



FINAL

Air Installation Compatible Use Zone Study



NAVAL AIR WEAPONS STATION, CHINA LAKE

May 2007

List of Acronyms and Abbreviations

AB	Assembly Bill	FOLS	Fresnel Lens Optical Landing System
AGL	Above Ground Level	GP	General Plan
AICUZ	Air Installations Compatible Use Zones	GPS	Global Positioning System
AIMD	Aircraft Intermediate Maintenance Division	HARM	High-Speed Anti-Radiation Missile
ALUCP	Airport Land Use Compatibility Plan	HERO	Hazards of Electromagnetic Radiation to Ordinance
AMRAAM	Advanced Medium Range Air-to-Air Missile	HIRL	High-Intensity Runway Light
ANSI	American National Standards Institute	IFR	Instrument Flight Rules
APCD	Air Pollution Control District	JDAM	Joint Direct Attack Munition
APZ	Accident Potential Zone	JLUS	Joint Land Use Study
ASO	Air Safety Officer	JSOW	Joint Standoff Weapon
ATCAA	Air Traffic Control Assigned Airspace	MIA	Military Influence Area
BASH	Bird/Aircraft Strike Hazard	MOA	Military Operations Area
BHC	Bird Hazard Condition	MSL	Mean Sea Level
BHWG	Bird Hazard Working Group	NAVAIR	Naval Air Systems Command
BLM	Bureau of Land Management	NAVFAC	Naval Facilities Engineering Command
CEQA	California Environmental Quality Act	NAWCWD	Naval Air Warfare Center Weapons Division
CFR	Code of Federal Regulations	NAWS	Naval Air Weapons Station China Lake
CNIC	Commander Naval Installations Command	NAWSINST	Naval Air Weapons Station Instruction
CLUMP	Comprehensive Land Use Management Plan	NLR	Noise Level Reduction
CNEL	Community Noise Equivalent Level	NM	Nautical Miles
CZ	Clear Zone	NTC	National Training Center
DNL	Day-Night Average Sound Level	OPNAVINST	Chief of Naval Operations Instruction
dB	decibel	OPR	Office of Planning and Research
DOD	Department of Defense	PAPI	Precision Approach Path Indicator
DON	Department of the Navy	RA	Restricted Area
EIS	Environmental Impact Statement	RDM	Runway Distance Marker
EMCON	Emission Control	RDT&E	Research, Development, Test and Evaluation
EMI	Electromagnetic Interface	SB	Senate Bill
EPMD	Environmental Planning and Management Department	SEL	Sound Exposure Level
FAA	Federal Aviation Administration	TACAN	Tactical Air Navigation
FAR	Floor Area Ratio	TERPS	Terminal Instrument Procedures
FAS	Federation of American Scientists	TJS	Tactical Jamming System
FCLP	Field Carrier Landing Practice	UFC	Unified Facilities Criteria
		V/STOL	Vertical/Short Takeoff and Land
		WSSA	Weapon System Support Activity

Acknowledgement

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30 May, 2007

From: Director, Ashore Readiness Division
To: Commanding Officer, Naval Air Weapons Station China Lake
Subj: AIR INSTALLATIONS COMPATIBLE USE ZONES (AICUZ) STUDY;
APPROVAL FOR NAVAL AIR WEAPONS STATION (NAWS) CHINA LAKE
Ref: (a) NAWS China Lake ltr 5090 Ser N45NCW/ 452 of 9 Nov 06
(b) OPNAVIST 11010.36B

1. Per references (a) and (b), the AICUZ Update for NAWS China Lake is approved.
2. The approved AICUZ supersedes the previous 1977 AICUZ footprint and provides recommendations for compatible land use development in the vicinity of NAWS China Lake. The AICUZ Study analyses aircraft noise and aircraft safety based on current and projected operational conditions using the latest methodology for describing aircraft noise exposure.
3. Through continuing dialogue between your command, local government, and community leaders in the City of Ridgecrest and Kern County, California, it is anticipated that the updated AICUZ footprints and land use recommendations will be incorporated into local comprehensive plans to provide long term encroachment protection.

A handwritten signature in black ink, appearing to read 'M. A. HANDLEY', written over the typed name and title.

M. A. HANDLEY
Rear Admiral, CEC, U.S. Navy

Copy to:
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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 to 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 Armitage Airfield. The study examines various airfield planning parameters related to aircraft operations, noise, and safety, and provides an analysis of land use compatibility in both on- and off-Station properties.

An AICUZ study was prepared and approved for NAWS in 1977. 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 2006 AICUZ study.

Alternative Operational Scenarios

This AICUZ study provides an analysis of noise and safety issues associated with both baseline and prospective operational conditions at NAWS. Both sets of operational conditions are consistent with the operational scenarios 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. The 2004 EIS identified a 25% increase in airfield and range flight operations as the preferred alternative. The prospective operational conditions described in this AICUZ study correspond to the preferred alternative analyzed in the 2004 EIS, and the baseline operational conditions evaluated herein correspond to the No Action Alternative (existing conditions) evaluated in the 2004 EIS. Another operational alternative proposed by the AICUZ Working Group involved a potential six degree shift of the TACAN/Instrument Approach route. This alternative was evaluated by NAWS Air Operations and Safety personnel. After careful analysis, NAWS staff determined that the proposed six degree shift would present increased and unacceptable safety risks. This operational alternative was therefore not given further consideration in this study. NAWS has proposed a third operational scenario in the interests of reducing potential noise impacts and safety risks associated with airfield departures over portions of Ridgecrest and unincorporated Kern County. The proposed alternative represents a consolidation and westward shift of several primary departure flight routes. This proposal is evaluated as the "Consolidated Departure Alternative" in appropriate sections of this AICUZ

study. Under this Alternative, specific departure routes would be shifted at least 0.5 mile westward from their current profile. The operational profile for this Alternative would be consistent with the prospective level of operations (25 percent increase), as described above and in the 2004 EIS.

Safety

This 2006 AICUZ study defines standard Accident Potential Zones (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. The study proposes an expansion of the traditional AICUZ planning area, called a Military Influence Area (MIA), to address the higher safety risks in these areas.

Noise

This AICUZ study reports the results of noise studies conducted for each of the defined operational alternatives. A comparison of noise contours overlain on area maps reveals that the Consolidated Departure Alternative would minimize the noise impacts of prospective levels of operations on off-Station land areas. In addition, the defined AICUZ planning area for this alternative includes fewer pre-existing, non-compatible land uses and is, in general, more compatible with NAWS operations. For these reasons, the Consolidated Departure Alternative has been selected as the preferred operational profile for Armitage Airfield.

Land Use Compatibility

This study defines and analyzes two different AICUZ planning areas surrounding Armitage Airfield. These include the traditional AICUZ footprint and the MIA, which more thoroughly addresses regional safety issues and also provides a noise buffer zone to better insulate NAWS against future encroachment. Using accepted Navy guidelines, current zoning designations in both planning areas 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. Several of these areas are as much as 50 percent developed and contain pre-existing, non-compatible land uses.

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-Station.
 - 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 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) Incorporate the AICUZ MIA and land use compatibility recommendations in the Ridgecrest General Plan Update and proposed Indian Wells Valley Specific Plan. Establish a Military Sustainability Element in the Ridgecrest General Plan Update that incorporates the salient components of this AICUZ study, and also add such components to the Military Sustainability Element of the Kern County General Plan and the proposed Indian Wells Valley Specific Plan. 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 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.

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 efforts associated with the development of cooperative agreements, sale and/or transfer related to excess land parcels located within or adjacent to the AICUZ MIA.

Recommendations for all AICUZ Participants

Actively participate in the regional R-2508 Joint Land Use Study (JLUS). The purpose of the R-2508 Airspace Complex JLUS is to identify 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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1.0 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 Department of the Navy (DON) 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 DON have implemented the Air Installation Compatible Use Zone (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 remains a high priority. Historically, off-Station 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 the Station. 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 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.

This study analyzes baseline and prospective airfield flight operations at NAWS and evaluates the noise and safety considerations associated with these operations. Operational scenarios are defined for two sets of flight route profiles: the established arrival and departure flight routes currently flown at the airfield, and a Consolidated Departure Alternative, involving a proposed lateral shift in departure routes combined with the established arrival flight routes. Based on the analysis of safety and noise issues for each scenario, the study identifies NAWS' preferred operational profile and defines a traditional "AICUZ footprint" and a "Military Influence Area" for Armitage Airfield based on the selected profile. Land use compatibility within each of these planning areas is then evaluated, and the AICUZ study concludes by presenting recommended strategies to encourage compatible development and avoid or mitigate incompatible development in the vicinity of Armitage Airfield.

This first section of the document introduces the background of the Navy AICUZ Program and the scope of this AICUZ study for NAWS. Section 2 provides an overview of the installation, Armitage Airfield, and associated military airspace. Section 3 presents a description of existing and prospective aircraft operations, and defines the proposed Consolidated Departure flight route alternative. 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, including baseline and prospective noise conditions associated with established flight routes and the noise implications of the alternative departure profile. Section 6 presents the rationale for NAWS's decision to adopt the Consolidated Departure Alternative, and assesses land use compatibility within defined planning areas affected by NAWS flight operations. 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 Station 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 sophisticated 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. APZs encompass a portion of departure, arrival, and other 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 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;
- Chief of Naval Operations *Instruction (OPNAVINST) 11010.36B, Air Installations Compatible Use Zones Program*, December 19, 2002;
- U.S. DOD, *Unified Facilities Criteria (UFC) 3-260-01 Airfield and Heliport Planning and Design*, November 1, 2001; and
- U.S. Department of Transportation, FAA Regulations, *Code of Federal Regulations (CFR), Title 14, Part 77, Objects Affecting Navigable Airspace*, 1992.

1.1.2 Previous AICUZ Study 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 accident potential zones for a preferred operational profile that established the current 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 (DPZ). The 1977 AICUZ analyzed land use compatibility within the AICUZ footprints, DPZs and associated operational areas, and provided recommended land use strategies for minimizing incompatibilities with airfield and range flight operations.

1.1.3 2004 Environmental Impact Statement (EIS)

This AICUZ study provides an analysis of noise and safety issues associated with both baseline and prospective operational conditions at NAWS. Both sets of operational conditions are described in detail in Section 3.0 and both are consistent with operational scenarios analyzed in the Station's *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"). The 2004 EIS evaluated three operational scenarios and identified a 25% increase in airfield and range flight operations as the preferred alternative. The "prospective operational conditions" described in this AICUZ study correspond to the preferred alternative analyzed in the 2004 EIS, and the "baseline operational conditions" evaluated herein correspond to the No Action Alternative (existing conditions) evaluated in the 2004 EIS.

1.2 Purpose and Scope of the 2006 AICUZ Study

This 2006 AICUZ Study implements the DON's AICUZ Program at NAWS and is intended to replace the 1977 AICUZ Study. This current study has been prepared in accordance with Navy AICUZ program guidelines per OPNAVINST 11010.36B and addresses current and prospective Armitage Airfield flight operations only. 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 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 Station's 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.

In accordance with OPNAVINST 11010.36B, this study includes an analysis of current and prospective noise impacts and flight safety considerations within a defined AICUZ planning area and for areas beyond the associated noise contours where mission compatible land use controls are considered necessary.

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 the Station 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 report. The installation is also responsible for responding to any questions or concerns from the public associated with the contents or objectives of the 2006 AICUZ Study. In order to help implement proper planning actions so that impacts do not occur, the Navy has the responsibility to inform and cooperate with the planning departments of Kern and San Bernardino Counties and the City of Ridgecrest. Should the information in this report 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.

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 complimentary 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, and 926; 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 for 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.

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 overflights, 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."

2.0 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 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 station 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 Station 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.

Communities in the vicinity of Armitage Airfield include the incorporated City of Ridgecrest (adjoining the southern boundary of North Range) and 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.

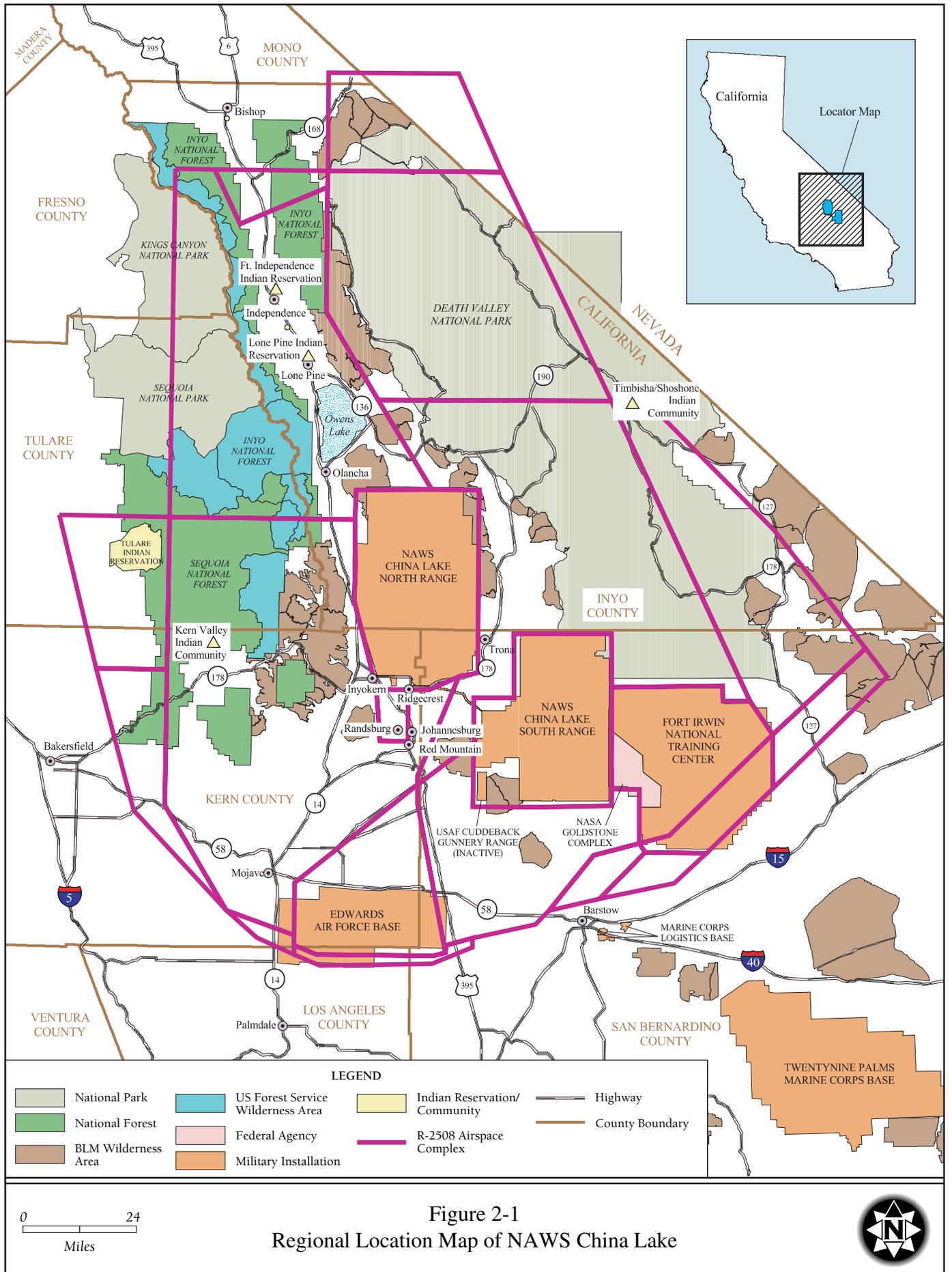


Figure 2-1
Regional Location Map of NAWS China Lake

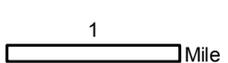
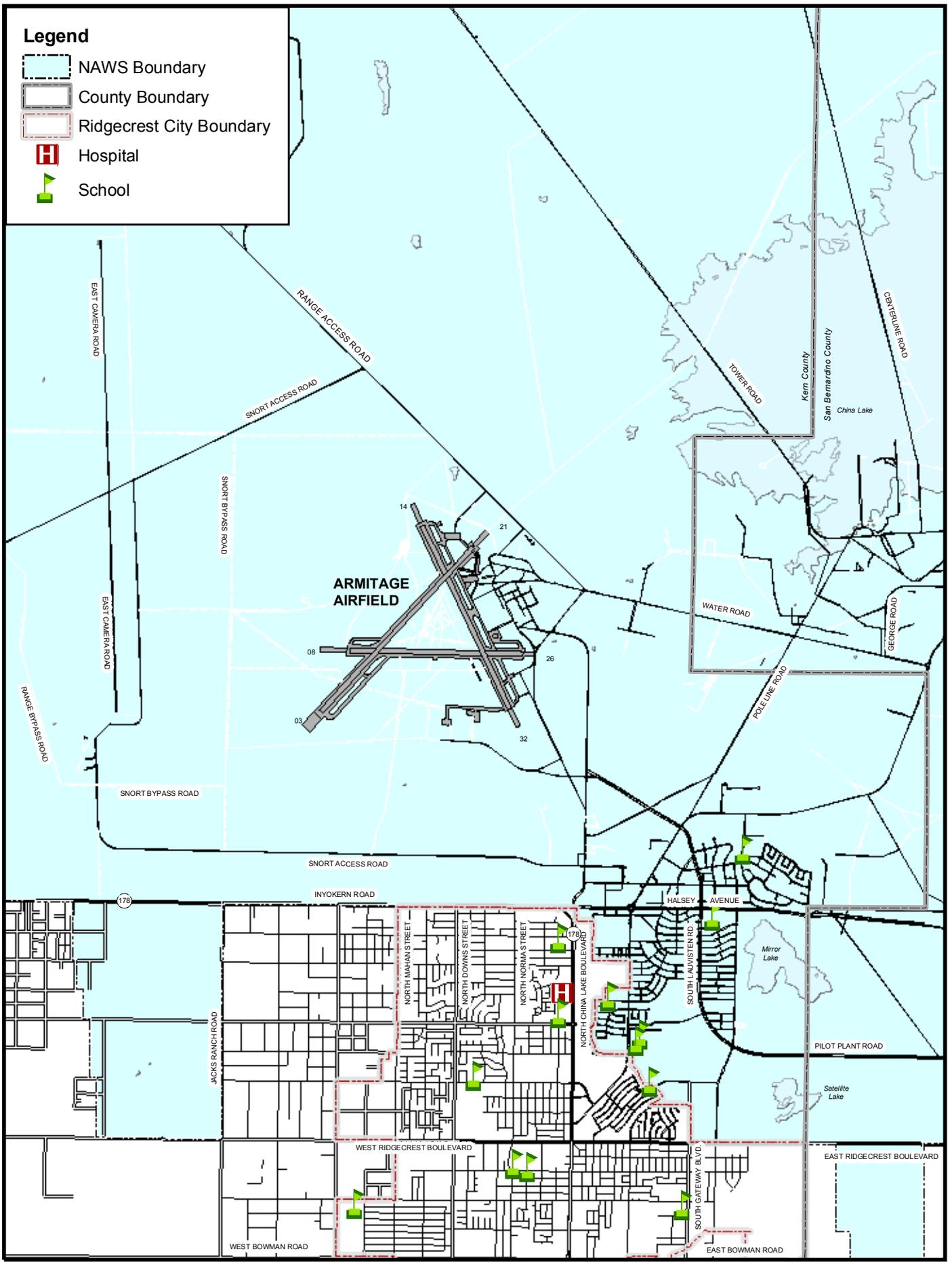


Figure 2-2
Location of Armitage Airfield



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-Station include munitions delivery, tactics, electronic warfare, and Special Forces training. NAWS operates and maintains the Station's facilities and provides support services, including airfields, and is responsible for managing all lands within the Station 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 DON AICUZ program.

NAWS' vision for this AICUZ study is to ensure the continued ability of NAWS and Armitage Airfield 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:

- 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;
- Forces require the weapons, support systems, and operational areas to "train as they fight;"
- The American public expects victory and near-flawless performance in peacekeeping and battle.

2.3 Demographics and Regional Economic Influence

With an estimated 2005 population of 26,493 (including NAWS residents), Ridgecrest is currently the third largest city in Kern County (California Department of Finance 2006). Since 2000, the City population has increased 6.2 percent, thereby reversing a trend of declining population throughout the latter half of the 1990's (Table 2-1) (City of Ridgecrest 2006). The regional economy in the Ridgecrest area is anchored by NAWS. With 3,251 civilian and 951 military employees, the installation is the largest employer in the area (Table 2-2) (Ridgecrest Chamber of Commerce 2006). 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 2000 census (US Census Bureau 2000). These data show, for example, that a much higher percentage of employees in Ridgecrest (40.7 percent) are employed in higher paying management, professional, and related occupations than for Kern County as a whole (27 percent). Accordingly, the median annual family income in Ridgecrest in 1999 was \$52,725, compared to a median of \$39,403 countywide, while more than 52 percent of Ridgecrest families had incomes of \$50,000 or greater, compared to only 39 percent of families countywide.

Table 2-1. City of Ridgecrest Population Change (1990 – 2005)

Year	Population	Percent Change
1990	28,295	---
1991	28,700	+1.4
1992	29,000	+1.0
1993	29,400	+1.4
1994	29,250	-0.5
1995	28,900	-1.2
1996	28,773	-0.4
1997	28,741	-0.1
1998	28,077	-2.3
1999	27,373	-2.5
2000	24,927	-8.9
2001	25,217	+1.2
2002	25,555	+1.3
2003	25,798	+0.9
2004	25,842	+0.2
2005	26,493	+2.5

Source: City of Ridgecrest 2006.

Table 2-2. Ten Largest Employers in City of Ridgecrest

Employer	Type of Business	No. of Employees
Naval Air Weapons Station China Lake and Tenant Commands	Defense RDT&E	3,251 (civilian) 951 (military)
Searles Valley Minerals	Mining of Soda Ash Products	625
Sierra Sands Unified School District	Education	620
Ridgecrest Regional Hospital	Acute-Care Hospital	340
Wyle Laboratories	Defense Contractor	280
SA-Tech (Systems Applications & Technologies)	Defense Contractor	187
Wal-Mart	Discount Department Store	184
Cerro Coso Community College	Education	175
Alta One Federal Credit Union	Credit Union	161
Desert Area Resources and Training	Training and Social Services	155

Source Ridgecrest Chamber of Commerce 2006.

Military personnel who live on-Station spend approximately 40 percent of their income in the local community. Those living off-Station 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 does not operate on Saturdays and operations on Sundays do not begin until 3:00 p.m. (1500). 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 Aids. 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 Length: 7,701 feet
Width: 200 feet
Magnetic headings: 08°/26° (08/26)
Overruns: 1,000/1000 feet (08/26)
- Runway 14/32 Length: 9,011 feet
Width: 200 feet
Magnetic headings: 14°/32° (14/32)
Overruns: 1,000/1,000 feet (14/32)
- Runway 03/21 Length: 9,991 feet
Width: 200 feet
Magnetic headings: 03°/21° (03/21)
Overruns: 1,000/1,000 feet (03/21)

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.

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 taxiway's except parallel Taxiway 08.

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 Air Test and Evaluation Squadron VX-31. The AIMD is located at various buildings at the airfield and is capable of performing intermediate-level maintenance functions 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 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 Air Force Base, and NTC Fort Irwin. The responsibilities of the Board include overall operational policy and joint management and control of military activities within the Complex.

2.5.1 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.

2.5.2 Restricted Areas (RAs)

RAs are three-dimensional areas of airspace established by the Federal Aviation Administration (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 is located in R-2505, one of the seven restricted airspace areas in the R-2508 Complex. In addition to the airfield, R-2505 contains 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.

2.5.3 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.

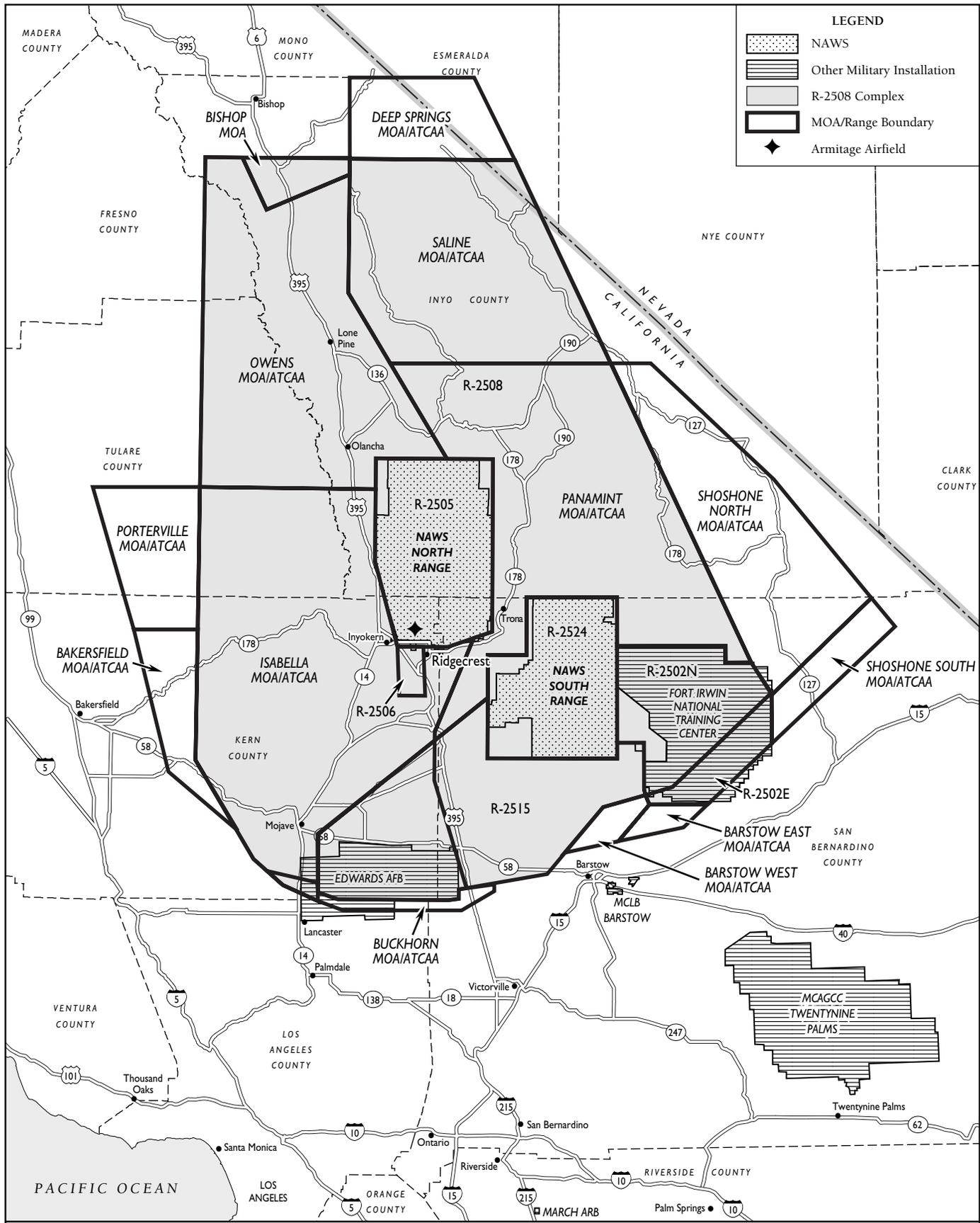
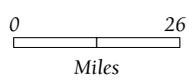


Figure 2-3
R-2508 Airspace Complex



2.5.4 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.

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3.0 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 baseline condition (as defined in the 2004 EIS) and for prospective operational conditions involving a 25 percent increase in annual airfield operations. Aircraft arrival and departure flight routes and flight patterns are illustrated to identify the general location and configuration of aircraft operations. In addition to describing the standard departure flight routes currently and traditionally used by aircraft at Armitage Airfield, this section also describes a proposed consolidation and westward shift in several departure flight routes. This proposed shift in flight patterns is being evaluated in this AICUZ study as an operational alternative to reduce noise and safety exposure in the City of Ridgecrest and northeastern Kern County.

3.1 Aircraft Types

Annual aircraft operations at Armitage Airfield are predominantly conducted by four primary aircraft types: F/A-18C/D, F/A-18E/F, EA-6B, and AV-8B aircraft. 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 four primary aircraft types are analyzed in this AICUZ study. Details about each of these aircraft types are provided below (based on information from the Federation of American Scientists [FAS] website [FAS 2006]).

3.1.1 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.



- Manufacturer: Boeing [McDonnell Douglas Aerospace] and Northrop Grumman.
- 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, Sparrow Advanced Medium Range Air-to-Air Missile (AMRAAM) and the infrared imaging Maverick air-to-ground missile.

3.1.2 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 percent larger wing area, and carries 33 percent more internal fuel, which effectively increases mission range by 41 percent and endurance by 50 percent. The Super Hornet also incorporates two additional weapons stations, for a total of 11.



- Manufacturer: Boeing [McDonnell Douglas Aerospace] and Northrop Grumman.
- 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 Munition (JDAM) and the Joint Standoff Weapon (JSOW).

3.1.3 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).

3.1.4 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.



- 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: 18.3 feet, 11.6 feet, 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.

3.2 Airfield Flight Operations

3.2.1 Types and Timing of 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 approaches the runway 1,500 feet above the altitude of the landing pattern. 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.

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. (0700 and 1900 hours), evening operations occur between 7:00 p.m. and 10:00 p.m. (1900 and 2200 hours), and night operations are flown between 10:00 p.m. and 7:00 a.m. (2200 and 0700 hours). Currently, less than 10 percent of the flight operations conducted at Armitage Airfield occur in the evening or at night.

3.2.2 Baseline Flight Operations

As presented and analyzed in the 2004 EIS, the baseline operational conditions at Armitage Airfield comprise approximately 27,000 airfield operations conducted during an average of 305 days per year. Approximately 76 percent of these operations are flown by the four primary aircraft types described above. Based on their predominant contribution to the noise environment as compared to 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 for this AICUZ study (see Section 5). The remaining aircraft types that use Armitage Airfield do not contribute significantly to the noise environment (Wyle Laboratories 1998). As input to the noise model, annual flight operations data for the four primary aircraft types were adjusted to represent an “average busy day” scenario. Using this approach, the noise modeling results more accurately reflect the noise exposure at Armitage Airfield, as 96 percent of the total annual operations are known to occur over an average of only 188 busy days each year. In Table 3-1, operations data used in the AICUZ noise analysis is presented by type of operation and time of day for each of the four primary aircraft types. As shown in the Table, the four primary aircraft types conduct an average of 68.14 flight operations on an average busy day under baseline conditions, approximately 90 percent of which occur during daytime.

3.2.3 Prospective Flight Operations

Under the prospective conditions described in the EIS, airfield operations were authorized to increase by 25 percent to 33,750 total operations per year, 76 percent of which would be conducted by the four primary aircraft types. As shown in Table 3-2, and again based on the average busy day approach, the four primary aircraft types would conduct an average of 85.11 flight operations on an average busy day under the prospective scenario (Table 3-2). Evening and night operations would continue to represent less than 10 percent of the airfield flight operations.

Table 3-1. Baseline Average Busy Day Flight Operations^{1,2} at Armitage Airfield

Aircraft	Operation Type	Day	Evening	Night	Total
F/A-18C/D	Departures	8.45	.46	.24	9.15
	Straight In Arrivals	1.38	.20	.01	1.59
	Overhead Arrivals	3.42	.17	.01	3.60
	Carrier Break Arrivals	2.31	.12	.01	2.44
	TACAN Arrivals	1.66	.10	.05	1.81
	Touch & Go	4.95	.57	.11	5.63
	FCLP	.50	.12	.00	.62
	Total	22.67	1.74	.43	24.84
F/A-18E/F	Departures	9.17	.49	.25	9.91
	Straight In Arrivals	1.81	.25	.02	2.08
	Overhead Arrivals	4.47	.23	.03	4.73
	Carrier Break Arrivals	3.01	.15	.02	3.18
	TACAN Arrivals	.19	.01	.01	.21
	Touch & Go	5.35	.62	.12	6.09
	FCLP	.68	.00	.00	.68
	Total	24.68	1.75	.45	26.88
EA-6B	Departures	2.47	.09	.00	2.56
	Straight In Arrivals	.19	.09	.00	.28
	Overhead Arrivals	1.43	.13	.00	1.56
	Carrier Break Arrivals	.96	.09	.01	1.06
	TACAN Arrivals	.27	.02	.01	.30
	Touch & Go	3.34	.32	.00	3.66
	FCLP	.65	.47	.00	1.12
	Total	9.31	1.21	.02	10.54
AV-8B	Visual Flight Rule Departures	2.27	.14	.07	2.48
	Straight In Arrivals	.10	.00	.01	.11
	Overhead Arrivals	.97	.05	.03	1.05
	Carrier Break Arrivals	.34	.01	.01	.36
	TACAN Arrivals	.46	.03	.01	.50
	Touch & Go	1.28	.08	.02	1.38
	FCLP	.00	.00	.00	.00
	Total	5.42	.31	.15	5.88
Total		62.08	5.01	1.05	68.14

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.

Source: Wyle Laboratories 2004.

Table 3-2. Prospective Average Busy Day Flight Operations¹ at Armitage Airfield

Aircraft	Operation Type	Day	Evening	Night	Total
F/A-18C/D	Departures	10.57	.58	.29	11.44
	Straight In Arrivals	1.73	.25	.01	1.99
	Overhead Arrivals	4.28	.22	.01	4.51
	Carrier Break Arrivals	2.88	.15	.01	3.04
	TACAN Arrivals	2.08	.12	.07	2.27
	Touch & Go	6.17	.72	.13	7.02
	FCLP	.63	.14	0	.77
	Total	28.34	2.18	.52	31.04
F/A-18E/F	Departures	11.44	.62	.30	12.36
	Straight In Arrivals	2.26	.32	.04	2.62
	Overhead Arrivals	5.59	.29	.04	5.92
	Carrier Break Arrivals	3.76	.19	.03	3.98
	TACAN Arrivals	.23	.01	.01	.25
	Touch & Go	6.69	.77	.14	7.60
	FCLP	.85	0	0	.85
	Total	30.82	2.20	.56	33.58
EA-6B	Departures	3.08	.20	.02	3.30
	Straight In Arrivals	.23	.12	0	.35
	Overhead Arrivals	1.78	.15	0	1.93
	Carrier Break Arrivals	1.21	.11	.01	1.33
	TACAN Arrivals	.33	.02	.01	.36
	Touch & Go	4.18	.41	.01	4.60
	FCLP	.82	.46	.01	1.29
	Total	11.63	1.47	.06	13.16
AV-8B	Visual Flight Rule Departures	2.84	.16	.09	3.09
	Straight In Arrivals	.12	0	.01	.13
	Overhead Arrivals	1.22	.06	.04	1.32
	Carrier Break Arrivals	.44	.02	.01	.47
	TACAN Arrivals	.58	.03	.01	.62
	Touch & Go	1.58	.09	.03	1.70
	FCLP	0	0	0	0
	Total	6.78	.36	.19	7.33
Total	77.57	6.21	1.33	85.11	

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.

Source: Wyle Laboratories 1998, 2001, 2004.

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. Designation of runway 32 as the primary instrument runway is in response to a need for simultaneous range and airfield operations and off-station development. Runway 26 is used by aircraft that cannot roll over arresting gear (such as the AV-8B, T-39D and Metro III). Runway 14 is used when winds are out of the southeast, or when Runway 21 is not available.

Approximately 75 percent of F/A-18 and 78 percent of EA-6B aircraft operations occur on Runway 21 (Table 3-3). The majority of AV-8B flight operations (74 percent) are conducted on Runway 26.

Runway 08 and Runway 03 are rarely used and account for less than 1 percent of all aircraft operations. Approximately 12 percent of F-18 and EA-6B operations and even smaller percentages of EA-6B and AV-8B operations are conducted on Runway 14. Prospective operations evaluated in this AICUZ Study have the same proportional runway utilization as baseline conditions.

**Table 3-3. Runway Utilization by Aircraft
Baseline and Prospective Conditions**

Runway	Aircraft			
	F/A-18C/D	F/A-18E/F	EA-6B	AV-8B
03	<1%	<1%	<1%	<1%
08	<1%	<1%	<1%	<1%
14	12%	12%	11%	8%
21	76%	75%	78%	16%
26	6%	6%	7%	74%
32	6%	7%	4%	2%
Total	100%	100%	100%	100%

Source: Wyle Laboratories 1998, 2001.

3.4 Flight Routes

3.4.1 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 the five established Departure flight routes shown in 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.

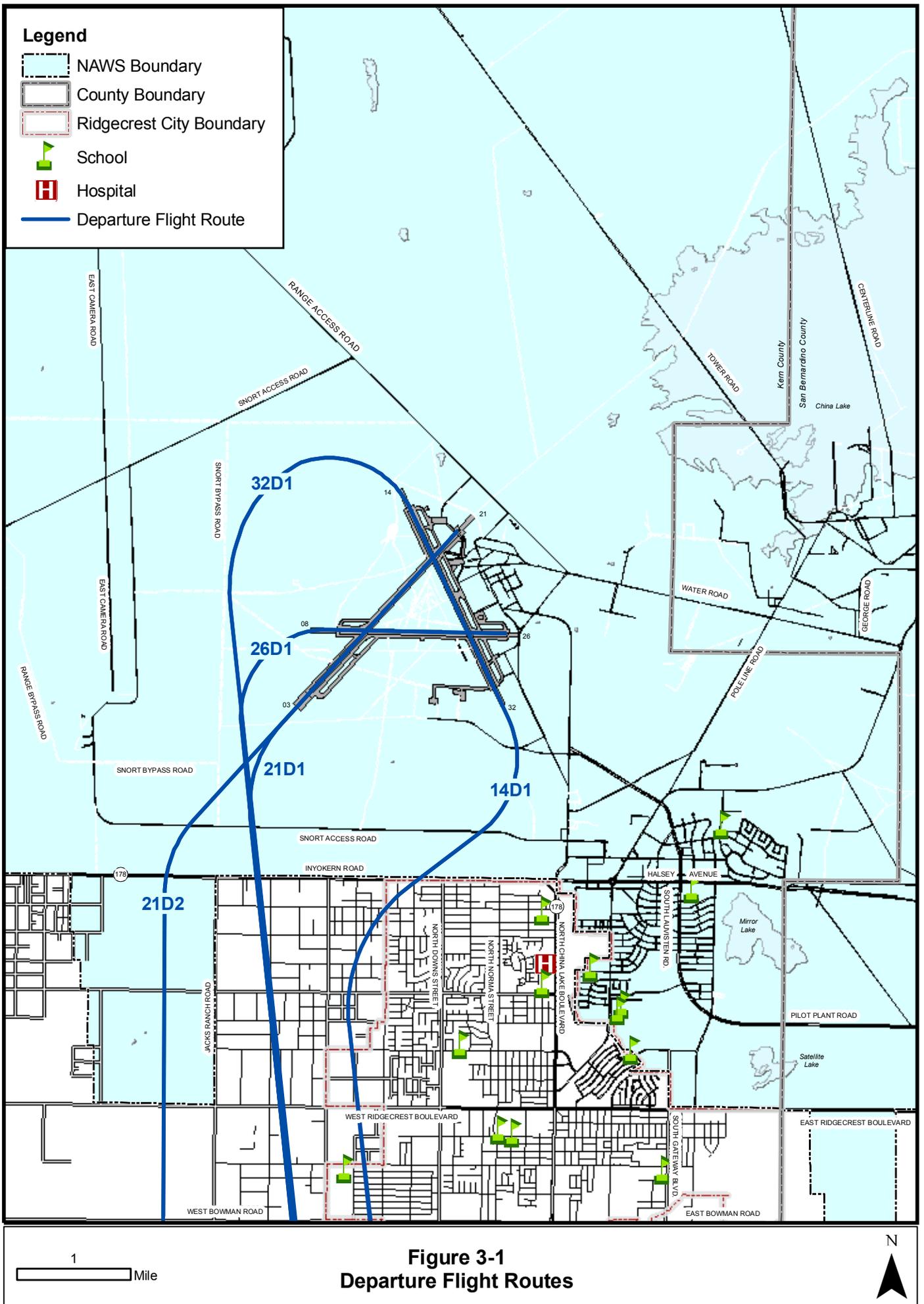


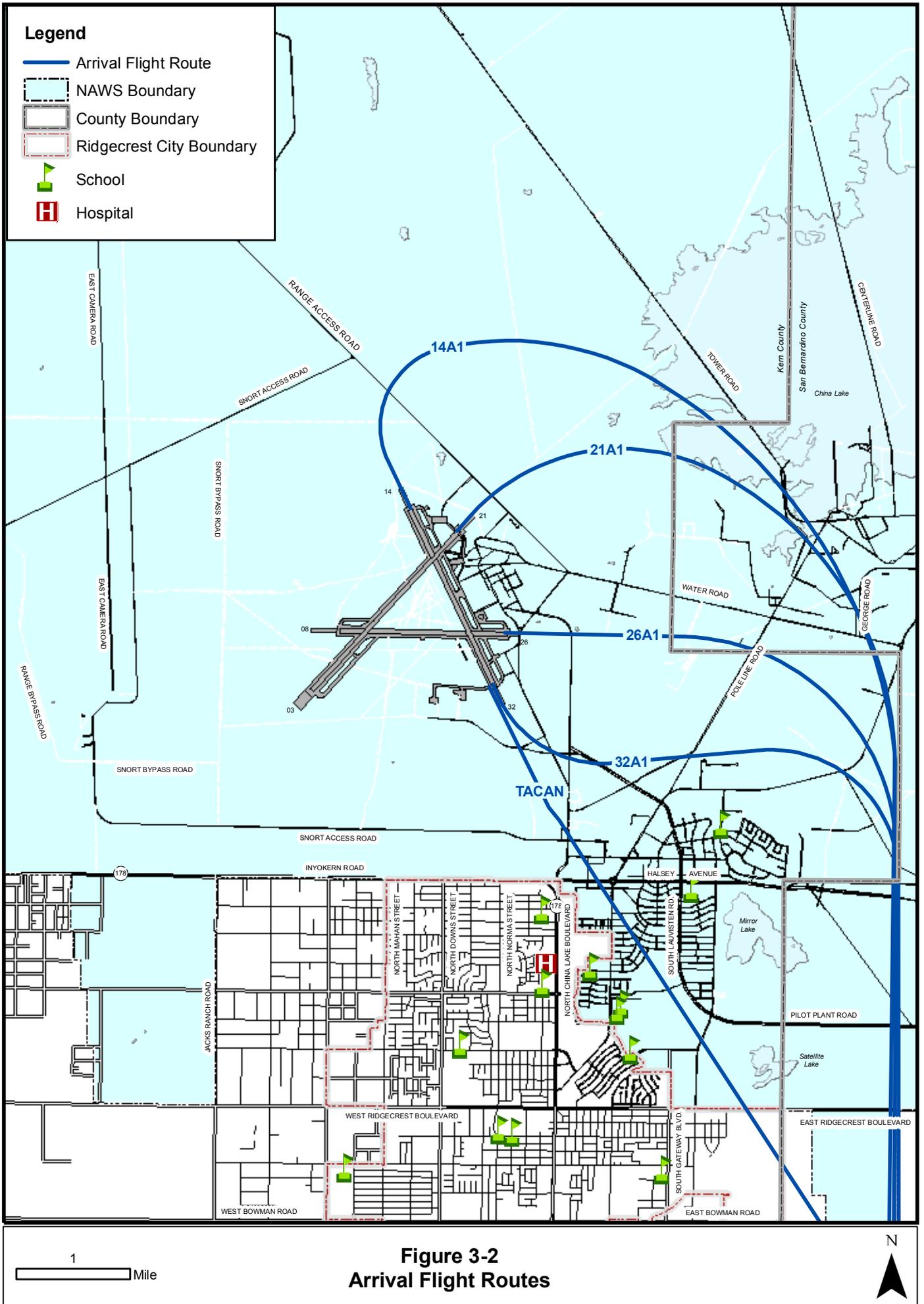
Figure 3-2 illustrates the five flight routes that have been designated for Arrivals, while Figure 3-3 shows the four Overhead and Carrier Break Arrival patterns, and Figure 3-4 displays the four flight patterns used for Touch and Go and FCLP operations. Table 3-4 presents the general flight route utilization for each of the primary aircraft types flown at Armitage Airfield. Flight operations and flight route utilization under the prospective operational scenario are no different than under baseline conditions.

**Table 3-4. Flight Route Utilization by Aircraft:
Baseline and Prospective Conditions**

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 and Go	23%	23%	35%	23%
Field Carrier Landing Practice	2%	2%	10%	0%
Total	100%	100%	100%	100%

Source: Wyle Laboratories 1998, 2001.

A designated flight route is the *intended* 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 definition of AICUZ planning areas and the discussion of land use compatibility in Section 6.



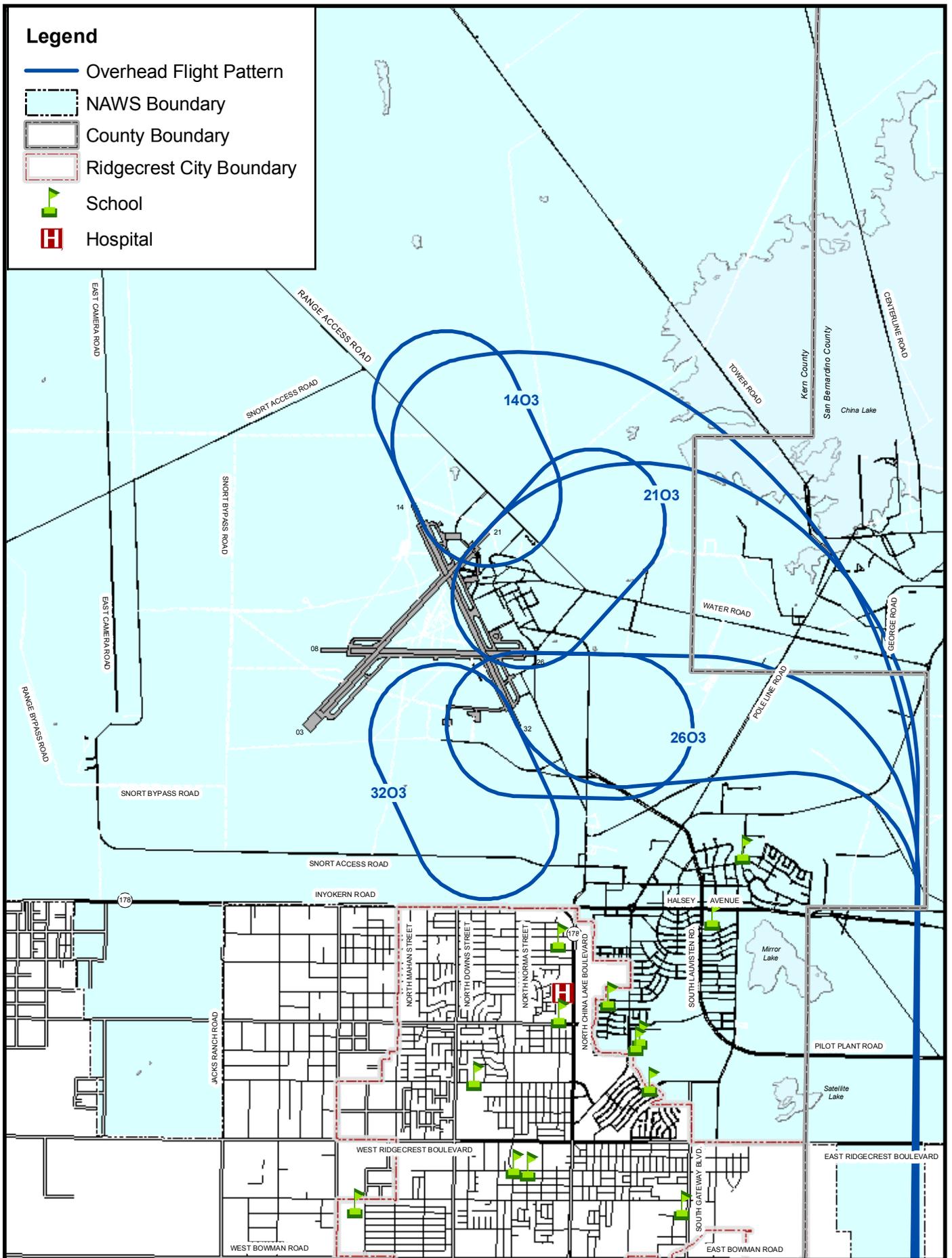


Figure 3-3
Overhead and Carrier Break
Arrival Flight Patterns

1 Mile



3.4.2 Consolidated Departure Alternative Profiles

As previously depicted in Figure 3-1, four of the established flight routes currently flown by departing aircraft at Armitage Airfield (14D1, 21D1, 26D1, and 32D1) traverse developed areas of eastern Kern County and Ridgecrest. The noise and safety implications of these departure route alignments were identified in the 2004 EIS. In the interests of reducing potential noise impacts and safety risks associated with airfield departures over Ridgecrest and Kern County property, NAWS proposes a potential consolidation and westward shift of these four flight routes. The proposal is to consolidate the aforementioned departure routes and align them along the west side of Jacks Ranch Road, as depicted in Figure 3-5. This proposal is evaluated as the “Consolidated Departure Alternative” in appropriate sections of this AICUZ study. Under this Alternative, Route 14D1 would shift more than a mile westward from its current profile, while Routes 21D1, 26D1, and 32D1 would be adjusted approximately 0.5 mile to the west. All arrival and other flight routes shown in Figures 3-2, 3-3, and 3-4 would continue to be flown under the Consolidated Departure Alternative; only the four departure flight routes would change. The operational profile for this Alternative would be consistent with the prospective level of operations (25 percent increase), as described above and in the 2004 EIS.

There is one conditional scenario on departure route 14D1 under which an exception to the Consolidated Departure Alternative would be necessary. As noted previously, the actual location and altitude of an aircraft during a flight operation is dependent on specific atmospheric conditions affecting the performance of the aircraft at the time of the flight. This is of critical importance during a departure when the aircraft’s gross weight is at its highest. High ambient temperatures can significantly degrade an aircraft’s ability to climb and maneuver during the initial phases of departure. While flights departing runways 21D1, 26D1, and 32D1 will normally be able to conform to their respective adjusted flight routes even during high temperature conditions, flight operations departing runway 14D1 may not always be able to conform to the proposed consolidated departure route along Jacks Ranch Road, particularly during months with higher temperatures (May through September). High temperatures degrade aircraft performance to the point that heavily loaded tactical aircraft and some larger aircraft may not be able to turn west as sharply as necessary to follow the adjusted 14D1 flight route shown in Figure 3-5, and would instead follow a flight path closer to the one illustrated in Figure 3-6. Under such conditions an aviator departing on 14D1 would lift off from the runway, execute a right turn within the safe maneuvering limitations of the aircraft’s performance envelope and vector toward a departure point at Bowman Road at the Kern County Landfill. Once reaching the departure point, aircraft will assume an appropriate heading and proceed with their designated mission. As shown in Figure 3-6, this conditional exception to the Consolidated Departure Alternative would result in a 14D1 departure route that falls between the current established route and the proposed consolidated departure route.

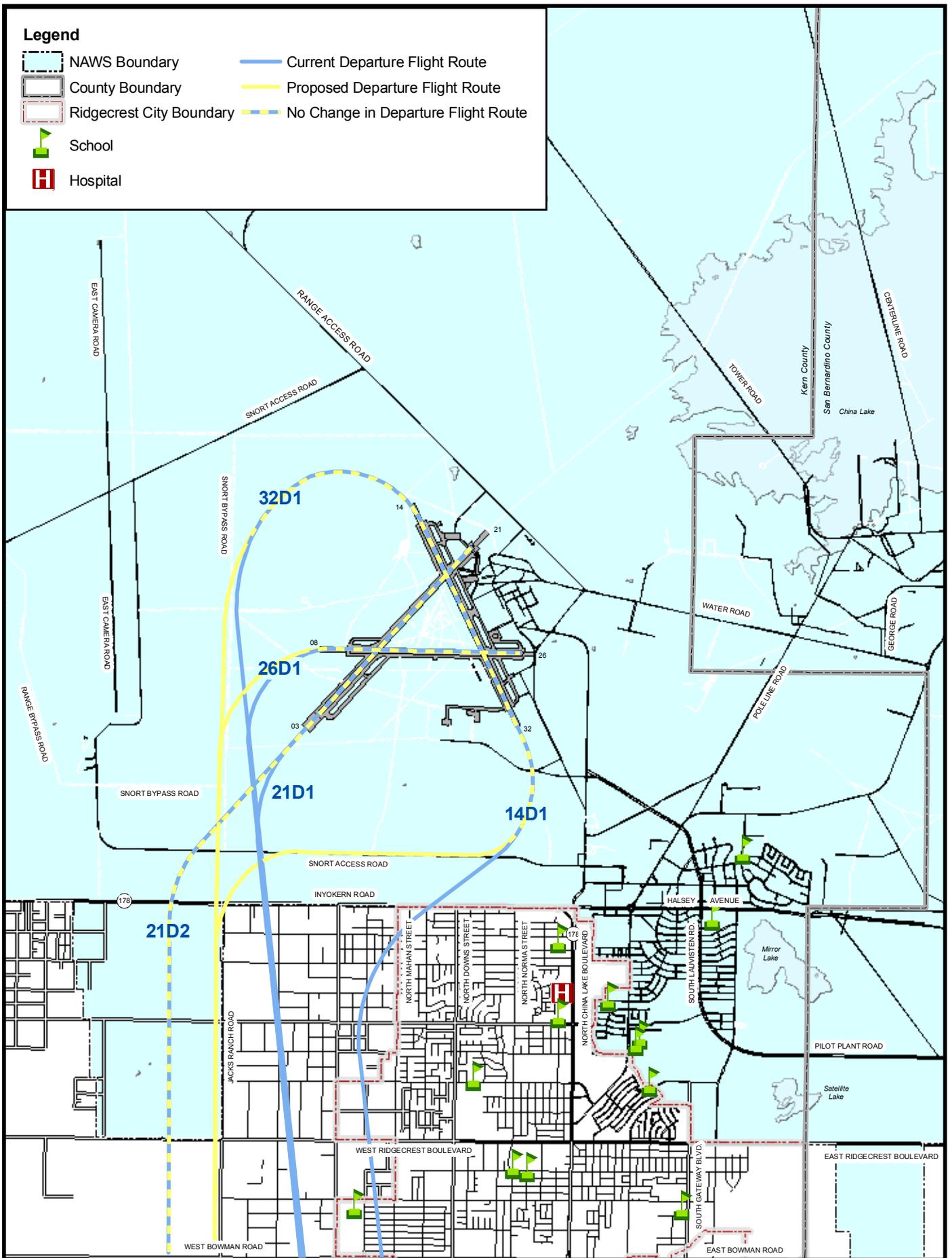


Figure 3-5
Adjusted Flight Routes in the
Consolidated Departure Alternative

1 Mile



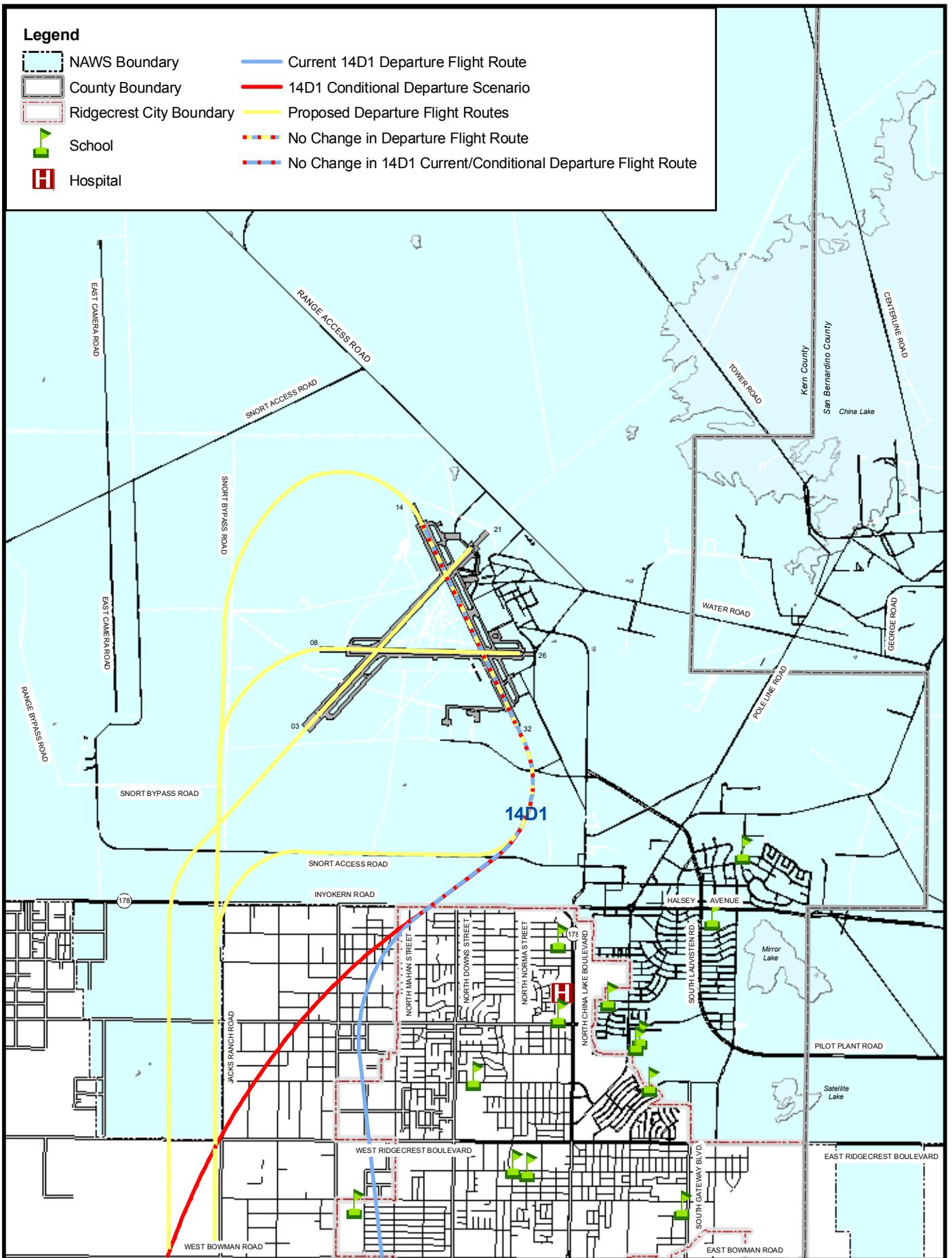


Figure 3-6
Runway 14 Conditional Scenario for
the Consolidated Departure Alternative

3.5 Engine Maintenance Tests

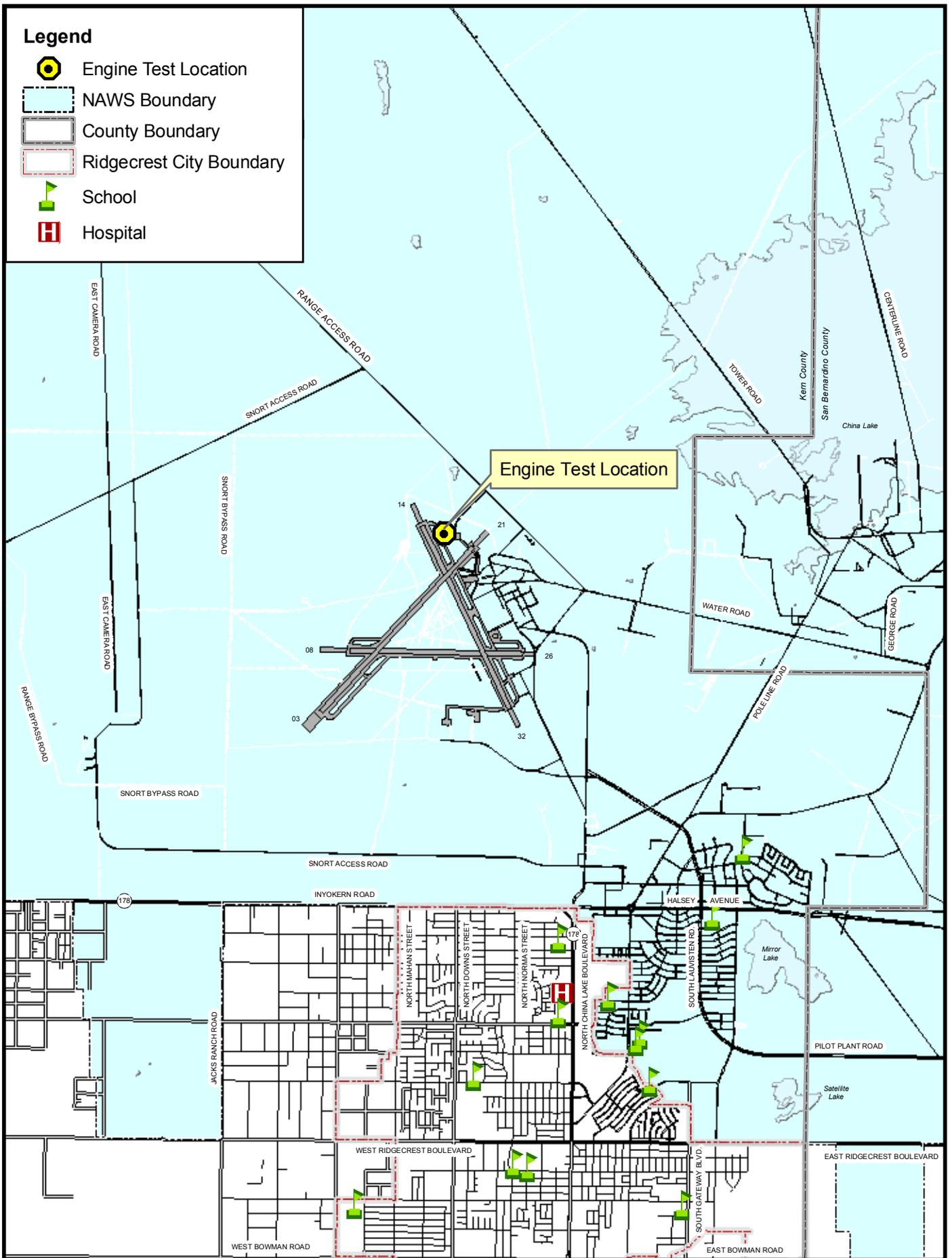
Aircraft ground run-ups are routine aircraft engine maintenance tests that require the operation of an engine at various power settings for several minutes. Idle, the lowest power setting, is used for the longest duration; military and afterburner power settings are louder but are used for a very short duration. At Armitage Airfield, these tests are performed on F/A-18C/D, F/A-18E/F, and EA-6B aircraft at the northern edge of the airfield (Figure 3-7), with the aircraft engine oriented to direct aircraft noise towards unpopulated areas.

Baseline conditions include the performance of 27 annual tests on the F/A-18C/D aircraft, three tests per year on the F/A-18E/F, and 15 annual tests on the EA-6B. Prospective 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 3-5). The 25-percent increase in total engine maintenance tests under prospective conditions is commensurate with the overall increase in aircraft operations.

Table 3-5. Engine Maintenance Tests

Aircraft	Power Setting	Duration (minutes)	Annual Tests (baseline)	Annual Tests (prospective)
F/A-18C/D	idle	15	27	18
	military	2.5	27	18
	afterburner	2.5	27	18
F/A-18E/F	idle	15	3	19
	military	2.5	3	19
	afterburner	2.5	3	19
EA-6B	idle	15	15	19
	military	2	15	19
Total		57	120	149

Source: Wyle Laboratories 1998, 2001.



**Figure 3-7
Engine Test Location**

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4.0 Safety

Safety is an essential element in AICUZ planning. The U.S. 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 NAWS vicinity and the area surrounding Armitage Airfield. The following describes each Imaginary Surface defined for Class B runways:

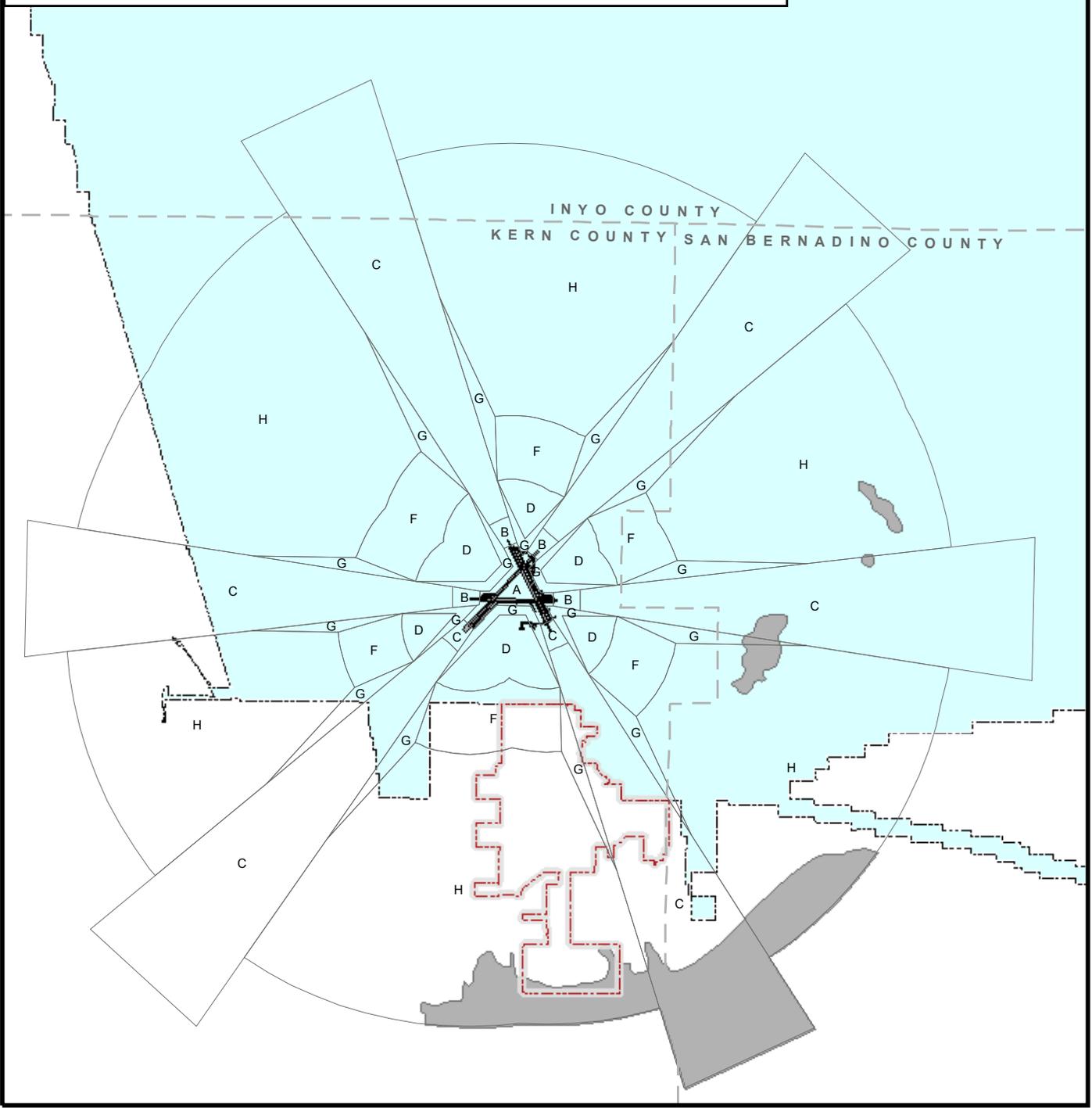
- **Primary Surface** – A surface on the ground centered lengthwise on the runway and extending 200 feet (61 meters) beyond each end of the runway. The area beneath the Primary Surface is required to be free of obstructions. The width of the Primary Surface is 1,500 feet (457 meters).
- **Clear Zone 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 (15,240 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.

Legend

-  NAWS Boundary
-  Ridgecrest City Boundary
-  Terrain Penetration
-  County Boundary

KEY

- A-- Primary Surface
- B-- Clear Zone Surface
- 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**

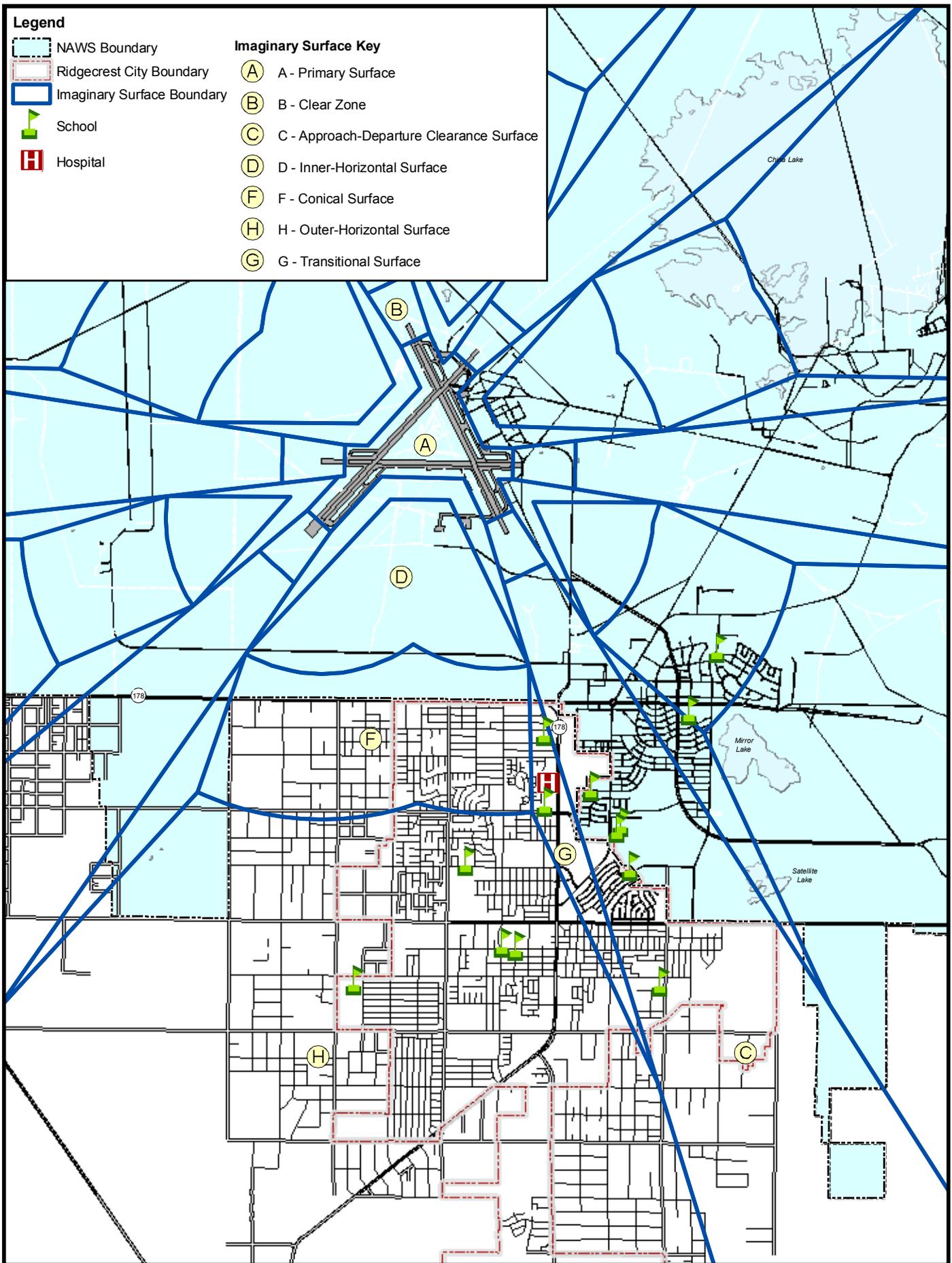


Figure 4-2
Local Imaginary Surfaces

- **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 Above Ground Level 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.

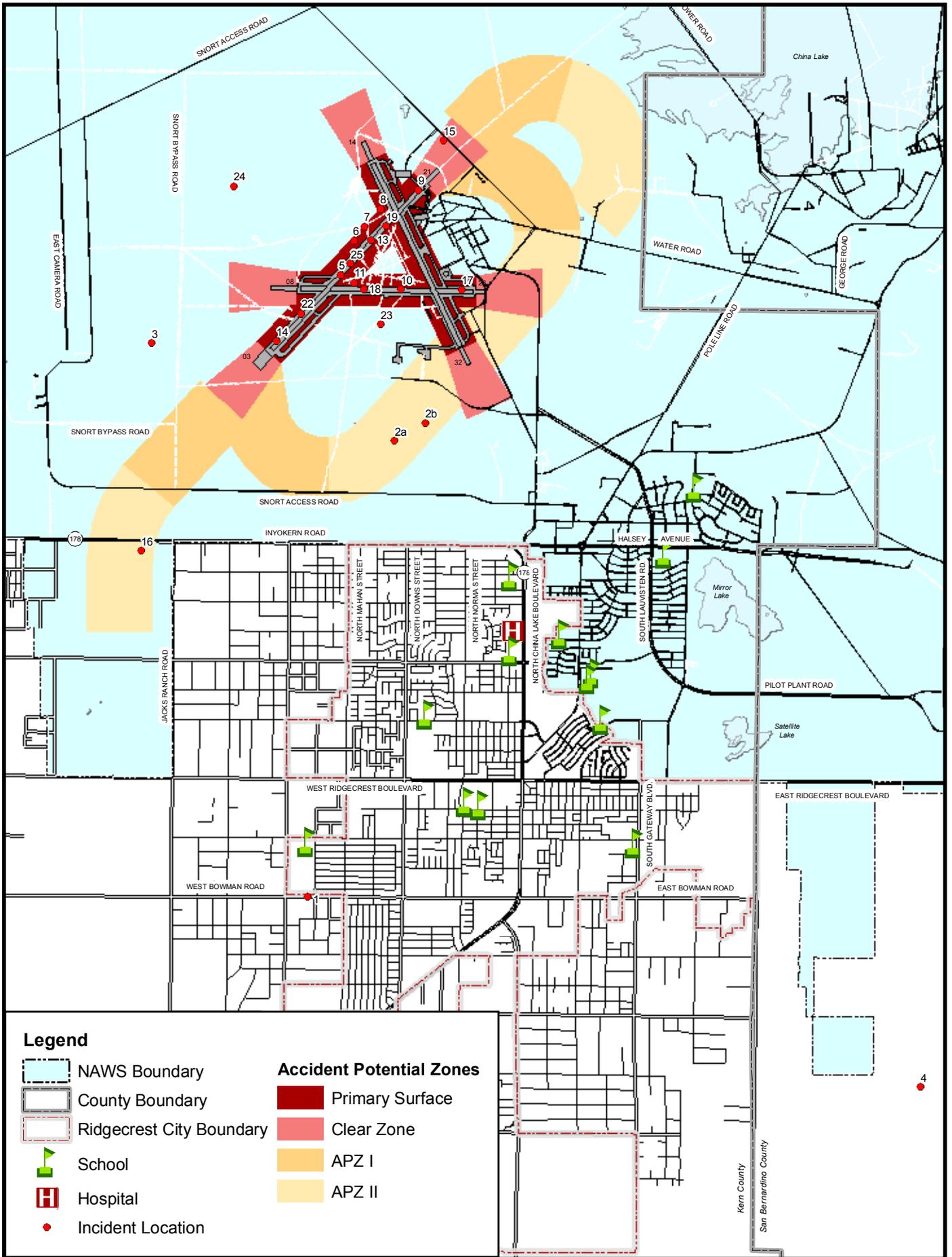
Criteria on APZs are found in OPNAVINST 11010.36B. The U.S. Navy recognizes three types of APZs for Class B runways: the Clear Zone, APZ I, and APZ II, defined as follows:

- **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 U.S. 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.

As shown in Figure 4-3, Clear Zones at Armitage Airfield are designated at the ends of Runways 03/21, 08/26, and 14/32. APZs I and II are associated with the ends of Runway 03/21 and reflect the frequently used arrival, departure, and closed pattern flight paths on that runway.

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 2006, 25 aircraft incidents associated with test and training operations occurred in the vicinity of Armitage Airfield. Table 4-1 describes each incident, and Figure 4-3 identifies the approximate location of each incident relative to the airfield and the established APZs. Of the 25 identified incidents, all but two occurred on NAWS property. Of the two incidents that occurred off-Station, one (shown as Incident 1 in Table 4-1 and on Figure 4-3) involved an aircraft crash in the vicinity of what is now Faller School. The other incident (Incident 4 in Table 4-1 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.



**Figure 4-3
Accident Potential Zones
and Incident Locations**

1 Mile



Table 4-1. Accidents in the Vicinity of Armitage Field

ID#	Aircraft	Date	Description	Location
1	QF-86F	August 1979	Post-takeoff off-station crash	See Figure 4-3
2a/2b	A-6/A-7	June 1976	Landing pattern mid-air collision	See Figure 4-3
3	QF-4N	1995	Post-take-off Crash (unmanned)	See Figure 4-3
4	AV-8B	September 1994	Post-takeoff, off-station crash	See Figure 4-3
5	A-4/A-4	1984	Collision on the runway, post-landing	See Figure 4-3
6	QF-4N	September 1990	Departed runway during take off (unmanned)	See Figure 4-3
7	QF-4N	January 1991	Departed runway during take off (unmanned)	See Figure 4-3
8	QF-86F	April 1992	Departed runway after landing (unmanned)	See Figure 4-3
9	QF-86F	October 1984	Landed short of runway (unmanned)	See Figure 4-3
10	AV-8B	February 1994	Un-commanded jettison of external stores on takeoff **	See Figure 4-3
11	F-18D	March 1996	Aircraft departed runway on landing	See Figure 4-3
12	AV-8B	June 1996	Departed controlled flight	Approx. 7-1/2 miles NW
13	AV-8B	September 1989	Electrical failure, gear-up landing	See Figure 4-3
14	QF-86F	May 1992	Loss of aircraft component in flight	See Figure 4-3
15	F-18C	May 1993	Un-commanded release of test article **	See Figure 4-3
16	*	June 1958	Loss of test weapon (inert) after takeoff **	See Figure 4-3
17	UH-1N	May 1991	Hard landing	See Figure 4-3
18	UH-1N	September 1990	Hard landing	See Figure 4-3
19	A-7E	August 1985	Nose gear failure on landing	See Figure 4-3
20	*	May 1992	In-flight loss of test weapon (inert) component **	Approx. 7 miles W
21	F-18C	January 1991	Un-commanded in-flight release of ordnance (inert)**	Approx. 9 miles NW
22	F-18	July 1990	In-flight loss of weapon (inert) component **	See Figure 4-3
23	QF-86F	March 1991	In-flight loss of aircraft component **	See Figure 4-3
24	QT-33	June 1976	Departed controlled flight (unmanned)	See Figure 4-3
25	F-18	December 1997	Aircraft departed runway after landing	See Figure 4-3

Note: *Data not available; **equipment “drop”
Source: NAWS Air Operations 2006.

4.4 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.

4.5 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 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



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.

airfield. While the effects of existing light sources and glare are not currently a significant operational concern, initiatives should be pursued on- and off-Station to ensure that future sources are developed in a manner that minimizes the potential for impacts to NAWS' test and training operations.

4.6 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-Station smoke and dust sources remains an important safety concern for airfield flight operations at NAWS.

Activities that generate smoke and dust off-Station 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-station. Off-Station 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.

4.7 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 Planning and Management Department (EPMD) (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.

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5.0 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, including the definition of the noise “footprint” associated with NAWS airfield 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 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.

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.

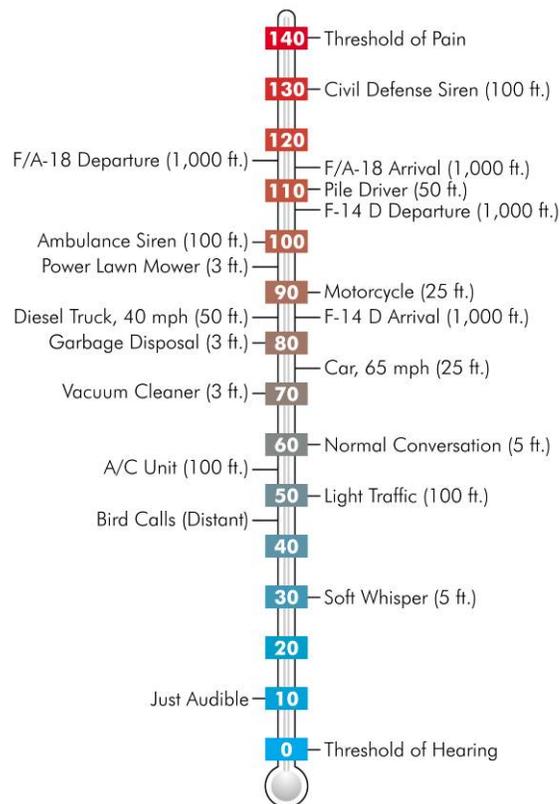


Figure 5-1 Sound Levels of Typical Sources and Environments

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:

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

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: Wyle Laboratories, 2004

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. Throughout this report, all dB measurements 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. (2200 to 0700 hours).

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 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 louder than daytime events.

Like the DNL metric, CNEL values around an airfield are presented for a typical 24-hour period referred to as an “average busy-day”. 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 CNEL values are represented as contours connecting points of equal dB value, usually in 5-dB increments from 60 or 65 dB up to the highest contour values. Because NAWS is located in California, the CNEL metric is used in this AICUZ noise analysis instead of the DNL. Because of the additional dB penalty associated with evening operations, CNEL represents a slightly more conservative measure of potential noise exposure than the DNL.

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 report 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. 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 overflights. Table 5-2 lists SEL values that indicate what a person on the ground would hear at representative distances from an aircraft flying overhead.

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.

Table 5-2. Representative SEL Values for Aircraft

Comparison of Representative SEL Values for Downwind Leg Segment of FCLP Pattern		
Aircraft	Altitude (feet AGL)	SEL (dBA)
F/A-18 C/D	600	111.5
	800	109.2
	1,000	107.5
F/A-18 E/F	600	117.0
	800	114.8
	1,000	113.0
EA-6B	600	114.7
	800	112.3
	1,000	110.4
AV-8B	600	103.6
	800	101.1
	1,000	99.0

Comparison of Representative SEL Values for Take-off and Approach Referenced to 1,000 FT		
Aircraft	Operation Type	SEL (dBA)
F/A-18 C/D	Departure	111.8
	Approach	109.3
F/A-18E/F	Departure	115.4
	Approach	113.8
EA-6 B	Departure	122.6
	Approach	114.5
AV-8B	Departure	103.7
	Approach	99.3

Source: Wyle Laboratories 2006.

Notes: SEL generated for representative airspeed and power settings. Sound Exposure Level (SEL), above ground level (AGL), compressor speed (NC), revolutions per minute (RPM)

The Navy uses NOISEMAP, a widely accepted computer model, to generate noise contours around an airfield. NOISEMAP calculates DNL or CNEL contours resulting from aircraft operations, based on variables such as daily flight operations by aircraft type; 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, establish the shape of the noise contours. In general, approaches and departures cause the narrow tapering of portions of the contours aligned with the runways, while touch and go and FCLP operations determine the general contour size. Noise from pre-flight and maintenance run-up operation locations, if not overshadowed by flight operations, causes generally circular arcs.

5.3 Noise Zones at Armitage Airfield

At a minimum, the DOD requires that noise contours in AICUZ studies be plotted for CNEL values of 65 dB and above (in 5-dB increments). Recently, CNEL contours of 60 dB are also commonly depicted to account for potential noise impacts in areas of low ambient noise. Identification of the 60-dB contour may also encourage preventative land use planning in areas where potential increases to established flight operations could affect noise exposure.

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

5.3.1 Baseline Noise Contours for Established Flight Routes

Figure 5-2 displays the noise contours and noise zones computed for the baseline level of airfield operations flown on established flight routes at Armitage Airfield. These contours include noise levels ranging from 60 dB (quietest) to 85 dB (loudest), with intermediate contours expressed in increments of 5 dBs. The figure shows that baseline noise contours (modeled using the average busy day flight operations from Table 3-1) are contained primarily within the NAWS boundary. The highest noise levels occur in the immediate vicinity of the airfield, with noise steadily decreasing 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 contour line extends slightly off-station to include less than one acre of Kern County land immediately south of Inyokern Road, just to the east of Nolan Street. The 65-dB and 60-dB contour lines cross the NAWS boundary into unincorporated county land and the northwest portion of the City of Ridgecrest.

A total of 953 acres of land outside the NAWS boundary is located between the 65-69 dB noise contours (Table 5-3). Less than 1 acre of land off-station lies between the 70-74 dB contours.

Table 5-3. Baseline Noise Exposure (acres)

dB Range	Off Station	On Station	Total
60-64 dB	4,611	7,680	12,291
65-69 dB	953	6,233	7,186
70-74 dB	<1	3,814	3,815
75-79 dB	0	1,531	1,531
80-84 dB	0	698	698
85+ dB	0	578	578
Total	5,565	20,534	26,099

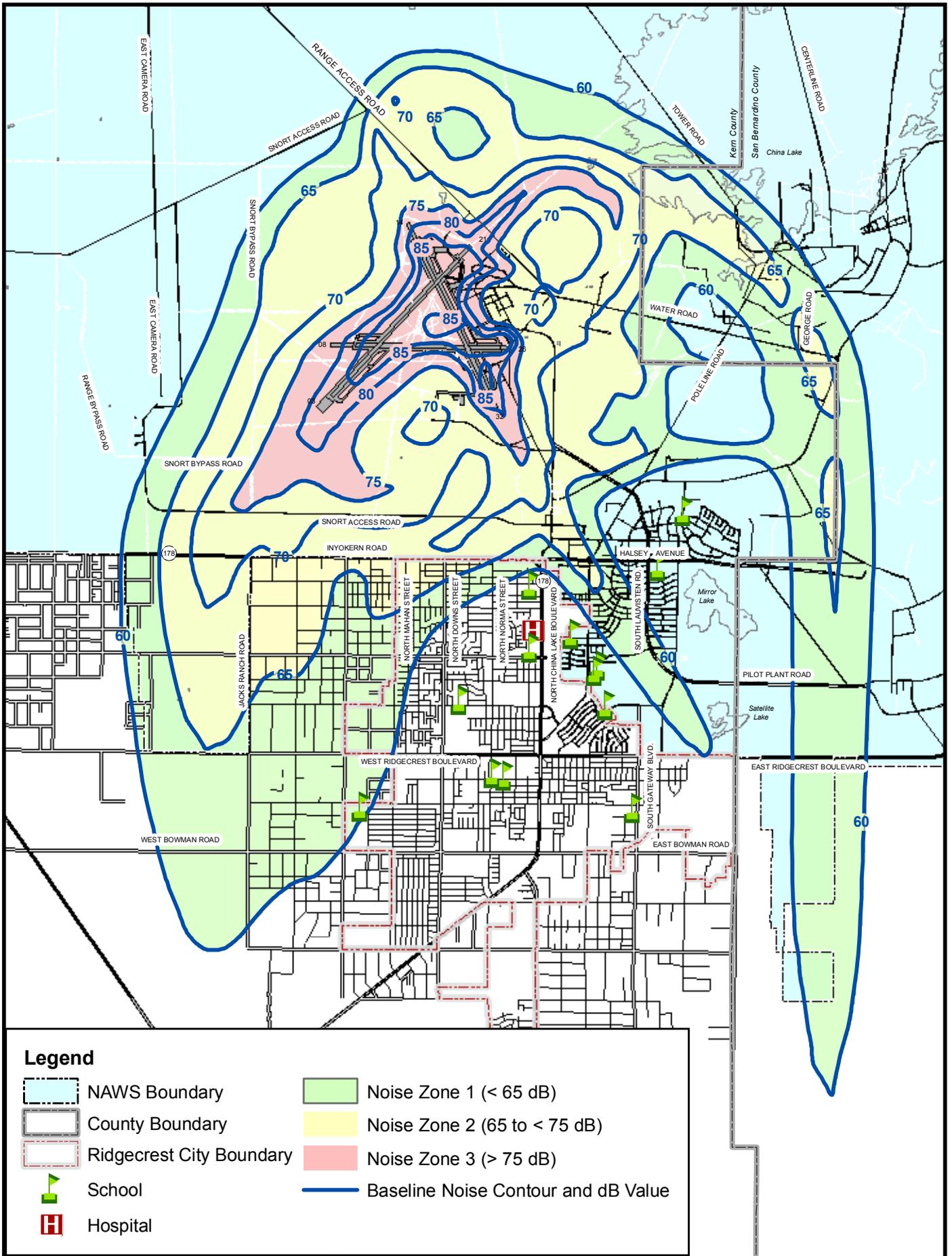


Figure 5-2
Baseline Noise Environment

5.3.2 Prospective Noise Contours for Established Flight Routes

Figure 5-3 displays the noise contours and noise zones associated with the prospective level of operations (modeled using the 25-percent higher average busy day flight operations from Table 3-2) conducted on the established flight route profiles. Figure 5-4 is also provided to illustrate the change in these prospective noise contours compared to the baseline noise environment depicted in Figure 5-2. As shown in these figures, the prospective contours do not vary dramatically from the baseline contours shown in Figure 5-2. The highest (Noise Zone 3) contours continue to occur within the NAWS boundary, but most contour lines shift slightly outward (Figure 5-4). The largest expansion in noise contours occurs to the south, in areas outside the NAWS boundary. The 65-dB contour line extends slightly to the south of West Ridgecrest Boulevard near Jacks Ranch Road, just below the NAWS boundary line, before curving north to re-enter the Station just east of North Norma Street. The 70-dB contour line also extends slightly further to the south compared to the baseline scenario, nearly reaching Alene Avenue near Inyo Street in the City of Ridgecrest, and approaching Graaf Avenue to the east of Primavera Street on Kern County land. A more detailed view of the path of the 65- and 70-dB contours within City and County lands is provided in Section 6, Land Use Compatibility Analysis.

As shown in Table 5-4, a total of 1,517 acres off-Station fall within the 65-69 dB noise range and 87 off-Station acres are located within the 70-74 dB contour lines.

Table 5-4. Prospective Noise Exposure – Established Flight Routes (acres)

dB Range	Off Station	On Station	Total
60-64 dB	5,692	7,603	13,295
65-69 dB	1,517	6,506	8,023
70-74 dB	87	4,306	4,393
75-79 dB	0	2,121	2,121
80-84 dB	0	938	938
85+ dB	0	791	791
Total	7,296	22,265	29,561

Table 5-5 illustrates the aggregate differences between baseline noise contours and prospective noise contours for operations conducted on the established flight routes at Armitage Airfield.

Table 5-5. Change in Total Noise Exposure – Established Flight Routes (acres)

dB Range	Baseline	Prospective	Change
60-64 dB	12,291	13,295	+1,004
65-69 dB	7,186	8,023	+837
70-74 dB	3,815	4,393	+578
75-79 dB	1,531	2,121	+590
80-84 dB	698	938	+240
85+ dB	578	791	+213
Total	26,099	29,561	+3,462

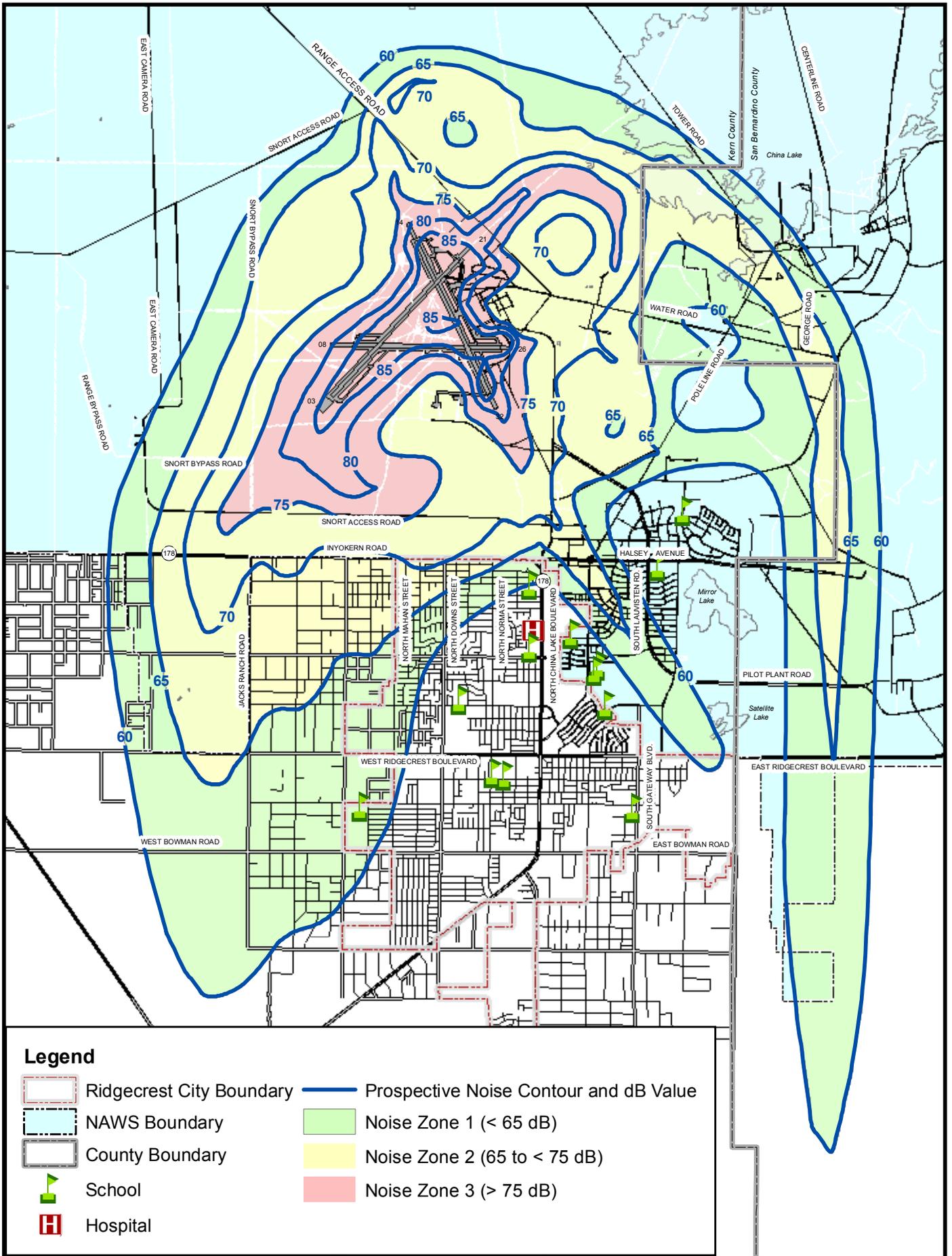


Figure 5-3
Prospective Noise Environment:
Current Flight Route Profiles

1
 Mile

N

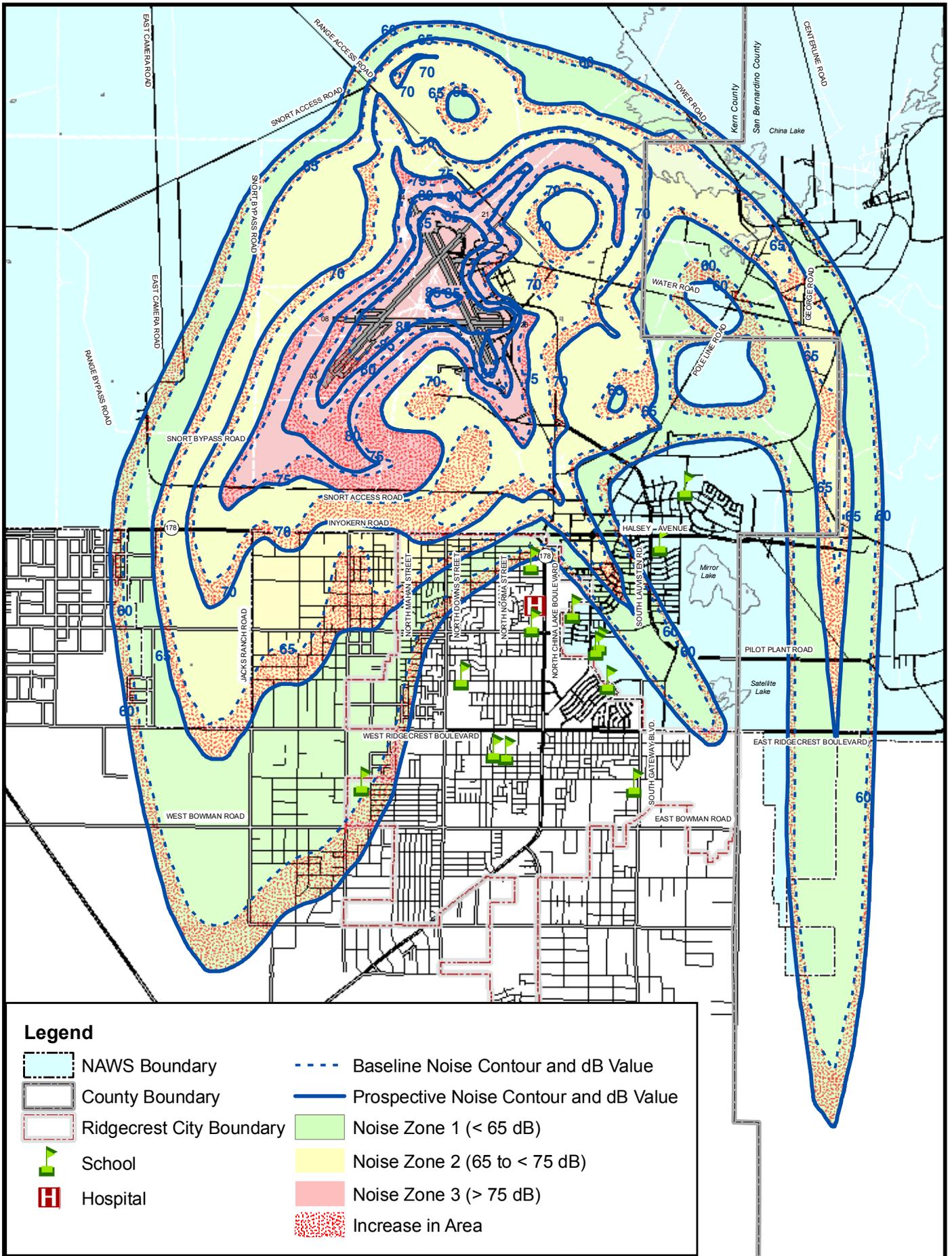


Figure 5-4
Noise Contour Comparison:
Current Flight Route Profiles

1
 Mile

N

5.3.3 Noise Contours for the Consolidated Departure Alternative

Figure 5-5 depicts the noise contours and noise zones associated with the Consolidated Departure Alternative. As with the established flight route scenario described above, these results were also based on the prospective 25 percent increase in operations from Table 3-2. For comparison, Figure 5-6 illustrates the change in noise modeling results between the Consolidated Departure Alternative and the baseline noise contours from Figure 5-2. As shown in these figures, the 65- and 60-dB noise contours associated with the departure alternative recede from more populated areas of the City and County and expand over NAWS property and less populated county lands west of Jacks Ranch Road.

As shown in Table 5-6, a total of 1,292 acres of land off-Station fall within the 65-69 dB contours under the consolidated departure scenario (compared to 1,517 acres for prospective operations on established flight routes; see Table 5-4). In the 70-74 dB contour range, only 31 acres of land off-Station are affected (compared to 87 off-Station acres when flying prospective operations on the established routes).

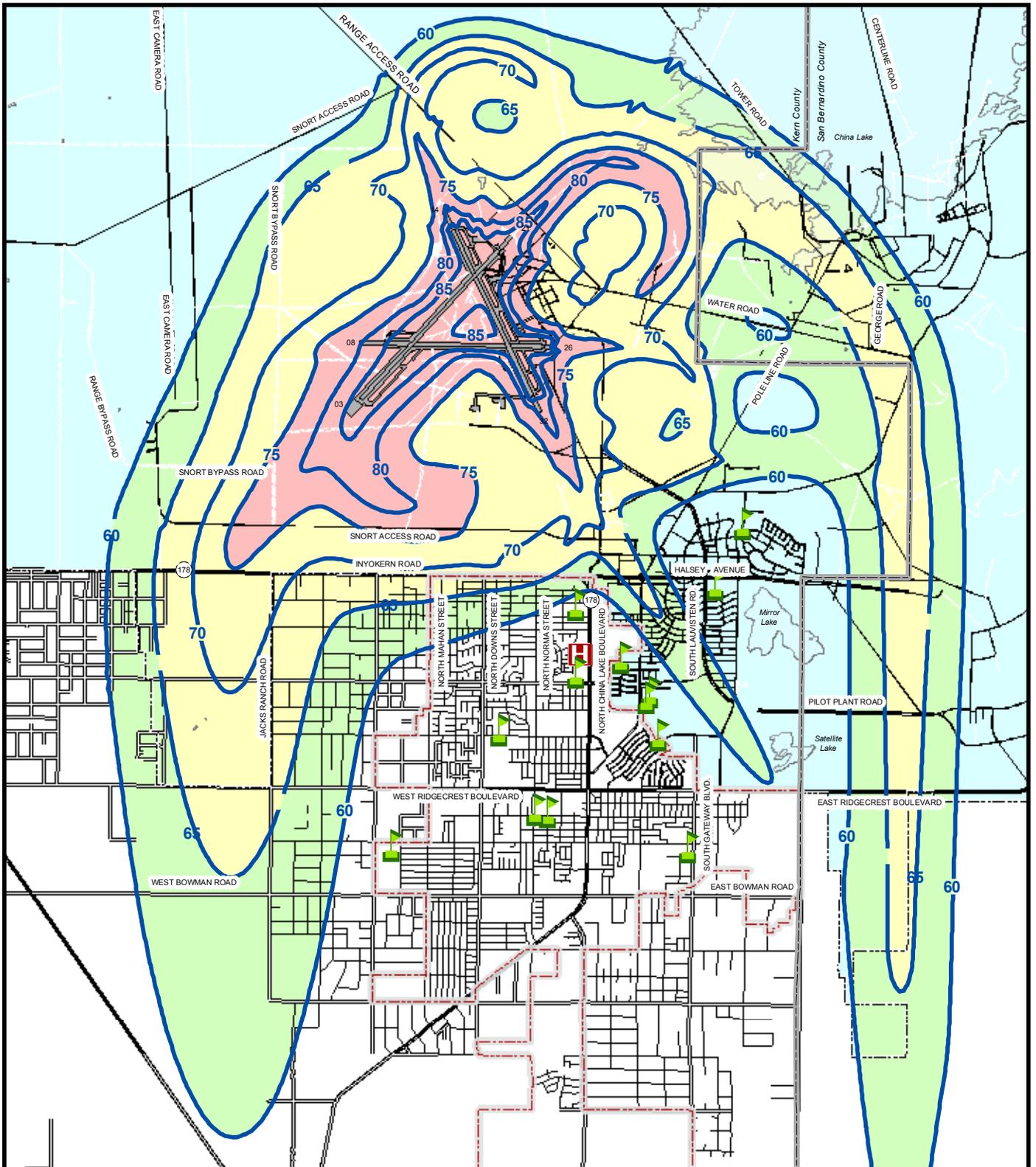
Table 5-6. Prospective Noise Exposure – Consolidated Departure Alternative (acres)

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

Table 5-7 displays the aggregate differences in noise exposure between prospective operations on the established flight routes and prospective operations for the consolidated flight route alternative. The consolidated scenario results in more total acres affected by noise in the mid-range contours (65 to 79-dB) and fewer acres affected at the highest and lowest noise contour ranges. Note that the net increase of 632 acres within the 65-69 dB range for the consolidated scenario derives from an increase of 857 on-Station acres and a decrease of 225 acres off-Station. Similarly, in the 70-74 dB range, the net increase of 66 acres represents an increase of 122 acres on-Station and a decrease of 56 acres off-Station. The net increase of 154 acres within the 75-79 dB range is exclusively on-Station. Consequently, while the noise footprint of the Consolidated Departure Alternative affects more acres overall in the 65-dB and higher contours (+821 acres), these noise levels affect 281 fewer acres in the local community.

Table 5-7. Change in Total Noise Exposure by Flight Route Scenario – Prospective Operations (acres)

dB Range	Established	Consolidated	Change
60-64 dB	13,295	12,833	-462
65-69 dB	8,023	8,655	+632
70-74 dB	4,393	4,459	+66
75-79 dB	2,121	2,275	+154
80-84 dB	938	922	-16
85+ dB	791	776	-15
Total	29,561	29,920	+359



Legend

- | | | |
|--------------------------|----------|--|
| NAWS Boundary | School | Prospective Noise Contour and dB Value |
| County Boundary | Hospital | Noise Zone 1 (< 65 dB) |
| Ridgecrest City Boundary | | Noise Zone 2 (65 to < 75 dB) |
| | | Noise Zone 3 (> 75 dB) |

1
Mile

Figure 5-5
Prospective Noise Environment
Consolidated Departure Alternative

N



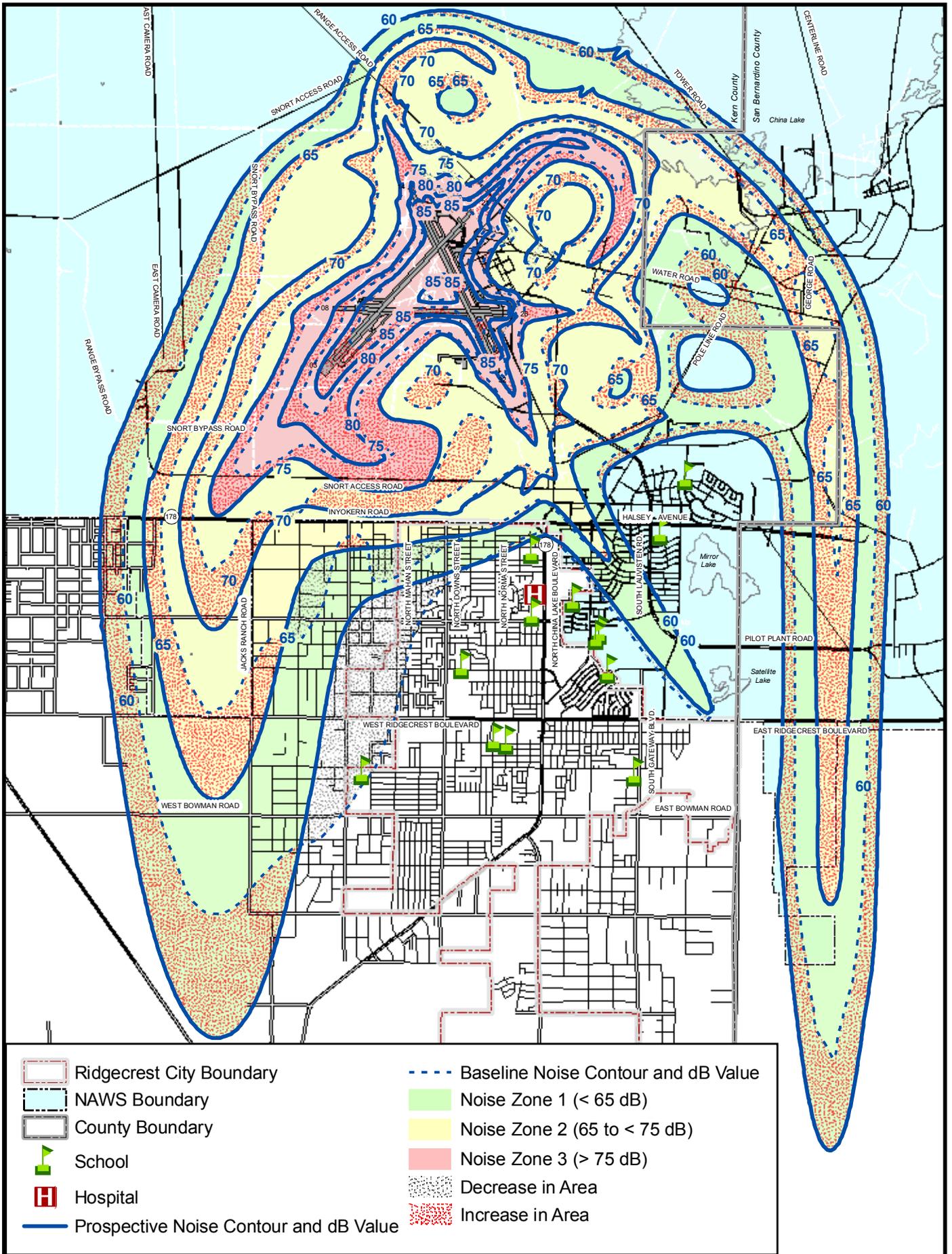


Figure 5-6
Noise Contour Comparison:
Consolidated Departure Alternative

5.4 Noise Complaints and Noise Abatement Procedures

NAWS received 48 noise complaints from the communities of Ridgecrest and Inyokern between January 2000 and mid-July 2006 (Table 5-8). Noise complaints originating from Inyokern are related to noise associated with Range corridor access (vs. airfield operations). Therefore, approximately 25 percent of the complaints involved flight operations away from Armitage Airfield, while 75 percent involved airfield flight operations.

*Table 5-8. Noise Complaints 2000-2006**

Location	Number of Events	Percentage
Ridgecrest	36	75%
Inyokern	12	25%
Total	48	100%

Source: NAWS 2006

*Notes: * Represents actual complaints received January 2000 to 13 July 2006 with the exception of January to August 2004. Complaints for this 8 month period were estimated based on the average number received between August 2004 and mid July 2006 (an average of 6 per month in Ridgecrest and 1 per month in Inyokern)*

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.

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) only propeller aircraft are permitted to approach Runway 32 from Ridgecrest, and 5) engine run-ups are conducted as far away from Ridgecrest as possible.

Runway 21 Noise Abatement Procedures. Because Runway 21 is the most heavily used runway at the airfield, special noise abatement procedures have been instituted. Whenever possible, departures from Runway 21 use low power settings up to 2.5 miles (4 kilometers) away from the airfield, and 25 percent of aircraft departures continue straight out from the runway to avoid turning over populated areas.

Nighttime Noise Abatement Procedures. In addition to the procedures outlined above, additional noise abatement procedures are applied during nighttime hours (10 p.m. to 7 a.m.). Nighttime departures are routed, to the extent possible, to the northwest, north, or northeast to avoid inhabited areas. Arrivals are routed from the northwest, north, and northeast for straight-in, full-stop landings, and aircraft perform a TACAN or Global Positioning System (GPS) approach in order to ensure safe operations.

6.0 Land Use Compatibility Analysis

This section of the AICUZ Study considers the potential noise and safety implications of prospective airfield flight operations as a basis for evaluating land use compatibility within defined AICUZ planning areas. The section begins by acknowledging NAWS' selection of the Consolidated Departure Alternative as the preferred operational profile for future airfield flight activity. The relevant planning areas are then defined, including a traditional "AICUZ footprint" and a more comprehensive "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 each of the two planning areas.

6.1 Selection of the Consolidated Departure Alternative

After careful consideration of preliminary AICUZ analysis results and operational requirements, NAWS has selected the Consolidated Departure Alternative as the preferred operational profile for Armitage Airfield. NAWS has based this decision on the following factors:

- The Alternative is consistent with current and anticipated mission requirements, existing airfield departure protocols, and air operations safety requirements.
- The Alternative is consistent with Navy AICUZ Program guidelines for minimizing noise and accident potential in populated areas;
- The Alternative makes the best use of the land previously acquired by NAWS during the mid-1980's (the area west of Jacks Ranch Road and east of County Line Road).

The changes to specific departure flight routes, with conditional departure scenarios allowed on Route 14D1 as necessary (refer to Section 3.4.2), will be communicated to aviators via revised airfield "course rules" and other standard protocols.

6.2 Definition of the AICUZ Footprint

The AICUZ footprint is 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. The traditional AICUZ footprint encompasses noise contours of 65 dB and higher (i.e., Noise Zones 2 and 3) as well as the APZs, primary surface, and clear zones surrounding an airfield's runways. Figure 6-1 presents the 2006 AICUZ footprint for Armitage Airfield based on the prospective level of airfield operations and the consolidated departure flight route profiles.

The 2006 AICUZ footprint can be compared to the 1977 AICUZ footprint (see Figure A-1 in Appendix A) to see how changes in aircraft types, flight route profiles, operations tempo, and other factors have influenced the shape of the footprint over time. The 1977 AICUZ footprint was adopted by Kern County and the City of Ridgecrest in their planning documentation. It included range operations as well as airfield operations while the 2006 AICUZ addresses only airfield operations. In general, in off-Station areas both the 70-dB and 65-dB noise contours have shifted to the west compared to the 1977 footprint, although a portion of the 65-dB contour has also shifted southward over the northwest reaches of the City along the Inyokern Road corridor.

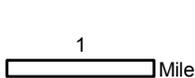
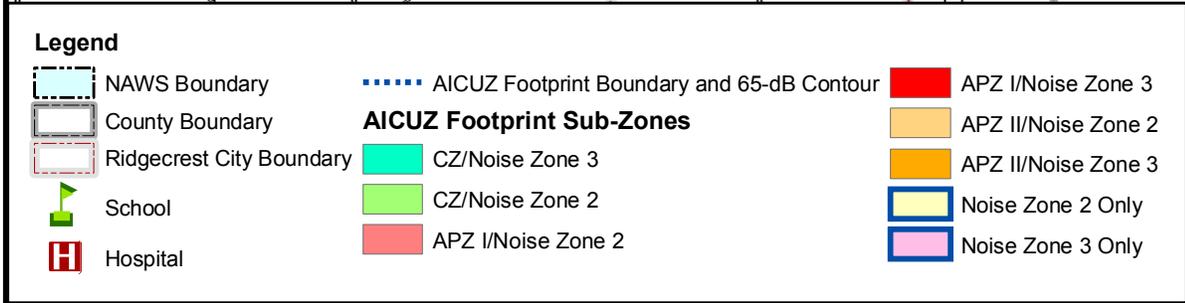
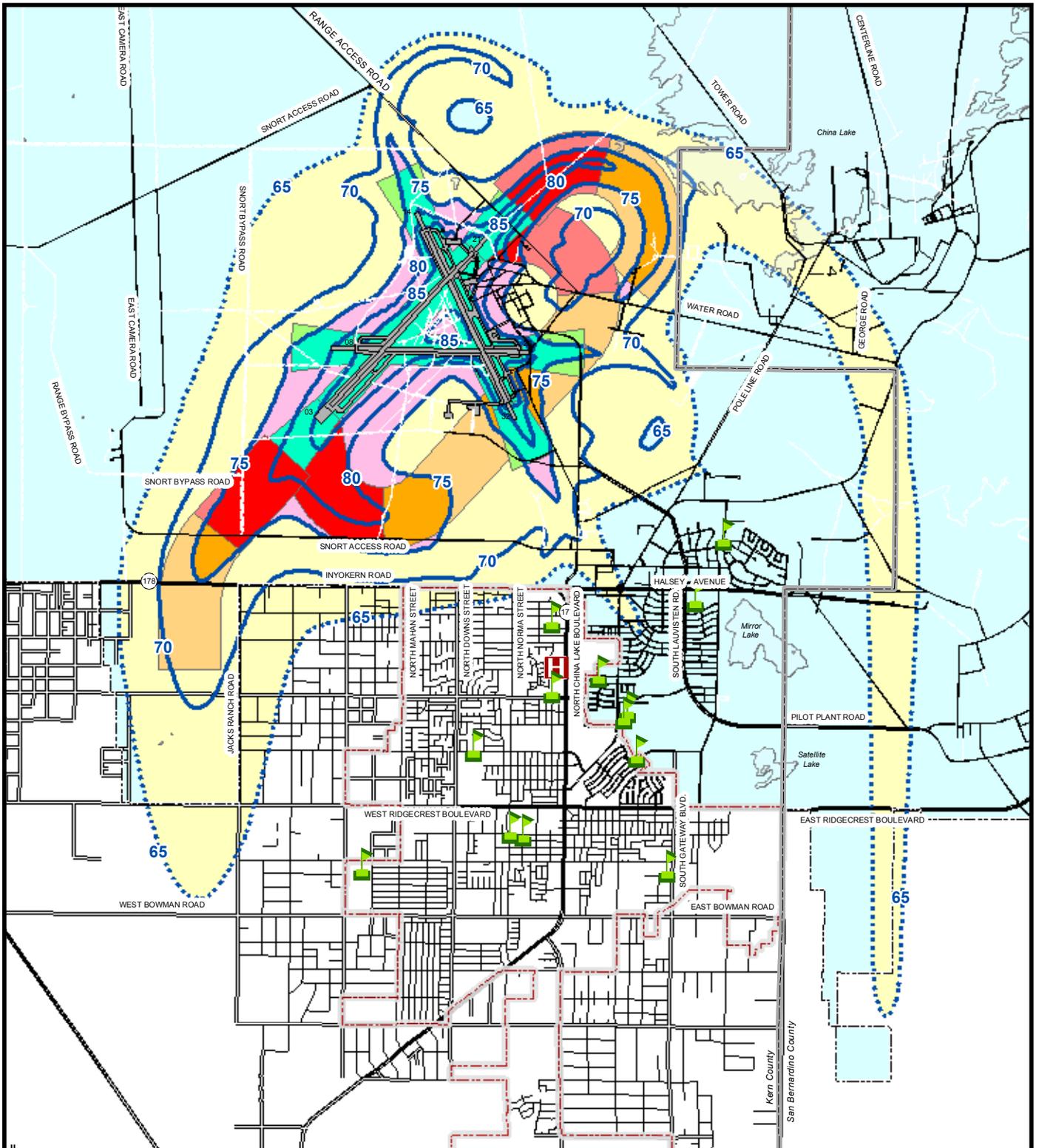


Figure 6-1
AICUZ Footprint for Armitage Airfield
(Consolidated Departure Alternative)



As illustrated in Figure 6-1, the superimposed noise exposure levels and APZ boundaries create subzones within an AICUZ footprint, representing different combinations of noise and APZ exposure. The 2006 AICUZ footprint includes 8 different subzones. The subzones with the highest noise and accident potential include combinations of the Clear Zones (combined with the Primary Surface and designated as CZ in Figure 6-1) with Noise Zone 3, as well as APZ I combined with Noise Zone 3. Small portions of the CZ and APZ I also overlap Noise Zone 2, indicating higher accident potential and moderate noise exposure. 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 AICUZ subzones that coincide with APZ areas occur within NAWS boundaries.

The AICUZ footprint also includes two subzones that occur outside the APZs. These subzones correlate with moderate to high noise exposure in Noise Zones 2 and 3, respectively, but with lower potential for aircraft incidents than is assumed in the CZ and APZs. The “Noise Zone 2 Only” subzone is the only one that extends off-Station onto City and County land. The off-Station portion of the AICUZ footprint comprises 1,323 acres of land associated with Noise Zone 2. The amount of land within each of the 8 applicable AICUZ subzones at Armitage Airfield is displayed in Table 6-1.

Table 6-1 Land Area Within AICUZ Subzones (Acres¹)

Accident Potential Zones	Noise Zones		
	1 60-64 dB CNEL	2 65-74 dB CNEL	3 75+ dB CNEL
Clear Zone (with Primary Surface)	N/A ²	152	1,412
APZ I	N/A ²	479	880
APZ II	N/A ²	1,164	591
Outside APZs	N/A ²	9,996 (on-Station) 1,323 (off-Station) ¹	1,090

Notes: ¹ All acreage estimates apply to on-Station property except as otherwise indicated.

² N/A indicates Not Applicable. By definition, the AICUZ footprint does not include Noise Zone 1.

6.3 Definition of the Military Influence Area

According to the State’s OPR, a Military Influence Area (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.
- 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 11010.36B. Figure 6-2 depicts the recommended MIA surrounding Armitage Airfield.

As defined for this AICUZ study, the MIA includes, in addition to the AICUZ footprint, all land within the 60 dB CNEL contour (Noise Zone 1) and a larger portion of the primary flight corridors used by arriving and departing aircraft. Noise Zone 1 is included in the MIA as a proxy for potential expansion of the noise contours should NAWS experience future increases in operational tempo (no such increases beyond the "prospective" operations evaluated in this AICUZ study are currently planned). The geographical location and extent of any such shift in future noise contours would of course depend on the specific nature of the increased operations (e.g., runway distribution, aircraft type, type of operation, etc.), but if other variables remained constant and only the number and frequency of operations were to increase, the 65-dB noise contour would tend to expand toward the current 60-dB contour.

Portions of the primary flight corridors (beyond the standard APZs) are also included in the MIA in an effort to minimize the risks of aircraft accidents that can occur beyond the runway environment. The establishment of criteria that limits the maximum number of dwellings or people in this area 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 previously in Section 3.4. The width of the flight corridor segments in the MIA reflects this potential variation. The corridors are included because of the inherent risk of aircraft incidents (e.g., equipment drops, crashes, etc.) occurring within these corridors.

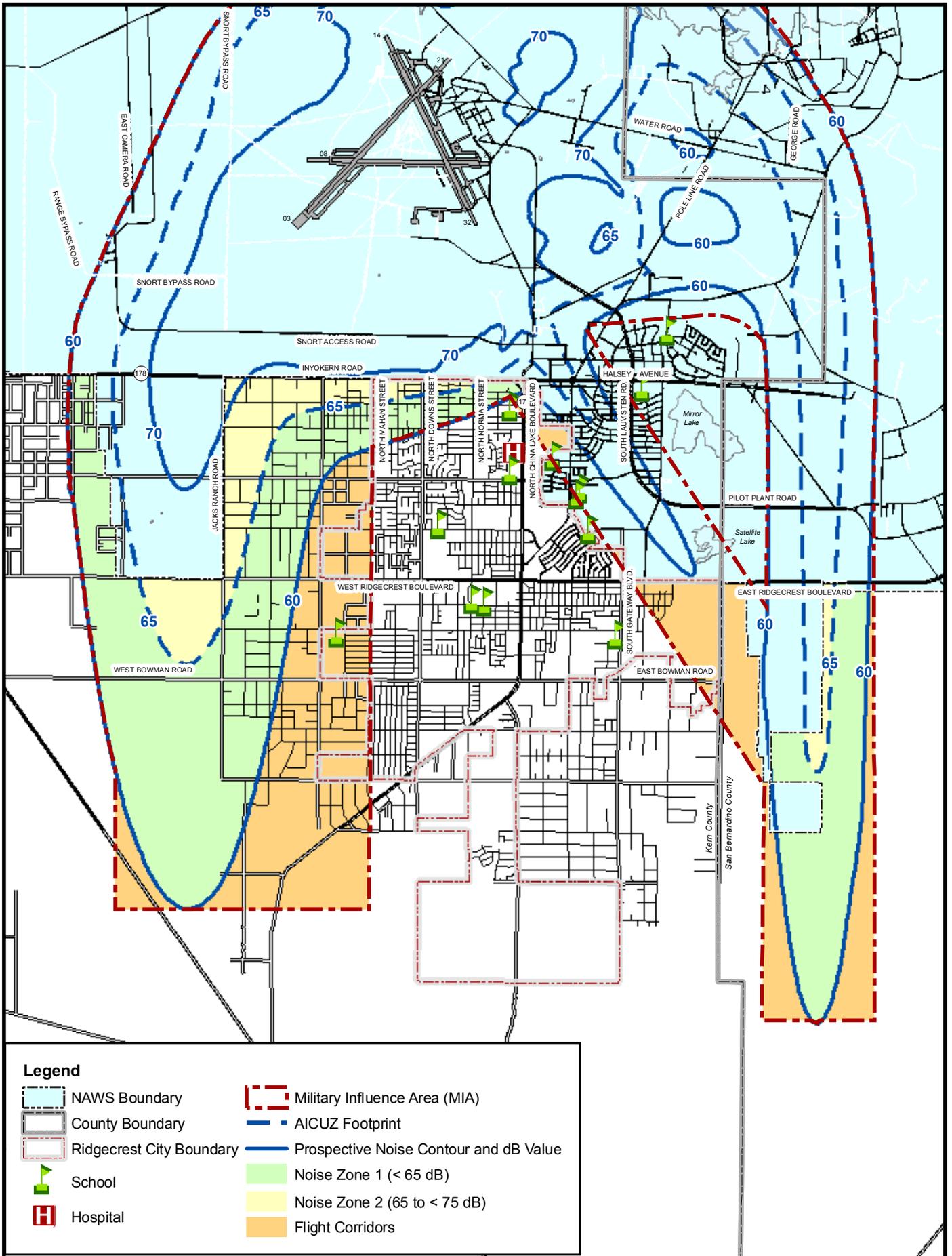


Figure 6-2
Definition of Military Influence Area (MIA)

6.4 Land Use Compatibility Guidelines

The analysis of land use compatibility in AICUZ planning areas is based on federal government guidelines contained in OPNAVINST 11010.36B. These guidelines are used for land use planning and analysis by the U.S. 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 Tables B-1 and B-2 of Appendix B.

According to the guidelines for noise exposure (Table B-1), some land use categories (e.g., manufacturing/industrial) are deemed compatible without restriction at lower noise exposure levels (less than 70 dB) and compatible under specific conditions at higher noise exposure levels. Conditional compatibility 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 not compatible with any noise exposure levels above CNEL 65 dB, but exceptions may be relevant under specific circumstances in areas within Noise Zone 2 (65-74 dB). Residential uses are discouraged at noise exposure levels of 65-69 dB and strongly discouraged in areas of 70-74 dB, 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 in areas affected by 65-69 dB, and 30 dB in areas of 70-74 dB, 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, the reduction requirements are sometimes stated as 5, 10, or 15-dB over standard construction.

Compatibility guidelines associated with accident potential (Table B-2) are similarly defined. In this case, conditions placed on the compatibility or non-compatibility 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 not more than 50 people per acre in APZ II.

In general, residential land use of any type is not compatible 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 conditionally compatible with accident potential in APZ II.

Compatibility is a relative term and 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.

6.5 Compatibility Analysis for the AICUZ Footprint (Off-Station)

This section evaluates land use compatibility in off-Station areas of the AICUZ footprint (on-Station 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 11010.36B (Appendix A). 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-Station land use conditions.

6.5.1 Noise Exposure

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

Kern County

As shown in Table 6-2, most of the off-Station lands within the AICUZ footprint are located in the unincorporated area of Kern County. All but 31 acres of this land is exposed to noise in the CNEL 65-69 dB range. The land subject to higher noise exposure (70-74 dB) comprises 28 acres of undeveloped land and 3 acres that have been developed as roadways. The 28 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 6-3a. According to the land use compatibility guidelines (Table B-1), residential land use in this area is not compatible 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 be incorporated into building codes and be made a condition of individual approvals.

Table 6-2. Off-Station Zoning Designations and Noise Exposure in the AICUZ Footprint (acres)

	dB Range					
	60-64 dB	65-69 dB	70-74 dB	75-79 dB	80-84 dB	85+ dB
Kern County Unincorporated						
Residential	N/A ¹	495	28	0	0	0
Industrial	N/A	107	<1	0	0	0
Agriculture	N/A	48	0	0	0	0
Open Space	N/A	2	0	0	0	0
Floodplain Primary	N/A	4	0	0	0	0
BLM Land	N/A	362	0	0	0	0
<i>Kern Co. Subtotals</i>		1,018	28	0	0	0
City of Ridgecrest						
Residential	N/A	35	0	0	0	0
Commercial	N/A	14	0	0	0	0
Professional Office	N/A	3	0	0	0	0
Industrial	N/A	35	0	0	0	0
<i>Ridgecrest Subtotals</i>		87	0	0	0	0
San Bernardino County Unincorporated						
BLM Land	N/A	136	0	0	0	0
No Zoning (roads)	N/A	51	3			
Totals	N/A	1,292	31	0	0	0

Notes: ¹ N/A indicates Not Applicable. By definition, the AICUZ footprint does not include Noise Zone 1.

The 70-74 dB noise range also overlays 0.7 acre of currently undeveloped land located at North Nolan Street and Inyokern Road; this parcel is zoned for industrial use. An industrial land use at this location would be conditionally compatible with this level of noise exposure provided that measures to achieve an NLR of 25 dB were incorporated into the design and construction of any office areas, noise sensitive areas, buildings accessible to the public, or where the normal noise level is low.

In the 65-69 dB noise exposure range, the AICUZ footprint includes 1,018 acres of zoned land in unincorporated Kern County, distributed as shown in Table 6-2 across residential, commercial, industrial, and agricultural zoning categories. Land zoned for residential use in this area totals 495 acres, and includes parcels zoned for 5-acre estates, 2.5-acre estates, 1-acre estates, and mobile home parks (Figure 6-3a). Per the compatibility guidelines, residential land use in this area is not compatible with this level of noise exposure and is therefore discouraged. Pre-existing, non-conforming uses in this area include two mobile home parks and several dispersed residential developments on large parcels. In the event that county authorities determine that additional residential development in this area should be allowed, it is recommended that measures to achieve an NLR of 25 dB be incorporated into building codes and be made a condition of individual approvals.

Kern County land zoned for industrial uses within the 65-69 dB noise exposure area totals 107 acres, all of which is located along Inyokern Road (Figure 6-3a). Industrial development on such parcels would be compatible with this level of noise exposure without restrictions. Similarly, the 48 acres of agricultural land is compatible at this level of noise exposure, though it is recommended that any residential buildings associated with agricultural uses in this zone be constructed with an NLR of 25 dB.

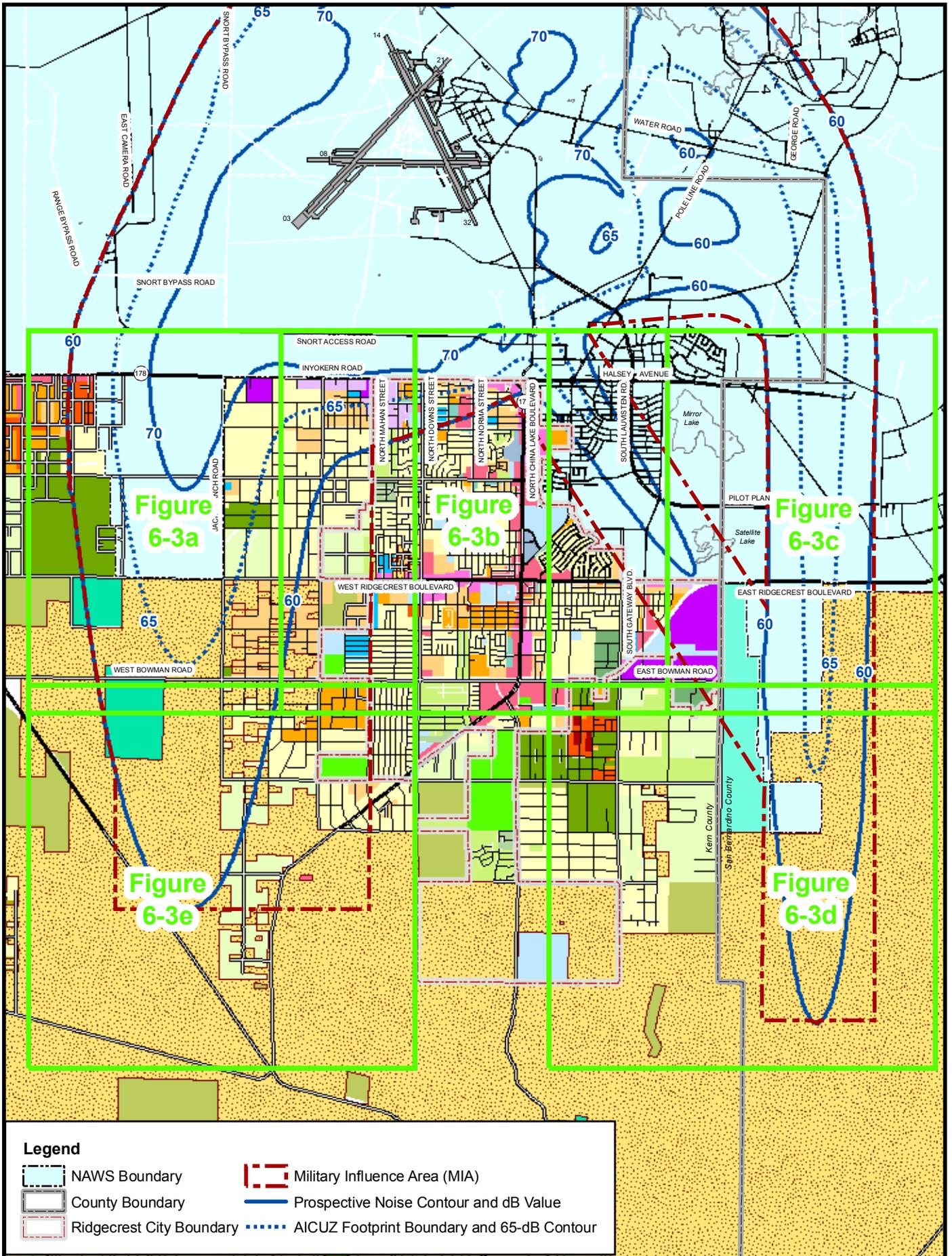


Figure 6-3
Off-Station Land Use Compatibility
Overview

The 65-69 dB noise exposure area of the AICUZ footprint also includes 362 acres of BLM land, situated primarily west of Jacks Ranch Road and south of Ridgecrest Road (see Figure 6-3a). This land is currently undeveloped and is not influenced by Kern County zoning controls. Should this area ever be acquired from the BLM, County planners would be encouraged to maintain the area in an undeveloped state because of its location under the primary departure corridor.

City of Ridgecrest

The AICUZ footprint overlays a narrow strip of land in the City of Ridgecrest along Inyokern Road between North Mahan Street and a point just east of Norma Street (see Figure 6-3b). This area corresponds to a noise exposure level between 65-69 dB and is zoned for residential units (35 acres), light industrial uses (35 acres), general commercial (14 acres), and office development (2 acres). Much of the land in this area has already been developed according to these zoning designations. Per the AICUZ compatibility guidelines, residential land use in this area is not compatible 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 25 dB be incorporated into building codes and be made a condition of individual approvals.

City land zoned for industrial uses within the 65-69 dB noise exposure range is located between Inyokern Road on the north, Graaf Avenue on the south, Mahan Street on the west, and just east of Inyo Street on the east (Figure 6-3b). According to aerial photos taken in 2003, approximately 50 percent of this area has been developed. Industrial development in this area is compatible with this level of noise exposure without restrictions.

City land zoned for general commercial use is located along the south side of Inyokern Road and land zoned for professional offices occurs along the north side of Graaf Avenue (west of Downs Street) and along the west side of Downs Street (Figure 6-3b). According to a 2003 aerial photo, most of the area zoned for commercial uses along Inyokern Road has already been developed, but much of the area zoned for office is still undeveloped. According to the AICUZ guidelines, both of these types of land use are compatible with noise exposure levels of 65-69 dB without restriction.

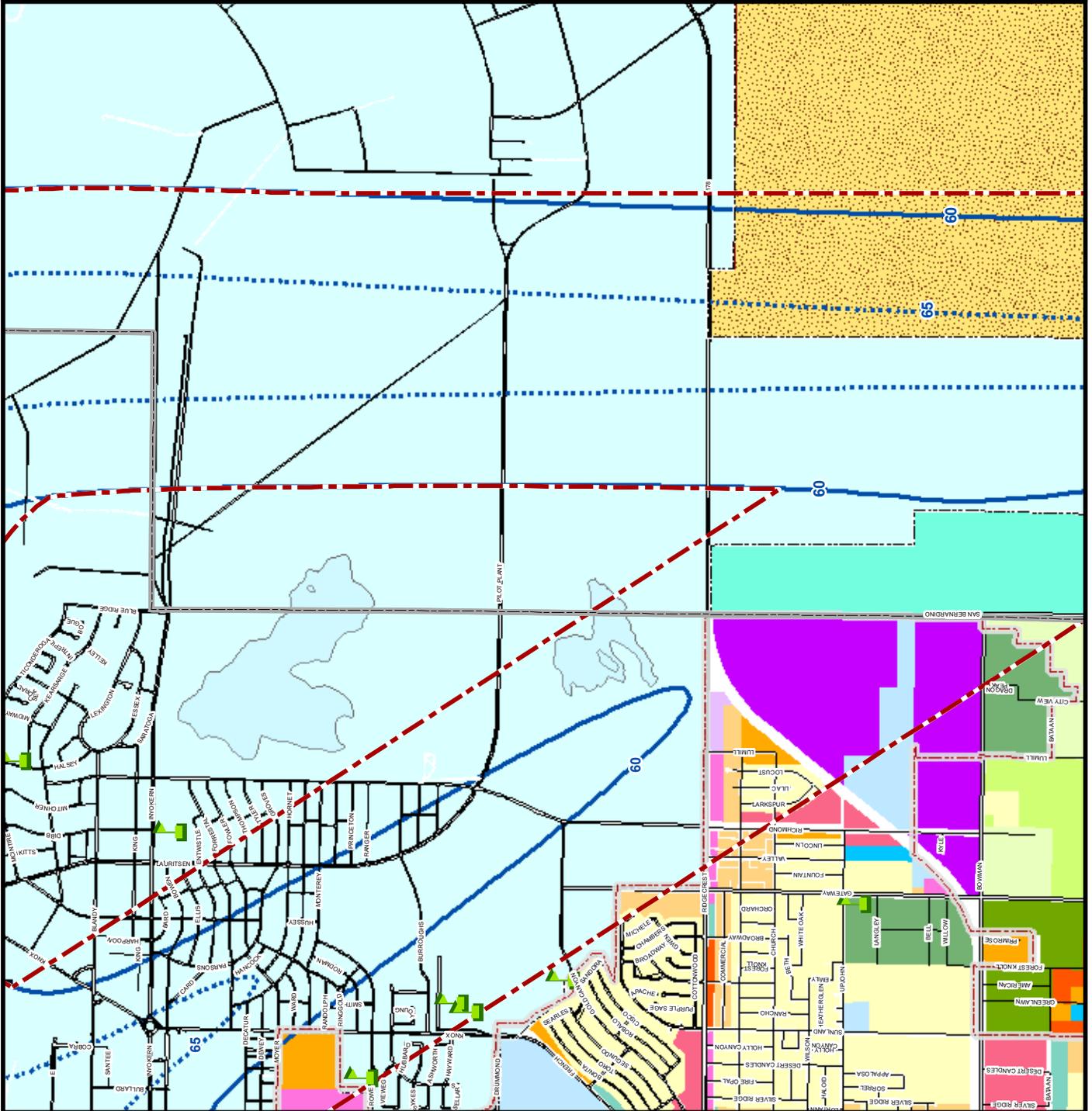
San Bernardino County

As shown in Figures 6-3c and 6-3d, the AICUZ footprint includes a narrow strip of BLM land in San Bernardino County totaling 136 acres. This land is currently undeveloped and is not influenced by San Bernardino County zoning controls. Should this land ever be acquired from the BLM, County planners would be encouraged to maintain the area in an undeveloped state because of its location under the primary arrival corridor into Armitage Airfield.

Figure 6-3c
Off-Station Land Use Compatibility
Northeast

- Legend**
- NAWS China Lake
 - City of Ridgecrest
 - School
 - Military Influence Area (MIA)
 - Prospective Noise Contour and dB Value
 - AICUZ Footprint Boundary and 65-dB Contour
 - BLM Land
 - City of Ridgecrest Zoning**
 - A-5 (Agriculture)
 - CG (General Commercial)
 - CS (Commercial Services)
 - M-1 (Light Industrial)
 - M-2 (Heavy Industrial)
 - PO (Professional Office)
 - R-1 (Single Family)
 - R-2 (Low Density, Multi-Family)
 - R-3 (Medium Density, Multi-Family)
 - R-4 (High Density, Multi-Family)
 - RMH (Mobile Home)
 - RSP (Recreation, Schools, Public)
 - Kern County Zoning**
 - A-1 (Limited Agriculture)
 - E-10 (Estate 10 Acre)
 - E-5 (Estate 5 Acre)
 - E-2 1/2 (Estate 2 1/2 Acre)
 - E-1/2 (Estate 1/2 Acre)
 - E-1/4 (Estate 1/4 Acre)
 - MP (Mobile Home Park)
 - M-2 (Heavy Industrial)
 - San Bernardino County Zoning**
 - Resource Conservation

Notes: Data is from Kern Co., City of Ridgecrest, and NAWS China Lake.



6.5.2 Accident Potential

As depicted in Figure 6-1, the CZ and APZ portions of the 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-Station land use as it relates to accident potential is discussed in Section 6.7.

6.6 Compatibility Analysis for the MIA (Off-Station)

As defined above in Section 6.3, the MIA extends the area of concern for local land use compatibility to take into account a noise exposure buffer zone (the current 60-64 dB contour range) and additional accident potential outside the APZ areas. Since the MIA encompasses the entire AICUZ footprint, the off-Station compatibility analysis described above for the AICUZ footprint is also relevant to those portions of the MIA. This section describes land use compatibility (with respect to both noise exposure and accident potential) for additional off-Station land areas that are unique to the MIA.

6.6.1 Noise Exposure

Table 6-3 presents the distribution of off-Station land within the MIA by general zoning category and noise exposure range. The data presented for noise exposures of 65 dB and above correspond to the traditional AICUZ footprint described previously. The rest of the MIA is currently subject to noise exposure below 65 dB. As such, all zoning categories and pre-existing developments would currently be compatible with the AICUZ guidelines. However, since this part of the MIA represents an area of potential increase in noise exposure in the event of a hypothetical increase in operations at Armitage Airfield, the land use compatibility in this area is analyzed for the next higher noise exposure range. Specifically, current zoning designations in areas exposed to a range of 60-64 dB are evaluated for compatibility with the 65-69 dB range. Such areas would be the most likely to experience an increase in noise exposure and would therefore represent the most likely constraint on potential future expansion of NAWS operations. Such an expansion could occur, for example, in conjunction with future Base Realignment and Closure (BRAC) initiatives required by Congress. This forward-looking analysis is 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.

Kern County

As indicated in Table 6-3, the MIA includes 3,881 acres of land in unincorporated Kern County within the 60-64 dB range of noise exposure. The majority of this land (1,859 acres) is undeveloped BLM land but a sizeable proportion (63 percent) of the non-BLM land in the 60-64 dB range is zoned for residential uses (1,274 acres). Other smaller parcels in this area are zoned for commercial (10 acres), industrial (5 acres), and agriculture (723 acres). The northern extent of this portion of the MIA was displayed in Figure 6-3a. The southern extent is shown in Figure 6-3e. Note on Figure 6-3a that the MIA includes unincorporated areas of the County to the west of the NAWS property.

The majority of the land zoned for residential uses in the 60-64 dB portion of the MIA is designated for 2.5-acre estates (700 acres), though sizeable areas are also zoned for 1-acre, 5-acre, 1/2-acre, and 1/4-acre estates. A cursory review of a 2003 aerial photo of this area suggests that approximately 50 percent of the lands zoned for residential use in the 60-64 dB noise exposure range have already been developed. As suggested above, these pre-existing residences are currently compatible with the AICUZ guidelines, but residential development in these areas would likely become conditionally incompatible (and therefore discouraged) if NAWS operations were to increase in the future and the 65-dB contour shifted accordingly to include these areas. The other zoning categories would likely remain compatible under a future expansion scenario.

Table 6-3. Off-Station Zoning Designations and Noise Exposure in the MIA¹ (acres)

	dB Range						
	< 60	60-64	65-69	70-74	75-79	80-84	> 85
Kern County Unincorporated							
Residential	1,400	1,274	495	28	0	0	0
Commercial	9	10	0	0	0	0	0
Industrial	0	5	107	<1	0	0	0
Agriculture	0	723	48	0	0	0	0
Open Space	0	3	2	0	0	0	0
Floodplain Primary	0	7	4				
BLM Land	1,036	1,859	362	0	0	0	0
<i>Kern Co. Subtotals</i>	<i>2,445</i>	<i>3,881</i>	<i>1,018</i>	<i>28</i>	<i>0</i>	<i>0</i>	<i>0</i>
City of Ridgecrest							
Residential	332	116	35	0	0	0	0
Commercial	62	56	14	0	0	0	0
Professional Office	0	16	2	0	0	0	0
Industrial	233	57	35	0	0	0	0
Recreation, Schools, Public Use	66	11	0	0	0	0	0
Urban Reserve	115	0	0	0	0	0	0
Agriculture	15	0	0	0	0	0	0
<i>Ridgecrest Subtotals</i>	<i>823</i>	<i>256</i>	<i>86</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
San Bernardino County Unincorporated							
Resource Conservation	364	0	0				
BLM Land	825	1,386	136	0	0	0	0
<i>San Bernardino Co. Subtotals</i>	<i>1,189</i>	<i>1,386</i>	<i>136</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
No Zoning (roads)	229	127	52	3			
Totals	4,686	5,650	1,292	28	0	0	0

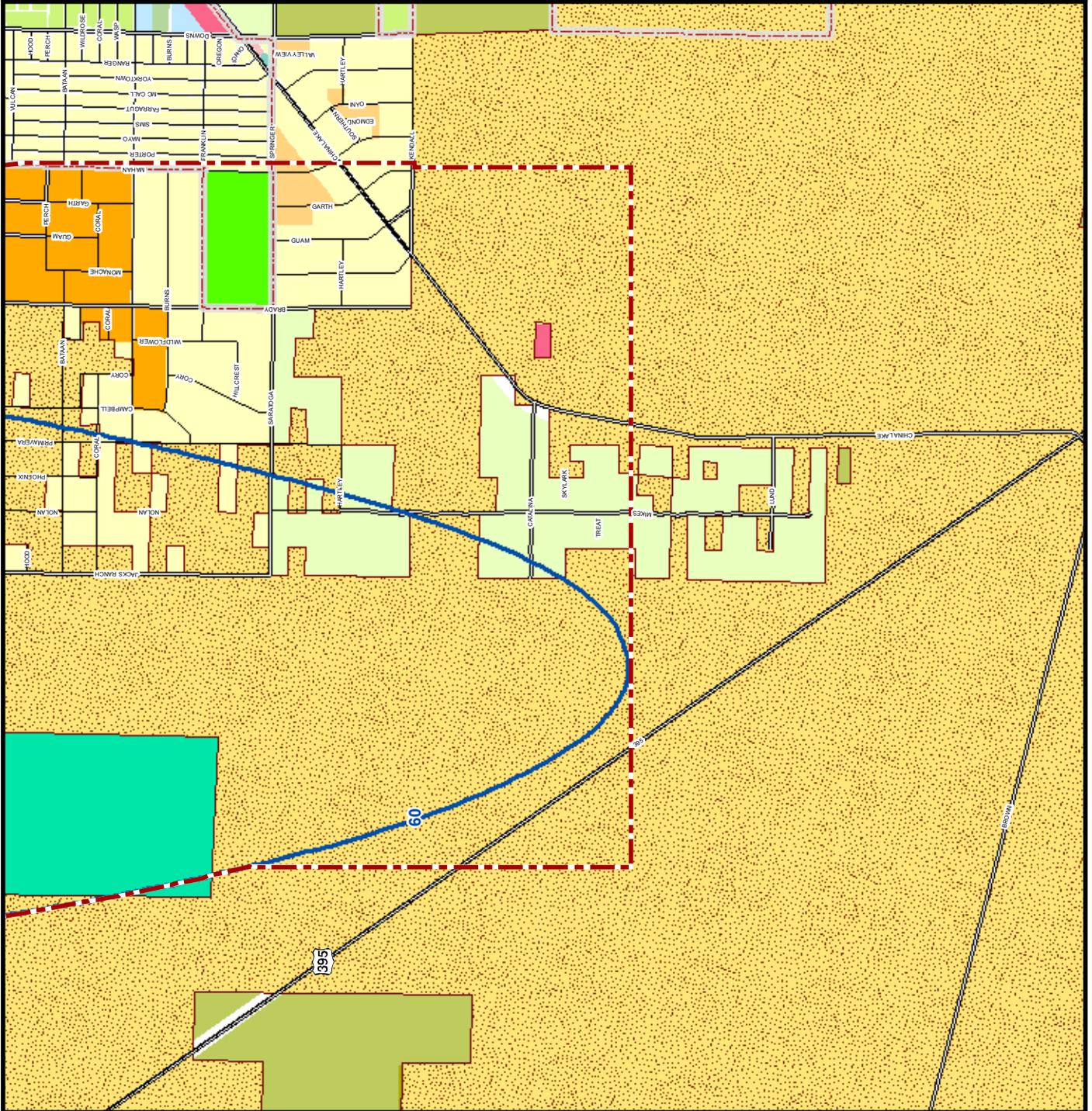
Notes: ¹ The MIA includes the AICUZ footprint, which is represented by the data in dB ranges above 65 dB.

Figure 6-3e
Off-Station Land Use Compatibility
Southwest

- Legend**
- NAWS China Lake
 - City of Ridgecrest
 - School
 - Military Influence Area (MIA)
 - Prospective Noise Contour and dB Value
 - AICUZ Footprint Boundary and 65-dB Contour
 - BLM Land
- City of Ridgecrest Zoning**
- CG (General Commercial)
 - CN (Neighborhood Commercial)
 - E-2 (Estate 2 Acre)
 - E-3 (Estate 3 Acre)
 - PO (Professional Office)
 - R-1 (Single Family)
 - RSP (Recreation, Schools, Public)
 - UR (Urban Reserve)
- Kern County Zoning**
- A (Exclusive Agriculture)
 - E-20 (Estate 20 Acre)
 - E-10 (Estate 10 Acre)
 - E-5 (Estate 5 Acre)
 - E-2 1/2 (Estate 2 1/2 Acre)
 - E-1 (Estate 1 Acre)
 - E-1/2 (Estate 1/2 Acre)
 - C-2 (Commercial)
 - OS (Open Space)

Notes: Data is from Kern Co., City of Ridgecrest, NAWS China Lake, and the U.S. Bureau of Land Management.

0.5 Mile



City of Ridgecrest

A total of 256 acres of land in the City of Ridgecrest falls within the 60-64 dB noise exposure range, 116 acres of which are zoned for residential use (see Table 6-3 and Figure 6-3b). This area includes:

- Parcels zoned R-1 (single-family detached housing) on Perdew and Graaf Streets to the east of Downs Street and to the east of Norma Street, and along Ward Street between Inyo Street and Downs Street;
- Parcels zoned R-2 (low-density, multi-family) along Alene Street between Sierra View and Wayne Streets, and a small area east of Sierra View Street and south of Reeves Street;
- Parcels zoned R-3 (medium-density, multi-family) between Perdew and Graaf Streets east of Sierra View, a small area north of Ward Street between Erwin and El Prado, and a narrow area south of Perdew Street west of Downs Street;
- A large area zoned RMH (residential mobile homes) north of Ward Street between Downs and Sierra View;
- Parcels zoned E-2 (2-acre estates) located south of Ward Street between Mahan Street and Inyo Street.

Based on 2003 aerial photography, it appears that the majority of these areas are already developed according to their respective zoning requirement. Residential development in these areas are currently compatible with the AICUZ guidelines for the 60-64 dB noise exposure zone; however, under a potential increased operations scenario, residential development in these areas would be conditionally incompatible and therefore discouraged. Pre-existing developments in this area would benefit from retrofitting with increased insulation and other noise attenuation strategies.

Other city zoning categories applicable to the 60-64 dB noise exposure range in the MIA include commercial (56 acres); office (16 acres); industrial (56 acres); and recreation, schools, and public use (11 acres). These parcels appear to be largely undeveloped according to 2003 aerial imagery. With the possible exception of the vacant 11-acre parcel reserved for recreation, schools, and public use (located at the northwest intersection of Ward Street and Downs Street), development of these land uses would likely remain compatible with AICUZ guidelines even under an expanded operations scenario.

San Bernardino County

As displayed in Table 6-3, and in Figures 6-3c and 6-3d, the 60-64 dB portion of the MIA includes a sizeable area of BLM land in western San Bernardino County (1,386 acres). This land is currently undeveloped and is not influenced by Kern County zoning controls. Should this area ever be acquired from the BLM, County planners would be encouraged to maintain the area in an undeveloped state because of its location under the primary arrival corridor to Armitage Airfield.

6.6.2 Accident Potential

Land use compatibility with regard to accident potential is typically evaluated in AICUZ studies based solely on the locations of CZs and APZs and the associated compatibility guidelines in Table B-2. However, these guidelines do not provide compatibility determinations for at-risk areas beyond the immediate vicinity of the runways. As described in Section 4.3, two aircraft crashes have previously occurred off-Station, 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 Station 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-Station. Accordingly, NAWS is recommending an MIA that includes larger portions of the primary flight corridors (including the diagonal TACAN corridor), as shown in Figure 6-2.

Because the normal AICUZ guidelines for compatibility with accident potential and safety (Table B-2) are not applicable to the flight corridor areas of the MIA, this AICUZ study provides no specific determinations regarding the compatibility of current land uses or current zoning under these corridors with respect to accident potential. Much of the land within the flight corridor component of the MIA has been discussed above in sections pertaining to the noise exposure in the AICUZ footprint and in the 60-65 dB noise range. The remaining land situated outside the 60-dB contour but inside the MIA flight corridors is shown on Figures 6-3a and 6-3e for the west side of the planning area and on Figures 6-3c and 6-3d for the east side. The distribution of land in these areas by zoning category are shown in the <60 dB column of Table 6-3. As indicated in the table and the figures, the majority of the lands within the flight corridor are zoned for residential uses. Aerial photos from 2003 indicate that approximately 40 to 50 percent of these lands have been developed. In order to minimize safety risks under the flight route corridors, NAWS encourages local government planning authorities to:

- Update their General Plans to incorporate the MIA boundaries and to recognize the MIA as an area of increased risk to public health and safety.
- 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 flight safety risk to realtors, 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.

6.7 Compatibility Analysis for On-Station Land Use

6.7.1 Noise Exposure

Approximately 92 percent of the land inside the AICUZ footprint, and all of the land affected by noise exposure levels of 75 dB and above, occurs within NAWS boundaries (Table 6-4). As indicated in Table 6-5 and Figure 6-4, most of this on-Station land is designated for Operations and Training use and as Range Area.

Table 6-4. Distribution of Noise Exposure in the AICUZ Footprint (acres)

dB Range	Off Station	On Station	Total
65-69 dB	1,292	7,363	8,655
70-74 dB	31	4,428	4,459
75-79 dB	0	2,275	2,275
80-84 dB	0	922	922
85+ dB	0	776	776
Total	1,323	15,764	17,087

Other on-Station land use designations within the AICUZ footprint include RDT&E, maintenance, supply, community, interim use, and utilities areas. The distribution of on-Station acreage exposed to various noise exposure levels under the Consolidated Departure Alternative is shown in Table 6-5. All current land uses in these areas are compatible with their respective noise exposure zones per the AICUZ compatibility guidelines. Figure 6-4 identifies other on-Station land use designations in the vicinity of the airfield, including administration, housing, medical, and recreation, but all of these areas occur outside the AICUZ footprint. They are all compatible with NAWS operations.

Table 6-5. On-Station Land Use Designations and Noise Exposure in the MIA (acres)

	dB Range						
	< 60	60-64	65-69	70-74	75-79	80-84	> 85
NAWS Master Plan Categories							
Operations and Training	533	2,037	2,718	2,443	1,602	834	755
Range Area	959	4,479	4,409	1,831	583	31	0
RDT&E	55	152	92	69	20	12	2
Maintenance	24	55	20	48	43	35	17
Supply	5	47	37	37	27	10	2
Community	2	28	24	0	0	0	0
Interim Use	282	265	16	0	0	0	0
Utilities	1	46	47	0	0	0	0
Recreation	121	59	0	0	0	0	0
Outlease	<1	11	0	0	0	0	0
Administration	16	4	0	0	0	0	0
Housing	10	0	0	0	0	0	0
Totals	2,008	7,183	7,363	4,428	2,275	922	776

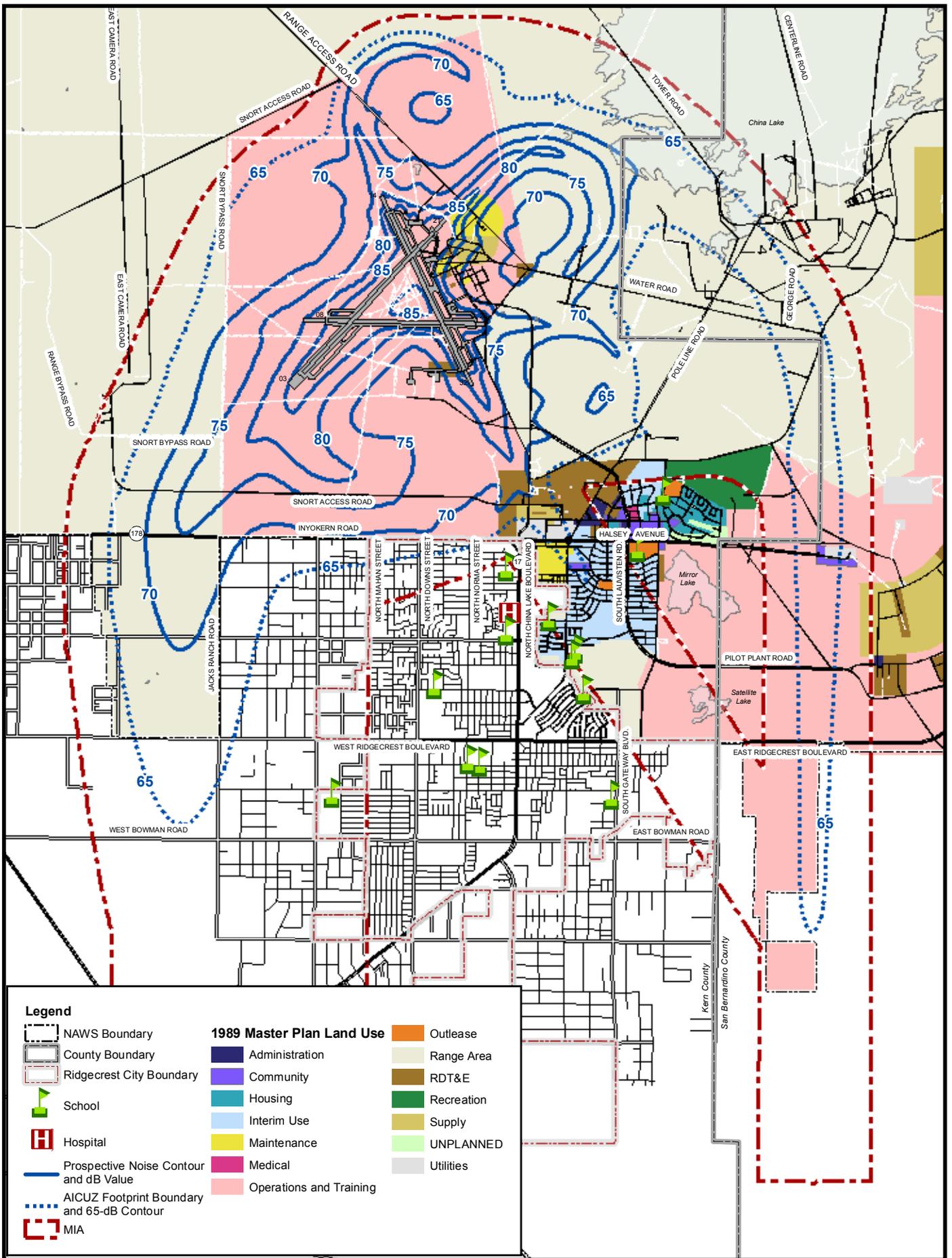


Figure 6-4
On-Station Land Use Compatibility

1
 Mile



6.7.2 Accident Potential

The flight route corridor components of the MIA encompass a variety of on-Station land use designations. The largest areas, particularly under the primary departure and arrival corridors, are designated for Operations and Training functions and as Range Area. Within the TACAN corridor, however, smaller areas within Mainside are designated for RDT&E, supply, utilities, maintenance, interim use, community, and outlease. The interim use designation pertains to an area that was formerly the site of on-Station housing, but all housing was removed from this site several years ago and it is currently undeveloped. Most of the developed land within this corridor is designated for RDT&E, supply, utilities, and maintenance; all such developments are compatible with NAWS operations in this area.

There is one pre-existing, non-conforming land use on-Station (a high school) located on the western edge of the TACAN corridor. Three other schools are located nearby, just outside the western MIA boundary.

7.0 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-Station. 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 65-dB and above), NAWS is equally concerned about land use compatibility within the identified 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 immediate airfield environment. The MIA also includes a noise buffer zone to help prevent or minimize incompatible land uses that could present future constraints on the NAWS mission.

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.

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.

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.

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 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.

7.2.2 Navy Land Use Management Strategies

Easement Acquisition

Easements may be acquired by the U.S. 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 baseline and prospective conditions at NAWS, easement acquisitions are not currently required.

Encroachment Partnering

Encroachment partnering is outlined in OPNAVINST 11010.40, Navy Encroachment Management Program, and involves working with other land acquisition authorities to reduce or eliminate potential encroachment that is likely to restrict military operations. The program authorizes military departments to acquire property adjacent to military installations from willing sellers in order to create buffer zones to prevent incompatible land use from impacting military missions. Encroachment partnering is a strategy that NAWS may consider in the future as part of the AICUZ implementation plan.

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. Under baseline and prospective conditions, land acquisitions are not currently required at NAWS.

7.2.3 State and Regional Laws and Regulations

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.

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.

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 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.

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 installation or under an MIA or 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.

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 2006 NAWS AICUZ Study 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-Station land development in the vicinity of NAWS. Coordination of AICUZ land use compatibility guidelines with local zoning codes can ensure continued land use compatibility in the future.

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.

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.

Transfer 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.

7.2.5 Private Sector Strategies

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.

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 are for residential development in areas compatible with AICUZ guidelines.

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-Station.

- 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 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) Incorporate the AICUZ MIA and land use compatibility recommendations in the Ridgecrest General Plan Update and proposed Indian Wells Valley Specific Plan. Establish a Military Sustainability Element in the Ridgecrest General Plan Update that incorporates the salient components of this AICUZ study, and also add such components to the Military Sustainability Element of the Kern County General Plan and the proposed Indian Wells Valley Specific Plan. 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 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, sale and/or transfer related to excess land parcels located within or adjacent to the AICUZ MIA.

7.3.4 Recommendations for all AICUZ Participants

Actively participate in the regional R-2508 Joint Land Use Study (JLUS). The purpose of the R-2508 Airspace Complex JLUS is to identify 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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8.0 References

- California Department of Finance. 2006. Table E-1, City and County Population Estimates, 2005-2006. Demographic Research Unit.
- City of Ridgecrest. 2006. City of Ridgecrest Population 1950-2005. Available on the Internet at <http://ci.ridgecrest.ca.us/index.asp?id=79>.
- Department of the Navy, Office of the Chief of Naval Operations (OPNAV). 2002. OPNAV INSTRUCTION 11010.36B. Air Installations Compatible Use Zones [AICUZ] Program. 19 December.
- Federation of American Scientists (FAS). 2006. Military Analysis Network website available on the Internet at: <http://www.fas.org/man/dod-101/sys/ac/index.html>.
- NAWS and Bureau of Land Management. 2004. Environmental Impact Statement for Proposed Military Operational Increases and Implementation of Associated Comprehensive Land Use and Integrated Natural Resources Management Plans. February.
- NAWS 2005. Statistical data from 31 December 2005, as reported in an undated Powerpoint briefing entitled "The Road Ahead," prepared on behalf of Captain Mark Storch, NAWS Commanding Officer.
- NAWS. 2006. Noise End of Year Reports. September.
- Ridgecrest Chamber of Commerce. 2006. Indian Wells Valley Statistics, Economic Indicators. March 10, 2006. Available on the Internet at <http://ci.ridgecrest.ca.us/index.asp?id=79>.
- State of California. 2006. California Advisory Handbook for Community and Military Compatibility Planning. Governor's Office of Planning and Research. February.
- U.S. Census Bureau. 2000. Profile of Selected Economic Characteristics: 2000. Tables DP-3 for Ridgecrest city and Kern County, California.
- Wyle Laboratories. 1998. Final Noise Study, NAWS China Lake, California. Wyle Research Report WR 99-11. December 1998.
- Wyle Laboratories. 2001. Supplemental Noise Study for NAWS China Lake, Wyle Research Report WR 01-13, May.
- Wyle Laboratories. 2004. Letter Report J/N 50268 to Mr. John O'Gara. NAWS China Lake CY 1998 Noise Contour, Including TACAN Approach to Runway 32. 27 April.

REFERENCES

Wyle Laboratories. 2006. SEL noise data provided in email communication from Geral Long to John O’Gara on 06 July.

Appendix A
1977 AICUZ Map

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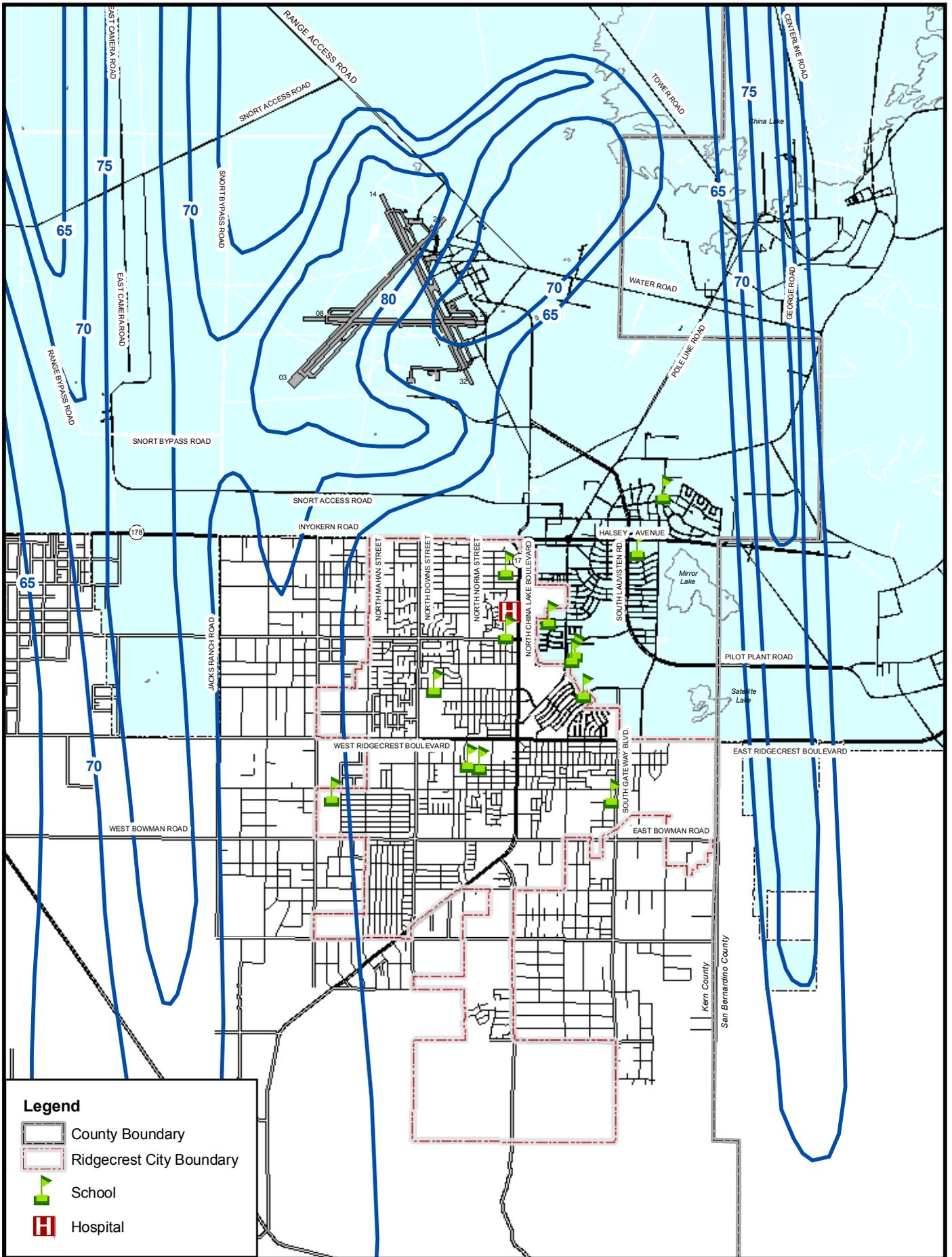


Figure A-1
1977 AICUZ Footprint at Armitage Airfield

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Appendix B

AICUZ Land Use Compatibility Guidelines

Table B-1 Suggested Land Use Compatibility in Noise Zones

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55-64	65-69	70-74	75-79	80-84	85+
	Residential							
11	Household units	Y	Y ¹	N ¹	N ¹	N	N	N
11.11	Single units: detached	Y	Y ¹	N ¹	N ¹	N	N	N
11.12	Single units: semidetached	Y	Y ¹	N ¹	N ¹	N	N	N
11.13	Single units: attached row	Y	Y ¹	N ¹	N ¹	N	N	N
11.21	Two units: side-by-side	Y	Y ¹	N ¹	N ¹	N	N	N
11.22	Two units: one above the other	Y	Y ¹	N ¹	N ¹	N	N	N
11.31	Apartments: walk-up	Y	Y ¹	N ¹	N ¹	N	N	N
11.32	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	Manufacturing							
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

(Continued on next page)

Table B-1 Suggested Land Use Compatibility in Noise Zones (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55-64	65-69	70-74	75-79	80-84	85+
30	<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
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	<i>Trade</i>							
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

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Table B-1 Suggested Land Use Compatibility in Noise Zones (Continued)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55-64	65-69	70-74	75-79	80-84	85+
60	<i>Services</i>							
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 facilities	Y	Y ¹	25	30	N	N	N
65.16	Nursing homes	Y	Y	N ¹	N ¹	N	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Government services	Y	Y ¹	Y ¹	25	30	N	N
68	Educational services	Y	Y ¹	25	30	N	N	N
69	Miscellaneous	Y	Y	Y	25	30	N	N
70	<i>Cultural, entertainment, and recreational</i>							
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 (golf courses, riding stables, water recreation)	Y	Y ¹	Y ¹	25	30	N	N
75	Resorts and group camps	Y	Y ¹	Y ¹	Y ¹	N	N	N
76	Parks	Y	Y ¹	Y ¹	Y ¹	N	N	N
79	Other cultural, entertainment, and recreation facilities	Y	Y ¹	Y ¹	Y ¹	N	N	N

(Continued on next page)

Table B-1 Suggested Land Use Compatibility in Noise Zones (Concluded)

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55-64	65-69	70-74	75-79	80-84	85+
80	<i>Resource production and extraction</i>							
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	Agriculture-related activities	Y	Y	Y ⁸	Y ⁹	Y ¹⁰	Y ^{10,11}	Y ^{10,11}
83	Forestry activities	Y	Y	Y ⁸	Y ⁹	Y ¹⁰	Y ^{10,11}	Y ^{10,11}
84	Fishing activities	Y	Y	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y	Y	Y

Source:

OPNAVINST 11010.36B, 2002.

Key:

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

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

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

Y* (Yes with Restrictions) Land use and related structures are generally compatible. However, see note(s) indicated by the superscript.

N* (No with Exceptions) Land use and related structures are generally incompatible. However, see notes indicated by the superscript.

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

25, 30, or 35 The numbers refer to NLR levels. Land use and related structures generally are compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. Measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure, and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.

DNL Day Night Average Sound Level.

CNEL Community Noise Equivalent Level (Normally within a very small decibel difference of DNL).

Ldn Mathematical symbol for DNL.

Notes:

1.
 - a) Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals, indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.
 - b) Where the community determines that these uses must be allowed, measures to achieve and outdoor to indoor NLR of at least 25 dB in DNL 65-69 and NLR of 30 dB in DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.
 - 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 (STC) ratings in windows and doors and closed windows year-round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.
 - d) NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure, particularly from ground-level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that protect only interior spaces.

Notes (Continued):

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.
6. No buildings.
7. Land use compatible provided special sound reinforcement systems are installed.
8. Residential buildings require NLR of 25.
9. Residential buildings require NLR of 30.
10. Residential buildings not permitted.
11. Land use not recommended, but if community decides use is necessary, hearing protection devices should be worn.

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

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
10	<i>Residential</i>				
11	Household units				
11.11	Single units: detached	N	N	Y ²	Maximum 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	<i>Manufacturing</i> ³				
21	Food and kindred products; manufacturing	N	N	Y	Maximum FAR 0.56
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	Maximum 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	

(Continued on next page)

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

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
30	<i>Manufacturing</i>³ (continued)				
31	Rubber and misc. plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56
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	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	<i>Transportation, communication, and utilities</i>⁴				See Note 3 below.
41	Railroad, rapid rail transit, and street railway transportation	N	Y ⁵	Y	Same as above.
42	Motor vehicle transportation	N	Y ⁵	Y	Same as above
43	Aircraft transportation	N	Y ⁵	Y	Same as above
44	Marine craft transportation	N	Y ⁵	Y	Same as above
45	Highway and street right-of-way	N	Y ⁵	Y	Same as above
46	Auto parking	N	Y ⁵	Y	Same as above
47	Communication	N	Y ⁵	Y	Same as above
48	Utilities	N	Y ⁵	Y	Same as above
485	Solid waste disposal (landfills, incineration, etc.)	N	N	N	
49	Other transport, communication, and utilities	N	Y ⁵	Y	See Note 3 below
50	<i>Trade</i>				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I. & .56 in APZ II.
52	Retail trade—building materials, hardware and farm equipment	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
53	Retail trade—shopping centers	N	N	Y	Maximum FAR of 0.22.
54	Retail trade—food	N	N	Y	Maximum FAR of 0.24
55	Retail trade—automotive, marine craft, aircraft and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade—apparel and accessories	N	N	Y	Maximum FAR 0.28
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	Maximum FAR of 0.22

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

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
60	Services⁶				
61	Finance, insurance, and real estate services	N	N	Y	Maximum FAR of 0.22 for "General Office/Office park"
62	Personal services	N	N	Y	Office uses only. Maximum FAR of 0.22.
62.4	Cemeteries	N	Y ⁷	Y ⁷	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Max. FAR of 0.22 in APZ II
63.7	Warehousing and storage services	N	Y	Y	Max. FAR 1.0 APZ I; 2.0 in APZ II
64	Repair services	N	Y	Y	Max. FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Max. FAR of 0.22
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Max. FAR of 0.11 APZ I; 0.22 in APZ II
67	Government services	N	N	Y	Max FAR of 0.24
68	Educational services	N	N	N	
69	Miscellaneous	N	N	Y	Max. FAR of 0.22
70	Cultural, entertainment, and recreational				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y ⁸	Y ⁸	
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, mini-golf, driving ranges; amusement parks	N	N	Y	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y ⁸	Y ⁸	Max. FAR of 0.11 APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y ⁸	Y ⁸	Same as 74
79	Other cultural, entertainment, and recreation facilities	N	Y ⁸	Y ⁸	Same as 74
80	Resource production and extraction				
81	Agriculture (except livestock)	Y ⁴	Y ⁹	Y ⁹	
81.5, 81.7	Livestock farming and breeding	N	Y ^{9,10}	Y ^{9,10}	
82	Agriculture-related activities	N	Y ⁹	Y ⁹	Max FAR of 0.28 APZ I; 0.56 APZ II no activity that produces smoke, glare, or involves explosives
83	Forestry activities ¹¹	N	Y	Y	Same as Above

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

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
84	Fishing activities ¹²	N ¹²	Y	Y	Same as Above
85	Mining activities	N	Y	Y	Same as Above
89	Other resource production or extraction	N	Y	Y	Same as Above
90	Other				
91	Undeveloped land	Y	Y	Y	
93	Water areas	N ¹³	N ¹³	N ¹³	

Source:
OPNAVINST 11010.36B, 2002.

Key:

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

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 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 structure 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 not more than 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 Clear Zone areas on or off the installation. The Clear Zone is subject to severe restrictions. See NAVFAC P-80.3 or Tri-Service Manual AFM 32-1123(I); TM 5-803-7, NAVFAC P-971, *Airfield and Heliport Planning & Design*, May 1, 1999, for specific design details.
5. No passenger terminals and no major aboveground transmission lines in APZ I.
6. Low-intensity office uses only. Accessory uses such as meeting places and auditoriums are not recommended.
7. No chapels are allowed within APZ I or APZ II.
8. Facilities must be low intensity, and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, and large classrooms are not recommended.
9. 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.
10. Includes feedlots and intensive animal husbandry.
11. 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.
12. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
13. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are compatible.