

Final

Air Installations Compatible Use Zones Report

Naval Air Station Lemoore, California

November 2010



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San Diego, California

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Acronyms and Abbreviations

| | |
|--------|--|
| ACS | American Community Survey |
| AGL | above ground level |
| AICUZ | Air Installations Compatible Use Zones |
| AMRAAM | Advanced Medium Range Air-to-Air Missile |
| APZ | Accident Potential Zone |
| ARTCC | Air Route Traffic Control Center |
| ATC | Air Traffic Control |
| ATCAA | Air Traffic Controlled Assigned Airspace |
| BASH | bird/animal aircraft strike hazard |
| CANG | California Air National Guard |
| CEQA | California Environmental Quality Act |
| CNEL | Community Noise Equivalent Level |
| CP&LO | Community Plans & Liaison Officer |
| CPSJV | California Partnership for the San Joaquin Valley |
| CSFWP | Commander Strike Fighter Wing, United States Pacific Fleet |
| CTOL | conventional takeoff/ landing |
| CV | carrier variant |
| CVW | Carrier Airwing Staffs |
| CY | calendar year |
| dB | decibel(s) |
| dBA | A-weighted decibel(s) |
| DNL | day-night average sound level noise metric |
| DoD | U.S. Department of Defense |
| EA | environmental assessment |
| EIS | environmental impact statement |
| EMI | electromagnetic interference |
| EPA | U.S. Environmental Protection Agency |
| FAA | Federal Aviation Administration |
| FCLP | Field Carrier Landing Practice |
| FCPUC | Fresno County Property Use Code |
| FEMA | Federal Emergency Management Agency |
| FOD | foreign object debris |
| FRC | Fleet Readiness Center |
| FRCW | Fleet Repair Center West |

List of Acronyms, continued

| | |
|--------------|--|
| FRS | Fleet Replacement Squadron |
| ft | feet |
| FY | fiscal year |
| GCA | ground-controlled approach |
| GIS | Geographic Information System |
| HUD | Housing and Urban Development |
| ILS | instrument landing system |
| JDAM | joint direct attack munition |
| JSF | Joint Strike Fighter |
| JSOW | joint standoff weapon |
| KCLUC | Kings County Land Use Code |
| L_{eq} | equivalent sound level |
| L_{max} | maximum sound level |
| MIA | Military Influence Area |
| MOA | Military Operations Area |
| MSA | Metropolitan Statistical Area |
| MSL | mean sea level |
| NA L_{max} | Number-of-events at or above a specified maximum sound level |
| NASL | Naval Air Station Lemoore |
| Navy | United States Department of the Navy |
| NEPA | National Environmental Policy Act |
| NLR | noise-level reduction |
| nm | nautical mile |
| ODO | (Air) Operations Duty Officer |
| OPNAVINST | Office of the Chief of Naval Operations Instruction |
| RATCF | Radar Air Traffic Control Facility |
| SAR | search-and-rescue |
| SB | Senate Bill |
| SFWSP | Strike Fighter Weapons School Pacific |
| SH | State Highway |
| SLUCM | Standard Land Use Coding Manual |
| STOVL | short takeoff/vertical landing |
| SUA | special-use air space |
| T & G | touch-and-go |
| TDR | Transfer of Development Rights |
| UFC | United Facilities Criteria |
| USC | United States Code |

Executive Summary

The population in the San Joaquin Valley in California is expected to increase by 33% in the next 15 years. This population growth is expected to increase urbanization pressures, stress water supplies and transportation systems, and encourage conversion of agricultural land to other uses. All these factors may bring the civilian population in closer contact with Naval Air Station Lemoore (NASL), its noise footprint, and aircraft flight tracks.

In the early 1970s, the U.S. Department of Defense (DoD) established the Air Installations Compatible Use Zones (AICUZ) Program to protect the operational capabilities of its military installations and the health, safety, and welfare of communities nearby. The AICUZ Program provides recommendations for community land uses compatible with noise levels, accident potential, and flight clearance requirements associated with military airfield operations in the hope that the information will be incorporated into local, county, and regional planning programs. The NASL AICUZ Program and this AICUZ Report will help guide a variety of planning efforts to avoid conflict with current and future military operations. Planning efforts currently underway include the Partnership for the San Joaquin Valley blueprint and Fresno County General Plan update. Additionally the NASL Joint Land Use Study is scheduled to begin in 2010.

The previous NASL AICUZ Report was completed in 1993 and requires updating due to changes in the ground-controlled approach flight track 2RG1 (GCA Box Pattern) which has been lengthened by approximately 1 mile to the south to avoid flights over the community of Stratford. Additionally, the 1993 NASL AICUZ Report requires updating due to: the introduction of the F/A-18 E/F Super Hornet in the late 1990's, a proposed increase in Super Hornet squadrons and operations, the possible home basing of the F-35C Lightning II, and a

change to the Ground Control Approach (GCA) flight pattern. The prospective scenario presented in this AICUZ Report is defined as these operational changes that are expected to occur within the next ten-year planning period (i.e., a 2020 Planning horizon).

ES.1 Aircraft Noise

The primary sources of noise at airfields are flight operations or aircraft run-ups. The 2020 prospective scenario presented in this AICUZ report is based on the prospective scenario modeled in the *Revised Final Aircraft Noise Study for Naval Air Station Lemoore, California* (Wyle Laboratories, Inc. June 2010). Noise exposure from aircraft at NASL is measured using the community noise equivalent level (CNEL).

2020 Prospective Noise Contours

The prospective contours modeled in this AICUZ Report cover a larger area and extend farther in every direction than the 1993 AICUZ Report. Noise Zones 1 and 2 (greater than 65 CNEL) increase by approximately 51,100 acres, which is a more than a 200% increase from the previous modeled contours. The primary reasons for increases in the 2020 prospective noise contours are newer aircraft stationed at NASL, changes in flight operations and flight tempos based on new training requirements, and improvements in the noise modeling software used to create the noise contours.

ES.2 Airfield Safety

This AICUZ Report defines Accident Potential Zones (APZs) for operations at NASL as well as identifies key flight safety issues. APZs modeled by this AICUZ Report increased by approximately 2,100 acres from the previous AICUZ Report; this increase is primarily due to new closed-loop APZ 2 on runways 14L/32R and 14R/32L. Key flight safety issues identified include: bird/animal strike hazards, electromagnetic interference, lighting, as well as visibility and health impacts associated with smoke, dust, and steam. In recent years, NASL has had increased exposure to foreign object debris and severe dust storms due to an ongoing local drought.

ES.3 Land-Use Compatibility Analysis

Planned and existing land uses within APZs and 2020 prospective noise zones were evaluated for compatibility in accordance with Navy recommendations (Chief of Naval Operations Instruction [OPNAVINST] 11010.36C). The results of the analysis identified several areas of concern:

- Development, west of State Highway 41 in association with West Hills Community College, that underlies the 4LG1/2RGI flight track (GCA Box Pattern);
- Large-acreage dairy farms located north and northeast of NASL within Noise Zone 3;
- A residential parcel located north of Runway 14L within Noise Zone 3 and APZ 2;
- Residential and other development in and around the communities of Burrell and Lanare currently within Noise Zone 1;
- Recent residential development and potential future development within the community of Riverdale that underlies several arrival flight tracks;
- Residential and other development, southeast of the community of Lanare, that underlies the 4LG1/2RGI flight track (GCA Box Pattern); and
- The prevalence of 'Resource Production and Extraction' land-use in Noise Zones 2 and 3.

ES.4 Recommendations

The following actions for NASL, local governments and agencies, as well as real estate professionals, business, and private citizens are recommended to promote compatible development and activities near NASL.

Naval Air Station Lemoore Recommendations

- **Air Operations Procedures.** The NASL Air Operations Department, in conjunction with the local community, should continue to examine ways to improve noise abatement procedures.
- **Noise Complaint Hotline.** Noise complaints are directed to the Air Operations Duty Officer and should be collected in a

standard format for future planning use (NASL Instruction 3710.1P).

- **Community Outreach Program.** Update and focus the Community Outreach Program on communities where noise is likely to cause the most impact, including the communities of Stratford, Riverdale, Lanare, and Burrel, as well as areas west of State Highway 41.
- **Presentation of the AICUZ Program.** Utilize information presented in this report in the Community Outreach Program, as well as to inform community decision makers about land-use decisions that can protect or threaten NASL's mission.
- **Remain Engaged in Local Planning Processes.** Representatives should attend public hearings and provide comment on actions, general plan updates, and amendments that affect NASL.
- **Local Plans, Regulations, and Policies.** NASL should continue to actively participate in local and regional government land-use related reviews, recommendations, and decision-making processes.

Local Government and Agency Recommendations

- **Communication –** Community decision-makers should continue to inform and seek input from NASL regarding land-use decisions that could affect NASL's operational integrity.
- **Decisions with Future Impacts –** Local governments are encouraged to recognize that the AICUZ footprint is dynamic and to work with NASL to establish as special planning area in Noise Zone 1 (less than 65 CNEL) and outside APZs.
- **Land Use Plans and Regulations –** Local governments should enact land-use controls in areas encumbered by the AICUZ footprint.
- **Capital Improvement –** Community decision-makers should evaluate capital improvement projects for direct and indirect impacts to implementation of the AICUZ Program.
- **Building Codes –** Building codes related to noise attenuation should be reviewed and modified to be consistent with Navy guidance (OPNAVINST 11010.36C).
- **Public Land Acquisition Programs –** Local governments should review public land acquisition programs to determine if they can be used to support the AICUZ Program.

- **Guidance Documents** – Local governments should familiarize themselves with guidance documents such as the *California Advisory Handbook for Community and Military Compatibility Planning* and *Compatible Civilian Development near Military Installations*.

Real Estate, Business, and Private Citizen Recommendations

- **Real Estate Professionals** – Real estate professionals should: provide a written disclosure to prospective purchasers, renters, or lessees when a property is located within an APZ or noise zone; should acknowledge the AICUZ program on their website and link to the NASL website for further information; and should provide prospective buyers and lessees with the AICUZ brochure and inform them of the potential magnitude of noise exposure.
- **Business** – Lending institutions should consider limiting development and construction loans for real estate purchases or construction incompatible with the AICUZ Program.
- **Citizens** – Citizens should familiarize themselves with the AICUZ Program.

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1

Introduction

The population of the San Joaquin Valley is expected to grow by 33% in the next 15 years, from a 2010 projected population of 4,188,340 to 5,591,395 in 2025. The populations of Fresno and Kings Counties are also expected to grow by 27% and 32% respectively (The Great Valley Center 2002). **This population growth is expected to increase** urbanization pressures, stress water supplies and transportation systems, and encourage conversion of agricultural land to other uses. All these factors may bring the civilian population in closer contact with Naval Air Station Lemoore (NASL), its noise footprint, and aircraft flight tracks. The Air Installations Compatible Use Zones (AICUZ) Program will help guide a variety of planning efforts seeking to provide smart growth opportunities in the San Joaquin Valley and avoid conflict with current and future military operations. Among the efforts currently under way is a blueprint for planning growth up to 2050, prepared by the California Partnership for the San Joaquin Valley (CPSJV), a consortium of eight counties within the San Joaquin Valley. Additionally, Kings County adopted the 2035 General Plan in January 2010, and Fresno County is in the process of reviewing their General Plan. The Kings County Association of Governments is sponsoring a NASL Joint Land Use Study that is set to begin in 2010 and will include the jurisdictions of the City of Lemoore and Fresno and Kings Counties. The City of Lemoore is experiencing growth pressures that have led to expansion of the city towards NASL and beneath established flight tracks.

The goal of the **AICUZ Program** is protect military operational capabilities and the health, safety, and welfare of the public by achieving compatible land-use patterns and activities in the vicinity of a military installation.

The U.S. Department of Defense (DoD) initiated the AICUZ Program to help state and local governments anticipate, identify, and promote compatible land use and development near military installations. The goal of this program is to protect military operational capabilities and to protect the health, safety, and welfare of the public by achieving

compatible land-use patterns and activities in the vicinity of a military installation. The AICUZ Program recommends community land uses compatible with noise levels, accident potential, and flight clearance requirements associated with military airfield operations in the hope that the information will be incorporated into local, county, and regional planning programs.

As required by Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C, this report was prepared in consideration of expected changes in mission, aircraft, operational levels, and other aspects that may occur within the next ten-year planning cycle. The original AICUZ for NASL was prepared in 1978 and was last updated in 1993. The 1993 update reflected the effects of the newly introduced F/A-18 (U.S. Department of the Navy 1993). This AICUZ report updates the 1993 NAS Lemoore report.

The U.S. Department of the Navy (Navy) greatly values the strong, positive relationship between NASL and the local community. That relationship is a considerable strategic advantage. NASL is a nationally critical asset with unique capabilities that cannot be duplicated elsewhere. The Navy and local governments must continue to work together to preserve that vital capability. Thus, the Navy will use the AICUZ report as an opportunity to provide input to counties and local communities on land-use planning, zoning, and other matters that could affect NASL operations or mission.

This report provides background information on the AICUZ Program (Section 1) and describes NASL (Section 2). Section 3 discusses current aircraft operations and airspace at NASL. Section 4 presents aircraft noise zones—how noise zones are determined, what changes have occurred, and what measures have been implemented by the Navy in response to noise complaints. Section 5 discusses aircraft safety issues, including changes in the accident potential zones (APZs) and pilot safety. Section 6 evaluates the compatibility of surrounding land uses and aircraft operations, and Section 7 provides the Navy's recommendations for promoting land-use compatibility consistent with the goals of the AICUZ Program.

1.1 AICUZ Program

In the early 1970s, the DoD established the AICUZ Program to balance the need for aircraft operations with community concerns about aircraft noise and accident potential. The AICUZ Program was developed in response to growing incompatible urban development (encroachment) around military airfields. The objectives of the AICUZ Program are:

- To protect the health, safety, and welfare of civilians and military personnel by encouraging land uses that are compatible with aircraft operations
- To protect the Navy and Marine Corps installation investment by safeguarding the installation's operational capabilities
- To reduce noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements, both on and in the vicinity of air installations
- To inform the public about the AICUZ Program and seek cooperative efforts to minimize noise and aircraft accident potential impact by promoting compatible development in the vicinity of military installations (adopted from OPNAVINST 11010.36C [U.S. Department of the Navy 2008]).

To meet these objectives, the Navy identified the following components as requirements for a successful AICUZ Program:

- Develop and periodically update a study and map for each air installation to quantify and depict aircraft noise zones and APZs
- Coordinate with federal, state, and local officials to encourage compatible land-use development around each air installation
- Inform the local communities of the importance of maintaining the Navy's ability to conduct aircraft operations
- Review operations and implement operational changes and noise abatement strategies to minimize noise impacts while ensuring mission requirements.

Under the AICUZ Program, the DoD identifies noise zones and APZs as planning tools for local planning agencies. The Federal

Aviation Administration (FAA) and the DoD also encourage local communities to restrict development or land uses that could endanger aircraft in the vicinity of the airfield, including lighting (direct or indirect) that would impair pilot vision; towers, tall structures, and vegetation that penetrate navigable airspace or are constructed near the airfield; uses that generate smoke, steam, or dust; uses that attract birds, especially waterfowl; and uses that create electromagnetic interference (EMI) with aircraft communication, navigation or weapons systems.

1.2 Purpose, Scope, and Authority

The **AICUZ report** analyzes community development trends, land-use tools, and mission requirements to develop a recommended strategy for communities to prevent incompatible land development adjacent to the installation.

The purpose of the AICUZ Program is to achieve compatibility between air installations and neighboring communities. To satisfy the purpose of the AICUZ Program, the Station Command works with the host community to discourage incompatible development of land adjacent to the installation. As development encroaches upon the airfield, more people experience the noise and accident potential associated with aircraft operations.

The scope of the AICUZ report includes a detailed analysis and quantification of:

- Aircraft noise and accident potential,
- Land-use compatibility,
- Operational alternatives, and
- Recommended strategies to address existing and potentially incompatible development in the vicinity of the air installation.

The AICUZ report uses an analysis of community development trends, land-use tools, and mission requirements to develop a recommended strategy for communities that prevents incompatible land development adjacent to the installation. AICUZ considerations are based on the impacts of noise, the safety considerations of aircraft accidents, and economic considerations relating to public funds and local economic viability. The basis for implementing AICUZ guidelines is to protect the installation's mission requirements and to protect and

promote the public's health, safety, and welfare through the Station Command's recommendations for land use to be adopted by local governments. The authority for the establishment and implementation of the NASL AICUZ Program is derived from the following:

- DoD Instruction 4165.57, "Air Installations Compatible Use Zones" (November 8, 1977)
- DoD Instruction 4715.13 "Department of Defense Noise Program" (November 15, 2005)
- Office of Naval Operations Instruction (OPNAVINST) 11010.36C, "Air Installations Compatible Use Zones Program" (October 9, 2008)
- Secretary of the Navy Instruction (SECNAVINST) 11011.47A, "Acquisition, management, and disposal of real property and real property interests by the DoN" (February 23, 2006)
- NASL Instruction 3710.1P, "Air Operations Manual, Naval Air Station Lemoore, California" (July 16, 2007)
- United Facilities Criteria (UFC) 3-260-01, "Airfield and Helicopter Planning and Design" (November 17, 2008)
- Code of Federal Regulations (CFR) Title 47, Chapter 102, "Federal Management Regulations" (July 1 2009 rev)
- Noise Control Act of 1972, 42 United States Code (U.S.C.) 4901
- FAA Federal Aviation Regulations, 14 CFR part 77, "Objects Affecting Navigable Airspace" (U.S. Department of Transportation-Federal Aviation Administration 2006).

1.3 Responsibility for Compatible Land Use

Ensuring land-use compatibility within the AICUZ is the responsibility of many, including the DoD, local planning and zoning agencies, real estate agencies, residents, developers, and builders. Military installations and local government agencies with planning and zoning authority share the responsibility for preserving land-use compatibility near the military installation. Cooperative action by all parties is essential to prevent land-use incompatibility and hazards to the neighboring community. Table 1-1 identifies some responsibilities for various community stakeholders residing near an installation.

| Table 1-1 Responsibility for Compatible Land Uses | |
|--|--|
| U.S. Department of the Navy | <ul style="list-style-type: none"> ▪ Examine air mission for operation changes that could reduce impacts. ▪ Conduct noise and Accident Potential Zone studies. ▪ Develop AICUZ maps. ▪ Examine local land uses and growth trends. ▪ Make land-use recommendations. ▪ Release an AICUZ report. ▪ Work with local governments and private citizens. ▪ Monitor operations and noise complaints. ▪ Update AICUZ plans, as required. |
| Local Government | <ul style="list-style-type: none"> ▪ Incorporate AICUZ guidelines into a comprehensive development plan and zoning ordinance. ▪ Regulate height and obstruction concerns through an airport ordinance. ▪ Regulate acoustical treatment in new construction. ▪ Require fair disclosure in real estate for all buyers, renters, lessees, and developers. |
| Private Citizens | <ul style="list-style-type: none"> ▪ Educate oneself on the importance of the installation's AICUZ Program. ▪ Identify AICUZ considerations in all property transactions. ▪ Understand AICUZ effects before buying, renting, leasing, or developing property. |
| Real Estate Professionals | <ul style="list-style-type: none"> ▪ Ensure potential buyers and lessees receive and understand AICUZ information on affected properties. ▪ When working with builder/developers, ensure an understanding and evaluation of the AICUZ Program. |
| Builders/Developers | <ul style="list-style-type: none"> ▪ Develop properties in a manner that appropriately protects the health, safety, and welfare of the civilian population by constructing land-use facilities that are compatible with aircraft operations (e.g., sound attenuation features, densities, and occupations). |

1.4 Previous AICUZ Efforts and Studies

Previous AICUZ efforts for NASL include the initial, full 1978 AICUZ report, the subsequent 1983 update as part of the NASL Master Plan, and the 1993 update. In addition to these AICUZ studies, several noise studies have been conducted during changes in aircraft operations and bed-down scenarios. Furthermore the Navy has conducted National Environmental Policy Act (NEPA) analysis associated with past home basing actions when aging legacy aircraft platforms were replaced with newer aircraft. The May 1998 FEIS for home basing the Super Hornet identified noise and land-use effects as well as provided opportunity for local municipalities and the public to provide comment on proposed alternatives.

Other operational changes at NASL have occurred overtime where the base conducted appropriate outreach efforts to keep city planners and the public aware of those changes. As appropriate, there were collaborative efforts between base and community to address change and potential encroachment concerns – although those efforts were never institutionalized with published reports or zoning changes. NAS Lemoore is currently participating in the development of the Joint Land Use Study managed by the Kings County Council of Government.

This AICUZ report reflects the most recent noise study (Wyle Laboratories, Inc. June 2010). This current AICUZ report nullifies all previous AICUZ reports or noise studies.

1.5 Changes that Require an AICUZ Update

Aircraft noise consists of two major sound sources: flight operations and ground engine maintenance “run-ups,” which are associated with pre-flight and maintenance checks. The level of noise exposure is related to a number of variables, including the aircraft type, engine power setting, altitude, direction of aircraft during run-ups, duration of run-ups, flight tracks, temperature, relative humidity, frequency, and time of operations. Generally, these factors fluctuate from year to year. Small fluctuations in the annual numbers of operations of like aircraft do not have a significant effect on a community’s exposure to noise.

The AICUZ report should be updated when NASL has a significant change in aircraft operations (i.e., the number of takeoffs and landings), a change in the type of aircraft stationed and operating at NASL, or changes in flight paths or procedures.

NASL’s current, adopted 1993 AICUZ report requires updating due to:

- The introduction of the F/A 18 Super Hornet in the late 1990’s,
- A proposed increase in Super Hornet squadrons and operations,

Over time, the operational tempo at NAS Lemoore has fluctuated. Projected **annual flight operations** of 210,002 operations are used as the basis for this AICUZ report.

- The possible home basing of the F-35C Lightning II, and
- A change to the Ground Control Approach (GCA) flight pattern.

In the early 1990's the Navy began a replacement of some of the F-14 Tomcat and early model F/A-18 aircraft at NASL with the newer F/A-18 E/F Super Hornet. The Navy is currently examining a proposal to increase in the number of Super Hornet squadrons, resulting in more Super Hornet flight operations.

While still in the early planning stages, the FA-18 C/D Hornet aircraft may be replaced by the F-35C (Lightning II, e.g., Joint Strike Fighter) aircraft. The final home basing site(s) for the F-35 will be decided after the Navy has conducted an extensive environmental review under the National Environmental Policy Act (NEPA).

Furthermore, the ground-controlled approach (GCA) flight track 2RG1 (GCA Box) has been lengthened by about 1 mile to the south to avoid flights over the community of Stratford.

2 Naval Air Station Lemoore

2.1 Location

NASL is located in the San Joaquin Valley, approximately equidistant between San Francisco and Los Angeles and about 80 miles east of the Pacific Ocean. NASL is located 7 miles west of Lemoore, Kings County, California, and 17 miles west of Hanford (Kings County seat). The City of Fresno (Fresno County seat) is located 35 miles north of NASL (see Figure 2-1) (Naval Facilities Engineering Command Southwest July 2007). Straddling the county line between Kings and Fresno counties, NASL owns 18,784 acres, 12,343 acres of which are leased out for agricultural uses. In addition, the Navy holds flight easements over 11,020 acres of land (City of Lemoore 2008).

2.2 History

NASL was commissioned on July 8, 1961, at a time when its location in California's Central Valley was considered remote. The location was close enough to Navy seaport facilities for logistical support but far enough from population centers to allow for possible expansion. NASL is the Navy's newest and largest Master Jet Base, with more than 40 tenants involved in aviation (Wyle Laboratories, Inc. June 2010).

2.3 Mission

NASL is the west coast master jet base with a mission-critical function of strike aviation. Over time, the Navy has replaced aging legacy aircraft platforms with newer versions. For instance: at NASL, A-7 was replaced by FA-18 Hornet in early 1990's, and F-14 Tomcat was replaced by the FA-18 Hornet by mid in 1990's. As the FA-18 reaches its service life, the FA-18 Hornet will be replaced by F-35C (JSF). As

the west coast master jet base for strike fighter aircraft, NASL will likely be considered for home basing JSF aircraft. NASL supports Navy fleet carrier attack and strike-fighter squadrons and trains aircrews and supporting personnel to ensure first-line combatant attack and strike-fighter capability and readiness. Within the next several years, NASL will transition from the Hornet to the next generation aircraft, the JSF-35C Lightning II (U.S. Department of the Navy July 2007).

2.4 NASL Operational Areas

NASL has three operational areas (see Figure 2-2):

- **Air Operations Area.** Includes the airfield, weapons handling and storage facilities, fuels, aircraft maintenance, and aviation storage
- **Administration Area.** Contains NASL administrative offices, training schools, public works facilities, emergency services, and a water treatment plant
- **Housing Area.** Contains K-8 and K-5 grade schools, a Youth Center, 1,640 single and multi-family homes, several restaurants, Enlisted & Officers clubs, 16 barracks, a hospital, a gymnasium, a shopping mall, an equestrian center, and other community support facilities.

NASL’s Air Operations Area has two parallel, canted and offset bi-directional Class B runways, Runways 14 L/32R, and 14R/32L (Table 2-1). The separation between these runways is 4,600 feet on the centerline. Each runway has arresting gear for supporting tail-hook-equipped aircraft and to arrest landings and abort takeoffs. NASL aircraft operations are typically conducted seven days per week during the following hours:

Monday-Thursday: 8:00 a.m. to 12:00 a.m. midnight
 Friday: 8:00 a.m. to 6:00 p.m.
 Saturday: 10:00 a.m. to 6:00 p.m.
 Sunday: 1:00 p.m. to 9:00 p.m.

| Runway | Length (feet) | Width (feet) |
|---------------|----------------------|---------------------|
| 14L/32R | 13,500 | 200 |
| 14R/32L | 13,500 | 200 |

Source: NASL Instruction 3710.1P.

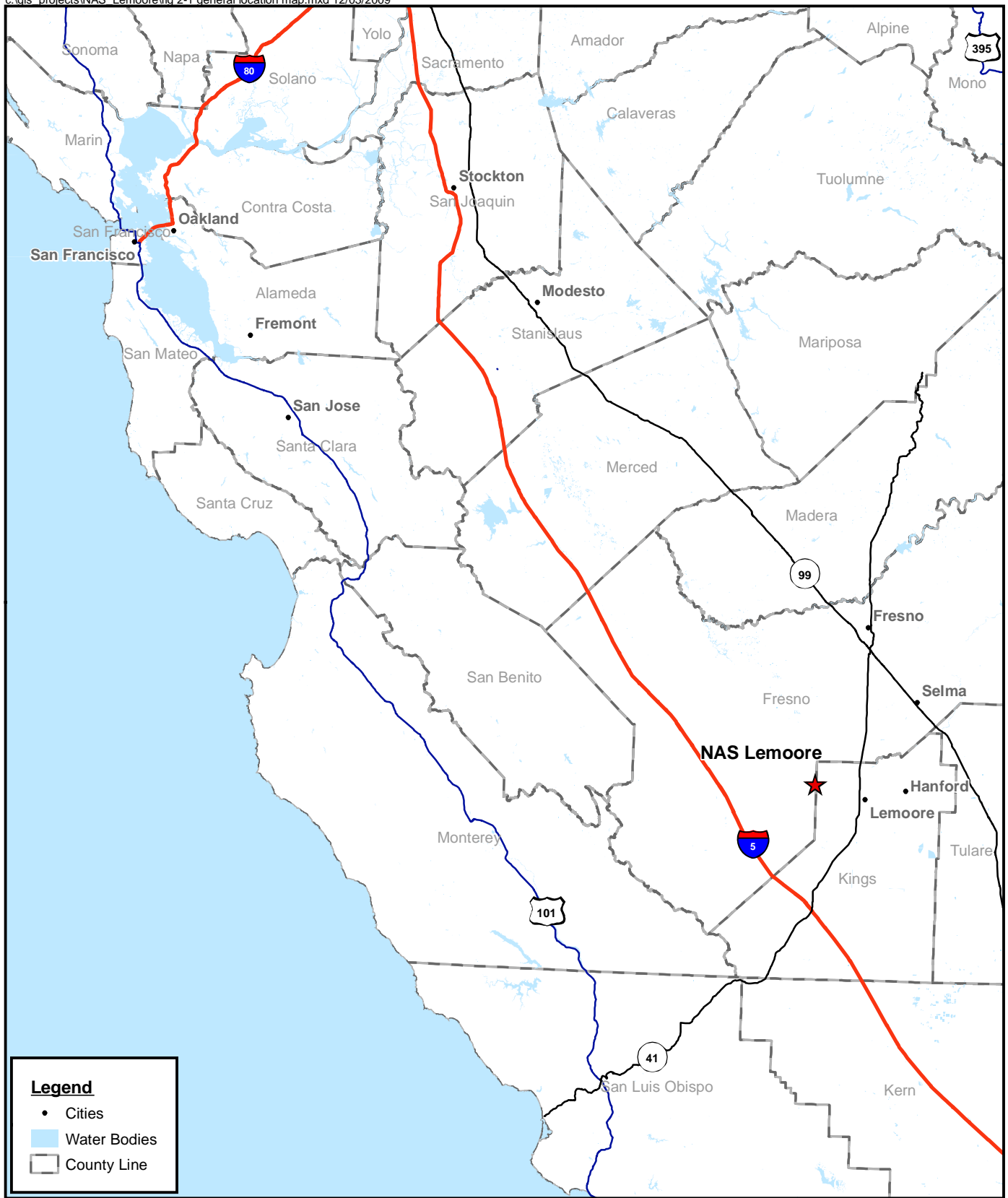
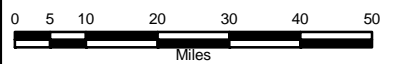
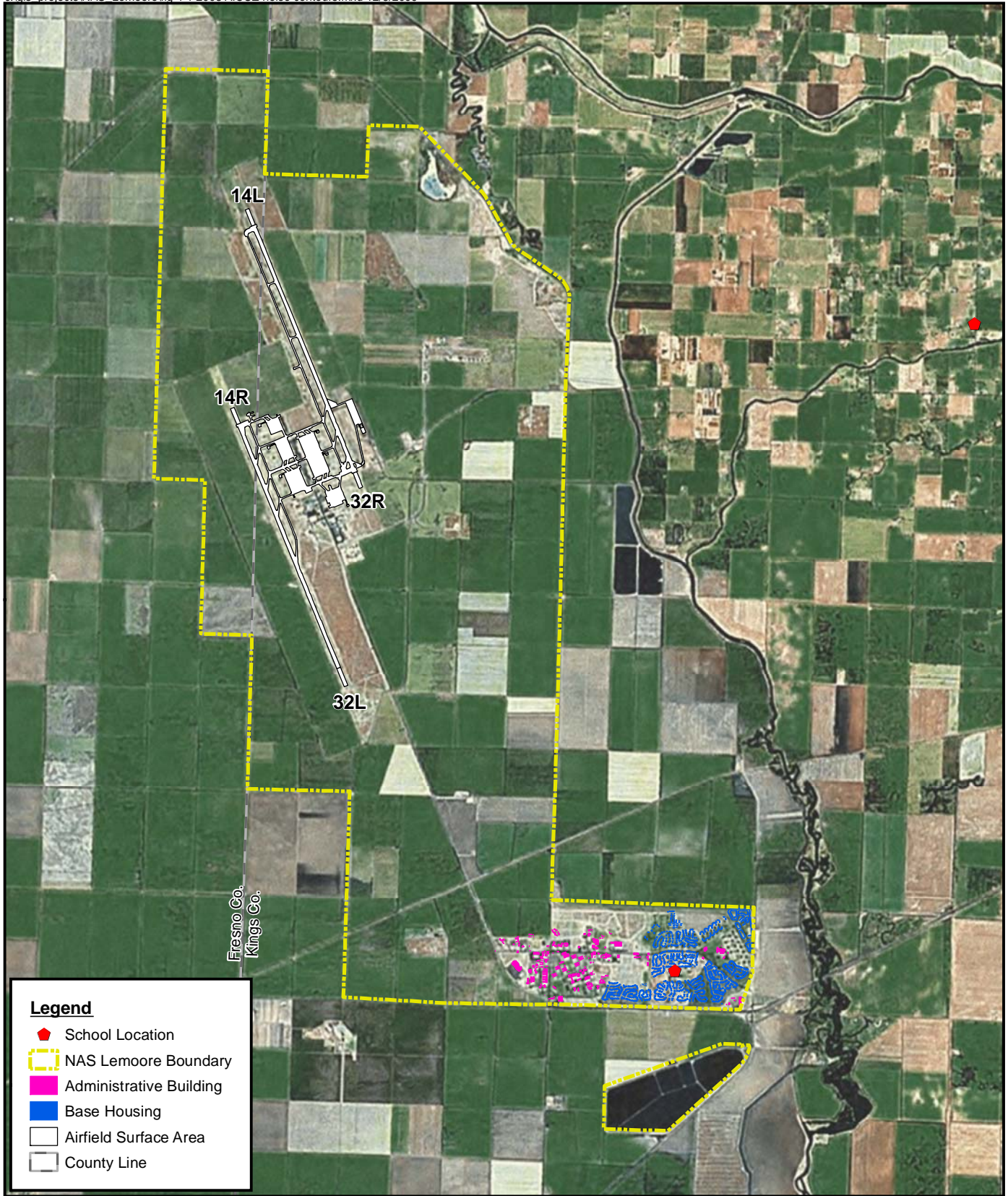


Figure 2-1
General Location Map
NAS Lemoore
Lemoore, California

NAS Lemoore
Lemoore, California



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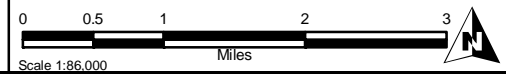


Legend

- ◆ School Location
- NAS Lemoore Boundary
- Administrative Building
- Base Housing
- Airfield Surface Area
- County Line

Figure 2-2
NAS Lemoore Base Map
Lemoore, California

NAS Lemoore
Lemoore, California



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2.5 Tenant Commands

In all, NASL hosts more than 40 tenants involved in aviation. Operational units include four Carrier Air Wing Staffs (CVW), the Commander Strike Fighter Wing, the U.S. Pacific Fleet (CSFWP), fourteen operational fleet squadrons, two fleet replacement squadrons (FRSs), the Strike Fighter Weapons School Pacific (SFWSP), the Fleet Readiness Center (FRC)-West, and the Center for Naval Aviation Technical Training (Knapp 2009). The aircraft associated with this and other tenant commands and their operations are described in greater detail in Section 3.

2.5.1 Commander Strike Fighter Wing, US Pacific Fleet

The CSFWP provides strike fighter squadrons trained to conduct all-weather, carrier-based attack and support missions (Commander Strike Fighter Wing, U.S. Pacific Fleet n.d.). The CSFWP currently comprises seven F/A-18C/D Hornet and seven F/A-18E/F Super Hornet fleet squadrons as well as an F/A-18C/D FRS training squadron and an F/A-18E/F FRS.

2.5.2 Additional Commands

Other tenant commands at NASL include the Aviation Survival Training Center at Lemoore; Construction Battalion Maintenance Unit 303, a unit of the Seabees (Navy Engineers); and Naval Hospital Lemoore. Approximately 17,250 active duty, retired, and reservist military personnel and dependents use the Naval Hospital every year (Knapp 2009).

2.6 Local Economic Impacts and Population Growth

The primary industry in the San Joaquin Valley is agriculture, with a total production in Fresno County of \$4.8 billion in 2006 (ABC, Inc. 2008). Crops include grapes, cotton, nuts, citrus fruits, and

vegetables along with livestock and dairy. Additionally the San Joaquin Valley is California’s primary oil production region with six oil fields located to the west of NASL (California Department of Conservation 2006).

2.6.1 Population and Regional Growth

Estimates of the 2008 population indicate that the City of Lemoore is the 270th most populous city in the state of California (U.S. Census Bureau 2009a). The City of Lemoore comprises 8,023 households and 6,123 families, according to the American Community Survey (U.S. Census Bureau 2009b). The American Community Survey (ACS) provides average estimates for three years (2006 to 2008). Table 2-2 identifies the 2005 through 2009 population estimates and projections for the City of Lemoore in Kings County and for Fresno County. Limited population projection data are available; thus, both the city and surrounding counties are included. As shown on the table, both the city and counties have grown over the past eight years.

| Table 2-2 City of Lemoore, King County, and Fresno County Population | | | | | | |
|---|-----------------|-------------|-------------|-------------|------------------------|-----------------------------------|
| Population Area | Estimate | | | | Projection 2009 | % change from 2005 to 2009 |
| | 2005 | 2006 | 2007 | 2008 | | |
| Lemoore, CA | 22,440 | 23,267 | 24,072 | 24,340 | 24,818 | 11% growth |
| Kings County, CA | 145,426 | 148,212 | 151,249 | 153,572 | 154,743 | 6% growth |
| Fresno County, CA | 881,324 | 897,242 | 912,725 | 928,066 | 942,298 | 7% growth |

Population estimate source: State of California 2009

NASL employs approximately 6,123 military personnel, 1,074 government civilian personnel, and 403 contractors (Naval Air Station Lemoore Economic Impact Assessment November 2009). The installation recently completed construction of 1,640 single and multi-family residential homes that house approximately 4,100 military dependents living on the installation. In support of its bachelor population, the installation has 16 barracks that can accommodate up to 2,000 personnel. The remaining population resides in the communities surrounding NASL and contributes to the population of those communities. The Central Union School District has two schools located

on-base. The schools teach grades K-8 and accommodate up to 1,600 students (Benitez December 2, 2009). Military dependents attend high school within the surrounding communities.

2.6.2 Economy and Employment

NASL significantly benefits the regional economy. An Economic Impact Assessment (EIA) completed in 2009 collected extensive data on defense procurement contracts, base expenditures, active duty and civilian salaries, and on military retirement and disability benefits paid to area residents in order to quantify NASL contributions to Kings and Fresno counties (Naval Air Station Lemoore Economic Impact Assessment November 2009). NASL contributions include:

- 11,700 military and civilian personnel associated with NASL
- 8,713 retired veterans living in the vicinity of NASL
- 13,569 jobs generated
- 23,456 transient personnel (training and detachment)
- \$982.35 million per year direct and indirect economic impacts.

Other major employers in the City of Lemoore include Palace Casino (800 employees); Leprino Foods, a mozzarella cheese manufacturer (670 employees); and Communication Services for the Deaf (250 employees) (Kings County Economic Development Corporation 2006). Outside the City of Lemoore's boundaries, the region is primarily farmland, interspersed with small businesses and communities that support farmers, their employees, and their families.

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3 Aircraft Operations

Flight operations at NASL are primarily fixed-wing aircraft. Fixed-wing aircraft are either “based aircraft” or “transient aircraft.” Aircraft descriptions in this report are of based aircraft only because they account for the majority of the operations at the airfield.

3.1 Aircraft Types

Aircraft types currently stationed or planned to be stationed at NASL are as follows:



3.1.1 Boeing F/A-18 C/D Hornet

- **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, the Sparrow Advanced Medium Range Air-to-Air Missile (AMRAAM) and the infrared imaging Maverick air-to-ground missile.

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 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, the A-7 Corsair II light attack jet, and the A-6 Intruder as these aircraft were being retired during

the 1990s (U.S. Department of the Navy 2008a). NASL currently is host to an average of seven Hornet fleet squadrons and a fleet FRS. Each squadron consists of 10 aircraft and each FRS typically consists of 12 aircraft.



3.1.2 Boeing F/A-18E/F Super Hornet

- **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). (U.S. Department of the Navy 2008b).

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



3.1.3 Lockheed Martin F-35C Lightning II (JSF)

The JSF is a joint, multinational acquisition program for the Air Force, Navy, Marine Corps, and eight cooperating international partners. The stealth, supersonic F-35 JSF will replace a wide range of aging fighter and strike aircraft. There are three variants of the JSF aircraft: conventional takeoff/ landing (CTOL) used by the Air Force, the Navy carrier-based variant (CV) “F-35C,” and the short takeoff/vertical

landing (STOVL) aircraft flown by the Marine Corps. The F-35C aircraft is the “next generation” strike fighter for the Navy. The F-35C airframe design and capabilities provide the Navy with enhanced war-fighting capabilities while achieving efficiencies in operations and support. It is a carrier-based, highly advanced, single-engine, single-seat, supersonic, multi-role strike-fighter aircraft that can take off from conventional runways and aircraft carriers. U.S. Congress authorized the purchase of JSF as a replacement for the Navy’s aging FA-18 Hornet aircraft. As the west coast master jet base for strike-fighter aircraft, it is likely that NASL would be considered as a potential home base for JSF. For land-use planning purposes of this AICUZ document, it is assumed that NASL would support a complement of JSF squadrons similar to current home basing complement of FA-18 Hornets.

3.2 Airspace

The use of airspace over NASL is dictated by the FAA National Airspace System. This system is designed to ensure the safe, orderly, and efficient flow of commercial, private, and military aircraft. NASL Lemoore’s Tower and Radar Air Traffic Control Facility (RATCF) provides airport traffic control services to all terminal air traffic operating within a 70 mile by 40 mile area above NASL. This area is generally bordered by Mendota in the north, Wasco in the south, and Hanford and Coalinga in the east and west respectively (Naval Facilities Engineering Command Southwest July 2007). Airport traffic control also is provided for aircraft and vehicles operating on the taxiways and runways at NASL. Use of airspace surrounding the airspace controlled by NASL RATCF is within the control area boundary of the FAA Oakland Air Route Traffic Control Center (ARTCC) in Fremont, California (Naval Facilities Engineering Command Southwest July 2007).

When not flying pattern flight tracks near NASL, aircraft typically fly training operations in the R-2508 airspace complex, the Fallon Range Training Complex, or the El Centro Complex (Naval Facilities Engineering Command Southwest July 2007). The R-2508

Airspace Complex is used primarily by aircraft originating at NASL. This airspace covers approximately 19,600 square miles in the western Mojave Desert near Naval Air Weapons Station China Lake and encompasses portions of Inyo, Fresno, Tulare, Kern, Los Angeles, San Bernardino, and Mono counties in California and a small part of Esmeralda County in Nevada. R-2508 airspace is used by a variety of aircraft from all branches of the military, as well as by civilian aircraft. Activities within this special-use airspace (SUA) include low-level flights, air combat maneuvering training, routine research and development/testing and evaluation, and routine training. Refueling, supersonic operations, cargo/personnel drops, ordnance drops, and special missions are conducted in designated areas.¹ The Navy and the California Air National Guard (CANG) have initiated the establishment of a new SUA consisting of a Military Operations Area (MOA) and Air Traffic Controlled Assigned Airspace (ATCAA) above NAS Lemoore, California. The MOA and ATCAA will have the same perimeter boundary as the airspace controlled by the NASL RATCF. This airspace enables Navy squadrons at NAS Lemoore and the CANG to meet mandated DoD training objectives.

Aircraft noise consists of two major sources – *flight operations* and *ground engine maintenance “run-ups*.

3.3 Aircraft Operations

The primary noise sources at NASL are aircraft operations, including flight operations, and engine maintenance operations or run-ups.

3.3.1 Engine Run-up Operations

NASL performs engine maintenance run-ups to test engines at various power settings and durations and to check for any malfunctions. These run-ups can last anywhere from 2 to 60 minutes. In-frame aircraft maintenance run-ups are performed outside on the parking apron, in a maintenance hanger, or in specialized buildings, called test cells, built for

¹ More information on the R-2508 airspace complex can be found in the R-2508 Joint Land Use Study (Governors Department of Planning and Research March 2008).

such tests. Because some of the ground engine maintenance run-ups are performed at high power settings, these types of run-ups are normally restricted between the hours of 2200 (10:00 p.m.) and 0700 (7:00 a.m.).

Two types of run-up operations were modeled for this analysis:

- 1) Preflight run-up operations on each Hornet departure on the active runway prior to brake release; and
- 2) Maintenance run-up operations.

Hornet pilots report run-ups for no more than five seconds at 97% NC Takeoff Power. The frequency of those run-up operations equals the number of Hornet departure operations. Super Hornets do not typically conduct pre-flight run-ups (Wyle Laboratories, Inc. June 2010). Figure 3-1 shows NASL's run-up locations.

3.3.2 Flight Operations

Aircraft activities at NASL averaged approximately 210,000 aircraft operations over five calendar years, from 2002 to 2006. The peak year of operation was reached during 2004 (with 240,776 aircraft operations), followed by another high-tempo year in 2005 (212,002 aircraft operations). The year with the least amount of activity over the five-year study period was 2006 (178,904 aircraft operations). The calendar year 2006 (CY06) number of aircraft operations is about 15% lower than the five-year average (Wyle Laboratories, Inc. June 2010).

| YEAR | MILITARY | | CIVIL | | TOTAL |
|------|-------------|----------------|-------------|------------------|---------|
| | Navy/Marine | Other Military | Air Carrier | General Aviation | |
| 2002 | 201,083 | 2,226 | 537 | 5,615 | 209,461 |
| 2003 | 191,626 | 1,278 | 17 | 1,459 | 194,380 |
| 2004 | 236,805 | 2,314 | 47 | 1,610 | 240,776 |
| 2005 | 209,904 | 828 | 13 | 1,257 | 212,002 |
| 2006 | 176,263 | 1,186 | 7 | 1,448 | 178,904 |

Source: Wyle Laboratories, Inc. June 2010.

Notes:

- (1) Based on annual Air Traffic Activity Reports.
- (2) Counts do not include transitions through NASL airspace.
- (3) Touch-and-go (T&G) patterns, Field Carrier Landing Practice (FCLP), and Ground-Controlled Approach (GCA) patterns are counted as two operations.

According to NASL Air Traffic Control (ATC) personnel (Bitonio April 29, 2008), operation types include departures (from brake release), full-stop arrivals (either ‘straight-in’ or from an overhead-break), touch-and-go (T & G) patterns, field carrier landing practice (FCLP), and GCA operations.

A flight operation refers to any takeoff or landing. The takeoff and landing may be part of a training maneuver (or pattern) associated with the air station runway or may be associated with a departure or arrival of an aircraft to or from defense-related, special-use airspace. Certain flight operations (e.g., GCA Box Pattern, T&G, etc.) are conducted as patterns. A pattern consists of a takeoff and a landing operation.

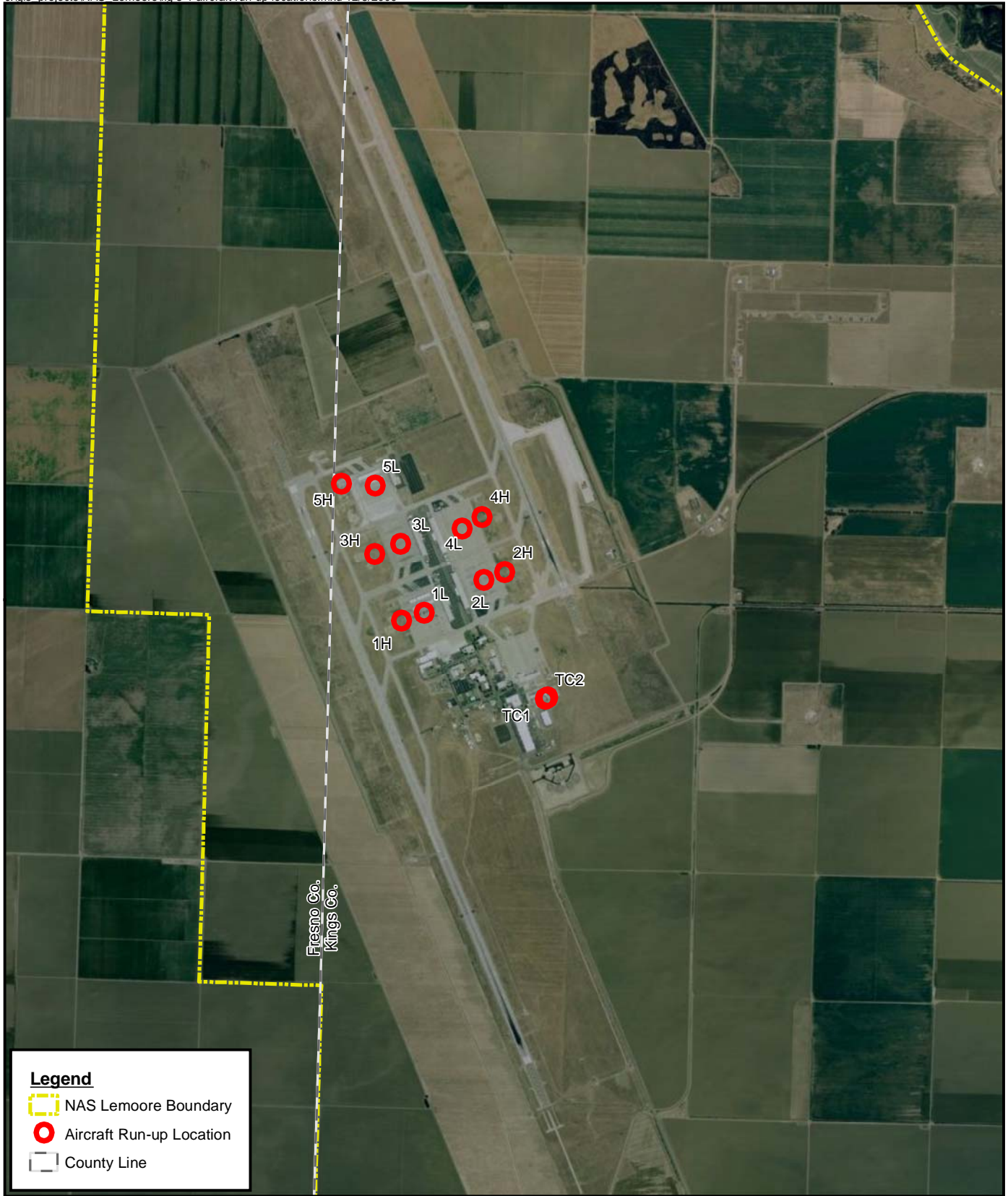
Basic flight operations at NASL are:

- **Departure.** An aircraft taking off to a local training area, a non-local training area, or as part of a training maneuver (e.g., T&G).
- **Straight-In/Full-Stop Arrival.** An aircraft lines up on the runway centerline, descends gradually, lands, comes to a full stop, and then taxis off the runway.
- **Overhead Break Arrival.** An expeditious arrival using visual flight rules. An aircraft approaches the runway 500 feet above the altitude of the landing pattern. Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and

performs a 180-degree descending turn to land on the runway.

- **Ground-Controlled Approach Box.** A radar or “talk down” approach directed from the ground by ATC personnel. ATC personnel provide pilots with verbal course and glide-slope information, allowing them to make an instrument approach during inclement weather. The GCA Box is counted as two operations—the landing is counted as one operation, and the takeoff is counted as another.
- **Touch-and-Go Operation.** 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. The T&G is counted as two operations—the landing is counted as one operation, and the takeoff is counted as another.
- **Field Carrier Landing Practice.** An aircraft practices simulated carrier landings. FCLPs are required training for all pilots before landing on a carrier. The number of FCLPs performed is determined by the length of time that has elapsed since the pilot’s last landing on a carrier.

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Legend




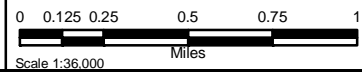
-  NAS Lemoore Boundary
-  Aircraft Run-up Location
-  County Line

Figure 3-1
Aircraft Run-up Locations
NAS Lemoore
Lemoore, California

NAS Lemoore
Lemoore, California



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3.3.3 NASL Flight Operations

The number of annual operations projected for NASL as part of the noise study conducted for this AICUZ report is shown in Table 3-2. The total projected number of air operations is 210,002. Flight operations categorized by aircraft and flight track can be found in the noise study (Wyle Laboratories, Inc. June 2010). The projected air operations analysis assumed that the Hornet aircraft may be replaced by F-35C and additional Super Hornet aircraft.

| Table 3-2 Prospective Annual Air Operations, NAS Lemoore, California | | | | | |
|---|------------------------|--------------------------|-------------------------------|----------------------------|----------------|
| Category | Operation Type | Day 0700-1900 | Evening 1900-21200 | Night 2200-0700 | Total |
| Based JSF | Departure | 17,942 | 2,016 | 202 | 20,160 |
| | Straight-in Arrival | 2,516 | 548 | 161 | 3,225 |
| | Overhead Break Arrival | 14,563 | 1,693 | 677 | 16,933 |
| | Touch-and-Go(1) | 11,963 | 1,252 | 696 | 13,911 |
| | FCLP(1) | 12,259 | 8,268 | 7,983 | 28,510 |
| | GCA(1) | 1,309 | 1,279 | 457 | 3,045 |
| | Total | 60,552 | 15,056 | 10,176 | 85,784 |
| Based F/A-18E/F | Departure | 23,784 | 2,672 | 267 | 26,723 |
| | Straight-in Arrival | 3,335 | 727 | 214 | 4,276 |
| | Overhead Break Arrival | 19,305 | 2,245 | 898 | 22,448 |
| | Touch-and-Go(1) | 15,858 | 1,660 | 922 | 18,440 |
| | FCLP(1) | 16,251 | 10,960 | 10,582 | 37,793 |
| | GCA(1) | 1,735 | 1,695 | 605 | 4,035 |
| | Total | 77,512 | 19,274 | 13,024 | 109,810 |
| Transient Jet | Departure | 684 | 73 | 6 | 763 |
| | Straight-In Arrival | 138 | 18 | 2 | 158 |
| | Overhead Break Arrival | 597 | 7 | 0 | 604 |
| | Touch-and-Go(1) | 651 | 77 | 15 | 743 |
| | FCLP(1) | 0 | 0 | 0 | 0 |
| | GCA(1) | 1,219 | 136 | 7 | 1,362 |
| | Total | 3,289 | 311 | 30 | 3,630 |
| Transient Large/Heavy | Departure | 214 | 43 | 15 | 272 |
| | Straight-In Arrival | 236 | 35 | 2 | 273 |
| | Overhead Break Arrival | 0 | 0 | 0 | 0 |
| | Touch-and-Go(1) | 385 | 53 | 5 | 443 |
| | FCLP(1) | 0 | 0 | 0 | 0 |
| | GCA(1) | 305 | 38 | 0 | 343 |

| Table 3-2 Prospective Annual Air Operations, NAS Lemoore, California | | | | | |
|---|------------------------|--------------------------|-------------------------------|----------------------------|----------------|
| Category | Operation Type | Day 0700-1900 | Evening 1900-21200 | Night 2200-0700 | Total |
| | Total | 1,140 | 169 | 22 | 1,331 |
| Transient-based Prop | Departure | 398 | 35 | 4 | 437 |
| | Straight-In Arrival | 357 | 57 | 11 | 425 |
| | Overhead Break Arrival | 11 | 0 | 0 | 11 |
| | Touch-and-Go(1) | 646 | 107 | 33 | 786 |
| | FCLP(1) | 0 | 0 | 0 | 0 |
| | GCA(1) | 107 | 18 | 5 | 130 |
| | Total | 1,519 | 217 | 53 | 1,789 |
| Transient-based General Aviation | Departure | 579 | 38 | 8 | 625 |
| | Straight-In Arrival | 536 | 75 | 15 | 626 |
| | Overhead Break Arrival | 0 | 0 | 0 | 0 |
| | Touch-and-Go(1) | 1,853 | 316 | 70 | 2,239 |
| | FCLP(1) | 0 | 0 | 0 | 0 |
| | GCA(1) | 202 | 54 | 7 | 263 |
| | Total | 3,170 | 483 | 100 | 3,753 |
| All Aircraft | Departure | 43,601 | 4,877 | 502 | 48,980 |
| | Straight-In Arrival | 7,118 | 1,460 | 405 | 8,983 |
| | Overhead Break Arrival | 34,476 | 3,945 | 1,575 | 39,996 |
| | Touch-and-Go | 31,356 | 3,465 | 1,741 | 36,562 |
| | FCLP(1) | 28,510 | 19,228 | 18,565 | 66,303 |
| | GCA(1) | 4,877 | 3,220 | 1,081 | 9,178 |
| | Total | 149,938 | 36,195 | 23,869 | 210,002 |

Source: Wyle Laboratories, Inc. June 2010.

Note:

(1) Counted as two operations.

Key:

FCLP = Field Carrier Landing Practice.

GCA = Ground Controlled Approach.

3.3.4 NASL Runway and Flight Track Utilization

Aircraft approaching or departing from the air stations are assigned specific routes or flight tracks. Flight tracks are represented on illustrations as single lines; however, flights vary due to aircraft performance, pilot technique, and weather conditions, so the actual flight track is a flight corridor, often one-half mile to several miles wide. The flight tracks shown in this AICUZ report are idealized representations.

The predominant arrival, departure, and pattern flight tracks and their approximated flight corridors are shown on Figures 3-2 through 3-4. Arrival and departure flight tracks that receive ten or more average daily flight events are identified on Figures 3-2 and 3-3 due to their contribution to the noise environment. Flight track 4RG1/2LG1 (Figure 3-4) is used approximately 95% of the time because Runway 32L is NASL's primary instrument runway. Runway 32L is preferred to Runway 32R because its instrument lighting and carrier box markings support FCLP and because the general design includes a high speed taxiway that allows for refueling with minimum delay between operations.

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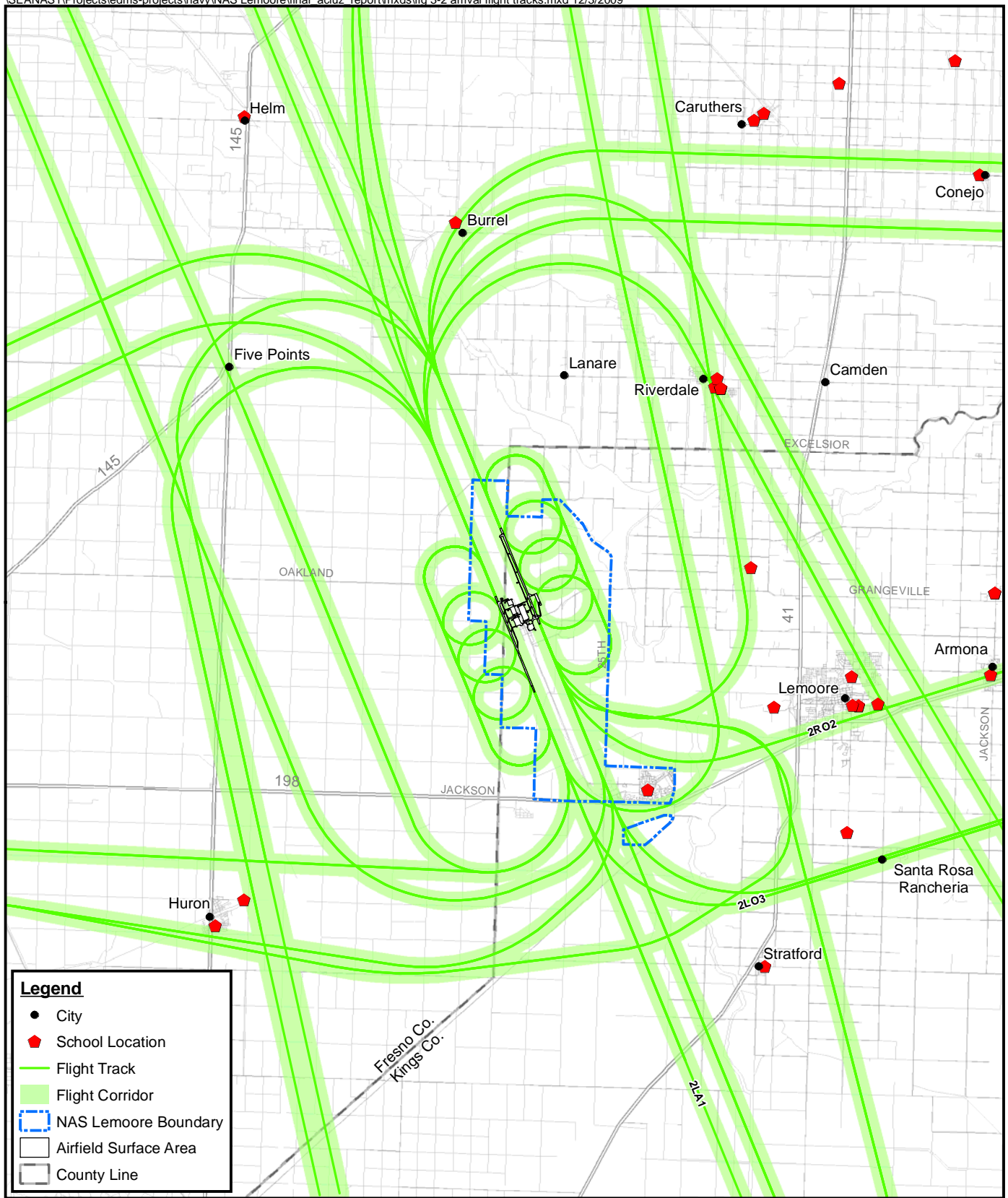
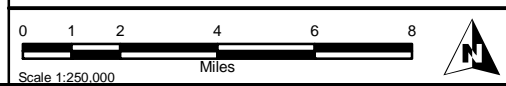


Figure 3-2
 Arrival Flight Tracks (Fixed Wing)
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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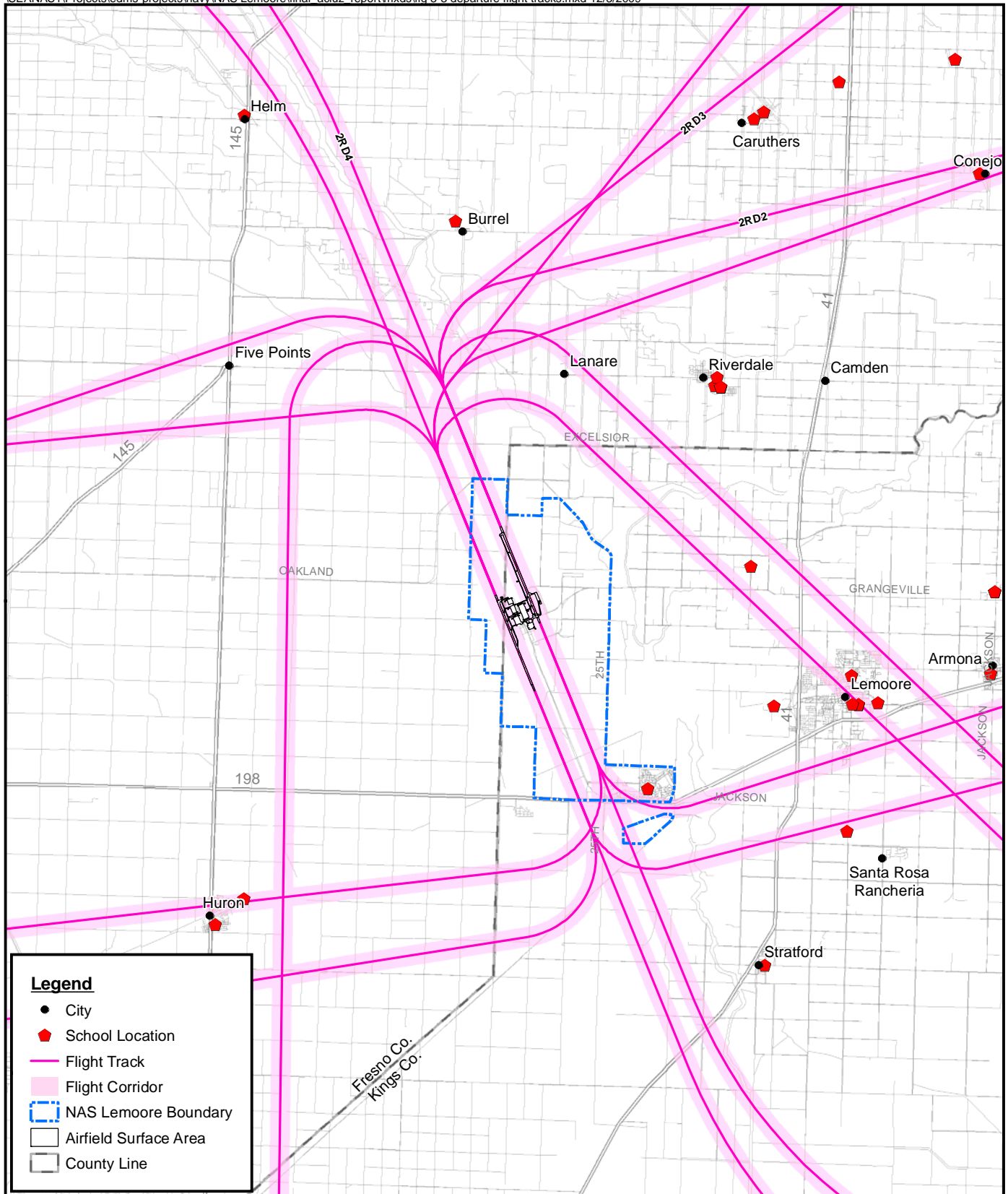
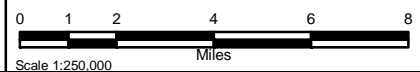


Figure 3-3
 Departure Flight Tracks (Fixed Wing)
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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4 Aircraft Noise

Aircraft noise can be a concern for people living in communities surrounding an installation. Thus, the impact of aircraft noise is a critical factor in planning future land uses near installations. NASL defines certain areas as high-noise zones under their AICUZ Program because the noise from aircraft operations may significantly impact land use in those areas. This section discusses noise associated with aircraft operations at NASL including average noise levels, noise complaints, noise abatement/flight procedures, and noise contours.

4.1 What is Sound/Noise?

Noise exposure at NASL is measured using the **community noise equivalent level (CNEL)** noise metric.

Sound is the result of a sound source inducing vibrations in the air. Noise can be defined as unwanted sound. Some of the potential sources of noise include roadway traffic, business/industrial facilities, railways, and aircraft operations. Whether sound becomes noise depends on the listener, but sound can become noise when it interferes with normal activities.

In this document, all sound or noise levels are measured in A-weighted decibels (dBA), which are units of sound pressure adjusted to the range of human hearing with intensity greater than the ambient or background sound pressure. Normal speech has a noise level of approximately 60 dBA. Generally, a sound level above 110 dBA will begin to be uncomfortable to the human ear.

The noise exposure from aircraft at NASL is measured using the community noise equivalent level (CNEL). CNEL is a variant of the day-night average sound level (DNL) used in California. The DNL and CNEL metrics developed by the U.S. Environmental Protection Agency (EPA) present reliable measures of community sensitivity to aircraft noise.

CNEL averages aircraft sound levels at a location over a 24-hour period. Both CNEL and DNL add an additional 10 decibels (dB) to

events occurring between 10:00 p.m. and 7:00 a.m. CNEL also adds an additional 5 dB to events occurring between 7:00 p.m. and 10:00 p.m. These decibel “penalties” represent the added intrusiveness of sounds occurring during evening and normal sleeping hours when sensitivity to noise is increased and ambient sound levels are typically lower.

By combining factors most noticeable about noise annoyance—loudness, total noise energy (number and/or length of noise events) and time of day—CNEL provides a single measure of overall noise impact. Scientific studies and social surveys conducted to evaluate community annoyance with all types of environmental noise have found DNL and CNEL to be the best measures of that annoyance (Federal Interagency Committee on Urban Noise 1980; Federal Interagency Committee on Noise 1992).

Although CNEL provides a single measure of overall noise impact, it does not provide specific information on the number of noise events or the individual sound levels that occur during the day. For example, a CNEL of 65 dBA could result from only a few noisy events or from a large number of quieter events.

The CNEL is depicted visually as a noise contour that connects points of equal value. The noise contours in this document are depicted in 5 dBA increments. The area between two noise contours is known as a noise zone. The noise exposure area is divided into noise zones as follows:

- Less than 65 CNEL
- 65 to 74 CNEL
- Greater than 75 CNEL.

For land-use planning purposes, the noise zones above are categorized as Noise Zone 1 (less than 65 CNEL), which is generally considered an area of low or no noise impact; Noise Zone 2 (65 to 75 CNEL), which is an area of moderate impact, where some land-use controls are required; and Noise Zone 3 (greater than 75 CNEL), which is the most severely impacted area and requires the greatest degree of land-use control.

For land-use planning purposes, noise zones are grouped into three noise zones:

Noise Zone 1 (less than 65 CNEL) is generally considered an area of low or no noise impact.

Noise Zone 2 (65 to 74 CNEL) is an area of moderate impact, where some land use controls are required.

Noise Zone 3 (greater than 75 CNEL) is the most severely impacted area and requires the greatest degree of land use control.

4.2 Airfield Noise Sources

The main sources of noise at airfields are flight operations or run-ups. Computer models are used to develop noise contours, based on information about these operations, including the following factors:

- Type of operation (arrival, departure, and pattern)
- Number of operations per day
- Time of operation
- Flight track
- Aircraft power settings, speeds, and altitudes
- Number and duration of maintenance run-ups
- Terrain
- Surface type
- Environmental data (temperature and humidity).

4.3 Noise Complaints

Individual response to noise levels varies and is influenced by many factors:

- Activity the individual is engaged in at the time of the noise
- General sensitivity to noise
- Time of day
- Loudness of the event
- Length of time an individual is exposed to a noise
- Predictability of noise
- Average temperature.

A small increase in noise level generally will not be noticeable, but as the change in noise level increases, individual perception is greater, as shown in Table 4-1.

Noise complaint procedures for NASL are outlined in NASL Instruction 3700.1D, Aircraft Noise Complaints. The procedures address how noise complaints shall be received, the responsible parties to be advised of the noise complaint, and what type of action is required to address the complaint. NASL recorded one noise complaint in 2007,

during an F/A18 overflight arriving from overseas deployment. The previous 1993 AICUZ reported an annual average of 7 aircraft-related noise complaints. The resident population in the NASL area is generally accustomed to the presence of jets and their accompanying noise. Noise complaints typically have occurred during unscheduled operations and/or arrivals (Bitonio April 29, 2008).

| Table 4-1 Subjective Response to Noise | |
|---|-------------------------------------|
| Change | Change in Perceived Loudness |
| 1 decibel | Requires close attention to notice |
| 3 decibels | Barely noticeable |
| 5 decibels | Quite noticeable |
| 10 decibels | Dramatic – twice or half as loud |
| 20 decibels | Striking – fourfold change |

4.4 Noise Abatement/Flight Procedures

NASL is proactive with respect to **noise abatement** and is committed to minimizing noise impacts without compromising operational and safety requirements.

NASL actively pursues operational measures to reduce noise. The Navy conducts noise abatement procedures to the best of its ability, commensurate with safety and operational training requirements. Noise abatement procedures at NASL are implemented under the NASL air operations manual and are summarized in Table 4-2. The purpose of these procedures is to minimize noise in recognition of community response to aircraft noise at NASL.

| Table 4-2 Noise Abatement/Flight Procedures, Naval Air Station Lemoore, California |
|--|
| <p>Noise Abatement</p> <ul style="list-style-type: none"> ▪ To the maximum extent possible, do not fly over base administration and housing areas, or the cities of Hanford and Lemoore, below 4,000 feet, unless directed by Air Traffic Control. ▪ When the flight pattern Flight Track 4LG1/2RG1 (GCA Box Pattern) is near saturation it passes directly over the Town of Stratford at 1,800 feet above mean sea level. If both Runways 32R and 32L are being utilized then the pattern height is raised to above 1,800 feet to allow for simultaneous instrument runway operations. |

Source: NASL Instruction 3710.1P, 2002.

Flight Track 4LG1/2RG1 (GCA Box Pattern) has historically passed directly over the Town of Stratford. NASL flight instructions were established to reduce noise impacts (see Table 4-2). As part of the

AICUZ planning process and due to results of the 2008 Aircraft Noise Study for NASL (Wyle Laboratories, Inc. September 2008), the GCA flight track was extended 1 mile to the south to avoid overflying the Town of Stratford (Wyle Laboratories, Inc. June 2010). The extended GCA flight track is modeled by this AICUZ report.

Flight Track 4LG1/2RG1 (GCA Box Pattern) also passes directly over West Hills Community College. Because of the density of housing in the area, the flight track can not be shifted to avoid the college. The pattern cannot be altered because of radar/instrument flight rules governing separation requirements between aircraft and also because the pattern ensures that the pilots fly a familiar profile with established standard rates of turn and allowing for a 30-degree turn-on to the final approach to Runway 32R to ensure there are no conflicts with Runway 32L's pattern (Benitez April 29, 2008).

4.5 Noise Contours

The Navy periodically conducts noise studies to assess the noise impacts of aircraft operations. The need to conduct a noise study is generally prompted by a significant change in aircraft operations—either by the number of operations conducted at the airfield, the numbers and types of aircraft using the airfield, or the flight paths used for airfield departure/arrival changes.

The Navy uses NOISEMAP, a widely accepted computer model that projects noise impacts around military airfields. NOISEMAP calculates CNEL contours resulting from aircraft operations using variables such as power settings, aircraft model and type, maximum sound levels and duration, and flight profiles for a given airfield.

The AICUZ process calls for the modeling and analysis of existing conditions and any future operational changes that can reasonably be predicted. Available unclassified information was used to provide a forecast of air operation activity levels for NASL. These operational projections were revalidated for this report. In support of the NASL AICUZ report, prospective noise contours for NASL that

The Navy uses **NOISEMAP**, a computer model, to project noise impacts.

incorporate the forecast of air operation activity, site-specific operational data, and the most recent F-35 JSF noise profile information were modeled (Wyle Laboratories, Inc. June 2010).

4.5.1 2020 AICUZ Noise Contours

The 2020 AICUZ noise contours for NASL extend off-station in all compass directions (see Figure 4-1). The formations of the noise contours largely reflect departure and GCA/FCLP pattern flight tracks. Noise Zone 1 extends in a northeastern direction due to the 2RD2 departure flight track (see Figure 3-3) and extends in long loops running north-south along the runway axis due to the GCA/FCLP flight tracks (Figure 3-4). Noise Zone 2 forms hook patterns running perpendicular to the runway axis. Noise Zone 3 forms tight loops to the west of Runway 14R/32L and east of Runway 14L/32R (Figure 4-1). Overall, the 2020 NASL noise contours cover approximately 146,775 acres.

4.6 Comparison of 1993 and 2020 AICUZ Noise Contours

The 2020 AICUZ noise contours have changed in size and location from the 1993 AICUZ noise contours (see Figure 4-2 and Table 4-3). Although the most recent AICUZ document prior to this update is the 1993 AICUZ, updated noise contours have been provided via the 1999 Environmental Impact Statement for the introduction of the F/A-18E/F Super Hornet. The Super Hornet EIS noise contours showed an increase in size and location due to the introduction of the Super Hornet. A complete report methodology for the development of the 1993 noise contours was not provided in the 1993 AICUZ document. However, sufficient information exists to conduct a comparative analysis of the two sets of noise contours.

The modeled 2020 noise contours cover a larger area and extend farther in every direction (see Figure 4-2) than do the noise contours in the 1993 AICUZ report. The 65 to 74 CNEL noise contours and the greater-than-75 CNEL noise contours increased by more than 200% from their previous size. Increases in the modeled noise contours are due

multiple factors including: newer aircraft currently stationed at NAS Lemoore (Super Hornet), JSF aircraft evaluated under the prospective scenario, changes in air operations, and improvements in the noise modeling software. All of the modeled 2020 noise contours extend farther east toward the City of Lemoore. The 60 to 64, 65 to 69, and 70 to 74 CNEL noise contours extend southeast beyond the Town of Stratford. The 60 to 64 CNEL noise contour also extends northeast over the rural community of Lanare and north over the community of Burrel. Overall, the area covered by the greater-than-65 CNEL noise contour will increase by approximately 51,133 acres between 1993 and 2020 (see Table 4-3).

As described above and depicted on Figure 4-2, the modeled 2020 AICUZ noise contours have changed in size and location from the 1993 AICUZ noise contours. The primary reasons for the increase in the noise contours are due to newer aircraft stationed at NAS Lemoore, changes in flight operations and flight tempos based on new training requirements, and improvements in the noise modeling software used to create the modeled noise contours. Noise contours, as discussed in Section 4.5, incorporate aircraft-specific noise data, including aircraft operations, using such variables as power settings, aircraft model and type, maximum sound levels, and duration and flight profiles for a given airfield (see Table 4-4 for representative sound exposure levels [SELs] and maximum sound level [L_{max}] for representative aircraft flown in 1993, 2010, and 2020). Therefore, the addition and/or removal of an aircraft from the installation will result in a change in the noise contours. As such, each aircraft has specific operational profiles that determine flight patterns.

Since 1993, NAS Lemoore has transitioned from the F/A-18C/D Hornet to the F/A-18E/F Super Hornet and, if selected following an extensive environmental review, would transition in part to the F-35C Joint Strike Fighter. As shown in Table 4-4, depending on the flight operation, each aircraft has a specific noise exposure, and depending on the number of operations conducted, contributes differently to the overall

noise contours. (For a detailed discussion on noise please see Wyle Noise Report 08-11R, June 2010.)

As mapped, noise propagates from the flight pattern and, as such, will vary from aircraft to aircraft and pattern to pattern as they change over time. As a result, aircraft mix and flight patterns have changed since the 1993 AICUZ noise contours, resulting in changes in size and location of the modeled 2020 noise contours.

Additionally, improvements in the noise model contribute to changes in the size and location of the 2020 noise contours. The operational tempo of an installation also impacts the noise contours. As the operational tempo of an installation varies over time, so do the noise contours. However, noise contours are not a direct reflection of the operational tempo. If operations decrease, the noise contours do not necessarily decrease; likewise, if operations increase the noise contours do not necessarily increase. This is true with respect to the aircraft mix at the installation as noise associated with specific aircraft varies. NOISEMAP, as specified in OPNAVINST 11010.36C, was used to calculate and plot the 60 through 85 CNEL noise contours for the 2010 AICUZ. The 1993 noise contours were modeled based on requirements in OPNAVINST 11010.36A. Noise-mapping technology has significantly progressed since the 1993 noise contours were developed. Advances in noise-mapping technology contribute to the changes in size and location of the 2020 noise contours.

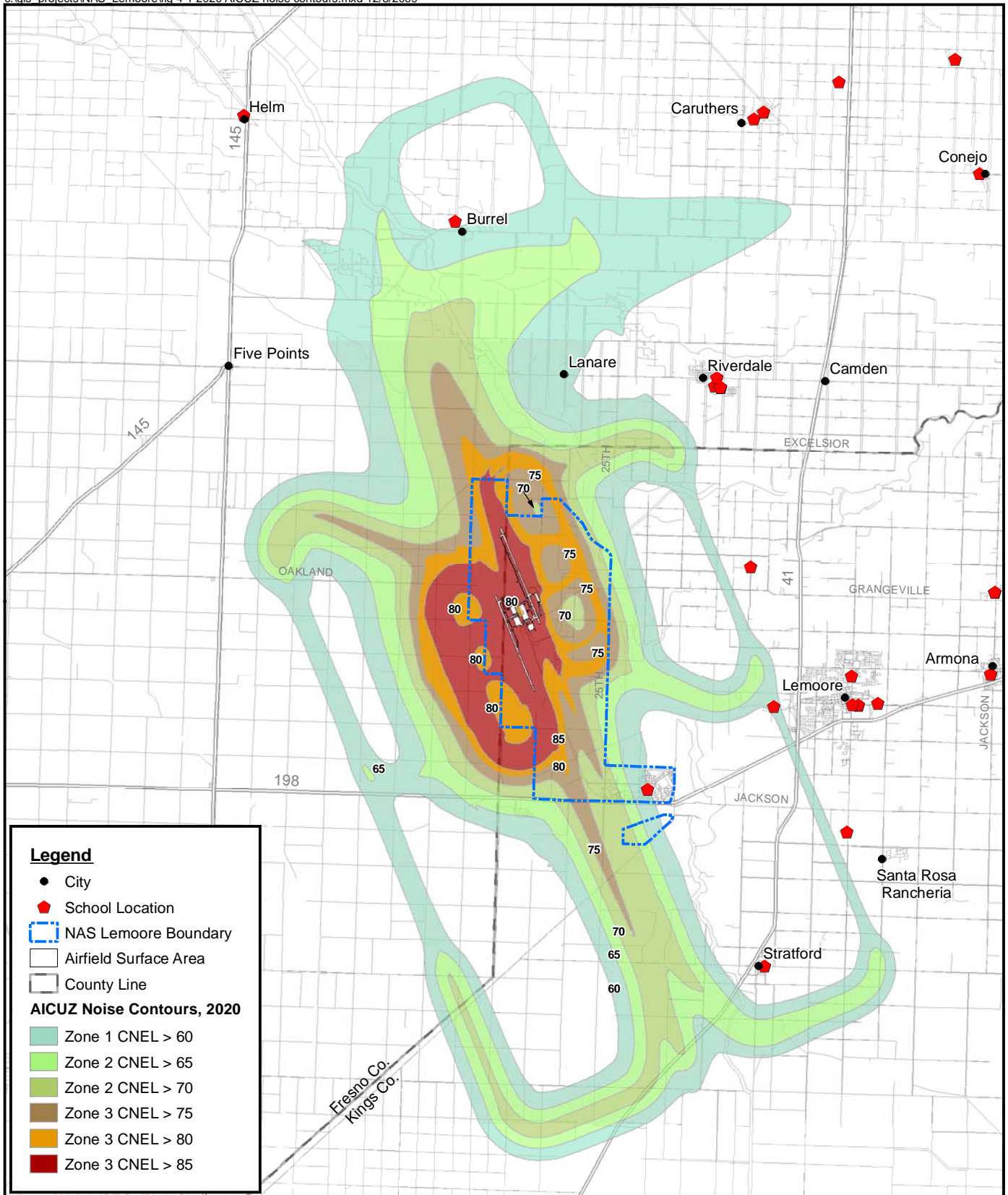
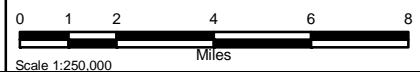


Figure 4-1
 2020 Prospective AICUZ Noise Contours
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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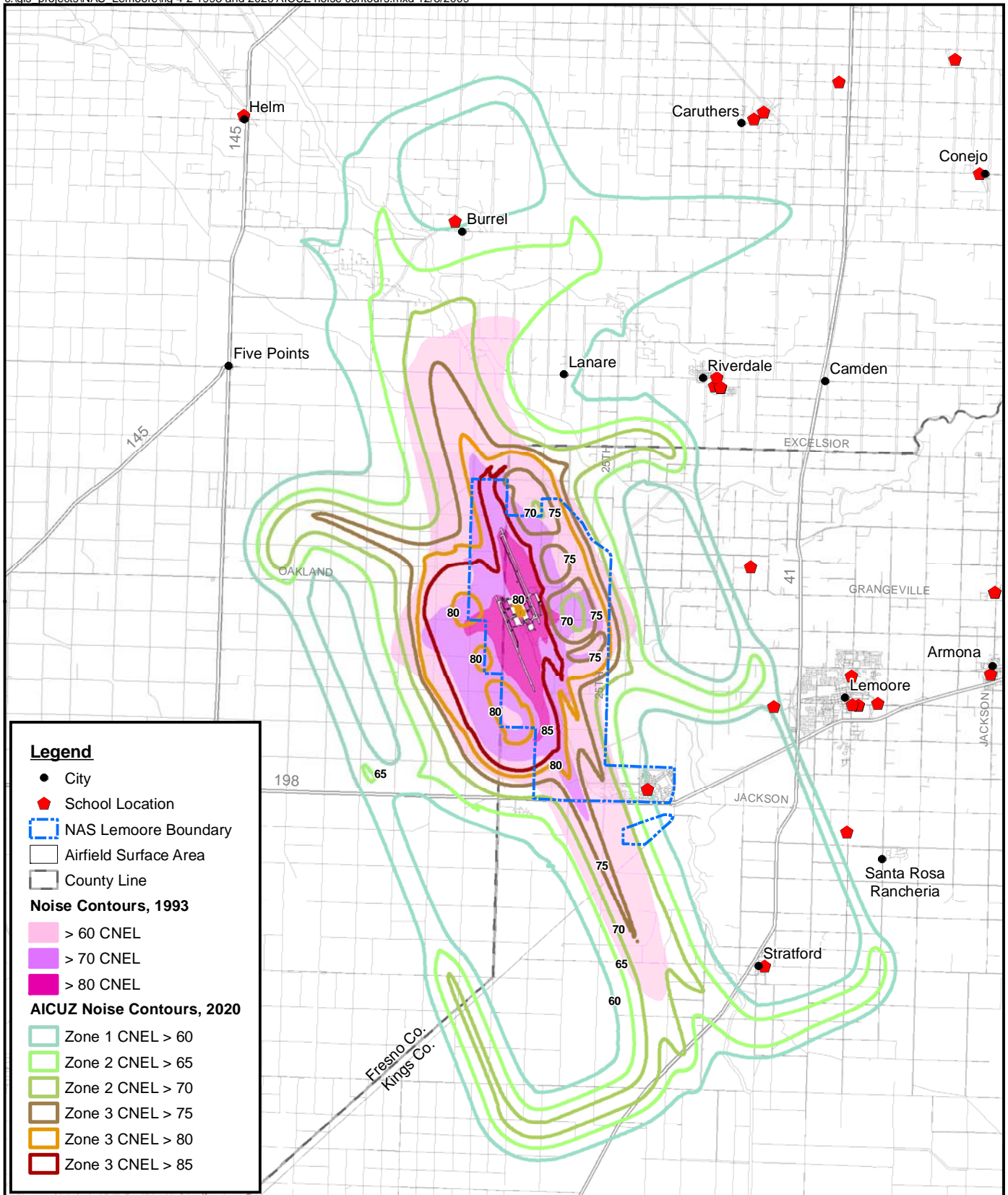
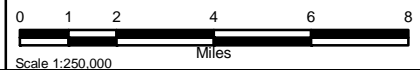


Figure 4-2
 Comparison of 1993 and 2020 Prospective AICUZ Noise Contours
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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| Table 4-3 Total Areas within Noise Zones – 1993 and 2020 (Community Noise Equivalent Level [CNEL]), Naval Air Station Lemoore, California | | |
|--|-----------------------------------|-------------------------------|
| Noise Zone (CNEL) | TOTAL LAND AREA (in acres) | |
| | 1993 AICUZ Noise Zones | 2020 AICUZ Noise Zones |
| 60 to 64 | Not Available | 61,397 |
| 65 to 69 | 21,928 | 34,411 |
| 70 to 74 | | 21,844 |
| 75 to 79 | | 10,372 |
| 80 to 84 | 12,317 | 8,636 |
| 85+ | | 10,115 |
| TOTAL AREA | 34,245 | 146,775 |

Sources: U.S. Department of the Navy 1993; Wyle Laboratories Inc. June 2010.

Notes:

The 1993 AICUZ Report utilized data from a 1988 noise study.
 Figures may not sum exactly due to rounding.

Key:

AICUZ = Air Installations Compatible Use Zones.

| Table 4-4 Sound Exposure Levels and Maximum Sound Levels for Representative Flight Conditions | | | | | | | | | | | | |
|--|------------------|------------------------------------|------------------|------------------------------|------------------|------------------------------------|------------------|------------------------------|----------------------------|------------------------------------|------------------|------------------------------|
| Condition | F/A-18C/D | | | | F/A-18E/F | | | | F-35C⁽¹⁾ | | | |
| | Power %NC | Speed (knots)⁽²⁾ | SEL (dBA) | L_{max} (dBA) | Power %NC | Speed (knots)⁽²⁾ | SEL (dBA) | L_{max} (dBA) | Power %ETR | Speed (knots)⁽²⁾ | SEL (dBA) | L_{max} (dBA) |
| Departure through 1,000 ft AGL (not co-located) | 97 | 300 | 114 | 108 | 97 | 250 | 116 | 113 | 100 | 300 | 117 | 114 |
| Departure through 10,000 ft MSL (prior to Hwy 41) | 97 | 310 | 91 | 77 | 97 | 350 | 91 | 83 | 100 | 350 | 91 | 83 |
| Non-Break Arrival through 1,800 ft MSL (near Initial Points) | 88 | 135 | 103 | 95 | 85 | 135 | 110 | 103 | 35 | 170 | 91 | 84 |
| FCLP on Downwind (600 ft AGL) | 88 | 135 | 114 | 108 | 85 | 135 | 118 | 113 | 57 | 145 | 113 | 107 |
| GCA Box mid-downwind (1,800 ft MSL) | 83 | 200 | 91 | 84 | 83 | 200 | 102 | 93 | 33 | 200 | 89 | 83 |

Source: Wyle 2010.

Notes:

- 1) Modeled with F-35A (Edwards AFB data 2008).
- 2) May be interpolated for the condition.

Key:

- ft AGL = feet above ground level.
- ft MSL = feet mean sea level.
- FCLP = Field Carrier Landing Practice.
- GCA = Ground Controlled Approach.
- dBA = A-weighted decibels.
- NC =
- SEL = sound exposure level.
- L_{max} = maximum sound level.

5 Airfield Safety

The Navy has identified airfield safety issues to assist the community in developing land uses compatible with airfield operations. These issues include accident potential and hazards within the airfield vicinity that obstruct or interfere with aircraft and departures, pilot vision, communications, or aircraft electronics.

While the likelihood of an aircraft mishap occurring is remote, the Navy identifies areas of accident potential to assist in land-use planning. The Navy has identified APZs around its runways based on historical data for aircraft mishaps. The Navy recommends that certain land uses that concentrate large numbers of people— such as apartments, churches, and schools—be constructed outside the APZs.

In addition, the FAA and the military have defined flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks and surrounding the airfield. For the safety of the aircraft, the heights of structures and vegetation are restricted in these zones. The flight safety zones are designed to minimize the potential harm if a mishap does occur.

Other hazards to flight safety that should be avoided in the airfield vicinity include:

- Uses that would attract birds
- Uses that generate EMI with aircraft communication, navigation, or weapons systems
- Lighting (direct or indirect) that could impair pilot vision
- Uses that may cause smoke, steam, or dust.

5.1 Accident Potential Zones

In the 1970s, recognizing the need to identify areas of accident potential, the military conducted a tri-service study of earlier accident and operations data. The study showed that most aircraft mishaps occur

on or near the runway or along the centerline of the runway, diminishing in likelihood with distance. Using the study, the DoD has identified APZs as areas where an aircraft accident is most likely to occur (if one were to occur); the APZs do not reflect the probability of an accident. APZs follow departure, arrival, and pattern flight tracks and are based upon analysis of historical data.

5.1.1 Aircraft Mishaps

There are three categories of aircraft mishaps. The most severe is a Class A mishap. This is an accident in which the total cost of damage to property or aircraft exceeds \$1 million, a naval aircraft is destroyed or missing, or any fatality or permanent total disability results from the direct involvement of naval aircraft.

From 2003 to 2008, there have been five Class A mishaps at NASL (Bitonio April 29, 2008). The last recorded Class A incident occurred in 2007, involving an F/A-18 breaking a landing gear, which resulted in the aircraft performing 360-degree turns down Runway 14R upon landing (Bitonio April 29, 2008). Prior to that, in 2006 a mid-air collision between two Navy aircraft occurred during a local training mission, resulting in one fatality. In 2004, an aircraft overturned on landing rollout, resulting in minor injuries. In 2003, two Class A incidents occurred: the first involved a stuck throttle in flight, forcing the pilot to eject as the aircraft left the runway upon landing. The second Class A incident in 2003 involved an aircraft landing off the runway and striking the arresting gear engine on touchdown (Hobbs July 11, 2008). There have been other, minor incidents around the NASL airfield that are not considered Class A mishaps.

5.1.2 APZ Configurations and Areas

Clear Zones and APZs are areas in the vicinity of airfield runways where an aircraft mishap is most likely to occur (if one were to occur). While the likelihood of a mishap is remote, the Navy recommends that land uses within APZs be minimal or low density to ensure the maximum protection of public health and property. The DoD

uses two classes of fixed-wing runways for the purpose of defining APZs: Class A runways for light aircraft and, generally, runways of less than 5,000 feet, and Class B runways for heavy aircraft and runway lengths exceeding 8,000 feet. Runways 14R/32L and 14L/32R at NASL are Class B runways.

The components of a standard APZ are identified on Figure 5-1 and are defined as follows (adapted from OPNAVINST 11010.36C [U.S. Department of the Navy 2008]):

- **Clear Zone.** Extends 3,000 feet immediately beyond the runway and has the highest potential for accidents. It measures 1,500 feet wide at the end of the runway and 2,284 feet wide at its outer edge. A Clear Zone is required for all active runways and should remain undeveloped.
- **APZ 1.** Extends 5,000 feet beyond the Clear Zone, with a width of 3,000 feet. An APZ 1 is typically rectangular; however, when circumstances warrant, the APZ may be curved to correspond with predominant flight tracks. An APZ 1 area is provided for flight tracks that experience 5,000 or more annual operations (departures or approaches).
- **APZ 2.** Extends 7,000 feet beyond APZ 1 (or the Clear Zone if APZ 1 is not used), with a width of 3,000 feet. If APZ 1 is not warranted, the APZ 2 may still be used if an analysis of operations and/or accidents indicates a need for it. Similar to APZ 1, the geometric configuration of APZ 2 may also be curved. When FCLP is an active aspect of aircraft operations at an installation, APZ 2 extends the entire FCLP track beyond APZ 1.

An accident is more likely to occur in APZ 1 than APZ 2, and is more likely to occur in the Clear Zone than in APZ 1 or APZ 2. An APZ 2 area is designated whenever APZ 1 is required. APZs extend from the end of the runway but apply to the predominant arrival and departure flight tracks used by the aircraft. Therefore, if an airfield has more than one predominant flight track to or from the runway, APZs can extend in the direction of each flight track (Figure 5-1).

Most land uses within the Clear Zone are incompatible with military aircraft operations. For this reason, the Navy's policy is to acquire sufficient real property interests in land within the Clear Zone to ensure that incompatible development does not occur. Within APZs 1

and 2, a variety of land uses are compatible; however, people-intensive uses (e.g., schools, apartments, etc.) should be restricted because of the greater risk in these areas. When events resulting in threats to operational integrity from incompatible development (encroachment) occur, and when local communities are unwilling or unable to take the initiative in combating the threat via their own authority, consideration will be given by the Navy to acquire real estate interests (U.S. Department of the Navy 2008). Outside the Clear Zone, APZ 1, and APZ 2, the risk of aircraft accidents is not significant enough to warrant special consideration in land-use planning.

5.1.3 Comparison of 1993 and 2010 AICUZ APZs

Figure 5-2 illustrates the prospective 2010 APZs generated as part of this AICUZ report. All Clear Zones and the majority of APZ 1 for both runways are contained within the NASL base boundary, while a significant portion of APZ 2 extends in a loop over primarily agricultural land to the east and west of NASL.

Figure 5-3 compares the 1993 and 2010 APZs at NASL. Both the 1993 and 2010 AICUZ reports include straight and curved APZs from runway end 14L. The 1993 AICUZ report shows one additional APZ extending from the east side of runway 14L/32R. It also contains two curved APZs extending from runway end 32R, whereas the 2010 AICUZ report contains three curved APZs. Both reports include a straight and a curved APZ extending from runway end 32L and an additional curved APZ extending off the west side of runway 14R/32L. Both reports also have a curved APZ extending from runway end 14R; however, the 1993 AICUZ report has an additional straight APZ extending westward from that runway end. In the 2010 report, runways 14L/32R and 14R/32L have a closed loop APZ 2 that connects the curved APZs extending from each runway end. This AICUZ report reflects current Navy guidelines for closed loop APZs on Field Carrier Landing Practice (FCLP) pattern flight tracks. The 1993 AICUZ report pre-dates guidance for closed loop APZs on FCLP pattern flight tracks

and therefore the 1993 APZs do not include closed loop APZ 2s on runways 14L/32R and 14R/32L.

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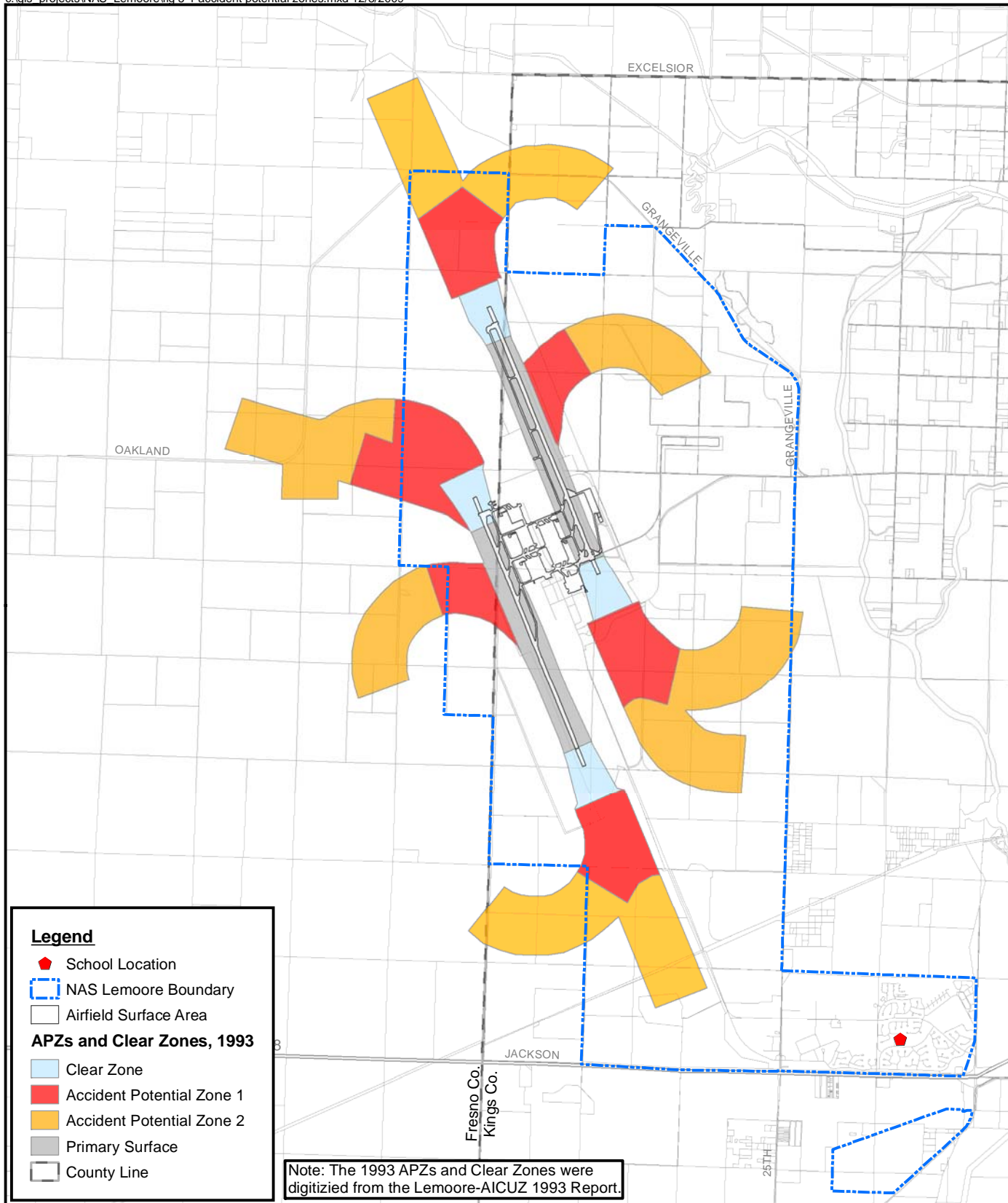
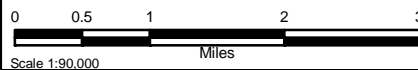


Figure 5-1
1993 Accident Potential Zones
NAS Lemoore
Lemoore, California

NAS Lemoore
Lemoore, California



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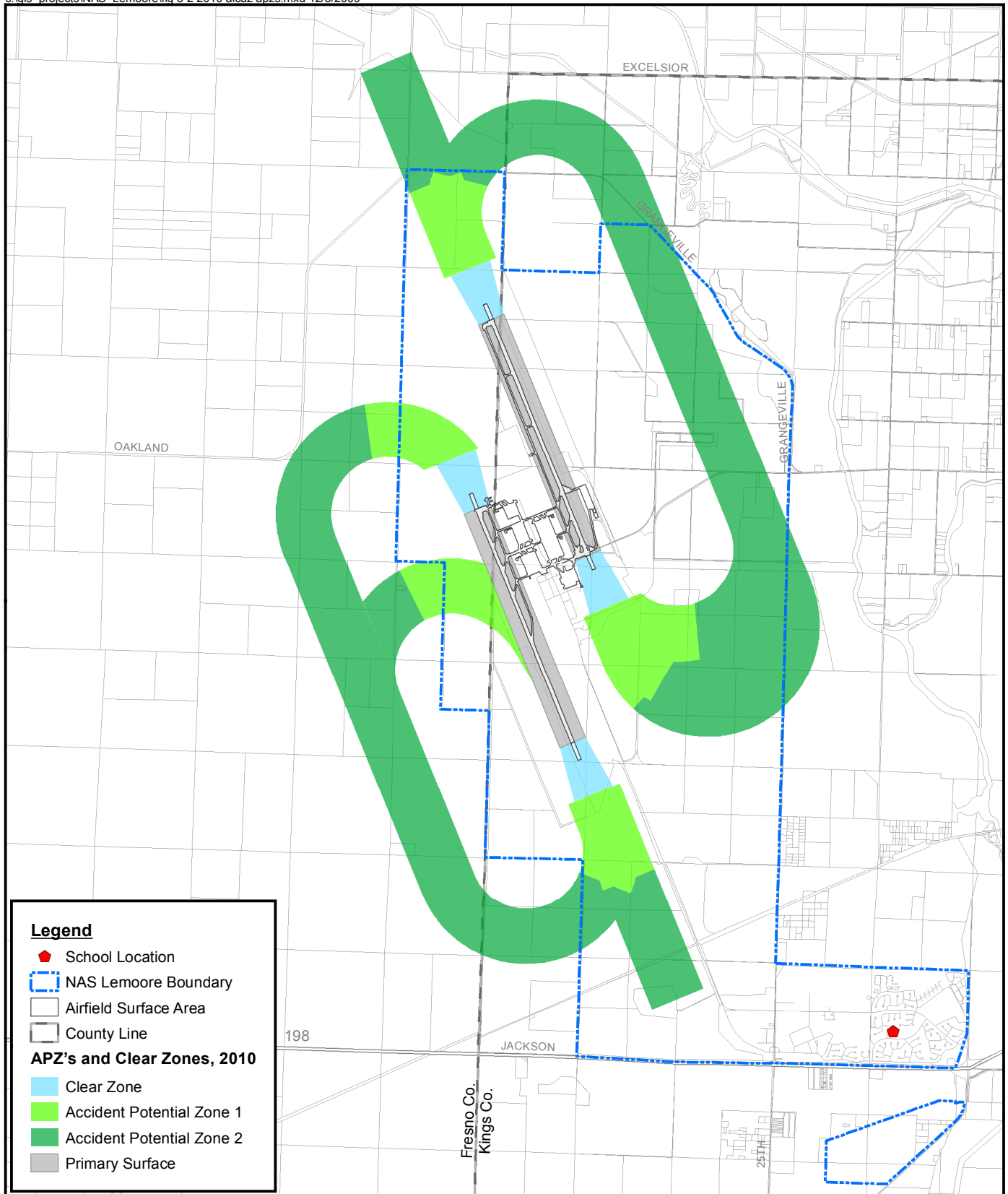


Figure 5-2
2010 AICUZ APZs
NAS Lemoore
Lemoore, California

NAS Lemoore
Lemoore, California



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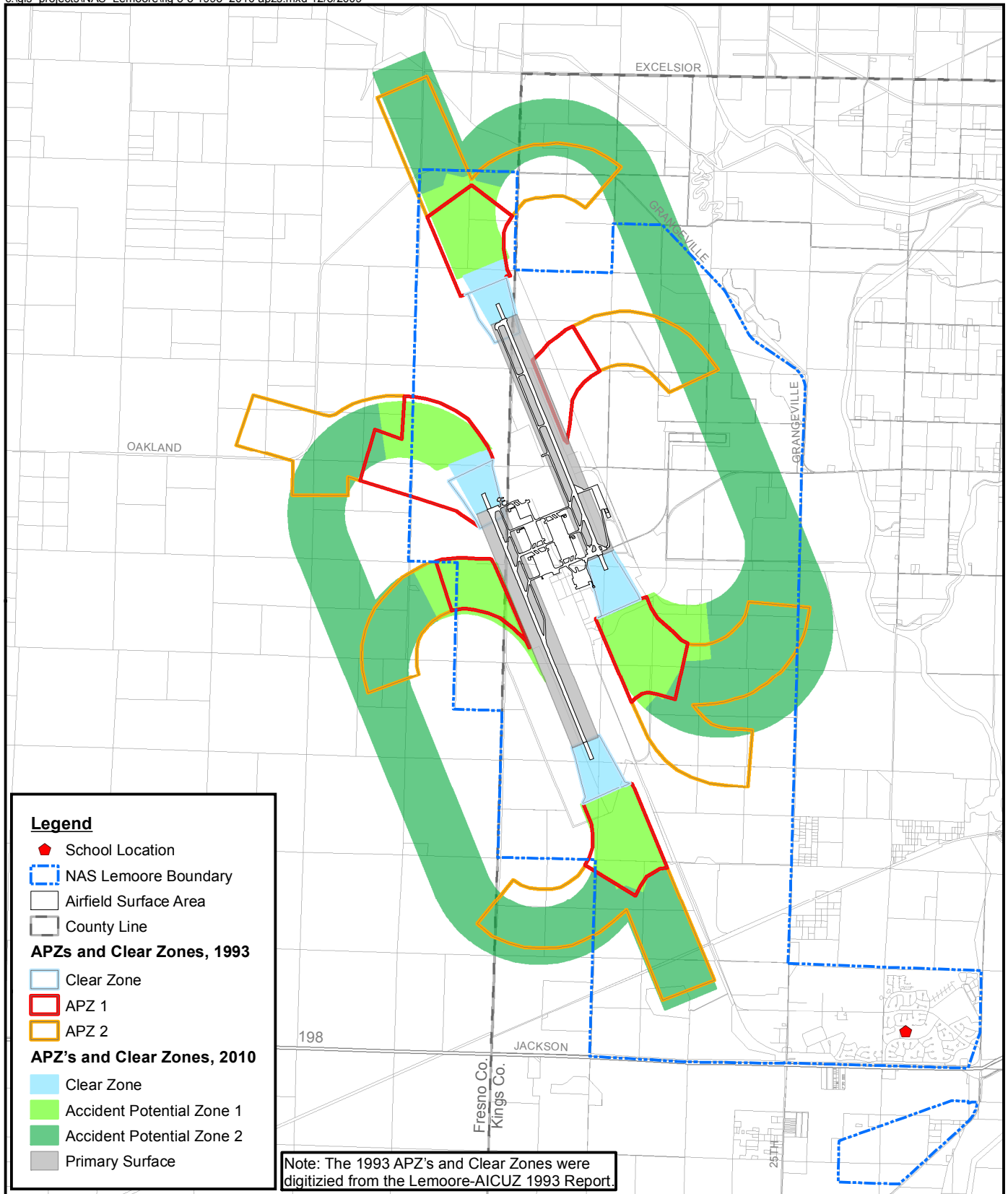
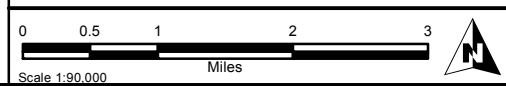


Figure 5-3
 Comparison of 1993 and 2010
 AICUZ APZs
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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Table 5-1 provides a comparison of the acreages that comprise the Clear Zone and each APZ in the 1993 report and the 2010 report. As the table illustrates, the 2010 APZs comprise 2,084 more acres of land than the 1993 APZs.

| Table 5-1 Total Land Area within 1993 and 2010 Clear Zones and Accident Potential Zones, Naval Air Station Lemoore, California | | | | |
|---|---------------------------|----------------------|----------------------|---------------------------|
| Airfield | Clear Zone (acres) | APZ 1 (acres) | APZ 2 (acres) | Total Area (acres) |
| 1993 NASL APZs | 628 | 2,408 ^(a) | 4,820 | 7,856 |
| 2010 NASL APZs | 522 | 2,004 | 7,414 | 9,940 |

Note:

(a) Acreage estimate based on seven APZs, given the amount of overlap between departures.

5.2 Imaginary Surfaces

Imaginary planes and transition surfaces define the required airspace that must remain free of obstructions to ensure safe flight approaches, departures, and patterns. Obstructions may include natural terrain and manmade features such as buildings, towers, poles, and other vertical obstructions to airspace navigation. Brief descriptions of the imaginary surfaces for Class B fixed-wing runways are provided in Table 5-2. These areas are labeled on Figure 5-4, and Figure 5-5 shows the composite imaginary and transitional surfaces at NASL.

| Table 5-2 Imaginary Surfaces – Class B Fixed-Wing Runways | |
|--|---|
| Planes and Surfaces | Geographical Dimensions |
| Class B | |
| Primary Surface | A 1,500-foot-wide plane centered over the runway and extending 200 feet beyond the end of the runway. |
| Clear Zone | A fan-shaped area, symmetrical about the runway centerline, and extending 3,000 feet beyond the end of the runway. |
| Approach-departure clearance surface (glide angle: 50:1) | An inclined plane extending at a 50:1 angle (i.e., 1 vertical foot for every 50 horizontal feet), from the end of the Primary Surface to an elevation of 500 feet above the airfield. |
| Approach-departure clearance surface (horizontal) | A horizontal surface extending from the 500-foot elevation of the glide angle for a distance of 50,000 feet from the point of origin. |
| Inner horizontal surface | An oval-shaped plane 150 feet above the runway, extending in a 7,500-foot radius from the centerline of the end of each runway. |

Table 5-2 Imaginary Surfaces – Class B Fixed-Wing Runways

| Planes and Surfaces | Geographical Dimensions |
|--------------------------|--|
| Conical surface | A conical surface extending 7,000 feet from the periphery of the inner horizontal surface at a 20:1 slope (i.e., 1 vertical foot for every 20 horizontal feet) to an elevation of 500 feet above the airfield. |
| Outer horizontal surface | An oval-shaped plane 500 feet above the runway, extending 30,000 feet beyond the periphery of the conical surface. |
| Transitional surface | An inclined plane that connects the Primary Surface and the approach-departure clearance surface to the inner horizontal surface, conical surface, and outer horizontal surface. |

Source: U.S. Department of the Navy July 2007.

5.3 Flight Safety

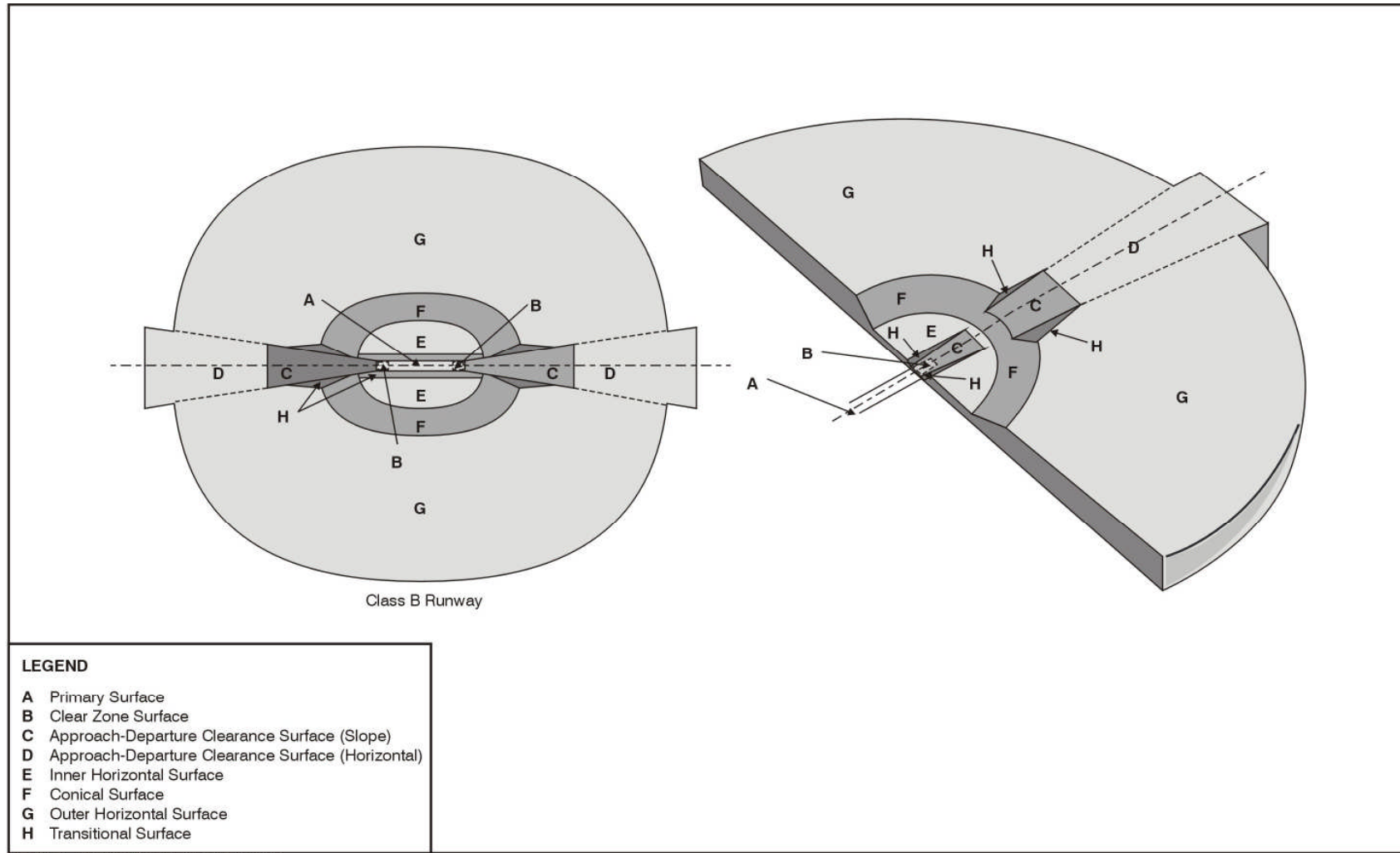
Hazards to flight safety should be avoided in the airfield vicinity. These hazards include activities and land uses that obstruct or interfere with aircraft arrivals and departures, pilot vision, communications, or aircraft electronics.

5.3.1 Bird/Animal Strike Hazard

Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to the open, grassy areas and warm pavement of the airfield. Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft. Most collisions occur when the aircraft is at an elevation of less than 1,000 feet. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force.

To reduce bird and animal strike hazards (BASH), the FAA and the military recommend that land uses that attract birds be located at least 10,000 feet from the airfield. These land uses include:

- Waste disposal operations
- Wastewater treatment facilities
- Landfills
- Golf courses
- Wetlands
- Dredge disposal sites
- Seafood processing plants
- Storm water ponds.



5-4 Imaginary Surfaces and Transition Planes for Fixed-Wing Runways

Design modifications also can be used to reduce the attractiveness of these types of land uses to birds and other wildlife

Electromagnetic interference (EMI) is defined by the American National Standards Institute as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment.

5.3.2 Electromagnetic Interference

New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, care should be taken in siting any activities that create EMI. 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 line leakage. Additionally, EMI may be caused by atmospheric phenomena such as lightning and precipitation static and by non-telecommunication equipment such as vehicles and industry machinery.

5.3.3 Lighting

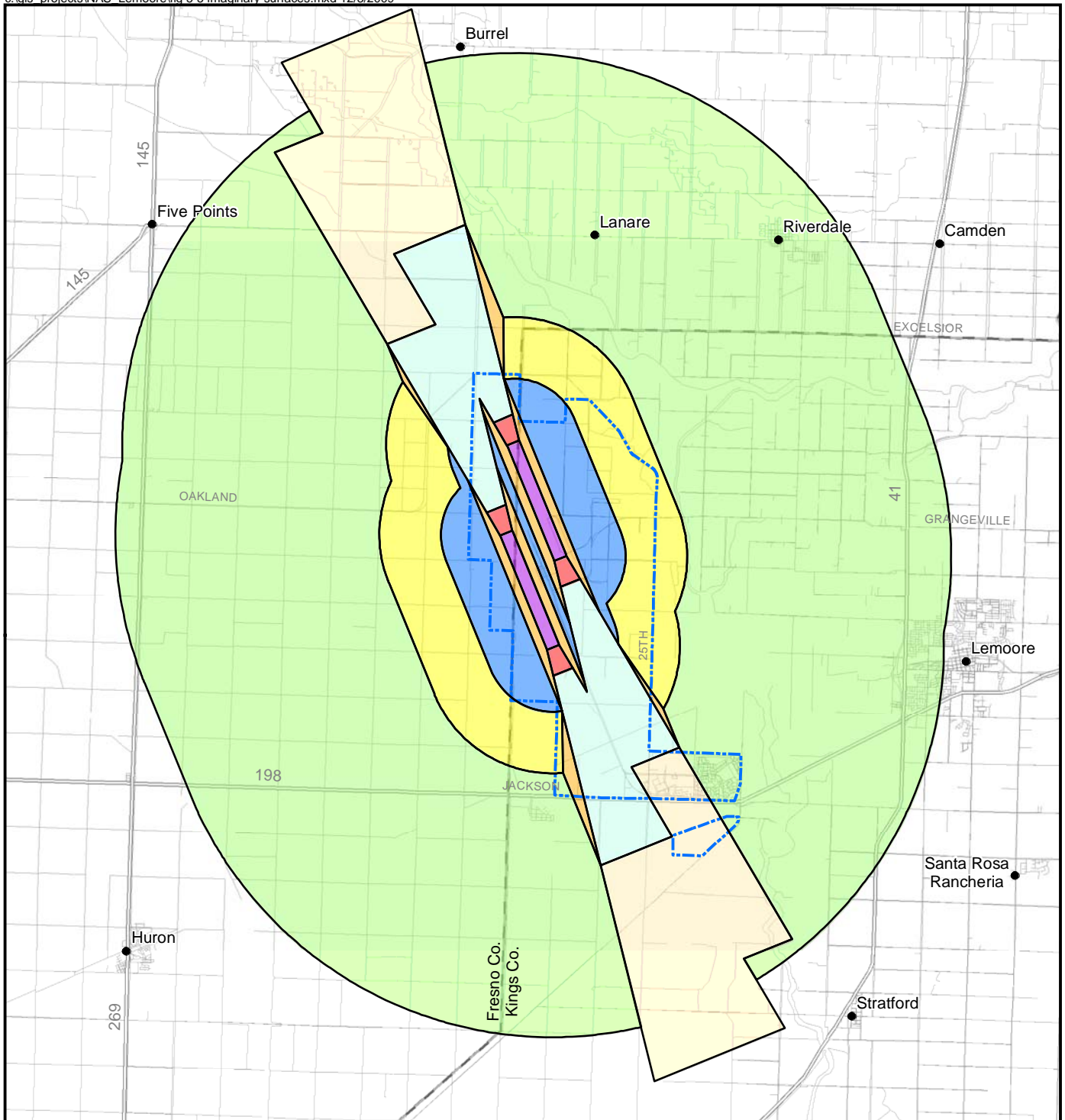
Bright lights, either direct or indirect, in the airfield vicinity can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot or "halo" to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous at night when the flash can diminish the eye's ability to adapt to darkness. Partial recovery is usually achieved in minutes, but full recovery typically requires 40 to 45 minutes.

5.3.4 Smoke, Dust, and Steam

Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity could obstruct the pilot's vision during takeoff, landing, or other periods of low-altitude flight. NASL leases some of its acreage for agricultural uses. More than 5,000 acres of these outleased parcels and farmland have been left fallow because of an ongoing local drought, which has resulted in more exposure at NASL to more foreign object debris (FOD) hazards and severe dust storms. Dust particles are known to transmit Valley fever spores, which are endemic to the San Joaquin Valley. Valley fever poses a particular risk to NASL personnel who may

not be from the San Joaquin Valley and therefore may not be immune to the disease.

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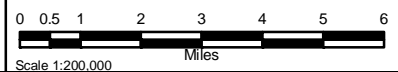


Legend

- City
- NAS Lemoore Boundary
- County Line
- Approach/Departure Clearance Surface (500' Horiz *)
- Approach/Departure Clearance Surface (50:1 Slope)
- Clear Zone Surface
- Conical Surface (20:1 Slope)
- Inner Horizontal Surface (150' Elev)
- Outer Horizontal Surface (500' Elev)
- Primary Surface
- Transitional Surface (7:1 Slope)

Figure 5-5
 Imaginary Surfaces
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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6 Land-Use Compatibility Analysis

The 2010 NASL AICUZ map comprises the 2010 APZs and the 2020 prospective noise contours for NASL (see Figure 6-1). The AICUZ map defines the minimum recommended, acceptable area within which land-use controls are suggested in order to protect the health, safety, and welfare of those living near a military airfield and to preserve the defense flying mission. The AICUZ map (and information derived from the map) is the fundamental tool necessary for the AICUZ planning process.

This section addresses land-use compatibility within the prospective 2020 noise zones and APZs by examining planned and existing land uses near NASL. This section begins with a general description of the area, land uses, and zoning as well as the county and city planning authorities. This background discussion is followed by the Standard Land Use Coding Manual (SLUCM) classification of the existing land uses around NASL and land-use guidelines. A land-use compatibility assessment and discussion of compatibility concerns concludes the section.

6.1 Land Use and Planning

To determine land-use compatibility, the Navy examined both existing and planned land uses near NASL. The development and control of lands outside of the NASL base boundary is beyond the control of the Station Commander. Development of these lands is dictated by local comprehensive land-use planning and regulations. Land-use planning in Fresno County, Kings County, and the City of Lemoore influence the area surrounding NASL. Land-use compatibility concerns resulting from local planning are discussed in Section 6.4.2.

6.1.1 Fresno and Kings Counties Land-Use Plans

North and west of NASL, in Fresno County, land use is predominantly agricultural, with the farming communities of Burrel, Lanare, and Riverdale located north of NASL. Within Kings County, land uses east and southeast of NASL are predominantly agricultural, with the exception of the City of Lemoore, which is located east of the base, and the Town of Stratford, which is located to the southeast along State Highway (S.H.) 41. Burrel, Lanare, Riverdale, Lemoore, and Stratford are all within NASL's Military Influence Area (MIA).

The Fresno County and Kings County General Plans provide land-use planning guidance for unincorporated areas near NASL. The Fresno County General Plan update was adopted in 2000 and provides a long-term planning framework for development within the county. The agriculture and land use element in the plan provides guidance for rural development north and west of NASL (Fresno County 2000). The 2035 Kings County General Plan (adopted in January 2010) provides a guide for development in areas surrounding NASL in Kings County; this plan applies to unincorporated areas of the county and excludes NASL and the City of Lemoore (Kings County 2010).

Both Fresno and Kings counties have exclusive agricultural designations in areas surrounding NASL that restrict parcels to low-density agriculturally related uses and establish minimum parcel sizes to discourage other uses. In Fresno County, a zoning designation of "AE 40" restricts parcel sizes to a minimum of 40 acres within 4 miles of NASL's boundaries. In addition, a safety easement extends along NASL's western boundary permanently restricting development. In Kings County, an "AX" zoning designation (created specifically to buffer NASL) limits parcel size within 3 miles of the NASL boundary to 40 acres or more (U.S. Department of the Navy July 2007).

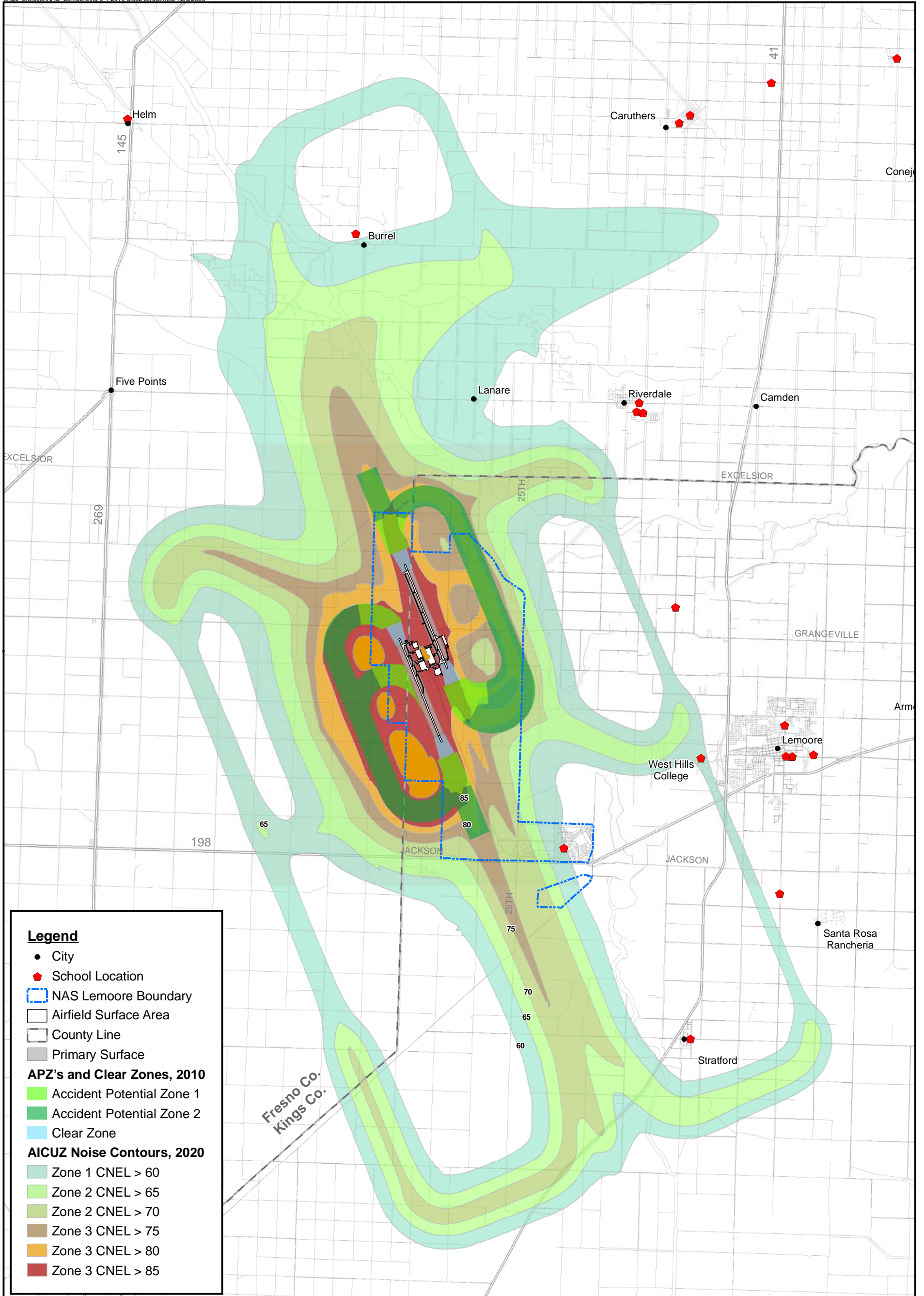
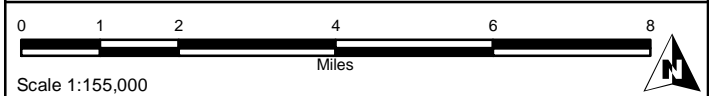


Figure 6-1

2010 NAS Lemoore AICUZ Map
 NAS Lemoore
 Lemoore, California

NAS Lemoore
 Lemoore, California



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6.1.2 City of Lemoore

The City of Lemoore encompasses approximately 8.5 square miles and is located approximately 7 miles east of NASL. The city's planning area comprises both incorporated and unincorporated land, totaling approximately 19 square miles (12,227 acres), which will affect future growth of the city. Land uses consist primarily of low- to medium-density housing along with mixed use and commercial designations north of S.H.198 and east of S.H.41. South of S.H.198, land-use designations are primarily industrial, along with very low-density housing. To the west of S.H. 41, the primary land use designations are low-density single-family, along with regional commercial and community facilities (City of Lemoore 2008a).

The City of Lemoore 2030 General Plan, adopted by the City Council on May 6, 2008, designates land use, traffic circulation, and public facilities within the city and its vicinity (City of Lemoore 2008). The geographic scope of the General Plan includes the city limits and land designated within the city's planning area, which extends outwards approximately 1 mile to the west and 0.5 miles north and south of the city limits.

The 2030 Lemoore General Plan includes the addition of an AICUZ noise overlay on approved uses west of S.H.41, the removal of the proposed business park designation west of 21st Avenue, and designates the use of 21st Avenue as Lemoore's westerly city development boundary. The intent of these additions is to preserve the noise buffer between NASL and the City of Lemoore (City of Lemoore 2008b). The 2030 Plan calls for the city to adopt noise mitigation policies into the municipal code. Aircraft noise mitigation measures include noise insulation, noise disclosure, a "buyer beware" program, and aviation easements. The adoption of the 2030 Plan also requests that the city council postpone land-use submittals in the southern area of the Lemoore planning area (south of the city limits) until after the completion of this AICUZ report, as well as other Federal Emergency Management Act (FEMA) studies.

6.2 Land-Use Compatibility Classification and Recommendations

Existing county land-use data are used to determine compatibility with noise zones and APZs. Subdivision of parcels, existing development before zoning, and uses that have gained planning commission approval could all cause the existing use of a parcel to be different from the planned or zoned development of the parcel. Because of the potential for inconsistency between the existing and zoned land use, an evaluation of existing land uses is included in this analysis.

To aid in determining land-use compatibility, the Navy has developed recommendations for APZs and noise zones. These recommendations, found in OPNAVINST 11010.36C, “Air Installations Compatibility Use Zones Program” (U.S. Department of the Navy 2008) and summarized in Table 6-1 (also see Appendix A), are intended to serve as guidelines for both the placement of APZs and noise zones and the development of land uses around military air installations. The guidelines assume that noise-sensitive land uses (e.g., houses, churches) will be placed outside high-noise zones and that people-intensive uses (e.g., food stores, shopping centers, recreational dirt tracks) will not be placed in APZs. Certain land uses are considered incompatible with APZs and high-noise zones, while other land uses may be considered compatible, compatible with restrictions, or incompatible with exceptions. The land-use compatibility analysis is based on the Navy’s land-use compatibility recommendations. To determine land-use compatibility within NASL’s 2020 prospective noise zones and APZs, the Navy examined existing land uses near NASL.

Table 6-1 Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|---|---------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 69 CNEL | 70 to 74 CNEL | 75 to 79 CNEL | 80 to 84 CNEL |
| 10 | Residential | | | | | | | |
| 11 | Household units | NA | NA | NA | N ²⁸ | N ²⁸ | N | N |
| 11.11 | Single units; detached | N | N | Y ² | N ²⁸ | N ²⁸ | N | N |
| 11.12 | Single units; semidetached | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.13 | Single units; attached row | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.21 | Two units; side-by-side | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.22 | Two units; one above the other | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.31 | Apartments; walk up | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.32 | Apartments; elevator | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 12 | Group quarters | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 13 | Residential hotels | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 14 | Mobile home parks or courts | N | N | N | N | N | N | N |
| 15 | Transient lodgings | N | N | N | N ²⁸ | N ²⁸ | N ²⁸ | N |
| 16 | Other residential | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 20 | Manufacturing ³ | | | | | | | |
| 21 | Food and kindred products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 22 | Textile mill products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 23 | Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 24 | Lumber and wood products (except furniture); manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 25 | Furniture and fixtures; manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 26 | Paper and allied products; manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 27 | Printing, publishing, and allied industries | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 28 | Chemicals and allied products; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 29 | Petroleum refining and related industries | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |

Table 6-1 Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|--|---------------------------------------|------------------|-----------------|---------------|------------------|------------------|-----------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 69 CNEL | 70 to 74 CNEL | 75 to 79 CNEL | 80 to 84 CNEL |
| 30 | Manufacturing (continued) ³ | | | | | | | |
| 31 | Rubber and misc. plastic products; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 32 | Stone, clay, and glass products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 33 | Primary metal products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 34 | Fabricated metal products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 35 | Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks | N | N | N | Y | 25 | 30 | N |
| 39 | Miscellaneous manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 40 | Transportation, communication and utilities ^{6,7} | | | | | | | |
| 41 | Railroad, rapid rail transit, and street railway transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 42 | Motor vehicle transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 43 | Aircraft transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 44 | Marine craft transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 45 | Highway and street right-of-way | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 46 | Automobile parking | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 47 | Communication | N | Y ^{5,7} | Y ⁵ | Y | 25 ³² | 30 ³² | N |
| 48 | Utilities | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 485 | Solid waste disposal (landfills, incineration, etc.) | N | N | N | NA | NA | NA | NA |
| 49 | Other transportation, communication, and utilities | N | Y ⁷ | Y ⁷ | Y | 25 ³² | 30 ³² | N |
| 50 | Trade | | | | | | | |
| 51 | Wholesale trade | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 52 | Retail trade – building materials, hardware, and farm equipment | N | Y ⁸ | Y ⁸ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 53 | Retail trade ¹⁰ – shopping centers, home improvement store, discount club, electronics superstore | N | N | Y ⁹ | Y | 25 | 30 | N |
| 54 | Retail trade – food | N | N | Y ¹¹ | Y | 25 | 30 | N |

Table 6-1 Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|--|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 69 CNEL | 70 to 74 CNEL | 75 to 79 CNEL | 80 to 84 CNEL |
| 55 | Retail trade – automotive, marine craft, aircraft, and accessories | N | Y ¹² | Y ¹² | Y | 25 | 30 | N |
| 56 | Retail trade – apparel and accessories | N | N | Y ¹³ | Y | 25 | 30 | N |
| 57 | Retail trade – furniture, home furnishings, and equipment | N | N | Y ¹³ | Y | 25 | 30 | N |
| 58 | Retail trade – eating and drinking establishments | N | N | N | Y | 25 | 30 | N |
| 59 | Other retail trade | N | N | Y ⁹ | Y | 25 | 30 | N |
| 60 | Services ¹⁴ | | | | | | | |
| 61 | Finance, insurance, and real estate services | N | N | Y ¹⁵ | Y | 25 | 30 | N |
| 62 | Personal services | N | N | Y ¹⁶ | Y | 25 | 30 | N |
| 62.4 | Cemeteries | N | Y ¹⁷ | Y ¹⁷ | Y | Y ²⁹ | Y ³⁰ | Y ^{31,37} |
| 63 | Business services (credit reporting; mail, stenographic reproduction; advertising) | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 63.7 | Warehousing and storage services | N | Y ¹⁹ | Y ¹⁹ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 64 | Repair services | N | Y ²⁰ | Y ²⁰ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 65 | Professional services | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 65.1 | Hospitals, other medical facilities | N | N | N | 25 | 30 | N | N |
| 65.16 | Nursing homes | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 66 | Contract construction services | N | Y ²⁰ | Y ²⁰ | Y | 25 | 30 | N |
| 67 | Governmental services | N | N | Y ¹¹ | Y ²⁸ | 25 | 30 | N |
| 68 | Educational services | N | N | N | 25 | 30 | N | N |
| 69 | Miscellaneous | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 70 | Cultural, entertainment and recreational | | | | | | | |
| 71 | Cultural activities (& churches) | N | N | N | 25 | 30 | N | N |
| 71.2 | Nature exhibits | N | Y ²¹ | Y ²¹ | Y ²⁸ | N | N | N |
| 72 | Public assembly | N | N | N | Y | N | N | N |
| 72.1 | Auditoriums, concert halls | N | N | N | 25 | 30 | N | N |

Table 6-1 Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|------------|--|---------------------------------------|---------------------|---------------------|-----------------|-----------------|-----------------|---------------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 69 CNEL | 70 to 74 CNEL | 75 to 79 CNEL | 80 to 84 CNEL |
| 72.11 | Outdoor music shells, amphitheaters | N | N | N | N | N | N | N |
| 72.2 | Outdoor sports arenas, spectator sports | N | N | N | Y ³³ | Y ³³ | N | N |
| 73 | Amusements- fairgrounds, miniature golf, driving ranges; amusement parks, etc. | N | N | Y | Y | Y | N | N |
| 74 | Recreational activities (including golf courses, riding stables, water recreation) | N | Y ^{20, 21} | Y ^{20, 21} | Y ²⁸ | 25 | 30 | N |
| 75 | Resorts and group camps | N | N | N | Y ²⁸ | Y ²⁸ | N | N |
| 76 | Parks | N | Y ^{20, 21} | Y ^{20, 21} | Y ²⁸ | Y ²⁸ | N | N |
| 79 | Other cultural, entertainment and recreation | N | Y ^{17, 20} | Y ^{17, 20} | Y ²⁸ | Y ²⁸ | N | N |
| 80 | Resource production and extraction | | | | | | | |
| 81 | Agriculture (except livestock) | Y ⁶ | Y ²² | Y ²² | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 81.5, 81.7 | Livestock farming and breeding | N | Y ^{22, 23} | Y ^{22, 23} | Y ³⁴ | Y ³⁵ | N | N |
| 82 | Agricultural related activities | N | Y ^{22, 24} | Y ^{22, 24} | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 83 | Forestry activities ²⁵ | N | Y ²⁴ | Y ²⁴ | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 84 | Fishing activities ²⁶ | N ²⁶ | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 85 | Mining activities | N | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 89 | Other resource production and extraction | N | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 90 | Other | | | | | | | |
| 91 | Undeveloped Land | Y | Y | Y | NA | NA | NA | NA |
| 93 | Water areas | N ²⁷ | N ²⁷ | N ²⁷ | NA | NA | NA | NA |

Adapted from OPNAVINST 1101036.C (U.S. Department of the Navy 2008).

Notes:

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to FARs are provided as a guide to densities in some categories. In general, land-use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ 1 and 50 per acre in APZ 2 are the range of occupancy levels, including employees, considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ 1, and Maximum (MAX) assemblies of 50 people per acre in APZ 2.

Table 6-1 Land-Use Compatibility Recommendations

2. The suggested maximum density for detached single-family housing is 1 to 2 dwelling units per acre (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 % 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. Maximum FAR of 0.56 in APZ 2.
5. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2.
6. No structures (except airfield lighting), buildings, or aboveground utility/communications lines should normally be located in clear zone areas on or off the installation. The clear zone is subject to severe restrictions. See UFC 3-260-01 "Airfield and Heliport Planning & Design" dated 10 November 2001 for specific design details.
7. No passenger terminals and no major aboveground transmission lines in APZ 1.
8. Within SLUCM Code 52, Max FARs for lumber yards (SLUCM Code 521) are 0.20 in APZ 1 and 0.40 in APZ 2. For hardware/paint and farm equipment stores, SLUCM Code 525, the Max FARs are 0.12 in APZ 1 and 0.24 in APZ 2.
9. Maximum FAR of 0.16 in APZ 2.
10. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super regional facilities anchored by small businesses, supermarket or drug store, discount retailer, department store, or several department stores, respectively. Included in this category are such uses as big box discount and electronics superstores. The Max recommended FAR for SLUCM 53 should be applied to the gross leasable area of the shopping center rather than attempting to use other recommended FARs listed in Table 2 under "Retail" or "Trade."
11. Maximum FAR of 0.24 in APZ 2.
12. Maximum FAR of 0.14 in APZ 1 and 0.28 in APZ 2.
13. Maximum FAR of 0.28 in APZ 2.
14. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc., are not recommended.
15. Maximum FAR of 0.22 for "General Office/Office park" In APZ 2.
16. Office uses only. Maximum FAR of 0.22 in APZ 2.
17. No chapels are allowed within APZ 1 or APZ 2.
18. Maximum FAR of 0.22 in APZ 2.
19. Maximum FAR of 1.0 in APZ 1 and 2.0 in APZ 2.
20. Maximum FAR of 0.11 in APZ 1 and 0.22 in APZ 2.
21. Facilities must be low intensity and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc., are not recommended.
22. 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.
23. Includes feedlots and intensive animal husbandry.
24. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2. No activity that produces smoke or glare or involves explosives.
25. 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.
26. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
27. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are compatible.
28. 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 approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.
b. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB in DNL 65-69 and NLR of 30 dB DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75-79.
c. Normal permanent construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

Table 6-1 Land-Use Compatibility Recommendations

- d. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor exposure, particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures which only protect interior spaces.
29. Measures to achieve an NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
30. Measures to achieve an NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
31. Measures to achieve an NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
32. If the project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.
33. Land use compatible provided special sound reinforcement systems are installed.
34. Residential buildings require an NLR of 25.
35. Residential buildings require an NLR of 30.
36. Residential buildings not permitted.
37. Land-use not recommended, but if the community decides use is necessary, hearing protection devices should be worn.

Key:

- Y (Yes) = Land use and related structures compatible without restrictions.
- N (No) = Land use and related structures are not compatible and should be prohibited.
- Y^x = (Yes with restrictions) The land use and related structures are generally compatible. However, see notes indicated by superscript.
- N^x = (No with exceptions) The land use and related structures are generally incompatible. However, see notes indicated by superscript.
- SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation.
- NA = Not Applicable (no data available for that category).
- FAR = (Floor Area Ratio) A floor area ratio is the ratio between the square feet of floor area of the building and the site area. It is customarily used to measure non-residential intensities.
- Du/Ac = (Dwelling Units per Acre) = This metric is customarily used to measure residential densities.
- DNL = Day-night average sound level.
- L_{dn} = Mathematical symbol for DNL.
- CNEL = Community Noise Equivalent Level (normally within a very small decibel difference of DNL).
- NLR = (Noise-Level Reduction) = NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
- 25, 30, or 35 = The numbers refer to NLR levels. Land use and related structures generally compatible however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structure. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with on of these numbers.

6.2.1 Existing Land Use Data

The noise zones and APZs associated with NASL extend over Fresno and Kings counties. The Fresno County Assessor's Office and the Kings County Assessor's Department were the primary sources for existing land-use information and data for determining land-use compatibility within noise zones and APZs associated with NASL.

Each parcel of land in the Fresno County database is classified using a seven-field alphanumeric code. The Fresno County Property Use Code (FCPUC) provides information on the highest and best use of the property (position 1), the primary use of the property (positions 2 through 4), and secondary use of the property if significant to the value (positions 5 through 7). The primary use is the main use the property currently has.

Each parcel of land in the Kings County database is classified using a four-digit land-use code. The first two digits of the Kings County Land Use Code (KCLUC) refer to a general land type and the second two digits provide a more specific land-use description.

The Navy uses the Standard Land Use Coding Manual (SLUCM) classifications in OPNAVINST 11010.36C to assess compatibility with noise zones and APZs. The SLUCM relies on a two-to four-digit land-use coding system. Both the FCPUC and the KCLUC are different coding systems from the SLUCM and draw different distinctions between land uses. The FCPUC and KCLUC identify multiple land-use types per parcel (i.e., agricultural and residential use), whereas the SLUCM identifies parcels by a single type. In order to complete the geographic information system (GIS) land-use compatibility data analysis, each parcel within the noise zones and APZs was assigned a code from SLUCM based primarily on the data provided by the FCPUC and KCLUC. In several instances the FCPUC and KCLUC did not provide sufficient information to assign a SLUCM code; aerial verification was used to assign a SLUCM classification to areas for which no or incomplete FCPUC and KCLUC existed. (For a detailed

methodology on equating parcel land use to the SLUCM code, see Appendix A.)

6.2.2 SLUCM-Classified Land Use

For the purposes of this analysis, each parcel within the noise zones or APZs of NASL was assigned a code from the SLUCM classification system. The SLUCM classifies parcels into eight land-use types. An additional land use type, “military,” was added for the purposes of this analysis. SLUCM land-use types and examples of land-uses within the NASL AICUZ footprint are provided in the box below. Existing land uses of parcels within the noise zones and APZs are illustrated on Figures 6-2 and 6-3. Tables 6-2 and 6-3 identify the approximate area of each land-use category that underlies the identified noise zones and APZs.

Land-Use Descriptions

Military – Land owned and used by the U.S. Department of Defense, including NASL.

Residential – Parcels usually less than 5 acres in size, with one or more household units; may include manufactured homes.

Manufacturing – Parcels containing food-processing or packing facilities, cotton gins, and other miscellaneous manufacturing facilities.

Transportation, Communication and Utilities – Parcels used for transportation including rail transportation, roadways, and automobile parking, as well as parcels used for communication and utilities, including transmission or communication lines, cell phone towers, and publicly owned utilities. This description also includes parcels used for other transportation-, communication-, and utilities-related uses.

Trade – Parcels containing shopping centers or food stores; farm equipment and hardware stores; restaurants; or other retail trade.

Services – Parcels containing personal, professional, or government services; educational services; warehousing and storage; cemeteries; and miscellaneous services.

Cultural, Entertainment, and Recreation – Parcels used for cultural activities, including churches and community centers; parcels used for entertainment and recreation, including dirt race tracks and parks. The description also includes parcels with other cultural-, entertainment-, and recreation-related uses.

Resource Production and Extraction – Parcels containing the sub-classifications described below as well as other agriculture-related activities:

Agriculture – Classification includes field crops and/or orchard agriculture as well as occasional residential development.

Agriculture (No Residences) – Classification includes field crops and/or orchard agriculture and has no known residential development.

Livestock Farming – Classification includes pasture land and agricultural parcels with all or a significant portion containing livestock, including poultry and cattle.

Other – Parcels include undeveloped land and water areas.

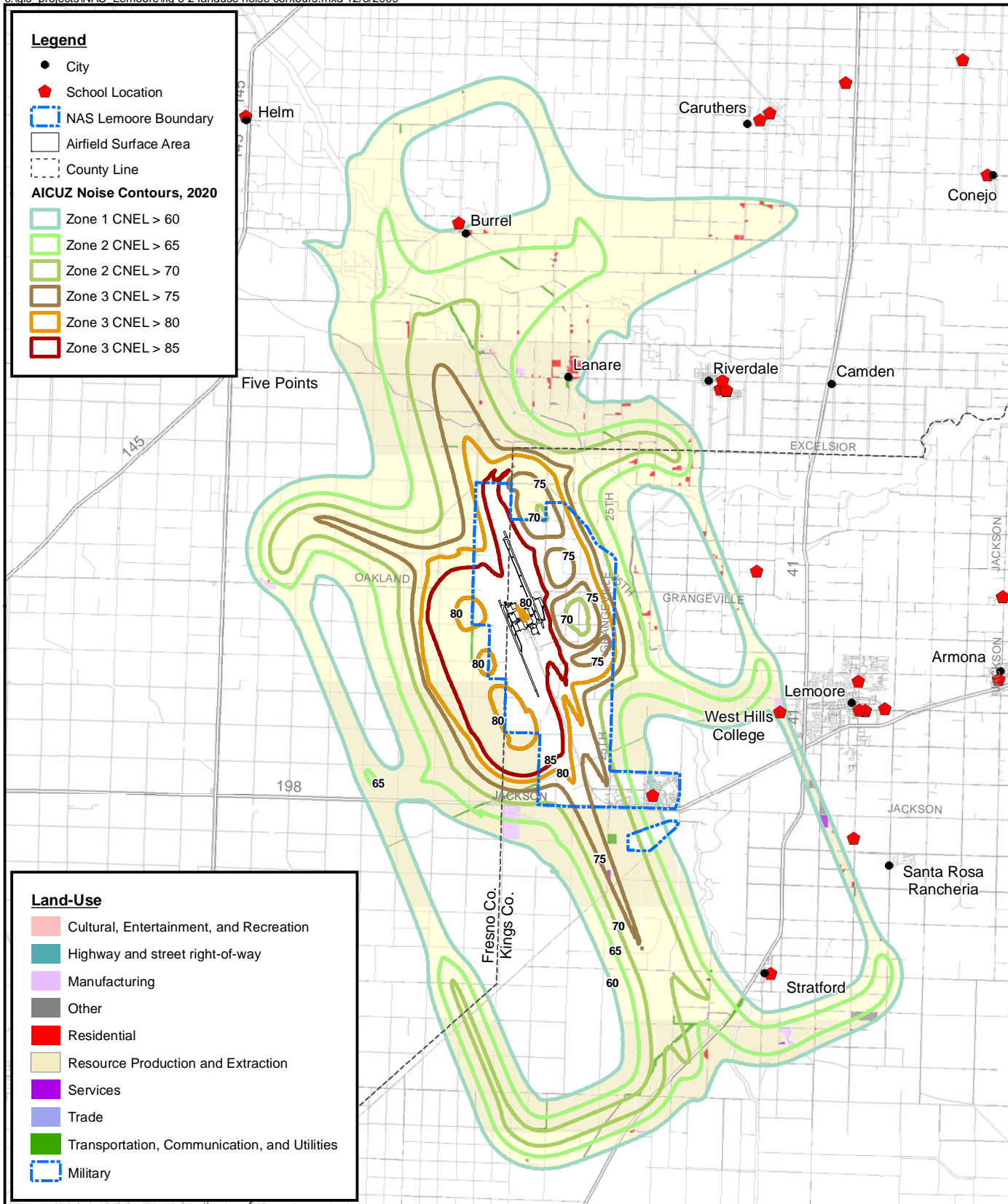
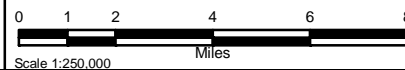


Figure 6-2
 Existing Land-Use within 2020 Prospective AICUZ Noise Contours
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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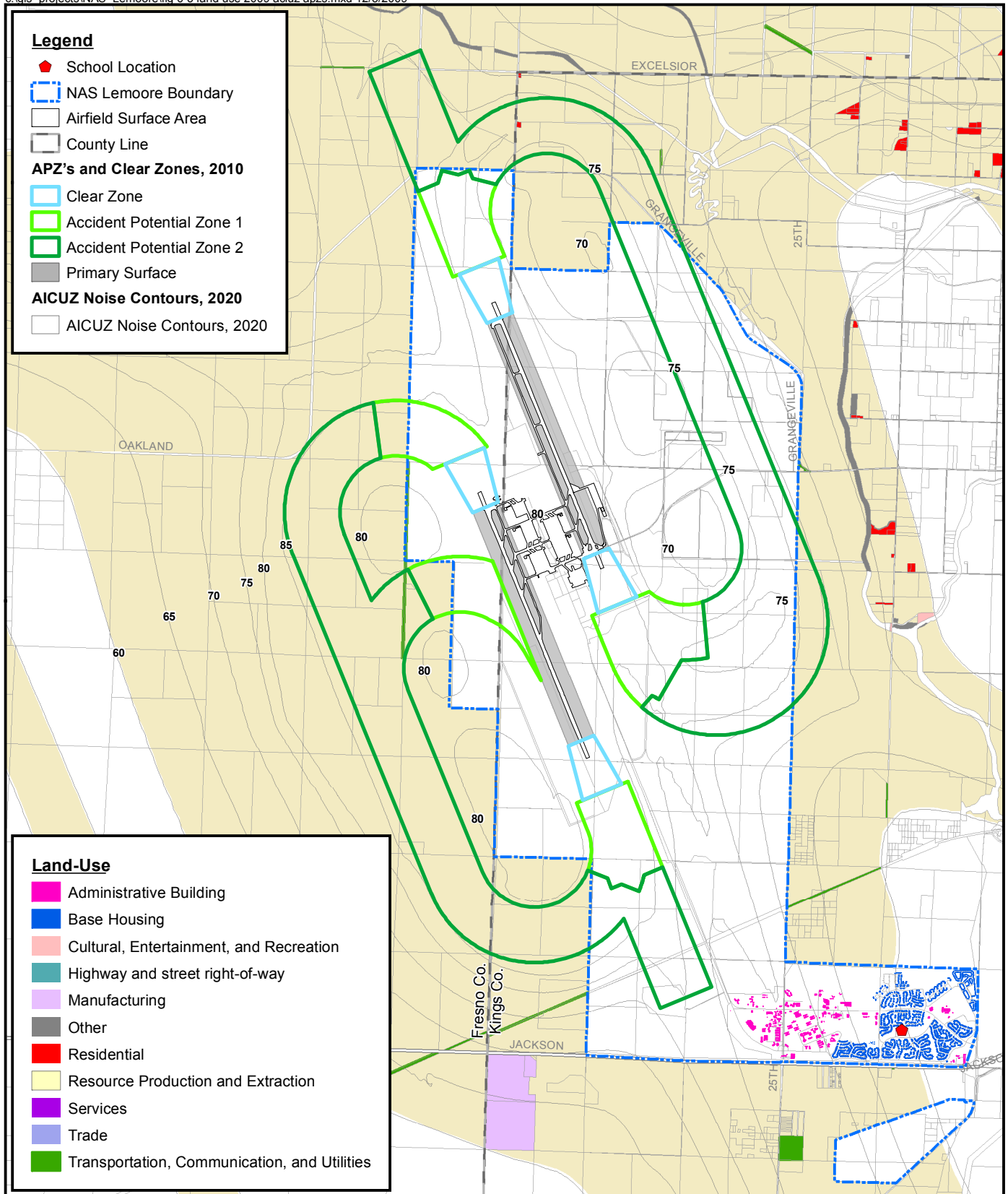
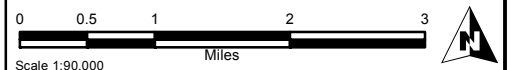


Figure 6-3
 Existing Land-Use and 2010 AICUZ APZs
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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Table 6-2 Existing Land Use (acres) within Prospective 2020 Noise Contours, Naval Air Station Lemoore, California

| Land Use | Noise Zone 1* | Noise Zone 2 | | | Noise Zone 3 | | | Total Acres |
|--|---------------|---------------|---------------|---------------|---------------|---------------|----------------|-------------|
| | 60 to 64 CNEL | 65 to 69 CNEL | 70 to 74 CNEL | 75 to 79 CNEL | 80 to 84 CNEL | 85+ CNEL | | |
| Military (NASL) | 510 | 692 | 2,246 | 4,015 | 4,820 | 5,980 | 18,264 | |
| Residential | 437 | 70 | 6 | 1 | 2 | - | 516 | |
| Manufacturing | 329 | 198 | 19 | - | - | - | 546 | |
| Transportation Communication and Utilities | 1,656 | 997 | 676 | 89 | 17 | 13 | 3,447 | |
| Trade | 3 | - | - | - | - | - | 3 | |
| Services | 46 | 7 | 1 | 16 | - | - | 69 | |
| Cultural, Entertainment and Recreation | 43 | 28 | - | - | - | - | 71 | |
| Resource Production and Extraction | 57,963 | 32,243 | 18,816 | 6,224 | 3,797 | 4,122 | 123,165 | |
| Other | 410 | 176 | 80 | 26 | 1 | <1 | 693 | |
| Total | 61,397 | 34,411 | 21,844 | 10,372 | 8,636 | 10,115 | 146,775 | |

*Noise Zone 1 includes all areas experiencing less than 65 dB CNEL

Note: Figures may not sum exactly due to rounding.

Key:

CNEL = Community Noise Equivalent Level.

Table 6-3 Existing Land Use (acres) within Accident Potential Zones, Naval Air Station Lemoore, California

| Land Use | Clear Zone | APZ 1 | APZ 2 | Total Acres |
|--|------------|--------------|--------------|--------------|
| Military (NASL) | 522 | 1,759 | 3,125 | 5,406 |
| Residential | - | - | 2 | 2 |
| Transportation Communication and Utilities | - | - | 50 | 50 |
| Resource Production and Extraction | - | 245 | 4,237 | 4,483 |
| Total | 522 | 2,004 | 7,414 | 9,940 |

Note: Figures may not sum exactly due to rounding.

Key:

APZ = accident potential zone.

NASL = Naval Air Station Lemoore.

The existing land use around NASL is primarily zoned as ‘Resource Production and Extraction,’ which indicates an agricultural or livestock farming land use. The existing land use generally corresponds to the Fresno County AE 40 and Kings County AX zoned land uses (see Section 6.1.1); however, the investigation of existing land uses within the

noise zones revealed substantial acres of ‘Transportation, Communication, and Utilities,’ followed by ‘Other,’ ‘Manufacturing,’ and ‘Residential’ classifications (see Table 6-2). Areas of clustered residential parcels associated with Burrel, Lenare, and areas southeast of Lanare in Kings County were identified in Noise Zones 1 and 2, as well as portions of two residential parcels in Noise Zone 3. ‘Transportation, Communication, and Utilities’ and “Other” classified parcels typically correspond to roadways and irrigation ditches located throughout all three noise zones. Several large ‘Manufacturing’-classified parcels were also identified directly southwest of NASL, south of Stratford, west of Lemoore and Lanare and along Oakland Road towards S.H.269.

Within the APZ footprint and outside the NASL base boundary, the land use is predominantly ‘Resource Production and Extraction’ (see Table 6-3). A single residential parcel of approximately 2 acres off of Runway 14L north of the base boundary has been identified within APZ 2. Transportation, Communication, and Utilities’ land use is also noted within APZ 2 extending west from Runway 14R/32L (see Figure 6-3).

6.2.3 SLUCM Land-Use Compatibility Recommendations

The Navy’s land-use compatibility recommendations for noise zones and APZs for all affected land uses in Fresno and Kings counties are summarized in Table 6-4. The complete Navy guidance compatibility recommendations are summarized in Appendix A (adapted from OPNAVINST 11010.36C [U.S. Department of the Navy 2008]).

6.3 Land-Use Compatibility Assessment

To determine land-use compatibility with aircraft operations at NASL, SLUCM-matched land uses within the noise zones and APZs were compared with the land-use compatibility recommendations summarized in Table 6-4 (see also Appendix A).

Table 6-4 Land Use Compatibility Recommendations within the NAS Lemoore 2010 AICUZ Footprint

| | 2020 Noise Zones (Community Noise Equivalent Level [CNEL]) | | | | | | 2010 APZs | | |
|---|---|-------------|-------------|-------------|-------------|--------|---------------|--------|--------|
| | 60 to 64 | 65 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ | Clear Zone | APZ 1 | APZ 2 |
| Residential | | | | | | | | | |
| Single Detached Unit | Yellow | Orange | Orange | Red | Red | Red | Red | Red | (1) |
| Two Units | Yellow | Orange | Orange | Red | Red | Red | Red | Red | |
| Manufactured Home | Yellow | Red | Red | Red | Red | Red | Red | Red | |
| Manufacturing | | | | | | | | | |
| Food processing / Textile mill | Green | Green | Yellow | Yellow | Yellow | Red | Red | Red | (1) |
| Miscellaneous | Green | Green | Yellow | Yellow | Yellow | Red | Red | (1) | (1) |
| Transportation, Communication, and Utilities | | | | | | | | | |
| Rail Transportation / Road / Parking Lot | Green | Green | Yellow | Yellow | Yellow | Red | Red | (1) | (1) |
| Utilities | Green | Green | Yellow | Yellow | Yellow | Red | Red | (1) | (1) |
| Communication / Other | Green | Green | Yellow | Yellow | Red | Red | Red | (1) | (1) |
| Trade | | | | | | | | | |
| Hardware and Farm Equipment | Green | Green | Yellow | Yellow | Yellow | Red | Red | (1) | (1) |
| Shopping Ctr. / Food Store / Other Trade | Green | Green | Yellow | Yellow | Red | Red | Red | Red | (1) |
| Restaurants | Green | Green | Yellow | Yellow | Red | Red | Red | Red | |
| Services | | | | | | | | | |
| Personal & Prof. Services / Misc. | Green | Green | Yellow | Yellow | Red | Red | Red | Red | (1) |
| Cemeteries | Green | Green | Yellow | Yellow | Yellow | Red | Red | Yellow | Yellow |
| Warehousing & storage | Green | Green | Yellow | Yellow | Yellow | Red | Red | (1) | (1) |
| Government | Yellow | Yellow | Yellow | Yellow | Red | Red | Red | Red | (1) |
| Education | Yellow | Yellow | Yellow | Red | Red | Red | Red | Red | Red |
| Cultural, Entertainment and Recreation | | | | | | | | | |
| Cultural activities | Yellow | Yellow | Yellow | Red | Red | Red | Red | Red | Red |
| Recreational activities | Yellow | Yellow | Yellow | Yellow | Red | Red | Red | (1) | (1) |
| Parks / Other Cultural, Entertainment & Rec. | Yellow | Yellow | Yellow | Red | Red | Red | Red | (1) | (1) |
| Resource Production & Extraction | | | | | | | | | |
| Agriculture | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| Agriculture & No Residences | Green | Green | Green | Green | Yellow | Yellow | Yellow | Yellow | Yellow |
| Livestock farming | Green | Yellow | Yellow | Red | Red | Red | Red | Yellow | Yellow |
| Agriculture related activities | Green | Yellow | Yellow | Yellow | Yellow | Yellow | Red | (1) | (1) |






Table 6-4 Land Use Compatibility Recommendations within the NAS Lemoore 2010 AICUZ Footprint

| | 2020 Noise Zones (Community Noise Equivalent Level [CNEL]) | | | | | | 2010 APZs | | |
|------------------|---|----------|----------|----------|----------|-----|------------|-------|-------|
| | 60 to 64 | 65 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ | Clear Zone | APZ 1 | APZ 2 |
| Other | | | | | | | | | |
| Undeveloped Land | | | | | | | | | |
| Water Areas | | | | | | | | | |

Adapted from OPNAVINST 11010.36C

Key:

(1) Density Recommendation

| | |
|---|------------------------------------|
|  | = Compatible |
|  | = Compatible with restrictions |
|  | = Incompatible with exceptions |
|  | = Incompatible |
|  | = No Compatibility Recommendations |

Areas of incompatible, incompatible with exceptions, compatible with restrictions, and compatible development within the noise zones are categorized according to noise contours in Table 6-5 and are illustrated on Figure 6-4.

Table 6-5 Land-Use Compatibility Noise Zones (CNEL), Naval Air Station Lemoore, California

| CNEL | Compatible (acres) | Compatible with Restrictions (acres) | Incompatible with Exceptions (acres) | Incompatible (acres) | Total Acres |
|--------------|--------------------|--------------------------------------|--------------------------------------|----------------------|----------------|
| 60 to 64 | 60,882 | 515 ⁽¹⁾ | - | - | 61,397 |
| 65 to 69 | 28,937 | 5,404 | 37 | 33 | 34,411 |
| 70 to 74 | 18,367 | 3,471 | 6 | - | 21,844 |
| 75 to 79 | 8,456 | 1,852 | - | 63 | 10,372 |
| 80 to 84 | 4,821 | 3,813 | - | 2 | 8,636 |
| 85+ | 5,980 | 4,122 | - | 13 | 10,115 |
| Total | 127,443 | 19,178 | 43 | 111 | 146,775 |

Notes:

Figures may not sum exactly due to rounding.

Land uses with no compatibility recommendations and military land uses are considered 'compatible.'

(1) Noise level reduction measures for residential land uses are recommended per OPNAVINST 11010.36C, Table 1, Note 1d.

Key:

CNEL = Community Noise Equivalent Level.

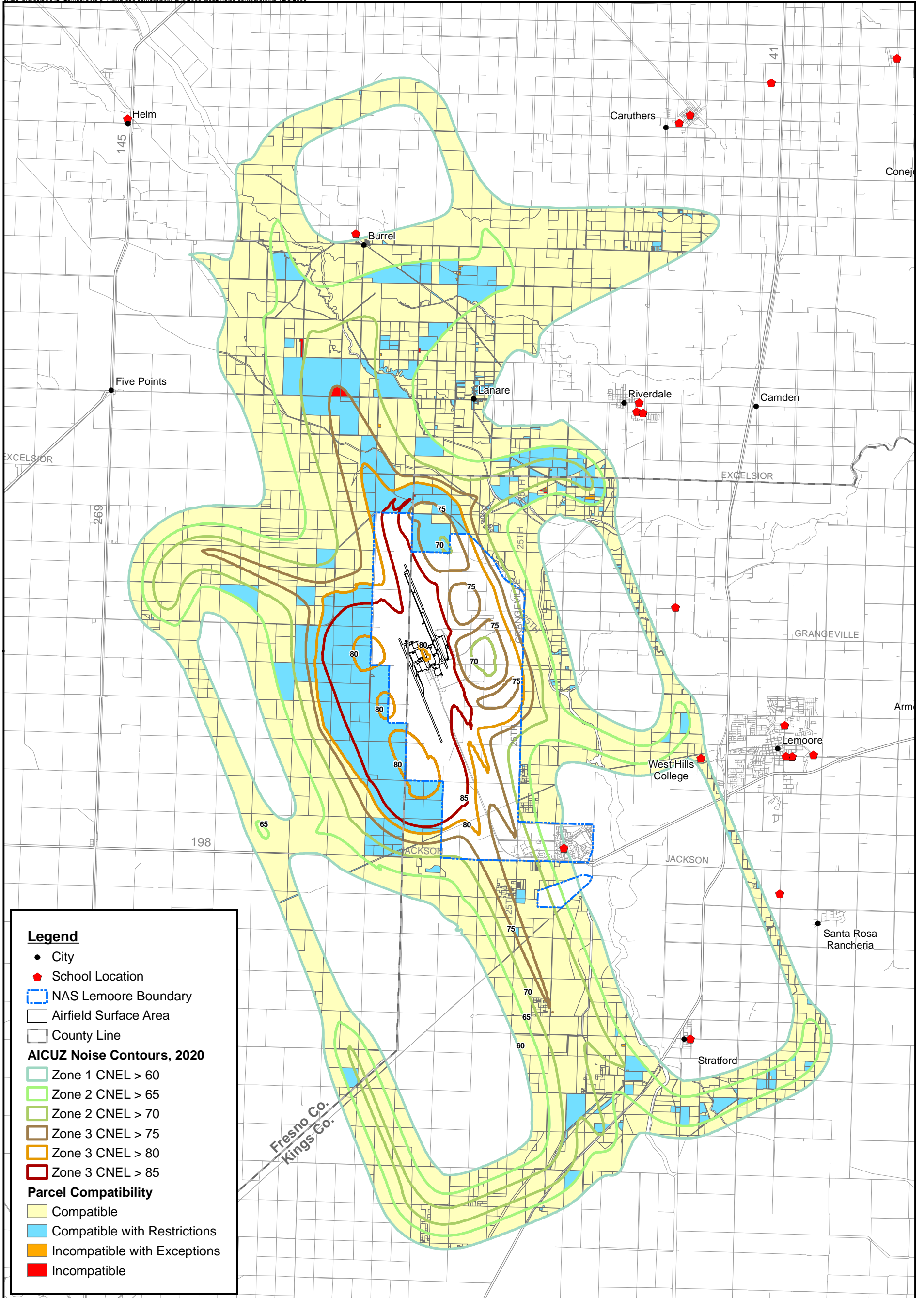
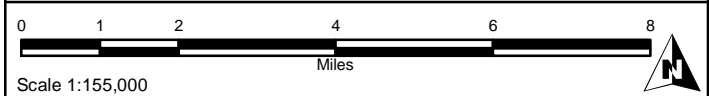


Figure 6-4

Land-Use Compatibility
 and 2020 Prospective AICUZ Noise Contours
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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Of the 146,775 acres within the AICUZ noise footprint, 127,443 acres currently contain compatible land uses, 19,178 acres have compatible land uses with restrictions, 43 acres have incompatible land uses with exceptions, and 111 acres are considered to have incompatible land uses. Large incompatible parcels are noted northwest of NASL within the 65 to 69 CNEL (Noise Zone 2) and 75 to 79 CNEL (Noise Zone 3) noise contours. These parcels are known to comprise a residential parcel classified as SLUCM 14 (manufactured housing) and two parcels in Noise Zone 3 containing dairy operations (SLUCM 81.5). A large motor vehicle transportation parcel (SLUCM 42) also is noted as incompatible in the greater-than-85 CNEL noise contour (Noise Zone 3). In total, these four parcels comprise approximately 85% of land uses incompatible with noise recommendations.

Residential parcels less than 5 acres in size account for the remaining incompatible land uses. Portions of two single detached residential parcels (SLUCM 11.11) incompatible with noise recommendations are located in the 75 to 79 and 80 to 84 CNEL noise contours (Noise Zone 3). Eight incompatible parcels with manufactured housing are also identified within the 65 to 69 CNEL noise contour (Noise Zone 2). Land uses incompatible with exceptions are identified as single detached residential parcels (SLUCM 11.11) located throughout Noise Zone 2.

Large agricultural parcels considered compatible with restrictions are generally located north, northeast, and south of the base within the 65 to 69, 70 to 74, and 75 to 79 CNEL noise contours. These areas correspond to SLUCM- classified parcels 81, 81.5, and 82. In noise contours 80 CNEL and greater virtually all land uses not considered to be incompatible or incompatible with exceptions are considered compatible with restrictions (see Figure 6-4); these parcels are primarily agricultural land uses.

Similar to the noise zones, a compatibility analysis was conducted for the APZs. The compatibility of areas within the APZs is summarized in Table 6-6 and illustrated on Figure 6-5. Military land use comprises the majority of compatible land uses within the APZs. Other

compatible land uses include 50 acres of ‘transportation, communication, and utility’ parcels in APZ 2. Agricultural areas comprise the majority of land uses considered compatible with restrictions in APZ 1 and 2. A single 2-acre residential parcel located in APZ 2 north of Runway 14L is considered also to be compatible with restrictions. No land uses within APZs are considered to be incompatible with exceptions or incompatible.

| Table 6-6 Compatibility of All Land Uses within Accident Potential Zones, Naval Air Station Lemoore, California | | | | | |
|--|---------------------------|-------------------------------------|-------------------------------------|-----------------------------|--------------------|
| | Compatible (acres) | Compatible with Restrictions | Incompatible with Exceptions | Incompatible (acres) | Total Acres |
| Clear Zone | 522 | 0 | 0 | 0 | 522 |
| APZ 1 | 1,759 | 245 | 0 | 0 | 2,004 |
| APZ 2 | 3,174 | 4,239 | 0 | 0 | 7,414 |
| Total | 5,455 | 4,485 | 0 | 0 | 9,940 |

Notes:

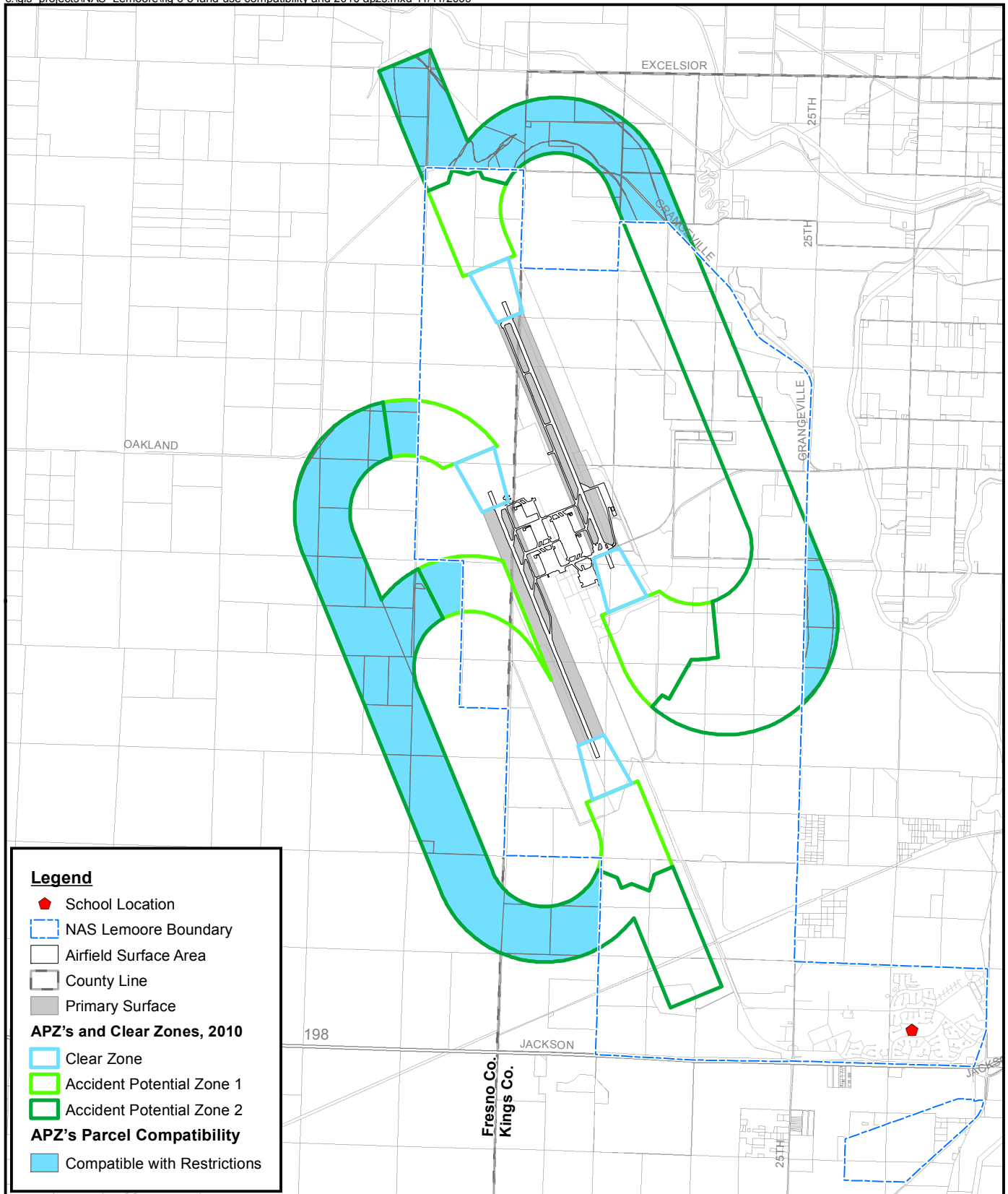
Figures may not sum exactly due to rounding.

Land uses with no compatibility recommendations and military land uses are considered ‘compatible.’

APZ suggested compatibilities that include density recommendations are included in ‘compatible with restrictions’ and ‘incompatible with exceptions’ classifications.

Key: APZ = accident potential zone.

Table 6-7 and Figure 6-6 summarize the overall compatibility of parcels in both the noise zones and APZs. As shown in Table 6-7, 87% of the area within the noise zones and 55% of the area within the APZs currently contain compatible land uses. Approximately 13% (19,178 acres) of the area within noise zones is compatible with restrictions, less than 1% (43 acres) is incompatible with exceptions, and less than 1% is incompatible(111 acres). Within APZs, 45% (4,485 acres) of the land uses is considered compatible with restrictions, all of which occur off-base.



Legend

- ◆ School Location
- NAS Lemoore Boundary
- Airfield Surface Area
- County Line
- Primary Surface

APZ's and Clear Zones, 2010

- Clear Zone
- Accident Potential Zone 1
- Accident Potential Zone 2

APZ's Parcel Compatibility

- Compatible with Restrictions

Figure 6-5
 Land-Use Compatibility
 and 2010 AICUZ APZs
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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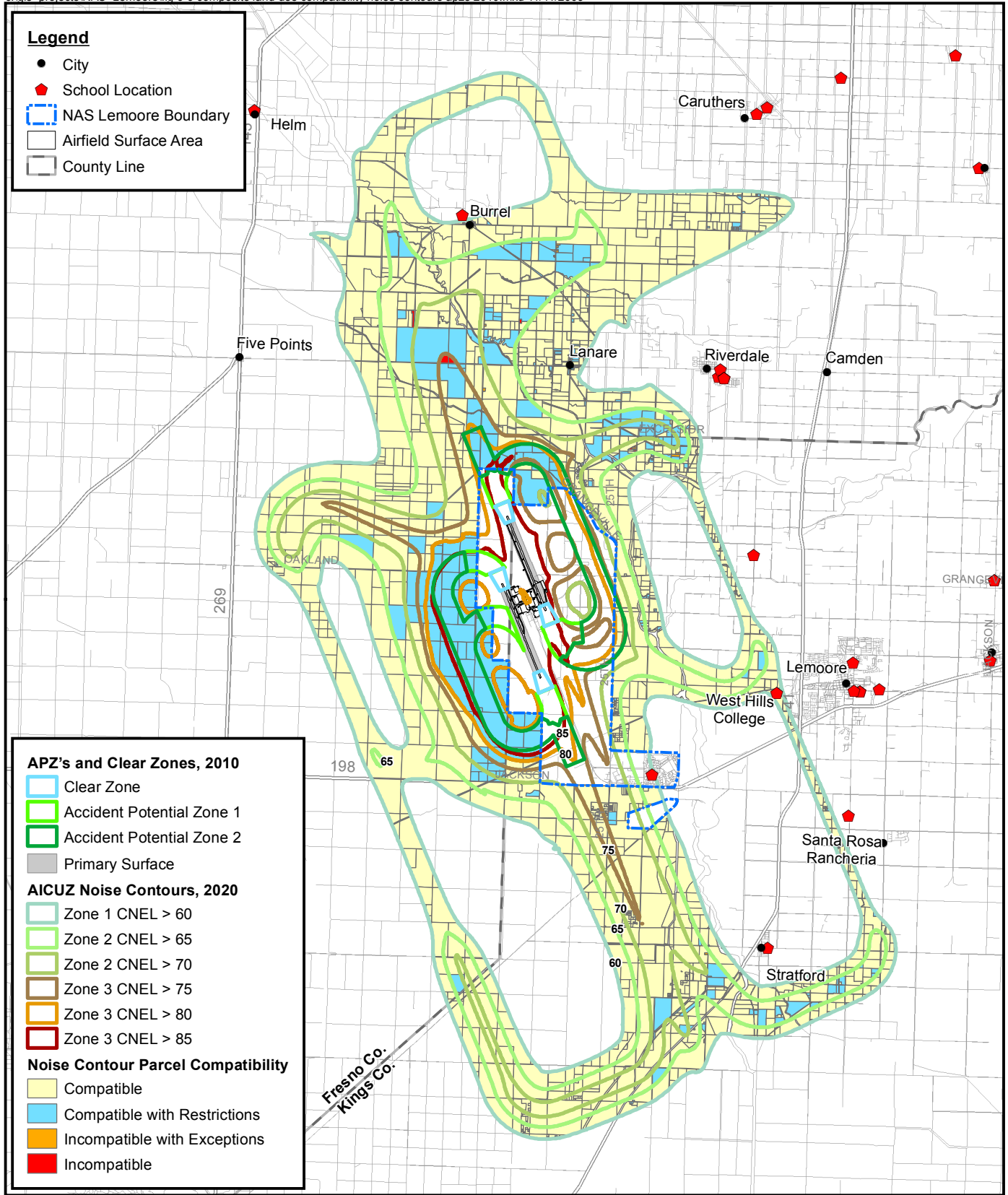
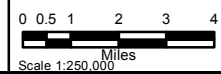


Figure 6-6
 Composite Coverage for Land-Use and
 2020 Prospective AICUZ Noise Contours and 2010 APZs
 NAS Lemoore
 Lemoore, California

NAS Lemoore
Lemoore, California



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| Compatibility | Noise Zones | | APZ | |
|------------------------------|----------------|------------|--------------|------------|
| | Acres | % | Acres | % |
| Compatible | 127,443 | 87 | 5,455 | 55 |
| Compatible with Restrictions | 19,178 | 13 | 4,485 | 45 |
| Incompatible with Exceptions | 43 | <1 | 0 | 0 |
| Incompatible | 111 | <1 | 0 | 0 |
| Total | 146,775 | 100 | 9,940 | 100 |

Notes:

Figures may not sum exactly due to rounding.

Land uses with no compatibility recommendations and military land uses are considered 'compatible.'

APZ suggested compatibilities that include density recommendations are included in 'compatible with restrictions' and 'incompatible with exceptions' classifications.

Key:

AICUZ = Air Installations Compatible Use Zones.

APZ = accident potential zone.

6.3.1 Population

In addition to the land-use compatibility analysis, the area under each noise contour was overlaid with the “Census 2000 Tiger/Line Data Census Blocks 2000” to provide an estimate of the affected population within each noise contour (U.S. Census Bureau 2000). The area under each noise contour and the estimated affected population is provided in Table 6-8.

| CNEL | Acreage | Population | | |
|--------------|----------------|---------------|---------------|---------------|
| | | Fresno County | Kings County | Total |
| 60 to 64 | 59,916 | 2889 | 5561 | 8450 |
| 65 to 69 | 33,706 | 820 | 4302 | 5122 |
| 70 to 74 | 20,512 | 398 | 4018 | 4416 |
| 75 to 79 | 10,124 | 71 | 27 | 98 |
| 80 to 85 | 8,583 | 28 | 27 | 55 |
| 85+ | 10,016 | 12 | 0 | 12 |
| Total | 142,857 | 4,218 | 13,935 | 18,153 |

Note: Figures may not sum exactly due to rounding.

Key:

AICUZ = Air Installations Compatible Use Zones.

CNEL = Community Noise Equivalent Level.

6.4 Areas of Land-Use Compatibility Concern

Compatibility concerns identified through an investigation of land use and planning (Section 6.1) and land-use compatibility analysis (Section 6.3) are identified in this section. Although the Navy does not offer compatibility recommendations for military-owned land, this section provides a discussion of compatibility concerns for land uses within NASL and in the vicinity of NASL.

6.4.1 NASL Land-Use Compatibility Concerns

Land-use compatibility concerns for NASL are minimal. The main NASL facility controls development in the APZs. Although on-base housing (typically incompatible with exceptions in Noise Zone 2) lies within an area that periodically experiences 60 to 64 CNEL (Noise Zone 1) and a small portion that experiences 65 to 69 CNEL (Noise Zone 2). Single family residences on NASL have been designed with sound attenuation, including double-paned windows, to minimize increases in noise during flight operations.

6.4.2 NASL Vicinity Land-Use Compatibility Concerns

Identifying and minimizing potential incompatible land uses within the off-base AICUZ footprint is one of the objectives of this NASL AICUZ report. It is essential to NASL's mission that incompatible land uses are identified and minimized where possible to prevent further encroachment towards the base.

General compatibility concerns include encroachment from local municipalities upon the 3-mile and 4-mile exclusive agricultural buffer in Kings County and Fresno County, respectively, and encroachment of the class "D" airspace or into pre-established low level flight tracks. Class "D" airspace extends from ground level to 2,500 feet above the airfield

elevation. Development and siting of structures that could penetrate the primary surface surrounding the airfield is also a compatibility concern.

General compatibility concerns regarding agricultural land use include residential development in exclusive agricultural zone areas and subdivision of zoned agricultural use properties and farmland conversion. Limited subdivision of exclusive agriculture zone parcels allows the creation of multiple home sites. If developed, these home sites could be incompatible with APZ and noise recommendations. Fresno and Kings counties are projected to lose approximately 160,000 acres of agricultural land between 2000 and 2040 (Naval Facilities Engineering Command Southwest July 2007). Within the AICUZ footprint, conversion of agricultural land to more intensive land uses may be incompatible with APZ and noise recommendations.

Specific current and potential land-use compatibility concerns surrounding the airfield include:

- Development west of S.H. 41 in association with West Hills Community College is a compatibility concern. Future development in this area could underlie the 4LG1/2RG1 flight track (GCA Box Pattern). As discussed in Section 4.4, the GCA Box Pattern passes over the college and cannot be moved because of flight profile requirements..
- Large-acreage dairy land uses located north and northeast of NASL within Noise Zone 3 are a compatibility concern. These parcels are identified in Section 6.3 as incompatible development within the 75 to 79 CNEL noise contour.
- A residential land use located north of Runway 14L is a compatibility concern. A 2-acre residential parcel was identified by the land-use compatibility analysis within the 80 to 84 CNEL noise contour and APZ 2. Residential parcels are recommended as incompatible land uses in Noise Zone 3 and compatible with restrictions and density recommendations within APZ 2. Although this particular parcel accounts for a small portion of the total incompatible land uses around NASL, it is identified as a compatibility concern because of its proximity to the base boundary.
- Residential and other development in and around the community of Burrel and Lenare are a compatibility concern for future operations at NASL. Although these communities are within Noise Zone 1 and have no incompatible and few compatible with restrictions or incompatible with exceptions land uses, increases or changes in flight operations could

cause the community to experience higher noise levels. Although these communities are currently located in Noise Zone 1, higher levels of noise may cause currently compatible, compatible with restrictions, or incompatible with exceptions land uses to become incompatible with Navy CNEL recommendations.

- Recent residential development and potential future development within the community of Riverdale is a compatibility concern (Naval Facilities Engineering Command Southwest 2007). Although the community of Riverdale is currently outside the 60 to 64 dB CNEL noise contour, it is located under several arrival flight tracks (see Figure 3-2). Increases or changes in flight operation could cause the community to experience higher noise levels.
- Residential and other development southeast of the community of Lanare, which underlies the 4LG1/2RG1 flight track (GCA Box Pattern), are a concern. Residential and developed properties in this area correspond to a concentration of agriculturally zoned parcels that have been subdivided. Increased flight operations could cause this area to experience higher levels of noise, potentially causing developed land uses to become incompatible.
- The prevalence of compatible with restriction land uses classified as 'Resource Production and Extraction' in Noise Zones 2 and 3 is a compatibility concern. These land uses comprise 14% and 33% of all land uses in Noise Zones 2 and 3, respectively. Ensuring that those who live and work in these areas are adequately informed and protected against the effects of noise is a compatibility concern.

7 Land-Use Tools and Recommendations

The goal of the AICUZ Program—to protect the health, safety, and welfare of those living near military airfields while preserving the defense flying mission—can most effectively be accomplished by active participation of all interested parties, including the Navy, local governments, private citizens, developers, real estate professionals, and others.

At NASL the Base Commander is responsible for ensuring a successful AICUZ Program. The Air Installation Commander at NASL is committed to and shall:

- Become familiar with the AICUZ program
- Implement an AICUZ Program for NASL
- Work with state and local planning officials to implement the objectives of the AICUZ plan
- Notify the chain of command when local conditions merit an update or review of the AICUZ report
- Promote familiarity with the AICUZ Program development techniques and implementation among aviation staff personnel
- If appropriate, designate the Community Plans and Liaison Officer (CP&LO) to assist in the execution of the AICUZ plan at NASL and to act as spokesperson for the Command in AICUZ matters
- Provide assistance in developing AICUZ information, including operational data needed to update the AICUZ plan
- Justify the retention of land or interest of land required for operational performance (adapted from OPNAVINST 11010.36C [U.S. Department of the Navy 2008]).

This section presents and describes land-use planning tools and recommendations for implementing and achieving a successful AICUZ Program.

7.1 Tools for Implementing AICUZ

7.1.1 Federal Tools

Environmental Review. Environmental review involves assessing projects that may have some potential impact on land use and the public's interest. For example, the National Environmental Policy Act (NEPA) mandates full disclosure of the environmental effects resulting from proposed federal actions, approvals, or funding. Impacts of the action are generally documented in an environmental impact statement (EIS) or an environmental assessment (EA), which is more limited in scope than an EIS. The environmental review process includes a procedure for incorporating the elements of the AICUZ in the planning review process.

Executive Order 12372, Intergovernmental Review of Federal Programs (July 1982). As a result of the Intergovernmental Cooperation Act of 1968, the U.S. Bureau of the Budget requires that all federal-aid development projects be coordinated with and reinforce state, regional, and local planning. Executive Order 12372 allows state governments to set up review periods and processes for federal projects and provides an early entry point into the process to introduce AICUZ concepts and to discuss AICUZ issues.

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

Housing and Urban Development (HUD) Circular 1390.2, "Noise Abatement and Control, Department Policy and Implementation Responsibilities and Standards." Approvals of mortgage loans from the Federal Housing Administration are subject to requirements of this HUD circular. The circular sets forth a discretionary policy to withhold funds for housing projects when noise exposure exceeds prescribed levels. Residential construction may be permitted

inside the 65 DNL contour, provided sound attenuation is accomplished. However, the added construction expense of noise attenuation may make siting facilities in these noise exposure areas financially less attractive. Because the HUD policy is discretionary, variances may also be permitted, depending on regional interpretation and local conditions. HUD also has a policy that prohibits funding for projects in clear zones and APZs unless the project is compatible with the AICUZ.

Encroachment Partnering (10 U.S.C. 2684a). The Secretary of Defense or the Secretary of a military department may enter into agreements with an eligible entity or entities to address the use or development of real property in the vicinity of, or ecologically related to, a military installation or military airspace in order to limit encroachment or other constraints on military training, testing, and operations. Eligible entities include a state, a political subdivision of a state, and a private entity that has, as its principal organizational purpose or goal, the conservation, restoration, or preservation of land and natural resources, or a similar purpose or goal.

Encroachment Partnering Agreements provide for an eligible entity to acquire fee title, or a lesser interest, in land for the purpose of limiting encroachment on the mission of a military installation and/or to preserve habitat off the installation to relieve current or anticipated environmental restrictions that might interfere with military operations or training on the installation. The DoD can share the real estate acquisition costs for projects that support the purchase of fee or a conservation or other restrictive easement for such property. The eligible entity negotiates and acquires the real estate interest for encroachment partnering projects with a voluntary seller. The eligible entity must transfer the agreed-upon restrictive easement interest to the United States of America upon the request of the Secretary.

7.1.2 California State Tools

The California Environmental Quality Act (CEQA). CEQA is an environmental review process by which state, local, and other agencies must evaluate, avoid, and where possible mitigate the

environmental effects of their actions. Impacts of actions are usually disclosed to the public and affected agencies in a negative declaration, a mitigated negative declaration, or an environmental impact report. The CEQA review provides a way in which the AICUZ program can be incorporated into local planning decisions.

The California Partnership for the San Joaquin Valley. The CPSJV was established by Executive Order in 2005 and is composed of eight counties in the San Joaquin Valley, including Fresno and Kings counties. The goal of the partnership is to encourage sustainable growth as outlined in the strategic action plan (California Partnership for the San Joaquin Valley 2006). Although NASL is not a member of the partnership, the partnership is an opportunity to educate policy makers at the local and state level about the AICUZ program.

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

SB 1462. SB 1462 provides that notification of environmental review and consultation with military branches be carried out under CEQA for projects located beneath SUA. In addition, this bill provides state policy to cooperate with the military to protect SUA from incompatible land use; respect the constitutional rights of the property owner; identify, avoid, and mitigate incompatible land use; and create a conflict-resolution process. SB 1462 provides a means by which NASL can work with local government to prevent and mitigate incompatible land uses within the AICUZ footprint.

SB 1468. SB 1468 requires counties to include military facilities in the land use element, circulation element, and conservation element in

their General Plans. Within the land use element, the effects of new development on NASL's military readiness must be considered. Kings County has developed a 3-mile agricultural land buffer around NASL to prevent other potentially incompatible land uses from encroaching on the base.

7.1.3 Local Government Tools

Local Government General Plans and Zoning. Planning and zoning regulations are tools available for use by local governments for dealing with future land-use planning and physical development. As noted in Section 6.1.1, Fresno and Kings counties limit parcels for agriculture-related uses to a minimum of 40 acres for areas within 4 and 3 miles, respectively, of NASL base boundaries. Section 6.1.2 identifies several amendments that the City of Lemoore made to the 2030 General Plan to encourage future compatible development within their planning jurisdiction. The 2030 General Plan has also identified "support [ing] a land use pattern that will maintain compatibility and livability between the air station and City residents and visitors" as among its objectives (City of Lemoore 2008c).

The Navy recommends that Fresno and Kings counties, as well as the City of Lemoore, adopt this AICUZ report, including guidance provided in Navy Instructions OPNAVINST 11010.36C, in order to develop permitted uses and regulations for the areas around public, private, and military airports. Implementation of airport imaginary surfaces zoning protection provided by this report should be pursued by all affected planning authorities.

Capital Improvements Programs. Capital improvements projects such as potable water lines, sewage transmission lines, road paving and/or improvements, new rights-of-way acquisition, and schools can be used to direct growth and types of growth toward areas compatible with the AICUZ Program. Local government agencies and organizations should develop capital improvement programs that avoid extending capital improvements into or near high-noise zones or APZs.

Transfer of Development Rights (TDR). TDR involves purchasing property development rights and transferring those rights to another piece of property. Thus, development of the original property is prevented.

Purchase of Development Rights. The local government may consider the purchase of development rights.

Building Code. The local building code should be used to implement the noise-attenuation measures identified in the AICUZ Program. Although this tool will not prevent incompatible development, building codes can ensure compatibility to the greatest extent possible.

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

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

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

7.1.4 Private Citizens/Real Estate Professionals/Businesses

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

provides disclosure language typical for residences located near airports that is incorporated in each contract between buyer and seller.

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

Business-Development and Construction Loans to Private Contractors. Lending institutions can limit financing for real estate purchases or construction incompatible with the AICUZ Program by restricting or prohibiting mortgage and/or other types of loans in areas potentially impacted by noise or APZ. The state and/or local government also could designate restricted areas around NASL.

Private Citizens. Private citizens do not have to purchase property within high-noise zones and/or APZs.

7.2 Recommendations

7.2.1 NASL Recommendations

Ultimately, control over land use and development in the vicinity of NASL is the responsibility of Fresno County, Kings County, the City of Lemoore, and local communities. The Navy has the ability and responsibility to implement programs, where possible, in support of local efforts. NASL values the professional and amicable relationship it has established with the community and thus will continue and/or consider the following:

Air Operations Procedures. The NASL Air Operations department, in conjunction with the local community, should continue to examine ways to improve noise abatement procedures.

Noise Complaint Hotline. A standard procedure is followed for noise complaints about operations at the main airfield that are called into NASL. This procedure is outlined in NASL Instruction 3710.1P (July

16, 2007). Aircraft noise complaints received by telephone are directed to the Air Operations Duty Officer (ODO). The ODO or Flight Clearance Supervisor will complete a record of Aircraft Noise Complaint. A log of noise complaints is maintained and, when necessary, the CP&LO, in coordination with the Public Affairs Officer, will perform any follow-up actions required.

Complaints should be collected in a standard format for plotting locations in a spatial database for future planning use. Recording these complaints can help:

- Document whether newly developing sites may be noise-sensitive in the future
- Provide land-use planning information for the local government;
- Determine which operational flight tracks are responsible for the noise complaint and at what time most complaints occur
- Provide valuable information for real estate transactions.

Community Outreach Program. Update and expand the Community Outreach Program, which is an educational program of presentations to real estate offices, neighborhood civic leagues, and service clubs. Future initiatives for community outreach should focus in communities where noise is likely to cause the most impact, including the community of Stratford, areas west of S.H. 41, and the communities of Riverdale, Lanare, and Burrel.

Presentation of the AICUZ Program. This presentation could be shown individually or collectively to community decision-makers, including local planning commissions, city councils, county legislatures, government councils, and other interested agencies. It would provide an opportunity to inform and educate individuals or groups who make land-use decisions (e.g., infrastructure siting, schools, zoning changes, etc.) that can either protect or threaten NASL's mission.

Materials for presentation and distribution should be developed or updated to include flight simulations, videos, poster boards, electronic or slide presentations, and fact sheets. Presentation information could be used as part of the community outreach program and would inform the

general public on AICUZ issues, NASL's contribution to the local economy, and the need for responsible land-use planning.

Keep Engaged in the Local Planning Process. NASL should attend public hearings and provide comments on actions that may affect AICUZ planning, including land-development regulations updates and amendments to the general plans for Fresno County, Kings County, and local communities surrounding NASL.

Local Plans, Regulations, and Policies. NASL should continue to be an active participant in local government and regional reviews, recommendations, and decision-making processes for land-use decisions that may affect the operational integrity of NASL, including:

- Requests for rezoning or a variance to permit an incompatible use, such as a higher density or removal of height restrictions
- Capital improvements plans such as potable water lines, sewage transmission lines, road paving and/or improvements, and new rights-of-way acquisition
- Building code changes
- Ensuring necessary ordinances and records-keeping capability to enact restrictions within the AICUZ footprint
- Community facilities construction (e.g., schools, stadiums, churches)
- Updates and amendments to local zoning ordinances and comprehensive plans or other such ordinances that may affect NASL
- Development of lighting guidelines and standards for new and existing development
- Approvals for subdivisions, site plans, wetland permits, or other proposed approvals necessary for development.

7.2.2 Local Government and Agency Recommendations

Communication. NASL will continue to educate community decision-makers about the AICUZ Program. Community decision-makers should continue to actively inform and seek input from NASL regarding land-use decisions that could affect the operational integrity of NASL. Working groups and regular meetings or conferences help to

ensure open lines of communication between the local/community decision makers and Navy representatives (i.e., the Commanding Officer and/or CPLO).

To communicate with the public, local government websites should acknowledge the AICUZ Program for NASL and provide a link to the NASL website for information on aircraft operations and the NASL AICUZ Program.

Decisions with Future Impacts. It is recommended that when local governments make land-use decisions about areas near the established AICUZ footprint, local governments recognize:

- Noise contours and APZs comprising the AICUZ footprint are dynamic, and the potential exists for changes in the AICUZ footprint as operational needs to satisfy the military mission change.
- Because of the AICUZ Program's dynamics, it is recommended that local governments work with NASL to establish a special planning area (or district) for areas within Noise Zone 1 (less than 65 CNEL) and outside the established APZs that are most likely to present compatibility problems, given changes in operations at NASL. As a beginning point, it is recommended that local governments use the flight tracks described in Section 3.3.2 to preserve the operational integrity of these flight tracks and protect the health and safety of the population.

Land-Use Plans and Regulations. As noted in Section 7.1.3, local governments currently within the AICUZ footprint recognize their responsibility to provide land-use controls in areas encumbered by the AICUZ footprint. To protect the health, safety, and general welfare of the population, the Navy recommends that local governments adopt the Navy's NAS Lemoore AICUZ Report as guidance for their land use and zoning updates.

Capital Improvement. It is recommended that all capital improvement projects in proximity to NASL be evaluated and reviewed for potential direct and indirect impacts that such improvements may have on the ability to implement a successful AICUZ Program.

Building Codes. Local building codes should be reviewed and/or modified to ensure consistency with noise-attenuation

recommendations of the AICUZ Program, as specified in OPNAVINST 11010.36C.

Public Land Acquisition Programs. These programs should be reviewed to ascertain whether they can be used to support the AICUZ Program.

Guidance Documents. It is recommended that local communities familiarize themselves with guidance documents such as the *California Advisory Handbook for Community and Military Compatibility Planning* and *Compatible Civilian Development Near Military Installations*.

7.2.3 Real Estate Professionals/Businesses Recommendations/ Private Citizens

Real Estate Professionals. Real estate professionals should:

- Provide written disclosure to prospective purchasers, renters, or lessees when a property is located within an APZ or noise zone
- Provide on their websites acknowledgement of the NASL AICUZ Program and provide a link to the NASL website for information on aircraft operations and the AICUZ Program at NASL
- Provide an AICUZ brochure to prospective buyers and lessees
- To the greatest extent possible, make prospective buyers and lessees aware of the potential magnitude of noise exposures they might experience.

Business-Development and Construction Loans to Private Contractors. Lending institutions should consider whether to limit financing for real estate purchases or construction incompatible with the AICUZ Program. This strategy encourages review of noise and accident potential as part of a lender's investigation of potential loans to private interests for real estate acquisition and development. Diligent lending practices will promote compatible development of the City of Lemoore and protect lenders and developers alike. Local banking and financial institutions should be encouraged to incorporate a "Due Diligence Review" of all loan applications, including determination of possible

noise or APZ impacts on the mortgaged property. The Navy can play a role in this strategy by providing AICUZ seminars to lenders throughout the region.

Citizens. The citizens of the local community have a responsibility to become informed about the AICUZ Program at NASL and learn about the program's goals and objectives; its value in protecting the health, safety, and welfare of the population; the limits of the program; and the positive community aspects of a successful AICUZ Program.

7.2.4 Summary

The AICUZ Program provides the tools needed to promote compatible development and activities near military installations. As noted above, responsibilities for disseminating relevant material, sharing knowledge, and developing cooperative relationships is the responsibility of numerous entities and individuals, not only the military and local government but community members as well. By working together, the military and the community help to preserve the defense mission while improving the quality of life of those living around the installation.

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APPENDIX A

Land Use Compatibility Recommendations

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APPENDIX A

Land-Use Compatibility Recommendations

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

A.1 Existing Land Use Data

The noise zones and APZs associated with NASL extend over Fresno and Kings Counties. The Fresno County Assessor’s Office and the Kings County Assessor’s Department were the primary sources for existing land-use information and data for determining land-use compatibility within noise zones and APZs associated with NASL (Fresno County Assessor’s Office 2008, Kings County Assessors Department 2008).

Fresno County

Within the Fresno County database, each parcel of land in the county is classified using a seven-field alphanumeric code. The Fresno County Property Use Code (FCPUC) provides information on the highest and best use of the property (position 1), the primary use of the property (positions 2 through 4), and secondary use of the property if significant to the value of the property (positions 5 through 7). The primary use is the main use the property currently has.

OPNAVINST 11010.36C utilizes the Standard Land Use Coding Manual (SLUCM) to classify land use to assess compatibility with noise zones and APZs. The SLUCM relies on a two- to four-digit land-use coding system. The FCPUC and the SLUCM are different coding systems and draw different distinctions between land uses. The FCPUC identifies multiple land-use types per parcel (i.e., agricultural and residential use), whereas the SLUCM identifies parcels by a single type. In order to complete the Geographic Information System (GIS) land-use compatibility data analysis, each parcel within the noise zones and APZs was assigned a code from SLUCM.

The SLUCM codes were assigned to each parcel based on the FCPUC, parcel size, and aerial verification. When aerial verification is utilized to assist in the assignment of a SLUCM code, the parcel is located through the GIS mapping and land use verified via overhead photographs as well as satellite Google and Bing maps. The FCPUC and parcel size were utilized as the primary sources of information to assign equivalent SLUCM codes.

For the majority of the parcels the primary use of the property (FCPUC positions 2 through 4) was used to assign equivalent SLUCM classifications. Several preliminary determinations were made in

equating a SLUCM classification. All determinations made are documented as follows and are intended to assign conservative SLUCM codes to the current land use.

- Residential land-use types with one or more manufactured homes were considered to be SLUCM land use code *14-Mobile home parks or courts* in order to conservatively equate the noise and APZ sensitivity of the parcel.
- Given the rural and agricultural regional setting of NASL, the secondary land use (positions 5 through 7) of parcels less than 5 acres in size was used to make SLUCM classification if the secondary land use would equate to a SLUCM classification with more noise and APZ recommendations.
- All parcels with an agricultural primary use and an agricultural or vacant secondary land use were considered to be classification *80.5- Agriculture (except livestock) & no residences* for the purposes of this analysis.

Table A-1 shows the SLUCM classification equated through the primary and secondary land uses. In several instances the primary use provided insufficient information and the secondary use was utilized to equate the SLUCM code.

| Table A-1 | | | |
|---|--|--|---|
| Equated SLUCM Classifications and FCPUCs | | | |
| SLUCM Classification | | FCPUC - Primary Use Field (positions 2 through 4) | |
| Residential | | | |
| 11.11 | Single Units: detached | S01 | 1 Single Family Residential ^a |
| 11.21 | Two Units: side-by-side | S02 | 2 Single Family Residential |
| 14 | Mobile Home parks or courts | SM2 | 2 Single Family & Manufactured Home |
| | | SM3 | 3 Single Family & Manufactured Home |
| | | OM1 | 1 Only Manufactured Home |
| | | OM2 | 2 Only Manufactured Home ^b |
| | | OM3 | 3 Only Manufactured Home |
| | | MH1 | 1 Manufactured Home on Permanent Foundation |
| | | MH2 | 2 Manufactured Home on Permanent Foundation |
| | | GAR | Garage ¹ |
| Manufacturing | | | |
| 21 | Food & Kindred products; manufacturing | GRA | Granary & Rice Mill |
| 22 | Textile mill products; manufacturing | COG | Cotton Gin & Compress |
| Trade | | | |
| 54 | Retail trade - food | SS1 | 1 Suburban & Country Store ² |
| 58 | Retail trade- Eating and drinking establishments | RES | Restaurant |
| 59 | Other retail trade | CS1 | 1 Commercial Store |
| Services | | | |
| 63.7 | Warehousing and storage services | WAH | Warehouse |
| 67 | Government Services | WAC | Water Company ^c |
| Cultural, Entertainment and Recreation | | | |
| 71 | Cultural activities (& Churches) | CHU | Church |

| Table A-1 | | | |
|---|---|--|-------------------------------------|
| Equated SLUCM Classifications and FCPUCs | | | |
| SLUCM Classification | | FCPUC - Primary Use Field (positions 2 through 4) | |
| Resource Production and Extraction | | | |
| 81 | Agriculture (except Livestock) | ALM | Almonds ³ |
| | | AFU | Apples – Fuji |
| 80.5 | Agriculture (except Livestock) & No Residences ^c | APR | Apricots |
| | | DRY | Dry Farming |
| | | FIE | Field Cropland ⁴ |
| | | OLI | Olives |
| | | PIS | Pistachios |
| | | POM | Pomegranates |
| | | NEC | Nectarines |
| | | TRX | Trees - Mixed |
| | | TVX | Trees – Vines Mixed ⁶ |
| | | VIX | Vines – Mixed |
| | | VIR | Vines – Raisin Variety ⁵ |
| | | VIT | Vines – Table Variety |
| | | VIW | Vines – Wine Variety |
| | | WAL | Walnuts |
| 81.5 | Livestock Farming | DAI | Dairy |
| | | PAS | Pasture - Native |
| | | POU | Poultry |
| | | FEE | Feed Lot |
| Other | | | |
| 91 | Undeveloped Land | 000 | Vacant |

Notes:

^a Several exceptions - Secondary uses were utilized to equate a SLUCM code.

^b One exception - A secondary use was utilized to equate a SLUCM code.

^c Secondary use was utilized to equate a SLUCM code.

¹ A single parcel secondary use OM1.

² One exception - Secondary use OM1, SLUCM classification 14.

³ Two exceptions – (1) Secondary use S01, SLUCM classification 11.11; (2) Secondary use 000, SLUCM classification 80.5

⁴ Three exceptions - (1) Secondary use *TWR-Cell tower site*, SLUCM classification 47; (2) Secondary use *PAH-Packing House*, SLUCM classification 21; (3) Secondary use S01, SLUCM classification 11.11 or 81

⁵ One exception - Secondary use S01, SLUCM classification 11.11

⁶ One exception - Secondary use SM8, SLUCM classification 81

Key:

FCPUC = Fresno County Property Use Code.

SLUCM = Standard Land Use Classification Manual.

In several instances, the primary and secondary use of the parcel did not provide adequate information to equate a SLUCM classification. Parcels with both primary and secondary information of *XXX-other*, *000-vacant*, *S00-0 Single Family Residential*, *PCI-partially completed improvements*, and *PUB-publicly owned* were assessed a SLUCM classification through aerial verification; unless both the primary and secondary information provided a land use of *000-vacant*, in which case SLUCM classification *91-Undeveloped Land* was applied.

In approximately 200 instances there was no property use code provided with parcels potentially affected by noise zones and APZs. In these instances, the parcel identification number provided information toward the land use as a *U-Utility* and *T-Tax Exempt* property. All parcels with a *U-utility* identification number were assessed a SLUCM classification of *48-Utilities*. All remaining parcels were assessed through aerial verification.

SLUCM classifications equated through aerial verification intended to be a conservative reflection of the current land use. SLUCM classifications assessed through aerial verification include; *11.11-single units: detached, 14-Mobile Home parks or courts, 39-Miscellaneous manufacturing, 42-Motor vehicle transportation, 45-Highway and street Right-of-way, 46-Automobile parking, 63.7-Warehousing and storage, 68-Educational services, 74-Recreational activities, 80.5 Agriculture (except livestock & No Residences), 81-Agriculture (except livestock), 81.5-Livestock farming, 82-Agriculture-related activities, 91-Undeveloped Land, and 93-Water areas.*

Kings County

Within the Kings County database, each parcel of land in the county is classified using a four-digit land-use code. The first two digits of the Kings County Land Use Code (KCLUC) refer to a general land type (i.e., 01-09 refer to Residential, 11-27 refer to Agriculture, etc.); the second two digits provide a more specific land-use classification. Although the KCLUC is similar in classification concept to SLUCM, the KCLUC and the SLUCM are different land-use codes that draw different distinctions between classifications.

In order to complete the GIS land-use compatibility data analysis, each parcel within the noise zones and APZs was assigned a code from SLUCM. The SLUCM codes were assigned to each parcel based on the KCLUC, parcel size, aerial verification, and ownership where applicable. The KCLUC and parcel size were utilized as the primary sources of information to assign equivalent SLUCM codes. Several preliminary determinations were made to guide the SLUCM classification and are documented as follows:

- Residential land-use types with one or more mobile homes were considered to be SLUCM land use code *14-Mobile home parks or courts* in order to conservatively equate the noise and APZ sensitivity of the parcel.
- Given the rural and agricultural regional setting of NASL, parcels less than 5 acres in size with non-residential KCLUC land type and one or more residence were considered to be a residential SLUCM, or the SLUCM classification in which the most noise and APZ restrictions would apply.
- KCLUCs that indicate a current use to ‘alternate use’ or ‘transitional’ were equated to a SLUCM code most similar to the current use.
- KCLUCs indicating multiple land uses were equated to the SLUCM land use classification in which the most restrictive noise and APZ recommendations would apply.
- All parcels with an agricultural uses only with no residential development were considered to be classification *80.5- Agriculture (except livestock) & no residences* for the purposes of this analysis.

Table A-2 shows the equated SLUCM classification to the KCLUCs. ‘Resource Production and Extraction’ SLUCM classifications may contain occasional household units.

| Table A-2 | | | |
|--|---|--------------|--|
| Equated SLUCM Classification and KCLUCs | | | |
| SLUCM Classification | | KCLUC | |
| Residential | | | |
| 11.11 | Single Units: detached | 0100 | Single Family Residence |
| | | 1910 | Rural Home sites & Single Family Residence |
| 11.21 | Two Units: side-by-side | 0120 | More than 1 Single Family Residence |
| | | 1920 | Rural Home sites & More than 1 Single Family Residence |
| 11.22 | Two Units: One above the other | 3120 | Store- Small/ Grocery/ Office & More than 1 Single Family Residence |
| 14 | Mobile Home parks or courts | 0130 | 1 Single Family Residence & Mobile Home |
| | | 0500 | Mobile Home |
| | | 0950 | Vacant Lot with Mobile Home |
| | | 1830 | Bee/Honey Processing & More than 1 Single Family Residence & Mobile Home |
| | | 1850 | Bee/Honey Processing & Mobile Home(s) |
| | | 1930 | Rural Home sites & 1 Single Family Residence & Mobile Home(s) |
| | | 1950 | Rural Home sites & Mobile Home(s) |
| | | 1970 | Rural Home site & Mobile Home on PF |
| | | 3150 | Store- Small/ Grocery/ Office & Mobile Home(s) |
| Manufacturing | | | |
| 21 | Food & Kindred products; manufacturing | 5500 | Food Processing |
| 22 | Textile mill products; manufacturing | 5800 | Cotton Gins |
| 39 | Miscellaneous manufacturing | 5190 | Light Manufacturing & Misc. Improvements |
| | | 5990 | Commercial/ Industrial & Misc Improvements |
| Transportation, Communication and Utilities | | | |
| 46 | Automobile Parking | 4900 | Parking Lots |
| 49 | Other transportation, communication and utilities | 3790 | Communication- Transportation & Misc. Improvements |
| Trade | | | |
| 52 | Retail trade- building materials, hardware and farm equipment | 4500 | Farm Machinery Sales/ Storage |
| 53 | Retail trade- shopping centers | 3300 | Department/ General Stores |
| 54 | Retail trade- food | 3100 | Store- Small Grocery/ Office |
| 58 | Retail trade- Eating and drinking establishments | 4100 | Restaurants/ Lounges/ Cafes |
| 59 | Other retail trade | 4710 | Nurseries/ Greenhouse & 1 Single Family Residence |
| Services | | | |
| 62 | Personal services | 4400 | Service Shops |
| 62.4 | Cemeteries | 8400 | Mortuaries/ Cemeteries |
| 63.7 | Warehousing and storage | 5400 | Packing shed/ Cold storage |
| | | 5600 | Warehousing/ Ice Plant/ Grain EI |
| | | 5690 | Warehousing & Misc Improvements |
| 65 | Professional services | 3900 | Professional building |

| Table A-2 | | | |
|--|--|--------------|--|
| Equated SLUCM Classification and KCLUCs | | | |
| SLUCM Classification | | KCLUC | |
| 67 | Government services | 9100 | Water Companies |
| 68 | Education Services | 8500 | Schools / Museums |
| 69 | Miscellaneous | 3700 | Commercial Lot to Alternate Use |
| | | 4800 | Service Stations |
| Cultural, Entertainment and Recreation | | | |
| 71 | Cultural activities (& Churches) | 8100 | Churches |
| | | 8110 | Churches & 1 Single Family Residence |
| 74 | Recreational activities (include golf courses, riding stables, water rec.) | 4200 | Recreation |
| Resource Production and Extraction | | | |
| 80.5 | Agriculture (except Livestock) & No Residences | 1100 | Field Crops |
| | | 1190 | Field Crops & Misc. Improvements |
| | | 1500 | Trees & Vines |
| | | 1590 | Trees & Vines & Misc. Improvements |
| | | 2400 | Dry Farming |
| 81 | Agriculture (except Livestock) | 1110 | Field Crops & 1 Single Family Residence |
| | | 1120 | Field Crops & More than 1 Single Family Residence |
| | | 1130 | Field Crops & 1 Single Family Residence & Mobile Home(s) |
| | | 1140 | Field Crops & More than 1 Single Family Residence & Mobile Home(s) |
| | | 1150 | Field Crops & Mobile Home(s) |
| | | 1170 | Field Crops & Mobile Home on PF |
| | | 1510 | Trees & Vines & 1 Single Family Residence |
| | | 1520 | Trees & Vines & More than 1 Single Family Residence |
| | | 1530 | Trees & Vines & 1 Single Family Residence & Mobile Home(s) |
| | | 1550 | Trees & Vines & Mobile Home(s) |
| | | 1700 | Agriculture Land to Alternate Use |
| | | 1790 | Agriculture/ Transitional & Misc. Improvements |
| | | 2410 | Dry Farming & 1 Single Family Residence |
| 81.5 | Livestock Farming | 1300 | Irrigated Pasture |
| | | 1310 | Irrigated Pasture & 1 Single Family Residence |
| | | 1320 | Irrigated Pasture & More than 1 Single Family Residence |
| | | 1390 | Irrigated Pasture & Misc. Improvements |
| | | 2120 | Dairies & More than 1 Single Family Residence |
| | | 2130 | Dairies & 1 Single Family Residence & Mobile Home(s) |
| | | 2140 | Dairies & More than 1 Single Family Residence & Mobile Home(s) |
| | | 2190 | Dairies & Misc. Improvements |
| | | 2300 | Grazing Land |
| | | 2310 | Grazing Land & 1 Single Family Residence |
| | | 2350 | Grazing Land & Mobile Home(s) |
| | | 2390 | Grazing & Misc. Improvements |

| Table A-2 | |
|--|---|
| Equated SLUCM Classification and KCLUCs | |
| SLUCM Classification | KCLUC |
| | 2610 Cattle Feed Lot & 1 Single Family Residence 2690 Cattle Feed Lot & Misc. Improvements 2700 Poultry 2710 Poultry & 1 Single Family Residence |
| Other | |
| 91 Undeveloped Land | 0900 Vacant Residential Lot 0990 Residential Lot with Misc. Improvements 1900 Rural Home sites/ Vacant 1990 Rural Home sites & Misc. Improvements 5900 Commercial/ Industrial Vacant Lots |
| 93 Water Areas | 9300 Ditches/ Water Storage 9390 Ditches/ Water Storage & Misc. Improvements 9400 Evaporation Ponds |

In several instances, the KCLUC classifications and parcel size did not provide clear or specific information and could not be directly equated to SLUCM codes (i.e., *1970-Rural Home site and Mobile Home on PF*, *5900-Commercial/Industrial Vacant Lots*, *9600-Assessed on Utility Role*, *9900-Government Exempt Properties*). Aerial verification and ownership were utilized to make individual parcel SLUCM classifications. For these parcels, several assumptions were made regarding ownership of the parcels and documented as follows:

- Parcels identified through aerial verification as vacant lots were equated to SLUCM *91-Undeveloped Land* unless ownership indicated alternate or potential future development (i.e., Kings Telephone Company equated to SLUCM *47-Communication*).
- Parcels identified through ownership as reclamation and conservation areas were equated to SLUCM *76-Parks*.

The bulk of the parcels equated to SLUCM codes through aerial verification and ownership are classified by the KCLUC as *9900-Government Exempt Properties*. There are approximately 352 parcels classified by KCLUC as 9900 and potentially affected by noise and APZ zones. SLUCM codes assigned to KCLUC 9900 outside of NASL base boundaries include *41-Railroad, rapid rail transit, and street railway transportation*; *42-Motor vehicle transportation*; *48-Utilities*; *49-Other transportation, communication and utilities*; *68-Education Services*; *71-Cultural Activities (& Churches)*; *76-Parks*; and *81-Agriculture (except Livestock)*.

Unclassified Land Uses

The FCPUC and KCLUC provided parcel information for more than 97% of area encumbered by the AICUZ footprint. Aerial verification identified the remaining 2.4% of areas encumbered by the AICUZ footprint as NASL, or areas associated with irrigation ditches, water courses, or roadways located between parcel boundaries. These areas were classified as military land use if located on NASL, or *42-Motor vehicle transportation* if located outside the base boundary.

A.2 SLUCM Land-Use Compatibility Recommendations

Table A-3 presents the Navy's land-use compatibility recommendations for noise zones and APZs. Classification *80.5-Agriculture (except Livestock) & No Residences* and *99-Military* were added for the purposes of this analysis. Compatibility recommendations for SLCUM classification *80.5* are equivalent to classification *81* except when the compatibility restrictions regarded residential buildings (noise levels 65 to 69, 70 to 74 and 75 to 79 dBA CNEL) in which case 'compatible with restrictions' was changed to 'compatible.' Compatibility recommendations for SLUCM classification *99* are considered compatible in all noise and accident potential zones.

**Table 6-1
 Land-Use Compatibility Recommendations**

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|---|---------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |
| 10 | Residential | | | | | | | |
| 11 | Household units | NA | NA | NA | N ²⁸ | N ²⁸ | N | N |
| 11.11 | Single units; detached | N | N | Y ² | N ²⁸ | N ²⁸ | N | N |
| 11.12 | Single units; semidetached | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.13 | Single units; attached row | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.21 | Two units; side-by-side | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.22 | Two units; one above the other | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.31 | Apartments; walk up | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 11.32 | Apartments; elevator | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 12 | Group quarters | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 13 | Residential hotels | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 14 | Mobile home parks or courts | N | N | N | N | N | N | N |
| 15 | Transient lodgings | N | N | N | N ²⁸ | N ²⁸ | N ²⁸ | N |
| 16 | Other residential | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 20 | Manufacturing ³ | | | | | | | |
| 21 | Food and kindred products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 22 | Textile mill products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 23 | Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 24 | Lumber and wood products (except furniture); manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 25 | Furniture and fixtures; manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 26 | Paper and allied products; manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 27 | Printing, publishing, and allied industries | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 28 | Chemicals and allied products; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 29 | Petroleum refining and related industries | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 30 | Manufacturing (continued) ³ | | | | | | | |

**Table 6-1
 Land-Use Compatibility Recommendations**

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|--|---------------------------------------|------------------|-----------------|--------------|------------------|------------------|-----------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |
| 31 | Rubber and misc. plastic products; manufacturing | N | N | N | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 32 | Stone, clay, and glass products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 33 | Primary metal products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 34 | Fabricated metal products; manufacturing | N | N | Y ⁴ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 35 | Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks | N | N | N | Y | 25 | 30 | N |
| 39 | Miscellaneous manufacturing | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 40 | Transportation, communication and utilities ^{6,7} | | | | | | | |
| 41 | Railroad, rapid rail transit, and street railway transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 42 | Motor vehicle transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 43 | Aircraft transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 44 | Marine craft transportation | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 45 | Highway and street right-of-way | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 46 | Automobile parking | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 47 | Communication | N | Y ^{5,7} | Y ⁵ | Y | 25 ³² | 30 ³² | N |
| 48 | Utilities | N | Y ^{5,7} | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 485 | Solid waste disposal (Landfills, incineration, etc.) | N | N | N | NA | NA | NA | NA |
| 49 | Other transportation, communication, and utilities | N | Y ⁷ | Y ⁷ | Y | 25 ³² | 30 ³² | N |
| 50 | Trade | | | | | | | |
| 51 | Wholesale trade | N | Y ⁵ | Y ⁵ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 52 | Retail trade – building materials, hardware, and farm equipment | N | Y ⁸ | Y ⁸ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 53 | Retail trade ¹⁰ – shopping centers, Home Improvement Store, Discount Club, Electronics Superstore | N | N | Y ⁹ | Y | 25 | 30 | N |
| 54 | Retail trade – food | N | N | Y ¹¹ | Y | 25 | 30 | N |

**Table 6-1
 Land-Use Compatibility Recommendations**

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|--|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |
| 55 | Retail trade – automotive, marine craft, aircraft, and accessories | N | Y ¹² | Y ¹² | Y | 25 | 30 | N |
| 56 | Retail trade – apparel and accessories | N | N | Y ¹³ | Y | 25 | 30 | N |
| 57 | Retail trade – furniture, home furnishings, and equipment | N | N | Y ¹³ | Y | 25 | 30 | N |
| 58 | Retail trade – eating and drinking establishments | N | N | N | Y | 25 | 30 | N |
| 59 | Other retail trade | N | N | Y ⁹ | Y | 25 | 30 | N |
| 60 | Services ¹⁴ | | | | | | | |
| 61 | Finance, insurance, and real estate services | N | N | Y ¹⁵ | Y | 25 | 30 | N |
| 62 | Personal services | N | N | Y ¹⁶ | Y | 25 | 30 | N |
| 62.4 | Cemeteries | N | Y ¹⁷ | Y ¹⁷ | Y | Y ²⁹ | Y ³⁰ | Y ^{31,37} |
| 63 | Business services (credit reporting; mail, stenographic reproduction; advertising) | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 63.7 | Warehousing and storage services | N | Y ¹⁹ | Y ¹⁹ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 64 | Repair services | N | Y ²⁰ | Y ²⁰ | Y | Y ²⁹ | Y ³⁰ | Y ³¹ |
| 65 | Professional services | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 65.1 | Hospitals, other medical facilities | N | N | N | 25 | 30 | N | N |
| 65.16 | Nursing homes | N | N | N | N ²⁸ | N ²⁸ | N | N |
| 66 | Contract construction services | N | Y ²⁰ | Y ²⁰ | Y | 25 | 30 | N |
| 67 | Governmental services | N | N | Y ¹¹ | Y ²⁸ | 25 | 30 | N |
| 68 | Educational services | N | N | N | 25 | 30 | N | N |
| 69 | Miscellaneous | N | N | Y ¹⁸ | Y | 25 | 30 | N |
| 70 | Cultural, entertainment and recreational | | | | | | | |
| 71 | Cultural activities (& churches) | N | N | N | 25 | 30 | N | N |
| 71.2 | Nature exhibits | N | Y ²¹ | Y ²¹ | Y ²⁸ | N | N | N |
| 72 | Public assembly | N | N | N | Y | N | N | N |
| 72.1 | Auditoriums, concert halls | N | N | N | 25 | 30 | N | N |

Table 6-1
Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|------------|--|---------------------------------------|---------------------|---------------------|-----------------|-----------------|-----------------|---------------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |
| 72.11 | Outdoor music shells, amphitheaters | N | N | N | N | N | N | N |
| 72.2 | Outdoor sports arenas, spectator sports | N | N | N | Y ³³ | Y ³³ | N | N |
| 73 | Amusements- fairgrounds, miniature golf, driving ranges; amusement parks, etc. | N | N | Y | Y | Y | N | N |
| 74 | Recreational activities (including golf courses, riding stables, water recreation) | N | Y ^{20, 21} | Y ^{20, 21} | Y ²⁸ | 25 | 30 | N |
| 75 | Resorts and group camps | N | N | N | Y ²⁸ | Y ²⁸ | N | N |
| 76 | Parks | N | Y ^{20, 21} | Y ^{20, 21} | Y ²⁸ | Y ²⁸ | N | N |
| 79 | Other cultural, entertainment and recreation | N | Y ^{17, 20} | Y ^{17, 20} | Y ²⁸ | Y ²⁸ | N | N |
| 80 | Resource production and extraction | | | | | | | |
| 81 | Agriculture (except livestock) | Y ⁶ | Y ²² | Y ²² | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 81.5, 81.7 | Livestock farming and breeding | N | Y ^{22, 23} | Y ^{22, 23} | Y ³⁴ | Y ³⁵ | N | N |
| 82 | Agricultural related activities | N | Y ^{22, 24} | Y ^{22, 24} | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 83 | Forestry activities ²⁵ | N | Y ²⁴ | Y ²⁴ | Y ³⁴ | Y ³⁵ | Y ³⁶ | Y ^{36, 37} |
| 84 | Fishing activities ²⁶ | N ²⁶ | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 85 | Mining activities | N | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 89 | Other resource production and extraction | N | Y ²⁴ | Y ²⁴ | Y | Y | Y | Y |
| 90 | Other | | | | | | | |
| 91 | Undeveloped Land | Y | Y | Y | NA | NA | NA | NA |
| 93 | Water Areas | N ²⁷ | N ²⁷ | N ²⁷ | NA | NA | NA | NA |

Adapted from OPNAVINST 11010.36C (U.S. Department of the Navy 2008).

Key:

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

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

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

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

SLUCM = Standard Land Use Coding Manual.

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

DNL = Day-night average sound level.

NA = Not Applicable (no data available for that category).

Table 6-1
Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|------|---------------------------------------|-------|-------|--------------|--------------|--------------|--------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |

25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structure.

Notes:

1. A “Yes” or a “No” designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to FARs are provided as a guide to densities in some categories. In general, land-use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ 1 and 50 per acre in APZ 2 are the range of occupancy levels, including employees, considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ 1, and Maximum (MAX) assemblies of 50 people per acre in APZ 2.
2. The suggested maximum density for detached single-family housing is 1 to 2 dwelling units per acre (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 % 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. Maximum FAR of 0.56 in APZ 2.
5. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2.
6. No structures (except airfield lighting), buildings, or aboveground utility/communications lines should normally be located in clear zone areas on or off the installation. The clear zone is subject to severe restrictions. See UFC 3-260-01 “Airfield and Heliport Planning & Design” dated 10 November 2001 for specific design details.
7. No passenger terminals and no major aboveground transmission lines in APZ 1.
8. Within SLUCM Code 52, Max FARs for lumber yards (SLUCM Code 521) are 0.20 in APZ 1 and 0.40 in APZ 2. For hardware/paint and farm equipment stores, SLUCM Code 525, the Max FARs are 0.12 in APZ 1 and 0.24 in APZ 2.
9. Maximum FAR of 0.16 in APZ 2.
10. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super regional facilities anchored by small businesses, supermarket or drug store, discount retailer, department store, or several department stores, respectively. Included in this category are such uses as big box discount and electronics superstores. The Max recommended FAR for SLUCM 53 should be applied to the gross leasable area of the shopping center rather than attempting to use other recommended FARs listed in Table 2 under “Retail” or “Trade.”
11. Maximum FAR of 0.24 in APZ 2.
12. Maximum FAR of 0.14 in APZ 1 and 0.28 in APZ 2.
13. Maximum FAR of 0.28 in APZ 2.
14. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc., are not recommended.
15. Maximum FAR of 0.22 for “General Office/Office park” In APZ 2.
16. Office uses only. Maximum FAR of 0.22 in APZ 2.
17. No chapels are allowed within APZ 1 or APZ 2.
18. Maximum FAR of 0.22 in APZ 2.
19. Maximum FAR of 1.0 in APZ 1 and 2.0 in APZ 2.
20. Maximum FAR of 0.11 in APZ 1 and 0.22 in APZ 2.
21. Facilities must be low intensity and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc., are not recommended.
22. 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.
23. Includes feedlots and intensive animal husbandry.
24. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2. No activity that produces smoke or glare or involves explosives.
25. 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.
26. Controlled hunting and fishing may be permitted for the purpose of wildlife management.

Table 6-1
Land-Use Compatibility Recommendations

| Land Use | | Accident Potential Zones ¹ | | | Noise Levels | | | |
|-----------|------|---------------------------------------|-------|-------|--------------|--------------|--------------|--------------|
| | | | | | Noise Zone 2 | | Noise Zone 3 | |
| SLUCM No. | Name | Clear Zone | APZ 1 | APZ 2 | 65 to 70 DNL | 70 to 75 DNL | 75 to 80 DNL | 80 to 85 DNL |

27. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are compatible.
28. 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 approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.
 - b. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB in DNL 65-69 and NLR of 30 dB DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75-79.
 - c. Normal permanent construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.
 - d. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor exposure, particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures which only protect interior spaces.
29. Measures to achieve an NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
30. Measures to achieve an NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
31. Measures to achieve an NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
32. If the project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.
33. Land use compatible provided special sound reinforcement systems are installed.
34. Residential buildings require an NLR of 25.
35. Residential buildings require an NLR of 30.
36. Residential buildings not permitted.
37. Land-use not recommended, but if the community decides use is necessary, hearing protection devices should be worn.