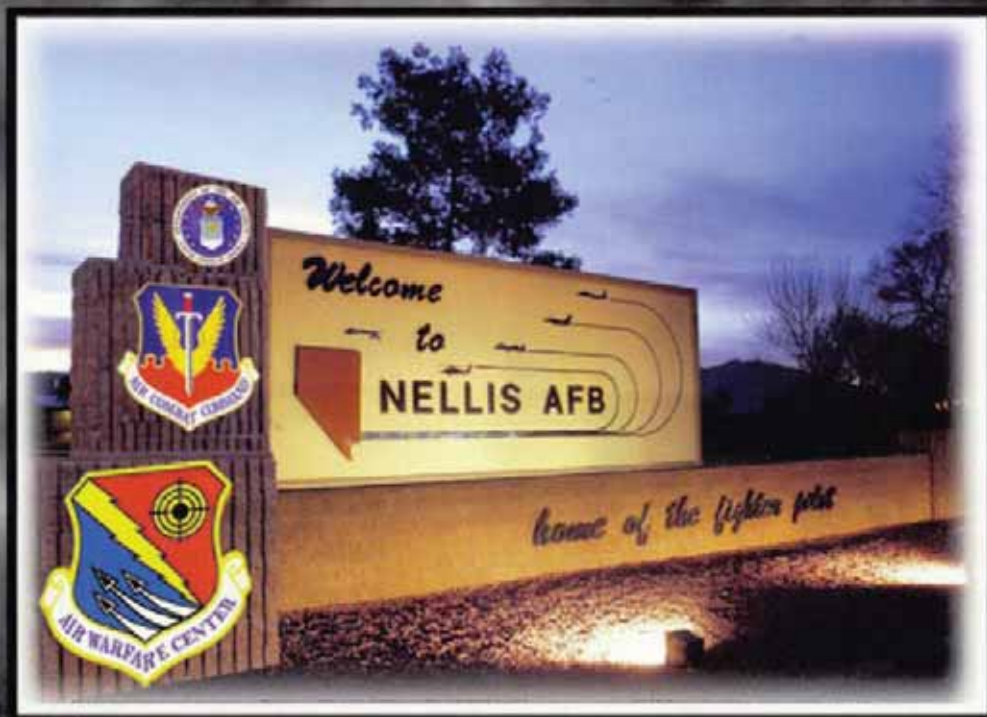




Air Installation Compatible Use Zone (AICUZ) Report



VOLUME 1 & 2

**United States Air Force
Nellis Air Force Base, Nevada**



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR WARFARE CENTER (ACC)
NELLIS AIR FORCE BASE, NEVADA

FROM: HQ AWFC/CC

22 September 2004

SUBJECT: Air Installation Compatible Use Zone (AICUZ) Report

TO: Area Governments

1. This Air Installation Compatible Use Zone (AICUZ) Report for Nellis Air Force Base is an update of the previous AICUZ report dated December 1992. The update was initiated because of the beddown of the F/A-22 aircraft as well as changes in Nellis AFB flight patterns. It is a re-evaluation of aircraft noise and accident potential related to Air Force flying operations. It is designed to aid in the development of local planning mechanisms, which will protect the public safety, health and welfare, as well as preserve the operational capabilities of Nellis AFB.
2. The enclosed report contains a summary description of the affected areas around the base. The report outlines the location of runway clear zones, aircraft accident potential zones and noise contours, and recommends compatible land use for areas in the vicinity of the base. It is our hope that this information will be incorporated into your community plans, zoning ordinances, subdivision regulations, building codes and other related documents.
3. The basic objective of the AICUZ program is to achieve compatible uses of public and private lands in the vicinity of military airfields by controlling incompatible development through local actions. This update provides noise contours based on the Day-Night Average A-Weighted Sound Level (DNL) metric used by the Air Force. This report provides the information necessary to maximize beneficial use of the land surrounding Nellis Air Force Base, while minimizing the potential for degradation of the safety, health and welfare of the affected public.
4. We greatly value the positive relationship Nellis AFB has experienced with its neighbors over the years. As a partner in the process, we have attempted to minimize noise disturbances through such actions as minimizing night flying, avoiding flights over heavily populated areas to the maximum extent possible, installing jet engine noise suppressors for maintenance activities, etc. We solicit your cooperation in implementing the recommendations and guidelines presented in this AICUZ report.

Stephen G. Wood
STEPHEN G. WOOD
Major General, USAF
Commander

TABLE OF CONTENTS

LIST OF FIGURES iii

LIST OF TABLES iv

SECTION 1 PURPOSE AND NEED 1

 1.1 Introduction 1

 1.2 Purpose and Need 1

 1.3 Process and Procedure 2

SECTION 2 INSTALLATION DESCRIPTION 3

 2.1 Mission 3

 2.2 Economic Impact 3

 2.3 Flying Activity 7

SECTION 3 LAND USE COMPATIBILITY GUIDELINES 9

 3.1 Introduction 9

 3.2 Land Use Compatibility 15

 3.3 Participation in the Planning Process 15

SECTION 4 LAND USE ANALYSIS 20

 4.1 Introduction 20

 4.2 Existing Land Use 21

 4.2.1 Unincorporated Clark County 21

 4.2.2 City of North Las Vegas 22

 4.2.3 City of Las Vegas 22

 4.3 Current Zoning 23

 4.3.1 Clark County 23

 4.3.2 City of North Las Vegas 24

 4.4 Future Land Use 24

 4.5 Incompatible Land Uses 25

 4.5.1 Noise Zones 25

 4.5.2 Clear Zones and Accident Potential Zones 26

 4.5.3 Planning Considerations 26

SECTION 5 IMPLEMENTATION 30

 5.1 Air Force Responsibilities 30

 5.2 Local Community Responsibilities 31

LIST OF FIGURES

Figure 1 VICINITY MAP..... 6

Figure 2 NELLIS FLIGHT TRACKS MAP..... 8

Figure 3 COMPOSITE NOISE CONTOURS AND ACCIDENT POTENTIAL ZONES MAP . 11

Figure 4 1992 NOISE CONTOURS MAP..... 12

Figure 5 F/A-22 EIS PROJECTED NOISE CONTOURS MAP..... 13

Figure 6 2001 NOISE CONTOURS MAP..... 14

Figure 7 GENERALIZED EXISTING LAND USE MAP..... 26

Figure 8 GENERALIZED ZONING MAP..... 27

Figure 9 GENERALIZED FUTURE LAND USE MAP..... 28

LIST OF TABLES

Table 2-1 PERSONNEL BY CLASSIFICATION AND HOUSING - FY 2001 4

Table 2-2 SUMMARY OF ANNUAL GROSS PAYROLL - FY 2001 5

**Table 2-3 SUMMARY OF CONTRACTS AND EXPENDITURES FOR
MATERIALS, EQUIPMENT, AND SUPPLIES - FY 2001..... 5**

Table 3-1 LAND USE COMPATIBILITY 15

SECTION 1 PURPOSE AND NEED

1.1 Introduction

This report is an update of the Nellis Air Force Base Air Installation Compatible Use Zone (AICUZ) report. The update presents and documents the changes to the AICUZ for the period of 1992 to 2001. It reaffirms Air Force policy of promoting public health, safety, and general welfare in areas surrounding Nellis AFB. The report presents noise contours as they have fluctuated over time due to changes in flight operations since the 1992 report. To assist Clark County in their future land use planning, we have included guidelines for determining land uses compatible with aircraft noise and accident potential. In addition to current noise footprints, we have included a composite noise contour map depicting a graphic combination of the largest northern and southern noise footprints based on past studies. It is conceivable that, based on the most reasonable data projections available, these levels of noise exposure could return in the future. It is hoped this information will assist the local communities, and serve as a tool for future planning and zoning activities. The changes in the AICUZ are attributed to:

- Beddown of the F/A-22 aircraft
- Changes in Nellis AFB flight patterns
- Technical improvements to the NOISEMAP program.

The addition of assigned aircraft to Nellis AFB and the continued operation/expansion of the previously assigned missions require an update of the Air Installation Compatible Use Zone Report.

1.2 Purpose and Need

As stated in the previous Nellis AFB AICUZ report, the purpose of the AICUZ program is to promote compatible land development in areas subject to aircraft noise and accident potential. Clark County has incorporated AICUZ recommendations as an integral part of the comprehensive planning process. Accident potential and aircraft noise land use compatibility are regulated in the Clark County Unified Development Code, Title 30, Section 30.48, Part A, Airport Environs Overlay District, dated June 21, 2000, under the authority of Chapter 278, Planning and Zoning, of the Nevada Revised Statutes. Noise compatibility and airport environs implementing standards have been adopted in the Clark County "Public Health and Safety Programs: Airport Environs Plan," an amendment of the Clark County Comprehensive Plan.

Air Force AICUZ land use guidelines reflect land use recommendations for clear zones (CZ), accident potential zones (APZ) I and II, and four noise zones. These guidelines have been established on the basis of studies prepared and sponsored by several federal agencies, including the Department of Housing and Urban Development, Environmental Protection Agency, Department of Defense (DoD), and state and local agencies. The guidelines recommend land uses which are compatible with airfield operations while allowing maximum beneficial use of adjacent properties. The Air Force has no desire to recommend land use regulations that render property economically useless. It does, however, have an obligation to the inhabitants near Nellis AFB and to the residents of Nevada to point out ways to protect the people in adjacent areas, as well as the public investment in the installation itself.

The AICUZ program uses the DOD NOISEMAP methodology to define noise levels in areas near Air Force installations. An analysis of Nellis AFB's flying operations was performed, including types of aircraft, flight patterns utilized, variations in altitude, power settings, number of operations, and hours of operations. This information varies over time, and those variations were used to develop each of the noise contour maps presented in this report. The composite map is the result of combining the southern portion of the 1992 noise footprints with the northern portion of the noise footprints projected with the beddown of the F/A-22. The Day-Night Average A-Weighted Sound Level (DNL) metric was used to define the noise zones for Nellis AFB.

1.3 Process and Procedure

Preparation and presentation of this update to Nellis AFB's AICUZ Report is part of the continuing Air Force participation in the local planning and zoning process. It is recognized that, as local communities prepare land use plans and zoning ordinances, the Air Force has the responsibility of providing inputs on its activities relating to the community. This report is presented in the spirit of mutual cooperation and assistance by Nellis AFB to aid in the local land use planning and zoning process. This report provides flight track information as of 2001 (Figure 2) and noise footprints as a result of changes in base flying activities from 1992-2001 (Figures 3, 4, 5 and 6). These changes include phase-out of the F-4 and EF-111 aircraft, and addition of the F/A-22 aircraft.

The composite noise contours in this AICUZ report (Figure 3) are a combination of the 1992 AICUZ and F/A-22 Beddown Environmental Impact Statement (EIS) noise studies. The noise contours in Figure 6 are the result of the most current operational data and use the actual F/A-22 noise signature that was not available for use in the 1999 EIS. The noise contours south of Nellis AFB are from the 1992 AICUZ report and the noise contours north of Nellis AFB are from the 1999 F/A-22 Aircraft Force Development Evaluation and Weapon School Beddown EIS final report. Aircraft operational and maintenance data collection for the 2001 report was conducted between 30 July and 10 August 2001. Composite noise contours are shown in this report to provide both consistent and viable aircraft operational requirements for future land use planning and zoning purposes. Land use control measures based on the depicted composite noise contours will provide viable benchmarks. The composite contours have been plotted on an area map and overlaid with clear zone and accident potential zone areas (Figure 3). Appendix A of Volume II contains detailed information on the development of the AICUZ program.

SECTION 2 INSTALLATION DESCRIPTION

2.1 Mission

Nellis AFB provides realistic advanced composite strike force training for the U.S. Air Force, other services, and air and ground units from allied nations, which includes virtually every type of aircraft used by the Air Force, air and ground units from the Army, Navy, and Marines, and air units from allied nations. Flight training is accomplished through Nellis AFB's host command, the U.S. Air Force Air Warfare Center. Nellis AFB organizations also perform operational testing and evaluation, develop and evaluate combat tactics, and maintain combat-ready forces for worldwide deployment and tactical testing and evaluation, using the latest weapon systems.

2.2 Economic Impact

Nellis AFB is the nation's premier air warfare training center. The base is located in Clark County, Nevada, and is part of metropolitan Las Vegas. The Las Vegas metropolitan area is one of the economic hubs for the southwest United States and has been one of the fastest-growing metropolitan areas in the United States since 2001. There are currently 1.6 million people living in Clark County. The base is adjacent to the City of North Las Vegas and is located in the northeastern corner of the Las Vegas valley that makes up metropolitan Las Vegas. This location is in an extremely arid region of the Mojave Desert characterized by excellent flying weather. Nellis AFB economic region of influence (ROI) extends outward a radius of 50 miles from the base borders and includes the five incorporated townships and two unincorporated townships within the valley. The Clark County Unified Development Code Title 30, includes the Nellis Airport Environs which is the major controlling document overseeing development within the Nellis AFB environs and off-base portion of Nellis AICUZ report. The City of North Las Vegas is developing similar ordinances that should protect Nellis AFB in the future as the city continues to grow and annex more County lands adjacent to the base.

The main base is bordered by Nellis Boulevard, Las Vegas Boulevard, and the City of North Las Vegas to the west, unincorporated County land's called Sunrise Manor to the south and southeast, Sunrise Mountain to the east, and City of North Las Vegas and unincorporated Clark County to the north. Interstate 15 passes north of the base connecting Las Vegas to Salt Lake City, Utah, and south to Los Angeles, California. Air service to the Las Vegas valley is provided by most major airlines at the McCarran International Airport, approximately 10.5 miles southwest of the base, and by North Las Vegas Airport, a general aviation facility 7.7 miles to the west. Rail freight transport is provided to the valley by the Union Pacific Railroad, with a main line north of and parallel to Interstate 15, 2.5 miles from the base. There were two spur lines from Union Pacific's main rail line into Nellis AFB, one into the Industrial Area and the other into the Weapon Storage Area; both were discontinued. Heavy cargo is delivered to Nellis AFB by truck via Las Vegas Boulevard and Craig Road.

Table 2-1 PERSONNEL BY CLASSIFICATION AND HOUSING - FY 2001

CLASSIFICATION	LIVING ON-BASE	LIVING OFF-BASE	TOTAL
ACTIVE DUTY MILITARY	2,412	4,447	6,859
TRADITIONAL GUARDSMEN/RESERVISTS			11,174
TOTAL MILITARY			18,033
MILITARY RETIREES			20,108
APPROPRIATED FUND CIVILIANS			
General Schedule			660
Federal Wage Board			244
TOTAL CIVILIANS			904
NON-APPROPRIATED FUND CIVILIANS, CONTRACT CIVILIANS, AND PRIVATE BUSINESS			
Civilian NAF			547
Civilian BX			380
Contract Civilians			795
Private Businesses On-base			36
GRAND TOTAL			40,803

Source: Nellis AFB Economic Resource Impact Statement, Fiscal Year 2001.

Table 2-2 SUMMARY OF ANNUAL GROSS PAYROLL - FY 2001

CLASSIFICATION	TOTAL
ACTIVE DUTY MILITARY	\$131,172,188
APPROPRIATED FUND CIVILIANS	
General Schedule	\$32,308,195
Federal Wage Board	\$10,262,245
NONAPPROPRIATED FUND CIVILIANS, CONTRACT CIVILIANS AND PRIVATE BUSINESS	
Civilian NAF	\$7,470,044
Civilian BX	\$7,600,000
Commissary	\$6,300,000
Contract Employees	\$41,980,000
Private Business	\$605,990
MILITARY RETIREES (ALL BRANCHES)	\$359,112,000
TOTAL PAYROLL	\$596,810,662

Source: Nellis AFB Economic Resource Impact Statement, Fiscal Year 2001.





Table 2-3 SUMMARY OF CONTRACTS AND EXPENDITURES FOR MATERIALS, EQUIPMENT, AND SUPPLIES - FY 2001

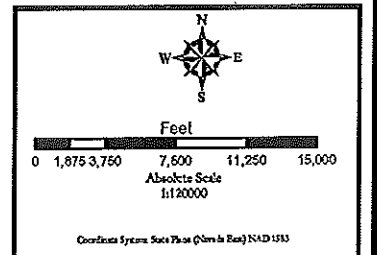
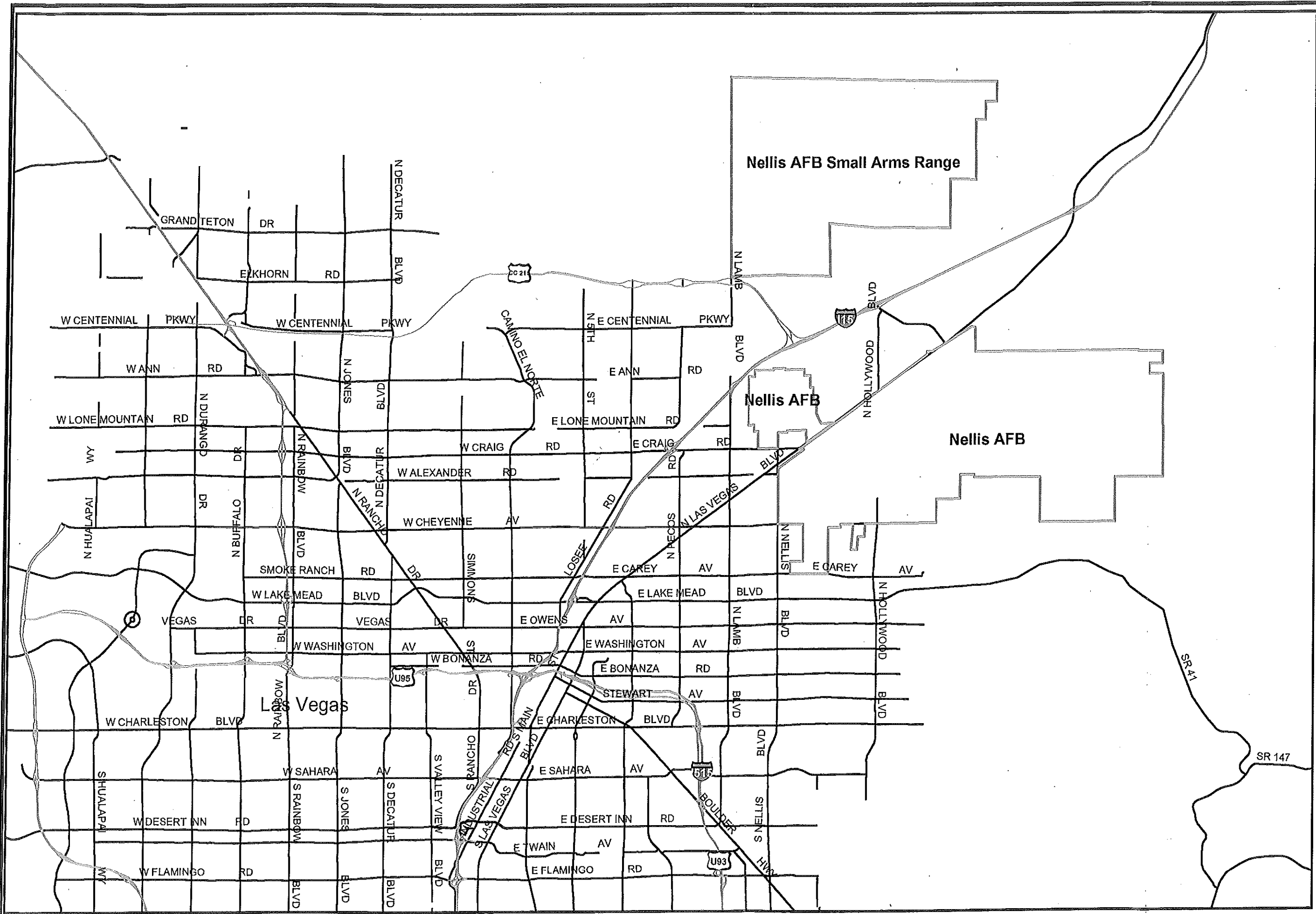
CONTRACTS & PROCUREMENT: SERVICES, MATERIALS, EQUIPMENT, AND SUPPLIES	ACTUAL ANNUAL EXPENDITURE
CONTRACTING ACTIVITY	
Small Business	\$48,847,000
Small Business Disadvantaged Business	\$37,455,000
Small Women-Owned Business	\$14,461,000
Set-Aside	\$38,214,000
Competition	\$84,539,000
HUB Zone (small business in underutilized business zones)	\$6,166,000
TOTAL ANNUAL CONTRACTS	\$229,682,000
BASE EXPENDITURES	
Base Operational Support (includes fuels, hospital, and family housing)	\$334,410,000
Range Operational Support	\$67,933,000
Tenant Unit Support	\$1,197,000
TOTAL ANNUAL EXPENDITURES	\$403,540,000

Source: Nellis AFB Economic Resource Impact Statement, Fiscal Year 2001.

Legend

Vicinity Map

-  Nellis AFB
-  Interstate
-  Highways
-  Streets



Vicinity Map
Figure 1
Clark County, NV

Prepared By: Nellis Geo Integration Office



2.3 Flying Activity

To describe the relationship between aircraft operations and land use, it is necessary to fully evaluate the exact nature of flying activities. An inventory was conducted indicating the types of aircraft based at Nellis AFB, where those aircraft fly, how high they fly, how many times they fly over a given area, and at what time of day they operate.

The F-15, F-16, A-10, F/A-22 and HH-60G are the principal aircraft operating from Nellis AFB and the average numbers of daily operations for these aircraft are shown below. An operation is defined as one takeoff, one landing, or half of a closed pattern. A closed pattern consists of both a departure portion and an approach portion: i.e. two operations.

<u>TYPE OF AIRCRAFT</u>	<u>AVERAGE DAILY OPERATIONS</u>
F-15	53.18
F-16	88.14
A-10	40.26
F/A-22	34.60 (proposed)
HH-60G	33.60
Transient/Exercise	45.79

In addition to these assigned aircraft, numerous transient aircraft from other military installations land and take-off from Nellis AFB. Nellis AFB composite strike force training for the U.S. Air Force, and allied air forces exercises host almost every type of aircraft used by the Air Force, air and ground units from the Army, Navy, and Marines, and air and ground units from allied nations.

Nellis AFB aircraft use the following basic flight patterns:

- Straight out departure.
- Straight in approach.
- Overhead landing pattern.
- Visual flight rules (VFR) or closed pattern.
- Re-entry VFR pattern.

Nellis AFB flight tracks (Figure 2, Flight Tracks map) result from several considerations, including:

- Takeoff patterns routed to avoid heavily populated areas as much as possible.
- Air Force criteria governing the speed, rate of climb, and turning radius for each type of aircraft.
- Efforts to control and schedule missions to keep noise levels low, especially at night.
- Coordination with the Federal Aviation Administration (FAA) to minimize conflict with civilian aircraft operations.

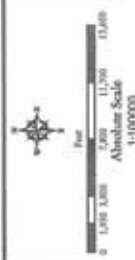
To the maximum extent possible, engine run-up locations have been established in areas that minimize noise for people on-base and in the surrounding communities. Normal base operations do not include late night engine run-ups, but heavy work loads or unforeseen contingencies sometimes require a limited number of late night engine run-ups.



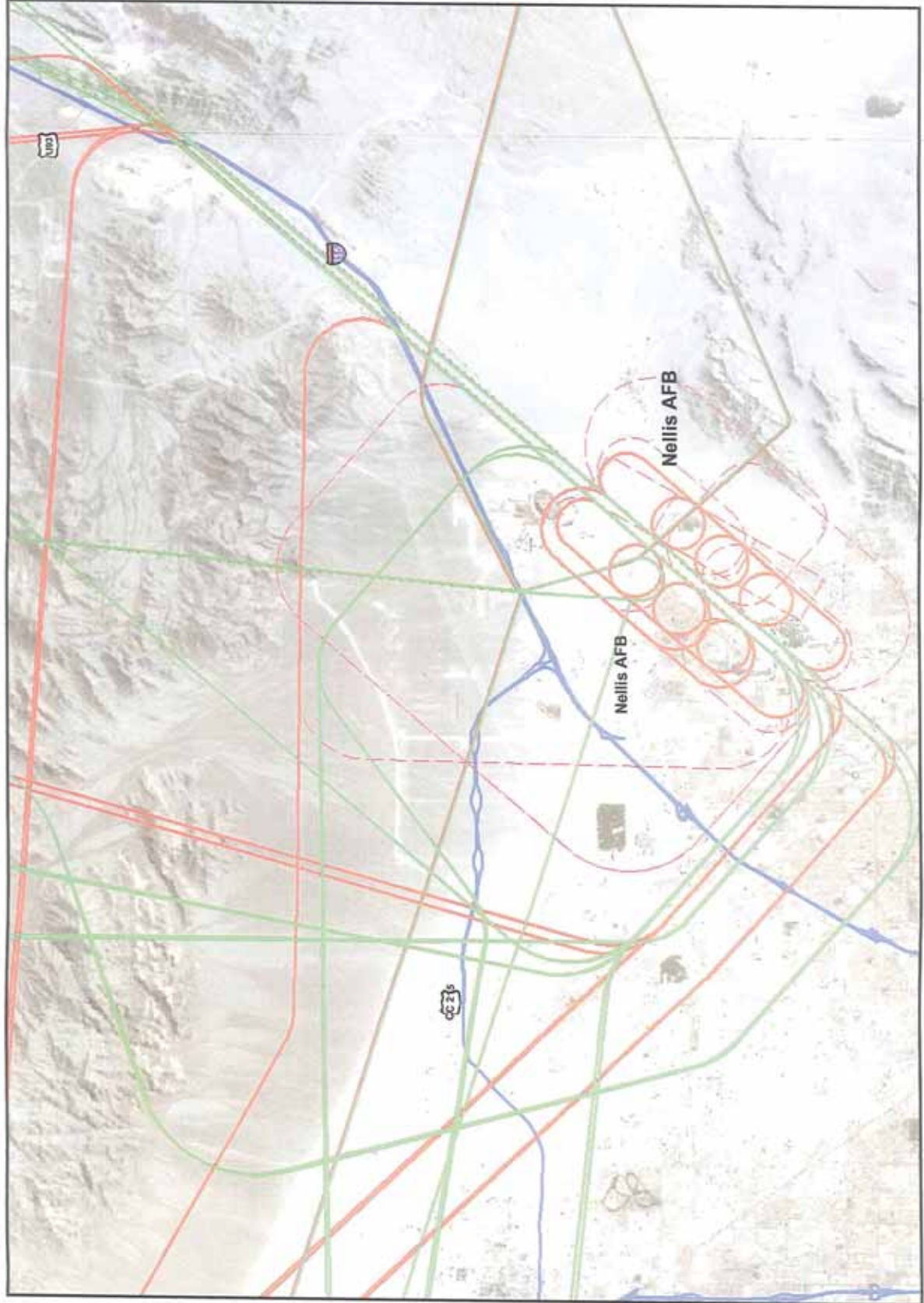
Legend

Nellis Flight Tracks

- Arrivals
- Closed
- Departures
- Freeways



Coordinate System: State Plane (NAD83) East NAD 1983
Nellis Flight Tracks
Figure 2
Nellis AFB, NV
Prepared By:
Nellis Data Integration Office



Airfield environs planning is concerned with three primary aircraft operational/land use determinants: (1) accident potential to land users, (2) aircraft noise, and (3) hazards to operations from land uses (height obstructions, etc.). Each of these concerns is addressed in conjunction with mission requirements and safe aircraft operation to determine the optimum flight patterns for each aircraft type. The flight tracks depicted in Figure 2 are the result of such planning.

SECTION 3 LAND USE COMPATIBILITY GUIDELINES

3.1 Introduction

The DoD developed the Air Installation Compatible Use Zone (AICUZ) program for military airfield safety. Using this program, DoD works to protect aircraft operational capabilities at its installations and to assist local government officials in protecting and promoting the public health, safety, and quality of life of people in the surrounding communities. The goal is to promote compatible land use development around military airfields by providing information on aircraft noise exposure and accident potential.

The AICUZ report describes the noise exposure levels generated from flight operations and identifies other constraints resulting from aircraft activity. The first constraint involves areas the Federal Aviation Administration (FAA) and DoD have identified for height limitations (see Height and Obstruction Criteria in Appendix D of Volume II). Air Force obstruction criteria are based upon constraints contained in Federal Aviation Regulation Part 77, Subpart C and the Armed Forces, Unified Facilities Criteria, UFC 3-260-01.

The second constraint involves noise contours produced by the computerized Day-Night Average A-Weighted Sound Level (DNL) metric and the DOD NOISEMAP methodology. Using the NOISEMAP program, which is similar to FAA's Integrated Noise Model, DoD produces noise contours showing the noise levels generated by aircraft operations. Aircraft operational and maintenance data is obtained to derive average daily operations by runway and type of aircraft. This data is supplemented by flight pattern information, flight profile information, and engine ground run-up information. The noise contours are plotted in increments of 5 dB, ranging from DNL 65 dB to DNL greater than 80 dB. Additional information on noise methodology is contained in Appendix C of Volume II of this report.

The noise contours in this AICUZ report are presented in the spirit of mutual cooperation and assistance by Nellis AFB to aid the Las Vegas valley community planning and zoning process. Any change in Nellis AFB's aircraft mix, operations tempo, flight patterns, approach-departure directions, or hours of operations will cause noise contours to change; the composite noise contours (Figure 3) are a combination of two such changes (Figure 4 and Figure 5). Figure 3 represents the maximum extent of noise exposure levels above DNL 65 dB from aircraft operations in the past; it is a hybrid (composite) of the flight activity for two time periods. To the south and west of Nellis AFB noise exposure levels were greatest in 1992 (Figure 4) and to the north and east noise exposure levels were greatest as predicted in the 1999 EIS for the F/A-22 Aircraft Force Development Evaluation and Weapon School Beddown (Figure 5). The noise contours in the F/A-22 EIS revealed a shift to the north in the area exposed to high noise levels. This shift was due in part to operational changes by Nellis AFB to minimize noise impacts on residential areas by departing primarily to the north and arriving from the north as much as possible;

Nellis revealed a reduction in the total land area affected by DNLs greater than 65 dB (Figure 6). This reduced exposure was due primarily to changes in Nellis' aircraft operations including, but not limited to, a reduction in the average number of daily sorties and updates to the F/A-22 noise signature. Changes in training requirements and world conditions could lead to training requirements that would cause Nellis AFB to meet or surpass past flight operations and again increase exposure levels around the base.

Use of the composite noise contours in the community planning and zoning process will help to avoid fluctuating local zoning criteria due to aircraft noise impacts. In addition, it will help maintain consistent land use controls, minimize inconsistent residential development during periods of reduced noise levels, better safeguard the health and safety of the surrounding communities, and promote beneficial land use that will be compatible with Nellis AFB operations for the foreseeable future.

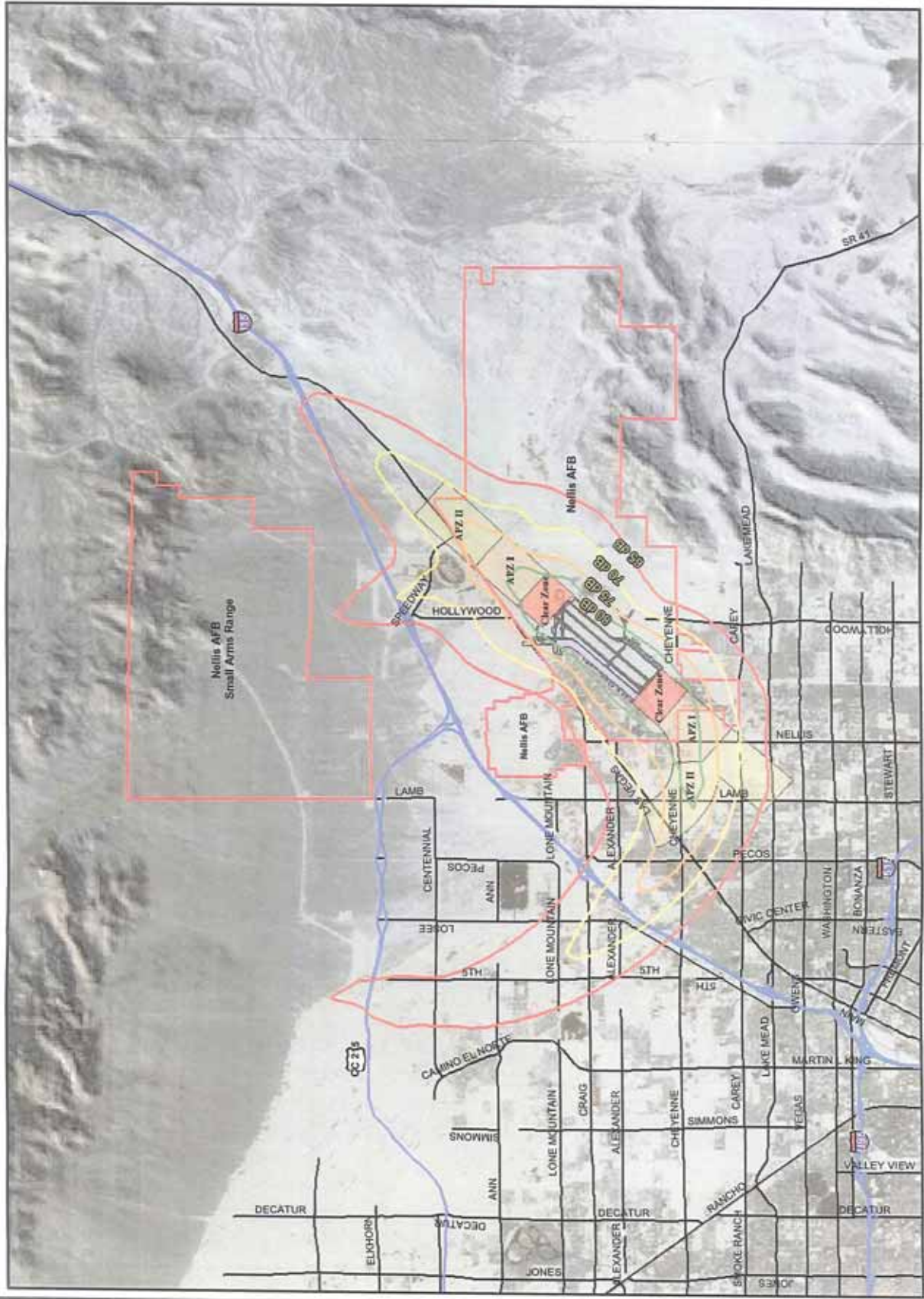
The third constraint involves accident potential zones based on statistical analysis of past DoD aircraft accidents. DoD analysis has determined that the areas immediately beyond the ends of runways and along the approach and departure flight paths have significant potential for aircraft accidents. Based on this analysis, DoD developed three zones that have high relative potential for accidents. The clear zone, the area closest to the runway end, is the most hazardous. The overall risk is so high that DoD generally acquires the land through purchase or easement to prevent development. Accident potential zone I (APZ I) is an area beyond the clear zone that possesses a significant potential for accidents. Accident potential zone II (APZ II) is an area beyond APZ I having lesser, but still significant potential for accidents. While aircraft accident potential in APZs I and II does not warrant acquisition by the Air Force, land use planning and controls are strongly encouraged in these areas for the protection of the public. Clear zones and accident potential zones are established for each runway. Nellis AFB has two parallel runways with overlapping zones which affect the overall size of the zones. The combined clear zones each encompass areas 4,000 feet wide by 3,000 feet long, APZ I is 4,000 feet wide by 5,000 feet long, and APZ II is 4,000 feet wide by 7,000 feet long (Figure 3). Additional information on APZs are contained in Appendix B of Volume II of this report.



Legend

- 1992 Noise Contours**
- 65 dB (DNL)
 - 70 dB (DNL)
 - 75 dB (DNL)
 - 80 dB (DNL)
 - Clear Zone
 - APZ I
 - APZ II
 - Nellis AFB
 - Freeways
 - Streets

Prepared By:
 Nellis Civil Integration Office



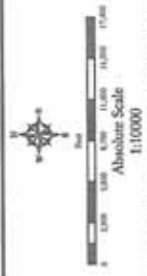
1992 Noise Contour Map
Figure 4



Legend

F/A-22 EIS Projected Contours

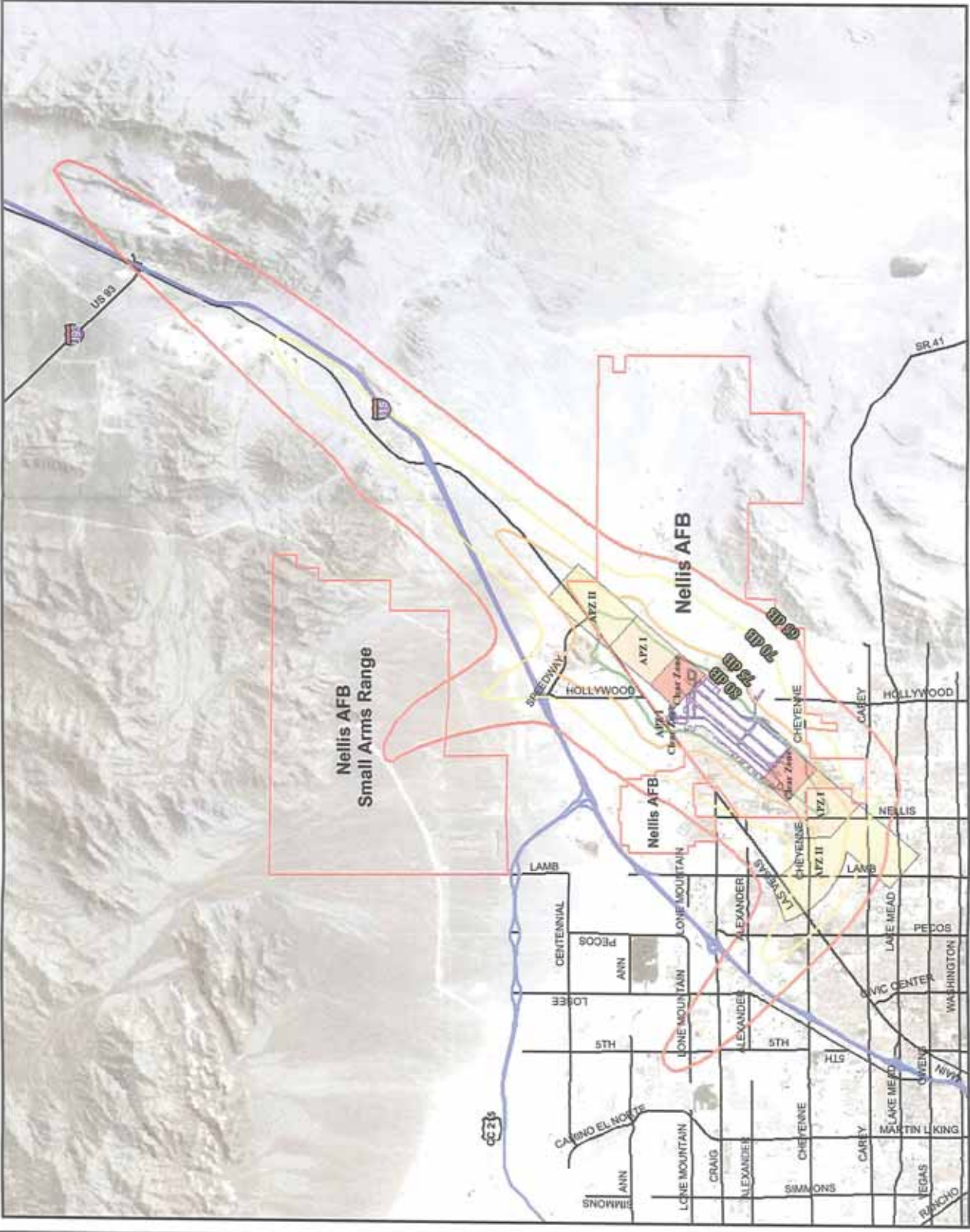
- 65 dB (DNL)
- 70 dB (DNL)
- 75 dB (DNL)
- 80 dB (DNL)
- Clear Zone
- APZ I
- APZ II
- Nellis AFB
- Freeways
- Streets



Absolute Scale
1:10000
Coordinate System: State Plane (Nevada East) NAD 1983

F/A-22 EIS Projected Contour Map Figure 5

Prepared By:
Nellis AFB, NV
Nellis Core Integration Office





Legend

2001 Noise Contours

- 65 dB (DNL)
- 70 dB (DNL)
- 75 dB (DNL)
- 80 dB (DNL)
- Clear Zone
- APZ I
- APZ II
- Nellis AFB
- Freeways
- Streets

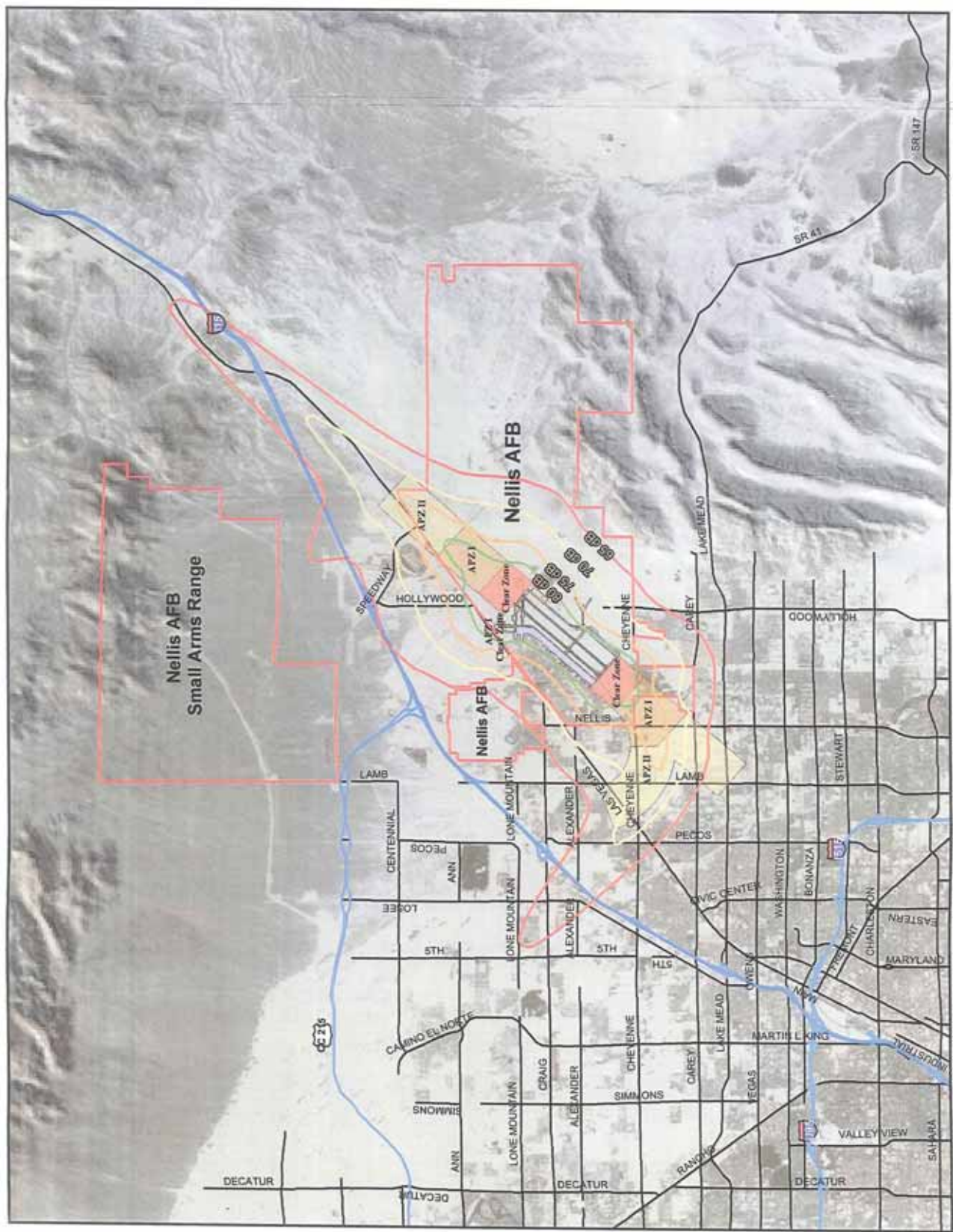
Scale: 0 5 10 15 20 Miles

Absolute Scale
1:10000

Coordinate System: State Plane (Nevada East) NAD 1983

2001 Noise Contour Map
Figure 6
Nellis AFB, NV

Prepared by:
Health Code Integration Office



3.2 Land Use Compatibility

Each AICUZ report contains land use guidelines. Table 3-1 lists land uses versus all possible combinations of noise exposure and accident potential at Nellis AFB, showing land uses that are compatible or incompatible. Noise guidelines are essentially the same as those published by the Federal Interagency Committee on Urban Noise in the June 1980 publication, Guidelines for Considering Noise in Land Use Planning and Control. The U.S. Department of Transportation publication, Standard Land Use Coding Manual (SLUCM), has been used for identifying and coding land use activities.

3.3 Participation In The Planning Process

As local communities prepare and update their land use plans, the Air Force must be ready to provide updated information of noise contours, accident potential zones, and flight paths. The 99th Civil Engineer Squadron Commander has been designated as the official liaison with the local community on all planning matters. This office is prepared to participate in the continuing discussion of zoning and other land use matters as they may affect, or may be affected by Nellis AFB operations.

**Table 3-1
LAND USE COMPATIBILITY**

SLUCM NO.	LAND USE NAME	ACCIDENT POTENTIAL ZONES			NOISE ZONES			
		CLEAR ZONE	APZ I	APZ II	65-70	70-75	75-80	80+
10	Residential							
11	Household units							
11.11	Single units; detached	N	N	Y ¹	A ¹¹	B ¹¹	N	N
11.12	Single units; semidetached	N	N	N	A ¹¹	B ¹¹	N	N
11.13	Single units; attached row	N	N	N	A ¹¹	B ¹¹	N	N
11.21	Two units; side-by-side	N	N	N	A ¹¹	B ¹¹	N	N
11.22	Two units; one above the other	N	N	N	A ¹¹	B ¹¹	N	N
11.31	Apartments; walk up	N	N	N	A ¹¹	B ¹¹	N	N
11.32	Apartments; elevator	N	N	N	A ¹¹	B ¹¹	N	N
12	Group quarters	N	N	N	A ¹¹	B ¹¹	N	N
13	Residential hotels	N	N	N	A ¹¹	B ¹¹	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A ¹¹	B ¹¹	C ¹¹	N
16	Other residential	N	N	N ¹	A ¹¹	B ¹¹	N	N
20	Manufacturing							
21	Food & kindred products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
22	Textile mill products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴

NELLIS AFB, NV

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-70	70-75	75-80	80+
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
24	Lumber and wood products (except furniture); manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
25	Furniture and fixtures; manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
26	Paper & allied products; manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
27	Printing, publishing, and allied industries	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
28	Chemicals and allied products; manufacturing	N	N	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
29	Petroleum refining and related industries	N	N	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
30	Manufacturing							
31	Rubber and misc. plastic products, manufacturing	N	N ²	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
32	Stone, clay and glass products manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
33	Primary metal industries	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
34	Fabricated metal products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks manufacturing	N	N	N ²	Y	A	B	N
39	Miscellaneous manufacturing	N	Y ²	Y ²	Y	Y ¹²	Y ¹³	Y ¹⁴
40	Transportation, communications and utilities							
41	Railroad, rapid rail transit and street railroad transportation	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
42	Motor vehicle transportation	N ³	Y	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
43	Aircraft transportation	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
44	Marine craft transportation	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
45	Highway & street right-of-way	N ³	Y	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
46	Automobile parking	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
47	Communications	N ³	Y ⁴	Y	Y	A ¹⁵	B ¹⁵	N
48	Utilities	N ³	Y ⁴	Y	Y	Y	Y ¹²	Y ¹³
49	Other transportation communications and utilities	N ³	Y ⁴	Y	Y	A ¹⁵	B ¹⁵	N

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-70	70-75	75-80	80+
50	Trade							
51	Wholesale trade	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
52	Retail trade-building materials, hardware and farm equipment	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
53	Retail trade-general merchandise	N	N ²	Y ²	Y	A	B	N
54	Retail trade-food	N	N ²	Y ²	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N	Y ²	Y ²	Y	A	B	N
56	Retail trade-apparel and accessories	N	N ²	Y ²	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N	N ²	Y ²	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N ²	Y	A	B	N
59	Other retail trade	N	N ²	Y ²	Y	A	B	N
60	Services							
61	Finance, insurance and real estate services	N	N	Y ⁶	Y	A	B	N
62	Personal services	N	N	Y ⁶	Y	A	B	N
62.4	Cemeteries	N	Y ⁷	Y ⁷	Y	Y ¹²	Y ¹³	Y ^{14,21}
63	Business services	N	Y ⁸	Y ⁸	Y	A	B	N
64	Repair services	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
65	Professional services	N	N	Y ⁶	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y ⁶	Y	Y	A	B	N
67	Governmental services	N	N	Y ⁶	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N ²	Y ²	Y	A	B	N
70	Cultural, entertainment and recreational							
71	Cultural activities (including churches)	N	N	N ²	A*	B*	N	N
71.2	Nature exhibits	N	Y ²	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N
72.11	Outdoor music shell, amphitheaters	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y ¹⁷	Y ¹⁷	N	N
73	Amusements	N	N	Y ⁸	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y ^{8,9,10}	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y ⁹	Y ⁸	Y*	Y*	N	N
79	Other cultural, entertainment and recreation	N	Y ⁹	Y ⁹	Y*	Y*	N	N

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-70	70-75	75-80	80+
80	Resources production and extraction							
81	Agriculture (except livestock)	Y ¹⁶	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
82	Agricultural related activities	N	Y ⁵	Y	Y ¹⁸	Y ¹⁹	N	N
83	Forestry activities and related services	N ⁵	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
84	Fishing activities and related services	N ⁵	Y ⁵	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y ⁵	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y ⁵	Y	Y	Y	Y	Y

LEGEND

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

Y - (Yes) - Land use and related structures are compatible without restriction.

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

Y^X - (yes with restrictions) - Land use and related structures generally compatible; see notes 1 through 21.

N^X - (no with exceptions) - See notes 1 through 21.

NLR - (Noise Level Reduction) - NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation measures into the design and construction of the structures. See Appendix E, Vol II.

A, B, or C - Land use and related structures generally compatible; measures to achieve NLR for A(DNL 65-70), B(DNL 70-75), C(DNL 75-80), need to be incorporated into the design and construction of structures. See Appendix E, Vol II.

A*, B*, and C* - Land use generally compatible with NLR. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes.

* - The designation of these uses as "compatible" in this zone reflects individual federal agencies' and program considerations of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

NOTES

1. Suggested maximum density of 1-2 dwelling units per acre, possibly increased under a Planned Unit Development (PUD) where maximum lot coverage is less than 20 percent.
2. Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures .
3. The placing of structures, buildings, or above-ground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See UFC 3-260-01 for specific guidance.
4. No passenger terminals and no major above-ground transmission lines in APZ I.
5. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
6. Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.
7. Excludes chapels.
8. Facilities must be low intensity.
9. Clubhouse not recommended.
10. Areas for gatherings of people are not recommended.
11. a. Although local conditions may require residential use, it is discouraged in DNL 65-70 dB and strongly discouraged in DNL 70-75 dB. An evaluation should be conducted prior to approvals, indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones, and that there are no viable alternative locations.
b. Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) for DNL 65-70 dB and DNL 70-75 dB should be incorporated into building codes and considered in individual approvals. The installation of sound attenuation material is strongly recommended for approved residential development in DNL 65-75 dB. See Appendix E for a reference to NLR procedures.
c. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.
12. Measures to achieve the same NLR as required for facilities in DNL 65-70 dB range 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.
13. Measures to achieve the same NLR as required for facilities in DNL 70-75 dB range 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.
14. Measures to achieve the same NLR as required for facilities in DNL 75-80 dB range 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.
15. If noise sensitive, use indicated NLR; if not, the use is compatible.
16. No buildings.
17. Land use is compatible provided special sound reinforcement systems are installed.
18. Residential buildings require the same NLR as required for facilities in DNL 65-70 dB range.
19. Residential buildings require the same NLR as required for facilities in DNL 70-75 dB range.
20. Residential buildings are not permitted.
21. Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

SECTION 4 LAND USE ANALYSIS

4.1 Introduction

Land use planning and control is a dynamic process, rather than a "static" process. The specific characteristics of land use determinants will always reflect, to some degree, the changing conditions of the economic, social, and physical environment of a community, as well as changing public concern. The planning process accommodates this fluidity in that decisions are normally not based on boundary lines, but rather on more generalized area designations.

Nellis AFB was originally built in an outlying, largely undeveloped area 8 miles from the city of Las Vegas. Encroachment by civilian development is the predominant land use issue impacting Nellis AFB. The base continues to work closely with Clark County and the City of North Las Vegas to identify land use conflicts in future development decisions and develop zoning ordinances compatible with Nellis AFB operations.

Computer technology has enabled Nellis AFB to more precisely display its flight patterns and noise contours for land use planning purposes. This same technology has revealed Nellis AFB's region of influence extends through portions of North Las Vegas to the west and into unincorporated Clark County to the northwest and northeast.

For the purposes of this report, existing land uses have been generally classified into one of the following six categories:

- Residential. This category includes all types of residential activity, such as single and multi-family residences and mobile homes, at a density of greater than one dwelling unit per acre.
- Commercial. This category includes offices, retail, restaurants and other types of commercial establishments.
- Industrial. This category includes manufacturing, warehousing, and other similar uses.
- Public/Quasi-Public. This category includes publicly owned lands and/or lands to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
- Recreation. This category includes land areas designated for recreational activity, including parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hiking, camping, etc.
- Open/Agriculture/Low Density. This category includes undeveloped land areas, agricultural areas, grazing lands, and areas with residential activity at densities less than or equal to one dwelling unit per acre.

4.2 Existing Land Use

Nellis AFB is located in northeastern Clark County, in the arid Las Vegas valley region of the Mojave Desert. The valley is surrounded by mountains from 4,000 feet to almost 12,000 feet in elevation, and is adjacent to Lake Mead. The Las Vegas Valley enjoys 310 days of sunshine a year. The arid landscape contains flora and fauna characteristic of low desert ecosystems and is unsuitable for most agricultural purposes. Development within the valley has generally been in a modified grid pattern, with arterial streets running north-south and east-west. This pattern has tended to concentrate similar land uses in a manner that reduces intrinsic incompatibilities and complements the transportation and commercial needs of the populace. Development surrounding Nellis AFB is primarily residential, commercial, and undeveloped land areas. The majority of undeveloped lands to the south and west of Nellis AFB are in private holding, with the lands to the north and east being in public holdings, mainly under Bureau of Land Management's (BLM) control.

4.2.1 Unincorporated Clark County

Unincorporated Clark County land abuts Nellis AFB and the Cities of North Las Vegas and Las Vegas. Land uses in unincorporated Clark County are those typically found in and near large metropolitan areas. The Las Vegas valley is one of the fastest growing communities in the United States. This incredible growth is expected to continue in the near future. As undeveloped property within the incorporated areas, such as the Cities of North Las Vegas and Las Vegas, become less obtainable, development activity within unincorporated Clark County will expand rapidly.

To the north and northeast land is primarily undeveloped. Development that has occurred in the north includes industrial, a racetrack (the Las Vegas Motor Speedway); commercial retail, and some multi-family residences including several motels. Development has been primarily along Las Vegas Boulevard.

Considerable development has occurred southwest of the base along the Nellis Boulevard corridor within unincorporated Sunrise Manor. Between Nellis Boulevard and Nellis AFB, off the ends of Runway 03L/R, industrial development is the predominant land use. Several small tracts of residential property also exist between Nellis AFB and Nellis Boulevard. Most notable residential development is in the form of mobile home parks, multi-family housing, and single-family housing. West of Nellis Boulevard, land use is almost exclusively residential. Some commercial development is present along Nellis Boulevard.

The predominant land use south of Cheyenne Boulevard, east of Lamb Boulevard, and north of Judson Street is industrial. Development west of Lamb Boulevard is a mixture of land uses, residential being the primary use. The Carey Avenue corridor contains several public school facilities.

South of the base, but still within Sunrise Manor's jurisdiction, residential is by far the largest land use. Again this covers the spectrum of residential possibilities, with considerable amounts of multi-family, high-density development. The Nellis Boulevard corridor continues to maintain its exclusively commercial characteristics. Several public schools are also located in this region.

Property to the east of Nellis AFB is primarily undeveloped and mainly under the control of BLM. Frenchman's Mountain presents extreme topographical variations and is unsuitable for development.

A tract of county land north of Interstate 15, and completely enclosed by the City of North Las Vegas, is impacted by noise from Nellis AFB. Although residences are sited in this "county island," their densities fit into the open agricultural land use classification (Figure 4).

4.2.2 City of North Las Vegas

The City of North Las Vegas, although not immediately adjacent to Nellis AFB, does contain land that is impacted by Nellis AFB operations. The most common land use in this area is industrial. Along the length of the north side of Interstate 15, and within the land bordered by Interstate 15, Craig Boulevard, and Lamb Boulevard, the land use is exclusively industrial. The Las Vegas Boulevard corridor contains a nearly continuous commercial pattern from Owens Avenue to Pecos Road. Although most of this commercial activity is less than one block deep, major commercial concentrations occur near intersections with Lake Meade Boulevard, Bruce Street, Evans Avenue, and Pecos Road. Commercial development along Lake Mead Boulevard accounts for the major remaining commercially-developed areas in North Las Vegas.

Between Las Vegas Boulevard and Interstate 15, the land use is a mixture of residential development with several areas of public uses, such as schools, parks, and municipal buildings.

North of the industrial strip occurring along Interstate 15, the land use is primarily undeveloped. Several large recreational areas, such as the North Las Vegas Regional Park, the Shadow Creek Golf Course, and Craig Ranch Golf Course, are present. Small residential areas occur at the Martin Luther King intersections with Ann Road and Lone Mountain Road. South of Lone Mountain Road residential development exists at the North 5th Street intersection (Figure 7). The City of North Las Vegas is being petitioned to allow additional residential development in this area.

4.2.3 City of Las Vegas

The City of Las Vegas, although considerably more developed than either North Las Vegas or unincorporated Clark County, is not directly impacted by Nellis AFB operations. The majority of Las Vegas land use visible within the Nellis AFB AICUZ maps is residential. Commercial development exists along the major thoroughfare of Nellis Boulevard.

4.3 Current Zoning

Clark County airport overlay zones require sound attenuation for many structures, primarily residential, which are sited within the 1992 AICUZ noise contours. These sound attenuation and land use standards remain valid when based on the composite noise contours (Figure 3). Considerable amounts of land within the jurisdiction of North Las Vegas is impacted by noise from Nellis AFB flying operations although no building standards addressing noise attenuation are in effect. If building standards are not developed, future development incompatibilities due to noise impacts are expected.

Zoning designations allow residential development on land impacted by DNL greater than 75 dB noise (Figure 8). Residential development in high-noise zones is incompatible with Air Force compatibility standards. Provided these zoning designations remain, incompatible development is expected to occur.

4.3.1 Unincorporated Clark County

Clark County realized the need to incorporate land use restrictions for property in the vicinity of active airports, which protect public safety, protect encroachment from development, and maintains economic viability. The Clark County Board of Commissioners appointed a citizens board in 1980 to begin researching the subject. Clark County was more fortunate with its timing of addressing these matters in that a large amount of the impacted land in the vicinity of Nellis AFB is still undeveloped. The outcome of the County's effort to address airport environs land use compatibility issues was the adoption of the Public Health and Safety Programs: Airport Environs into the Clark County, Nevada Comprehensive Plan, in December of 1985.

To maintain compatible development within noise zones and accident potential zones, Clark County has implemented airport overlay zoning districts. These overlay districts implement additional restrictions upon land uses in addition to the requirements of the formal zoning designation. Developments within the overlay district must conform to the requirements of both districts or the more restrictive of the two. Clark County's airport environs overlay districts are composed of seven sub-zones: clear zone, accident potential zone I and II, and DNL noise zones 65-70 dB, 70-75 dB, 75-80 dB, and greater than 80 dB. The zones were based on the results of Nellis AFB's 1981 AICUZ Report and are consistent with the recommendations of the United States Air Force and the Standard Land Use Classification Manual. Sound attenuation is required within the noise-impacted areas. Density and land use restrictions have been incorporated for the accident potential zones. In addition to these land use classifications, Clark County has implemented height restrictions in the Nellis AFB environs consistent with the requirements of Armed Forces, Unified Facilities Criteria, UFC 3-260-01, and Federal Aviation Regulation Part 77.

4.3.2 City of North Las Vegas

In March of 1988 the city of North Las Vegas adopted a zoning ordinance to protect the health, safety, and general welfare of their residents through the establishment of minimum regulations governing development and use of land. Airports and airport overlay zoning are not addressed in their zoning ordinances.

The vast majority of North Las Vegas land near Nellis AFB is zoned either for residential or industrial use. North of Interstate 15, a wide corridor of industrial zoning exists to utilize the railroad freight service. A triangular tract of land north of Craig Road and east of Lamb Boulevard is also zoned as industrial. The length of Las Vegas Boulevard is essentially zoned commercial, as is a large amount of Cheyenne Boulevard. Another significant tract of commercial designation is sited south of Craig Road, north of Alexander Road, and west of Pecos Road. The remainder of the land within the environs is almost entirely designated for residential usage (Figure 8).

4.4 Future Land Use

Vacant Clark County property adjacent to Nellis AFB is expected to develop in a manner consistent with its present zoning. The industrial area off the departure ends of Runways 21 L/R is expected to expand, filling the majority of presently vacant Sunrise Manor property. Residential development within Sunrise Manor is anticipated to expand north of Las Vegas Boulevard. The intermittent commercial corridor along Las Vegas Boulevard is expected to expand, occupying the vacant parcels. Properties on the northeast side of Las Vegas Boulevard north of, and adjacent to Nellis AFB were purchased by the Air Force. These lands are part of the Nellis AFB Live Ordnance Departure Area (LODA). The base continues to work with Clark County Department of Comprehensive Planning to help ensure future developments are compatible with our flying mission.

Projections of future development within North Las Vegas, based upon the existing locations of the different zoning classifications, are very similar to the pattern of current development. Commercial development along Las Vegas Boulevard should see growth, resulting in a continuous and expanded commercial corridor. Property adjacent to Craig Road should see an expansion of commercial and industrial development.

City of Las Vegas property near Nellis AFB is extensively developed and future changes will primarily be a result of redevelopment and renovation.

4.5 Incompatible Land Uses

4.5.1 Noise Zones

Continuing changes in aircraft types and flying operations since the Nellis AFB 1992 AICUZ report suggest that noise from Nellis AFB impact varying amounts of land. To account for this fluctuation in exposure levels, the incompatible land uses in this report are based on a composite of the 1992 AICUZ and the 1999 F/A-22 EIS. The composite contours show approximately 20,415 off-base acres affected by DNLs greater than 65 dB as a result of Nellis AFB flying operations. The existing industrial and recreational land uses in the expanded area are compatible with the increased noise contours.

Day-night average sound levels in excess of 80dB impact 580 off-base acres, containing approximately 395 residents. This level of noise exposure impacts about 6.5 acres of the Carefree Manufactured Home Community, sited west of Nellis Boulevard and north of Cheyenne Avenue. This form of residential development is incompatible within AICUZ noise contours, according to the Air Force recommendations. Industrial development within the DNL greater than 80dB noise zone totals approximately 135 acres. The majority of this development is within the AE-80 (Airport Environs DNL 80 dB) county airport overlay zoning district. Noise attenuation is required in office and public receiving areas for industrial operations to be compatible.

The DNL 75-80 dB contours impact approximately 1,545 acres containing approximately 5,296 residents. Roughly 313 acres of residential development is impacted. Based on Clark County's airport overlay zoning, housing sited within this contour should have sound attenuation measures incorporated. Air Force guidelines do not recommend any residential development within areas impacted by noise above DNL 75 dB. Business and industry located in this area are required to have sound attenuation measures.

Approximately 4,656 acres and 9,462 residents would be exposed to DNL 70-75 dB noise contours based on the composite noise contours. Residential development may be compatible provided sound attenuation is incorporated. Most of the housing, besides mobile homes, within this contour is relatively new and should contain sound attenuation or thermal insulation. Recreational areas impacted by this noise zone, in the form of city parks and playgrounds, are compatible from an Air Force perspective. Commercial and industrial activity within the DNL 70-75 dB contour, totaling approximately 80 acres and 401 acres respectfully, is compatible, especially when sound attenuation is incorporated in the office and meeting spaces.

The DNL 65-70 dB noise contour encircles approximately 13,634 acres, impacting over 9,000 residents. The predominant land use, involving nearly 10,500 acres, is open agriculture, and, for the most part, is undeveloped. Residential development involves approximately 1,655 acres, the majority of which is within Sunrise Manor, the remainder being within North Las Vegas. Sound attenuation requirements for those residences within Clark County's airport overlay districts, which overlay Sunrise Manor, and modern energy conservation designs for those residences outside of the overlay districts, should allow most of these residences to be designated compatible. Mobile home parks within this contour, such as those located south of Craig Road, remain incompatible according to Air Force recommendations regardless of appropriate sound attenuation requirements.

4.5.2 Clear Zones and Accident Potential Zones

Incompatible development within the northern Clear Zones and Accident Potential Zone I of Runway 21 L/R is currently non-existent. Incompatibility potential does exist within APZ II due to the presence of the Las Vegas Motor Speedway. Population concentrations at the speedway may very easily exceed the Air Force fifty persons per acre density recommendation. Fortunately, races are held on weekends and evenings during hours of minimal flying operations. If weekday races were to become popular, incompatibility of the racetrack within APZ II could become an issue.

The Runway 03 L/R Clear Zone (the southern clear zone) is entirely within the base proper and contains no incompatibilities. However, development within Runway 03 APZs is much more significant than what has occurred within the northern APZs. Within APZ I the majority of development adjacent to the base is light industrial and commercial, which is compatible provided population densities are not exceeded. The most critical example of incompatibility within APZ I is the Carefree Country Manufactured Home Community. A small amount of low-density residential development is also present; however, at this time it does not exceed one dwelling unit per acre. The total number of residents living within APZ I is approximately 837. APZ II contains a mix of industrial, commercial and residential development. Mobile home parks and apartment complexes constitute a significant amount of the residential activity. Within either APZ, these forms of development are incompatible according to Air Force development density guidelines. These sites are located at the intersection of Carey Avenue and Marion Drive, the intersection of Colton Avenue and Lamb Boulevard, and along Dolly Lane (Figure 7). The total number of residents living within APZ II is approximately 4,218.

4.5.3 Planning Considerations

Noise contour studies describe the noise characteristics of a specific operational environment, and as such, will change if a significant operational change occurs. If a new mission is established at Nellis AFB, that adds a larger number of airplanes or additional model types, then the AICUZ noise contours could fluctuate. Changes in flight patterns, approach-departure directions, and hours of operations can also cause noise contour fluctuations. The southern noise contours have been reduced through a concerted effort to maximize take-offs and landings from the northern runways. There is no guarantee that Nellis AFB will be able to maintain the current number of take-offs and landings from the southern runways in the future. The composite noise contours maintain the 1992 noise contours south of the runways to avoid constant fluctuations in zoning criteria over heavily residential areas, thereby maintaining consistent planning control mechanisms, and minimizing inconsistent residential development during periods of reduced noise contours.



Department of the Air Force
Department of Defense
Nellis AFB

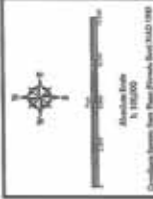
Legend

Noise Contours

- 65 dB (DNL)
- 70 dB (DNL)
- 75 dB (DNL)
- 80 dB (DNL)
- Nellis AFB
- Freeways

Existing Land Use

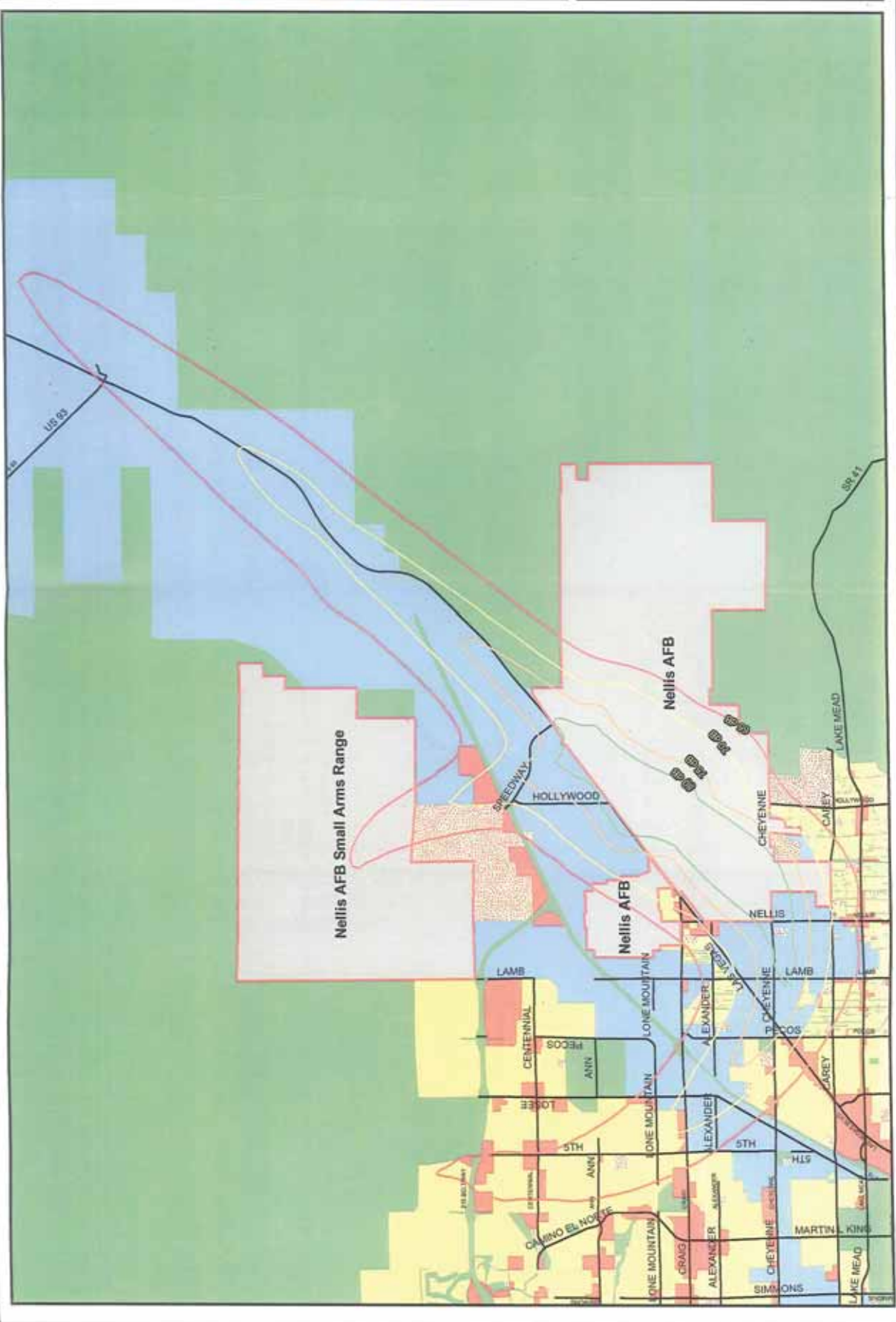
- INDUSTRIAL
- COMMERCIAL
- RESIDENTIAL
- OPEN SPACE
- PUBLIC/SEMI-PUBLIC



March 2009
N 110200
Coordinates: North American Datum 1983
Nellis AFB, NV



Prepared by: Nellis Air Operations Office
Nellis AFB, NV

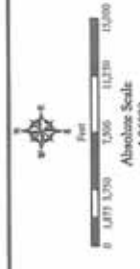




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LV Zoning

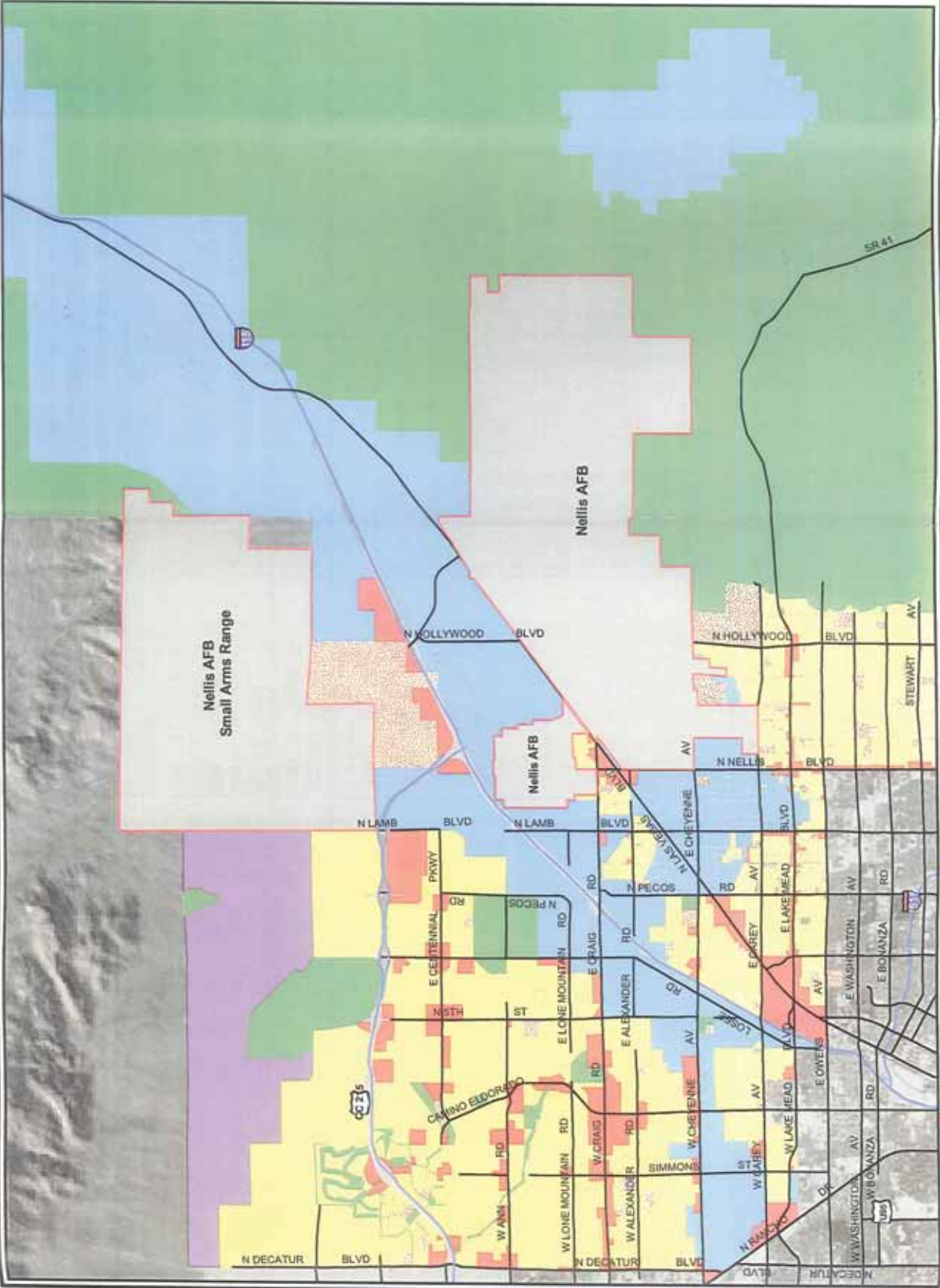
- INDUSTRIAL
- COMMERCIAL
- RESIDENTIAL
- OPEN LAND
- WILDERNESS STUDY AREA
- PUBLIC FACILITIES
- Nellis AFB
- Freeways
- Streets



Coordinate System: State Plane Nevada East NAD 1983

**Zoning Map
Figure 8
Nellis AFB, NV**

Prepared By:
Nellis Base Integration Office





Legend

Future Land Use

- INDUSTRIAL
- COMMERCIAL
- RESIDENTIAL
- OPEN LAND
- WILDERNESS STUDY AREA
- PUBLIC FACILITIES
- Neillis AFB
- Freeways
- Streets

Noise Contours

- 65 dB (DNL)
- 70 dB (DNL)
- 75 dB (DNL)
- 80 dB (DNL)



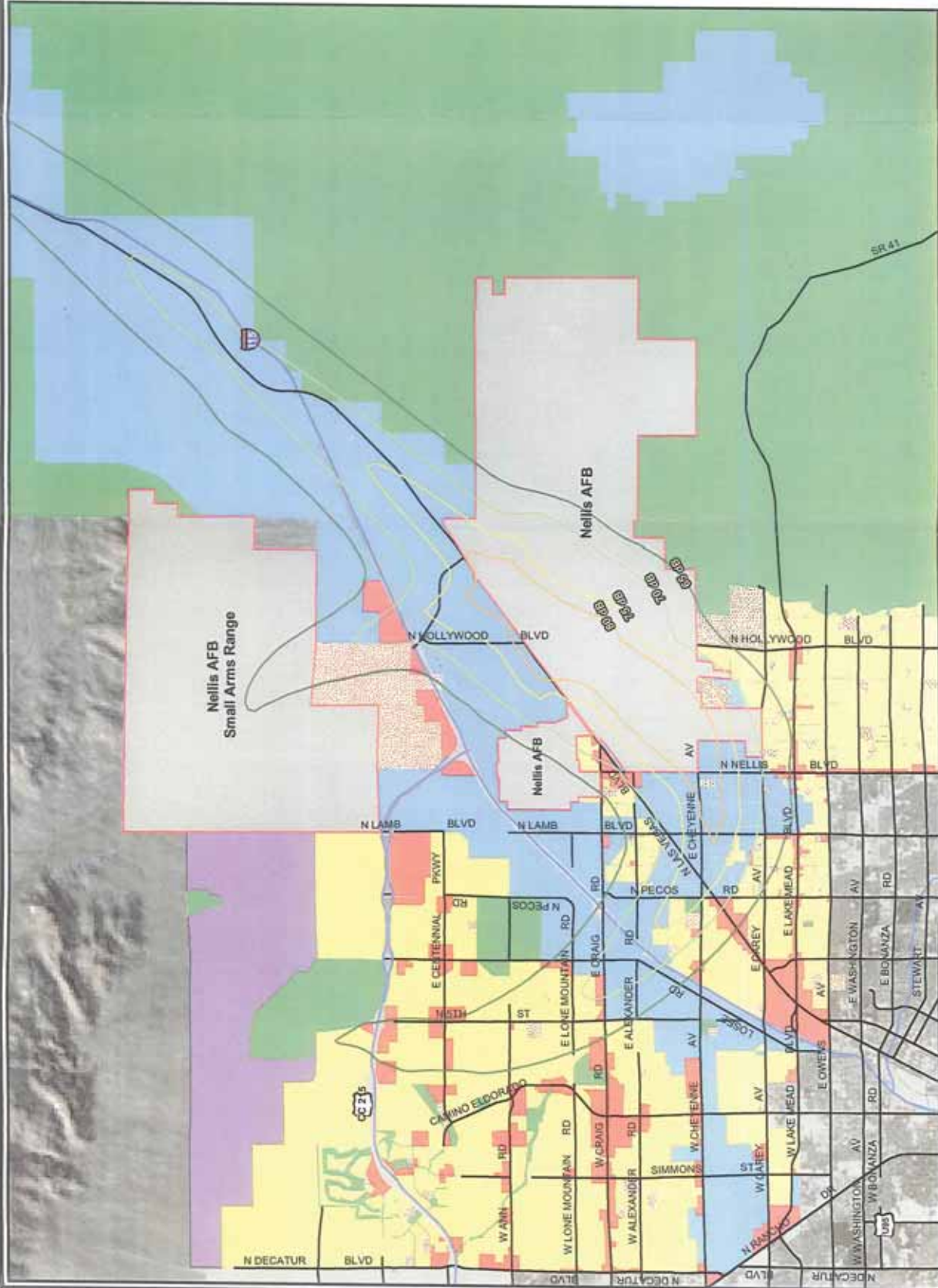
Coordinate System: State Plane (Nevada East) NAD 83

Future Land Use

Figure 9

Neillis AFB, NV

Prepared By:
Neillis Geo Integration Office



Nellis AFB has revised our 1992 AICUZ Report to provide flight patterns, accident potential zones, and noise contour information that reflects the most viable picture of aircraft activities. The composite noise contours in this report reflect the beddown of the F/A-22 aircraft, an increase in nighttime operations, and stability of southern contours over populated areas. Using these contours for land use development should safeguard the health and safety of surrounding communities and promote beneficial land use that is compatible with Nellis AFB operations.

SECTION 5 IMPLEMENTATION

The implementation of the AICUZ Report must be a joint effort between the Air Force and the adjacent communities. The Air Force's role is to minimize the impact on the local communities by Nellis AFB operations. The role of the communities is to ensure that development near Nellis AFB is compatible with accepted planning and development principles and practices.

5.1 Air Force Responsibilities

In general, the Air Force perceives its AICUZ responsibilities as encompassing the areas of flying safety, noise abatement, and participation in the land use planning process.

Well-maintained aircraft and well-trained aircrews do much to ensure that aircraft accidents are avoided. Despite the best training of aircrews and maintenance of aircraft, accidents can occur. It is imperative that flights be routed over sparsely populated areas, as much as possible, to reduce the exposure of lives and property to a potential accident.

By Air Force regulation, commanders are required to periodically review existing traffic patterns, instrument approaches, weather minima, and operating practices, and evaluate these factors in relationship to populated areas and other local situations. This requirement is a direct result and expression of Air Force policy that all AICUZ plans must include an analysis of flying and flying-related activities designed to reduce and control the effects of such operations on surrounding land areas. Noise is generated from aircraft both in the air and on the ground. In an effort to reduce the noise effects of Nellis AFB operations on surrounding communities, the base limits nighttime flying activities and has routed flight patterns to avoid populated areas such as the City of Las Vegas. Based upon the level of night operations in recent conflicts in the Balkans, Afghanistan and Iraq, Nellis will see an increase in nighttime training; hence, nighttime restrictions will become less effective as more sorties operate at night. Practice takeoffs/landings and instrument approaches are conducted at times when individuals are normally awake. These activities are not scheduled between 10 p.m. and 6 a.m. During this time, only mission essential aircraft arrivals and departures are conducted. Whenever possible, traffic patterns are all located away from the population centers, both on and off base. Aircraft taking off to the southwest are not able to avoid populated areas due to

The preparation and presentation of this Nellis AFB AICUZ report is one phase of the continuing Air Force participation in the local planning process. It is recognized that as the local community updates its land use plans, the Air Force must be ready to provide additional information.

It is also recognized that the AICUZ program will be an ongoing activity even after compatible development plans are adopted and implemented. Base personnel are prepared to participate in the continuing discussion of zoning and other land use matters as they may affect, or may be affected by Nellis AFB. Base personnel will also be available to provide information, criteria and guidelines to state, regional and local planning entities, civic associations and similar groups.

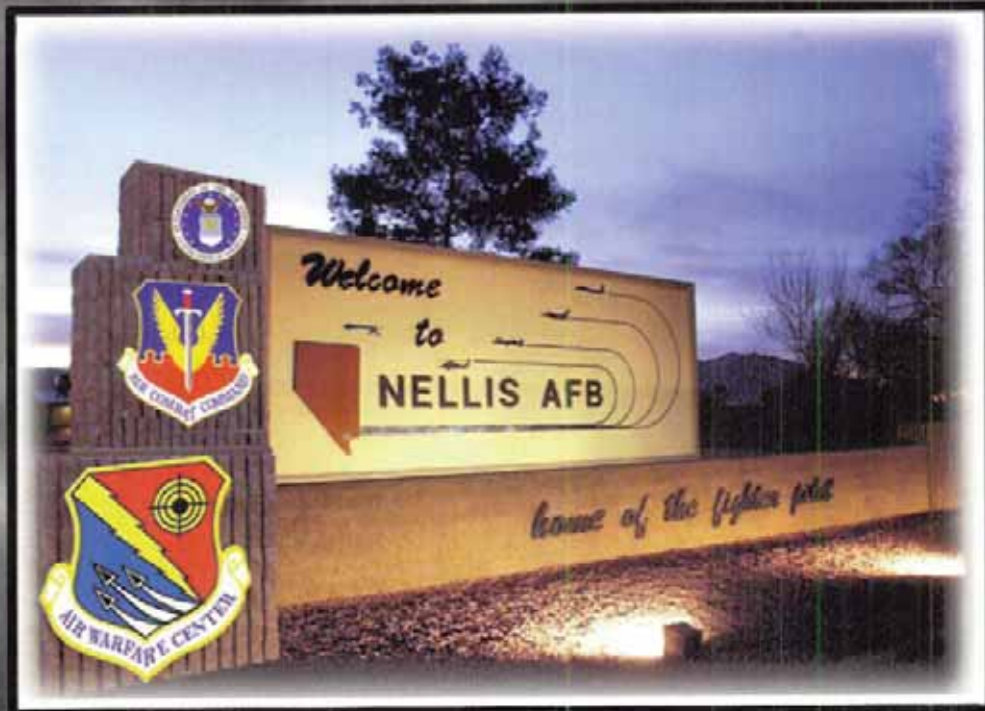
5.2 Local Community Responsibilities

The residents near Nellis AFB and the personnel at Nellis AFB have a long history of working together for mutual benefit. Nellis AFB senior leadership feels that adoption of the following recommendations will strengthen this relationship, protect the health and safety of the public, and help preserve the integrity of the base's flying mission:

- Incorporate AICUZ policies and guidelines into the comprehensive plans of Clark County, and the cities of Las Vegas and North Las Vegas. Use overlay maps of the AICUZ noise contours and Air Force Land Use Compatibility Guidelines to evaluate existing and future land use proposals.
- Modify zoning ordinances and subdivision regulations to support the compatible land uses and population densities outlined in Air Force guidance.
- Ensure height and obstruction ordinances reflect current Air Force and Federal Aviation Administration (FAA) Part 77 requirements.
- Modify building codes to ensure that new construction within the AICUZ area has the recommended noise level reductions incorporated into its design and construction.
- Continue to inform Nellis AFB, 99 CES Community Planner at (702) 652-4153, of planning and zoning actions that have the potential of affecting base operations. Develop a working group representing city planners, county planners, and base planners to meet at least quarterly to discuss AICUZ concerns and major development proposals that could affect airfield operations.



Air Installation Compatible Use Zone (AICUZ) Report



VOLUME 2

**United States Air Force
Nellis Air Force Base, Nevada**

NELLIS AFB AICUZ

VOL. II

APPENDICES

This is the companion document to Volume I of the Air Installation Compatible Use Zone (AICUZ) report prepared for Nellis AFB, Nevada. It contains supplemental AICUZ information.

APPENDIX A

THE AICUZ STUDY, INCLUDING THE AICUZ STUDY AREA

APPENDIX B

AICUZ STUDY AREA MAP

APPENDIX C

DESCRIPTION OF THE AICUZ STUDY AREA

APPENDIX D

REPORT AND FINDINGS OF THE AICUZ STUDY

APPENDIX E

REPORT AND FINDINGS OF THE AICUZ STUDY

TABLE OF CONTENTS

LIST OF FIGURES	3
LIST OF TABLES.....	4
APPENDIX A	
THE AICUZ CONCEPT, PROGRAM, METHODOLOGY, AND POLICIES	5
APPENDIX B	
ACCIDENT POTENTIAL ZONES.....	11
APPENDIX C	
DESCRIPTION OF THE NOISE ENVIRONMENT.....	17
APPENDIX D	
HEIGHT AND OBSTRUCTIONS CRITERIA	20
APPENDIX E	
NOISE LEVEL REDUCTION GUIDELINES	23

LIST OF FIGURES

FIGURE B-1 DISTRIBUTION OF AIR FORCE AIRCRAFT ACCIDENTS 13

FIGURE B-2 AIR FORCE ACCIDENT DATA (1968-1975) 14

FIGURE B-3 AIR FORCE ACCIDENT DATA (1968-1985) 14

FIGURE C-1 DAY-NIGHT AVERAGE A-WEIGHTED SOUND LEVEL 18

FIGURE C-2 SOUND EXPOSURE LEVEL..... 18

FIGURE D-1 AIRSPACE CONTROL SURFACE PLAN..... 22

LIST OF TABLES

TABLE B-1 LOCATION ANALYSIS 12

TABLE B-2 ACCIDENT TO AREA RATIO 15

TABLE B-3 ADDITIONAL ACCIDENT DATA..... 15

APPENDIX A

THE AICUZ CONCEPT, PROGRAM, METHODOLOGY, AND POLICIES

A.1 Concept

Federal legislation, national sentiment, and other external forces which directly affect the United States Air Force mission have served to greatly increase the Air Force's role in environmental and planning issues. Problems of airfield encroachment from incompatible land uses surrounding installations, as well as air and water pollution and socioeconomic impact, require continued and intensified USAF involvement. The nature of these problems dictates direct USAF participation in comprehensive community and land use planning. Effective, coordinated planning that bridges the gap between the federal government and the community requires the establishment of good working relationships with local citizens, local planning officials, and state and federal officials. This planning depends upon creating an atmosphere of mutual trust and helpfulness. The Air Installation Compatible Use Zone (AICUZ) concept has been developed in an effort to:

- Protect local citizens from the noise exposure and accident potential associated with flying activities.
- Prevent degradation of the Air Force's capability to achieve its mission by promoting compatible land use planning.

The land use guidelines developed herein are a composite of a number of other land use compatibility studies that have been refined to fit the Nellis AFB aviation environment.

A.2 Program

Base Commanders establish and maintain active programs to achieve the maximum feasible land use compatibility between air installations and neighboring communities. The program requires that all appropriate governmental bodies and citizens be fully informed whenever AICUZ or other planning matters affecting the installation are under consideration. This includes positive and continuous programs designed to:

- Provide information, criteria, and guidelines to federal, state, regional, and local planning bodies, civic associations, and similar groups.
- Inform such groups of the requirements of the flying activity, noise exposure, aircraft accident potential, and AICUZ plans.
- Describe the noise reduction measures that are being used.
- Ensure that all reasonable, economical, and practical measures are taken to reduce or control the impact of noise-producing activities. These measures include such considerations as proper location of engine test facilities, provision for sound suppressors where necessary, and adjustment of flight patterns and/or techniques to minimize the noise impact on populated areas. This must be done without jeopardizing safety or operational effectiveness.

A.3 Methodology

The AICUZ consists of land areas upon which certain land uses may obstruct the airspace or otherwise be hazardous to aircraft operations; and land areas which are exposed to the health, safety, or welfare hazards of aircraft operations. The AICUZ includes:

- Accident potential zones (APZs) and CZs based on past Air Force aircraft accidents and installation operational data (Appendix B).
- Noise zones (NZs) produced by the computerized Day-Night Average A-Weighted Sound Level (DNL) metric (Appendix C).
- The area designated by the Federal Aviation Administration and the Air Force for purposes of height limitations in the approach and departure zones of the base (Appendix D).

The APZs and NZs are the basic building blocks for land use planning with AICUZ data. Compatible land uses are specified for these zones, and recommendations on building materials and standards to reduce interior noise levels inside structures are provided in Appendix E.

As part of the AICUZ program, real property acquisition has been authorized by Congress for USAF bases to acquire areas designated as the CZ and in a few situations areas within the APZs. Real property interests are acquired by fee or easement giving the base control over the use of the property. Fee land so acquired may be leased out for agricultural or grazing purposes. Nellis AFB has acquired land use control within its CZs through easements. Compatible land use controls for the areas surrounding the remaining airfield should be accomplished through the community land use planning processes.

A.4 AICUZ Land Use Development Policies

The basis for any effective land use control system is the development of, and subsequent adherence to, policies which serve as the standard by which all land use planning and control actions are evaluated. Nellis AFB recommends the following policies be considered for incorporation into the comprehensive plans of Clark County and the cities of Las Vegas and North Las Vegas in the vicinity of Nellis AFB:

A.4.1 Policy 1. In order to promote the public health, safety, peace, comfort, convenience, and general welfare of the inhabitants near the airfield, it is necessary to:

- Guide, control, and regulate future growth and development.
- Promote orderly and appropriate use of land.
- Protect the character and stability of existing land uses.
- Prevent the destruction or impairment of Nellis AFB and the public investment therein.
- Enhance the quality of living in the areas affected.
- Protect the general economic welfare by restricting incompatible land use.

A.4.2 Policy 2. In furtherance of Policy 1, it is appropriate to:

- Establish guidelines of land use compatibility.
- Prevent establishment of any land use which would unreasonably endanger aircraft operations and the continued use of Nellis AFB.
- Incorporate the Air Installation Compatible Use Zone concept into community land use plans, modifying them when necessary.
- Adopt appropriate ordinances to implement Nellis AFB compatible land use plans.

A.4.3 Policy 3. Within the boundaries of the AICUZ, certain land uses are inherently incompatible. The following land uses are not in the public interest and would severely impact Nellis AFB operations:

- Uses that release into the air any substance, such as steam, dust, or smoke, which would impair visibility or otherwise interfere with the operation of aircraft.
- Uses that produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision.
- Uses that produce electrical emissions which would interfere with aircraft communication systems or navigation equipment.
- Uses that attract birds or waterfowl, such as operation of sanitary landfills, maintenance or feeding stations, or growth of certain vegetation.
- Uses that provide for structures within ten feet of aircraft approach-departure and/or transitional surfaces.

A.4.4 Policy 4. Certain noise levels of varying duration and frequency create hazards to both physical and mental health. A limited, though definite, danger to life exists in certain areas adjacent to airfields. Where these conditions are sufficiently severe, it is not consistent with public health, safety, and welfare to allow the following land uses

- Residential.
- Retail business.
- Office buildings.
- Public buildings (schools, churches, etc.).
- Recreation buildings and structures.

A.4.5 Policy 5. Land areas below takeoff and final approach flight paths are exposed to significant danger of aircraft accidents. The density of development and intensity of use must be limited in such areas.

A.4.6 Policy 6. Different land uses have different sensitivities to noise. Standards of land use acceptability should be adopted, based on these noise sensitivities. In addition, a system of Noise Level Reduction guidelines (Appendix E) for new construction should be implemented to permit certain uses where they would otherwise be prohibited.

A.4.7 Policy 7. Land use planning and zoning in the airfield environs cannot be based solely on aircraft-generated effects. Allocation of land used within the AICUZ should be further refined by consideration of:

- Physiographic factors.
- Climate and hydrology.
- Vegetation.
- Surface geology.
- Soil characteristics.
- Intrinsic land use potential and constraints.
- Existing land use.
- Land ownership patterns and values.
- Economic and social demands.
- Cost and availability of public utilities, transportation, and community facilities.
- Other noise sources.

The end of each runway at Nellis AFB has a 3,000-foot by 3,000-foot CZ and two APZs (Appendix B). Accident potential on or adjacent to the runway or within the CZ is so high that the necessary land use restrictions would prohibit reasonable economic use of land. As stated previously, it is Air Force policy to request Congress to authorize and appropriate funds for the necessary real property interests in this area to prevent incompatible land uses.

APZ I is less critical than the CZ, but still possesses a significant risk factor. This 3,000-foot by 5,000-foot area has land use compatibility guidelines which are sufficiently flexible to allow reasonable economic use of the land, such as industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture. However, uses that concentrate people in small areas are not acceptable.

APZ II is less critical than APZ I, but still possesses potential for accidents. APZ II, also 3,000 feet wide, is 7,000 feet long extending to 15,000 feet from the runway threshold. Acceptable uses include those of APZ I, as well as low density single family residential, and those personal and business services and commercial/retail trade uses of low intensity or scale of operation. High density functions such as multi-story buildings, places of assembly (theaters, churches, schools, restaurants, etc.), and high density office uses are not considered appropriate.

High people densities should be limited to the maximum extent possible. The optimum density recommended for residential usage (where it does not conflict with noise criteria) in APZ II is one dwelling per acre. For most non-residential usage, buildings should be limited to one story and the lot coverage should not exceed 20 percent.

A.5 Basic Land Use Compatibility

Research on aircraft accident potential, noise, and land use compatibility is ongoing at a number of federal and other agencies. One such effort is the Concentrations of Persons per Acre Standard developed by the Sacramento Area Council of Governments for incorporation into the land use planning process. These and all other compatibility guidelines must not be considered inflexible standards. They are the framework within which land use compatibility questions can be addressed and resolved. In each case, full consideration must be given to local conditions such as:

- Previous community experience with aircraft accidents and noise.
- Local building construction and development practices.
- Existing noise environment due to other urban or transportation noise sources.
- Time period of aircraft operations and land use activities.
- Specific site analysis.
- Noise buffers, including topography.

These basic guidelines cannot resolve all land use compatibility questions, but they do offer a reasonable framework within which to work.

A.6 Accident Potential

Land use guidelines for the two APZs are based on a hazard index system which compares the relationship of accident occurrence for five areas:

- On or adjacent to the runway.
- Within the CZ.
- In APZ I.
- In APZ II.
- In all other areas within a 10-nautical mile radius of the runway.

Accident potential on or adjacent to the runway or within the CZ is so high that few uses are acceptable. The risk outside APZ I and APZ II, but within the 10 nautical mile radius area, is significant, but is acceptable if sound engineering and planning practices are followed.

Land use guidelines for APZs I and II have been developed. The main objective has been to restrict all people-intensive uses because there is greater risk in these areas. The basic guidelines aim at prevention of uses that:

- Have high residential density characteristics.
- Have high labor intensity.
- Involve above-ground explosive, fire, toxic, corrosive, or other hazardous characteristics.
- Promote population concentrations.
- Involve utilities and services required for area-wide population, where disruption would have an adverse impact (telephone, gas, etc.).
- Concentrate people who are unable to respond to emergency situations, such as children, elderly, handicapped, etc.
- Pose hazards to aircraft operations.

There is no question that these guidelines are relative. Ideally, there should be no people-intensive uses in either of these APZs. The free market and private property systems prevent this where there is land development. To go beyond these guidelines, however, substantially increases risk by placing more people in areas where there may ultimately be an aircraft accident.

A.7 Noise

Nearly all studies on residential aircraft noise compatibility recommend no residential uses in noise zones above DNL 75 dB. Usually, no restrictions are recommended below noise zone DNL 65 dB. Between DNL 65-75 dB there is currently no consensus. These areas may not qualify for federal mortgage insurance in residential categories according to the Department of Housing and Urban Development (HUD) Regulation 24 CFR 51B. In many cases, HUD approval requires noise attenuation measures, the Regional Administrator's concurrence, and an Environmental Impact Statement. The Department of Veterans Affairs also has airfield noise and accident restrictions which apply to their home loan guarantee program. Whenever possible, residential land use should be located below DNL 65 dB according to Air Force land use recommendations.

Most industrial/manufacturing uses are compatible with airfield operations. Exceptions are uses such as research or scientific activities which require lower noise levels. Noise attenuation measures are recommended for portions of buildings devoted to office use, receiving the public, or where the normal background noise level is low.

The transportation, communications and utilities categories have a high noise level compatibility because they generally are not people-intensive. When people use land for these purposes, the use is generally very short in duration. Where buildings are required for these uses, additional evaluation is warranted.

The commercial/retail trade, and personal and business services categories are compatible without restriction up to DNL 70 dB; however, they are generally incompatible above DNL 80 dB. Between DNLs 70-80 dB, noise level reduction measures should be included in the design and construction of buildings.

The nature of most uses in the public and quasi-public services category requires a quieter environment, and attempts should be made to locate these uses below DNL 65 (an Air Force land use recommendation), or else provide adequate noise level reduction.

Although recreational use has often been recommended as compatible with high noise levels, recent research has resulted in a more conservative view. Above DNL 75 dB, noise becomes a factor which limits the ability to enjoy such uses. Where the requirement to hear is a function of the use (i.e., music shell, etc.), compatibility is limited. Buildings associated with golf courses and similar uses should be noise attenuated.

With the exception of forestry activities and livestock farming, uses in the resources production, extraction, and open space category are compatible almost without restrictions.

APPENDIX B

ACCIDENT POTENTIAL ZONES

B.1 Guidelines For Accident Potential

Urban areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircraft crews. Despite stringent maintenance requirements, a goal of zero mishaps, and countless hours of training, accidents are possible.

When the AICUZ program began, there were no current comprehensive studies on accident potential. In support of the program, the Air Force completed a study of Air Force accidents that occurred between 1968 and 1972 within 10 nautical miles of airfields. The study of 369 accidents revealed that 75 percent of aircraft accidents occurred on or adjacent to the runway (1,000 feet to each side of the runway centerline) and in a corridor 3,000 feet (1,500 feet either side of the runway centerline) wide, extending from the runway threshold along the extended runway centerline for a distance of 15,000 feet.

Three zones were established based on crash patterns: The CZ, APZ I, and APZ II. The CZ starts at the end of the runway and extends outward 3,000 feet. It has the highest accident potential of the three zones. The Air Force has adopted a policy of acquiring property rights to CZs because of the high accident potential. APZ I extends from the CZ an additional 5,000 feet. It includes an area of reduced accident potential. APZ II extends from APZ I an additional 7,000 feet in an area of further reduced accident potential.

The Air Force research work in accident potential was the first significant effort in this subject area since 1952 when the President's Airport Commission published "The Airport and Its Neighbors," better known as the "Doolittle Report." The recommendations of this earlier report were influential in the formulation of the APZ concept.

The risk to people on the ground of being killed or injured by aircraft accidents is small. However, an aircraft accident is a high consequence event and when a crash does occur, the result is often catastrophic. As a result, the Air Force approaches this safety issue from a land use planning perspective.

B.2 Accident Potential Analysis

Military aircraft accidents differ from commercial air carrier and general aviation accidents because of the variety of aircraft used, the type of missions, and the number of training flights. In 1973, the U.S. Air Force (USAF) performed a service-wide aircraft accident hazard study in order to identify land near airfields with significant accident potential. Accidents studied normally occurred within 10 nautical miles of airfields and were airfield-associated mishaps.

The study reviewed 369 major USAF accidents during 1968-1972, and found that 61 percent of the accidents were related to landing operations and 39 percent were takeoff related. It also found that 70 percent occurred in daylight, and that fighter and training aircraft accounted for 80 percent of the accidents.

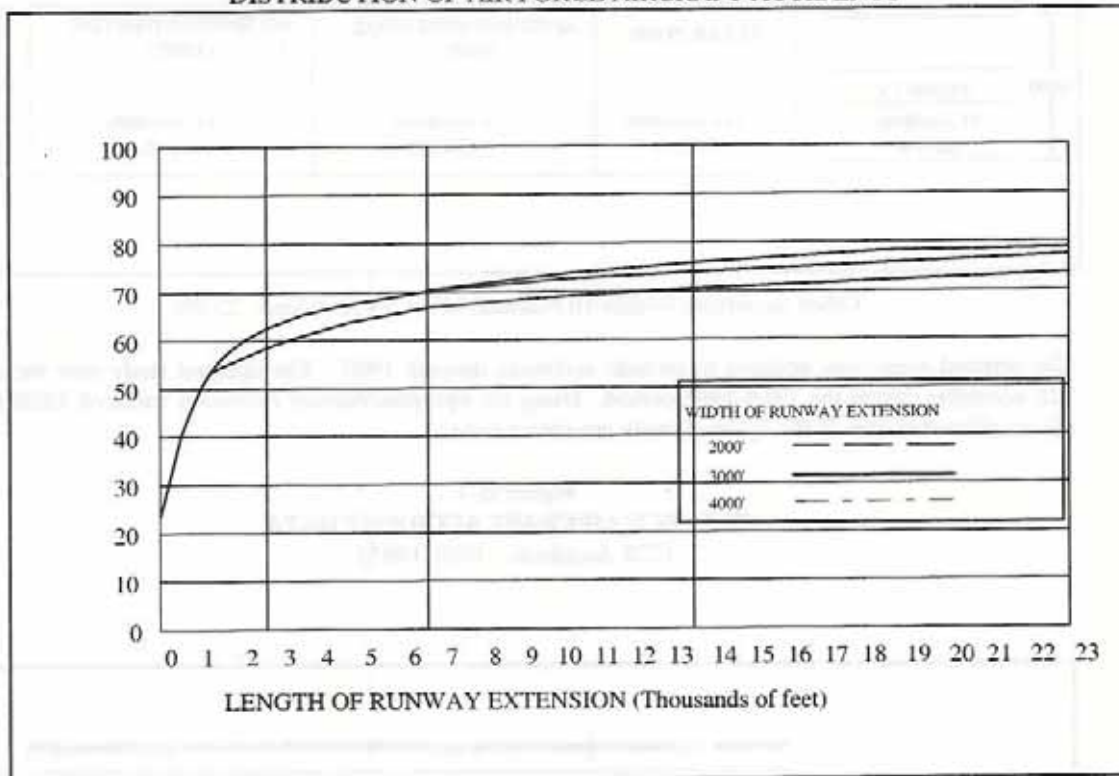
Because the purpose of the study was to identify accident hazards, the study plotted each of the 369 accidents in relation to the airfield. This plotting found that the accidents clustered along the runway and its extended centerline. To further refine this clustering, a tabulation was prepared which described the cumulative frequency of accidents as a function of distance from the runway centerline along the extended centerline. This analysis was done for widths of 2,000, 3,000, and 4,000 total feet. The location analysis found the following:

Table B-1 LOCATION ANALYSIS

Length From both Ends of Runway (feet)	Width of Runway Extension (feet)		
	2,000	3,000	4,000
Percent of Accidents			
On or adjacent to runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	35	39	39
3,000 to 8,000	8	8	8
8,000 to 15,000	5	5	7
Cumulative percent of accidents			
On or adjacent to runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	58	62	62
3,000 to 8,000	66	70	70
8,000 to 15,000	71	75	77

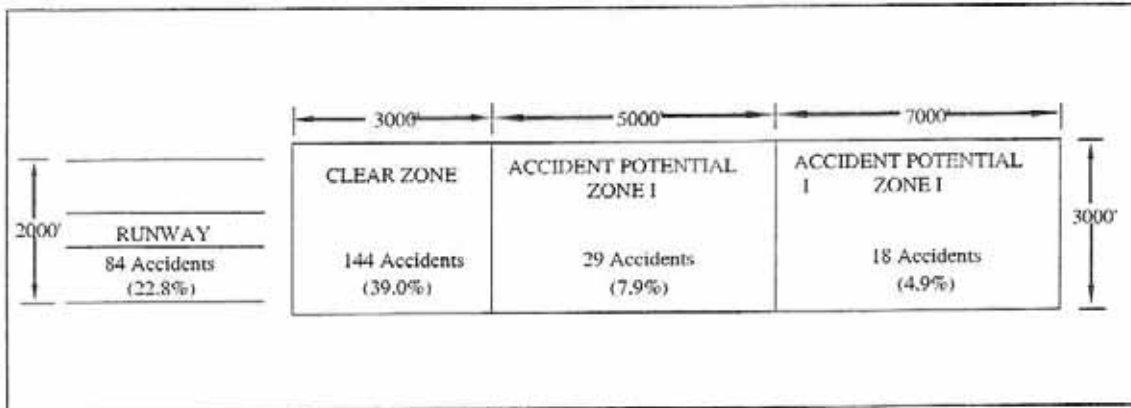
Figure B-1 indicates that the cumulative number of accidents rises rapidly from the end of the runway to 3,000 feet, rises more gradually to 8,000 feet, then continues at about the same rate of increase to 15,000 feet, where it levels off rapidly. The location analysis also indicates that the optimum width of the runway extension, which would include the maximum percentage of accidents in the smallest area, is 3,000 feet.

Figure B-1
DISTRIBUTION OF AIR FORCE AIRCRAFT ACCIDENTS



Using the optimum runway extension width, 3,000 feet, and the cumulative distribution of accidents from the end of the runway, zones were established which minimized the land area included and maximized the percentage of accidents included. The zone dimensions and accident statistics for the 1968-1972 study are shown in Figure B-2.

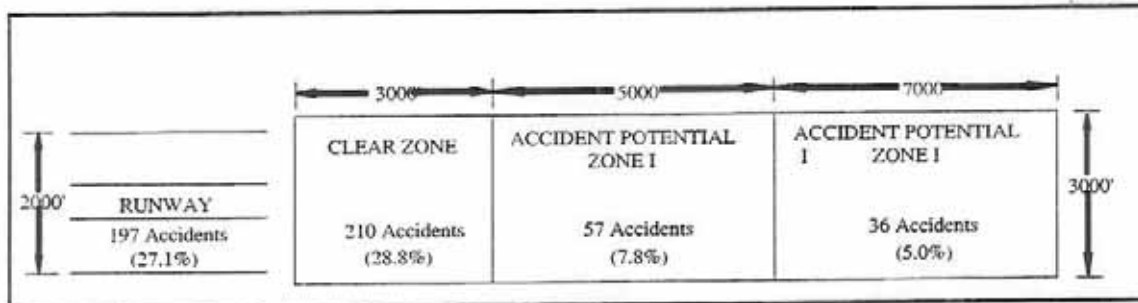
Figure B-2
 AIR FORCE AIRCRAFT ACCIDENT DATA
 (369 Accidents - 1968-1972)



Other Accidents Within 10 Nautical Miles 94 Accidents 25.4%

The original study was updated to include accidents through 1985. The updated study now includes 728 accidents during the 1968-1985 period. Using the optimum runway extension width of 3,000 feet, the accident statistics of the updated study are shown below

Figure B-3
 AIR FORCE AIRCRAFT ACCIDENT DATA
 (728 Accidents - 1968-1985)



Using the designated zones and accident data, it is possible to calculate a ratio of percentage of accidents to percentage of area size. These ratios indicate that the CZ, with the smallest area size and the highest number of accidents, has the highest ratio, followed by the runway and adjacent area, APZ I and then APZ II.

Table B-2
ACCIDENT TO AREA RATIO

Areas	Area ¹ (acres)	Ratio of Percentage of Accidents to Percentage of Area (Air Force Accident Data 1968 - 1985)				Ratio: ³ Accident to Area
		Number ² Accident	Accident Per Acre	% Total Area	% Total Accident	
Runway Area	487	197	1 Per 2.5	0.165	27.1	164
CZ	413	210	1 Per 1.9	0.140	28.8	206
APZ I	689	57	1 Per 12.1	0.233	7.8	33
APZ II	964	36	1 Per 26.7	0.327	5.0	15
Other	292,483	228	1 Per 1282.8	99.135	31.3	.3

- NOTES: 1. Area includes land within 10 nautical miles of runway.
2. Total number of accidents is 728 (through 1985).
3. Percent total accidents divided by percent total area.

Additional accident data for 1986 through July 1990 has been analyzed. Specific locational data for some of the 1986-1990 accidents was not available, and these were not included in the analysis. The following is a comparison of data through 1985 and data through July, 1990:

Table B-3 ADDITIONAL ACCIDENT DATA

ZONE	1968-1985	1968-1990
On-Runway	197-27.1 %	199-24.7 %
CZ	210-28.8 %	226-28.1 %
APZ I	57-7.8 %	84-10.4 %
APZ II	36-5.0 %	45-5.6 %
Other (Within ten NM)	228-31.3 %	251-31.2 %

Analysis has shown that the cumulative changes evident in accident location through July, 1990, reconfirm the dimensions of the CZs and APZs.

B.3 Definable Debris Impact Areas

The Air Force also determined which accidents had definable debris impact areas, and in what phase of flight the accident occurred. Overall, 75 percent of the accidents had definable debris impact areas, although they varied in size by type of accident.

The Air Force used weighted averages of impact areas, for accidents occurring only in the approach and departure phase, to determine the following average impact areas:

Average Impact Areas for Approach and Departure Accidents	
Overall Average Impact Area	5.06 acres
Fighter, Trainer and Misc. Aircraft	2.73 acres
Heavy Bomber and Tanker Aircraft	8.73 acres

B.4 Findings

- Designation of safety zones around the airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards.
- Air Force accident studies have found that aircraft accidents near Air Force installations occurred in the following patterns:
 - 61% were related to landing operations.
 - 39% were related to takeoff operations.
 - 70% occurred in daylight.
 - 80% were related to fighter and training aircraft operations.
 - 27% occurred on the runway or within an area extending 1,000 feet out from each side of the runway.
 - 29% occurred in an area extending from the end of the runway to 3,000 feet along the extended centerline and 3,000 feet wide, centered on the extended centerline.
 - 13% occurred in an area between 3,000 and 15,000 feet along the extended runway centerline and 3,000 feet wide, centered on the extended centerline.
- U.S. Air Force aircraft accident statistics found that 75% of aircraft accidents resulted in definable impact areas. The size of the impact areas were:
 - 5.1 acres overall average.
 - 2.7 acres for fighters and trainers.
 - 8.7 acres for heavy bombers and tankers.

DESCRIPTION OF THE NOISE ENVIRONMENT

C.1 Noise Contours

The following paragraphs describe the methodologies used to produce the noise contours contained in this AICUZ report.

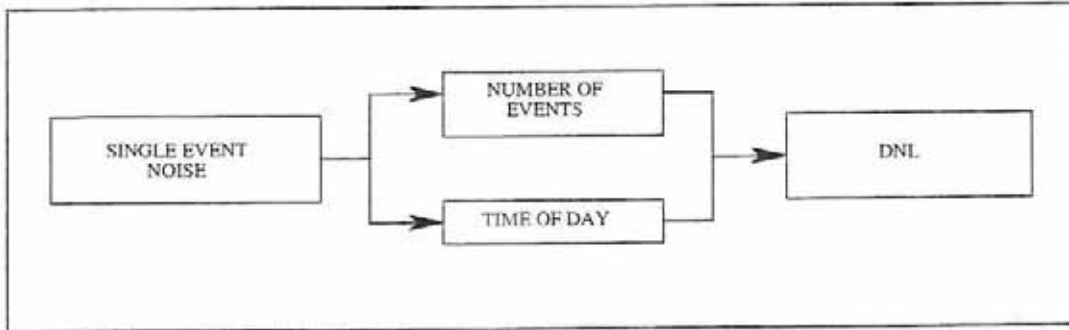
C.2 Noise Environment Descriptor

The noise contour methodology used herein is the Day-Night Average A-Weighted Sound Level (DNL) metric of describing the noise environment. Efforts to provide a national uniform standard for noise assessment have resulted in adoption by the Environmental Protection Agency of DNL as the standard noise prediction model for this procedure. The Air Force uses the DNL descriptor to assess the amount of exposure to aircraft noise, and predict community response to the various levels of exposure. The DNL values used for planning purposes are 65, 70, 75, and 80 dB. Land use guidelines are based on the compatibility of various land uses with these noise exposure levels. DNL is a measurable quantity and can be measured directly.

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. DNL begins with a single event descriptor and adds corrections for the number of events and the time of day. Since the primary development concern is residential, nighttime events are considered more annoying than daytime events and are weighted accordingly. DNL values are computed from the single event noise descriptor, plus corrections for number of flights and time of day (Figure C-1).



Figure C-1 DAY-NIGHT AVERAGE A-WEIGHTED SOUND LEVEL (DNL)

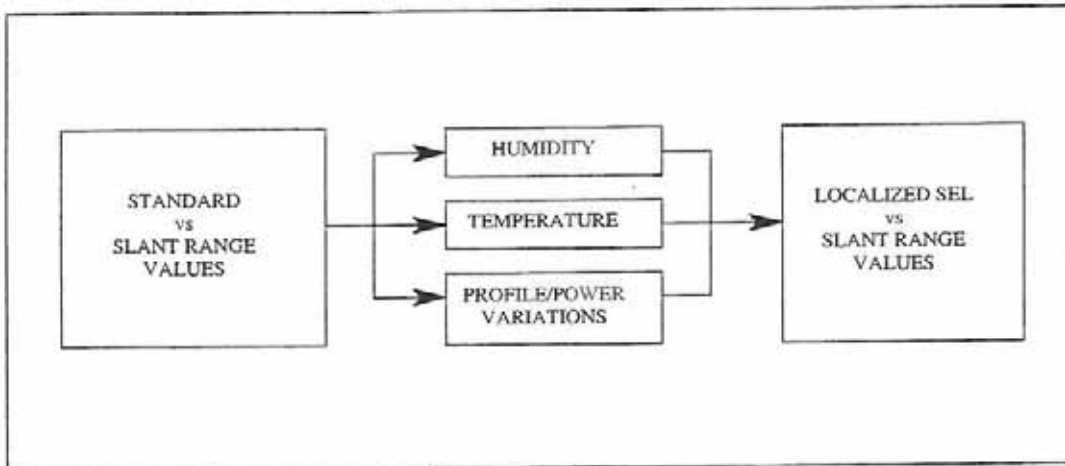


As part of the extensive data collection process, detailed information is gathered on the type of aircraft and the number and time of day of flying operations for each flight track during a typical day. This information is used in conjunction with the single event noise descriptor to produce DNL values. These values are combined on an energy summation basis to provide single DNL values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

C.3 Noise Event Descriptor

The single event noise descriptor used in the DNL system is the Sound Exposure Level (SEL). The SEL measure is an integration of an "A" weighted noise level over the period of a single event such as an aircraft flyover, in dB. Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft/engines at different power settings and phases of flight. The following diagram shows the relationship of the single event noise descriptor (SEL) to the source sound energy.

Figure C-2
Sound Exposure Level



SEL vs. slant range values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek, and Newman, Inc., in conjunction with the Air Force's Armstrong Laboratory (AL) and carried out by AL. These standard day, sea level values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, and variations from standard profiles and power settings.

Ground-to-ground sound propagation characteristics are used for altitudes up to 500 feet absolute with linear transition between 500 and 700 feet and air-to-ground propagation characteristics above 700 feet.

In addition to the assessment of aircraft flight operations, the DNL system also incorporates noise resulting from engine/aircraft maintenance checks on the ground. Data concerning the orientation of the noise source, type of aircraft or engine, number of test runs on a typical day, power settings used and their duration, and use of suppression devices are collected for each ground run up or test position. This information is processed and the noise contribution added (on an energy summation basis) to the noise generated by flying operations to produce noise contours reflecting the overall noise environment with respect to aircraft air and ground operations.

C.4 Noise Contour Production

Data describing flight track distances and turns, altitudes, airspeeds, power settings, flight track operational utilization, maintenance locations, ground run-up engine power settings, and number and duration of runs by type of aircraft/engine is assembled by each individual AFB. The data is screened by Air Combat Command (ACC). Trained personnel process the data for input into a central computer. Flight track maps are generated for verification and approval by Nellis AFB and ACC. After any required changes have been incorporated, DNL contours are generated by the computer using the supplied data and standard source noise data corrected to local weather conditions. These contours are plotted and prepared for photographic reproduction. Additional technical information on the DNL procedures is available in the following publications:

- Community Noise Exposure Resulting from Aircraft Operations: Applications Guide for Predictive Procedure, AMRL-TR-73-105, November, 1974, from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.
- Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety, EPA Report 550/9-74-004, March, 1974, from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

APPENDIX D

HEIGHT AND OBSTRUCTIONS CRITERIA

D.1 Height And Obstructions Criteria

D.1.1 General

This appendix establishes criteria for determining whether an object or structure is an obstruction to navigation. Obstructions to navigation are considered to be:

- Natural objects or man-made structures that protrude above the planes or surfaces as defined in the following paragraphs, and/or;
- Man-made objects that extend more than 500 feet above the ground at the site of the structure.

D.1.2 Explanation of Terms

The following will apply (See Figure D-1):

- Controlling Elevation. Whenever surfaces or planes within the obstructions criteria overlap, the controlling (or governing) elevation becomes that of the lowest surface or plane.
- Runway Length. Nellis AFB has two runways, and 16,003 feet of pavement designed and built for sustained aircraft landings and takeoffs.
- Established Airfield Elevation. The elevation, in feet above mean sea level for Nellis AFB is 1870 feet.
- Dimensions. All dimensions are measured horizontally unless otherwise noted.

D.1.3 Planes and Surfaces.

Definitions are as follows:

- Primary Surface. This surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. The primary surface comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond the end of the runway. The width of the primary surface for a single class "B" runway is 2,000 feet, or 1,000 feet on each side of the runway centerline.
- CZ Surface. This surface defines the limits of the obstruction clearance requirements in the vicinity contiguous to the primary surface. The length and width of a CZ surface (for a single runway) is 3,000 feet by 3,000 feet. Nellis AFB has two parallel runways 1,000 feet apart and overlapping CZs. The combined CZs at each end of the dual runways are each 4,000 feet by 3,000 feet.
- Approach-Departure Clearance Surface. This surface is symmetrical about the runway centerline extended, begins as an inclined plane (glide angle) 200 at the end of the primary surface of the centerline elevation of the runway end, and extends for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 along the extended runway (glide angle) centerline until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the start of the glide angle. The width of this surface at the runway end is 2,000 feet; it flares uniformly, and the width at 50,000 feet is 16,000 feet.
- Inner Horizontal Surface. This surface is a plane, oval in shape at a height of 150 feet above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet above the centerline at the end of the runway and interconnecting these arcs with tangents.

- **Conical Surface.** This is an inclined surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1.
- **Outer Horizontal Surface.** This surface is a plane located 500 feet above the established airfield elevation. It extends for a horizontal distance of 30,000 feet from the outer periphery of the conical surface.
- **Transitional Surfaces.** These surfaces connect the primary surfaces, clear zone surfaces, and approach-departure clearance surfaces to the outer horizontal surface, conical surface, other horizontal surface, or other transitional surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline. To determine the elevation for the beginning the transitional surface slope at any point along the lateral boundary of the primary surface, including the CZ, draw a line from this point to the runway centerline. This line will be at right angles to the runway axis. The elevation at the runway centerline is the elevation for the beginning of the 7:1 slope.

The land areas outlined by these criteria should be regulated to prevent uses which might otherwise be hazardous to aircraft operations. The following uses should be restricted and/or prohibited.

- Uses which release into the air any substance which would impair visibility or otherwise interfere with the operation of aircraft (i.e. steam, dust, or smoke).
- Uses which produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision.
- Uses which produce electrical emissions which would interfere with aircraft communications systems or navigational equipment.
- Uses which would attract birds or waterfowl, including but not limited to, operation of sanitary landfills, maintenance of feeding stations, or the growing of certain vegetation.
- Uses that provide for structures within ten feet of aircraft approach-departure and/or transitional surfaces.

D.2 Height Restrictions

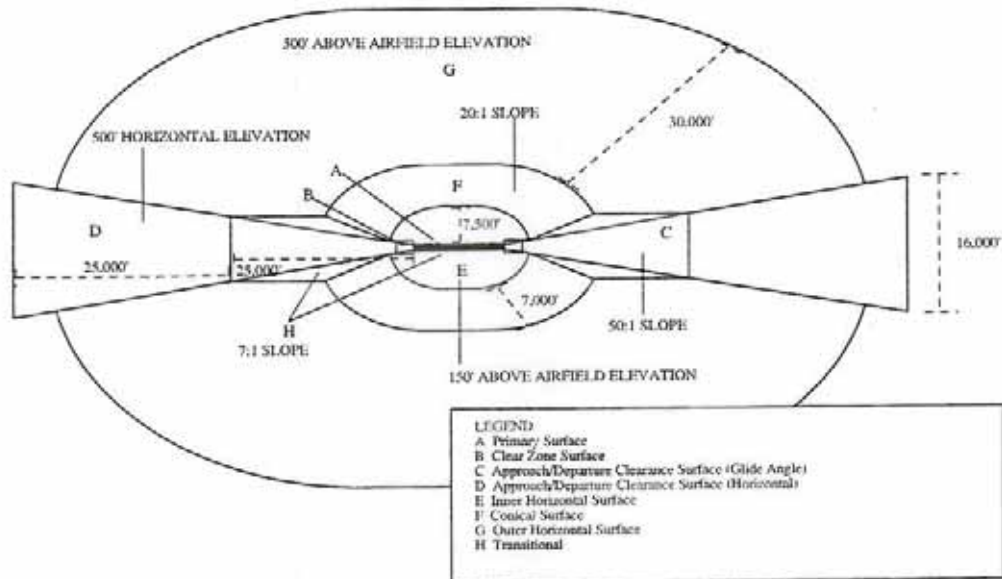
City/County agencies involved with approvals of permits for construction should require developers to submit calculations which show that projects meet the height restriction criteria of FAA Part 77 as described, in part, by the information contained in this Appendix.

NELLIS AFB, NEVADA COORDINATES AND ELEVATIONS

	FIELD ELEVATION:	1870 feet MSL
COORDINATES:	Runway 03 L	Lat. 36 Deg., 13 Min., 36.7 Sec. N Long. 115 Deg., 02 Min., 45.4 Sec. W
	Runway 03 R	Lat. 36 Deg., 13 Min., 30.2 Sec. N Long. 115 Deg., 02 Min., 36.1 Sec. W
	Runway 21 L	Lat. 36 Deg., 14 Min., 45.0 Sec. N Long. 115 Deg., 01 Min., 15.3 Sec. W
	Runway 21 R	Lat. 36 Deg., 14 Min., 52.0 Sec. N Long. 115 Deg., 01 Min., 24.0 Sec. W

Figure D-1
AIRSPACE CONTROL SURFACE PLAN

For a more complete description of airspace and control surfaces for Class A and Class B runways refer to FAR part 77, Subpart C or UFC 3-260-01.



APPENDIX E

NOISE LEVEL REDUCTION GUIDELINES

A study which provides in-depth, state-of-the-art noise level reduction guidelines was completed for the Naval Facilities Engineering Command and the Federal Aviation Administration, by Wyle Laboratories in November 1989. The study title is "Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations," Wyle Research Report WR 89-7. Copies of this study are available for review, from the Public Affairs Office at Nellis AFB, (702) 652-2750. In addition, the study is available electronically at the ACC website, www.cevp.com.