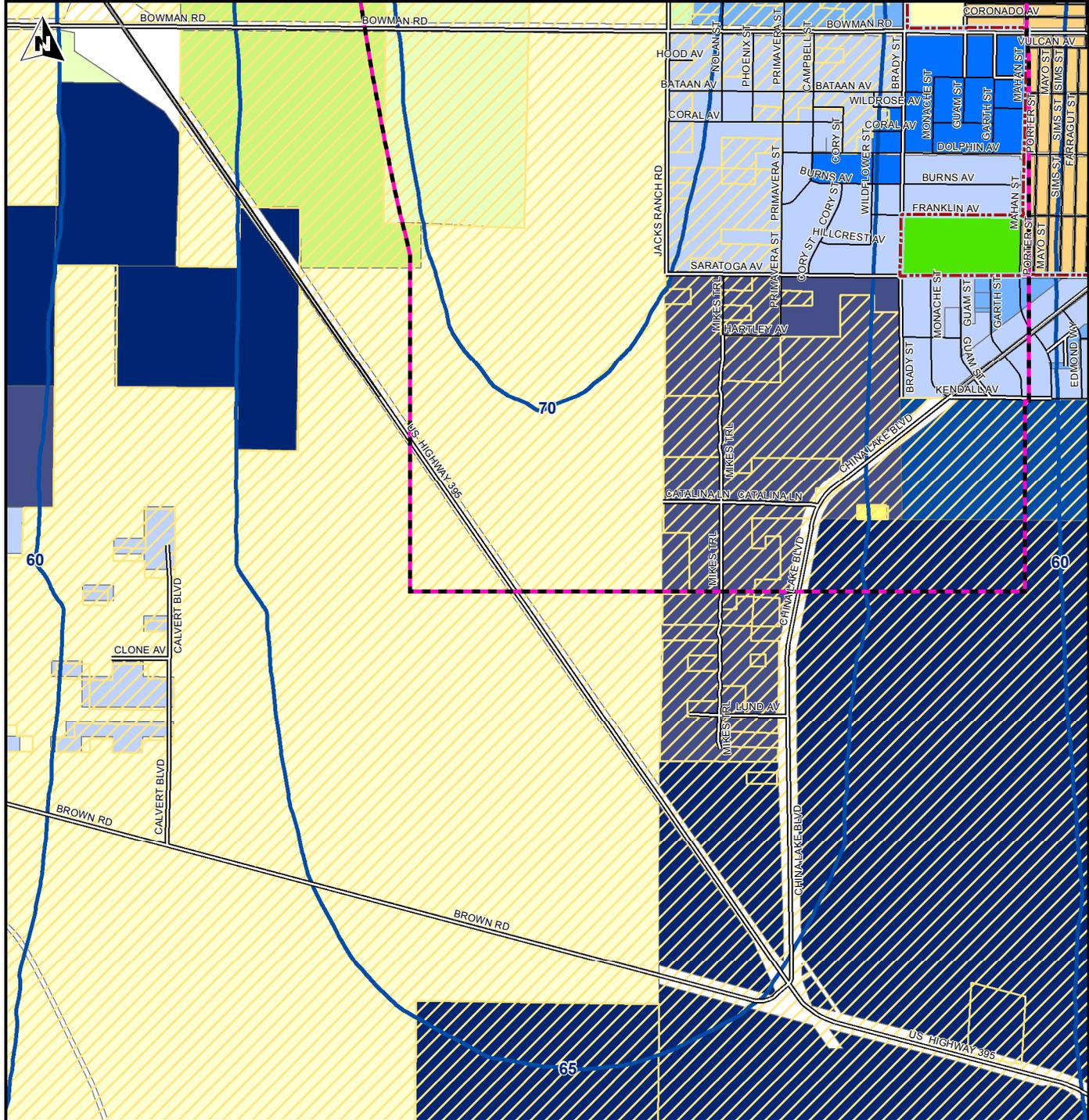
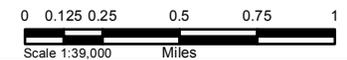


Figure 6-3e
Off-Station Land Use
South Central
(Area E)

NAWS China Lake
Ridgecrest, California

- 2011 AICUZ Noise Contour and dB CNEL Value
- 2007 Military Influence Area
- Ridgecrest City Boundary
- Bureau of Land Management
- City of Ridgecrest Zoning**
- E-1 (Residential - Low Density)
- R-1 (Residential- Low Density)
- UR (Open Space)
- Kern County Zoning**
- A (Exclusive Agriculture)
- A-1 (Limited Agriculture)
- C-2 (General Commercial)
- E(20) (Estate 20 Acres)
- E(10) (Estate 10 Acres)
- E(5) (Estate 5 Acres)
- E (2 1/2) (Estate 2.5 Acres)
- E(1) (Estate 1 Acre)
- E(1/2) (Estate 0.5 Acres)
- E(1/4) (Estate 0.25 Acres)
- NR(20) (Natural Resource 20 Acres)
- OS (Open Space)



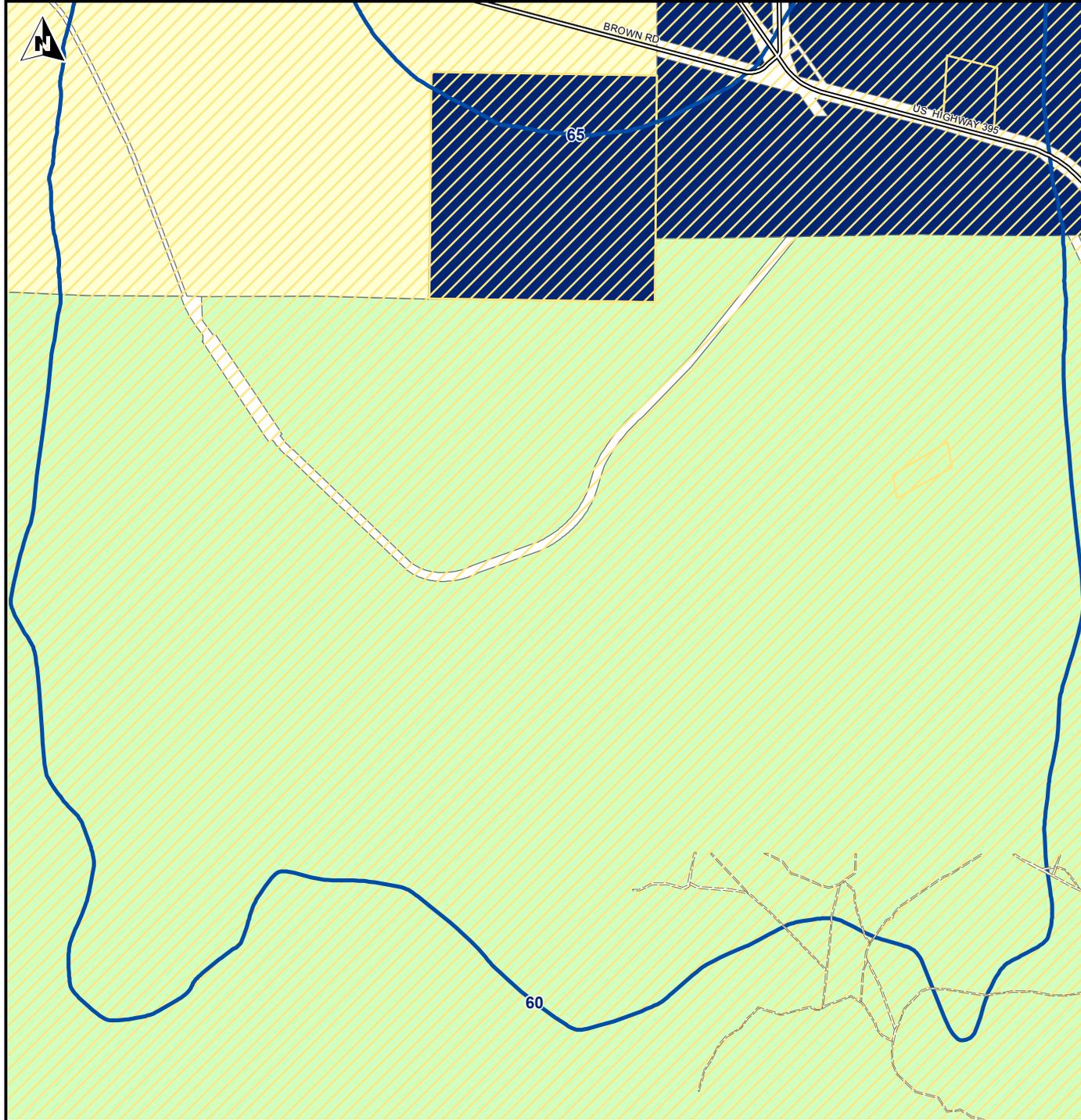


Figure 6-3f
Off-Station Land Use
South
(Area F)

NAWS China Lake
Ridgecrest, California

-  2011 AICUZ Noise Contour and dB CNEL Value
-  Bureau of Land Management
- Kern County Zoning**
 -  A-1 (Limited Agriculture)
 -  E(20) (Estate 20 Acres)
 -  OS (Open Space)



Scale 1:42,000

Approximately 58 acres classified as cultural/entertainment/recreation, 152 acres classified as manufacturing, 35 acres classified as open space, 1,051 acres classified as residential, and 205 acres classified as services land uses are located in Noise Zone 1 in the City of Ridgecrest. Within Noise Zone 1 residential and cultural/entertainment/recreation land uses are considered compatible with restrictions. Residential land use in this area is predominantly zoned for low-density residential and occurs throughout the 60 to 64 dB CNEL noise contours. Cultural/entertainment/recreation land uses correspond to five RSP (recreation, schools, public use) zoned areas located at the corner of West Upjohn Ave and Guam Street (Faller Elementary School), at the corner of North Sierra View Street and West Las Flores Ave (Las Flores Elementary School), at the corner of Downs Street and West Vicki Ave (Luna Park), at the corner of Drummond Ave and China Lake Blvd. (Mesquite Continuation High School), and at the corner of San Bernardino Blvd. and East Radar Ave (Desert Memorial Park). Navy recommendations for residential and cultural/entertainment/recreation land use in Noise Zone 1 are identical to those for similar land uses and noise exposure in unincorporated Kern County. All other land uses in Noise Zone 1 are considered compatible or do not have Navy noise recommendations.

6.4.1.3 San Bernardino County

As shown in Figure 6-3d, the 2011 AICUZ footprint includes 2,359 acres extending southeast from the base to Trona Road. This land is zoned resource conservation (2,123 acres) and rural living (236 acres) and corresponds to cultural/entertainment/recreation and residential land use classifications. Cultural/entertainment/recreation and residential land use classifications are compatible with restrictions in Noise Zone 1. Restrictions for these areas are identical to those for similar land uses and noise exposure in unincorporated Kern County.

6.4.1.4 BLM Land Ownership

The 2011 AICUZ footprint includes approximately 4,533 acres of BLM land situated primarily in unincorporated Kern County and San Bernardino County (see Figure 6-3b, 6-3d, 6-3e, and 6-3f). Approximately 1,559 acres of BLM-owned land is within Noise Zone 1 (60 to 64 dB CNEL) and 2,974 acres are within Noise Zone 2 (65- to 74-dB CNEL). This land is currently undeveloped and is not influenced by Kern County, the City of Ridgecrest, or San Bernardino County zoning controls. Should this area ever be acquired from the BLM, county and city planners would be encouraged to maintain the area in an undeveloped state because of its location under the primary departure and arrival corridors.

6.4.2 Accident Potential

As depicted in Figure 6-1, the CZ and APZ portions of the 2011 AICUZ footprint are contained entirely within NAWS boundaries. Accordingly, land use compatibility with respect to accident potential is not an issue for city and county lands within the AICUZ footprint. The compatibility of on-base land use as it relates to accident potential is discussed in Section 6.5.2.

6.5 Compatibility Analysis for On-Base Land Use

6.5.1 Noise Exposure

Approximately 65 % of the 2011 AICUZ footprint and more than 99% of the land affected by noise exposure levels of 75 dB CNEL and above (Noise Zone 3) occurs within NAWS boundaries (Table 6-4). As indicated in Table 6-3 and Figure 6-4, most of this on-base land encumbered by the AICUZ footprint is classified as “not zoned” by the NAWS Master Plan or designated for operations use. For this analysis approximately 94 acres encumbered by the AICUZ footprint on-base in Inyo County are classified as “not zoned.”

Table 6-3 Distribution of Noise Exposure in the 2011 AICUZ Footprint (acres)

dB CNEL Range	Off-Base	On-Base	Total
60-64	21,195	27,542	48,737
65-69	8,417	11,824	20,241
70-74	3,151	9,875	13,027
75-79	26	6,490	6,516
80-84	0	2,424	2,424
85+	0	1,934	1,934
Total	32,789	60,089	92,878

Other on-base land use designations within the 2011 AICUZ footprint include administration, community, housing, interim use, maintenance, medical, Research, Development, Test & Evaluation (RDT&E), recreation, supply, test/training, unplanned, and utilities. The distribution of on-base land uses exposed to various noise levels under projected conditions is shown in Table 6-4. Military-owned land uses are compatible with AICUZ guidelines; therefore, all current land uses on base are compatible with their respective noise exposure zones. Figure 6-4 identifies on-base land uses that occur within the 2011 AICUZ footprint.

Table 6-4 On-Base Land Use Classifications and Noise Exposure in the 2011 AICUZ Footprint (acres)

NAWS Master Plan Categories	dB CNEL Range					
	60-64	65-69	70-74	75-79	80-84	>85
Administration	2	38	0	0	0	0
Community	76	64	0	0	0	0
Housing	144	30	0	0	0	0
Interim Use	326	402	3	0	0	0
Maintenance	0	77	22	0	55	87
Medical	6	3	0	0	0	0
Operations	2,685	1,005	1,374	3,064	1,905	1,651
RDT&E	15	186	139	60	27	37
Recreation	22	258	0	0	0	0
Supply	264	0	40	0	3	74

Table 6-4 On-Base Land Use Classifications and Noise Exposure in the 2011 AICUZ Footprint (acres)

NAWS Master Plan Categories	dB CNEL Range					
	60-64	65-69	70-74	75-79	80-84	>85
Test/Training	0	0	0	0	0	23
Unplanned	55	0	0	0	0	0
Not Zoned/ No Zoning Designation	23,924	9,720	8,240	3,365	434	62
Utilities	23	39	57	0	0	0
Total	27,542	11,824	9,875	6,490	2,424	1,934

Notes: Totals may not sum exactly due to rounding.

6.5.2 Accident Potential

The APZs encompass 55 acres zoned as maintenance, 1,771 acres classified as operations, 13 acres classified RDT&E, and 1,374 acres that are classified “not zoned.” APZ 2 encompasses the most area and has the lowest accident potential of the areas defined. Most of the area encumbered by clear zones and primary surfaces (89%) is designated for operations. Within APZ 1, 99 % is designated as either operations or “not zoned,” and within APZ II more than 99% is designated “not zoned.” Military-owned land uses are compatible with AICUZ guidelines; therefore, all current land use designations are compatible with their respective accident potential zones.

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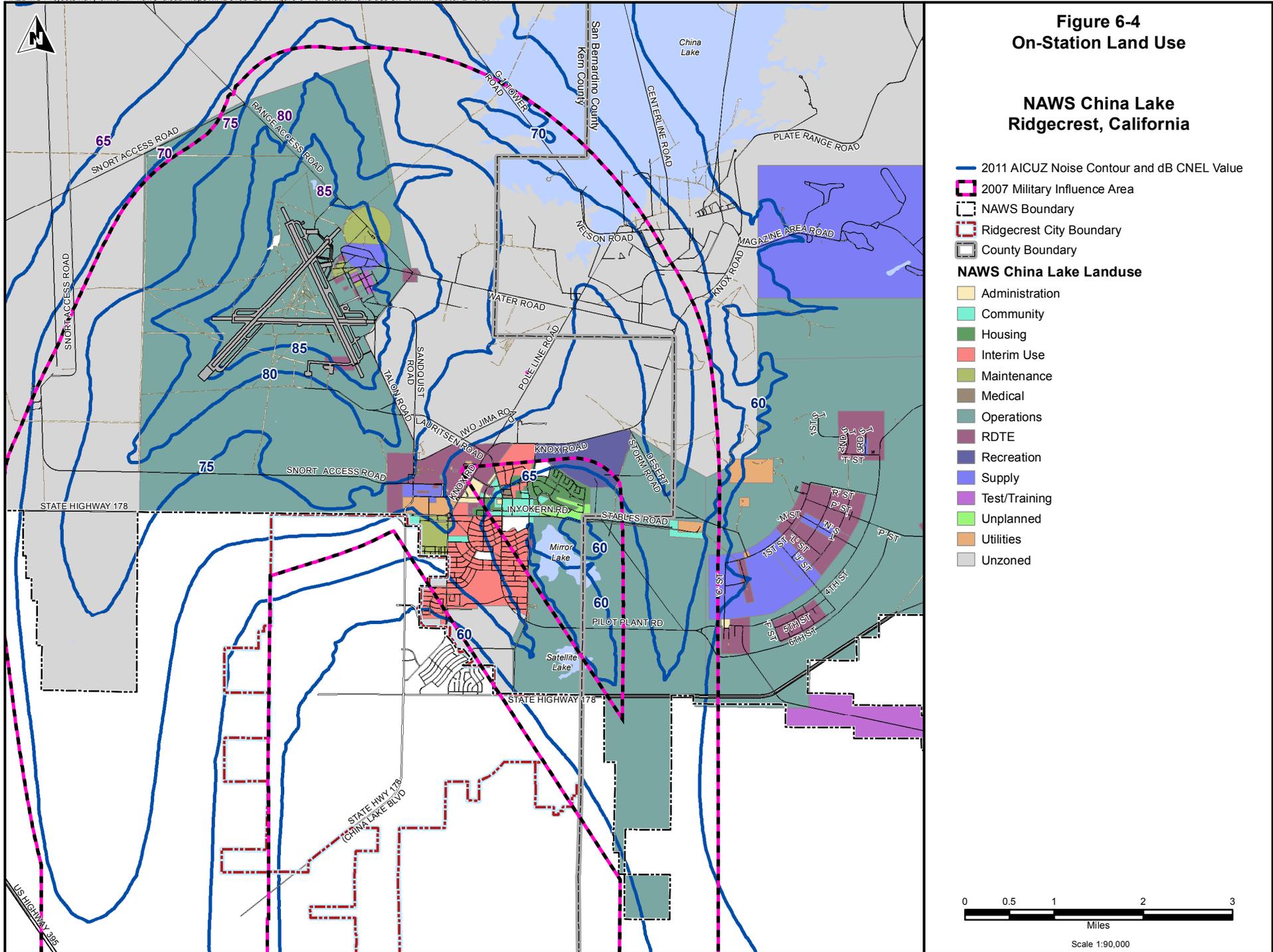
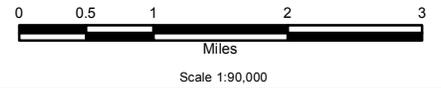


Figure 6-4
On-Station Land Use

NAWS China Lake
Ridgecrest, California

- 2011 AICUZ Noise Contour and dB CNEL Value
- 2007 Military Influence Area
- NAWS Boundary
- Ridgecrest City Boundary
- County Boundary
- NAWS China Lake Landuse**
- Administration
- Community
- Housing
- Interim Use
- Maintenance
- Medical
- Operations
- RDTE
- Recreation
- Supply
- Test/Training
- Unplanned
- Utilities
- Unzoned



7

AICUZ Implementation

This section summarizes potential strategies for the implementation of a successful AICUZ program at NAWS, and presents the recommendations of the NAWS AICUZ Working Group. These strategies and related recommendations represent a viable means to protect the public health and safety in local communities and promote mission compatible land use both on- and off-base. These goals can most effectively be accomplished by encouraging the active participation of all interested parties, including NAWS, local governments, private citizens, real estate professionals, and builders/developers.

Although the emphasis of the AICUZ program is traditionally focused on areas within the AICUZ footprint (defined to include APZs and all noise contours of 60 dB CNEL and above), NAWS is equally concerned about land use within the rest of the MIA. Maintaining land use compatibility within the MIA will enhance public safety because the MIA accounts for areas of increased safety risk and accident potential located outside the base boundary.

7.1 NAWS Implementation Plan

The NAWS AICUZ Program will be implemented through a NAWS Instruction that updates NAVWPNCEN INSTRUCTION 11010.3 under the leadership of the NAWS Commanding Officer. The updated Instruction will outline the full scope of actions to be implemented and the roles and responsibilities of participating offices or Codes.

7.2 Overview of Strategies and Programs that Facilitate AICUZ Planning

A variety of strategies and programs are available to NAWS officials and local government agencies to support implementation of the AICUZ program and promote the development and maintenance of compatible land uses within the NAWS planning area. Military installations and local government agencies with planning and zoning authority share the responsibility for preserving land use compatibility near a military air installation. Cooperative action by all parties is essential to ensure consistency for land use planning purposes.

AICUZ implementation strategies and programs fall into two basic categories: 1) actions that NAWS can take to maintain compatibility of flight operations with surrounding land uses; and 2) strategies available to local government agencies

and private entities to foster continued land use compatibility with NAWS operations. Implemented collectively, these strategies can be used to ensure that future land use in the vicinity of NAWS is planned and managed in accordance with the land use compatibility guidelines presented in Appendix B of this study.

7.2.1 Applicable Federal Laws and Regulations

The following federal laws and regulations provide an opportunity for NAWS to identify, comment on, and influence the direction of land uses on federal properties or projects in the vicinity of the installation.

7.2.1.1 National Environmental Policy Act of 1969

The National Environmental Policy Act requires full analysis and disclosure of the environmental effects resulting from proposed federal actions. The environmental impact review process provides an opportunity for the public and the Navy to comment on federal agency projects that may affect land use decisions on NAWS or the surrounding area.

7.2.1.2 Intergovernmental Review of Federal Programs

As a result of Presidential Executive Order 12372 (issued in July 1982 and amended in April 1983), all federal projects must be coordinated with state, regional, and local planning agencies. Through the state clearinghouse, NAWS is able to enter into the planning process and comment on local and state projects to ensure that land use planning initiatives are compatible with AICUZ land use compatibility guidelines.

7.2.1.3 Federal Mortgage Loans

Federally guaranteed mortgage loans from the Federal Housing Administration or the Department of Veterans Affairs are required to comply with Department of Housing and Urban Development guidelines (HUD Circular 1390.2, “Noise Abatement and Control, Department Policy and Implementation Responsibilities and Standards”) regarding home purchases that may be in areas subject to increased aircraft noise levels. Homes that are located in areas of increased noise levels or that do not meet certain noise level reduction requirements may not be eligible for loans.

7.2.1.4 Federally Funded Projects

General Services Administrations Federal Management Circular 75-2, “Compatible Land Uses at Federal Airfields,” allows NAWS to extend its land-use recommendations to federally funded projects in the vicinity. Specifically, it requires agencies sponsoring federally funded projects to ensure they are compatible with land-use plans of the air installation.

7.2.1.5 DoD Encroachment Protection Program

Title 10, U.S.C. § 2684a, authorizes the Secretary of Defense or the Secretary of a military department to enter into agreements with an eligible entity or entities to address the use or development of real property in the vicinity of, or ecologically related to, a military installation or military airspace, to limit encroachment or

other constraints on military training, testing, and operations. Eligible entities include a State, a political subdivision of a State, and a private entity that has, as its principal organizational purpose or goal, the conservation, restoration, or preservation of land and natural resources, or a similar purpose or goal. Encroachment Protection Agreements provide for an eligible entity to acquire fee title, or a lesser interest, in land for the purpose of limiting encroachment on the mission of a military installation and/or to preserve habitat off the installation to relieve current or anticipated environmental restrictions that might interfere with military operations or training on the installation. The DoD can share the real estate acquisition costs for projects that support the purchase of fee, a conservation, or other restrictive easement for such property. The eligible entity negotiates and acquires the real estate interest for encroachment protection projects with a voluntary seller. The eligible entity must transfer the agreed upon restrictive easement interest to the United States of America upon the request of the Secretary.

Encroachment Partnering

Under the Navy's Encroachment Partnering Program, NASCC should identify private land conservation organizations and/or government agencies to share the cost of land acquisition in order to preserve valuable natural habitat and restrict incompatible land use. Through partnerships, the Navy can work with local municipalities and decision-makers to identify areas where land acquisition and preservation buffers, in the form of either outright fee simple purchase or conservation easements, would be mutually beneficial.

7.2.2 Navy Land Use Management Strategies

7.2.2.1 Easement Acquisition

Easements may be acquired by the Navy to control the use of property and ensure compatible development. These easements are typically restrictive use easements or leaseholds. Restrictive use easements are acquired to guarantee that the development and use of property is limited to activities and structures that are consistent with the requirements of each AICUZ zone. Leaseholds are acquired to obtain exclusive property rights for specified periods of time. Easement acquisitions are used only if all other means of protecting the AICUZ are unavailable. Under 2007 AICUZ and projected conditions at NAWS, easement acquisitions are not currently required.

7.2.2.2 Land Acquisition

Land acquisition is the full ownership of property, which guarantees the Navy the complete and perpetual right to control what occurs on the property. Land acquisition is considered for properties that are essential for safe operations if all other means of protection are unavailable. Although this method has been used in the past to acquire land under the approach and departure corridors, under 2007 AICUZ and projected conditions, land acquisitions are not currently required at NAWS to protect the approach and departure corridors.

7.2.3 State and Regional Laws and Regulations

7.2.3.1 The California Environmental Quality Act (CEQA)

The CEQA requires that private and public projects undergo an environmental review for the analysis and disclosure of potential impacts of a proposed action. CEQA document reviews are used by agencies with land management authority to support their decision making processes. Participation in the CEQA process enables air stations to comment on projects that may adversely impact their missions and local governments to impose mitigation measures that reduce significant impacts.

7.2.3.2 California Department of Real Estate

The California Department of Real Estate prepares a subdivision Public Report for any proposed sale of five or more parcels. These reports are provided to the County Recorder's Office for distribution to prospective buyers and are intended to provide notes of any negative aspects (such as the location of property in an area of increased aircraft noise) to first purchasers of property in a subdivision.

7.2.3.3 Other State Legislation

Various Senate and Assembly bills have been passed that focus on military sustainability and the creation of partnerships between military installations and communities. The following is a description of bills that relate to enhanced AICUZ compatibility at NAWS.

- **Senate Bill 1468** amended by SB 926, is focused on long-term planning and specifies that cities and counties, when revising their general plans, must update five elements (land use, open space, circulation, conservation, and noise and safety) to consider military installations.
- **Senate Bill 1462** amends planning and zoning laws to grant public access to electronic mapping of military areas of concern, places the burden on the project applicant to review mapping and analyze impacts to the military, and provides military notice of a project when the proposed action is within 1000 feet of installations or beneath special use airspace or military training routes.
- **Senate Bill 375** sets planning requirements for transportation commissions, planning departments, agencies, plans, and projects and requires that preferred growth scenarios be taken into account in CEQA environmental reviews. The aim of SB 375 is to support the Clean Air Act by reducing greenhouse gas emissions through improved transportation policy choices, compact development, and expanded transit services. This bill may encourage farmland conversion to create more compact development. NAWS can encourage local communities to develop in ways compatible with SB 375 and the AICUZ program.
- **Assembly Bill 1108** amended the CEQA to provide military agencies with CEQA notices during scoping for projects that(a) require a general plan amendment and are of area-wide significance, (b) are adjacent to an installa-

tion, in an MIA, or under a special use airspace, or (c) are required to be referred to an airport land use commission.

7.2.4 City and County Strategies

Land use compatibility is a shared concern of the Navy, the public, and local government agencies who have planning and zoning authority. The decision makers for these agencies have the responsibility for taking actions that preserve land use compatibility. The cooperative actions of all participating agencies are essential to create and retain long term land use compatibility in the AICUZ planning area.

7.2.4.1 City and County Planning, Zoning, and Building Codes

The City of Ridgecrest and Kern County General Plans comprise several different elements. The Land Use, Noise, and Public Safety Elements can have a significant role in implementing the land use compatibility guidelines presented in the 2011 NAWS AICUZ Study update and can help ensure that future land use plans are compatible with aircraft flying activities. The City and County Zoning Ordinances prescribe which land uses are permissible for future off-base land development in the vicinity of NAWS. In addition, local building codes should be used to implement the noise-attenuation measures. Coordination of AICUZ land use compatibility guidelines with local zoning codes can ensure continued land use compatibility in the future.

7.2.4.2 Capital Improvements Program

Certain public improvements, such as major utilities, roadway improvements, or new rights-of-way, should encourage development in areas that do not conflict with AICUZ land use compatibility guidelines. Improvement programs should be coordinated to encourage development in areas away from increased levels of aircraft noise or increased accident potential.

7.2.4.3 Truth-in-Sales and Rental Ordinances

Truth-in-sales and rental ordinances provide a strategy of public disclosure pertaining to existing residential uses, proposed residential development, and subdivision approvals. Such disclosure is especially important in areas where aircraft flights and noise occur only during weekdays or during special training sessions. Under these circumstances, a potential buyer may be unaware of these conditions after conducting a visual inspection of a property.

7.2.4.4 Transfer and Purchase of Development Rights

The transfer of development rights allows the ownership of land to be separated from the right to build on it. This enables the transfer of development rights to areas where development would be compatible with the AICUZ program. Additionally, local government may consider the purchase of development rights.

7.2.4.5 Public Land Acquisition Programs

Public land acquisition programs can be used (as the conditions of the programs permit) for acquisition of land to support the AICUZ Program.

7.2.4.6 Health Code Programs

These programs protect people from adverse elements that may endanger them, including poor sanitary facilities, diseases, and inadequate or unsafe water supplies. The programs also can be used to protect people from noise impacts.

7.2.4.7 Special Planning Districts

Local governments have the power to create special districts for a special purpose, such as land-use control and protection of the environment and human health.

7.2.5 Private Sector Strategies**7.2.5.1 Real Estate Disclosure**

Real estate disclosures allow prospective buyers, lessees, or renters of property in the vicinity of military operations areas to make informed decisions regarding the purchase or lease of property. The purpose is to protect the seller, real estate agent, buyer, local jurisdiction, and the military. Disclosure of aviation noise and safety zones is a very important tool in informing the community about expected impacts of aviation noise and the location of airfield safety zones, subsequently reducing frustration and anti-airfield criticism by those who were not adequately informed prior to purchase of properties within impact areas. The California Association of Realtors provides disclosure language typical for residences located near airports that is incorporated in each contract between buyer and seller.

7.2.5.2 Real Estate Professionals

Real estate professionals can ensure that prospective buyers or lessees are fully aware of what it means to be within a high-noise zone and/or APZ. Truth-in-sales and rental ordinances can be enacted to ensure adequacy in providing public disclosure of the impact in high noise and accident potential zones. They also can show prospective buyers and lessees a property at a time when noise exposure is expected to be at its worst.

7.2.5.3 Construction Loans to Private Contractors

This strategy encourages the review of AICUZ land use compatibility guidelines as part of a lender's loan approval process to private contractors for construction of new buildings. Prudent lending practices encourage banks to apply capital to the development of land compatible with AICUZ guidelines.

7.2.5.4 Mortgage Loan Requirements

This strategy requires the review of AICUZ compatibility guidelines by mortgage lenders for structures within the AICUZ noise contours. Under this strategy, approved residential mortgages would be discouraged for residential development in areas incompatible with AICUZ guidelines.

7.2.5.5 Private Citizens

Citizens should seek information on noise zones and APZs when purchasing land near a military installation, and consider the possible impacts before purchasing property.

7.3 Specific AICUZ Recommendations

The following section provides specific recommendations stemming from the results of this AICUZ study. The recommendations have been developed in partnership with the stakeholder agencies participating in the AICUZ Working Group.

7.3.1 Recommendations for NAWS Action

1. Amend NAWS Comprehensive Land Use Management Plan (CLUMP) to incorporate AICUZ operational profiles, and noise and safety conditions into existing land management practices, including the site approval process, environmental review process, and Capital Improvements Program.
2. Maintain and enhance NAWS community information programs and AICUZ outreach efforts to address agency and public information needs.
3. Continue the implementation of the NAWS noise complaint response program to address and respond to public inquiries regarding NAWS air operations.
4. Continue implementation of the NAWS air operations noise abatement and aircrew education programs to minimize noise and flight safety impacts on and off-base.
5. Formalize flight safety incident database. Maintain database in accordance with Secretary of the Navy Instruction 5720.42F.

7.3.2 Recommendations for City and County Action

1. Continue to provide CEQA notifications to NAWS for review and consideration of Navy comments on city and county discretionary land use actions, including General/Specific Plan amendments, Zone changes, Tract Maps, Parcel Maps, Specific Development Plans, and Conditional Use Permits.
2. In coordination with NAWS, amend and adopt the existing Kern County Airport Land Use Compatibility Plan (ALUCP) – Military Aviation Section for NAWS, to include specific criteria, policies, and maps for use in evaluating projects, and provide a copy of the amended ALUCP to Cal Trans Department of Aeronautics, School Districts, and Special Districts.
3. The 2007 AICUZ study's military influence area of interest and land use compatibility recommendations have been incorporated into the 2010 Ridgecrest General Plan Update. City and county planners are encouraged to maintain the MIA as a valid planning tool to ensure future mission compatibility, as well as to consider the most recent AICUZ study during plan updates. Salient components of this AICUZ study should be added to the Military Sustainability Element of the Kern County General Plan and the proposed Indian Wells Valley Specific Plan. Planners are encouraged to develop and adopt specific policies and procedures to address compatible land uses (type, den-

sity, etc.) and air operations safety considerations (height obstructions, glare and smoke, electronic emissions, bird attractants, etc.), to identify appropriate densities of new residential development and minimize sensitive types of land use within the flight corridors and areas of increased risk. NAWS recommends city and county review and adjust as appropriate the MIA area of interest to meet their planning and management goals.

4. Develop and implement a policy requiring a site-specific evaluation for any proposed General Plan Amendments or zoning changes that would create residential projects or increase allowable density of existing designated residential development in an area identified as impacted by noise or safety concerns, and require appropriate notification of potential aircraft noise and flight safety risk to realtors, buyers, sellers, and residents of land within the flight corridor areas of the MIA.
5. Create specific policies for the General/Specific Plan that address restrictions on the location of sensitive receptors, such as schools, day care centers, apartments, hospitals, nursing homes, and senior living facilities in relation to noise contours.

7.3.3 Recommendations for BLM Action

Incorporate appropriate elements of this AICUZ study into the next amendment of the BLM's California Desert Conservation Area Plan. Involve NAWS in planning efforts associated with the development of cooperative agreements, proposed changes to land use type or intensity, sale and transfer related to excess land parcels located within or adjacent to the MIA.

7.3.4 Recommendations for all AICUZ Participants

Work with local and regional governments to implement the R-2508 Joint Land Use Study (JLUS). The R-2508 Airspace Complex JLUS identifies viable strategies to promote mutually compatible land use in proximity to NAWS and within the R-2508 airspace to reduce potential conflicts with the DoD military mission, sustain regional economic health, and protect public health and safety in the region.

8

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A

Land-Use Compatibility Methodology

The U.S. Department of the Navy (Navy) has developed land-use compatibility recommendations for accident potential zones (APZs) and noise zones. These recommendations, found in Chief of Naval Operations Instruction (OPNAVINST) 11010.36C, “Air Installations Compatibility Use Zones Program” (U.S. Department of the Navy 2008), are intended to serve as guidelines for both the placement of APZs and noise zones and the development of land uses around military air installations. The guidelines assume that noise-sensitive land uses (e.g., houses and schools) will be placed outside high-noise zones and that people-intensive uses (e.g., grocery shopping centers and restaurants) will not be placed in APZs. Certain land uses are considered incompatible with APZs and high-noise zones, while other land uses may be considered compatible, compatible with restrictions, or incompatible with exceptions. The land use compatibility analysis conducted for Naval Air Weapons Station China Lake (NAWS), California, was based on the Navy’s land-use compatibility recommendations. To determine the compatibility of land uses within NAWS noise zones and APZs, this document examined zoned land uses near NAWS.

A.1 Existing Land Use Data

The noise zones and APZs associated with NAWS extend over Kern, San Bernardino, and Inyo counties as well as the City of Ridgecrest. NAWS provided zoning information for Kern County, San Bernardino County. Matrix Design Group, Inc. provided zoning information for the City of Ridgecrest. The 60 dB CNEL contour encumbers approximately 94.1 acres in Inyo County, which are located entirely within the NAWS base boundary. For the purposes of this analysis the 94.1 acres were assigned a zoning classification of on-base “Un-zoned” in accordance with surrounding similarly zoned land.

Kern County, San Bernardino County, and the City of Ridgecrest each use different zoning classification systems. Kern County zoning classifications use an alpha-numeric code that identifies a primary use, parcel sizes, and up to three combined and secondary uses. San Bernardino County zoning classifications use a single broad use per zoned area. The City of Ridgecrest uses an alpha-numeric zoning code that identifies one or multiple uses and intensity of use per zoned area.

OPNAVINST 11010.36C uses the Standard Land Use Coding Manual (SLUCM) to classify land use to assess compatibility with noise zones and APZs. The SLUCM relies on a two- to four-digit land-use coding system. Zoning provided for Kern County, San Bernardino County, and the City of Ridgecrest and the SLUCM are different coding systems and draw different distinctions between land uses. In order to assess the compatibility of land uses encumbered within the AICUZ footprint, each zoning code within the noise zones and APZs was assigned a SLUCM group code (see Table A-1).

SLUCM group codes standardize and generalize the Kern County, San Bernardino County, and the City of Ridgecrest zoning codes. SLUCM codes *11-Housing Units, 39-Miscellaneous Manufacturing, 59-Other Retail Trade, 65-*

A Land-Use Compatibility Methodology

Professional Services, 76-Parks, 81- Agriculture (except livestock), and 91- Undeveloped Land provide representative compatibility recommendations for SLUCM groups 10, 20/30, 50, 60, 70, 80, and 90 respectively. The representative SLUCM codes reflect the majority of Kern County, San Bernardino County, and the City of Ridgecrest zoned uses as well as an average compatibility recommendation for each SLUCM group (see Appendix B for suggested land use compatibility). Areas located on-base are considered compatible with Navy recommendations.

A.2 Unclassified Areas

Zoning and NAWS Master Plan information provided classifications for more than 98 percent of the area encumbered by the AICUZ footprint. Aerial verification identified the majority of unclassified areas as roadways and areas located between zoning boundaries. For the purposes of this analysis these areas were classified as SLUCM use group *40-Transportation, communication, and utilities*. SLUCM code *42-Motor vehicle transportation* was used to determine compatibility recommendations for areas classified as SLUCM group 40.

Table A-1 Equated Zoning Codes to SLUCM Groups

SLUCM Group	Zoning Code	
Kern County		
10 Residential	E(1) (Estate 1 Acre)	
	E(1) MH (Estate 1 Acre, Mobile Home Combining)	
	E(1) RS (Estate 1 Acre, Residential Suburban Combining)	
	E(1) RS MH (Estate 1 Acre, Residential Suburban Combining, Mobile home Combining)	
	E(1) RS MH FPS (Estate 1 Acre, Residential Suburban Combining, Mobile home Combining, Flood Plain Secondary Combining)	
	E(1/2) RS MH (Estate 0.5 Acres, Residential Suburban Combining, Mobile home Combining)	
	E(1/2) RS MH FPS (Estate 0.5 Acres, Residential Suburban Combining, Mobile home Combining, Flood Plain Secondary Combining)	
	E(1/4) MH (Estate 0.25 Acres, Mobile Home Combining)	
	E(1/4) MH FPS (Estate 0.25 Acres, Mobile home Combining, Flood Plain Secondary Combining)	
	E(1/4) RS MH (Estate 0.25 Acres, Residential Suburban Combining, Mobile home Combining)	
	E(10) (Estate 10 Acres)	
	E(10) RS (Estate 10 Acres, Residential Suburban Combining)	
	E (2 1/2) (Estate 2.5 Acres)	
	E (2 1/2) MH (Estate 2.5 Acres, Mobile Home Combining)	
	E (2 1/2) RL (Estate 2.5 Acres, Rural Living Combining)	
	E(2 1/2) RS (Estate 2.5 Acres, Residential Suburban Combining)	
	E(2 1/2) RS FPS (Estate 2.5 Acres, Residential Suburban Combining, Flood Plain Secondary Combining)	
	E(2 1/2) RS MH (Estate 2.5 Acres, Residential Suburban Combining, Mobile home Combining)	
	E(2 1/2) RS MH FPS (Estate 2.5 Acres, Residential Suburban Combining, Mobile home Combining, Flood Plain Secondary Combining)	
	E(20) (Estate 20 Acres)	
	E(20) RS (Estate 20 Acres, Residential Suburban Combining)	
	E(20) RS FPS (Estate 20 Acres, Residential Suburban Combining, Flood Plain Secondary Combining)	
	E(5) (Estate 5 Acres)	
	E(5) FPS (Estate 5 Acres, Flood Plain Secondary Combining)	
	E(5) RS (Estate 5 Acres, Residential Suburban Combining)	
	E(5) RS FPS (Estate 5 Acres, Residential Suburban Combining, Flood Plain Secondary Combining)	
	MP (Mobile Home Park)	
	20/30 Manufacturing	M-1 (Light Manufacturing)
		M-1 D (Light Manufacturing, Architectural Design Combining)
		M-1 D FPS (Light Manufacturing, Architectural Design Combining, Flood Plain Secondary Combining)
M-1 FPS (Light Manufacturing, Flood Plain Secondary Combining)		
M-2 (Medium Industrial)		
M-2 D (Medium Industrial, Architectural Design Combining)		

Table A-1 Equated Zoning Codes to SLUCM Groups

SLUCM Group	Zoning Code
	M-2 D H (Medium Industrial, Architectural Design Combining, Airport Approach Height Combining)
60 Services	C-2 (General Commercial)
	C-2 PD (General Commercial, Precise Development Combining)
70 Cultural, Entertainment and Recreational	NR(20) (Natural Resource 20 Acres)
80 Resource production and extraction	A (Exclusive Agriculture)
	A FPS (Exclusive Agriculture, Flood Plain Secondary Combining)
	A-1 (Limited Agriculture)
	A-1 FPS (Limited Agriculture, Flood Plain Secondary Combining)
	A-1 MH (Limited Agriculture, Mobile Home Combining)
	A-1 MH FPS (Limited Agriculture, Mobile Home Combining, Flood Plain Secondary Combining)
90 Other	OS (Open Space)
	FPP (Flood Plain Primary)
San Bernardino County	
10 Residential	Rural Living
70 Cultural, Entertainment and Recreational	Resource Conservation
City of Ridgecrest	
10 Residential	E-1 (Residential - Low Density)
	E-2 (Residential - Low Density)
	E-3 (Residential - Low Density)
	R-1 (Residential- Low Density)
	R-2 (Residential- Low Density)
	R-3 (Residential- Medium Density)
	RMH (Residential- Low Density)
20/30 Manufacturing	M-1 (Industrial)
	M-2 (Industrial)
60 Services	CG (Commercial/Office)
	CI (Civic and Institutional District)
	CN (Commercial/Office)
	CS (Commercial/Office)
	PO (Commercial/Office)
70 Cultural, Entertainment and Recreational	RSP (Recreation, Schools, Public Use)
80 Resource production and extraction	A-5 (Agriculture)
90 Other	UR (Open Space)

B

AICUZ Land Use Compatibility Guidelines

B AICUZ Land Use Compatibility Guidelines

Table B-1 Suggested Land Use Compatibility in Noise Zones

SLUCM No.	Land Use Name	Suggested Land Use Compatibility						
		Noise Zone 1 (dB CNEL)		Noise Zone 2 (dB CNEL)		Noise Zone 3 (dB CNEL)		
		<55	55-64	65-69	70-74	75-79	80-84	85+
10	<i>Residential</i>							
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	Apartments: 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	<i>Manufacturing</i>							
21	Food and 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
30	<i>Manufacturing (continued)</i>							
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	<i>Transportation, Communication and Utilities</i>							
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

B AICUZ Land Use Compatibility Guidelines

Table B-1 Suggested Land Use Compatibility in Noise Zones

SLUCM No.	Land Use Name	Suggested Land Use Compatibility						
		Noise Zone 1 (dB CNEL)		Noise Zone 2 (dB CNEL)		Noise Zone 3 (dB CNEL)		
		<55	55-64	65-69	70-74	75-79	80-84	85+
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
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 ³	Y ^{4,11}	Y ^{6,11}
63	Business services	Y	Y	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y	Y	Y ²	Y ³	Y ⁴	N
64	Repair services	Y	Y	Y	Y ²	Y ³	Y ⁴	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	Governmental 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 (including golf courses, riding stables, water rec.)	Y	Y ¹	Y ¹	25	30	N	N

B AICUZ Land Use Compatibility Guidelines

Table B-1 Suggested Land Use Compatibility in Noise Zones

SLUCM No.	Land Use Name	Suggested Land Use Compatibility						
		Noise Zone 1 (dB CNEL)		Noise Zone 2 (dB CNEL)		Noise Zone 3 (dB CNEL)		
		<55	55-64	65-69	70-74	75-79	80-84	85+
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 livestock)	Y	Y	Y ⁸	Y ⁹	Y ¹⁰	Y ^{10,11}	Y ^{10,11}
81.5	Livestock farming	Y	Y	Y ⁸	Y ⁹	N	N	N
81.7	Animal breeding	Y	Y	Y ⁸	Y ⁹	N	N	N
82	Agricultural 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

Source: adopted from OPNAVINST 11010.36C, 2008.

Notes:

¹ General

- a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in CNEL 65 to 69 and strongly discouraged in CNEL 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 residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 Decibels (dB) in CNEL 65 to 69 and NLR of 30 dB CNEL 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 CNEL 75 to 79.
- c. Normal permanent construction can be expected to provide an 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 exposure, particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures which only protect interior spaces.

² Measures to achieve an 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 an NLR of 30 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.

⁴ Measures to achieve an 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 the 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 an NLR of 25.

⁹ Residential buildings require an NLR of 30.

¹⁰ Residential buildings not permitted.

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

Key:

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 structure. 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 on of these numbers.

CNEL = Community Noise Equivalent Level

N (No) = Land use and related structures are not compatible and should be prohibited.

NLR (Noise Level Reduction) = NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

N^x – (No with exceptions) = The land use and related structures are generally incompatible. However, see notes indicated by the superscript.

SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation

Y (Yes) = Land use and related structures are compatible without restrictions.

Y^x – (Yes with restrictions) = The land use and related structures are generally compatible. However, see note(s) indicated by the superscript.

B AICUZ Land Use Compatibility Guidelines

Table B-2 Suggested Land Use Compatibility in Accident Potential Zones

Air Installations Compatible Use Zones Suggested Land Use Compatibility in Accident Potential Zones ¹					
SLUCM No.	Land Use Name	Recommendations			
		CLEAR ZONE	APZ-I	APZ-II	Density
10	Residential				
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	Apartments: 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	Manufacturing³				
21	Food and 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	Manufacturing³ (continued)				
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, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II

B AICUZ Land Use Compatibility Guidelines

Table B-2 Suggested Land Use Compatibility in Accident Potential Zones

Air Installations Compatible Use Zones					
Suggested Land Use Compatibility in Accident Potential Zones ¹					
SLUCM No.	Land Use Name	Recommendations			
		CLEAR ZONE	APZ-I	APZ-II	Density
40	Transportation, Communication and Utilities^{4,5}				
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 transportation, comm., and utilities	N	Y ⁵	Y	See Note 5
50	Trade				
51	Wholesale trade	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
52	Retail trade – building materials, hardware, and farm equipment	N	Y	Y	See Note 6
53	Retail trade ⁷ – 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
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 of 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
60	Services⁸				
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 of 1.0 in APZ I; 2.0 in APZ II

B AICUZ Land Use Compatibility Guidelines

Table B-2 Suggested Land Use Compatibility in Accident Potential Zones

Air Installations Compatible Use Zones					
Suggested Land Use Compatibility in Accident Potential Zones ¹					
SLUCM No.	Land Use Name	Recommendations			
		CLEAR ZONE	APZ-I	APZ-II	Density
64	Repair Services	N	Y	Y	Max FAR of 0.11 in 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 in APZ I; 0.22 in APZ II
67	Governmental 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	
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 in 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	Resource Production and Extraction				
81	Agriculture (except livestock)	Y ⁴	Y ¹¹	Y ¹¹	
81.5, 81.7	Livestock farming and breeding	N	Y ^{11,12}	Y ^{11,12}	
82	Agricultural related activities	N	Y ¹¹	Y ¹¹	Max FAR of 0.28 in APZ I; 0.56 in 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

B AICUZ Land Use Compatibility Guidelines

Table B-2 Suggested Land Use Compatibility in Accident Potential Zones

Air Installations Compatible Use Zones					
Suggested Land Use Compatibility in Accident Potential Zones ¹					
		Recommendations			
SLUCM No.	Land Use Name	CLEAR ZONE	APZ-I	APZ-II	Density
90	Other				
91	Undeveloped Land	Y	Y	Y	
93	Water Areas	N ¹⁵	N ¹⁵	N ¹⁵	

Source: adopted from OPNAVINST 11010.36C, 2008.

Notes:

- 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 densities 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 than 25 people per acre in APZ I, and Maximum (MAX) assemblies of 50 people per acre in APZ II.
- ² The suggested maximum 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 the 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 aboveground transmission lines in APZ I.
- 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 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 use 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.

Key:

- Du/Ac- Dwelling Units per Acre = This metric is customarily used to measure residential densities.
- 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.
- N (No) = Land use and related structures are not normally compatible and should be prohibited.
- N^x – (No with exceptions) = The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
- SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation
- Y (Yes) = Land use and related structures are normally compatible without restrictions.
- Y^x – (Yes with restrictions) = The land use and related structures are generally compatible. However, see notes indicated by the superscript.

