Joint Land Use Study

Cannon Air Force Base and Melrose Air Force Range

Final Submittal
March 2011

Joint Land Use Study

Cannon Air Force Base and Melrose Air Force Range

Final Submittal
March 2011

Prepared by:

HDR

Prepared for:

Curry County, New Mexico

Roosevelt County, New Mexico

Department of Defense Office of Economic Adjustment

This study was prepared under contract with Curry County, New Mexico, with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of Curry County, New Mexico and does not necessarily reflect the views of the Office of Economic Adjustment.

Table of Contents

Curry Road R Closure

Appendices

Figures

Tables

This page intentionally left blank.

Acronyms and Glossary

Acronyms

Ax	major directorate, e.g.
A4/7	Logistics, Installations and Mission Support
A8	Strategic Plans and Programs
ADNL	A-weighted Day-Night Average Sound Level
AFB	Air Force Base
AFI	Air Force Instruction
AFJAM	Air Force Joint Manual
AFM	Air Force Manual
AFR	Air Force Range
AFR	Air Force Regulation
AFSOC	Air Force Special Operations Command
AGL	above ground level
AHAS	Avian Hazard Advisory System
AICUZ	Air Installation Compatible Use Zone
ALUP	airport land use plan
AO	Area of Operations
AOC	Air and space operations center
AOG	Air and space operations group
APZ	accident potential zone
ARC	Air Reserve Component
ARRA	American Recovery and Reinvestment Act
ARRS	Air Rescue and Recover Service
ARW	Air Refueling Wing
BAM	Bird Avoidance Model
BASH	Bird/Wildlife Aircraft Strike Hazard
BCE	base civil engineer
BNSF	Burlington Northern Santa FE
BRAC	Base Realignment and Closure
CAAT	combat aviation advisory team
CAT	combat aircrew training
CC	commander
CID	Construction Industries Division
CNEL	Community Noise Equivalent Level
CNT	corrected net thrust
CONUS	continental United States
CSAF	Chief of Staff of the USAF
CTIT	turbine inlet temperature, in degrees Celsius
CZ	clear zone
dB	decibel
dBA	a-weighted decibels
DHS	Department of Homeland Security
DISA	Defense Information Systems Agency
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DSO	direct support operator
DZ	drop zone
EIS	Environmental Impact Statement
EO	executive order
EOD	explosive ordnance disposal
ESA	emergency safe altitude
ETA	estimated time of arrival
FAA	Federal Aviation Administration
FICUN	Federal Interagency Committee on Urban Noise
FOB	forward operating base
FPCON	force protection condition
FY	fiscal year
GIS	Geographic Information System
GPS	global positioning system
HAA	height above airfield
HAT	height above threshold
HLZ	helicopter landing zone
IFR	Instrument Flight Rules
JA	judge advocate (legal)
JLUS	Joint Land Use Study
KIAS	knots indicated air speed
kWh	kilowatt hours
Ldn	Average Day-Night Sound Level

m/s	meters per second
MAJCOM	Major Command
MOA	military operations area
MOU	Memorandum of Understanding
NC	compressor speed
NEPA	National Environment Policy Act
NEXRAD	next-generation radar
NLR	noise level reduction
NM	New Mexico
NSA	nonstandard aircraft
NVG	night vision goggles
NZ	noise zone
OEA	Office of Economic Adjustment
OSD	Office of the Secretary of Defense
PA	public affairs
PDR	Purchase of Development Rights
PUD	planned unit development
Q	torque
RA	restricted area
RAICUZ	Range Air Installations Compatible Use Zones
RCCDC	Roosevelt County Community Development Corporation
RETA	Renewable Energy Transmission Authority
RF	radio frequency
RGMP	Regional Growth Management Plan
SAF/IEI	Secretary of the Air Force/Installations, Environment and Logistics
SECAF	Secretary of the Air Force
SLCUM	Standard Land Use Coding Manual
SM	square meters
SOF	special operations forces
SOW	Special Operations Wing
SUA	special use airspace
TBD	to be determined
TDR	Transfer of Development Rights
UAS	unmanned aerial systems
UFC	Unified Facilities Criteria
VFR	visual flight rules

Glossary

Flight

Two or more Airmen can form a flight. Two or more sections can also form a flight. It depends on how the squadron is organized. There are three types of flights: Numbered, Alpha, and Functional.

Numbered flights incorporate small mission elements into an organized unit. For example, flights in basic training are numbered flights. While in basic, you could be assigned to "Flight 421," for instance.

Alpha flights are components of a squadron and consist of elements with identical missions. Flights A, B, and C, of a Security Forces Squadron would be an example, or A, B, and C of an F-16 Fighter Squadron.

Functional flights consist of elements with specific missions. The "Military Personnel Flight (MPF)" and the "Social Actions Flight" are two examples of functional flights.

Group

Two or more Squadrons form a Group. In the Air Force, Groups are usually based upon assignment of squadrons with similar functions. For example, the Supply Squadron, Transportation, and Aircraft Maintenance Squadron would be assigned to the Logistics Group. The flying squadrons would be assigned to the Operations Group. The Dental Squadron and the Medical Squadron would be assigned to the Medical Group, etc. Usually, Groups take on the number of the Wing they are assigned to. The 49th Logistics Group, for example is assigned to the 49th Fighter Wing, at Holloman AFB in New Mexico. The group commander is usually a colonel (O-6).

Squadron

Two or more flights form a squadron. The squadron is the lowest level of command with a headquarters element (example, a Squadron Commander, or Squadron First Sergeant). In the Air Force, a squadron commander is generally in the rank of Lieutenant Colonel (O-5), although smaller squadrons may be commanded by majors, captains, and sometimes even lieutenants. Squadrons are usually identified both numerically and by function. An example would be the 49th Security Forces Squadron or the 501st Maintenance Squadron.

Wing

Two or more groups make up a Wing. There is only one wing on an Air Force base, and the wing commander is often considered to be the "Installation Commander." There are two types of wings: composite and objective. Composite Wings operate more than one kind of aircraft. Individual composite wings can have different missions.

This page intentionally left blank.

Executive Summary

ES.1 What is a Joint Land Use Study?

A Joint Land Use Study (JLUS) is a collaborative planning effort among active military installations, surrounding communities, and other affected agencies. The JLUS process is funded by a grant from the Department of Defense (DoD) Office of Economic Adjustment (OEA).

These studies have been highly successful. The JLUS effort can directly benefit both the jurisdiction and the installation by:

- Protecting the health and safety of residents living or working near military installations
- Preserving long-term land use compatibility between the installation and the surrounding community
- Promoting comprehensive community planning
- Encouraging a cooperative spirit between the local base command and local community officials
- Integrating the local jurisdiction's comprehensive plans with the installation's plans

ES.2 The JLUS Program and Cannon Air Force Base

Curry County is home to Cannon Air Force Base (AFB), and Roosevelt County is home to Melrose Air Force Range (AFR). The 27th Special Operations Wing (SOW) has a significant social and economic impact on Curry and Roosevelt counties. To ensure the operational effectiveness of the base and training range, the Cannon JLUS project will help mitigate land use incompatibility between the military, Curry and Roosevelt counties, local land owners, and governmental agencies. Additionally, land use strategies between the military and local communities will foster better planning and consistent land use development within New Mexico. Currently, there are few land use conflicts between the military and surrounding communities. This study will help put the proper procedures in place so future conflicts might be avoided. The best time to avoid these future problems is now. Planning efforts can provide significant benefits for future operations. The key phrase that emerged during the JLUS process was "Talk Early, Talk Often." One of the major benefits of this process is continuing this attitude into the future for installation leaders and community participants.

ES.3 Goals and Objectives

The overall goal of this JLUS is to reduce potential conflicts while accommodating growth, sustaining the economic health of the region, protecting public health and safety, and protecting private property rights. A JLUS has three primary objectives.

1. Understanding. Convene community, agency, and Cannon AFB representatives to study the issues in an open forum, taking into consideration community and military viewpoints and needs. This includes public outreach and input.
2. Collaboration. Encourage cooperative land use and resource planning between Cannon AFB, Melrose AFR, and surrounding communities so that future community growth and development is compatible with the training and operational missions of the region while seeking ways to reduce impacts on adjacent lands.
3. Actions. Provide a set of tools, activities, and procedures that local jurisdictions, agencies, and Cannon AFB can use to implement the recommendations developed during the JLUS process. The proposed actions include operational measures to mitigate Cannon AFB and Melrose AFR impacts, as well as local government and agency approaches to reduce impacts on Cannon AFB and Melrose AFR.

ES.4 The Cannon AFB and Melrose AFR JLUS Goals and Objectives

The goal of the Cannon AFB and Melrose AFR JLUS is to safeguard the military mission while fostering compatible and sustainable economic development and protecting private property rights and civilian growth in the study area.

This study's objectives, which support the scope of work, are:

1. Provide opportunities for meaningful input by the public.
2. Identify areas where land use conflicts exist.
3. Identify strategies to reduce encroachment and promote land use compatibility.
4. Provide examples of land use regulations or ordinances to the local government.
5. Create a final action plan and narrative report with recommendations and strategies.

ES.5 Study Area Overview

Cannon AFB is located in eastern New Mexico about 7 miles west of Clovis. Melrose AFR is about 25 miles west of Cannon AFB, primarily in Roosevelt County with a small portion in Curry County. Melrose AFR occupies 66,010 acres, and Cannon AFB occupies 3,789 acres.

The study area covers approximately 2,293 square miles, or 1,468,000 acres. This area was created by the study's technical and policy committees, and includes a 10-mile buffer around Melrose AFR and next-generation radar

Figure ES.1 | State Map

(NEXRAD) tower, and a 5-mile buffer around the Federal Aviation Administration (FAA) airspace at Melrose AFR and the holding pattern area to the south of Melrose AFR. The study area also includes buffers around Portales and Clovis and the imaginary surfaces at Cannon AFB. These areas were assessed to be affected by military operations the most.

The 5- and 10-mile buffers were developed through consultation with 27 SOW flying squadrons. During this consultation, operational considerations were given to ingress and egress for helicopter landing zones (HLZs) and airstrip landing zone operations, low-level mission requirements, and approach vectors for incoming Air Force Special Operations Command (AFSOC) and non-AFSOC aircraft. The impact in this area will adversely affect training mission requirements beyond mitigation capacity. See Figure ES.2, JLUS Study Area, for more details.

ES.6 Cannon AFB and Melrose AFR National and Local Importance

The largest factor for continuing what has been an outstanding relationship between the local community and the base is the mutual benefit. Cannon AFB was the largest employer within the microplex area in 2007, and it should remain the largest employer in the study area when buildout plans are taken into account.

About 20 percent of the Clovis area's economy is tied to Cannon AFB. About 10 percent of Portales' economy is attached to the base, and 500 to 800 Portales residents are associated with the base. Several thousand skilled spouses will enter the Portales and Clovis area in the next few years that will add quality to the region.

According to the Cannon AFB Economic Impact Statement, 2010, Cannon AFB has a total impact of $478,443,599 from employee payroll, other expenditures, and estimated local job creation. In addition to the monetary impact, Cannon AFB members volunteer thousands of hours each year to organizations in the surrounding communities.

Melrose AFR is utilized by Cannon AFB, but it also plays an important role for the New Mexico Air National Guard at Kirtland AFB and other U.S. and allied aircrew. According to a news article from the Air Force Times, "the new [27 SOW] mission put Cannon in the vanguard of the war on terrorism." In that article, AFSOC Lt. Gen. Michael Wooley said that Melrose AFR was key for special operations training. Having a range within a 5 minute flight of the base maximizes training time by reducing travel.

ES.7 Other Local Industry Importance

Portales and Roosevelt County are in the fortunate position of having balanced and stable economies with low unemployment rates. Employment in the market area is dominated by higher education and government, agricultural and dairy production, value-added food processing, and professional and support services. According to the Roosevelt County Community Development Corporation (RCCDC), about 25 percent of the Portales economy is directly dependent on employment and attendance at Eastern New Mexico University. Approximately 20 percent of the economy is dependent on agriculture and value-added food processing.

Curry County has experienced growth in the dairy industry, spurred by the Southwest Cheese Plant. There are more than 60 dairies in the region, and a large portion of their output provides milk to the cheese manufacturing facility, according to Curry County's comprehensive plan.

The dairy industry in New Mexico has brought significant economic benefits to the state. The average New Mexico dairy produces 44 million pounds of milk per year, worth an estimated $5.8 million, according to New Mexico State University.

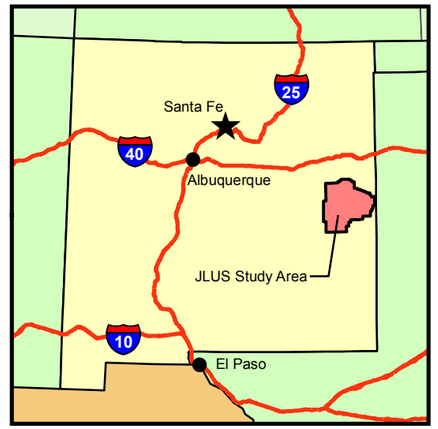
Approximately 75 percent of the milk in New Mexico is produced on the eastern side of the state (Curry, Roosevelt, Chaves, Eddy, and Lea counties). The direct economic impact (sale of milk) to the state is $1.2 billion, and the total economic impact (milk and all other related indirect, induced, and value-added business) is $2.7 billion annually (2006 numbers from New Mexico State University Dairy Facts).

In farm commodities cash receipts, Curry County is ranked number one and Roosevelt is ranked number four in the state of New Mexico. Curry and Roosevelt Counties have about $793 million in cash receipts for all farm commodities.

Nonfarm employment in the microplex is dominated by retail jobs, which account for approximately 24 percent of business establishments and 26 percent of employment. Health care and related businesses account for 11 percent of business establishments and 25 percent of jobs (Curry County Plan).

This page intentionally left blank.

Grady
Quay County
Curry County
Quay County
Debaca County
Roosevelt County
Melrose
Clovis
Texico
Curry County
Roosevelt County
Floyd
Portales
Roosevelt Road 10
Debaca County
Roosevelt County
Chaves County
Elida
268
209
224
311
77
60
84
60
523
277
467
267
70
236
202
88
206
330
CANNON AIR FORCE BASE



Location Map

- Town
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Texas

N

0 3.5 7 14 21 mi

Figure ES.2

JLUS Study Area

ES.8 Partnerships

This document is the result of a dedicated and collaborative planning effort by Air Force leaders, stakeholders, residents, and local officials. A policy committee and technical committee were formed to make recommendations and provide support to staff in making knowledgeable decisions. Officials from the city of Clovis, city of Portales, Roosevelt County, Curry County, Air Force leaders and personnel, local farmers and ranchers, and local business owners make up the policy committee. The technical committee comprises officials from the surrounding communities, Air Force leaders and personnel, and local citizens who have lived and worked in the area for years.

ES.9 JLUS Summary

ES.9.1 Introduction

The Cannon AFB JLUS is organized into seven parts.

Table ES.1 | JLUS Organization

Part	Description
1	Introduction – Background information and stakeholders involved in the JLUS process
2	Study Background – JLUS purpose, goals, objectives, and state and federal initiatives
3	Cannon AFB JLUS Organization – Goals and objectives, study area boundaries, and summary of the public participation plan
4	Technical Information – History, units, operation impacts, flight information, and land capability guidelines
5	Existing Conditions and Analysis – Existing conditions and regulations within the study area
6	Recommendations – A compilation of the realistic and executable actions created by the technical and policy committees that support the goals and objectives of the Cannon AFB JLUS
7	Appendices – Background and supplemental materials and examples

ES.9.2 Study Background

The JLUS is a basic, proactive planning process that is designed to identify encroachment issues facing both the civilian community affected by military operations and the military installations themselves, and to recommend strategies and actions to address the issues in the form of locally based initiatives.

In developing a JLUS, a good understanding of the installations, military training area, and local jurisdictions in the study area is necessary. This JLUS provides an overview of incompatibilities in terms of land use and growth trends for the two counties and includes recommended policies and actions that Cannon AFB and surrounding local governments should consider adopting as useful tools to manage the growth of their communities and Cannon AFB in a sound and sustainable manner, ensuring viability for all.

ES.9.3 Existing Plans and Analysis

The goal of the Cannon AFB and Melrose AFR JLUS is to safeguard the military mission while fostering compatible and sustainable economic development and civilian growth within the study area. As part of this process, a public participation plan was created to make residents of both Curry and Roosevelt counties aware of the issues and progress associated with the Cannon AFB and Melrose AFR JLUS, as well as to offer citizens opportunities to actively participate in the development of the plan.

This report provides an overview of available and relevant plans, programs, and studies, which are used to address compatibility issues in the study area. This includes technical studies as well as local comprehensive plans and zoning ordinances. Cannon AFB and Melrose AFR have little encroachment compared with similar bases. Encroachment can be defined as incompatible civilian development, which is land use and civilian development activities that adversely affect the utility or training and readiness missions of a military installation (DoD Instruction 3030.3, Joint Land Use Study Program). It is also defined as external influences threatening or constraining range and operating area activities required for force readiness and weapons research development testing and evaluation. Encroachment issues can include, but are not limited to, endangered species and critical habitat, unexploded ordnance and munitions, electronic frequency spectrum, maritime, airspace restrictions, air quality, airborne noise, and urban growth (DoD Directive 3200.15, Sustainment of Ranges and Operating Areas). There are few mechanisms in place that will help maintain the situation at Cannon AFB and Melrose

AFR, and those that are in place are not currently watched or enforced.

A major goal of this study is to prevent more encroachment, which could potentially force the installations to close if the situation becomes unsafe for Air Force operations. The recommendations in this study provide mechanisms and an implementation schedule that would help reduce encroachment that could be detrimental to installation operations and civilian safety while still protecting private property rights.

Table ES.2 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Acquisitions	1	Identify Mission-Critical Private Land Parcels	Explore strategies and potential funding sources to identify properties where purchase, renovation, or relocation assistance from Cannon AFB or local government would encourage the replacement of incompatible uses with uses compatible to the operations and impacts of Cannon AFB and Melrose AFR.	x		
	2	Consider Further Research and Creating Purchase of Development Rights (PDR) Program	PDR is a voluntary program in which a land trust or other agency, usually linked to local government, makes an offer to a landowner to buy the development rights on the parcel. Once an agreement is made, the property is placed under a permanent deed restriction, which restricts the type of activities that may take place on the land in perpetuity.	x		
	3	Consider Creating Transfer of Development Rights (TDR) Program	TDR programs allow landowners to sell development rights from their properties in government-designated low-density (sending) areas, and sell them to purchasers who want to increase the density of development in (receiving) areas that local governments have selected as higher density areas.		x	
ALUP	4	Consider Creating an Airport Land Use Plan (ALUP) to Reflect Military Air Facilities and Airspace	This sets policies for promoting compatibility between airports and the uses of the land that surround them. (See 39)		x	
Communications/Coordination	6	Consider Establishing a JLUS Implementation Committee	Continued communication beyond this study between Cannon AFB officials and local boards, agencies, and authorities will help maintain the viability of Cannon AFB. A joint effort by Cannon AFB officials, the public, local governments, local boards and agencies, and any other group could be made to ensure that the recommendations in this study are implemented.	x		
	7	Refer Development and Permit Applications to the Military Installations (Cannon AFB and Melrose AFR) for Review and Comment within the Study Area	Consider including Cannon AFB representatives in the technical review of those developments within the JLUS study area that would affect the installation. By including Cannon AFB in the initial review of projects, problems are eliminated early on. Each local jurisdiction should work with Cannon AFB officials to determine which type and location of development applications are most important to review and comment on.	x		

Table ES.2 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe: 0-2 Years	Timeframe: 3-5 Years	Timeframe: Ongoing
Communications/Coordination	8	Coordinate on Various Issues for Policy/ Implementation Changes	The military, local entities, state agencies, and energy providers should meet as needed to address changing alternative energy, communication, and to make recommendations for policy and implementation changes to address these items.	x		
	9	Develop an Outreach Program	Create and distribute educational information for the public and to inform residents, planning staff, and local officials within the area of the importance of Cannon AFB and any planning issues that may arise.	x		
	10	Provide Installation Information to Jurisdictions	Communicate new missions and construction plans to local government staff at the earliest opportunity in order to provide sufficient time for local governments to address and mitigate any impacts on the community.	x		
	11	Coordinate for Military Vehicle Routes	If this is a possible issue for the community on military vehicle routes, it should be looked at with the recommendations to resolve these issues.	x		
	12	Consider Establishing Procedures to Avoid Frequency Conflicts/ Issues	Consider establishing procedures for identifying types of proposed projects that involve frequency emissions (including WiFi) within the study area. The local jurisdiction, potentially affected stakeholders, and the Frequency Management Office of the installation should be contacted for project review to avoid potential frequency conflicts.	x		
	13	Encourage Cellular Tower Collocation/ Consolidation	Consider encouraging the collocation of cellular towers within the study area. This reduces the number of towers in one area if different cellular providers can collate on one tower.	x		
	14	Consider Adopting the Noise Contours once the Air Installation Compatible Use Zone (AICUZ) is Updated for 27 SOW	Updated noise contours should be adopted by the local jurisdictions affected.		x	
	15	Work to Evaluate Use of Existing Transmission Corridors	Work with a Renewable Energy Transmission Authority (RETA) and utility providers to evaluate the opportunity to use existing transmission corridors prior to developing new corridors and, where required, to develop new proposed transmission corridors that do not interfere with military operations.	x		
	16	Feed the Force, Fuel the Force	Feed the Force and Fuel the Force initiatives are aimed at satisfying base needs through sustainable regional business and local produce. A creation of a regional planning partnership among government, military, developers, agricultural, and environmental agencies that would hold regular forums and look for regional growth solutions would need to be created.			x
Disclosures	17	Consider Developing/ Updating an Avigation Easement Program	Consider the development of an avigation easement program, which includes sample easement language, designates areas where avigation easements should be required, and determines the appropriate agency to hold such easements.		x	

Table ES.2 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Master Plans	18	Ensure Water Impacts in Plan Development/ Updates	Ensure comprehensive plan updates and other relevant plans consider impacts to water availability and quality through policy or other development regulations. Water availability can impact both the ability for the local community and the military to continue to develop. Conservation and additional resources are just as important as considering the impacts of any new development both on the installation and in the community.			x
	19	Involve Military in Comprehensive Plan Update Process	As local jurisdictions update their comprehensive plans, they should consider involving Cannon AFB officials in the process to ensure continued compatibility with military operations.		x	
	20	Investigate Infill	Investigate the possibility for infill development during the comprehensive plan amendment process, avoiding growth in areas where incompatibility exists.	x		
	21	Include Military Housing Needs Discussions in Comprehensive Plan Housing Section	During the next housing update, include a separate discussion of military housing needs and the programs to address these needs. Work collaboratively with military installations and local entities to address their needs to look at military readiness.	x		
Legislative	22	Protecting Military Missions with Legislation	Consider supporting the codification of New Mexico Executive Order (EO) 2004-046 into state law. The purpose of EO 2004-046 is to ensure compatible land use development near New Mexico's military installations. Codifying the EO into law could give directive to the state, county, municipal, and local agencies through the state to consider land use planning decisions around military installations.			x
Light	23	Determine Dark-Sky Funding Source	Consider initiating a light and glare working group to evaluate appropriate lighting standards within applicable development codes to protect military operations from the impacts of light and glare. For portions of the study area identified by the military as critical to dark-sky initiatives, evaluate funding sources available to help with lighting retrofit programs.		x	
MOU	24	Coordinate Memorandum of Understanding (MOU)	An MOU is a contract among two or more government entities. The governing bodies of the participating public agencies must take appropriate legal actions – often adopting an ordinance or a resolution – before such agreements become effective.	x		
Military Ops Area	25	Develop Area of Interest Designations for Operations Area	Develop an "area of interest" designation for particular operation areas. That designation would be considered for use in comprehensive plans, as well as other planning documents (ALUP or Zoning Ordinance), to identify areas of military operations that need a site-specific review for compatibility. This process is being done with the approval of the JLUS.			x

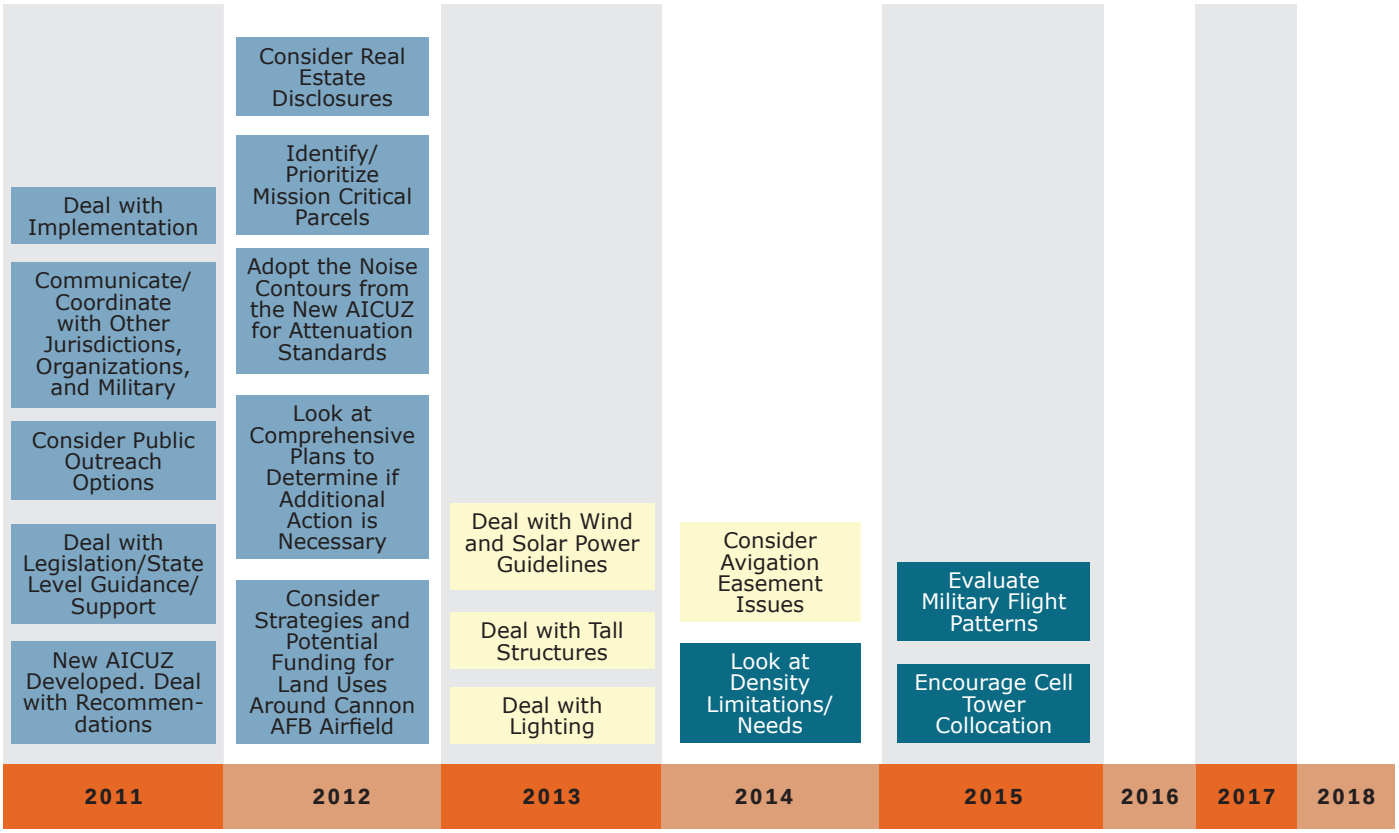
Table ES.2 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Military Instruction Area	26	Evaluate Military Flight Patterns	Cannon AFB/Melrose AFR can evaluate the feasibility of rerouting military flight operations (if there are areas with problems) while still meeting mission requirements.	x		
Real Estate	27	Consider Modifying Disclosure Notices for Military Operations	Disclosures ensure that sellers, buyers, and agents involved in real estate transactions are protected from potential liability for not informing the other parties of circumstances that may not be evident by viewing a property. The New Mexico boards have standardized agreements with diclosures sections included in Appendix A. Work with local real estate and military representatives to develop and implement language to include in disclosure notices pertaining to noise and safety considerations associated with military missions.	x		
Land Regulations	28	Consider Using Subdivision Regulations to Minimize impacts	Encourage subdivision regulations to allow for clustering of units to minimize areas affected by military operations. Encourage subdivision regulation to add certain plat notes to protect the buyer and the military.		x	
	29	Determine Density Limitations Needs	Examine the need for density limitations within flight corridors in consultation with the military.	x		
	30	Ensure Compliance with FAA Part 77	If height restrictions are to be utilized, local jurisdiction should ensure that new regulations comply with FAA Part 77.		x	
	31	Consider Developing and Adopting a Tall-Structure Ordinance Including Height Review Categories and Letter of Clearance Requirements	Consider developing a tower and tall-structure ordinance regulating the location and lighting of tall structures via height review categories as determined by the jurisdictions with input from the military. All local governments within the JLUS study area should contact Cannon AFB and receive a "letter of clearance" before any structure in excess the height review category is reviewed and acted on by the local governments. The letter of clearance recommendations could include: 1) No Objection, 2) Conditional Determination, 3) Objectionable.		x	
	32	Consider Developing Wind Power Guidelines	Local jurisdictions working with the wind energy industry and the military could consider development of guidelines on the development of wind turbines and wind farms.		x	
	33	Consider Developing Solar Power Guidelines	Local jurisdictions working with the solar energy industry and the military could consider the development of guidelines on the development of solar generating facilities.		x	

Table ES.2 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe: 0-2 Years	Timeframe: 3-5 Years	Timeframe: Ongoing
Land Regulations	34	Consider Developing and Adopt a Lighting Ordinance Minimizing Impacts on Cannon AFB Operations	Consider developing a lighting ordinance that addresses lighting requirements of towers/tall structures and other structures or places (i.e. ball fields, billboards, subdivisions, street lights, commercial, or industrial operations) where they would affect the base's night vision flight operations. Any areas or structures that are not properly lit can pose serious risks in harming military operations. Exterior lighting and light pollution can often interfere with night vision training. Lighting requirements can include both directional lighting design and safety lighting of towers/tall structures.		x	
	35	Consider Developing and Adopting Noise Attenuation Standards within the Defined Noise Contour Zones	Noise attenuation construction standards would require a certain decibel reduction inside the home within specific noise zones. For example, location in a day-night average sound level (DNL) 75 and above would require a 35 dB reduction. Location standards would include permitting manufactured homes only in certain noise zones, but not in others and would limit noise sensitive uses to the outer edges of certain noise zones and not allow them at all in other noise zones.		x	
	36	Amend and Update Local Comprehensive Plans and Land Development Codes and Maps	Plans should be amended as necessary to include the noise contour zones, height obstruction zones, Cannon AFB activity zones, or other applicable new zoning and character areas.		x	
	37	Research Further Development Tools for Possible Development Control, Such as TDR Policies	Local governments undertake TDR programs to use the market to implement and pay for development density and location decisions. TDR programs allow landowners to sell development rights from their properties in government-designated low-density "sending" areas, and sell them to purchasers who want to increase the density of development higher density "receiving" areas. TDR programs do not reduce the need for zoning and can actually be more complex to administer. They therefore need to be researched carefully prior to implementing.		x	
	38	Consider Establishing and Adopting One or More Special Airfield Zoning Districts or Zoning Overlay Districts (Based on the Noise Contour Zones and Height Obstruction Zones)	This increases compatibility of proposed development with Cannon AFB operations and phases out incompatible development and uses. Such zoning districts may regulate the population density by specifying minimum acres per lot, maximum concentration of people in one location for events or at employment sites, setbacks, prohibited and permitted uses, nonconforming uses, permits and variances, etc.		x	

FIGURE ES.3 | IMPLEMENTATION SCHEDULE



Represents initiatives that should begin within the general timeline as shown.

Represents initiatives that could be started within the first two years if staff time allows.

Represents ongoing initiatives that can be started at any time but should be implemented in the next five to seven years.

Introduction

Figure 1.1 | CV-22 at Cannon AFB

Figure 1.2 | Training Operations at Melrose AFR

Cannon Air Force Base (AFB) is in eastern New Mexico approximately 7 miles west of Clovis. It is home to the 27th Special Operations Wing (27 SOW). 27 SOW consists of four groups. Its primary mission is to plan and execute specialized and contingency operations using advanced aircraft, tactics, and air refueling techniques to infiltrate, exfiltrate, and resupply special operations forces (SOF) worldwide and to provide intelligence, surveillance, and reconnaissance and close air support for SOF operations. Due to the diversity of special operations, Cannon AFB has a variety of aircraft, including the MC-130W Combat Spear, AC-130H Spectre, CV-22 Osprey, and several versions of light and medium transport aircraft.

Melrose Air Force Range (AFR), approximately 25 miles west of Cannon AFB, is associated with 27 SOW training. The 66,010-acre bombing range run by Cannon AFB is used for air-to-ground, small arms, and electronic combat training. It is the only completely Air Force-controlled bombing range in the U.S. Airspace restrictions at Melrose AFR are unique, allowing 27 SOW to conduct multilevel training simulations in which aircraft fly at multiple altitudes within the same airspace.

Cannon AFB and Melrose AFR play an important role in the economies of Curry and Roosevelt counties. The purpose of this Joint Land Use Study (JLUS) is to ensure that Cannon AFB and Melrose AFR remain valuable assets to the area.

Cannon AFB and Melrose AFR are located in predominantly rural areas. The region surrounding Cannon AFB is expected to continue to experience population growth. An effort should be made to ensure that growth near the installation is managed in a compatible manner. Cannon AFB has various operations and training requirements that must be met. If the installation is unable to meet these requirements safely, the mission and/or installation could be at risk of relocation. For Cannon AFB and Melrose AFR to remain vital members of the local community and major contributors to the local economy, concessions must made on both sides to ensure compatible development around the installations and airspace.

Development around the airfield/bombing range can create issues in three main areas: safety, height hazards, and noise.

- Safety: Areas just beyond the runways are considered accident potential zones (APZs) I and II. These areas have a higher probability of accidents than other areas and should be developed with land use compatibility in mind to ensure safety for the community and pilots.
- Height Hazards: These can contribute to the loss of navigable airspace and can inhibit safe and efficient aircraft operation, particularly in airfield approach or departure areas. Tall structures within

the JLUS area can potentially affect Cannon AFB. Wind towers can reduce navigable airspace.

- Noise: Noise occurs at both the airfield and bombing range and can be undesirable for the local community. Methods and tools can be implemented to reduce the effects of undesirable noise.

Tools and techniques to help address these concerns are explained in Section 6, Study Recommendations.

One of the key outcomes of this JLUS is to instill the philosophy of "Talk Early, Talk Often" so that both sides can work together to find solutions that work for everyone. Along with the military, renewable energy is becoming a bigger part of the local economy and should be considered in land use planning. The "Talk Early, Talk Often" concept supports open lines of communication, which will help ensure that all industries can continue to grow and thrive without taking away private property rights of individuals in the area.

Curry County initiated this study with the help of Roosevelt County, the city of Clovis, and the city of Portales. Curry County applied for funding from the Office of Economic Adjustment (OEA), which was awarded in 2009. On 9 January 2009, representatives from OEA met with Curry County to introduce the purpose of a JLUS and to propose the county be the lead sponsor of the report. On 31 August 2009, Roosevelt County notified Curry County that it would share in the 10 percent case match required for the JLUS grant.

1.1 Acknowledgements

This JLUS is a result of dedicated and collaborative planning efforts by Air Force leaders, stakeholders, residents, and local officials. The study's content reflects participating stakeholders' views. Partners in the JLUS include: Curry County, Roosevelt County, city of Clovis, city of Portales, village of Melrose, village of Floyd, and Cannon AFB.

This document serves as a guide to local governments and the Air Force on how to enhance compatibility around Cannon AFB and Melrose AFR while strengthening the relationship between the military and the surrounding community.

1.2 Policy Committee

The policy committee was responsible for the overall direction of the JLUS, preparation and approval of the study design, approval of draft and final written reports, approval of policy recommendations, and monitoring implementation of the adopted policies. Members were:

- Sid Strebeck – Chair
- Hoyt Pattison – Vice Chair
- Caleb Chandler, Curry County Commissioner
- Wendell Bostwick, Curry County Commissioner
- Col. Stephen A. Clark, Cannon AFB
- Col. Steven Kimball, Cannon AFB
- Gayla Brumfield, Mayor, City of Clovis
- Randy Crowder
- Lee Malloy
- Kendell Buzard
- David Sander
- Sharon L. King, Mayor, City of Portales
- Darren Hooker, Roosevelt County Sheriff
- Danny Woodward, Business Owner

1.3 Technical Committee

The technical committee included representatives from city and county management and planning staffs, Cannon AFB planners, and the community. The committee is responsible for identifying and studying technical issues related to developing recommendations to the policy committee. Members were:

- Lance A. Pyle – Chair
- Lonnie Leslie – Vice Chair
- Darrell Bostwick
- Joe Thomas (or designee)
- Col. Clark (or designee)
- Col. Kimball (or designee)
- David Kube
- Paul Stout
- Charlene Hardin

Committee members were selected by the County Manager's Office, based on involvement in the Regional Growth Management Plan, encompassing a wide range of stakeholders. These members were approved by the Curry

County Board of County Commissioners. Most committee members represented not only their organization but also citizens.

Technical committee meetings were not open to the public, and technical experts were brought in when necessary to help provide more detailed information to the committee members. Policy committee meetings were open to the public as they reviewed the recommendations from the technical committee. This format created the potential for more productive meetings. The technical committee focused on existing conditions analysis and technical recommendations, while the policy committee focused on those recommendations and public input.

This page intentionally left blank.

Study Background

Airfields, both military and civilian, tend to attract economic development. As cities grow outward toward airfields, flight operations can be hindered. Cannon Air Force Base (AFB) is located some distance from the surrounding communities; however, it cannot escape the effects of land development. Cannon AFB was built in a relatively undeveloped area in Curry County, but development has increased around the northeast part of the base, near the departure end of Runway 04. There is also more development approaching the base along U.S. Highway 60.

The Department of Defense (DoD) has two major programs designed to reduce conflicts between military and civilian land uses. In 1973, the Air Installation Compatible Use Zone (AICUZ) program was established. This program provides information about installations' activities and encourages local communities to adopt land use patterns that are compatible with base operations and particularly with the operations noise footprint.

In 1985, the DoD initiated the Joint Land Use Study (JLUS) program to help better understand and incorporate the AICUZ program. The JLUS program has since evolved to address any issue or condition that could affect the military mission.

A JLUS is requested when there is concern with existing, planned, or potential encroachment on a military mission. If supported by the installation's major command, Office of Economic Adjustment (OEA) completes a review of the concerns and determines whether a local government will accept responsibility for the project. For this JLUS, Curry County accepted responsibility with the help of Roosevelt County, the cities of Clovis and Portales, and the villages of Melrose and Floyd.

The JLUS is designed to identify encroachment issues facing both the civilian community and the military installations, and to recommend strategies and plans to address the issues in the form of local comprehensive and general planning programs. The strategies and plans are created and accepted by the technical and policy committees.

The JLUS process encourages cooperative land use planning among residents, local decision-makers, and military representatives. It also encourages all parties to study compatibility issues in an open setting to offer a balance of both military and civilian interests.

The JLUS program is not intended to prohibit growth; rather, it is intended to foster smart growth, sustainable for both the surrounding communities and the military installations. This type of growth will help protect one of the microplex's most important economic influences. The JLUS is an advisory document only that will identify practices and tools to ensure compatible and successful growth around Cannon AFB and Melrose Air Force Range (AFR). It will be up to the communities and Cannon AFB to implement the recommendations through the appropriate mechanisms.

The Cannon AFB and Melrose AFR JLUS study area faces increasing encroachment. Growth in this area includes both residential and commercial growth as well as additional tall structures. Due to the flying missions at Cannon AFB and Melrose AFR, tall structures in training routes and flight paths can create as many problems as residential development around the installation and runways.

The base has been an integral part of the community for many years, and the importance of working with the community to sustain operations and prevent operational impact cannot be overstated. The various missions supported by Cannon AFB and Melrose AFR require an abundance of training capabilities and airspace. The proximity of such training assets to Cannon AFB is not matched by many military installations.

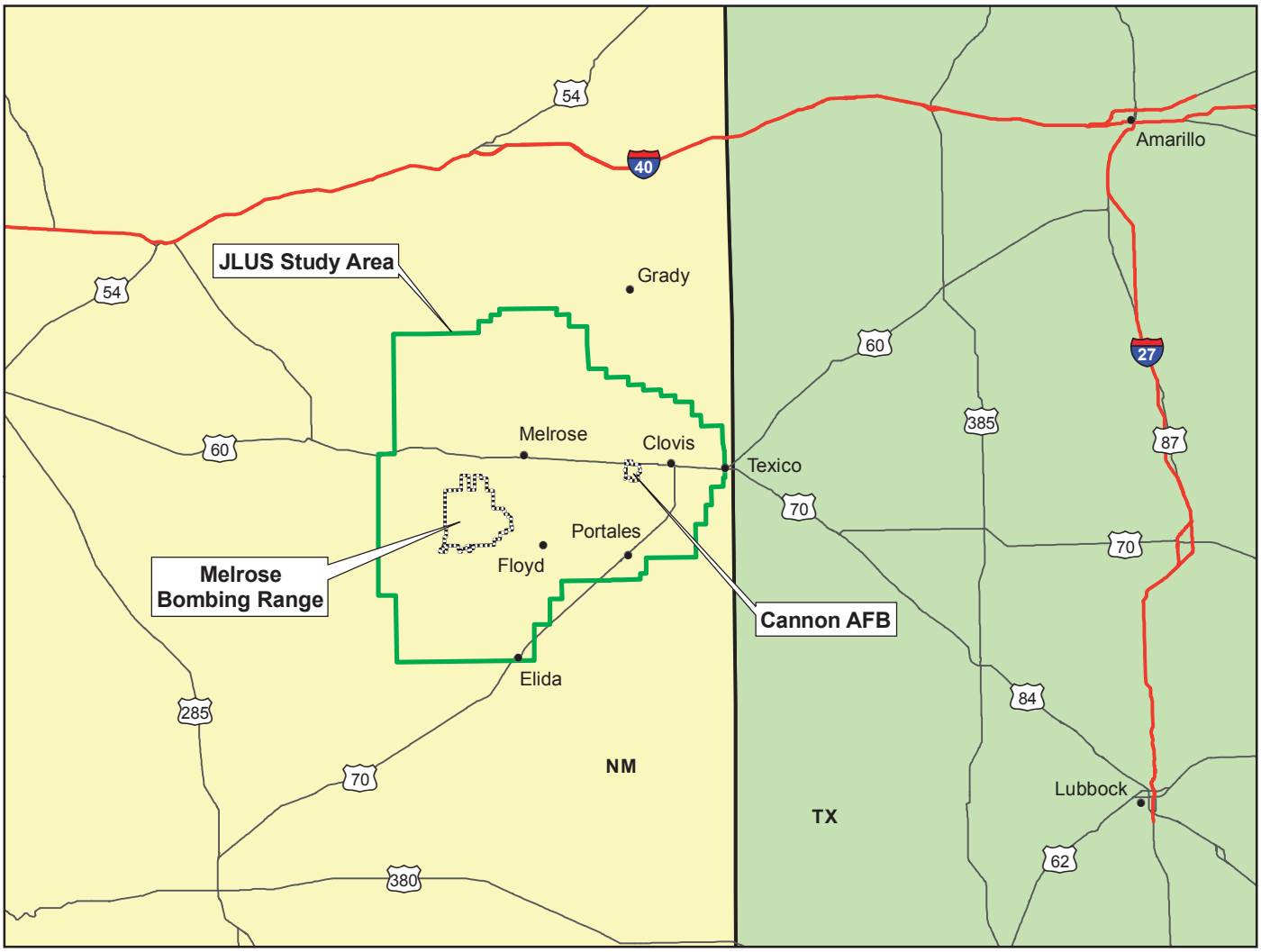


FIGURE 2.1 | VICINITY MAP

2.1 JLUS PURPOSE, GOALS, AND OBJECTIVES

The overall goal of this JLUS is to reduce potential conflicts while accommodating growth, sustaining the economic health of the region, protecting public health and safety, and protecting private property rights. The JLUS has three primary objectives.

1. Understanding: Convene community, agency, and Cannon AFB representatives to study the issues in an open forum, taking into consideration community and military viewpoints and needs. This includes public outreach and input.
2. Collaboration: Encourage cooperative land use and resource planning between Cannon AFB and surrounding communities so that future community growth and development are compatible with the training and operational missions of the region while seeking ways to reduce impacts on adjacent lands.
3. Actions: Provide a set of tools, activities, and procedures that local jurisdictions, agencies, and Cannon AFB can use to implement the recommendations developed during the JLUS process. The proposed actions include operational measures to mitigate Cannon AFB impacts, as well as local government and agency approaches to reduce impacts on Cannon AFB and Melrose AFR.

2.2 Overview of Previous Compatible Actions and Ongoing Initiatives

2.2.1 Federal

National Environmental Policy Act, 1969

The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decisions making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

Federal Aviation Administration Regulations, Part 77

This Federal Aviation Administration (FAA) regulation, which focuses on obstructions to navigation, establishes standards and notification requirements for objects affecting navigable airspace. See Section 5.4.3 within this study for more information.

2.2.2 State

New Mexico Executive Order No. 2004-046

"…direct all appropriate and relevant state agencies, which are involved with land-use planning to ensure compatible development with New Mexico's military installations. Further, I recommend that all political subdivisions and municipalities that adopt land-use plans and enforce zoning regulations ensure that planned development is compatible with military installations, and they consider the impact of new growth on 'Military Value' when preparing zoning ordinances or designating land uses for land adjacent to military facilities or other parcels of land which are in proximity to military installations."

The executive order (EO) was signed by Governor Bill Richardson to help protect the military installations in New Mexico. "Military Value" refers to the criteria that the military will be evaluated against and includes "the availability and condition of land, facilities, and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas)."

Unified Facilities Criteria 3-260-01, Airfield and Heliport Planning, November 2007

Unified Facilities Criteria (UFC) provides planning, design, construction, sustainment, restoration, and modernization criteria. This manual recognizes that planning aviation facilities requires planning for more than aspects such as runways and taxiways, and that environmental factors, land use considerations, airspace constrains, and surrounding infrastructure must be considered.

2.2.3 Operational Impact Reduction

Air Force Handbook 32-7084, 1 March 1999, AICUZ Program Manager's Guide

This handbook gives Major Command (MAJCOM) and base-level commanders and managers an overview of the Air Force's AICUZ Program. It provides specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ program.

Clovis-Portales Microplex Regional Growth Management Plan

This plan is focused on identifying how to handle future development mainly caused by the transition and growth of Cannon AFB. It is a proactive attempt to address the economic, social, and physical attributes that challenge the cities and counties within the microplex and to prevent them from becoming a problem. The JLUS is part of the recommendations resulting from this plan.

AICUZ, 2005

The purpose of the AICUZ program is to promote compatible development in areas subject to aircraft noise and accident potential. The AICUZ study has land use guidelines that reflect recommendations for clear zones (CZs), accident potential zones (APZs) I and II, and the three noise zones. The 2005 report has four local community recommendations as listed in Section 4.3.2, AICUZ. No official action was taken on the 2005 recommendations; however, a new AICUZ is scheduled to start in 2011. Prior to the 2005 AICUZ, development rights were purchased in the CZ and APZ; however, there is currently no government enforcement.

Environmental Impact Statement Air Force Special Operations Command Assets Beddown, January 2008

The Environmental Impact Statement (EIS) analyzed environmental impacts at Cannon AFB associated with the beddown of the Air Force Special Operations Command (AFSOC) assets, which includes substantial changes in the noise environment at the base and Melrose AFR. The findings of this report concluded that overall noise-incompatible land uses near Cannon AFB are minimal and would decrease under the proposed action.

This page intentionally left blank.

Cannon AFB JLUS Organization

Curry County is home to Cannon Air Force Base (AFB), and Melrose Air Force Range (AFR) is located in parts of Roosevelt County and Curry County. The 27th Special Operations Wing (SOW) has significant social and economic impacts on Curry and Roosevelt counties. To ensure the operational effectiveness of the Air Force base and training range, this Joint Land Use Study (JLUS) project is intended to help mitigate land use incompatibility between the military, Curry and Roosevelt counties, local land owners ,and governmental agencies. Additionally, land use strategies between the military and local communities will foster better planning and consistent land use development in New Mexico.

3.1 Cannon AFB JLUS Goals and Objectives

The goal of this JLUS is to safeguard the military mission while fostering compatible and sustainable economic development and protecting private property rights and civilian growth in the study area.

The study objectives, which support the scope of work, are:

1. Provide opportunities for meaningful input by the public.
2. Identify areas where land use conflicts exist.
3. Identify strategies to reduce encroachment and promote land use compatibility.
4. Provide examples to the local government of land use regulations or ordinances.
5. Create a final action plan and narrative report with recommendations and strategies.

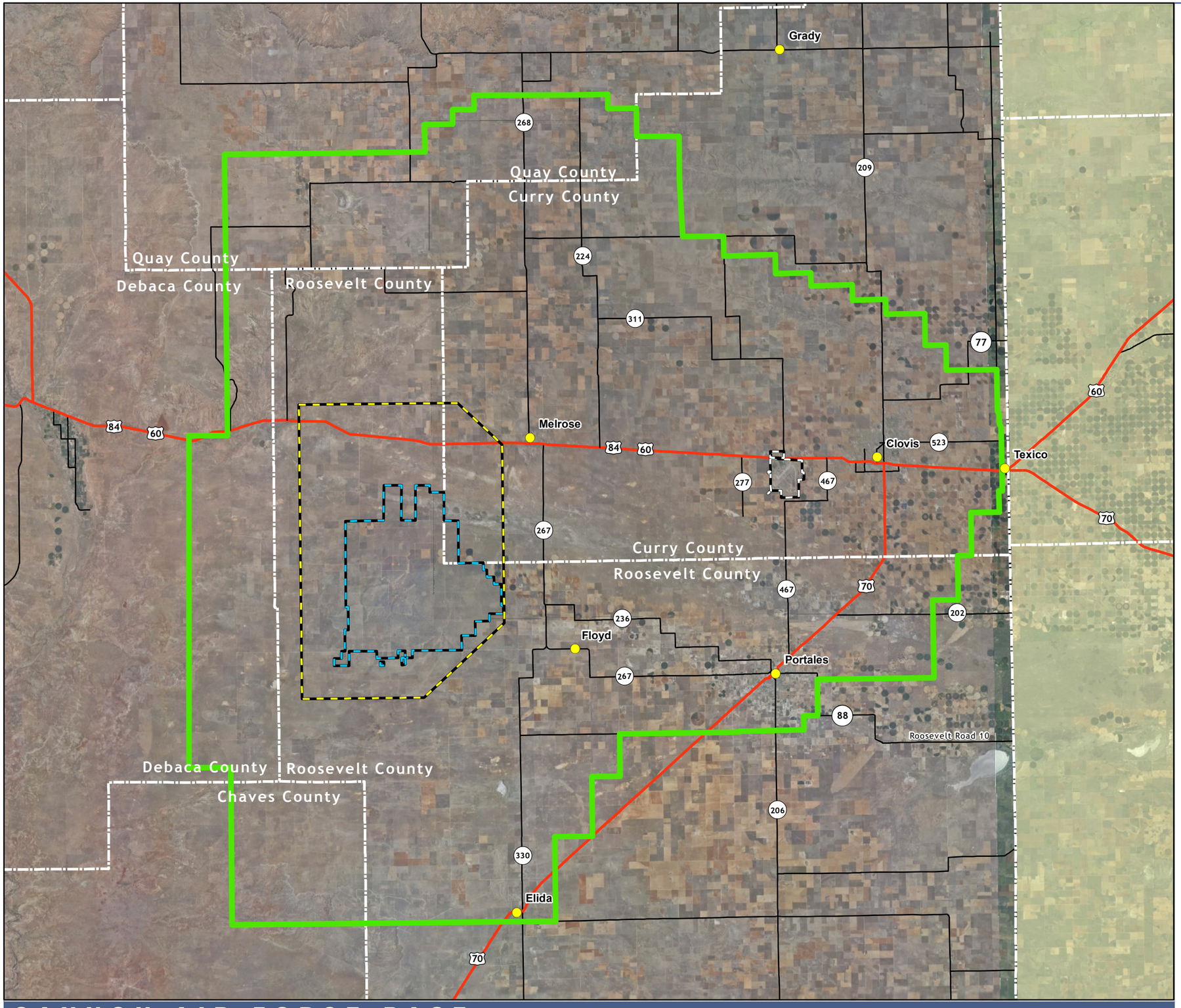
3.2 Planning Area

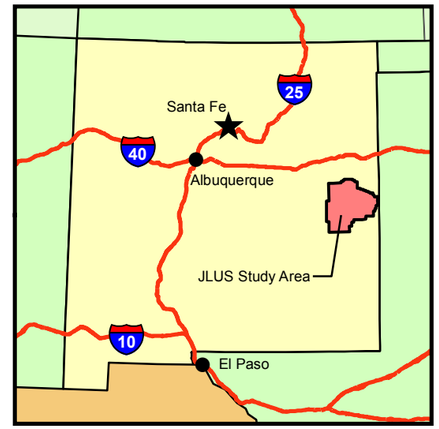
Cannon AFB is located in eastern New Mexico about 7 miles west of Clovis. Melrose AFR, approximately 25 miles west of Cannon AFB, is located primarily in Roosevelt County with a portion in Curry County. Melrose AFR occupies 66,010 acres, and Cannon AFB occupies 3,789 acres.

The study area, as shown in Figure 3.1, JLUS Study Area, covers approximately 2,293 square miles, or 1,468,000 acres. It reaches into parts of Quay County, De Baca County, and Chaves County, along with Roosevelt and Curry counties. This area was created by the technical and policy committees to include a 10-mile buffer around Melrose AFR and next-generation tower (NEXRAD) tower, and a 5-mile buffer around the Federal Aviation Administration (FAA) airspace at Melrose AFR and the holding pattern area south of Melrose AFR. The study area also encompasses buffers around Portales and Clovis and the imaginary surfaces at Cannon AFB. These areas were assessed to be the most affected and critical to military operations.

The 5- and 10-mile buffers were developed through consultation with 27 SOW flying squadrons. During this consultation, operational considerations were given to ingress and egress for helicopter landing zones (HLZ) and airstrip landing zone operations, low-level mission requirements, and approach vectors for incoming Air Force Special Operations Command (AFSOC) and non-AFSOC aircraft. Impact in this area will adversely affect training mission requirements beyond mitigation capacity.

This page intentionally left blank.





Location Map

Town

JLUS Study Area

Cannon AFB

Restricted Airspace-Surface to 23,000 MSL

Melrose AF Range Owned/Leased Land

Texas

N

0 3.5 7 14 21 mi

Figure 3.1

JLUS Study Area

3.3 Stakeholders

This document is the result of a dedicated and collaborative planning effort by Air Force leaders, stakeholders, residents, and local officials. A policy committee and a technical committee were formed to make recommendations and to provide support to staff in making knowledgeable decisions. The policy committee comprises officials from the cities of Clovis and Portales, Roosevelt and Curry counties, Air Force leaders and personnel, local farmers and ranchers, and local business owners. The technical committee includes officials from the surrounding communities, Air Force leaders and personnel, and residents who have lived and worked in the area for years.

Committee members were selected by the county manager's office, based on involvement in the Regional Growth Management Plan, encompassing a wide range of stakeholders. These members were approved by the Curry County Board of County Commissioners. Most committee members represented not only their organization but also local residents.

3.4 Summary of Public Participation

A public participation plan was created to help guide the public participation associated with the Cannon AFB and Melrose AFR JLUS. The community was offered opportunities to actively participate in the JLUS plan development. Education and public outreach are an essential part of fulfilling the counties' desire to inform the public about the JLUS planning process. As part of this, the public was ensured open discussion of relevant issues during the public meetings.

Public participation from residents, staff, and Cannon AFB personnel is a major part of this JLUS. Local government staffs, elected officials, and military personnel were on committees to help write this plan. Concerned residents were encouraged to provide input and feedback on the effects of Cannon AFB and Melrose AFR at public meetings, directly to policy committee members, or through written comments. Public meetings were held throughout the planning process, as were Board of County Commissioner meetings. Policy committee meetings were open to the public to help keep the community updated on discussions associated with the plan. Public meetings were held at multiple locations, and an informational brochure was handed out at the first one. A website was created to inform the public and gather input. This website was advertised in local newspapers to encourage public participation.

Table 3.1 | Public Meeting

Event	Date
JLUS kickoff, Curry County Board of County Commissioners, Clovis, NM	March 16, 2010
JLUS community kickoff meeting, Public Open House, Portales, NM	April 8, 2010
Policy committee meeting, Clovis, NM	April 19, 2010
Policy committee meeting, Portales, NM	May 17, 2010
Curry County Board of County Commissioners meeting, Grady, NM	May 18, 2010
Policy committee meeting, Clovis, NM	June 21, 2010
Policy committee meeting, Portales City Hall, NM	August 23, 2010
JLUS public open house, Senior Center, Melrose, NM	August 31, 2010
Policy committee meeting, Clovis, NM	September 8, 2010
Curry County Board of County Commissioners meeting, Clovis,NM	September 8, 2010
Roosevelt County Board of County Commissioners meeting, Portales, NM	September 27,2010
Joint committee meeting, Clovis, NM	September 27, 2010
JLUS public meeting, Clovis, NM	September 27, 2010
Policy committee meeting, Clovis, NM	December 20, 2010
Board of County Commissioners meeting, Clovis, NM	December 21, 2010
Policy committee meeting, Clovis, NM	March 2, 2011
Curry County Board of County Commissioners meeting, Grady, NM	March 15, 2011

3.4.1 Survey

A survey was used to gather information to help analyze the area and the relevant issues within the community. This survey was distributed at the public meetings and was also available through the website. The full survey results can be

found in Appendix E, Survey Results, and a summary of the results can be found in Section 5.9, Survey Results of Perceived Issues and Opportunities.

3.4.2 Website

HDR developed a JLUS website, www.cannonafbjlus.org. The site is updated regularly. Visitors can access and complete the survey, view membership of the technical and policy committees, review policy committee meeting minutes, and view maps of the study area. The website also offers a way for the public to contact staff to share comments or ask questions. The website was advertised at public meetings and in local newspapers.

3.4.3 Local Newspapers and Media

Public hearing dates and meetings were advertised in local newspapers, including the Clovis News Journal and the Portales News-Tribune. These newspapers also published several articles on topics related to the JLUS.

Technical Information

4.1 Military History and Mission

4.1.1 History

In the mid-1920s, Portair Field, a civilian passenger terminal for transcontinental flights, was established on the site now occupied by Cannon Air Force Base (AFB). In the 1930s, Portair Field was renamed Clovis Municipal Airport.

After the United States entered World War II, Clovis Municipal Airport was converted by the Army Air Corps to Clovis Army Air Base. The 302nd Bombardment Group arrived in 1943, and the base was renamed Clovis Army Airfield. Flying, bombing, and gunnery classes continued through the end of the war; however, the airfield was placed on reduced operation status by 1946 and was inactive by May 1947.

In 1951, the base was reactivated as Clovis AFB. The bases became a major training installation for "Sabre" pilots. In 1957 the base was renamed Cannon AFB in honor of the late Gen. John K. Cannon, former commander of the Tactical Air Command.

In 1956 the first F-100 Super Sabre arrived at Cannon AFB and would become the principal base aircraft for the next 12 years. The introduction of the F-111 airframe in 1969 began an almost 30-year relationship with Cannon AFB.

In 1995, the F-16 Fighting Falcons were assigned to Cannon AFB and stayed nearly a decade. As part of the 2005 Base Realignment and Closure (BRAC) process, Cannon AFB was recommended for closure if a new mission could not be identified. In 2007, the 27th Fighter Wing became the 27th Special Operations Wing (SOW), and Cannon AFB formally become an Air Force Special Operations Command (AFSOC) installation.

4.1.2 Mission

The 27 SOW at Cannon AFB is one of two Air Force active duty SOWs and falls under AFSOC.

The primary mission of the 27th SOW is to plan and execute specialized and contingency operations using advanced aircraft, tactics, and air refueling techniques to infiltrate, exfiltrate, and resupply special operations forces (SOF) and to provide intelligence, surveillance, reconnaissance, and close air support in support of SOF operations. The wing's core missions include aerospace-surface interface, agile combat support, information operations, recovery operations, precision aerospace fires, psychological operations dissemination, specialized aerospace mobility, and specialized aerial refueling.

4.1.3 Units

Cannon AFB employs more than 3,300 military and 600 civilian personnel. The wing is divided as follows.

27th Special Operations Wing

- 27th Special Operations Comptroller Squadron

27th Special Operations Group

- 3rd Special Operations Squadron, MQ-1 Unmanned Aerial Vehicle
- 73rd Special Operations Squadron, MC-130W Combat Spear
- 318th Special Operations Squadron, PC-12 and M-28
- 16th Special Operations Squadron, AC-130
- 20th Special Operations Squadron, CV-22 Osprey
- 33rd Special Operations Squadron, MQ-9 Unmanned Aerial Vehicle
- 524th Special Operations Squadron, Q-200
- Detachment 1, 27th Special Operations Group, MC-130J

Cannon AFB Tenant Units

- 551st Special Operations Training Squadron
- 56th Intelligence Squadron
- Detachment 1, 25th Intelligence Squadron

27th Special Operations Maintenance Group

- 27th Special Operations Maintenance Operations Squadron
- 27th Special Operations Aircraft Maintenance Squadron
- 27th Special Operations Component Maintenance Squadron
- 27th Special Operations Equipment Maintenance Squadron

27th Special Operations Mission Support Group

- 27th Special Operations Civil Engineering Squadron
- 27th Special Operations Communications Squadron
- 27th Special Operations Logistics Readiness Squadron
- 27th Special Operations Force Support Squadron
- 27th Special Operations Security Forces Squadron
- 27th Special Operations Contracting Squadron

27th Special Operations Medical Group

- 27th Special Operations Aerospace Medicine Squadron
- 27th Special Operations Dental Squadron
- 27th Special Operations Medical Operations Squadron
- 27th Special Operations Medical Support Squadron

4.2 Operational Impacts (Technical Data)

Cannon AFB and Melrose Air Force Range (AFR) have different types of missions and activities that create many types of operational impacts. Those can include noise, smoke, vibration, dust, and more. Protecting the safety of the people around the installations and ensuring mission success is the main goal of Cannon AFB and Melrose AFR. These installations have always strived to be good neighbors to people in the surrounding communities. Noise is a key concern associated with some operations and missions. The 27 SOW brings to Cannon AFB and Melrose AFR a different mission than the 27th Fighter Wing. According to the 2008 Environmental Impact Statement (EIS) for AFSOC Beddown, noise around Cannon AFB will decrease; however, due to different training types, noise associated with training around the range will increase.

The AFSOC aircraft is substantially quieter than the F-16 airframe previously based at Cannon AFB. The increase in range noise is the result of an increased percentage of flights occurring during later hours and lower altitudes than the F-16 training. In the R-5104 training area, the Day-Night Average Sound Level (DNL) is expected to increase from 48 to 56 DNL. In the R-5105 area, the expected increase is from 44 to 58 DNL. High-explosive ammunition used by AC-130 gunships will produce impulsive noise at Melrose AFR. High-explosive training did not occur on Melrose AFR prior to 27 SOW. Training areas are shown on Figure 4.3, Restricted Airspace.

4.3 Air Force Noise Tools

4.3.1 Ldn

To assist the surrounding communities in land use decisions, the Department of Defense (DoD) and Federal Aviation Administration(FAA) use decibel (dB) noise contours to illustrate the exposure to noise associated with aviation activities.

Ldn is a noise measure created by the DoD, used to describe average aircraft noise levels over a 24-hour period, typically an average day over the course of a year.

A-weighed Day-Night Average Sound Level (ADNL) is an abbreviation for the name of the measurement, and Ldn refers to the number and type of decibels measured. This measure penalizes aircraft operations that occur between the hours of 10 p.m. and 7 a.m. by 10 decibels to account for increased annoyance when ambient noise levels are lower and people are trying to sleep. Ldn may be determined for individual locations or expressed in noise contours. This is currently the accepted measure for aircraft noise analysis.

- Noise Zone III: This is an area around the source of noise in which the DNL is greater than 75 decibels, a-weighted (dBA). This zone is considered an area of severe noise exposure and is deemed unacceptable for noise-sensitive activities. For comparison, a noisy restaurant measures at 80 dBA, a night club with live music at 100 dBA, and a rock concert at 120 dBA.
- Noise Zone II: This area is considered to have significant noise exposure and is normally

unacceptable for noise-sensitive land uses. It consists of an area where the DNL is between 65 and 75 dBA. Other examples in this noise range include a vacuum cleaner from 3 meters or a gas lawn mower from 30 meters.

- Noise Zone I: This area, considered to have minimal noise exposure, includes areas in which the DNL is less than 65 dBA and is acceptable for all types of land uses. Examples of these levels range from an active office environment to a library, which is about 30 dBA.

4.3.2 AICUZ

The purpose of the Air Installation Compatible Use Zone (AICUZ) Program is to protect health, safety, and welfare from noise and hazards through compatible development. The program was instituted by DoD to address land development surrounding military air installations. The AICUZ identifies appropriate land uses for accident potential zones (APZs). For public safety purposes, this table should be included for adoption in Airfield Zoning Districts or overlays. The AICUZ is produced by the military, and recommendations are made by the military to local governments. Recommendations are generally related to areas significantly influenced by the operations of the airfield. Cannon AFB has a long history of working with local residents. The following recommendations came from the 2005 AICUZ report:

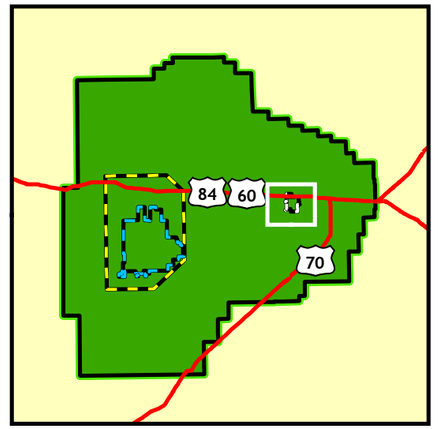
- Incorporate AICUZ policies and guidelines into the future planning of Clovis and Curry County. Use overlay maps of the AICUZ noise contours and Air Force Land Use Compatibility Guidelines to evaluate existing and future land use proposals.
- Adopt zoning ordinances and building codes to support compatible land uses outlined in this study.
- Continue to enforce height and obstruction ordinances that reflect current Air Force and Federal Aviation Administration (FAA) Part 77 requirements.
- Continue to inform Cannon AFB of planning and zoning actions that may potentially affect base operations. Develop a working group representing city planners, county planners, and base planners to meet every other year to discuss AICUZ concerns and major development proposals that could affect airfield operations.

None of the 2005 AICUZ recommendations have been officially adopted by the surrounding community; however, an updated AICUZ is proposed to start in 2011. As discussed in Section 4.4.3, Military CZs and APZs, development rights have been purchased between 1994 and 2003 in approximately 3,120 acres, which includes the clear zones (CZs) and APZs. Due to the general lack of knowledge and understanding of the easements purchased, there is no oversight on the enforcement of those easements. These easements, if fully understood and enforced, would accomplish most of the objectives of recommendations 1 and 2.

Figure 4.1, Cannon Noise Contours, and Figure 4.2, Melrose Noise Contours, illustrate Cannon AFB and Melrose AFR noise contours and imaginary surfaces.

This page intentionally left blank.

CANNON AIR FORCE BASE



Location Map

State Road

U.S. Highway

Noise Contour Line

Cannon AFB Boundary

Runway

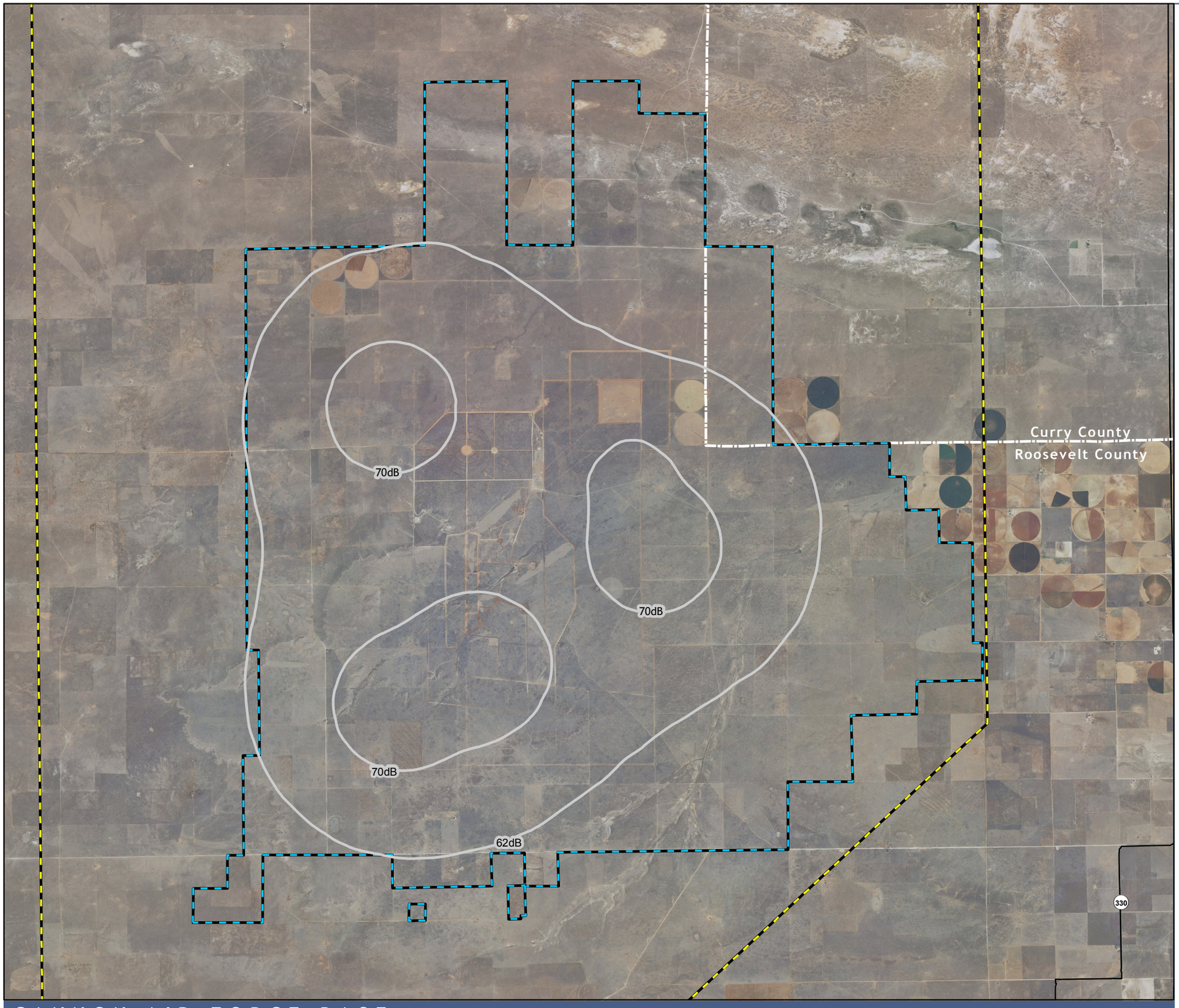
Clear Zone/Accident Potential Zone

N

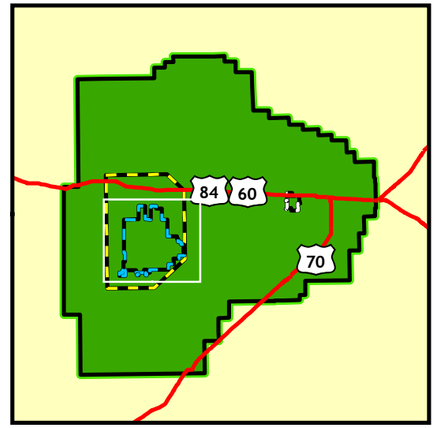
0 0.375 0.75 1.5 2.25 mi

Figure 4.1

Cannon Noise Contours



CANNON AIR FORCE BASE



Location Map

State Road

Noise Contour Line

Restricted Airspace-Surface to 23,000 MSL

Melrose AF Range Owned/Leased Land

N

0 0.75 1.5 3 4.5 mi

Figure 4.2

Melrose Noise Contours

4.4 Airspace Information

4.4.1 Military Operations Area

A military operations area (MOA) is airspace designated for nonhazardous military activity within the U.S. territorial airspace. Activities conducted in MOAs include, but are not limited to, aerobatics, air-combat tactics, formation training, and simulated air-to-ground deliveries. The DoD, in concert with the FAA, established these special use airspaces (SUAs) to separate military aircraft operations from other incompatible aviation activities.

Cannon AFB has four MOAs: Mount Dora, Pecos, Taiban, and Bronco. Table G.1, Flight Profiles and Altitude Distribution for Military Operations Areas, shows altitude distributions for aircraft operating in the MOAs in Appendix G, Flight Profiles and Altitude Distribution Tables. Figure 4.3, Restricted Airspace, illustrates the MOAs and restricted areas (RAs).

4.4.2 Restricted Area and Training Routes

Designated areas established by appropriate authorities where aircraft flight, while not wholly prohibited, is subject to restriction. RAs are designated rulemaking airspace, where restrictions are placed on all nonparticipating aircraft. This airspace is used for military activities that are hazardous to nonparticipating aircraft, and it must lie within the territorial airspace of the U.S. The term "hazardous" implies, but is not limited to, live fire or weapons release, or aircraft testing.

Cannon AFB includes three RAs: R-5104A, R-5104B, and R-5105. Table G.2, Flight Profiles and Altitude Distribution for Restricted Areas, shows altitude distributions for aircraft operating in the RAs in Appendix G. Generally, RAs are located within FAA-restricted airspace. These areas affect nonmilitary flights, such as crop dusting; however, coordination with the FAA and installation can resolve any issues.

Figure 4.3, Restricted Airspace, illustrates the MOAs and RAs. Figure 4.4, JLUS Airspace Flight Areas, shows the Military Flight Corridor and Airspace around Melrose AFR.

There are seven training routes used by Cannon AFB. Table G.3, Flight Profiles and Altitude Distribution Tables for Military Training Routes, shows altitude distributions for aircraft operating in the training routes.

4.4.3 Military Clear Zones and Accident Potential Zones

CZs and APZs are established near military airfields based on the military aircraft history of the area and a determination of where an accident is likely to take place and how large the impact may be from any single accident.

- The CZ is located at the end of the runway and extends outward 3,000 feet with 1,500 feet on either side of the runway centerline. This area's accident potential is so high that no structures are compatible.
- APZ I accident risk is lower than the CZ, although the accident potential is still significant. Located just beyond the CZ, the APZ I extends an additional 5,000 feet beyond the end of the CZ and is 3,000 feet wide on either side of the runway centerline.
- APZ II accident risk is much less than APZ I and the CZ. The zone extends 7,000 feet beyond APZ I but still faces some risk.

Recommended guidelines for compatible development within these zones can be found in Section 4.5, Compatibility Guidelines. An example of CZs and APZs is shown in Figure 4.4, JLUS Airspace Flight Areas.

Starting in 1994, CZ and APZ I and II development rights on approximately 3,120 acres were purchased by Curry County. Easements were written to include only those uses determined to be compatible with Air Force operations. Samples of the APZ I and II easements are included in Appendix C, which lists acceptable uses within each zone. Height is also restricted within easements purchased by the county. The height restriction in both zones is an inclined plane beginning at a height of 50 feet and extending outward and upward from the beginning of APZ I. For every 50 feet along the APZ, the obstruction height allowance increases 1 foot.

These easements were bought and put in place; however, there is little knowledge or government enforcement of the easements. The county has no code enforcement and does not review individual site plans, and officials believer the easements were turned over to the Air Force for enforcement. The state building department does not require county approval prior to building permits; therefore, applicants are relied on to include easements on site plans and self-regulate the requirements of the easement.

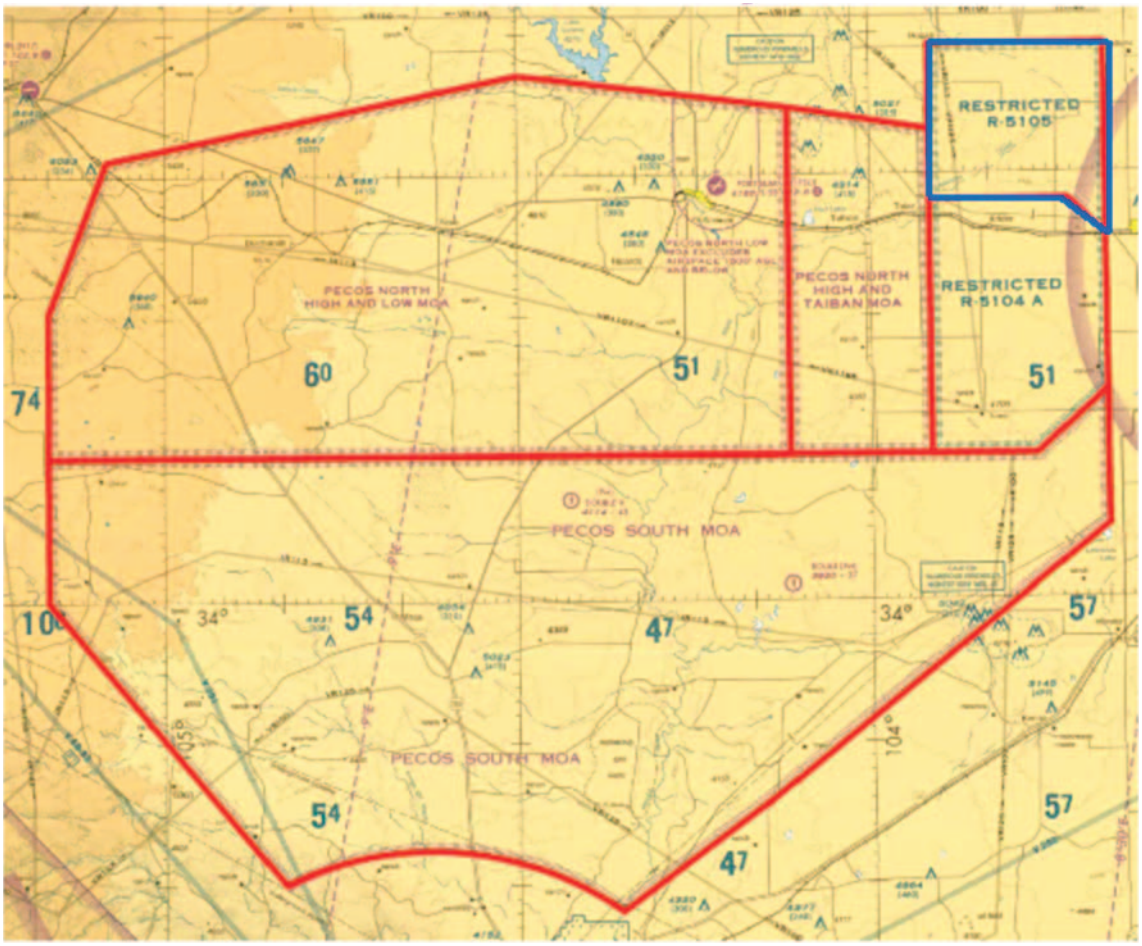
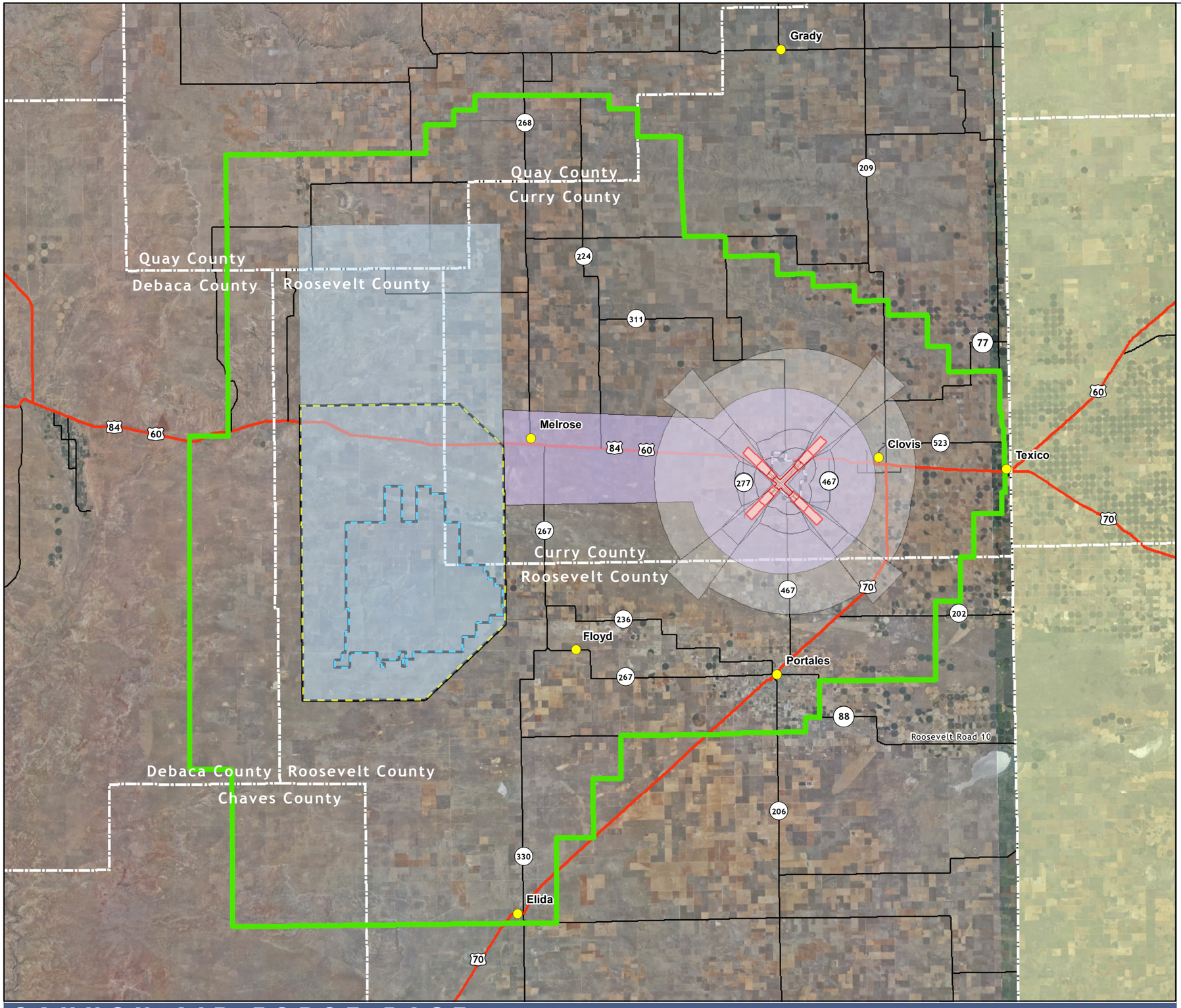
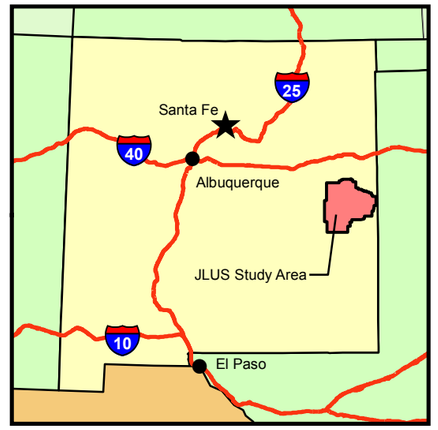


FIGURE 4.3 | RESTRICTED AIRSPACE



CANNON AIR FORCE BASE



Location Map

- Town
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Airfield Imaginary Surface
- Runway
- Clear Zone/Accident Potential Zone
- Military Flight Corridor
- Military/FAA Restricted Airspace
- Texas

N

0 3.5 7 14 21 mi

Figure 4.4

JLUS Airspace Flight Areas

4.4.4 Other Surfaces

The areas listed in this section are also considered part of the imaginary surfaces. These surfaces are defined by military airspace and planning criteria, and safety is a priority in establishing these guidelines.

- The Primary Surface is symmetrically centered on the runway, extending 200 feet beyond each runway end. The primary surface extends 2,000 feet on each side of the runway centerline.
- The Approach-Departure Clearance Surface is also symmetrically centered on the extended runway centerline, beginning at the end of the primary surface and extending horizontally for 50,000 feet. The slope surface is 50:1 (50 feet horizontal for every vertical foot) until it reaches an elevation of 500 feet above the established airfield elevation. It continues horizontally at this elevation to 50,000 feet from the starting point. The width at the end of the runway is 200 feet and flares uniformly to a width of 16,000 feet at 50,000-foot point, where it remains uniform for another 16,000 feet.
- The Inner Horizontal Surface is an oval plane at a height of 150 feet above the established airfield elevation. There are two segments within the horizontal surface (inner and outer). The inner boundary is formed by scribing arcs and intersects with the approach-departure clearance surface and the transitional surface. The outer boundary is formed by scribing arcs with a radius of 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
- The Conical Surface extends outward and upward at a slope of 20:1 from the outer edge of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the airfield's official elevation.
- The Outer Horizontal Surface (which is different from the outer boundary described in the Inner Horizontal Surface description) is located 500 feet above the airfield's official elevation and extends outward from the edge of the conical surface for a horizontal distance of 30,000 feet.
- Transitional Surface extends outward and upward at right angles to the runway centerline and along the extended runway centerline at a slope of 7:1. The transitional surface connects the primary and the approach-departure clearance surfaces to the inner horizontal, the conical, and the outer horizontal surfaces.

Clear zones and imaginary surfaces for Cannon AFB are shown in Figure 4.5, Runway Safety Clearances.

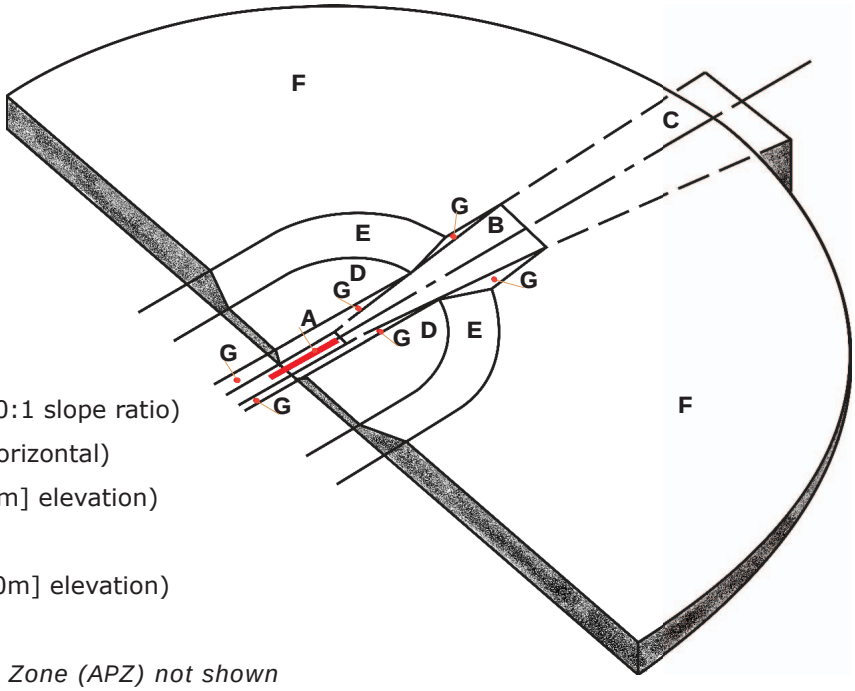


FIGURE 4.5 | RUNWAY SAFETY CLEARANCES

A Primary Surface

B Approach-Departure Clearance Surface (50:1 slope ratio)

C Approach-Departure Clearance Surface (horizontal)

D Inner Horizontal Surface (150 feet [45.72m] elevation)

E Conical Surface (20:1 slope ratio)

F Outer Horizontal Surface (500 feet [152.40m] elevation)

G Transitional Surface (7:1 slope ratio)

Note: Clear Zone Surface, Accident Potential Zone (APZ) not shown

4.5 Compatibility Guidelines

Encroachment occurs when adjacent military and civilian land uses generate one or both of the following effects.

- The neighboring communities' development interferes with the military's ability to perform its mission or causes modifications to the military's operating procedures.
- Neighboring communities and members of the public are exposed to operational impacts, such as noise or the risk of an aircraft accident or mishap, at a higher level than normal.

When compatible, different land uses can exist next to each other without causing interference between the military and its neighboring communities. Members of the community are not exposed to undue safety risks or nuisance. In this JLUS, aviation and range training activities raise compatibility issues when next to the following land uses:

- Noise-sensitive uses, such as housing, schools, medical facilities, or places of worship
- Uses that concentrate people, such as high residential densities, schools, shopping centers, and theaters
- Uses that can interfere with safe air navigation, such as tall structures, or activities that have excessive lighting, smoke, or dust that affect vision
- Uses that attract birds and wildlife that can interfere with safe aircraft operations

The JLUS draws its guidance from Air Force Handbook 32-7084, AICUZ Program Manager's Guide, to evaluate compatibility in designated noise and air safety zones. Table 4.1, Land Use Compatibility, shows compatible land uses in green, conditionally compatible land uses in yellow, and unacceptable land uses in red. The guidelines are advisory, and local governments have the authority to determine land uses around the installations.

Table 4.1 | Land Use Compatibility

Land Use	Accident Potential Zones			Noise Zones			
Name	Clear Zone	APZ I	APZ II	65-69 dBA	70-74 dBA	75-79 dBA	80+ dBA
Residential							
Household Units							
Single units	N	N	Y1	A11	B11	N	N
Single units	N	N	N	A11	B11	N	N
Single units	N	N	N	A11	B11	N	N
Two units	N	N	N	A11	B11	N	N
Two units	N	N	N	A11	B11	N	N
Other	N	N	N	A11	B11	N	N
Apartments	N	N	N	A11	B11	N	N
Apartments	N	N	N	A11	B11	N	N
Group quarters	N	N	N	A11	B11	N	N
Residential hotels	N	N	N	A11	B11	N	N
Mobile home parks or courts	N	N	N	N	N	N	N
Transient lodgings	N	N	N	A11	B11	C11	N
Other residential	N	N	N1	A11	B11	N	N
Manufacturing							
Food and like products; manufacturing	N	N2	Y	Y	Y12	Y13	Y14
Textile mill products; manufacturing	N	N2	Y	Y	Y12	Y13	Y14
Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N2	Y	Y12	Y13	Y14

Table 4.1 | Land Use Compatibility

Land Use	Accident Potential Zones			Noise Zones			
Name	Clear Zone	APZ I	APZ II	65-69 dBA	70-74 dBA	75-79 dBA	80+ dBA
Lumber and wood products (except furniture); manufacturing	N	Y2	Y	Y	Y12	Y13	Y14
Furniture and fixtures; manufacturing	N	Y2	Y	Y	Y12	Y13	Y14
Paper and allied products; manufacturing	N	Y2	Y	Y	Y12	Y13	Y14
Printing, publishing, and allied industries	N	Y2	Y	Y	Y12	Y13	Y14
Chemicals and allied products; manufacturing	N	N	N2	Y	Y12	Y13	Y14
Petroleum refining and related industries	N	N	N2	Y	Y12	Y13	Y14
Manufacturing							
Rubber and miscellaneous plastic products, manufacturing	N	N2	N2	Y	Y12	Y13	Y14
Stone, clay, and glass products; manufacturing	N	N2	Y	Y	Y12	Y13	Y14
Primary metal industries	N	N2	Y	Y	Y12	Y13	Y14
Fabricated metal products; manufacturing	N	N2	Y	Y	Y12	Y13	Y14
Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks; manufacturing	N	N	N2	Y	A	B	N
Miscellaneous manufacturing	N	Y2	Y2	Y	Y12	Y13	Y14
Transportation, communication and utilities							
Railroad, rapid rail transit, and street railroad transportation	N3	Y4	Y	Y	Y12	Y13	Y14
Motor vehicle transportation	N3	Y	Y	Y	Y12	Y13	Y14
Aircraft transportation	N3	Y4	Y	Y	Y12	Y13	Y14
Marine craft transportation	N3	Y4	Y	Y	Y12	Y13	Y14
Highway and street right-of-way	N3	Y	Y	Y	Y12	Y13	Y14
Automobile parking	N3	Y4	Y	Y	Y12	Y13	Y14
Communications	N3	Y4	Y	Y	A15	B15	N
Utilities	N3	Y4	Y	Y	Y	Y12	Y13
Other transportation communications and utilities	N3	Y4	Y	Y	A15	B15	N
Trade							
Wholesale trade	N	Y2	Y	Y	Y12	Y13	Y14
Retail trade – building materials, hardware and farm equipment	N	Y2	Y	Y	Y12	Y13	Y14
Retail trade – general merchandise	N	N2	Y2	Y	A	B	N
Retail trade – food	N	N2	Y2	Y	A	B	N
Retail trade – automotive, marine craft, aircraft and accessories	N	Y2	Y2	Y	A	B	N
Retail trade – apparel and accessories	N	N2	Y2	Y	A	B	N
Retail trade – furniture, home furnishings and equipment	N	N2	Y2	Y	A	B	N
Retail trade – eating and drinking establishments	N	N	N2	Y	A	B	N
Other retail trade	N	N2	Y2	Y	A	B	N

Table 4.1 | Land Use Compatibility

Land Use	Accident Potential Zones			Noise Zones			
Name	Clear Zone	APZ I	APZ II	65-69 dBA	70-74 dBA	75-79 dBA	80+ dBA
Services							
Finance, insurance, and real estate services	N	N	Y6	Y	A	B	N
Personal services	N	N	Y6	Y	A	B	N
Cemeteries	N	Y7	Y7	Y	Y12	Y13	Y14
Business services	N	Y8	Y8	Y	A	B	N
Repair services	N	Y2	Y	Y	Y12	Y13	Y14
Professional services	N	N	Y6	Y	A	B	N
Hospitals, nursing homes	N	N	N2	A*	B*	N	N
Other medical facilities	N	N	N2	Y	A	B	N
Contract construction services	N	Y6	Y	Y	A	B	N
Governmental services	N	N	Y6	Y*	A*	B*	N
Educational services	N	N	N2	A*	B*	N	N
Miscellaneous services	N	N2	Y2	Y	A	B	N
Cultural, entertainment, and recreational							
Cultural activities (including churches)	N	N	N2	A*	B*	N	N
Nature exhibits	N	Y2	Y	Y*	N	N	N
Public assembly	N	N	N	Y	N	N	N
Auditoriums, concert halls	N	N	N	A	B	N	N
Outdoor music shells, amphitheaters	N	N	N	N	N	N	N
Outdoor sports arenas, spectator sports	N	N	N	Y17	Y17	N	N
Amusements	N	N	Y8	Y	Y	N	N
Recreational activities (including golf courses, riding stables, water recreation)	N	Y8,9,10	Y	Y*	A*	B*	N
Resorts and group camps	N	N	N	Y*	Y*	N	N
Parks	N	Y8	Y8	Y*	Y*	N	N
Other cultural, entertainment, and recreation resources production and extraction	N	Y9	Y9	Y*	Y*	N	N
Agriculture (except livestock)	Y16	Y	Y	Y18	Y19	Y20	Y20,21
Livestock farming and animal breeding	N	Y	Y	Y18	Y19	Y20	Y20,21
Agricultural related activities	N	Y5	Y	Y18	Y19	N	N
Forestry activities and related services	N5	Y	Y	Y18	Y19	Y20	Y20,21
Fishing activities and related services	N5	Y5	Y	Y	Y	Y	Y
Mining activities and related services	N	Y5	Y	Y	Y	Y	Y
Other resources production and extraction	N	Y5	Y	Y	Y	Y	Y

Legend	
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.*
Yx	*Yes with restrictions – Land use and related structures generally compatible; see notes indicated by the numbers.*
Nx	*No with exceptions – See notes indicated by the numbers.*

Legend

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.*
A, B, or C	*Land use and related structures generally compatible; measures to achieve NLR for A (DNL/Community Noise Equivalent Level [CNEL] 65-69), B (DNL/CNEL 70-74), C (DNL/CNEL 75-79), need to be incorporated into the design and construction of structures.*
A, B*, or 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 one to two 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 deliberating by local authorities may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible use in any APZ (CZ, APZ I, or APZ II).*
3		*The placing of structures, buildings, or above-ground utility lines in the CZ is subject to severe restrictions. In a majority of the CZ, these items are prohibited. See Air Force Instruction (AFI) 32-7060 (formerly Air Force Regulation [AFR] 19-9) and Air Force Joint Manual (AFJAM) 32-8008 v1 (formerly Air Force Manual [AFM] 86-14) 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 are not recommended.*
11		*Residential Development*
	a	*Although local conditions may require residential use, it is discouraged in DNL/CNEL 65-69 dBA and strongly discouraged in DNL/CNEL 70-74 dBA. The absence of viable alternative development options should be determined and an evaluation indicating a demonstrated community need for residential use would not be met if development were prohibited in these zones should be conducted prior to approvals.*
	b	*Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor NLR for DNL/CNEL 65-69 dBA and DNL/CNEL 70-74 dBA should be incorporated into building codes and considered in individual approvals.*
	c	*NLR criteria will not eliminate outdoor noise problems. However, building location, 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 that only protect interior spaces.*
12		*Measures to achieve the same NLR as required for facilities in DNL/CNEL 65-69 dBA 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/CNEL 70-74 dBA 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/CNEL 75-79 dBA 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/CNEL 65-69 dBA range.*
19		*Residential buildings require the same NLR as required for facilities in DNL/CNEL 70-74 dBA 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.*

Appendix B, Guidelines for Considering Noise in Land Use Planning and Control (Federal Interagency Committee on Urban Noise [FICUN] 1980), contains guidelines for considering noise in land use planning, and Appendix C contains DoD compatible land use guidelines.

As shown in Figure 4.6, JLUS Land Use, the current land use for the surrounding area is currently very compatible with a few exceptions around Cannon AFB.

4.5.1 Air Space Intrusion

An air space intrusion is a physical intrusion into active air space, particularly for aircraft participating in low-altitude operations. Tall structures such as wind turbines and high-power electric power lines frequently penetrate active air space.

Communication towers frequently emit electromagnetic "noise" that may affect military avionics and radio frequency (RF)-dependant systems and communications.

4.5.2 RF Spectrum

Adequate RF spectrum is necessary to almost all aviation operations. Civilian radio devices (e.g. radios, radars, keyless entry devices) may transmit in military assigned frequencies, affecting electronic systems and communications equipment.

4.5.3 Exterior Lighting

Outdoor lighting, especially road lighting or exterior security lighting, often produce significant light in otherwise dark skies. The resulting light pollution can obscure pilot vision or interfere with the use of night vision training devices. Although New Mexico has a Night Sky Act, it does not apply to agricultural industries, which are prevalent around Cannon AFB and Melrose AFR.

Night vision flight training, when night vision goggles (NVG) or other types of night vision systems are used, is essential to the mission of the modern military. Night vision systems are designed to operate in rural or remote areas. Exposure to stray light can cause the vision screen to white-out, robbing the aviator or operator of vision. Excessive light pollution can render night vision training infeasible.

Excess light pollution can be an issue, although the sources of most light pollution in the area do not affect the training mission at this time. Major light producers are shown in Figure 4.7, JLUS Lighting. It is important to consider initiatives to help protect the area against future excessive light pollution; however, the current dairy lights and stadium lights do not affect training at Cannon AFB.

4.6 Building Permits

In unzoned counties or municipalities, the Construction Industries Division (CID) will review commercial and residential permits without input from the local jurisdictions. In municipalities and counties that have planning and zoning departments, those jurisdictions must sign off on site plans prior to CID review.

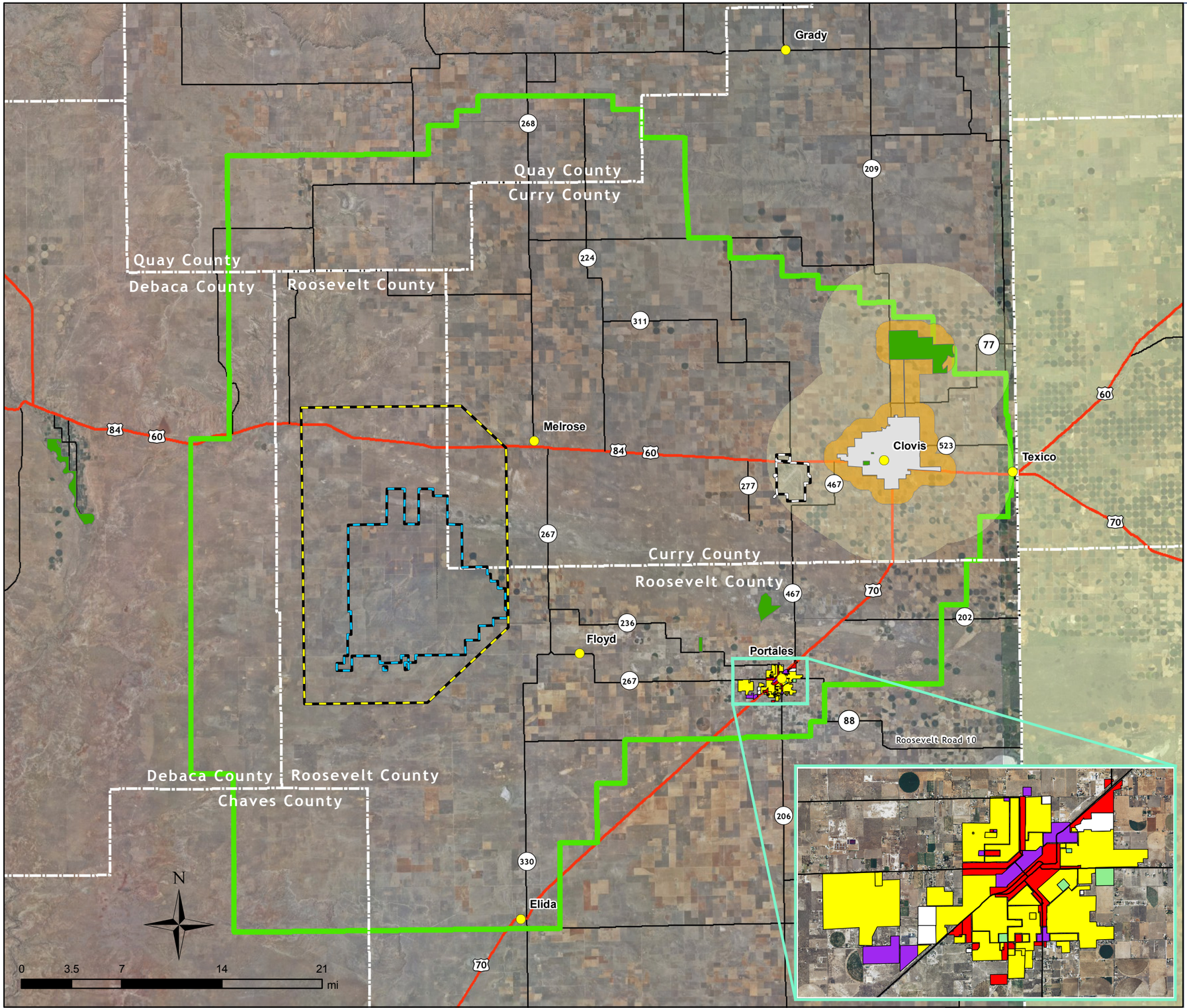
There are two ways to pull a permit for residential development: as a homeowner doing the work or by hiring a contractor. All associated forms can be found at www.rld.state.nm.us/cid . In both cases, unless the resident lives in Clovis or Portales, which have different requirements because of zoning, applicants do not have to go through the local jurisdiction prior to pulling a building permit. As part of a plan submission, the site plan must show the following:

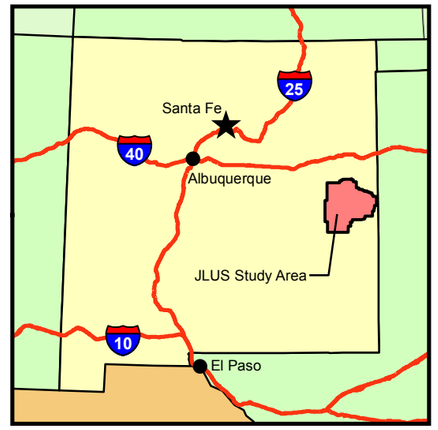
- New structures and any existing buildings or structures on site, including existing adjacent structures within 10 feet of any adjacent property lines
- North arrow
- Property lines with dimensions
- All streets, easements, and setbacks
- All water, sewer, electrical points of connection, proposed service routes, and existing utilities on the site
- General drainage and grading information

See Appendix A for building permit guide for residential construction.

The CID also has guidelines and procedures for small wind turbine systems permits (See Appendix A). A permit will not be processed without local planning and zoning approval, if applicable. In Roosevelt and Curry counties, there are no guidelines in place to require the review and approval of towers prior to CID reviewing of building permits.

According to CID representatives, this process can be modified if requested by the local jurisdiction so that notification and approval must be given prior to CID reviewing the building permit. Curry County has bought development rights; however, there is no one to enforce purchased easements in the CZs and APZs. It is currently up to the property owner to self-regulate the restrictions on purchased easements.





Location Map

- Town
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- State Park
- Clovis City Limits
- Clovis Extra-Territorial
- Clovis Sphere of Influence
- Texas

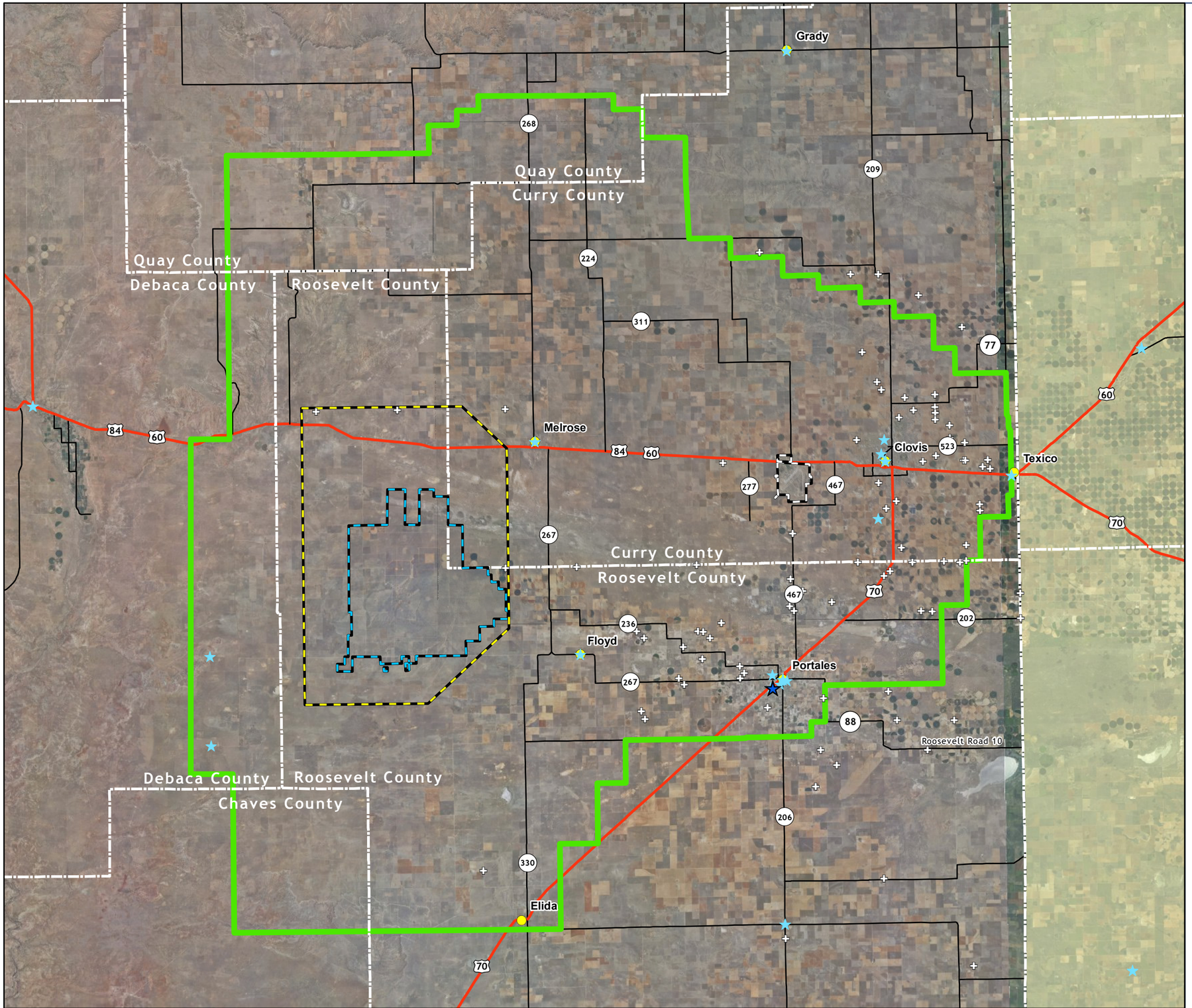
Portales Land Use

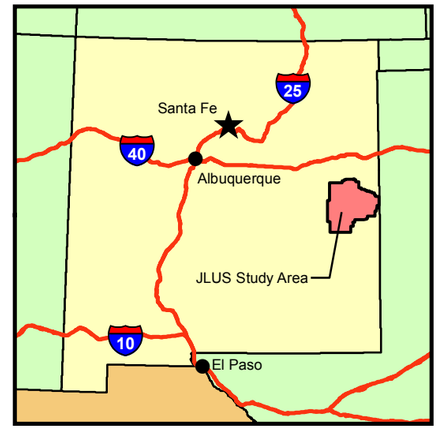
- Residential Activities
- Shopping, Business or Trade Activities
- Natural Resources-Related Activities
- Industrial, Manufacturing and Waste Activities
- Unclassifiable Activities

CANNON AIR FORCE BASE

Figure 4.6

JLUS Land Use





Location Map

- Town
- School
- Eastern New Mexico University
- Dairy Farm
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Texas

N

0 3.5 7 14 21 mi

Figure 4.7

JLUS Lighting

Existing Conditions and Analysis

Land uses around Cannon Air Force Base (AFB) and Melrose Air Force Range (AFR) primarily consist of agricultural lands, with the heaviest development occurring in and around the cities and villages. There is little development around the base; however, the possibility of incompatible land uses still exists. The only identified incompatible development is the sparsely populated residential/commercial area northeast of the base.

Although there has not been much land development in this area aside from farming and ranching, recent development has begun along highway frontages, including U.S. Highway 60/84. This development is a problem because it is near the Runway 04 clear zone (CZ), accident potential zone (APZ) I, and APZ II. There are no plans for additional development to the northeast of the base; however, there are no enforced regulations to prevent residential development from occurring within the APZ I and II zones. There are no regulations to prevent residential development in the noise contour zones of 75 to 90 decibel (dB) Day-Night Average Sound Level (DNL) and above. Most existing residential development to the north falls outside of the APZs but within the 65 to 70 DNL areas. This is conditionally allowed, according the compatibility guide; however, it is strongly discouraged, and noise-level reduction should be incorporated into construction. There is no requirement for noise reduction within this area.

In the immediate vicinity of Melrose AFR, land uses consist of undeveloped agricultural land. The closest residential developments are located in the villages of Melrose and Floyd.

5.1 Population Projections

Figure 5.1, Population Projections, shows that the population is projected to grow moderately over the next 25 years. This slow growth period is an ideal time to take the initiative to protect the community and the base from incompatible growth. With the right measures in place, the community can guide growth to more suitable areas and minimize problems before they arise.

Population estimates for the counties, villages, and cities show that populations have remained steady for the past 10 years. As shown in Table 5.1, Population Estimates, New

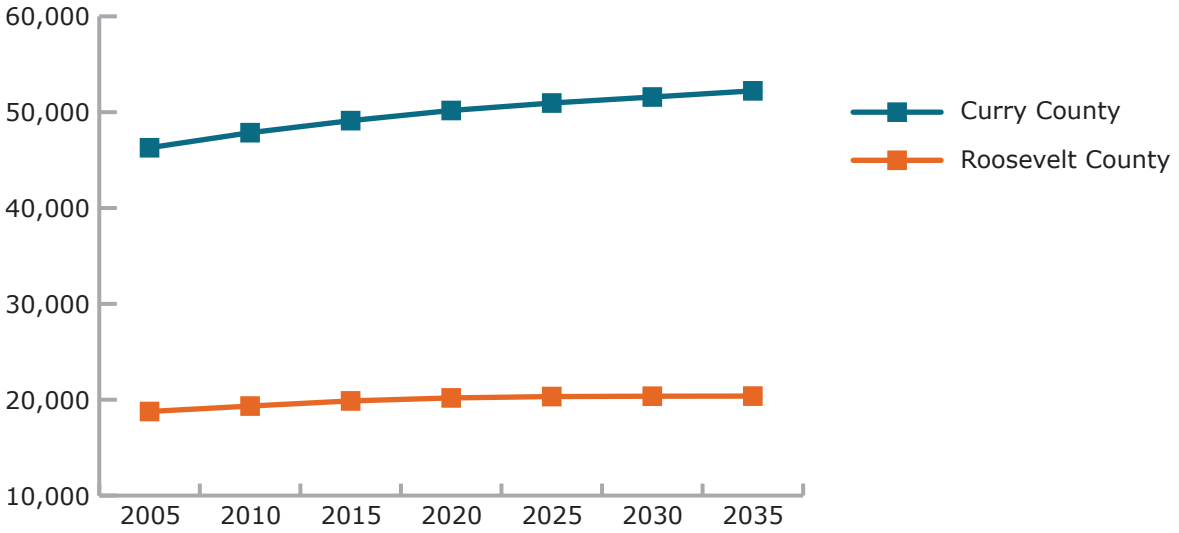


Figure 5.1 | Population Projections

(Source: New Mexico County Population Projections 1 July 2005 to 1 July 2035, Bureau of Business and Economic Research, University of New Mexico. Released August 2008.)

Table 5.1 | Population Estimates

Location	2000	2008-2009	Percent Change
United States	281,421,906	307,006,550	9.09
New Mexico	1,819,046	2,009,671	10.48
Curry County	45,044	44,407	-1.41
Roosevelt County	18,018	18,817	4.43
Clovis	32,667	32,352	-0.96
Portales	11,131	12,215	9.74
Melrose	736	678	-7.88
Floyd	78	74	-5.13

(Source: U.S. Census Data)

Mexico and the United States have had similar growth rates over the past 10 years to Roosevelt County and Portales.

Population within the counties is expected to maintain at least a 0.7 percent growth rate for 5 years. While the population is expected grow over the next 25 years, the rate after 2015 will drop to between 0.1 percent and 0.3 percent.

5.2 Infrastructure

5.2.1 Roads

The study area is served by several major north-south and east-west U.S. and state highways. Location and accessibility of the road networks are important because development and utility infrastructure tend to migrate along these corridors. Figure 5.2, JLUS Utility/Transportation Map, identifies the locations of the following major roads within the study area.

U.S. Highway 60/84

This highway is a major east-west arterial in Curry County and the communities of Clovis, Cannon AFB, and the village of Melrose. The two/four-lane highway is in good condition and is a utility corridor that is expected to see more and possible larger utilities in the future. Traffic volume is also an issue.

U.S. Highway 70

This highway is a major arterial that runs northeast from Portales through Clovis. The four-lane highway is maintained and in good condition. Several county roads have been improved that connect to U.S. Highway 70, providing access to/from Southwest Cheese Plant.

The following are major state highways that run north and south:

- New Mexico Highway 267/268 is a main highway that runs through Melrose and Floyd. New Mexico Highway 267 continues east and west to Portales. The highway is narrow and does not have a paved shoulder, but it is maintained and in good condition.
- New Mexico Highway 467 starts in southwest Clovis at the intersection with U.S. Highway 60/84. It travels south and west into Roosevelt County.
- New Mexico Highway 209 starts in Clovis at U.S. Highway 60/84 and proceeds north. This is a main transportation corridor in the eastern part of New Mexico for residents, farmers, and ranchers to or from Clovis.

The following are major state highways that run east and west:

- New Mexico Highway 523 is the main route to the Clovis Municipal Airport. It has a high traffic load. From the edge of Clovis east to the airport, the road is narrow and does not have paved shoulders on either side of the highway.
- New Mexico Highway 245 combined with New Mexico Highway 311, runs westward from the north side of Clovis. It provides a route for traffic from the northern part of Clovis to Cannon AFB.
- New Mexico Highway 236 connects Portales to New Mexico Highway 267.

5.2.2 Railroads

Rail transit in Clovis dates back to 1907. Although rail transit in this area is no longer serviced by passenger rail, it is one of Burlington Northern Santa Fe's (BNSF's) busiest commercial lines. (See Figure 5.2.) The processing and shipping of agricultural projects has been reinforced by the close association that Clovis has with BNSF. More than 100 BNSF trains are routed through the Clovis rail yard each day. The main BNSF line that runs through Clovis also runs along the northern boundary of Cannon AFB. According the Curry County Comprehensive Plan, an average of 75 to 80 trains run along the line near Cannon AFB per day.

The railroad employs an estimated 550 people locally. BNSF carries bulk freight, tankers, grains, vehicles, and

intermodal products to and from California, Dallas, Memphis, Atlanta, Birmingham, Phoenix, and El Paso. According to the Association of American Railroads, the average wages and benefits per freight railroad employee is $105,300. Based on the approximate number of railroad employees locally (500), BNSF has an estimated $52.7 million employment impact in Roosevelt and Curry counties. In America, freight railroads generate nearly $265 billion in total economic activity each year in direct, indirect, and induced effects. Southwest Railroad contracts with BNSF to provide commodity hauling for local grain elevators and the cheese factory from Clovis to Artesia, New Mexico.

Figure 5.2 identifies the locations of the existing rail lines within the study area.

5.2.3 Airports

The Clovis Municipal Airport is approximately 6 miles east of Clovis on state Highway 523. The airport has two paved runways that are more than a mile long and 150 feet wide. It has limited commercial service. Its capital improvement program for the next five fiscal years includes improving terminal and passenger areas and extending the main runways to accommodate larger aircraft (regional jets). Clovis Municipal Airport is currently in the process of extending the major runway to 7,200 feet.

The Portales Municipal Airport is about 5.5 miles south of Portales on U.S. Highway 70. The airport has two runways, the longest of which is 5,500 feet and is open to charter, private, and freight air carriers. Expansion and improvement of the city's airport are evaluated as needed.

Cannon AFB aircraft utilize local airports for occasional training purposes, and there have not been any conflicts with local airports.

5.2.4 Utilities (Gas, Electric, Water, Sanitary Sewer, and Stormwater)

Utility services, infrastructure, and locations are essential factors in the success of a community and region. Groundwater fulfills all water needs for residents, including farmers, ranchers, and county communities. County residents outside of communities get their water from private wells. Each incorporated community has its own water supply, storage, and distribution system.

Because of concerns about the water source, Cannon AFB is implementing water-conservation methods, using water-saving fixtures, and utilizing treated wastewater to irrigate parks and public landscaping. Roosevelt and Curry counties and the surrounding communities have created goals in their comprehensive plans to look for conservation measures to help offset the diminishing water supply.

County residents use on-site wastewater treatment for residential liquid waste generated by the residents living outside of the incorporated communities using septic tanks and discharge of effluent into leach fields. The incorporated communities have wastewater collection and treatment systems that are operated and maintained by the community. Cannon AFB has a wastewater collection and treatment plant. The effluent from the treatment plant is disinfected and utilized to water parks and landscaping on the base.

Stormwater infrastructure has been a problem historically. Stormwater drainage issues have created flooding problems in the area and will become more critical as state regulations are revised.

The capacity and conditions of the utility infrastructure is sufficient to meet existing demand based on surveys and research done for the Regional Growth Management Plan. Exceptions to this include the limitation on wastewater treatment, which includes accepting discharge from the cheese plant. Although the infrastructure is sufficient, the water supply is declining, and additional sources of water are being pursued in an American Recovery and Reinvestment Act (ARRA) for the Ute Dam Project.

5.2.5 Analysis of Infrastructure

The placement of future infrastructure is significant because of the potential encroachment of Cannon AFB and Melrose AFR. Although enhancements or expansions of infrastructure can enhance the operations of the installations, they can also encourage incompatible growth near the installations.

Cannon AFB is currently experiencing this encroachment along U.S. Highway 60/84. It is a regional road with easy access between Clovis and Cannon AFB, and utilities run along it, making it a corridor for future growth. Besides its proposed infrastructure, U.S. Highway 60/84 is also the proposed corridor for the Eastern New Mexico Rural Water System (Ute Reservoir Project).

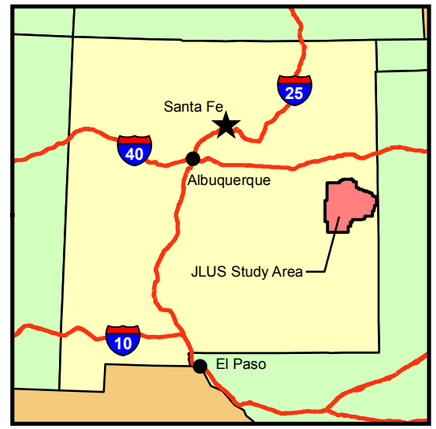
Another potential growth corridor that could present an encroachment issue for Cannon AFB is New Mexico Highway 467. This highway is the closest major connection from Portales to Cannon AFB, and it is another proposed corridor for the Eastern New Mexico Rural Water System. Growth will follow proposed infrastructure and cheaper land. As infrastructure is extended outside of city limits, growth will edge closer to the military installations.

Figure 5.3, Potential Growth Areas, shows general potential growth areas based on information gathered about

planned future developments and planned infrastructure improvements or extensions. It also anticipates that the incorporated cities and villages will continue to build out.

The areas around Cannon AFB and Melrose AFR have remained mostly undeveloped agricultural land. The biggest concern is the placement of future infrastructure that can cause potential encroachment around the installations. Other future infrastructure concerns are evaluated as tall structures in Section 5.4, Tall Structures.

Grady
Quay County
Curry County
Quay County
Debaca County
Roosevelt County
Clovis Municipal Airport
Melrose
Clovis
Texico
Curry County
Roosevelt County
Floyd
Portales
Roosevelt Road 10
Portales Municipal Airport
Debaca County
Roosevelt County
Chaves County
Elida
CANNON AIR FORCE BASE



Location Map

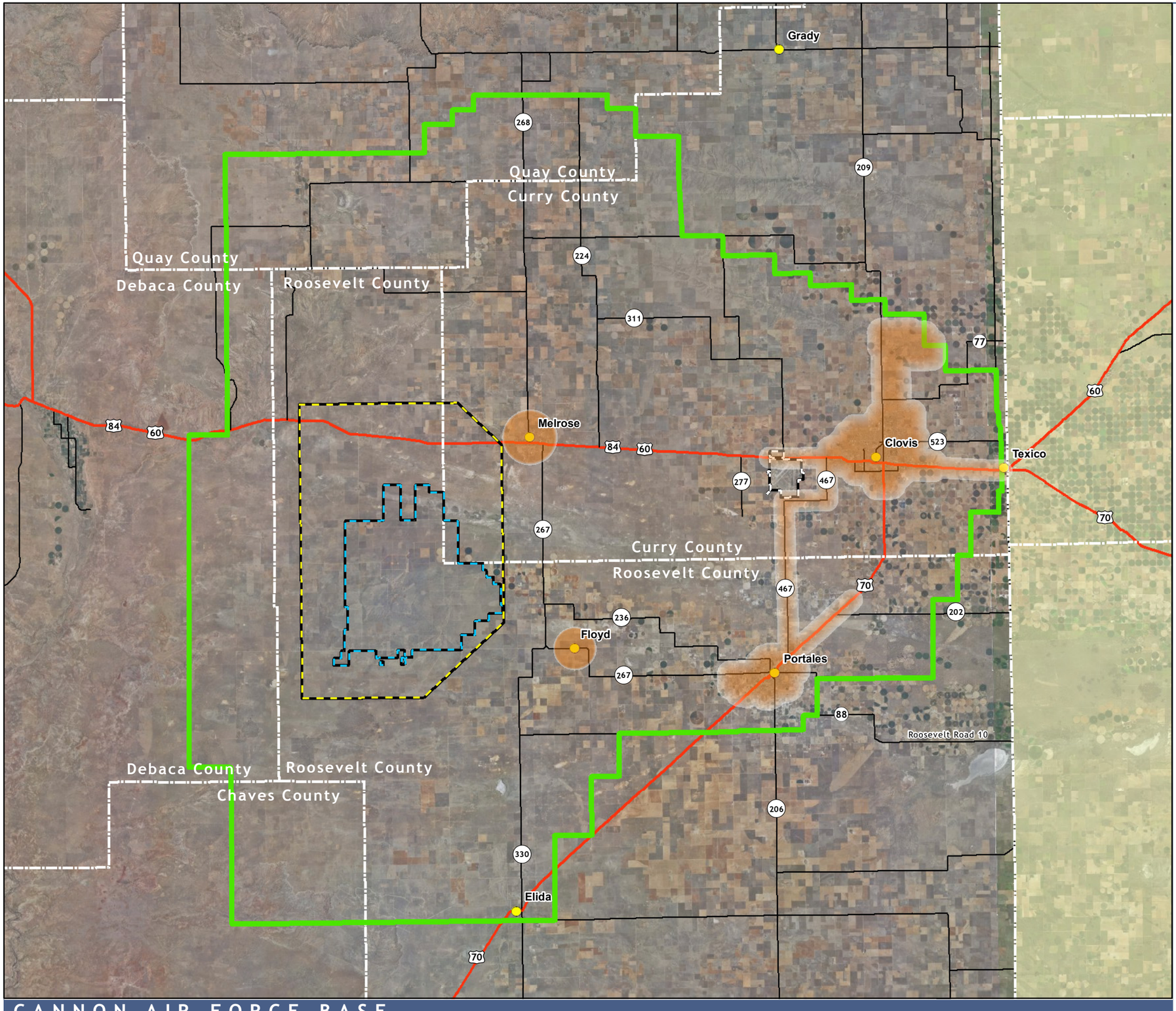
- Town
- Airport
- State Road
- U.S. Highway
- Railroad
- County Line
- Tres Amigas
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Texas

N

0 3.5 7 14 21 mi

Figure 5.2

JLUS Utility/Transportation



Location Map

- Town
- Potential Growth Area
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Texas

N

0 3.5 7 14 21 mi

Figure 5.3

Potential Growth Areas

CANNON AIR FORCE BASE

5.3 Local Regulations and Community Efforts

Current land use regulations are under the control of the local jurisdictions. New Mexico has state statues that apply to each jurisdiction; however, they do not apply within any county or municipality that, by ordinance or resolution, has adopted provisions that are equal to or more stringent than the provisions listed in the state statutes. The following paragraphs summarize the existing regulations, zoning codes, or ordinances that direct development in the vicinity of Cannon AFB and Melrose AFR or their flight operations within the study area. Table 5.2, Summary of Existing and Community Regulations, provides more information about these efforts.

5.3.1 State Statues

Examples of some of state statues that affect these communities include:

- Municipal Airport Zoning Law (Air Rights - Sections 3-39-16 through 3-39-26): It is hereby found and declared that an airport hazard endangers the lives and property of users of the airport and of occupants of land in its vicinity, and also, if of the obstruction type, in effect reduces the size of the area available for the landing, taking-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein, and is therefore not in the interest of the public health, public safety or general welfare.

  Therefore; Every municipality and county or other political subdivision having within its territorial limits an area within which, according to an airport approach plan adopted by the legislative body, measures should be taken for the protection of airport approaches, shall adopt, administer and enforce, under the police power and in the manner and upon the conditions hereinafter prescribed, airport zoning regulations applicable to such area, which regulations shall divide the area into zones and within such zones, specify the land uses permitted, regulate and restrict the height to which structures and trees may be erected or allowed to grow, and impose such other restrictions and requirements as may be necessary to effectuate the legislative body's approach plan for the airport.

- New Mexico Right to Farm Act (Encroachment - 47-9-1 through 47-9-7): The purpose of the Right to Farm Act is to conserve, protect, encourage, develop and improve agricultural land for the production of agricultural products and to reduce the loss to the state of its agricultural resources by limiting the circumstances under which agricultural operations may be deemed a nuisance. Similar measures could be passed to help protect the Air Force.

- New Mexico Night Sky Act (Lighting – 74-12-1 thru 11): The purpose is to regulate outdoor night lighting fixtures to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy. Enforcement of this statue is the construction industries division of the regulation and licensing department shall enforce the Night Sky Protection Act as it pertains to public buildings subject to permit and inspection under the Construction Industries Licensing Act and each political subdivision of the state shall fully enforce the provisions of the Night Sky Protection Act. There are exemptions to this act that include dairies.

- Zoning regulations 3-21: For the purpose of promoting health, safety, morals or the general welfare, a county or municipality is a zoning authority and may regulate and restrict within its jurisdiction the:

  a. Height, number of stories and size of buildings and other structures
  b. Percentage of a lot that may be occupied
  c. Size of yards, courts and other open space
  d. Density of population
  e. Location and use of buildings, structures and land for trade, industry, residence or other purposes

5.3.2 Curry County

Curry County has no specific zoning regulations, building codes, standards, or tower ordinances in place that directly address and regulate development in the vicinity of Cannon AFB or Melrose AFR and the flight paths.

Curry County's 2007 Comprehensive Plan has recommendations to minimize potential conflicts and help

ensure that there are no impediments to Cannon AFB's operations. Implementation measures associated with Cannon AFB include:

- Land Use Implementation Measure 3: Adopt land use regulation in the vicinity of Cannon AFB that is consistent with the current AICUZ report prepared for the AFB to protect the operations of the base in the future.
- Economic Development Implementation Measure 5. Work with Cannon AFB officials to identify and recruit businesses that provide services to base personnel or support the mission of the base.
- Economic Development Implementation Measure 7. Curry County should work with Air Force officials to prevent encroachment upon Cannon AFB and ensure its long-time viability. This might entail a land acquisition plan by the U.S. Air Force to acquire critical land around the base or the use of restrictive land easements to prevent residential and commercial development from happening in areas that might threaten future operations at the base.
- Economic Development Implementation Measure 8. Curry County should work with Air Force officials to ensure the long-time viability Cannon Air Force Base by preserving over flight capabilities in the county. Models exist for joint land use compatibility planning between base officials and county governments in other areas of the US. These studies and plans can serve as models for planning between Cannon AFB and county officials.

Curry County has made an effort to follow through on some implementation measures and, as part of the JLUS, more defined recommendations will help Cannon AFB and the county achieve the measures listed in the comprehensive plan. Curry County has bought easements within the Cannon AFB CZs and APZs in an effort to minimize adverse effects on pilots and to increase safety in flight operations for both pilots and residents on the ground. The county bought some development rights for approximately 3,120 acres CZ and APZ land. However, there is no clear enforcement of the easements that were purchased by the county. Samples of the easement and the full index can be found in Appendix F, Existing Clear Zone Documents.

Curry County has limited land use regulations, and therefore, most regulatory needs revert to the New Mexico state statutes. Curry County has preferred to resolve land issues by purchasing deeds and easements.

Curry County adopted a subdivision ordinance that verifies that sites have sufficient water, sufficient access, and adequate facilities to accommodate proposed subdivisions. The ordinance also has specific requirements on the standards of any new infrastructure proposed for the subdivision. The ordinance sets out review standards for different agencies affected as well as stormwater management and water conservation processes.

5.3.3 Roosevelt County

Roosevelt County has no specific zoning regulations, building codes, standards, or tower ordinances in place that directly address and regulate development in the vicinity of Melrose AFR. There are no regulations to help address an airfield being considered at Melrose AFR. According to Cannon AFB officials, an unimproved landing strip and helicopter landing zones (HLZs) are planned to be constructed at Melrose AFR in the near future. Other, more permanent airstrips are also under consideration. These landings strips and areas will dramatically increase the training capability for the region, ranking it among the premier training ranges within the United States and the Department of Defense (DoD).

The county has adopted a subdivision ordinance that verifies that sites have sufficient water, sufficient access, and adequate facilities to accommodate proposed subdivisions. The ordinance also ensures that proper utilities are available in the new subdivision.

Roosevelt County's 2002 comprehensive plan includes recommendations to help ensure Cannon AFB and Melrose AFR's continued existence in the community. Goals associated with Cannon AFB include maintain a strong working relationship with the base.

5.3.4 City of Clovis

Clovis is an incorporated city with separate regulations and standards from Curry County. Clovis has a municipal code that regulates land use, height, lighting, subdivision, and other issues within the city limits. Clovis also has specific zoning regulations around its municipal airport that limit height in CZs and APZs. Although Clovis does not directly abut Cannon AFB, it does have some land use control within the extraterritorial buffer area and zoning regulations within the city limits.

The city's municipal code regulates land uses in the following ways:

- Lighting: Height standards and permitted footcandles are regulated for both cut-off light standards and no-cut-off light standards based on the zone districts.
- Tower Height: Regulations include setbacks from the property lines along with a maximum height of 85 feet. Lighting is only permitted for security or required for safety.
- Airport Zoning Height: There are created and established zones that include land within the noninstrument approach zones, transition zones, horizontal zone, and conical zone. Such areas and zones are shown on the Clovis Municipal Airport zoning map.
    a. Noninstrument Approach Zones: 1 foot in height for each 40 feet in horizontal distance beginning at a point 200 feet from and at the centerline elevation of the end of the runways and extending to a point 10,200 feet from the end of the runway.
    b. Transition Zones: 1 foot in height for each 7 feet in horizontal distance beginning at any point 250 feet normal to and at the elevation of the centerline of each runway, extending 200 feet beyond each end thereof, extending to a height of 150 feet above the airport elevation. In addition to the foregoing, there are established height limits of 1 foot of vertical height for each 4 feet horizontal distance measured from the edges of all approach zones for the entire length of the approach zones and extending upward and outward to the points where they intersect the horizontal or conical surfaces.
    c. Horizontal Zone: 150 feet above the airport elevation.
    d. Conical Zone: 1 foot in height for each 20 feet of horizontal distance beginning at the periphery of the horizontal zone, extending to a height of 400 feet above the airport elevation.

The Clovis 2007 Comprehensive Plan includes recommendations to improve the quality of life and economics related to Cannon AFB. The city does not directly abut the installation, so there are no land use goals in the comprehensive plan; however, the city's economy is affected by Cannon AFB. Goals associated with Cannon AFB include:

- Economic Development Goal 1: Ensure the continued viability of existing businesses and industries, and encourage new businesses into the microplex area.
    a. Prepare planning documents to address the projected growth and future needs of Cannon AFB throughout the city of Clovis and Curry County.
    b. Protect the long-term operations of Cannon AFB.
- Transportation Infrastructure Goal 5: Examine extension of the city of Clovis transit system to serve county areas.
    a. Study the feasibility of providing scheduled transit service to Cannon AFB, particularly during commute times and weekends.

5.3.5 City of Portales

Portales is an incorporated city with separate regulations and standards from Roosevelt County. Within the city limits of Portales, a municipal code regulates land use, height, subdivision, and other issues. The municipal code does not regulate lights or provide light standards. The city also has zoning regulations around its municipal airport that limit use and height in CZs and APZs. Portales has a telecommunication tower ordinance. Portales does not directly abut Cannon AFB or Melrose AFR.

The Portales 2005 Comprehensive Plan makes recommendations to improve the quality of life and economics related to Cannon AFB. Portales does not directly abut the installation, so there are no land use goals in the comprehensive plan; however, the city's economy is affected by Cannon AFB. Goals associated with Cannon AFB include:

- Goal D: Create and maintain beneficial partnerships with neighboring communities, Roosevelt County, Eastern New Mexico University, and Cannon AFB.
    a. Objective 1: Initiate a systematic community

forum between the City, County, Eastern New Mexico University, and Cannon AFB for the purpose of identifying shared goals and solving community challenges.

b. Policy 4.7: It is the policy of the City of Portales to maintain strong relationships with Eastern New Mexico University and Cannon AFB in order to create economic development opportunities.

c. Policy 4.9: It is the policy of the City of Portales to support Cannon AFB activities and personnel.

- Cannon AFB Support Initiative: The City of Portales will support Cannon AFB by passing Resolutions of Support for the base and base activities in an effort to express continued appreciation and community spirit for the base. In addition, the City of Portales shall partner with the base on any mutually beneficial projects.

5.3.6 Village of Melrose

The village of Melrose is an incorporated city with separate regulations and standards from Curry County.

Melrose has limited land use regulations. There is a subdivision ordinance and a nuisance ordinance that includes noise. The village of Melrose has no zoning, height, or light ordinances.

The subdivision ordinance in Melrose verifies that sites have sufficient infrastructure and utilities to support proposed subdivisions. The nuisance ordinance gives the village the right to enforce against noxious weeds, trash, dilapidated buildings, obnoxious odors, and unreasonable noise.

5.3.7 Village of Floyd

The village of Floyd has no land use regulations.

5.3.8 Other New Mexico Communities

Other New Mexico communities near military installations have adopted forms of land use controls to help ensure the continued mission of the installations. Otero County encourages development appropriate for Holloman AFB based on AICUZ recommendations. The county's comprehensive plan includes the following recommendations:

- Strategy A: Work with Holloman AFB to promote further consideration of the Air Force AICUZ land use recommendations.
- Strategy D: Adopt the Holloman AFB AICUZ as county policy and attach the report as a technical appendix to the comprehensive plan.
- Strategy C: Implement the Holloman AFB AICUZ recommendations through cooperation between adjacent landowners and the base.

Kirtland AFB is surrounded by multiple jurisdictions and has no overarching land use control to ensure the continued mission.

5.3.9 Cannon AFB Programs

Bird Aircraft Strike Hazards

Aircraft collisions with birds and other wildlife annually cause millions of dollars in aircraft damage and may result in loss of aircraft and aircrews. The Bird/Wildlife Aircraft Strike Hazard (BASH) Team was formed to coordinate efforts in all areas, and it assists Air Force organizations worldwide to reduce the risk of bird strikes and collisions with other animals, such as deer. Cannon AFB is an example of a base with a BASH problem.

Aircrew in the 27 SOW often train at low altitudes. As a result, they are exposed to BASH, which pose the potential for life-threatening risks for pilots and costly damage to aircraft. Migrating waterfowl may temporarily stop at any reasonable size body of water. The North Playa, located on base approximately 1 mile east of the runway, provides an attractive roosting area. Several other large lakes are also located under local low-level training routes. These lakes provide additional roosting areas for migrating waterfowl. Soaring raptors (hawks, kites, and vultures) also present a significant hazard and may inhabit any area with an ample food supply. Food sources such as mice, prairie dogs, rabbits, and other small rodents are known to be on Cannon AFB and Melrose AFR. Additionally, smaller birds (horned larks, sparrows, swallows, pigeons, and mourning doves) will inhabit any area containing food (insects, seeds, etc.) and/or trees. Although small, these birds still pose a hazard because they tend to congregate and move in flocks.

The area around Cannon AFB and Melrose AFR is dominated by agriculturally centered businesses, with several dairy farms in close proximity of the base. These areas provide large habitats for wildlife, including cattle, egrets, prairie dogs, rabbits ,and small rodents. These provide an ample food source for large birds. During the migratory season, large flocks of ducks, sandhill cranes, and geese

often fly above the airfield. During the spring and summer, burrowing owls are known to make homes in abandoned prairie dog holes. The burrowing owl is a protected species.

This plan establishes procedures to minimize bird strike and wildlife risks to aircrew and aircraft. Methods are designed to encompass the airfield, traffic pattern, low-level routes, ranges, Military Operating Areas (MOAs), and divert bases. Use of these countermeasures and their intensity will be based on the level of observed bird activity and bird condition. For the purpose of mission planning, projected levels of bird activity in the anticipated training areas will be based on the U.S. Air Force Bird Avoidance Model (BAM) and Avian Hazard Advisory System (AHAS).

Noise Complaints

Cannon AFB officials get approximately 15 complaints per year regarding noise. All noise complaints and calls are to be directed to the Public Affairs Office. The Public Affairs Office captures as much detail as possible about the event, including time, date, location, direction of flight, number of aircraft, and aircraft description such as one or two tails, color, and jet or propeller.

Cannon AFB officials log the noise complaint into a database and coordinate with the appropriate agencies to investigate details of the incident. They attempt to determine if the incident involved Cannon AFB aircraft and if any violation of directives occurred so they can work to prevent such occurrences in the future.

Table 5.2 | Summary of Existing and Community Regulations

	State	Curry County	Roosevelt County	Clovis	Portales	Other NM	Other
Encroachment	None	Easements were purchased for the CZs, APZ I, and APZ II	None	Zoning regulations	Zoning regulations	Adopting AICUZ recommendations	Governing municipalities refer development applications within impact area to installation for review and comment
	-	-	-	Airport zoning regulations for Clovis Municipal Airport	Airport zoning regulations (municipal airport only)	Airport zoning regulations	Airport zoning regulations
Tall Structures	None (FAA regulations but no authority)	None	None	Code/zoning height restrictions per zone (Telecommunications exempt with special height restricts no greater than 85 feet)	Code/zoning height restrictions per zone - Telecommunications Tower and Facilities zoning code height restrictions - (max height 150 feet)	Height ordinances	Aviation easements, used as a plat note that restricts air space
	-	-	-	-	-	-	Code/zoning height restrictions on towers along with areas of concern for military review of wind/solar farms and towers
Light	Night Sky Act State Statute, exempts agriculture	None	None	Zoning code lighting standards (Cut off and illumination requirements)	None	Dark Skies Ordinance (Alamogordo), North Light Ordinance (Albuquerque)	Light ordinance with regard to cut-off lights
Noise	None	None	None	None	None	Noise is regulated. No Noise Attenuation standards have been found in NM	Adopted the AICUZ noise contours and limit use or have noise attenuation standards

5.4 Tall Structures

Tall structures are permanent or temporary and can include telecommunication towers, wind turbines, silos, radio antennae, cranes, tall stacks, and other structures tall enough to affect flight operations. If tall structures are located where they pose a danger to flight operations, they endanger the lives of Cannon AFB pilots and people on the ground. These structures may also impair the mission of the base by reducing the size of the area available for safe landing, takeoff, and maneuvering of aircraft. Consequently, the structures could affect the mission of Cannon AFB and public investment in the base. Refer to Figure 5.4, JLUS Tall Structures, for a map of tall structures in the study area.

Structure height and terrain are used to determine the minimum safe altitudes for training. Tall structures can affect the minimum safe altitudes at which pilots can safely fly and train in areas. There is no regulation in either county to guide the location of tall structures or encourage communication prior to building a tall structure. Building regulations for towers, wind farms, and solar development are only regulated by structural safety. The study area contains significant wind and solar resources, which means there is significant potential for future development.

5.4.1 Wind Turbines

The interest in alternative energy sources in this area has resulted in the construction of wind turbines, which can be up to 500 feet tall. The location and physical characteristics of the wind turbines can conflict with aircraft operations and airspace management.

Tall structures, such as wind turbines, may occur in combat zones.

Studies have shown that wind turbines affect not only aircraft because of their height, but they also affect radar. Proven mitigation methods include spacing between turbines, terrain masking, and terrain relief. These methods keep wind turbines out of the line of sight of radars. Other methods are being analyzed but have not been proven to work as well as regulations. Effects can be viewed in Appendix H in the Report to the Congressional Defense Committees, The Effect of Windmill Farms on Military Readiness 2006.

The Roosevelt County Community Development Corporation (RCCDC) is working with numerous energy firms to develop new, affordable wind and solar installation and transmission sites in Roosevelt County. Few locations in the nation offer Portales and Roosevelt County's combination of existing electrical grid access, affordable land, and high-value wind and solar energy. Clovis and Curry County also seek renewable energy sources for the area that will be compatible with base operations while providing the community with development opportunities.

5.4.2 Other Alternative Energy Sources

Solar power is also becoming a large-scale option. Solar arrays are being considered within this study area, and there are currently few regulations for them. Possible issues related to large-scale solar arrays include the height of the tower collector and possible reflection that could affect a pilot. If there is no central collection tower, the new solar panels can be made nonreflective, and arrays would not cause any height or reflective issues.

The New Mexico state statues contain a Solar Energy Development Act to promote the development and use of solar energy in New Mexico. There is also a Solar Collector Standards Act to promote the solar industry and stimulate a demand for high-quality solar components and systems. If the solar arrays are located in the proper locations, these can be beneficial rather than a hindrance.

5.4.3 FAA Regulations

Federal Aviation Administration (FAA) regulations require the notification of the FAA if a tower is proposed within 20,000 feet of a public or military airport or other restricted airspace. As a result, many of the towers, which are proposed outside the 20,000 foot radius, are not required to notify FAA and be reviewed for impacts on airspace.

Title 14 of the Code of Federal Regulations CFR Part 77 (CFR Title 14 Part 77.9) states that any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA:

"§ 77.9 Construction or alteration requiring notice.

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:

1. Any construction or alteration that is more than 200 ft. AGL at its site
2. Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:
    a. 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 ft. in actual length, excluding heliports

b. 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 ft. in actual length, excluding heliports

c. 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

3. Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section

4. Any construction or alteration on any of the following airports and heliports:

   a. A public use airport listed in the Airport/ Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications

   b. A military airport under construction, or an airport under construction that will be available for public use

   c. An airport operated by a Federal agency or the DoD

   d. An airport or heliport with at least one FAA-approved instrument approach procedure

5. You do not need to file notice for construction or alteration of:

   a. Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation

   b. Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose

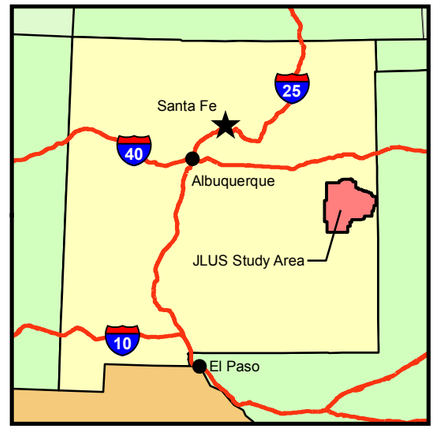
   c. Any construction or alteration for which notice is required by any other FAA regulation

   d. Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Persons failing to comply with the provisions of FAA Part 77 are subject to Civil Penalty under Section 902 of the Federal Aviation Act of 1958, as amended and pursuant to 49 U.S.C. Section 46301(a)."

Although the FAA has regulations in place to notify it of vertical obstructions, the FAA lacks land use control authority. The FAA has the responsibility to evaluate structures and determine whether they present hazards to air navigation; however, the FAA's only remedies are marking, lighting, and communicating the hazard to the flying community. It does not have the authority to prohibit construction of a structure that presents a hazard. This authority is reserved for state and local governments.

Grady
Quay County
Curry County
Quay County
Debaca County
Roosevelt County
Melrose
Clovis
Texico
Curry County
Roosevelt County
Floyd
Portales
Roosevelt Road 10
Debaca County
Roosevelt County
Chaves County
Elida
268
209
224
311
77
84
60
523
70
267
467
236
202
88
206
330



Location Map

- Town
- Vertical Obstruction Over 75'
- NEXRAD
- JLUS Study Area
- Cannon AFB
- Restricted Airspace-Surface to 23,000 MSL
- Melrose AF Range Owned/Leased Land
- Texas

N

0 3.5 7 14 21 mi

Figure 5.4

JLUS Tall Structures

CANNON AIR FORCE BASE

5.5 Noise-Sensitive and Community Facilities

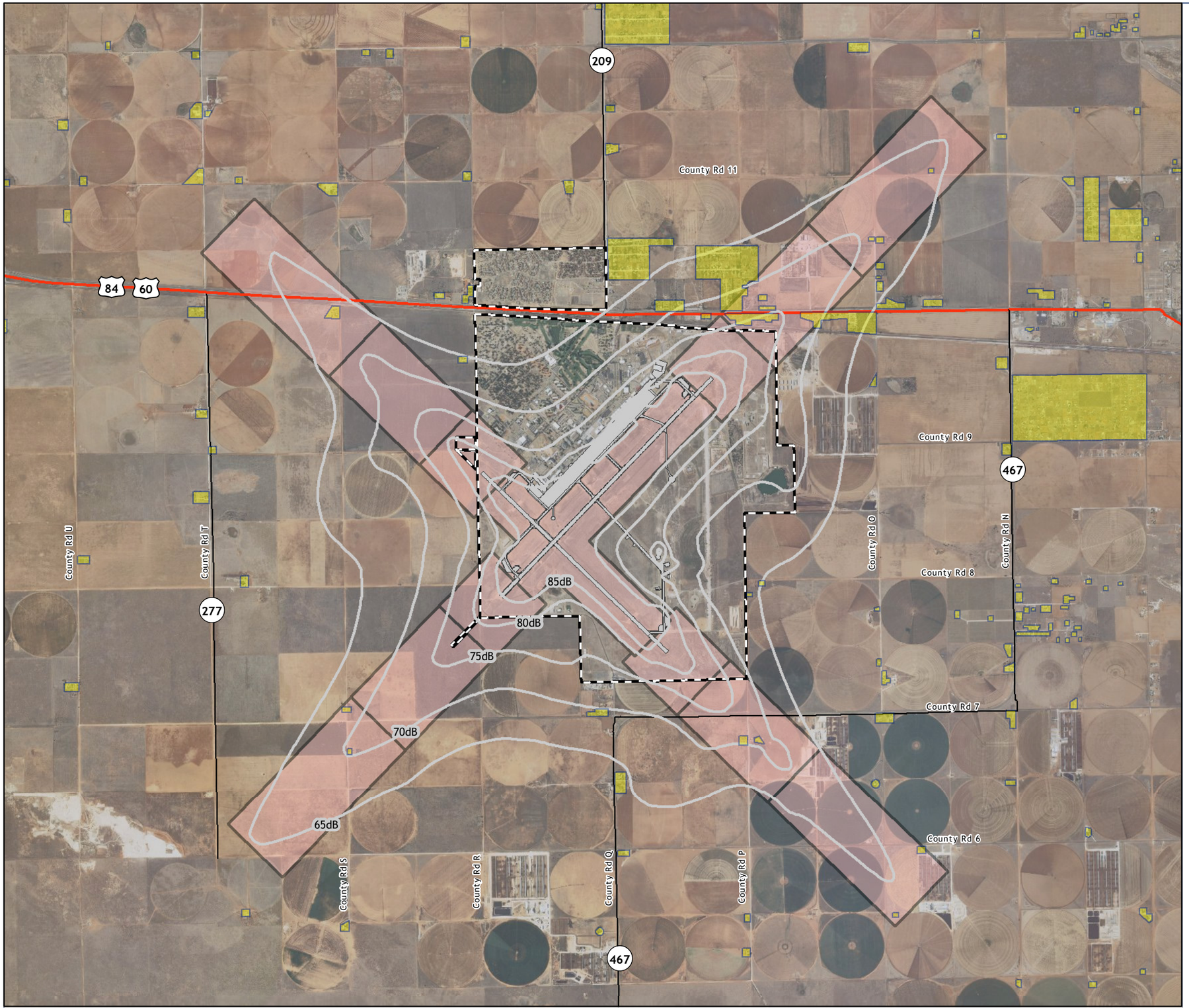
Noise-sensitive facilities generally include religious facilities, hospitals and other medical facilities, public and private schools, residential developments, city/county/state jails, libraries, courthouses, shopping centers, and any other noise-sensitive uses. These uses are generally not suitable to be next to active areas of a military installation, such as the airfield, because of the increased potential of an accident with large congregations of people, sensitivity to noise, and light pollution.

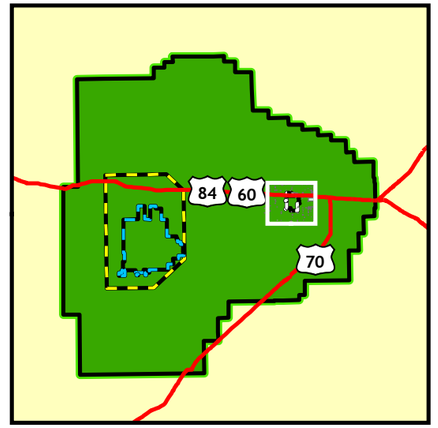
Based on the current noise contour maps, there are only small enclaves of residential areas and limited commercial areas that are affected by the noise contours. Most of this development is occurring just north of the base off U.S. Highway 60/84. Refer to Figure 5.5, Cannon Noise Sensitive Facilities. There are no plans for additional development to the northeast of the base; however, there are no regulations to prevent residential development from occurring within noise contour zones of 75 to 90 DNL and above. Existing residential to the north primarily falls outside of the APZs but within 65 to 70 DNL. According to the compatibility guide, this is conditionally allowed, but it is strongly discouraged, and noise-level reduction should be incorporated into buildings. There is no requirement for noise reduction within this area.

Development rights easements have been purchased by Curry County in the CZs and APZs, which makes incompatible development potential for those zones minimal. Due to the lack of oversight or enforcement of those easements, however, incompatible development is a possibility. There is no regulation or easements in place for the noise contours around Cannon AFB, which leaves a potential for incompatible development within the noise contours.

Efforts can include noise reduction standards for new construction and regulations to limit new or retrofit existing structures. There is limited noise sensitive or community facilities located next the Cannon AFB and no noise-sensitive facilities located next to Melrose AFR.

This page intentionally left blank.





Location Map

State Road

U.S. Highway

Noise Contour Line

Cannon AFB Boundary

Noise Sensitive Facility Area

Runway

Clear Zone/Accident Potential Zone

N

0 0.375 0.75 1.5 2.25 mi

Figure 5.5

Cannon Noise Sensitive Facilities

CANNON AIR FORCE BASE

5.6 Natural Resources

5.6.1 Wind

New Mexico's renewable energy wind resources are ranked 12th among the 50 states in value. The study area is expected to expand the development of wind energy resources in the region. The greatest wind potential in New Mexico is in the eastern half of the state. Areas with annual average wind speeds around 6.5 meters per second (m/s) or greater at 80 meters (262 feet) above the ground are generally considered to have suitable wind resources for wind development. As shown in Figure 5.6, Annual Wind Speed Averages for New Mexico, the study area has an average annual wind speed of 7 to 10 m/s.

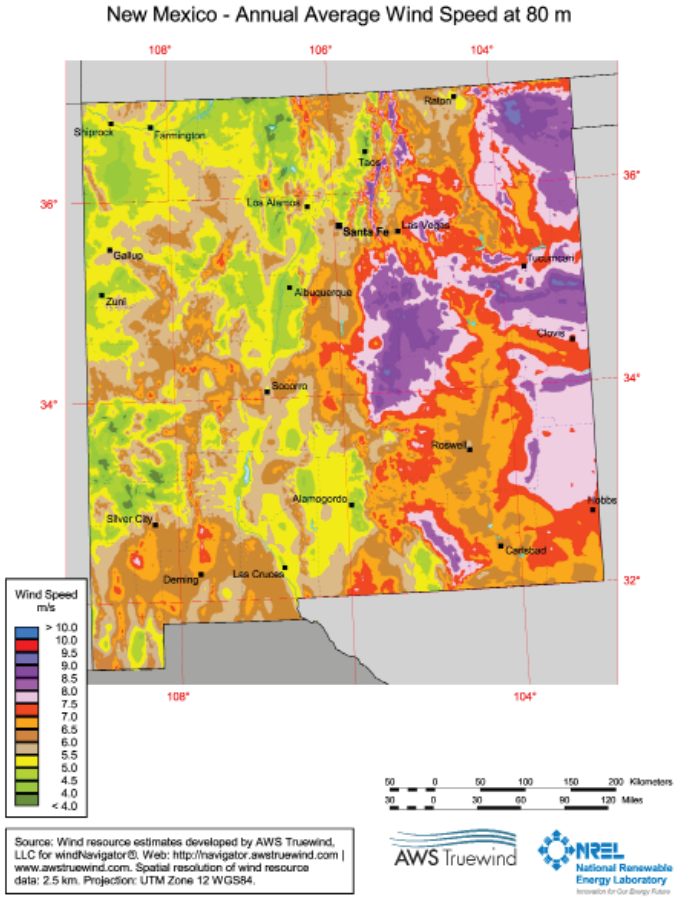


Figure 5.6 | Annual Wind Speed Averages for New Mexico

(Source: U.S. Department of Energy)

5.6.2 Solar

New Mexico has excellent solar resources in the study area. The study area is expected to expand the development of solar energy resources in the region. As shown in Figure 5.7, Solar Insolation Annual Average for New Mexico, the study area has an average 5.6 to 6.5 kilowatts per hour per square meter per day. Solar insolation is the amount of electromagnetic energy or solar radiation on the surface of the earth. The values represent the solar energy that strikes a square meter of the earth's surface in a single day.

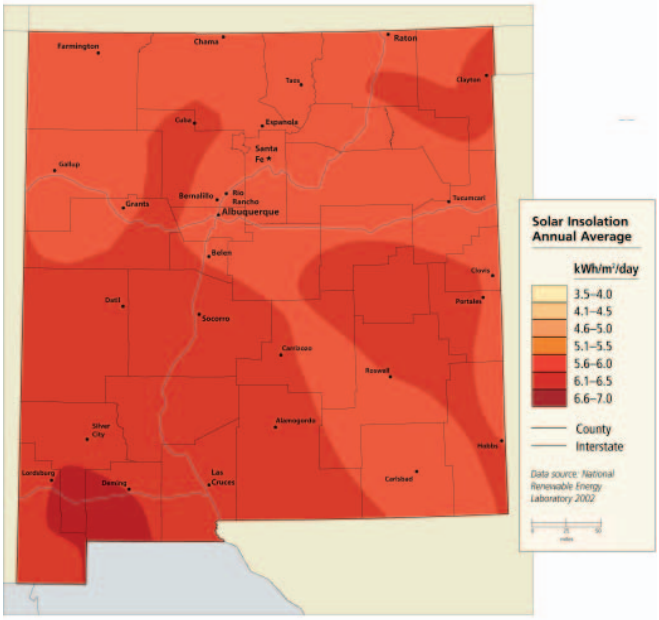


Figure 5.7 | Annual Solar Insolation Averages for New Mexico

(Source: National Renewable Energy Laboratory 2002)

FIGURE 5.8 | AQUIFER MAP

(Source: www.npwd.org/Ogallala.htm [July 2010])

5.6.3 Water

According to the 2009 Regional Growth Management Plan, form questionnaires distributed to the various utilities found that water is the top growth management concern for the area. This area depends upon groundwater for all drinking water, livestock, irrigation, and business needs. The Ogallala Aquifer (see Figure 5.8, Aquifer Map) contributes a majority of the groundwater for Roosevelt and Curry counties. Recharge to this aquifer is limited because of low rainfall, wind, and high evaporation rates. The aquifer is experiencing declining water levels averaging 2.6 feet per year.

Obtaining a sustainable water supply is critical to this area and the ARRA Ute Reservoir Project was started to help alleviate the strain on the communities in this area. The project will supply water needs in Curry and Roosevelt counties for municipal and industrial water; however, it will not alleviate the water issues for agricultural uses.

5.6.4 Recreational Parks

Recreational parks help increase the quality of life, which Cannon AFB officials say is a key concern for the men and women stationed at Cannon AFB. The only state park in the study area is between Cannon AFB and Portales along New Mexico Highway 467. The Oasis State Park is a 193-acre recreational area set among cottonwood tress and shifting sand dunes and includes a 3-acre fishing pond, along with numerous trails. Near the state park is the Blackwater Draw, which is a National Historic Landmark and one of the most well known and significant sites in North American archaeology.

Clovis has more than 600 acres of developed and maintained parks, including 17 parks and 27 ball fields. The Ned Houk Park, 7 miles north of Clovis along New Mexico Highway 209, has 370 developed acres and 3,200 available acres. This park includes numerous activities, trails, and a fishing lake.

5.7 REGIONAL ECONOMIC IMPACT OF CANNON AFB AND MELROSE AFR

The economic growth in the study area is reliant on federal spending at Cannon AFB, which has historically been the largest employer. According to Clovis and Curry County comprehensive plans, based on a 2006 study, it was projected that 26 percent of available jobs in Curry County would be lost if the base closed. Prior to the change of mission in 2006, it was estimated 3,846 military personnel and 1,039 civilian personnel were employed by the base. Based on the 2006 mission, Cannon AFB was estimated to have an economic impact on the regional economy, both through the goods and services purchased by Cannon AFB personnel and also through the economic benefit to local businesses supporting the Cannon AFB mission and personnel. According to Cannon AFB Economic Impact Statement, 2010, Cannon AFB has a total impact of $478 million from employment payroll, other expenditures, and estimated local job creation.

The buildout projection of Cannon AFB by fiscal year (FY) 2016 is 6,048 personnel. The FY10 population includes 4,330 assigned personnel and 467 contractors (27 SOW Authorized Vs. Assigned 1 Sept 10). Although there is expected to be a temporary reduction of personnel during the transition that will have short-term implications to the economy, the overall economic impact will return to the previous numbers and higher.

5.8 OTHER LOCAL INDUSTRY IMPACT

Portales and Roosevelt County have balanced and stable economies and low unemployment rates. Employment in the market area is dominated by higher education and government, agricultural and dairy production, value-added food processing, and professional and support services. According to RCCDC, about 25 percent of the Portales economy is directly dependent on employment and attendance at Eastern New Mexico University.

Approximately 20 percent of the economy is dependent on agriculture and value-added food processing.

Portales is best known for its food-processing facilities. The area is home to the nation's largest United States Department of Agriculture-certified organic peanut butter plant, the nation's largest milk balancing and powdered milk plant, the nation's largest roaster of baseball park peanuts, and the nation's largest American cheddar cheese plant, according to the RCCDC.

Roosevelt County depends heavily on the agricultural industry, containing more than 453,670 acres of cultivated crop land and 1,082,360 acres of range land, according to the 2002 Roosevelt County Comprehensive Plan. Roosevelt County is also home to 40 large dairies, a major wind farm, and hundreds of thousands of affordable land acres that are well-suited to wind, solar, and biofuel production.

Curry County has experienced growth in the dairy industry spurred by the cheese factory. There are over 60 dairies in the region, and a large portion of their output is milk provided to the cheese manufacturing facility, according to Curry County's comprehensive plan.

The dairy industry in New Mexico has brought significant economic benefits to the state. The average New Mexico dairy produces 44 million pounds of milk per year, worth an estimated $5.8 million, according to New Mexico State University.

Seventy five percent of the milk in New Mexico is produced on the eastern side of the state (Curry, Roosevelt, Chaves, Eddy, and Lea Counties). The direct economic impact (sale of milk) to the state is $1.2 billion, and the total economic impact (milk and all related indirect, induced and value-added business) is $2.7 billion annually (2006 numbers from New Mexico State University Dairy Facts).

In farm commodities cash receipts, Curry County is ranked number one and Roosevelt County is ranked number four in the state of New Mexico. Curry and Roosevelt counties have approximately $793 million in cash receipts for all farm commodities.

Nonfarm employment in the microplex is dominated by retail jobs, which account for approximately 24 percent of business establishments and 26 percent of employment. Health care and related businesses account for 11 percent of business establishments and 25 percent of jobs (Curry County Plan).

5.9 Survey Results of Perceived Issues and Opportunities

Survey results help define what residents feel are the area's most important issues regarding the military. The issues identified in the JLUS survey results include:

- A need for common ground between military needs and private property rights
- A need for common ground between military needs and renewable energy development, which will play an important role in the communities' futures
- Closing County Road R for the safety of the installation is not fully supported by many residents

Table 5.3 | Survey Participants

Residence	Number	Percent
Curry County	19	44.2
Roosevelt County	3	7.0
City of Clovis	16	37.2
City of Portales	3	7.0
Village of Melrose	0	0.0
Village of Floyd	0	0.0
Outside Listed Areas	2	4.7

As shown in Table 5.3, Survey Participants, most of the survey results come from Curry County residents.

Of the responses, 97 percent of residents found the military to be a valuable asset. A majority (54 percent) believes that there is no threat of Cannon AFB or Melrose AFR closing. The perception based on the survey results is Cannon AFB and Melrose AFR will remain in the community regardless of the residents' actions. As part of the JLUS process, the "Talk Early, Talk Often" philosophy will help protect the base from detrimental development that could result in the base's closure.

Based on the answers to other survey questions, the operational effects of Cannon AFB with regard to noise, traffic, and other factors are not a significant concern. There are a few concerns with area housing. Housing is being addressed through the Regional Growth Management Plan.

When asked an open-ended question to identify current or future land use conflicts around Cannon AFB and Melrose AFR, respondents gave a wide range of answers. The community recognizes that encroachment, both in tall structures or incompatible land uses in APZs, is a current and future issue, but that a plan to protect the base must have compromises on both sides.

For full survey results, see Appendix E, Survey Results.

This page intentionally left blank.

Study Recommendations

This document is intended to present a series of tools to minimize land use conflicts among Cannon Air Force Base (AFB), Melrose Air Force Range (AFR), and the surrounding communities. The recommendations presented are a result of public meetings, technical and policy committee meetings, and an effort to assess the existing and foreseeable effects of the installations on the surrounding communities, and vice versa.

The Joint Land Use Study (JLUS) is an advisory document only, and the strategies are recommendations for the surrounding communities. Many of these recommendations will require more detailed work following this study. These tasks include working with each community to develop the recommendations for noise standards, tall tower structure ordinances, communication tools, or real estate disclosure to ensure a successful implementation of the study.

6.1 Summary

The JLUS planning process continued to establish a high level of commitment and cooperation between Cannon AFB and the surrounding communities. Representatives from Cannon AFB and local area governments engaged in a detailed encroachment analysis and planning process that evaluated current conditions and land use policies with regard to the Cannon AFB mission and operation requirements.

The results of the JLUS process showed that there is limited incompatible development within the installation's area of influence; however, there are also few previously adopted land use regulations or tools in place to ensure the continuation of this pattern.

The JLUS should be used as a planning tool, and the creation of the recommended committees will ensure that this viable tool is used. The committees should include members of the policy and technical committees, members of development and business communities, conservation interests, as well as landowners and any other appropriate parties.

If the public is educated on the economic impact and importance of Cannon AFB on the area and the opportunities that arise from compatible planning, they will be more willing to plan with and advocate for the base. Educational information will need to be created and distributed by Cannon AFB and surrounding communities to inform residents.

6.2 Analysis of Compatibility and Future Compatibility

There are few current compatibility concerns; however, there are significant future compatibility concerns. Currently, the incompatible land uses are northeast of Cannon AFB. These include portions of the clear zone (CZ) and accident potential zones (APZs) I and II, which are located off Air Force property. There is also a portion of the Graded Area for Runway 13 that extends off Air Force land and crosses County Road R right-of-way onto private property. Although the Graded Area is supposed to be at a level grade, it is not. The CZ and APZ I and II have easements bought by Curry County that restrict the types and height of development; however, there is no government review or enforcement of buildings within the easements. Some necessary controls are in place for the CZ and APZs; however, lack of knowledge about the easements and enforcement of the regulations is a major concern.

The most important concern is the lack of open communication lines that could prevent future incompatible land uses around the base. Because Tres Amigas is in the area, it is likely more wind farms and transmission lines will be located within and around the study area. It is important that potential issues are addressed so private property rights and the Air Force are protected. If issues are addressed early through open lines of communication, Cannon AFB will be at less risk of a potential Base Realignment and Closure (BRAC) action.

It is suggested that each jurisdiction follows the implementation schedule presented in Section 6.4.3, Implementation Schedule, to ensure continued compatibility with the installations.

6.3 Areas of Concern

There are two main areas of concern as they relate to operations at Cannon AFB and Melrose AFR and the

surrounding community. Tall structures and residential and commercial encroachment adjacent to the installations currently have the most significant impact on the installations.

Tall structures are not regulated by either Roosevelt or Curry counties. Federal Aviation Administration (FAA) Part 77 provides requirements for review; however, the FAA has little power to enforce recommendations without the support of the local jurisdictions. It is recommended that each jurisdiction deal with tall structure issues with one of the tools in the toolkit. At minimum, it is desired that any structure taller than the respective heights, as determined by each jurisdiction with input from Cannon AFB officials, would complete a review process that would include Cannon AFB officials. Cannon AFB officials would review and comment on those structures, but the local jurisdictions would retain approval or disapproval rights as applicable. Encroachment near the installations is the second area of concern.

Although there is little encroachment at Melrose AFR or Cannon AFB, there is concern about future encroachment. There are no controls in either county that prevent development adjacent to the installations, with the exception of the easements purchased by Curry County for the CZ and APZs around Cannon AFB. Although the easements are in place, there is no government oversight or enforcement of the conditions in the easements. The current encroachment issue at Cannon AFB is the residential development occurring within the APZs and noise contours northeast of the installation and the Graded Area for Runway 13. Encroachment is a safety hazard for the operations of the installations as well as the surrounding community.

6.4 Recommendations

The following strategies and recommendations were created to meet the goals and objectives listed below as part of the Cannon AFB and Melrose AFR JLUS.

Goal

The goal of the JLUS program is to safeguard the military mission while fostering compatible and sustainable economic development and civilian growth in the study areas.

Objectives

1. Provide opportunities for meaningful input by the public.
2. Identify areas where land use conflicts exist.
3. Identify strategies to reduce encroachment and promote land use compatibility.
4. Provide examples to the local government of land use regulations or ordinances.
5. Create final action plan and narrative report with recommendations and strategies.

6.4.1 Overview of Strategies Toolkit

Table 6.1, Cannon AFB Implementation Strategies Toolkit and Schedule, provides an overview of possible strategies to help meet the previous goals and objectives. The strategies have been broken into 12 categories. Section 6.4.3, Implementation Schedule, shows recommendations for a timeline of when each jurisdiction should start addressing certain issues with a tool from the toolkit. Some samples of the tools found in Table 6.1 can be found in Appendix B.

- Acquisitions
- Airport Land Use Plan
- Communication/Coordination
- Disclosures
- Master Plans
- Legislative
- Light
- Memorandum of Understanding
- Military Operations Area
- Military Installation Operations
- Real Estate
- Land Use Regulations

Table 6.1 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Acquisitions	1	Identify Mission-Critical Private Land Parcels	Explore strategies and potential funding sources to identify properties where purchase, renovation, or relocation assistance from Cannon AFB or local government would encourage the replacement of incompatible uses with uses compatible to the operations and impacts of Cannon AFB and Melrose AFR.	x		
	2	Consider Further Research and Creating Purchase of Development Rights (PDR) Program	PDR is a voluntary program in which a land trust or other agency, usually linked to local government, makes an offer to a landowner to buy the development rights on the parcel. Once an agreement is made, the property is placed under a permanent deed restriction, which restricts the type of activities that may take place on the land in perpetuity.	x		
	3	Consider Creating Transfer of Development Rights (TDR) Program	TDR programs allow landowners to sell development rights from their properties in government-designated low-density (sending) areas, and sell them to purchasers who want to increase the density of development in (receiving) areas that local governments have selected as higher density areas.		x	
ALUP	4	Consider Creating an Airport Land Use Plan (ALUP) to Reflect Military Air Facilities and Airspace	This sets policies for promoting compatibility between airports and the uses of the land that surround them. (See 39)		x	
Communications/Coordination	6	Consider Establishing a JLUS Implementation Committee	Continued communication beyond this study between Cannon AFB officials and local boards, agencies, and authorities will help maintain the viability of Cannon AFB. A joint effort by Cannon AFB officials, the public, local governments, local boards and agencies, and any other group could be made to ensure that the recommendations in this study are implemented.	x		
	7	Refer Development and Permit Applications to the Military Installations (Cannon AFB and Melrose AFR) for Review and Comment within the Study Area	Consider including Cannon AFB representatives in the technical review of those developments within the JLUS study area that would affect the installation. By including Cannon AFB in the initial review of projects, problems are eliminated early on. Each local jurisdiction should work with Cannon AFB officials to determine which type and location of development applications are most important to review and comment on.	x		

Table 6.1 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe: 0-2 Years	Timeframe: 3-5 Years	Timeframe: Ongoing
Communications/Coordination	8	Coordinate on Various Issues for Policy/ Implementation Changes	The military, local entities, state agencies, and energy providers should meet as needed to address changing alternative energy, communication, and to make recommendations for policy and implementation changes to address these items.	x		
	9	Develop an Outreach Program	Create and distribute educational information for the public and to inform residents, planning staff, and local officials within the area of the importance of Cannon AFB and any planning issues that may arise.	x		
	10	Provide Installation Information to Jurisdictions	Communicate new missions and construction plans to local government staff at the earliest opportunity in order to provide sufficient time for local governments to address and mitigate any impacts on the community.	x		
	11	Coordinate for Military Vehicle Routes	If this is a possible issue for the community on military vehicle routes, it should be looked at with the recommendations to resolve these issues.	x		
	12	Consider Establishing Procedures to Avoid Frequency Conflicts/ Issues	Consider establishing procedures for identifying types of proposed projects that involve frequency emissions (including WiFi) within the study area. The local jurisdiction, potentially affected stakeholders, and the Frequency Management Office of the installation should be contacted for project review to avoid potential frequency conflicts.	x		
	13	Encourage Cellular Tower Collocation/ Consolidation	Consider encouraging the collocation of cellular towers within the study area. This reduces the number of towers in one area if different cellular providers can collate on one tower.	x		
	14	Consider Adopting the Noise Contours once the Air Installation Compatible Use Zone (AICUZ) is Updated for 27 SOW	Updated noise contours should be adopted by the local jurisdictions affected.		x	
	15	Work to Evaluate Use of Existing Transmission Corridors	Work with a Renewable Energy Transmission Authority (RETA) and utility providers to evaluate the opportunity to use existing transmission corridors prior to developing new corridors and, where required, to develop new proposed transmission corridors that do not interfere with military operations.	x		
	16	Feed the Force, Fuel the Force	Feed the Force and Fuel the Force initiatives are aimed at satisfying base needs through sustainable regional business and local produce. A creation of a regional planning partnership among government, military, developers, agricultural, and environmental agencies that would hold regular forums and look for regional growth solutions would need to be created.			x
Disclosures	17	Consider Developing/ Updating an Avigation Easement Program	Consider the development of an avigation easement program, which includes sample easement language, designates areas where avigation easements should be required, and determines the appropriate agency to hold such easements.		x	

Table 6.1 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Master Plans	18	Ensure Water Impacts in Plan Development/ Updates	Ensure comprehensive plan updates and other relevant plans consider impacts to water availability and quality through policy or other development regulations. Water availability can impact both the ability for the local community and the military to continue to develop. Conservation and additional resources are just as important as considering the impacts of any new development both on the installation and in the community.			x
	19	Involve Military in Comprehensive Plan Update Process	As local jurisdictions update their comprehensive plans, they should consider involving Cannon AFB officials in the process to ensure continued compatibility with military operations.		x	
	20	Investigate Infill	Investigate the possibility for infill development during the comprehensive plan amendment process, avoiding growth in areas where incompatibility exists.	x		
	21	Include Military Housing Needs Discussions in Comprehensive Plan Housing Section	During the next housing update, include a separate discussion of military housing needs and the programs to address these needs. Work collaboratively with military installations and local entities to address their needs to look at military readiness.	x		
Legislative	22	Protecting Military Missions with Legislation	Consider supporting the codification of New Mexico Executive Order (EO) 2004-046 into state law. The purpose of EO 2004-046 is to ensure compatible land use development near New Mexico's military installations. Codifying the EO into law could give directive to the state, county, municipal, and local agencies through the state to consider land use planning decisions around military installations.			x
Light	23	Determine Dark-Sky Funding Source	Consider initiating a light and glare working group to evaluate appropriate lighting standards within applicable development codes to protect military operations from the impacts of light and glare. For portions of the study area identified by the military as critical to dark-sky initiatives, evaluate funding sources available to help with lighting retrofit programs.		x	
MOU	24	Coordinate Memorandum of Understanding (MOU)	An MOU is a contract among two or more government entities. The governing bodies of the participating public agencies must take appropriate legal actions – often adopting an ordinance or a resolution – before such agreements become effective.	x		
Military Ops Area	25	Develop Area of Interest Designations for Operations Area	Develop an "area of interest" designation for particular operation areas. That designation would be considered for use in comprehensive plans, as well as other planning documents (ALUP or Zoning Ordinance), to identify areas of military operations that need a site-specific review for compatibility. This process is being done with the approval of the JLUS.			x

Table 6.1 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe		
				0-2 Years	3-5 Years	Ongoing
Military Instruction Area	26	Evaluate Military Flight Patterns	Cannon AFB/Melrose AFR can evaluate the feasibility of rerouting military flight operations (if there are areas with problems) while still meeting mission requirements.	x		
Real Estate	27	Consider Modifying Disclosure Notices for Military Operations	Disclosures ensure that sellers, buyers, and agents involved in real estate transactions are protected from potential liability for not informing the other parties of circumstances that may not be evident by viewing a property. The New Mexico boards have standardized agreements with diclosures sections included in Appendix A. Work with local real estate and military representatives to develop and implement language to include in disclosure notices pertaining to noise and safety considerations associated with military missions.	x		
Land Regulations	28	Consider Using Subdivision Regulations to Minimize impacts	Encourage subdivision regulations to allow for clustering of units to minimize areas affected by military operations. Encourage subdivision regulation to add certain plat notes to protect the buyer and the military.		x	
	29	Determine Density Limitations Needs	Examine the need for density limitations within flight corridors in consultation with the military.	x		
	30	Ensure Compliance with Federal Aviation Administration (FAA) Part 77	If height restrictions are to be utilized, local jurisdiction should ensure that new regulations comply with FAA Part 77.		x	
	31	Consider Developing and Adopting a Tall-Structure Ordinance Including Height Review Categories and Letter of Clearance Requirements	Consider developing a tower and tall-structure ordinance regulating the location and lighting of tall structures via height review categories as determined by the jurisdictions with input from the military. All local governments within the JLUS study area should contact Cannon AFB and receive a "letter of clearance" before any structure in excess the height review category is reviewed and acted on by the local governments. The letter of clearance recommendations could include: 1) No Objection, 2) Conditional Determination, 3) Objectionable.		x	
	32	Consider Developing Wind Power Guidelines	Local jurisdictions working with the wind energy industry and the military could consider development of guidelines on the development of wind turbines and wind farms.		x	
	33	Consider Developing Solar Power Guidelines	Local jurisdictions working with the solar energy industry and the military could consider the development of guidelines on the development of solar generating facilities.		x	

Table 6.1 | Cannon AFB Implementation Strategies Toolkit and Schedule

		Strategy	Explanation	Timeframe 0-2 Years	Timeframe 3-5 Years	Timeframe Ongoing
Land Regulations	34	Consider Developing and Adopt a Lighting Ordinance Minimizing Impacts on Cannon AFB Operations	Consider developing a lighting ordinance that addresses lighting requirements of towers/tall structures and other structures or places (i.e. ball fields, billboards, subdivisions, street lights, commercial, or industrial operations) where they would affect the base's night vision flight operations. Any areas or structures that are not properly lit can pose serious risks in harming military operations. Exterior lighting and light pollution can often interfere with night vision training. Lighting requirements can include both directional lighting design and safety lighting of towers/tall structures.		x	
	35	Consider Developing and Adopting Noise Attenuation Standards within the Defined Noise Contour Zones	Noise attenuation construction standards would require a certain decibel reduction inside the home within specific noise zones. For example, location in a day-night average sound level (DNL) 75 and above would require a 35 dB reduction. Location standards would include permitting manufactured homes only in certain noise zones, but not in others and would limit noise sensitive uses to the outer edges of certain noise zones and not allow them at all in other noise zones.		x	
	36	Amend and Update Local Comprehensive Plans and Land Development Codes and Maps	Plans should be amended as necessary to include the noise contour zones, height obstruction zones, Cannon AFB activity zones, or other applicable new zoning and character areas.		x	
	37	Research Further Development Tools for Possible Development Control, Such as TDR Policies	Local governments undertake TDR programs to use the market to implement and pay for development density and location decisions. TDR programs allow landowners to sell development rights from their properties in government-designated low-density "sending" areas, and sell them to purchasers who want to increase the density of development higher density "receiving" areas. TDR programs do not reduce the need for zoning and can actually be more complex to administer and therefore need to be researched carefully prior to implementing.		x	
	38	Consider Establishing and Adopting One or More Special Airfield Zoning Districts or Zoning Overlay Districts (Based on the Noise Contour Zones and Height Obstruction Zones)	This increases compatibility of proposed development with Cannon AFB operations and slowly over time phase out incompatible development and uses. Such zoning districts may regulate the density of population by specifying minimum acres per lot, maximum concentration of people in one location for events or at employment sites, setbacks, prohibited and permitted uses, nonconforming uses, permits and variances, etc.		x	

6.4.2 Toolkit Details

This section provides more detail for some of the tools listed in Table 6.1, Cannon AFB Implementation Strategies Toolkit and Schedule. Examples of some of the tools listed in Table 6.1 can be found in Appendix B.

JLUS Implementation Committee

This committee would focus on continued communication after this study between Cannon AFB officials and local boards, agencies, and authorities that will help maintain the viability of Cannon AFB. This committee could provide a joint effort by Cannon AFB officials, the public, local governments, local boards and agencies, and other groups to help ensure that the recommendations in this study are implemented.

- The committee should be established soon after the JLUS is adopted to help ensure implementation of the JLUS recommendations.
- All affected communities and the military should have a representative on the committee.
- The committee should meet as needed to start and move to quarterly meetings once implementation of recommendations has begun.
- The committee's primary goal should be to coordinate on various issues that would require policy and implementation changes.
- The committee should help coordinate with military on outreach programs.

Regional Advisory Board

Although not a specific strategy in the toolkit, such a group could be used to help with a number of tools in the coordination tab. This board could also be part of a bigger regional board through the regional growth management office. This board could, in part, help ensure technical communication between the installation and local governments. This board should consist of review staff from each jurisdiction and installation.

- The board should meet as needed. The main triggers to meet are the following:
    a. To formalize a portion of the development review process to determine when a full board review would be required compared with when only military review would be required within the study area
    b. To discuss development or permit applications within the JLUS boundary study area
    c. To receive updates from the installation on changes and developments on base
    d. To discuss military housing needs and action plans
    e. To review and comment on any comprehensive plan updates from surrounding jurisdictions
- This board should assist in technical review of new policy recommendations by the implementation committee as needed.

Memorandum of Understanding

A Memorandum of Understanding (MOU) is a contract among two or more government entities. The governing bodies of the participating public agencies must take appropriate legal actions, often adopting an ordinance or a resolution, before such agreements become effective.

The purpose of an MOU is to establish a formal framework for coordination and cooperation. These agreements may also assign roles and responsibilities for all of the agreement's signatories. MOUs generally promote:

- Coordination and collaboration by sharing information on specific community development proposals, such as tall structures and subdivision plats
- Joint communication among participating jurisdictions, agencies, and the military to help ensure that residents, developers, businesses, and local decision-makers have adequate information about military operations, possible effects on surrounding lands, procedures to submit comments, and any additional local measures to promote land use compatibility around installations
- Formal agreement on cooperative land use planning activities, such as implementation of the recommendations of this JLUS

Outreach Program

Such a program can create and distribute educational information for the public and inform citizens, planning staff, and local officials within the area of the importance of Cannon AFB about any planning issues that may arise.

Noise Contours as Zones for Noise Attenuation, Construction Standards within those Zones

Noise attenuation construction standards would require a certain decibel reduction inside homes within specific noise zones. For example, location in a Day-Night Average Sound Level (DNL) 75 decibels (dB) and above might require a 35 dB reduction. Location standards would include permitting manufactured homes only in certain noise zones and would limit noise-sensitive uses to the outer edges of certain noise zones and not allow them in other noise zones. This tool would require:

- Coordination with the local jurisdiction and the Construction Industry Division (CID).
- Adoption of regulations within the limited areas of the noise contours noise attenuation construction standards are met.

One or More Special Airfield Zoning Districts or Zoning Overlay Districts

It is important to adopt regulations within the APZ I and APZ II zones for safety. Development rights were bought through easements; however, knowledge and enforcement of those easements is uncertain. Creating an overlay and talking to the State Construction Industry about county review prior to building permits will help address implementation measures as presented in the County Comprehensive Plan: Land Use Implementation Measure 3. Adopt land use regulations in the vicinity of Cannon AFB that are consistent with the current Air Installation Compatibility Use Zone report prepared for the AFB to protect the operations of the base in the future. This increases compatibility of proposed development with Cannon AFB operations and slowly phases out incompatible development and uses. Such zoning districts could regulate the density of population by specifying minimum acres per lot, maximum concentration of people in one location for events or at employment sites, setbacks, prohibited and permitted uses, nonconforming uses, permits and variances, etc.

- Land uses/heights could be adopted as stated in the easements, which closely follow Table 4.1.
- It is recommended that land uses be adopted as shown in Table 4.1 for noise contours when amended by a new AICUZ study.
- State statues 3-39-16 through 26 allow the governing municipality the right, based on an airport approach plan, to regulate the land uses permitted, regulate and restrict the height to which structures and trees may be erected or allowed to grow, and impose such other restrictions and requirements as may be necessary to effectuate the legislative body's approach plan.

Real Estate Disclosure Statements

Disclosures are used to ensure that the sellers, buyers, and agents involved in real estate transactions are protected from potential liability for not informing the other parties of circumstances that may not be evident by simply viewing a property. The New Mexico boards that guide transactions for both commercial and residential property have standardized agreements with disclosure sections.

Cannon AFB and Melrose AFR should work with the state boards of real estate and the local real estate community to help ensure proper disclosure is provided. The Air Force should work with the boards to define an area around Cannon AFB and Melrose AFR where disclosures would be required and to develop and implement language to include in disclosure notices pertaining to noise and safety considerations associated with military missions.

Strategies and Potential Funding Sources

Once critical properties are identified and prioritized by the Air Force, Purchase of Development Rights (PDR) is a possible voluntary program in which a land trust or other agency, usually linked to local government, makes an offer to a landowner to buy the development rights on the parcel. Once an agreement is made, the property is placed under a permanent deed restriction, which restricts the type of activities that may take place on the land in perpetuity. This strategy is dependent on securing a funding source, and enforcement is dependent on that funding source. Possible options to consider include partnering opportunities utilizing:

- Department of Defense (DoD) Readiness and Environmental Protection Initiative
- Trust for Public Land

Tower/Tall Structure Ordinance

Any person/organization who intends to sponsor any of the following construction or alterations must notify the County, which will then notify Cannon AFB:

1. Any construction or alteration that is more than 200 feet above ground level (AGL) at its site
2. Any construction or alteration that exceeds an imaginary surface extending outward and upward

at any of the following slopes:

a. 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 feet in actual length, excluding heliports

b. 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports

c. 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

3. Any highway, railroad, or other traverse way for mobile objects, of a height that, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

4. Any construction or alteration on any of the following airports and heliports:

   a. A public use airport listed in the Airport/Facility Directory

   b. A military airport under construction, or an airport under construction that will be available for public use

   c. An airport operated by a federal agency or the DoD

   d. An airport or heliport with at least one FAA-approved instrument approach procedure.

5. You do not need to file notice for construction or alteration of:

   a. Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation

   b. Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose

   c. Any construction or alteration for which notice is required by any FAA regulation

   d. Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure

Although the Cannon Air Force Base would have regulations in place to be notified of vertical obstructions, Cannon Air Force Base would lack land use control authority. Cannon Air Force Base has the responsibility to evaluate structures and determine whether they present hazards to air navigation; however, Cannon Air Force Base's only remedies are marking, lighting, and communicating the hazard to the flying community. It does not have the authority to prohibit construction of a structure that presents a hazard. This authority is reserved for state and local governments, if applicable.

One of three responses is typically issued:

- No Objection: The subject construction did not exceed obstruction standards, and marking/lighting is not required.
- Conditional Determination: The proposed construction/alteration would be acceptable contingent upon implementing mitigating measures (marking and lighting, etc.).
- Objectionable: The proposed construction/alteration is determined to be a hazard and is thus objectionable. The reasons for this determination

are outlined to the proponent.

Transfer of Development Rights Policies

If Transfer of Development Rights (TDR) is a tool that any county would like to use, zoning or density restrictions must be in place countywide for this program to work effectively. A lower-density "sending" area and a higher-density "receiving" area are needed. The TDR program allows landowners to sell development rights from their properties in government-designated "sending" areas to purchasers who want to increase the density of development in "receiving" areas. TDR programs offer many advantages to control land use and also compensate landowners for restrictions on the development potential of their properties. Although TDR programs have many challenges, TDR programs do not reduce the need for zoning and can actually be more complex to administer and regulate. Therefore, they need to be researched carefully prior to implementation.

Feed the Force/Fuel the Force

Feed the Force and Fuel the Force initiatives are aimed at satisfying base needs through sustainable regional business and local produce. Feed and Fuel the Force initiatives involve the development of local food systems as well as alternative and value-added crop production. A creation of a regional planning partnership among government, military, developers, agricultural, and environmental agencies that would hold regular forums and look for regional growth solutions would need to be created.

Energy Executive Orders for Military

The targets, summarized below, are set forth in the following acts, executive orders (EOs), and guidance:

- Energy Policy Act 2005 (EPAct 05)
- Energy Independence and Security Act 2007 (EISA 07)
- EO 13423
- American National Standards Institute/ Management System for Energy (ANSI/MSE) 2000:2005
- Army Energy and Water Campaign Plan for Installations (AEWCPI)

The five initiatives stated in the AEWCPI of 2007 include the following:

- Eliminate energy waste in facilities.
- Increase energy efficiency in renovations and new construction.
- Reduce dependence on fossil fuels.
- Conserve water resources.
- Improve energy security.

Targets generated from the EOs and guidance include the following:

Water

- Reduce potable water consumption intensity 2 percent annually, or 26 percent total, through 2020 (EO 13514).
- Reduce agency industrial, landscaping, and agricultural water consumption by 2 percent annually, or 20 percent total, by 2020 (EO 13514).
- Identify, promote, and implement water-reuse strategies that reduce potable water consumption (EO 13514).
- Implement and achieve stormwater management guidance objectives (EO 13514).

Renewable Energy

- Ensure minimum purchases of energy from renewable sources such that 5 percent is achieved through 2010, and 7.5 percent is achieved by 2013, and each year thereafter (quantity generated can be doubled against goal if produced and used on a federal facility) (EPAct 05).
- Ensure that at least 50 percent of the renewable energy is from new (after 1 January 1999) resources (EO 13423).
- Ensure 25 percent of electrical energy is from renewable sources (National Defense Authorization Act).
- Meet 30 percent of the hot water demand in new buildings and major renovations through the use of solar hot water heaters, if life-cycle cost effective (EO 13423).

Regional and Local Planning

- Participate in regional transportation planning and recognize transportation infrastructure (EO 13514)
- Align with federal policies to increase effectiveness of local planning for energy choices (EO 13514)
- Ensure planning for new federal facilities or leases considers sites that are pedestrian friendly, near existing employment centers, accessible to public transit, and that it emphasizes existing central cities or existing or planned town centers (EO 13514)
- Identify impacts in Environmental Impact Statements (EISs) and EISs for new or expanded federal facilities (EO 13514)
- Coordinate with regional programs for ecosystem, watershed, and environmental management (EO 13514)

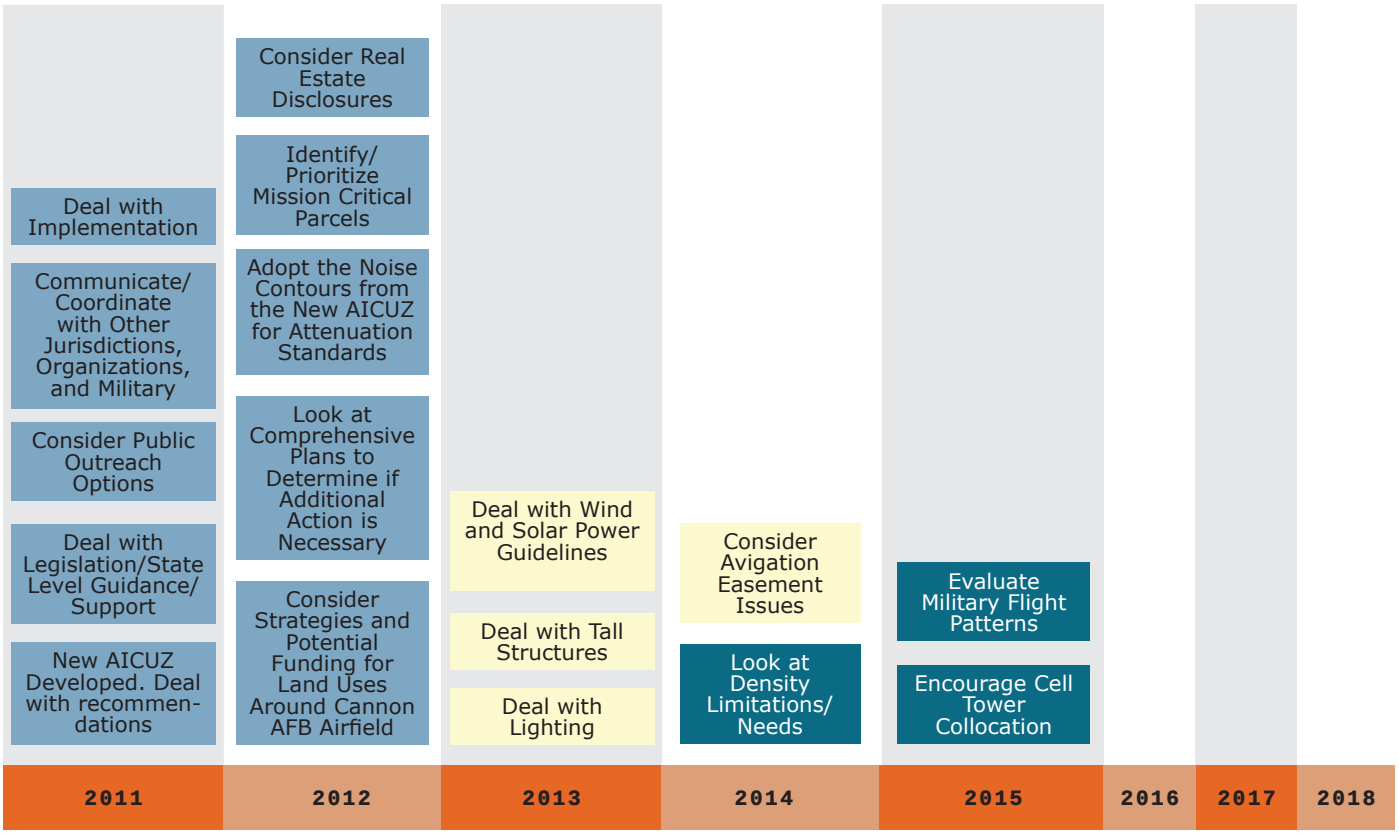
6.4.3 Implementation Schedule

See Figure 6.1 below.

6.5 Conclusions

The surrounding communities and Cannon AFB officials have a good relationship. Curry County has made a significant start toward maintaining compatibility by buying the development rights around Cannon AFB in the CZ and APZs. The next step needs to be taken to ensure there is oversight and enforcement of those easements. All affected communities need to work with the CID to help ensure that the "Talk Early, Talk Often" ideal occurs before structures are permitted. These are the next steps to ensure that Cannon AFB and Melrose AFR continue to be part of the community.

Figure 6.1 | Implementation Schedule



Curry Road R Closure

7.1 Procedures for Closing Curry Road R, Prepared by the County Attorney

To: Mr. Robert Sandoval, Chairman
Curry County Commission

Re: Closure of County Road "R"

PROCEDURES FOR CLOSING CURRY ROAD R
OVERVIEW

The United States Air Force, through its representatives, has initiated conversation regarding the overall safety, wellbeing and security of Cannon Air Force Base and its personnel as well as safety issues to potential motorists, due to the location of a county road to their facility. The portion of road that is in issue is a three (3) mile stretch of Curry Road "R" that runs south of US Highway 60/84 to the intersection of Curry Road 7. Curry County has also received a memorandum from Colonel Leahy, the previous Commander of Cannon Air Force Base, regarding County Road R concerns. The memorandum was dated December 30, 2008 and sets forth certain concerns regarding the proximity of County Road R to the west parameter of the Cannon Air Force Base facility. In addition, the County Commission has been briefed by Colonel Leahy and others regarding the specific issues and the United States Military's need for additional security and a "Buffer Zone" to its facility.

Curry Road R, at the present time, runs adjacent to the west boundary line of Cannon Air Force Base. The road runs parallel to the west boundary fence of Cannon Air Force Base which, serves not only as a indicator of the Base property but also, is a security line barring non-military personnel from obtaining access to the base. Portions of the road, and in particular, those parts of Curry Road R just north and south of the intersection with Curry Road 9 and, just south of the intersection of Curry Road 8 are within the direct flight path of Cannon Air Force Base's two (2) operating runways. Due to the recent changes in operations at Cannon Air Force Base, which has resulted in a shift from small jet propelled planes to the larger four engine propeller planes, the issue and concern of the safety of vehicles and passengers on Curry Road R has increased.

In addition, Cannon Air Force Base has previously requested that the Santa Fe Railroad change their policies so that trains approaching the crossing at the intersection of County Road R and

US 60/84, not blow their whistle. This railroad crossing is in close proximity to the housing area of Cannon personnel and is presently creating a quality of life issue.
The health and safety issue to motorists and to Cannon Air Force Base personnel are matters of great concern to the Curry County Commission. To alleviate these concerns, the issue of closing Curry Road “R” has been brought up. Closing Curry Road “R” from south of US Highway 60/84 to the intersection of Curry Road 7 would alleviate the concerns expressed by Cannon Air Force Base, as well as the concerns regarding the safety of motorists traveling this portion of Curry Road “R”. I have researched the issue and have determined that the New Mexico legislature has created a statutory framework within which County Commissions can close established public roads such as County Road “R”. There may also be, under the general health and safety provisions granted to Curry County, procedures available whereby travel on Curry Road “R” could be limited and/or restricted.

PROCEDURE FOR CLOSING CURRY ROAD "R"

By Ordinance 99-08,Curry County has adopted a County Road Policy. The Road Policy follows and is consistent with New Mexico statutes pertaining to closing county roads.

The process of closing, vacating or altering any county road is set forth in New Mexico Statutes §67-5-1 *et. seq.* The statutory procedures for closing County Road "R" are set forth in §67-5-4. That statute reads:

> Whenever, in the opinion of the board of county commissioners of any county, any road or part of a road then established and maintained as a public highway is not needed, or the repairs of the same are burdensome and in excess of the benefits therefrom, they may at a regular meeting appoint a board of commissioners of three freeholders of the county as viewers, to view such road or part of road, and make report thereof to the board of county commissioners at their next regular meeting, setting forth fully their finding, and if they recommend a discontinuance of such road or part of road, then the board of county commissioners may order the same vacated: provided, that if such road runs on the county line between two counties, the county commissioners of both the counties interested shall appoint viewers and the concurrence of the county commissioners of both counties shall be necessary to vacate it.

There are also other statutory provisions that make reference to the County Commissioners' power to close county roads. Section 67-2-7 states that any owner of land that is adjacent to County Road "R" can Petition the County Commission to abandon or vacate Curry Road "R". Sections 67-2-4, 67-2-6 and 67-2-7 also relate and provide for the vacation or abandonment of public highways, streets or roads by formal declaration of the State or any political subdivision, such as Curry County. The New Mexico Supreme Court in the case of Chavez v. County of Valencia, 85 NM 205, 521 P2d 1154 (1974) interpreted these three (3) statutes as being in pari materia and ruled that all three (3) statutes should be construed so as to give effect to every provision and held that the three (3) statutes set forth an intent by the New Mexico Legislature to provide a formal procedure for the abandonment or vacation of public roads. However, none of these statutes set forth any procedure for the County Commission to follow in closing the road. Without any specific procedure, I would interpret these statutes to read that upon a Petition being filed by a landowner to close or abandon a road, the County Commission could consider that request, but would have to fall back on and
utilize the specific procedure set forth in Section 67-5-4. Therefore, I do not believe that these other statutory provisions alter or change the method and/or manner by which the Curry County Commission can close and/or vacate Curry Road "R".

As you can see, under Section 67-5-4, there are two (2) legal justifications for the Board of County Commissioners to close County Road "R". The first basis would be that County Road R is no

longer needed as a county road. The second basis is that the reasonable and necessary repairs and upkeep on County Road “R” are burdensome and in excess of the benefits to Curry County that would be realized therefrom. The statute does not require any type of formal evidentiary hearing by which the County Commission determines whether there is a need to close County Road “R”. There are several Court cases that, while not directly on point, indicate that the County Commission does not need to make a formal finding or otherwise formerly state the reasons why they made the determination to close the road. I bring this up because, under the statute, the County’s willingness to work with Cannon Air Force Base, and/or its understanding of the security issues created by the current location of County Road “R”, do not form a proper valid basis under New Mexico statutes, for the Commissioners to close the county road. Therefore, throughout this memorandum I will address the criteria set forth in Section 67-5-4.

The Curry County Road Policy sets forth certain “Priorities for Road Vacations”. This provision seems to add another set of criteria that the Commission must follow before it can close the road. That section of the County Road Policy reads as follows:

> 2. ...The County Commission may permanently vacate a County road when it can be determined that the road will not in the foreseeable future be necessary, beneficial, or valuable for public use as a County road, and as such the county would not in the foreseeable future be in a position after such road is vacated, to have to obtain and use county funds to reacquire right-of-way to the road, and the road is not currently or in the foreseeable future valuable, necessary or beneficial for any of the following purposes, al of which are hereby declared to be of substantial value to Curry County:
>
> a. Used as officially declared school bus route or postal road.
> b. Serves as primary farm to market road which has and may provide substantial revenues for the County.
> c. Serves as primary access for production of minerals which may provide substantial revenues to the county.
> d. Serves as primary access to recreational areas for a substantial number of Curry County citizens.
>
> 3. Review and Approval Required for Permanent Road Vacations. Except as otherwise specified in this policy, and in accordance with all statutory and other legal requirements, permanent road vacations shall be reviewed and considered for final approval in accordance with provisions of this policy which provides that the Curry County Commission designates a Board of Freeholders to view a permanent road vacation, which must be held in accordance with this policy. Final consideration for approval of

such roads will be in accordance with this policy.

4. The legal publication hereof, notices shall be posted in three of the most public places along the road proposed for permanent closure, at least five days previous to the day fixed for the view thereof, giving parties in interest notice of the time and place for viewing such road.

The portion of County Road “R” to be closed, which is south of Highway 60/84 to County Road 7, directly serves only one (1) residence. The road itself has been in existence for a considerable period of time and, in fact has been in use and existence prior to Cannon Air Force Base opening and becoming operational. The various uses for this road however have changed. In the past, County Road “R” was a regularly used Farm to Market Road. At the present time, other than for the landowners whose farmland abut up against County Road “R”, the only other use of County Road “R” is to provide an access north for those individuals traveling west on Curry Road 7. I do not believe, from my analysis in studying, that any of the priorities as identified in the Curry County Road Policy are applied to this portion of County Road “R”. Therefore, if the present needs are determined to be minimal or can be addressed and dealt with by other routes, then the County Commission could find that County Road “R” is no longer needed as a part of the overall Curry County road system.

On the other hand, if the needs of Cannon Air Force Base, and the motoring public warrant a complete renovation of Curry Road “R”, and perhaps replacement of the existing railroad crossing, the County Commission could determine that the costs for the renovation/repair of Curry Road “R” exceed the benefit it provides to the motorists who presently use it. The Santa Fe, Atkinson and Topeka Railroad has suggested and presented a plan to Cannon Air Force Base and Curry County to change the existing railroad crossing on County Road “R” to a “quiet-zone” crossing. The Railroad would pay for the changes to the crossing itself but, the future maintenance of the crossing would be turned over to Curry County. More importantly however, liability for any accidents, incidents, death and/or injuries at this intersection because of the quiet-zone designation, would be the responsibility of Curry County. This could be a very costly undertaking for the County, and the Commission could determine that the costs and expenses in keeping this part of Curry Road “R” open exceed any benefit to the County.

The initial step to close County Road “R” would be a determination that one (1) of the specific requirements had been met and the Commission votes to close this portion of the road. To do this, the Curry County Commission would have to include on its agenda, at a publicly held meeting, an action item to discuss the closure of Curry Road “R”. The matter could be discussed among the Commissioners with or without public input. There is no requirement for an evidentiary hearing. If, at that meeting, the Curry County Board of Commissioners were to make a decision to close Curry Road “R”, then pursuant to the statute, at that meeting or at another regular meeting, they would need to appoint a board of three (3) viewers who are freeholders within the County. A freeholder is simply a property holder and, under statute, a viewer would be any person who owns land in Curry County. The statute does not require that any of the viewers be situated in the general vicinity of

Curry Road “R”.

In the past when the Board of Commissioners has been asked to alter an existing road or create a new road, it has traditionally chosen viewers that live in close proximity to the road in question. However, it must be noted that the provisions for altering an existing road and/or for opening a new road are statutorily different than the procedures for closing a county road. The procedures for closing a county road are all contained in §67-5-4. The procedures for altering or establishing a new road are set forth in §67-5-5 through 67-5-7. However, the procedures on appointing viewers for altering an established road or opening a new road, and the power and role of the viewers are set forth in §67-5-8 through 67-5-16. The statutory provisions for closing a road are fairly simple compared to the statutory provisions pertaining to alteration of an existing road or opening a new road. Therefore, regardless of any past procedure followed by the Curry County Commission with regard to the alteration of an existing road or opening of a new road, I do not believe that this would be binding on the Curry County Commission with regard to appointment of viewers to consider the closure of County Road “R”.

The three (3) viewers selected by the County Commission would then be responsible for going out, looking at Curry Road “R” and recommending to the Board of County Commissioners whether the road should be closed or remain open. The Curry County Road Policy, in Section 4.2.4 requires that

> “Notices shall be posted in three of the most public places along the road proposed for permanent closure, at least five days previous to the day fixed for the view thereof, giving parties in interest notice of the time and place for viewing such road.”

Even though this is not a statutory requirement, it has been adopted by the County Commission as an Ordinance and therefore, needs to be followed and complied with as well.

Should the viewers recommend closure of the road then, the County Commission would have the legal authority at their next regular meeting, to officially close Curry Road “R” and remove it from the County’s Road List. I would recommend that the procedure for voting on the closure of Curry Road “R” simply be addressed as an action item in the agenda. It does not need to be in the form of a Resolution or an Ordinance. An Ordinance certainly would not work since, by statute, the Commission would have to act on the viewers’ report at its first meeting. An Ordinance takes at least a month from the time that the Notice of Intent to Adopt an Ordinance until final action can be taken. A Resolution does not need any additional time but, without knowing what language the Commission wanted in the Resolution or how they want it addressed, there might be difficulties in getting a Resolution prepared at that meeting.

There is no case law in New Mexico setting forth what facts are necessary for a board of county commissioners to determine whether a road is needed or the repairs for the road are burdensome and in excess of the benefits in keeping the road open. I do not believe that the Curry County

Commission will have to make any type of special findings or otherwise try to justify their actions in the event that, at a regular meeting, they make a determination to close the road. However, at that meeting, or shortly thereafter, the Commission will have to address the issue of access for property owners, whose land is adjacent to Curry Road “R” and, the issue of an alternate route for motorists who wish to go north off of Curry Road “R”.

If the road is closed, a claim may be asserted against the County for damages by any person who sustains special damages as a result of the closing of County Road “R”. By special, it would have to be a unique damage to them and not those damages suffered or sustained by the general public at large or, by the general public that uses County Road “R”.

As I mentioned, there is one (1) residence situated off Curry Road “R”. This person(s) would lose access to their house which is a unique/special damage for which they would need to be compensated. Similarly if the remaining landowners who own property abutting Curry Road “R” were denied access to their properties, then they will have incurred a similar type of special damage. Their damages may be considered as a taking of their property by the County, similar to a condemnation and, they could be entitled to compensation from the County for the highest and best value of the property.

Under New Mexico statutes, I believe that this is the only possible procedure that the Commission can follow in closing Curry Road “R”. I have researched other statutes including condemnation and eminent domain, and have concluded that neither of these statutes are applicable to this situation. Those statutory provisions allow a means and methods by which the County can obtain and/or acquire ownership and possession of property. In this proceeding, the County already owns Curry Road “R” and holds it in trust, for the general public, as public roads.

Should the viewers vote not to close the County Road then, I am not aware of any other procedure available that would allow the Commission to close this portion of Curry Road “R”. I can find nothing in the statutes showing that the Commission could not, at a later meeting, pick up the subject again and, appoint a board of three (3) different viewers. That might raise a challenge by any person opposed to closing the County Road but, again, I can find no statutory provision that would prohibit the Commission taking the matter up again with a second group of viewers.

There are numerous cases in New Mexico that clearly provide that a governmental unit, whether it is the State of New Mexico, a County or City, can exercise its police powers to limit or regulate traffic on roads within its jurisdiction. In the case of *Primus v. City of Hot Springs* 256, P2d 1065, 57 NM 190 (1953), the New Mexico Supreme Court stated that Cities have full and complete charge over their streets. By law, Counties have the same powers that Cities have. Therefore, using its police power, the County Commission would have the authority to limit and restrict travel on Curry Road “R”. Utilizing its police powers, the County Commission could impose rules and regulations that would limit access to and/or even the use of County Road “R”. The road could be designated as not a through street, traffic could be limited to property owners only and other restrictions such as time of use, etc. could also be placed on the road. I do not believe that this

would satisfy the concerns expressed by of Cannon Air Force Base but, in the event that the viewers do not agree to close Curry Road “R”, the Commission could, impose some kind of travel restrictions on the road and, then, at a later date, consider the issue again. With restrictions in place, a different group of road viewers may reach a different result on the question of closing Curry Road “R”.

ACTION BY COUNTY COMMISSIONERS

If the viewers agree to close Curry Road “R”, then the Board of County Commissioners needs to develop a plan that would allow the motoring public traveling on Curry Road 7 to reach US Highway 60/84. An alternative route could be Curry Road “S” or Curry Road “T”. Those roads, as well as an extension of Curry Road 7 westward, would have to be improved to accommodate any increased travel load.

The railroad crossing at either Curry Road “S” or Curry Road “T” would also have to be improved and enhanced. If Curry Road “R” is closed, then the railroad could close entirely the crossing that presently exists on Curry Road “R”. This would result in a substantial savings to the railroad. Therefore, the railroad should be requested to contribute or participate in funding on the development and improvements to the new railroad crossing.

The access off of and onto Highway US 60/84 at the alternative road, Curry Road “S” and/or Curry Road “T” would also have to be improved and enhanced. This would have to be done in conjunction with the New Mexico Department of Transportation.

There is no need for the County Commission to adopt an ordinance or take any other type of formal action. The vote taken by the viewers, when announced in a public meeting, followed by the Commission’s acceptance of the viewer’s report and approval of a motion to close Curry Road “R”, from US Highway 60/84 south to Curry Road 7 would be sufficient to close Curry Road “R”.

Respectfully Submitted:

DOERR & KNUDSON, PA

_____

Stephen Doerr
212 West First Street
Portales, NM 88130
575-359-1289

7.2 Resolution 2009-34

RESOLUTION NO. 2009-34

THIS RESOLUTION is adopted by the Board of County Commissioners of Curry County on this 23rd day of June, 2009.

WHEREAS, Curry County is the home of Cannon Air Force Base, a military installation under the direct control of the United States Air Force; and

WHEREAS, Curry County, has, for the past several years, been working with Command Staff at Cannon Air Force Base to identify potential problems regarding the operation and use of Cannon Air Force Base's runway, and quality of life issues, that are affected by continued public use of Curry Road R; and

WHEREAS, Curry County has recently been approached by representatives of Cannon Air Force Base with their request regarding the closing of County Road R; and

WHEREAS, the westward expansion of the perimeter fence of Cannon Air Force Base would address and resolve a majority of the concerns expressed by the United States Air Force and it would also result in the closure of Curry Road R from U S Highway 60-84 South to CR 7; and

WHEREAS, to allow for public convenience and access around Cannon Air Force Base if County Road R were to be closed, the Board of County Commissioners has determined that chip sealing and making an alternate all weather public road from New Mexico 467 to US 60-84 is needed; and

WHEREAS, there is one (1) family that resides on the portion of Curry Road R that would loose access to their property if that road were closed.

WHEREAS, Curry County at this time does not have sufficient funds to construct

an alternate route from New Mexico 467 to US 60-84 and to assist the one (1) displaced family.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Curry County as follows:

1) The Board of County Commissioners of Curry County believes it to be in the public's best interest to close in its entirety, Curry Road R from US Highway 60-84 south to CR 7 and to construct an alternate chip sealed road from New Mexico Highway 467 to US Highway 60-84, at an estimated cost of two million dollars ($2,000,000.00).

2) The closure of Curry Road R would assist and be in the best interest of the United States Air Force as it would allow the Air Force to deal with the safety issues pertaining to public use of Curry Road R and allow them to pursue expansion of the western perimeter fence of Cannon Air Force Base.

3) That Curry County should assist the family that will loose access to their property if Curry Road R is closed.

4) That the Curry County manager is instructed to immediately proceed with applying for/requesting federal and/or state funds as well as other grant funds as may be necessary to cover the costs of this project pertaining to the closing of Curry Road R from US Highway 60-84 south to CR 7 and establishment of a new chip sealed alternative route from NM 467 to US Highway 60-84.

BE IT FURTHER RESOLVED that the Board of County Commissioners of Curry County do hereby request the support and assistance on this project from the City of Clovis, Cannon Air Force Base and other related and involved entities in obtaining grants

and funds to insure the implementation of this project.

DONE this 23rd day of June, 2009.

CURRY COUNTY:

By: Frank Blackburn
Commission Chairman

ATTEST TO:

Coni Jo Lyman, County Clerk

7.3 Resolution 2009-35

RESOLUTION NO. 2009-35

THIS RESOLUTION is adopted by the Board of County Commissioners of Curry County on this 23 day of June, 2009.

WHEREAS, the Board of County Commissioner's of Curry County have adopted Resolution No. 2009-40 dealing with the closure of Curry Road R from US Highway 60-84 South to CR 7; and

WHEREAS, in Resolution No. 2009-40 the Board of County Commissioner's of Curry County stated that an alternative all weather public road from New Mexico 467 to US Highway 60-84 is needed; and

WHEREAS, an alternate road from New Mexico 467 West on CR 7 to CR T and then North from CR T to US 60-84 appears to be a viable alternative route upon the closing of Curry Road R.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Curry County as follows:

1) The Board of County Commissioners of Curry County believe it to be in the public's best interest that upon the closing of Curry Road R from US Highway 60-84 South to CR 7, an alternate chip sealed road from New Mexico Highway 467 along CR 7 to CR T and then North on CR T to US Highway 60-84 be constructed.

2) That the Curry County manager is instructed to immediately proceed with applying for/requesting federal and/or state funds as well as other grant funds as may be necessary to cover the costs of this project pertaining to the establishment of a new chip sealed alternative route from New Mexico Highway 467 along CR 7 to CR T and then North

on CR T to US Highway 60-84.

BE IT FURTHER RESOLVED that the Board of County Commissioners of Curry County do hereby request the support and assistance on this project from the City of Clovis, Cannon Air Force Base and other related and involved entities in obtaining grants and funds to insure the implementation of this project.

DONE this 23 day of June, 2009.

CURRY COUNTY:

By: Frank B. Blackburn
Frank Blackburn
Commission Chairman

ATTEST TO:

Coni Jo Lyman, County Clerk

Sample Regulations/Ordinances/ Executive Order

This section includes the following documents:

- A.1 State of New Mexico Executive Order No. 2004-046
- A.2 Airport Zoning Regulations
  - A.2.1 Alamogordo Municipal Airport Hazards Zoning Ordinance. (Code 1960, § 11-19-1; Ord. No. 511, 1-29-74)
  - A.2.2 New Mexico Municipal Airport Zoning Law
- A.3 Avigation Easement Examples (from the Kirtland AFB JLUS)
- A.4 Light Ordinances
  - A.4.1 Alamogordo Outdoor Lighting Ordinance
  - A.4.2 Las Cruces Outdoor Lighting Ordinance
  - A.4.3 New Mexico State Statute (Night Sky Protection Act)
- A.5 Real Estate Disclosure
  - A.5.1 Realtors Association of New Mexico Property Disclosure Statement – Residential
  - A.5.2 Sample Real Estate Disclosure (from the Scott AFB JLUS)
- A.6 Wind Energy Ordinance/Guidelines
  - A.6.1 Jefferson County, Idaho
  - A.6.2 Morton County, North Dakota
- A.7 Existing State Building Guidelines
  - A.7.1 State of New Mexico Building Permit Guide for Residential Construction
  - A.7.2 State of New Mexico Tower-Mounted Small Wind Turbine Systems Guidelines and Procedures for Permitting

A.1 State of New Mexico Executive Order No. 2004-046

State of New Mexico
Office of the Governor

Bill Richardson
Governor

EXECUTIVE ORDER NO. 2004-046

LAND-USE PLANNING AND MILITARY INSTALLATION COMPATIBILITY

WHEREAS, New Mexico is proud to be the host of four outstanding military installations: Cannon AFB, Holloman AFB, Kirtland AFB, and White Sands Missile Range; and

WHEREAS, New Mexico's military installations have long played a significant role in the national security posture of our country; and

WHEREAS, New Mexico's military installations contribute significantly to the economic well-being of our State and our counties; and

WHEREAS, New Mexico's military installations have also made a significant contribution to the scientific and technical resources of our State; and

WHEREAS, New Mexico's military installations have a regional impact within the State of New Mexico; and

WHEREAS, the Department of Defense has announced a Base Realignment and Closure round in 2005; and

WHEREAS, "Military Value" will be the main criteria against which our military installations are evaluated, and

WHEREAS, "Military Value" includes "the availability and condition of land, facilities and associated airspace (including training areas suitable for maneuver by ground, naval, or air forces throughout a diversity of climate and terrain areas);" and

WHEREAS, land-use planning by State agencies and other political subdivisions and municipalities in coordination with our military installations can assist in preserving available land for military readiness;

NOW THEREFORE, I Bill Richardson, Governor of the State of New Mexico, by virtue of the authority vested in me by the Constitution and the laws of the State of New Mexico do hereby direct all appropriate and relevant State agencies, which are involved with land-use planning to ensure compatible development with New Mexico's military installations. Further, I recommend that all political subdivisions and municipalities that adopt land-use plans and

State Capitol • Room 400 • Santa Fe, New Mexico 87501 • 505-476-2200 • www.governor.state.nm.us

enforce zoning regulations ensure that planned development is compatible with military installations, and that they consider the impact of new growth on "Military Value" when preparing zoning ordinances or designating land uses for land adjacent to military facilities or other parcels of land which are in proximity to military installations.

THIS ORDER supersedes any other previous orders, proclamations, or directives in conflict. This Executive Order shall take effect immediately and shall remain in effect until such time as the Governor rescinds it.

ATTEST:

REBECCA VIGIL-GIRON
SECRETARY OF STATE

DONE AT THE EXECUTIVE OFFICE
THIS 26th DAY OF AUGUST, 2004

WITNESS MY HAND AND THE GREAT
SEAL OF THE STATE OF NEW MEXICO

BILL RICHARDSON
GOVERNOR

A.2 Airport Zoning Regulations

A.2.1 Alamogordo Municipal Airport Hazards Zoning Ordinance. (Code 1960, § 11-19-1; Ord. No. 511, 1-29-74)

4-07-010. Short title.

This article shall be known and may be cited as the "Alamogordo Municipal Airport Hazards Zoning Ordinance."

(Code 1960, § 11-19-1; Ord. No. 511, 1-29-74)

4-07-020. Definitions.

As used in this article, unless the context otherwise requires:

Airport means the Alamogordo Municipal Airport, Alamogordo, Otero County, New Mexico.

Airport elevation means the established elevation of the highest point on the usable landing area, which is four thousand one hundred ninety-seven (4,197) feet, M.S.L.

Airport hazard means any structure or object of natural growth located on or in the vicinity of the airport, or any use of land near the airport, which obstructs the air space required for the flight of aircraft in landing or take-off at such airport or is otherwise hazardous to such landing or take-off of aircraft.

Board of appeals means the Otero County-Alamogordo Airport Zoning Board established by Ordinance No. 508 adopted by the city commission on November 13, 1973, and by Ordinance No. 73-1 adopted by the board of county commissioners of Otero County on November 29, 1973, as provided in Section 3-39-22(B) N.M.S.A. 1978 Compilation.

Cross references: Airport zoning board, § 4-07-130.

Height for the purpose of determining the height limits in all zones set forth in this article and shown on the zoning map, that the datum shall mean sea level elevation unless otherwise specified.

Nonconforming use means any structure, tree or use of land which is lawfully in existence at the time the regulation is prescribed in this article or an amendment thereto becomes effective, and which is inconsistent with the provisions of this article or an amendment thereto.

Nonprecision instrument runway. A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in nonprecision instrument approach procedure has been approved or planned, and for which no precision approach facilities are planned or indicated on an F.A.A. planning document or military service's military airport planning document.

Person means an individual, firm, partnership, corporation, company, association, joint stock association, or governmental entity. It includes the trustee, receiver, assignee or similar representative of any of them.

Precision instrument runway means a runway having an existing instrument approach procedure utilizing an instrument landing system (ILS) or a precision approach radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated on an F.A.A. approved airport layout plan; a military services-approved military airport layout plan; and other F.A.A. planning document, or military services military airport planning document.

Primary surface means a surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends two hundred (200) feet beyond each end of that runway; but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The width of the primary surface of a runway will be that width prescribed in Part 77 of the Federal Aviation Regulations for the most precise approach existing or planned for either end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway center line.

Runway means the defined area on the airport prepared for landing and take-off of aircraft along its length.

Structure means an object constructed or installed by man, including, but not limited to, buildings, towers, smokestacks, earth formations and overhead transmission lines.

Tree means any object of natural growth.

(Code 1960, § 11-19-2; Ord. No. 511, 1-29-74)

Cross references: Rules of construction and definitions generally, § 1-2.

4-07-030. Zones.

In order to carry out the provisions of this article, there is hereby created and established certain zones which include all of the land lying within the precision instrument runway approach to the zone, transition zones, horizontal zone and conical zone. Such areas and zones are shown on the Alamogordo Municipal Airport Zoning Map, consisting of one sheet, prepared by Quinton Daniel, the City Engineer,

Alamogordo, New Mexico, and dated December 1, 1972, which is hereby made a part hereof. The various zones are hereby established and defined as follows:

(1) Runway larger than utility with a visibility minimum as low as three-quarter-mile nonprecision instrument approach zone. The inner edge of this approach zone coincides with the width of the primary surface and is one thousand (1,000) feet wide. The approach zone expands outward uniformly to a width of four thousand (4,000) feet at a horizontal distance of ten thousand (10,000) feet from the primary surface, its center line being the continuation of the center line of the runway.

(2) Precision instrument runway approach zone. The inner edge of this approach zone coincides with the width of the primary surface and is one thousand (1,000) feet wide. The approach zone expands outward uniformly to a width of sixteen thousand (16,000) feet at a horizontal distance of five thousand (5,000) feet, fifty thousand (50,000) feet from the primary surface, its center line being the continuation of the center line of the runway.

(3) Transition zones. Transition zones are hereby established adjacent to each nonprecision instrument runway and approach zone as indicated on the zoning map. Transition zones symmetrically located on either side of runways, have variable width as shown on the zoning map. Transition zones extend outward from a line five hundred (500) feet (nonprecision instrument) and five hundred (500) feet (precision instrument) on either side of the center line of the nonprecision or precision instrument runway for the length of such runway plus two hundred (200) feet on each end, and are parallel and level with such runway center lines. The transition zones along such runways slope upward and outward one foot vertically for each seven (7) feet horizontally to the point where they intersect the surface of the horizontal zone. Further, transition zones are established adjacent to noninstrument approach zones for the entire length of the approach zone. These transition zones have variable widths, as shown on the zoning map. Such transition zones flare symmetrically with either side of the runway approach zone from the base of such zone, and slope upward and outward at the rate of one foot vertically for each seven (7) feet horizontally to the point where they intersect the surface of the horizontal and conical zones. Transition zones for those portions of the precision instrument approach zones which project through and beyond the limits of the conical surface, extend a distance of five thousand (5,000) feet measured horizontally from the edge of the approach zones and at ninety (90) degree angles to the extended runway center line.

(4) Horizontal zone. A horizontal zone is hereby established by swinging arcs of ten thousand (10,000) feet radii from the center of each end of the primary surface of each runway, and connecting the adjacent arcs by drawing a line tangent to those arcs. The horizontal zone does not include the approach and transition zones.

(5) Conical zone. A conical zone is hereby established as the area that commences at the periphery of the horizontal zone and extends outward and upward therefrom at a slope of 20:1 a distance of four thousand (4,000) feet. The conical zone does not include the precision instrument approach zone and the transition zone.

(Code 1960, § 11-19-3; Ord. No. 511, 1-29-74)

4-07-040. Zone heights limitation.

(a) Specific zones. Except as otherwise provided in this article, no structure or tree shall be erected, altered, allowed to grow, or be maintained in any zone created by this article to a height in excess of the applicable height limit herein established for such zone. Such applicable height limitations are hereby established for each of the zones in question as follows:

(1) Runway larger than utility with a visibility minimum as low as three-quarter-mile nonprecision instrument approach zone. Slopes upward thirty-four (34) feet horizontally for each foot vertically beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of ten thousand (10,000) feet along the extended runway center line.

(2) Precision instrument runway approach zone. Slopes upward fifty (50) feet horizontally for each foot vertically, beginning at the end of and at the same elevation as the primary surface and extending to a horizontal distance of ten thousand (10,000) feet along the extended runway center line; thence slopes upward forty (40) feet horizontally for each foot vertically to an additional horizontal distance of forty thousand (40,000) feet along the extended runway center line.

(3) Transition zones. Slopes upward and outward seven (7) feet horizontally for each foot vertically beginning at the sides of and at the same elevation as the primary surface and the approach zones, and extending to a height of one hundred fifty (150) feet above the airport elevation, which is four thousand one hundred ninety-seven (4,197) feet above mean sea level. In addition to the foregoing, there are established height limits sloping upward and outward seven (7) feet horizontally for each foot vertically beginning at the

sides of and at the same elevation as the approach zones and extending to where they intersect the conical surface. Where the precision instrument runway approach zone projects beyond the conical zone, height limits sloping upward and outward seven (7) feet horizontally for each foot vertically shall be maintained beginning at the sides of and at the same elevation as, precision instrument runway approach surface, and extending to a horizontal distance of five thousand (5,000) feet measured at ninety (90) degree angles to the extended runway center line.

(4) Horizontal zone. One hundred fifty (150) feet above the airport elevation or height of four thousand three hundred forty-seven (4,347) feet above mean sea level.

(5) Conical zone. Slopes upward and outward twenty (20) feet horizontally for each foot vertically beginning at the periphery of the horizontal zone and at one hundred fifty (150) feet above the airport elevation and extending to a height of three hundred fifty (350) feet above the airport elevation.

(b) Excepted height limitations. Nothing in this article shall be construed as prohibiting the growth, construction or maintenance of any tree or structure to a height up to fifty (50) feet above the surface of the land.

(c) Conflicting height limitations. Where an area is covered by more than one height limitation, the more restrictive limitation shall prevail.

(Code 1960, § 11-19-4; Ord. No. 511, 1-29-74)

4-07-050. Use restrictions.

Notwithstanding any other provisions of this article, no use may be made of land within any zone established by this article in such a manner as to create electrical interference with navigational signals or radio communication between the airport and the aircraft, make it difficult for pilots to distinguish between airport lights and others, result in glare in the eyes of pilots using the airport, impair visibility in the vicinity of the airport or otherwise in any way create hazard or endanger the landing, take-off or maneuvering of aircraft intending to use the airport.

(Code 1960, § 11-19-5)

4-07-060. Nonconforming uses.

(a) Regulations not retroactive. The regulations prescribed in this article shall not be construed to require the removal, lowering, or other changes or alterations of any structure or tree not conforming to the regulations as of February 15, 1974, or otherwise interfere with the continuance of a nonconforming use. Nothing contained herein shall require any change in the construction or alteration, or intended use of any structure, the construction or alteration of which was begun prior to February 15, 1974, and is diligently prosecuted.

(2) Marking and lighting. Notwithstanding the preceding provision of this section, the owner of any nonconforming structure or tree is hereby required to permit the installation, operation and maintenance thereon of such markers and lights as shall be deemed necessary by the administrative agency to indicate to the operators of aircraft in the vicinity of the airport, the presence of such airport hazards. Such markers and lights shall be installed, operated and maintained at the expense of the city.

(Code 1960, § 11-19-6; Ord. No. 511, 1-29-74)

4-07-070. Permits.

(a) Future uses. Except as specifically provided in subparagraphs (1), (2) and (3) hereunder, no material change shall be made in the use of the land, and no structure or tree shall be erected, altered, planted or otherwise established in any zone hereby created unless a permit therefor shall have been applied for and granted. Each application for a permit shall indicate the purposes for which the permit is desired, with sufficient particularity to permit it to be determined whether the resulting use, structure or tree would conform to the regulations herein prescribed. If such determination is in the affirmative, the permit shall be granted.

(1) In the area lying within the limits of the horizontal zone and the conical zone, but not within the limits of a precision instrument or nonprecision approach zone or transition zone, no permit shall be required for any tree or structure less than one hundred and fifty (150) feet of vertical height above the airport elevation, except when, because of terrain, land contour or topographic features, such tree or structure would extend above the height limits prescribed for such zones.

(2) In the areas lying within the limits of the nonprecision instrument approach zone, but at a horizontal distance of not less than two thousand five hundred (2,500) feet from each end of the runways, no permit shall be required for any tree or structure less than seventy-five (75) feet of vertical height above the established airport elevation, except when, because of terrain, land contour or topographic features, such tree or structure would extend above the height limits prescribed for such zones.

(3) In the areas lying within the limits of the precision instrument approach zone, but at a horizontal distance of not less than three thousand seven hundred fifty (3,750) feet

from each end of the runways, no permit shall be required for any tree or structure less than seventy-five (75) feet of vertical height above the established airport elevation, except when, because of terrain, land contour, or topographic features, such tree or structure would extend above the height limits prescribed for such zone.

(4) In the areas lying within the limits of the transition zones beyond the perimeter of the horizontal zone, no permit shall be required for any tree or structure less than seventy-five (75) feet of vertical height above the ground, except when such tree or structure, because of terrain, land contour, or topographic features, would extend above the height limit prescribed for such transition zones.

Nothing contained in any of the foregoing exceptions shall be construed as permitting or intending to permit any construction, alteration or growth of any structure or tree in excess of any of the height limits established by this article except as set forth in section 4-07-040.

(b) Existing uses. No permit shall be granted that would allow the establishment or creation of an airport hazard or permit a nonconforming use, structure or tree to become a greater hazard to air navigation than it was on February 15, 1974, or any amendments thereto, or than it was when the application for a permit is made. Except as indicated, all applications for such a permit shall be granted.

(c) Nonconforming uses abandoned or destroyed. Whenever the administrative agency determines that a nonconforming tree or structure has been abandoned or more than eighty (80) percent torn down, physically deteriorated, or decayed, no permit shall be granted that would allow such structure or tree to extend the applicable height limit or otherwise deviate from the zoning regulations.

(d) Variances. Any person desiring to erect or increase the height of any structure, or permit the growth of any tree, or use his property not in accordance with the regulations prescribed in this article, may apply to the board of appeals for a variance from such regulations. Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and relief granted would not be contrary to the public interests, but will do substantial justice and be in accordance with the spirit of this article.

(e) Hazard marking and lighting. Any permit or variance granted may, if such action is deemed advisable to effectuate the purpose of this article and to be reasonable in the circumstances, be so conditioned as to require the owner of the structure or tree in question to permit the city, at its own expense, to install, operate and maintain thereon, such markers and lights as may be necessary to indicate to pilots the presence of an airport hazard.

(Code 1960, § 11-19-7; Ord. No. 511, 1-29-74)

Cross references: Licenses and miscellaneous business regulations, Ch. 17.

4-07-080. Enforcement.

The city commission is hereby designated the administrative agency or administrative officer. It shall be the duty of the administrative agency or officer to administer or enforce the regulations prescribed in this article. Applications for permits shall be made to the administrative agency upon a form furnished by it. Applications required by this article to be submitted to the administrative agency shall be promptly considered and granted or denied by it. Applications for action by the board of appeals shall be forthwith transmitted by the administrative agency.

(Code 1960, § 11-19-8; Ord. No. 511, 1-29-74)

4-07-090. Board of appeals.

(a) There is hereby created a board of appeals to exercise the following powers:

(1) To hear and decide appeals from any order, requirement, decision or determination made by the administrative agency or officer in the enforcement of this article.

(2) To hear and decide special exceptions to the terms of this article upon which such board of appeals under such regulations may be required to pass.

(3) To hear and decide specific variances.

The Alamogordo, Otero County Airport Zoning Board is hereby designated and appointed the board of appeals.

(b) The board of appeals shall adopt rules for its governance and procedure in harmony with the provisions of this article. Meetings of the board shall be held at the call of the chairman and at such other times as the board of appeals may determine. The chairman, or in his absence, the acting chairman, may administer oaths and compel the attendance of witnesses. All hearings of the board shall be published. The board shall keep minutes of its proceedings showing the vote of each member upon each question, or his absence or failure to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the administrative agency and shall be a public record.

(c) The board of appeals shall make written findings and facts and conclusions of law giving the facts upon which it acted and its legal conclusion from such facts in reversing,

affirming or modifying any order, requirement, decision or determination which comes before it under the provisions of this article.

(d) The concurring vote of a majority of the members of the board shall be sufficient to reverse an order, requirement, decision or determination of the administrative agency or decide in favor of the applicant upon any matter in which it is required to pass under this article, or to effect any variation in this article.

(Code 1960, § 11-19-9; Ord. No. 511, 1-29-74)

4-07-100. Appeals.

(a) Any person aggrieved, or any taxpayer affected, by any decision of the administrative agency made in its administration of this article, may appeal to the board of appeals.

(b) All appeals hereunder must be taken within a reasonable time as provided by the rules of the board of appeals, by filing with the administrative agency a notice of appeal specifying the grounds thereof. The administrative agency shall forthwith transmit to the board of appeals all the papers constituting the record upon which the action appealed from was taken.

(c) An appeal shall stay all proceedings in furtherance of the action appealed from, unless the administrative agency certifies to the board, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate a stay would, in its opinion, cause imminent peril to life or property. In such case, proceedings shall not be stayed except by order of the board on notice to the agency from which the appeal is taken and on due cause shown.

(d) The board of appeals shall fix a reasonable time for hearing appeals, give public notice and due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing, any party may appear in person or by agent or by an attorney.

(e) The board of appeals may, in conformity with the provisions of this article, reverse or affirm, in whole or in part, or modify the order, requirement, decision or determination appealed from, and may make such order, requirement, decision or determination as may be appropriate under the circumstances.

(Code 1960, § 11-19-10; Ord. No. 511, 1-29-74)

4-07-110. Judicial review.

Any person aggrieved, or any taxpayer affected by any decision of the board of appeals, may appeal to the district court as provided in section 3-39-23 N.M.S.A., 1978 Compilation.

(Code 1960, 11-19-11)

4-07-120. Conflicting regulations.

Where there exists a conflict between any one of the regulations or limitations described in this article, and any other regulations applicable to the same area, whether the conflict be with respect to the height of the structure or trees, the use of land, or any other matter, the more stringent limitation or requirement shall govern and prevail.

(Code 1960, § 11-19-13; Ord. No. 511, 1-29-74)

4-07-130. Aircraft and airport.

(a) Subject to like provisions being made by the board of county commissioners of Otero County, New Mexico, there is hereby established a joint city-county airport zoning board, to be known as the Otero County-Alamogordo Airport Zoning Commission, hereinafter called joint city-county airport zoning board, pursuant to authority conferred by Section 44-2-11 N.M.S.A. (1953 Comp., Repl. Vol.) and Sections 14-40-14 through 14-40-24 N.M.S.A. (1953 Comp. Repl Vol.); such joint city-county airport zoning board shall have the powers and exercise the duties set forth in Sections 14-40-14 through 14-40-24 N.M.S.A. (1953 Comp., Repl. Vol.).

(b) The joint city-county airport zoning board shall be composed of two (2) members to be appointed by the mayor and confirmed by the governing body of the city, and two (2) members to be appointed by the board of county commissioners of Otero County, and one (1) member to be appointed by a majority of the other members appointed as provided for herein. Said fifth member so appointed shall serve as chairman of the joint city-county airport zoning board.

(c) The members of the joint city-county airport zoning board shall be appointed to serve for a period of two (2) years from the date of their respective appointments. Such initial appointments are to be made and confirmed within thirty (30) days after the creation of the joint city-county airport zoning board; provided, however, that the failure of either political subdivision to appoint members to such board shall not invalidate any action taken by the board to implement and enforce the municipal airport zoning laws as provided in Section 44-2-11 N.M.S.A. (1953 Comp., Repl. Vol.), and such airport zoning laws as are contained in Sections 14-40-14 to 14-40-24 N.M.S.A. (1953 Comp., Repl. Vol.).

(d) The members of the airport zoning board shall be removable for cause by the appointing authority upon

written charges and after a public hearing,

(Ord. No. 508, §§ 1--4, 11-13-73)

A.2.2 New Mexico Municipal Airport Zoning Law

3-39-16. [Municipal Airport Zoning Law.]

Sections 3-39-16 through 3-39-26 NMSA 1978, may be cited as the "Municipal Airport Zoning Law."

3-39-17. Definitions.

As used in the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978], unless the context otherwise requires:

A. "airport" means any area of land or water designated for the landing and taking-off of aircraft and utilized or to be utilized by the public as a point of arrival or departure by air;

B. "airport hazard" means any overhead power line which interferes with radio communication between a publicly owned airport and aircraft approaching or leaving same; or any structure or tree which obstructs the aerial approaches of such an airport or is otherwise hazardous to its use for landing or taking off;

C. an airport is "publicly owned" if the portion thereof used for landing and taking-off of aircraft is owned by a governmental body, political subdivision, public agency or other public corporation;

D. "legislative body" means the legislative or governing body of any county or municipal or political subdivision of the state of New Mexico, having or acquiring a publicly owned airport within its corporate or political limits;

E. "person" means any individual, firm, copartnership, corporation, company, association, joint stock association or body politic, and includes any trustee, receiver, assignee or other similar representative thereof;

F. "structure" means any object constructed or installed by man, including, but without limitation, buildings, towers, smokestacks and overhead transmission lines; and

G. "tree" means any object of natural growth.

3-39-18. Airport hazards not in public interest.

It is hereby found and declared that an airport hazard endangers the lives and property of users of the airport and of occupants of land in its vicinity, and also, if of the obstruction type, in effect reduces the size of the area available for the landing, taking-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein, and is therefore not in the interest of the public health, public safety or general welfare.

3-39-19. Preparation of airport approach plans.

The legislative body is hereby empowered to formulate and adopt, and from time to time as may be necessary, revise an airport approach plan for any publicly owned airport within its corporate or political limits. Each such plan shall indicate the hazards, the area within which measures for the protection of the airport's aerial approaches should be taken, and what the height limits and other objectives of such measure should be. In adopting or revising any such plan, the legislative body shall consider, among other things, the character of the flying operations expected to be conducted at the airport, the nature of the terrain, the height of existing structures and trees above the level of the airport, and the possibility of lowering or removing existing obstructions, and the legislative body may obtain and consider the views of the agency of the federal government charged with the fostering of civil aeronautics as to the aerial approaches necessary to safe flying operations at the airport.

3-39-20. Adoption of airport zoning regulations.

A. Every municipality and county or other political subdivision having within its territorial limits an area within which, according to an airport approach plan adopted by the legislative body, measures should be taken for the protection of airport approaches, shall adopt, administer and enforce, under the police power and in the manner and upon the conditions hereinafter prescribed, airport zoning regulations applicable to such area, which regulations shall divide the area into zones and within such zones, specify the land uses permitted, regulate and restrict the height to which structures and trees may be erected or allowed to grow, and impose such other restrictions and requirements as may be necessary to effectuate the legislative body's approach plan for the airport.

B. In the event that a political subdivision has adopted, or hereafter adopts, a general zoning ordinance regulating, among other things, the height of buildings, any airport zoning regulations adopted for the same area or portion thereof under the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978] may be incorporated and made a part of such general zoning regulations, and be administered and enforced in connection therewith, but such general zoning regulations shall not limit the effectiveness or scope of the regulations adopted under this act.

C. Any zoning or other regulations applicable to any area within which, according to an airport approach plan adopted by the legislative body, measures should be taken for the protection of airport approaches, including not only any airport zoning regulations adopted under Sections 3-39-16 through 3-39-26 NMSA 1978, but any zoning or other regulations dealing with the same or similar matters, that have been or may be adopted under authority other than that conferred by Sections 3-39-16 through 3-39-26 NMSA 1978, shall be consistent with, and conform to, the legislative body's approach plan for such area, and shall be amended from time to time as may be necessary to conform to any revision of the plan that may be made by the legislative body.

D. All airport zoning regulations adopted under Sections 3-39-16 through 3-39-26 NMSA 1978, shall be reasonable and none shall require the removal, lowering or other change or alteration of any structure or tree not conforming to the regulations when adopted or amended, or otherwise interfere with the continuance of any nonconforming use, except as provided in Section 3-39-21 NMSA 1978.

3-39-21. Permits and variances.

A. When advisable to facilitate the enforcement of the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978], a system may be established for granting permits to establish or construct new structures and other uses. In any event, before any nonconforming structure may be replaced with a taller one or any nonconforming tree allowed to grow higher or be replanted, a permit must be secured from the administrative agency authorized to administer and enforce the regulations, authorizing such replacement or change. No such permit shall be granted that would allow the structure to become a greater hazard to air navigation than it was when the applicable regulation was adopted; and whenever the administrative agency determines that nonconforming structure or tree has been abandoned or more than eighty percent torn down, destroyed, deteriorated or decayed, no permit shall be granted that would allow said structure or tree to exceed the applicable height limit or otherwise deviate from the zoning regulations. Except as indicated, all applications for permits for replacement, change or repair of nonconforming uses shall be granted.

B. Any person desiring to erect any structure, or increase the height of any structure, or permit the growth of any tree, or otherwise use his property, in violation of airport zoning regulations adopted under the Municipal Airport Zoning Law, may apply to the board of appeals, as provided in Section 3-39-22 NMSA 1978, for a variance from the zoning regulations in question. Such variance shall be allowed where a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and the relief granted would not be contrary to the public interest but do substantial justice and be in accordance with the spirit of the regulations.

C. In granting any permit or variance under this section, the administrative agency or board of appeals may, if it deems such action advisable to effectuate the purposes of the Municipal Airport Zoning Law, and reasonable in the circumstances, so condition such permit or variance as to require the owner of the structure or tree in question to permit the political subdivision, at its own expense, to install, operate and maintain suitable obstruction markers and obstruction lights thereon.

3-39-22. Zoning regulations; procedure.

A. No airport zoning regulations shall be adopted, amended or changed under the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978] except by action of the legislative body of the political subdivision in question, after a public hearing in relation thereto, at which parties in interest and citizens shall have an opportunity to be heard. At least fifteen days' notice of the hearing shall be published in an official paper, or a paper of general circulation, in the political subdivision.

B. The legislative body of any political subdivision adopting airport zoning regulations under the Municipal Airport Zoning Law may delegate the duty of administering and enforcing such regulations to any administrative agency under its jurisdiction, but such administrative agency shall not be or include any member of the board of appeals. The duties of such administrative agency shall include that of hearing and deciding all permits under Section 3-39-21 NMSA 1978, but such agency shall not have or exercise any of the powers delegated to the board of appeals.

C. Airport zoning regulations adopted under the Municipal Airport Zoning Law shall provide for appointment of a board of appeals to have and exercise the following powers:

(1) to hear and decide appeals from any order, requirement, decision or determination made by the administrative agency in the enforcement of Sections 3-39-16 through 3-39-26 NMSA 1978, or of any ordinance adopted pursuant thereto;

(2) to hear and decide special exceptions to the terms of the ordinance upon which such board may be required to

pass under such ordinance; and

(3) to hear and decide specific variances under Section 3-39-21 NMSA 1978.

D. Where a zoning board of appeals or adjustment already exists, it may be appointed as the board of appeals. Otherwise, the board of appeals shall consist of five members, each to be appointed for a term of three years and to be removable for cause by the appointing authority upon written charges and after public hearing.

E. The board shall adopt rules in accordance with the provisions of any ordinance adopted under Sections 3-39-16 through 3-39-26 NMSA 1978. Meetings of the board shall be held at the call of the chairman and at such other times as the board may determine. The chairman, or in his absence the acting chairman, may administer oaths and compel the attendance of witnesses. All meetings of the board shall be public. The board shall keep minutes of its proceedings, showing the vote of each member upon each question, or, if absent or failing to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the board and shall be a public record.

F. Appeals to the board may be taken by any person aggrieved, or by any other officer, department, board or bureau of the political subdivision affected, by any decision of the administrative agency. An appeal must be taken within a reasonable time, as provided by the rules of the board, by filing with the agency from which the appeal is taken and with the board, a notice of appeal specifying the grounds thereof. The agency from which the appeal is taken shall forthwith transmit to the board all the papers constituting the record upon which the action appealed from was taken.

G. An appeal shall stay all proceedings in furtherance of the action appealed from, unless the agency from which the appeal is taken certifies to the board, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate a stay would, in its opinion, cause imminent peril to life or property. In such case proceedings shall not be stayed otherwise than by a restraining order which may be granted by the board or by a court of record on application on notice to the agency from which the appeal is taken and on due cause shown.

H. The board shall fix a reasonable time for the hearing of the appeal, give public notice and due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing any party may appear in person or by agent or by attorney.

I. The board may, in conformity with the provisions of the Municipal Airport Zoning Law, reverse or affirm, wholly or partly, or modify, the order, requirement, decision or determination appealed from and may make such order, requirement, decision or determination as ought to be made, and to that end shall have all the powers of the administrative agency from which the appeal is taken.

J. The concurring vote of a majority of the members of the board shall be sufficient to reverse any order, requirement, decision or determination of the administrative agency, or to decide in favor of the applicant on any matter upon which it is required to pass under any such ordinance, or to effect any variation in such ordinance.

3-39-23. Judicial review.

A. Any person aggrieved by a decision of the board of appeals, any taxpayer or any officer, department, board or bureau of the political subdivision may file an appeal pursuant to the provisions of Section 39-3-1.1 NMSA 1978.

B. Costs shall not be allowed against the board of appeals unless it appears to the court that it acted with gross negligence, in bad faith or with malice in making the decision appealed from.

3-39-24. Enforcement and remedies.

Each violation of the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978] or of any regulations, order or ruling promulgated or made pursuant to this act, shall constitute a misdemeanor and shall be punishable by a fine of not more than one hundred dollars ($100) or imprisonment for not more than ninety days or by both such fine and imprisonment, and each day a violation continues to exist shall constitute a separate offense. In addition the legislative body or the political subdivision within which the property is located may institute in any court of competent jurisdiction, an action to prevent, restrain, correct or abate any violation of the Municipal Airport Zoning Law, or of airport zoning regulations adopted under the Municipal Airport Zoning Law, or of any order or ruling made in connection with their administration or enforcement, and the court shall adjudge to the plaintiff such relief, by the way of injunction, which may be mandatory, or otherwise, as may be proper under all the facts and circumstances of the case, in order fully to effectuate the purposes of the Municipal Airport Zoning Law and of the regulations adopted and orders made pursuant thereto.

3-39-25. Removal of airport obstructions by municipalities.

Any county, municipality or political subdivision which is authorized by law to establish and maintain an airport or landing field, hereby is authorized and empowered whenever, in the judgment of the legislative body of such county, municipality or other political subdivision, any structure or object located adjacent to such airport or landing field constitutes a hazard to the efficient and safe use of such airport or landing field, or whenever notified of the existence of any such hazard to require the removal and elimination or relocation of such structure or such object, and to acquire all necessary lands or rights-of-way and easements over lands incidental to such removal, elimination or relocation of any such structure or object upon payment to the owner of any land that may be affected by such relocation and the damages occasioned by such removal, elimination or relocation.

3-39-26. Acquisition of air rights.

In any case in which:

A. it is desired to remove, lower or otherwise terminate a nonconforming use; or

B. the approach protection necessary according to the legislative body's airport approach plan cannot, because of constitutional limitations, be provided by airport zoning regulations under the Municipal Airport Zoning Law [3-39-16 to 3-39-26 NMSA 1978]; or

C. it appears advisable that the necessary approach protection is provided by acquisition of property rights rather than by airport zoning regulations, the political subdivision within which the property or nonconforming use is now located, or the political subdivision owning the airport or served by it, may acquire, by purchase, grant or condemnation in the manner provided by the law under which political subdivisions are authorized to acquire real property for public purposes, such an air right, easement or other estate or interest in the property or nonconforming use in question as may be necessary to effectuate the purpose of the Municipal Airport Zoning Law.

3-39-27. Issuance of bonds; purposes.

Subject to the limitation and in accordance with Article 9 of the constitution of New Mexico, any municipality may issue and dispose of negotiable bonds thereof, for the purposes of securing funds for the acquisition or construction of an airport or any part of an airport and the rights and properties used and connected with the airport in the manner provided for in Sections 3-30-1 through 3-30-9 NMSA 1978.

A.3 Avigation Easement Examples (Source: Kirtland AFB JLUS)

Prepared by:

_____
_____
_____
_____
_____

AVIGATION EASEMENT

THIS GRANT OF AN AVIGATION EASEMENT made this _____ day of _____, 20___, by and between _____, whose mailing address is _____ ("Grantor," which term shall include the singular and plural, masculine and feminine), and Escambia County, a political subdivision of the State of Florida, acting by and through its duly authorized Board of County Commissioners, whose mailing address is 223 Palafox Place, Pensacola, Florida 32502 ("Grantee").

WITNESSETH

WHEREAS Grantor is the owner of certain real property located in Escambia County, Florida; and

WHEREAS, Grantee requires, as a condition precedent to the development or use of the property, conveyance from Grantor of an Avigation Easement; and

WHEREAS Grantor has agreed to grant an Avigation Easement to Grantee in and over Grantor=s property under the terms and conditions set forth in this instrument;

NOW, THEREFORE, Grantor, for good and valuable consideration the receipt and sufficiency of which is acknowledged, does grant to Grantee and Grantee=s heirs, assigns, successors, and legal representatives, a perpetual Avigation Easement in and over the following described property (Property):

See legal description attached as Exhibit A

This Avigation Easement is granted with the following express terms and conditions:

1. Grantor grants, bargains, sells, and conveys to Grantee, its successors and assigns, for the use and benefit of Grantee and any civilian or military airfields that may be located in Escambia County and any operators, owners, or users of civilian or military Aircraft that may operate in the airspace in and above Escambia County, a perpetual Avigation Easement for the free and unobstructed flight of Aircraft (“Aircraft” being defined for the purpose of this instrument as any

contrivance now known or hereafter invented, used, or designed for flight in and through the air) in and through the airspace above, over, and across the surface of the Property, together with the right to create or cause in the airspace such noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, and for the use of the airspace by Aircraft for launching from, maneuvering about, and landing at local civilian or military airfields.

2. Nothing in this instrument shall operate to preclude claims by Grantor, his heirs, assigns, successors, and legal representatives, for any physical injuries or damages caused by Aircraft crashing into or otherwise coming into direct physical contact with the Property or persons located thereon.

3. Grantor, for himself, his heirs, assigns, successors, and legal representatives, expressly releases and forever discharges Grantee, its elected or appointed officials, representatives, agents, employees, and any operators, owners, or users of civilian or military Aircraft or airfields, from any and all liability whatsoever, including any and all suits, claims, debts, obligations, costs, expenses, actions, or demands, vested or contingent, known or unknown, whether for injuries to persons or damages to property, which Grantor may own, hold, or assert by reason of noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, caused or created by the flight or passage of Aircraft in or through the airspace subject to the easement described in this instrument. Additionally, Grantor, for himself, his heirs, assigns, successors, and legal representatives, waives any and all right to sue Grantee, its elected or appointed officials, representatives, agents, or employees, and any operators, owners, or users of civilian or military Aircraft or airfields, and agrees to dismiss any and all such suits that may be now or subsequently asserted against Grantee, its elected or appointed officials, representatives, agents, or employees, and any operators, owners, or users of civilian or military Aircraft or airfields, for injuries to persons or damage to property arising from noise, vibrations, odors, vapors, exhaust, smoke, dust or other effects that may be inherent in the operation of Aircraft, caused or created by the flight or passage of Aircraft in or through the airspace subject to the easement described in this instrument. Grantor acknowledges that the above-stated consideration is all that Grantor will receive for this easement and no promise for any other or further consideration has been made by anyone. Grantor further acknowledges that Grantor is executing this instrument solely in reliance upon his own knowledge, belief, and judgment and not upon any representations made by any party released or others in their behalf.

4. Grantor shall not build, construct, cause or permit to be built or constructed, or permit to remain on the Property any building or structure that would interfere with the rights conveyed by this instrument or that would violate any local, state, or federal law or regulation regarding the operation of Aircraft or airfields.

5. Grantor shall not use or permit the use of the Property in such a manner as to create electrical, electronic, or other interference with radio, radar, microwave, or other similar means of Aircraft communications, or to make it difficult for pilots to distinguish between airfield navigation lights

and visual aids and other lights, or to result in glare or other condition that would impair the vision of pilots, or to otherwise endanger the operation of Aircraft.

6. In the event of any violation of the rights and restrictions contained in this instrument, Grantee shall have the right, at its sole option after giving five (5) days prior notice to Grantor, to use any and all means to remedy the violation. Additionally, Grantee shall have a perpetual easement for ingress to and egress from the Property for the purpose of inspecting or removing any instrumentality that may be causing or contributing to a violation of the rights and restrictions conveyed by this instrument.

7. Grantor acknowledges that the Property is located in an area impacted by Aircraft noise and that present and future Aircraft noise may interfere with the unrestricted use and enjoyment of the Property. Grantor further acknowledge that Aircraft noise may change over time by virtue of greater numbers of Aircraft, louder Aircraft, variations in airfield operations, and changes in airfield and air traffic control procedures.

8. This Avigation Easement and all of the terms and conditions described in this instrument shall run with the land in perpetuity and shall be binding upon Grantor and his heirs, assigns, successors and legal representatives.

9. In the event that one or more of the provisions contained in this instrument or any part thereof or any application thereof shall be held invalid, illegal, or unenforceable in any respect by a court of competent jurisdiction, the validity, legality and enforceability of the remaining provisions shall not be affected or impaired and shall remain in full force and effect.

10. In the event that any civilian or military airfield adjacent to the Property ceases to operate, or if such other circumstances subsequently arise that would obviate the purpose underlying this instrument, then Grantor, his heirs, assigns, successors, and legal representatives, may petition the Board of County Commissioners of Escambia County to terminate this Avigation Easement. If the Board of County Commissioners approves the termination of this Avigation Easement, then it shall promptly execute and record in the public records an appropriate document reflecting the termination.

11. Grantor, for himself and his heirs, assigns, successors, and legal representatives, covenants with Grantee, its successors and assigns, that Grantor is lawfully seized and possessed of the Property in fee simple, has a good right and full power to grant, bargain, sell and convey this Avigation Easement over the Property.

IN WITNESS WHEREOF Grantor has executed this instrument on the date first above written.

GRANTOR:

Witness _____ By:_____

Print Name _____ (name of corporation/other business entity)

Print Name _____

Witness _____

Print Name _____

STATE OF FLORIDA

COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 20___, by _____. He/She is (_) personally known to me, (_) produced current _____ as identification.

_____

Signature of Notary Public

_____

Printed Name of Notary Public

(Notary Seal)

GRANTOR:

Witness _____ By:_____

Print Name _____ (name of corporation/other business entity)

Print Name _____

Witness _____

Print Name _____

STATE OF FLORIDA

COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 20___ by _____. He/She is (_) personally known to me, (_) produced current _____ as identification.

_____

Signature of Notary Public

_____

Printed Name of Notary Public

(Notary Seal)

ACCEPTANCE

This Avigation Easement accepted by Escambia County, Florida on the _____ day of _____, 20___, as authorized by the Board of County Commissioners of Escambia County, Florida at its meeting held on the _____ day of_____, 20 ___.

BOARD OF COUNTY COMMISSIONERS
ESCAMBIA COUNTY, FLORIDA

_____

Chairman

ATTEST: Ernie Lee Magaha
Clerk of the Circuit Court

_____

Deputy Clerk

(Seal)

****

This Avigation Easement utilizes the form provided by Escambia County in accordance with Section 3, Ordinance No. 2004-52. Therefore, acceptance is executed by the Planning and Zoning Director on behalf of the County, without further action required by the Board. Accepted on behalf of Escambia County, Florida, on the _____ day of _____, 20 ___ by

_____

Planning and Zoning Director

STATE OF FLORIDA
COUNTY OF ESCAMBIA

The foregoing instrument was acknowledged before me this _____ day of _____, 20___ by _____. He/She is (_) personally known to me, (_) produced current _____ as identification

_____

Signature of Notary Public

_____

Printed Name of Notary Public

(Notary Seal)

Recording Requested By And When Recorded Return To:

Burbank-Glendale-Pasadena
Airport Authority
2627 Hollywood Way
Burbank, CA 91505
Attn: Director, Airport Engineering

EASEMENT DEED AND AGREEMENT

(Avigation Rights)

This EASEMENT DEED AND AGREEMENT ("Avigation Easement Agreement") is executed and delivered as of this _____ day of _____, 1999, by [COMPANY NAME], a California corporation _____, as trustee under the Land Title Agreement dated _____ _____, 1999 ("Grantor") and the BURBANK-GLENDALE-PASADENA AIRPORT AUTHORITY, a public entity formed under a joint exercise of powers agreement among the cities of Burbank, Glendale and Pasadena, California, pursuant to the California Joint Exercise of Powers Act ("Grantee"), with reference to the following facts:

R E C I T A L S

A Grantor is the owner in fee simple of that certain real property (the "Property") located in the City of Burbank, County of Los Angeles, and State of California, legally described in Exhibit "A" attached hereto and incorporated herein by reference.

B Grantee is the owner and operator of the Burbank-Glendale-Pasadena Airport (the Burbank-Glendale-Pasadena Airport, together with any future expansion thereof or modification thereof being hereinafter referred to as the "Airport") situated in the County of Los Angeles, State of California, which is more particularly described in Exhibit "B" attached hereto and incorporated herein by reference.

C This Avigation Easement Agreement is made, executed and delivered pursuant to and in accordance with the terms of a Land Title Trust Agreement among the Trustee, Grantee and the City of Burbank, dated August ___, 1999 (the "Trust Agreement")

1. GRANT OF AVIGATION EASEMENT

FOR VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, Grantor, for itself and its successors and assigns, does hereby grant to Grantee, its successors and assigns, for the use and benefit of Grantee, the tenants and licensees of Grantee, and all users of the Airport, the following easements, rights and servitudes, which shall be appurtenant to the Airport, as to Grantee, and in gross, as to the tenants and licensees of Grantee and as to all users of the Airport (collectively the "Avigation Easement"):

1.1 Passage of Aircraft. A perpetual nonexclusive easement and right of way for the "Passage of Aircraft" (as hereinafter defined) by whomsoever owned and operated in, to, over and through all air space of the Property located above the height of the lowest of the "imaginary

surfaces" established in relation to the Airport and to each runway at the Airport in accordance with the applicable provisions of Federal Aviation Administration regulations set forth in 14 C.F.R. §§77.21-77.29 (as the same may be amended from time to time), to an indefinite height above said imaginary surfaces. As used herein, the term "Aircraft" shall mean any contrivance now known or hereafter invented, used or designed for navigation of or flight in the air, and the term "Passage of Aircraft" shall include, but not be limited to, Aircraft operation, navigation and flight; however, except to the extent constituting "Incidental Effects" as provided in Section 1.2 below, the term "Passage of Aircraft" shall not include Aircraft landing, explosion, crash, falling objects, dumping or spillage of liquid fuel or other occurrence causing direct physical injury to persons or direct physical damage to property.

1.2 Incidental Effects. A perpetual nonexclusive easement and right to cause within, and to enter or penetrate into or transmit through, any improved or unimproved portion of the Property, or any air space above the ground surface of the Property, such noise, sounds, vibrations, electronic interference, fumes, dust, fuel vapor particles, and all other similar effects that may result from or be related to the ownership, operation or maintenance of the Airport, the use of the Airport by Aircraft, the flight of Aircraft to, from or over the Airport, or the flight of Aircraft over the Property (at heights above the "imaginary surfaces" described in Section 1.1 above), or the taking-off or landing of Aircraft from or at the Airport (collectively, "Incidental Effects"), including, without limitation, any Incidental Effects that may be objectionable or would otherwise constitute a trespass, a permanent or continuing nuisance, personal injury or taking or damage to the Property due to invasiveness, intermittence, frequency, loudness, intensity, toxicity of Aircraft emissions or fuel, interference, emission, odor, annoyance or otherwise.

2. COVENANTS

2.1 Interference With Air Navigation. In furtherance of the easements and rights herein granted, Grantor hereby covenants, for itself and its successors and assigns, at all times hereafter, that it will not take any action, cause or allow any electronic, electromagnetic or light emissions, allow any obstruction to exist, or construct any structure on the Property which would conflict or interfere with or infringe Grantee's rights hereunder, including the full use and enjoyment of the Avigation Easement.

2.2 Changes. The rights, easements, benefits, waivers, covenants and agreements granted hereunder, including the Avigation Easement, shall continue notwithstanding any increase or other change in the boundaries, volume of operations, noise, or pattern of air traffic at the Airport. The Avigation Easement and this Avigation Easement Agreement may not be modified, amended, terminated or abandoned except by execution and delivery of an instrument executed and acknowledged by Grantee, and Grantor agrees that, in the absence of such an instrument, no conduct by Grantee or increase, diminution or change in use of the Avigation Easement shall constitute either an overburdening of the Avigation Easement or a termination or abandonment of the Avigation Easement.

2.3 Covenants Binding On and Benefiting Successive Owners and Assigns. The parties intend that all waivers, restrictions, covenants and agreements set forth herein relate to the use, repair, maintenance or improvement of the Property or the Airport, or some part thereof, and shall run with the land of Grantor and Grantee, and any grantee, successor or assign of Grantor who acquires any estate or interest in or right to use the Property shall be bound hereby for the benefit of the Airport and for the benefit of any grantee, successor or assign of Grantee, including, without, limitation, the tenants and licensees of Grantee, and all users of the Airport.

3. GENERAL PROVISIONS

3.1 Attorneys' Fees. Should Grantor or Grantee or any of their respective successors or assigns retain counsel to enforce any of the provisions herein or protect their interests in any matter arising under this Avigation Easement Agreement, or to recover damages by reason of any alleged breach of any provision of this Avigation Easement Agreement, the losing party in any action pursued in a court of competent jurisdiction shall pay to the prevailing party all costs, damages, and expenses incurred by the prevailing party, including, but not limited to, attorneys' fees and costs incurred in connection therewith.

3.2 Interpretation. No provision of this Avigation Easement Agreement is to be interpreted for or against any party because that party or that party's legal representative drafted such provision.

3.3 Waiver. No violation or breach of any provision of this Avigation Easement Agreement may be waived unless in writing. Waiver of any one breach of any provision of this Avigation Easement Agreement shall not be deemed to be a waiver of any other breach of the same or any other provision of this Avigation Easement Agreement.

3.4 Severability. In the event that any one or more covenant, condition, right or other provision contained in this Avigation Easement Agreement is held to be invalid, void or illegal by any court of competent jurisdiction, the same shall be deemed severable from the remainder of this Avigation Easement Agreement and shall in no way affect, impair or invalidate any other covenant, condition, right or other provision contained in this Avigation Easement Agreement.

3.5 Additional Documents. In addition to the documents and instruments to be delivered as provided in this Avigation Easement Agreement, Grantor or its successors and assigns, as the case may be, shall, from time to time at the request of Grantee, execute and deliver to Grantee such other documents and shall take such other action as may be reasonably required to carry out more effectively the terms of this Avigation Easement Agreement.

3.6 Governing Law. This Avigation Easement Agreement has been negotiated and entered into in the State of California, and shall be governed by, construed and enforced in accordance with the statutory, administrative and judicial laws of the State of California.

3.7 Integration. This Avigation Easement Agreement, including the exhibits, constitutes the final, complete and exclusive statement of the parties relative to the subject matter hereof and there are no oral or parol agreements existing between Grantor and Grantee relative to the subject matter hereof which are not expressly set forth herein and covered hereby. This is an integrated agreement.

3.8 Prior Rights. The rights, easements, benefits, waivers, covenants and agreements in favor of Grantee, its successors and assigns, the tenants and licensees of Grantee, and all users of the Airport under this Avigation Easement Agreement are subject and subordinate to, and do not terminate, modify, restrict, or impair in any manner the rights, easements, benefits, waivers, covenants and agreements in favor of the City of Burbank, a municipal corporation ("City"), its grantees, successors and assigns, under that certain document pertaining to the Property entitled Grant of Easements, Declaration of Use Restrictions and Agreement for Trust Property executed as of _____, 1999, by the Authority, the City, and the Trustee, and recorded on _____, 1999 as Document Number _____ at Book _____, Page _____ of Official Records, County of Los Angeles, State of California (the "Trust Property Easement"). Nothing in this Avigation Easement Agreement is intended to, nor shall be interpreted in any manner to (i) terminate, modify, restrict, or impair in any manner the rights of the City under that certain Grant of Easements, Declaration of Use Restrictions and Agreement for Adjacent Property executed by the Authority and the City as of _____, 1999, and recorded on _____, 1999 as Document Number _____at Book _____, Page _____ of Official Records, County of Los Angeles, State of California; (ii) permit or require use of the Property for purposes of expanding or enlarging the Airport under California Public Utilities Code Section 21661.6 ("PUC Section 21661.6"), or (iii) create rights that will result in the preemption of or otherwise affect adversely the applicability, validity and enforceability of PUC Section 21661.6 or local land use laws, including, but not limited to the City of Burbank's Zoning Ordinance and General Plan, or the Burbank Redevelopment Agency's Golden State Redevelopment Plan.

IN WITNESS WHEREOF, the parties have executed and delivered this Avigation Easement Agreement as of the date first set forth above.

"GRANTOR"

SECURITY TRUST COMPANY,

a California corporation,

_____

as trustee under Land Title Trust Agreement dated August _____ , 1999

By: _____

Title: _____

"GRANTEE"

BURBANK-GLENDALE-PASADENA AIRPORT AUTHORITY

By:

_____

Its: President

STATE

OF

CALIFORNIA

COUNTY OF LOS ANGELES

On _____, _____, before me, _____ [INSERT NAME], a Notary Public, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____ (SEAL)

STATE

OF

CALIFORNIA

COUNTY OF LOS ANGELES

On _____, _____, before me, _____ [INSERT NAME], a Notary Public, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument. WITNESS my hand and official seal.

Signature _____ (SEAL)

CERTIFICATE OF ACCEPTANCE

This is to certify that the interest in real property conveyed by the attached Easement Deed and Agreement (Aviation Rights) dated as of _____, _____, FROM _____, as a trustee under Land Title Trust Agreement dated _____, 1999, to the Burbank-Glendale-Pasadena Airport Authority, a public entity formed under a joint exercise of powers agreement among the cities of Burbank, Glendale and Pasadena, California, pursuant to the California Joint Exercise of Powers Act, is hereby accepted by the undersigned on behalf of the Burbank-Glendale-Pasadena Airport Authority pursuant to authority granted by motion at a meeting held on, ____, and Grantee consents to the recordation thereof by its duly authorized officer.

Dated: As of _____ , ____

BURBANK-GLENDALE-PASADENA

AIRPORT AUTHORITY

By: _____

Its: President

A.4 Light Ordinances

A.4.1 Alamogordo Outdoor Lighting Ordinance

ARTICLE 31-01. OUTDOOR LIGHTING

31-01-010. Purpose and applicability.
(a) The purpose of this chapter is to restrict the emission of undesirable light rays into the night sky which are detrimental to aviation and to astronomical observations. The provisions of this chapter shall apply to all outdoor lighting devices used for illumination or advertisement.
(b) The provisions of this chapter do not apply to incandescent lamps of one hundred fifty (150) watts or less; glass tubes filled with neon, argon or krypton; outdoor advertising signs constructed of translucent material and wholly illuminated from within and fossil fuel light sources.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 997, § 1, 4-22-97; Ord. No. 1057, 4-13-99)

31-01-020. Effect on other codes.
The provisions of this chapter are intended to supplement other applicable codes and requirements. Compliance with all applicable provisions of building, electrical and other codes must be observed. In the event of a conflict between the requirements of this code and other requirements, the more stringent requirement shall apply.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 1057, 4-13-99)

31-01-030. Shielding.
(a) General requirements. Except as otherwise provided below, all lighting devices or fixtures shall be shielded in such a manner that light rays emitted by the device or fixture, whether directly from the lamp or indirectly from the fixture, are projected below a horizontal plane running through the lowest point on the fixture where light is emitted.
(b) Low-pressure sodium. Low-pressure sodium lamps shall be shielded in such a manner that the lowermost edge of the shield is below the plane of the centerline of the light source or lamp so that light emission above the horizontal plane is minimized.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 1057, 4-13-99)

31-01-040. Light pollution; general requirements.
(a) Only shielded outdoor light fixtures may be installed for security purposes or for illumination of commercial establishments.
(b) Shielded, low-pressure sodium outdoor light fixtures or high pressure sodium lighting equipped with a minimum ninety degree side cut off internal louver may be installed to provide illumination for public streets or for any purpose other than that specifically listed in subsection 31-01-040(a). However, in the case of the replacement of light fixtures installed to provide illumination for public streets, low-pressure sodium outdoor light fixtures or high pressure sodium lighting equipped with a minimum 45-degree side cut off internal louver shall only be required if existing circuitry will allow the replacement of an individual light fixture with a low-pressure sodium light fixture or high pressure sodium lighting equipped with a minimum 45-degree side cut off internal louver.
(c) All outdoor light fixtures maintained on public or private property, whether installed before or after the effective date of this chapter, shall be turned off between 11:00 p.m. and sunrise except when used for:

(1) Commercial and industrial uses (such as sales, assembly and repair areas) where business is conducted after 11:00 p.m. but only for so long as such use continues;
(2) Illuminated advertising signs on the premises of a business while it is open to the public;
(3) Lighting necessary for security purposes or to illuminate walkways, roadways, equipment yards and parking lots; or
(4) Recreational use that continues after 11:00 p.m. but only for so long as such use continues.
(d) The operation of searchlights for advertising or commercial purposes is prohibited.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 1030, 4-14-98; Ord. No. 1057, 4-13-99)

31-01-050. Other requirements.
(a) Flashing lights. The use of flashing, rotating or pulsating lights in/on any outdoors sign or other lighting device is prohibited after one (1) year from the effective date of this chapter. This provision shall not apply to flashing, rotating or pulsating lights intended to warn of hazards and danger.
(b) Residential spill-over. Offstreet lighting shall be shielded and/or directed in such manner that it only illuminates the user's premises and does not spill over into neighboring residential areas so as to interfere with the peaceful enjoyment of residential properties.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 1057, 4-13-99)

31-01-060. Nonconforming fixtures.
Except as provided in section 31-01-050, all outdoor recreational facilities designed for specific sporting events are exempt from the shielding requirements of this chapter. All nonconforming fixtures must be abandoned or replaced by fixtures conforming to this chapter not later than July 1, 2005.
(Ord. No. 805, § 1, 12-11-90; Ord. No. 997, § 2, 4-22-97; Ord. No. 1057, 4-13-99)

A.4.2 Las Cruces Outdoor Lighting Ordinance

Chapter 39

OUTDOOR LIGHTING*

* **Editors Note:** Ord. No. 1813, § I, adopted Aug. 7, 2000, added a new chapter 39, sections 39-1--39-4, and 39-21--39-24.

ARTICLE I.

IN GENERAL

Sec. 39-1. Title.

This chapter shall be entitled the "outdoor lighting ordinance."
(Ord. No. 1813, § I, 8-7-00)

Sec. 39-2. Purpose.

The purpose of this chapter is to regulate outdoor lighting fixtures and installations in order to improve nighttime public safety and security, promote energy efficiency, and to reduce lighting which is detrimental to the environment or to public use and enjoyment of public and private property.
(Ord. No. 1813, § I, 8-7-00)

Sec. 39-3. Interpretation of meaning.

The building official or designee shall interpret the meaning of the provisions of this article. Disagreement with the building official's interpretation may be appealed to the city council.
(Ord. No. 1813, § I, 8-7-00)

Sec. 39-4. Definitions.

[As used in this chapter, the following words and phrases shall have the meanings ascribed to them in this section:]

Outdoor lighting fixtures: Any lighting device located exterior to a structure or intended to illuminate areas exterior to a structure, whether permanently or temporarily installed. Such devices include, but are not

limited to, search lights, spotlights, flood lights, sign and architectural lighting, and lighting for parks, parking lots, roadways, and athletic facilities.

Illuminating devices:

(1) Light fixture types:

a. Full cutoff fixture types--A fixture which, as installed, gives no emission of light above a horizontal plane;

b. Floodlights and spotlights--Fixtures defined as having a full beam width or beam spread of less than 110 degrees;

(2) Lamp types:

a. Incandescent lamps--Lamps which produce light via an electrically heated metallic filament;

b. Fluorescent lamps--Lamps which use fluorescence of a phosphor to produce visible light.

c. High intensity discharge lamps--Lamps which produce visible light directly by the electrical heating or excitation of a gas. Examples of such lighting include, but are not limited to, Metal Halide, High Pressure Sodium, Low Pressure Sodium, and Mercury Vapor. For purposes of this chapter, fluorescent lights are not considered HID lighting.

Measurement:

(1) Lamp output:

a. Total output: Measurement of total output is in lumens. This should be understood to be the initial lumen value for the lamp. (A 100-watt incandescent lamp produces about 1,800 lumens.)

b. Illuminance: Measurements of illuminance are expressed in initial lumens per square foot. (A desktop Illuminance of 20 initial lumens per square foot is adequate for most purposes.)

(2) Measurement: In measuring illuminance, the light detector should be pointed directly at the light source or sources. The intervening light path should be free of obstruction.

(Ord. No. 1813, § I, 8-7-00)

Secs. 39-5--39-20. Reserved

ARTICLE II.

PROVISIONS

Sec. 39-21. Non-permitted lighting.

(a) Newly installed fixtures which are not full-cutoff fixtures.

(b) Lighting which produces illumination in excess of 70 lumens per square foot at ground level.

(c) Lighting which presents a clear hazard to motorists, cyclists, or pedestrians.
(Ord. No. 1813, § I, 8-7-00)

Sec. 39-22. Exemptions and exceptions.

(a) Residential fixtures consisting of a single incandescent light having an output of less than 1,800 lumens or 100 watts.

(b) Floodlights and spotlight, provided that the total beam width is less than 110 degrees and the beam center is directed at least 65 degrees below the horizontal.

(c) Up lighting for billboards, signs, architectural illumination, provided that the total output is less than 5,400 initial lumens per property parcel and less than 1,800 initial lumens per fixture. Moreover, no illumination may project beyond the highest point of the structure.

(d) Seasonal decorative lighting consists of incandescent lamps in a temporary installation.

(e) Full cutoff street lighting which is part of a federal, state, or municipal installation.

(f) Specialized lighting necessary for safety, such as navigated or runway lighting of airports, or temporary lighting associated with emergency operations, road hazard warnings, etc.

(g) Lighting of sports facilities or stadiums prior to 11:00 p.m. Illumination after 11:00 p.m. is also permitted if it is necessary in order to conclude a recreational, sporting, or other scheduled activity which is in progress prior to that time.

(h) Internally illuminated and exposed neon signs, including neon used for decorative purposes. Internally illuminated signs must be constructed so that the top of the sign is constructed of metal or of suitable material that does not allow light penetration vertically, so as to ensure that light is not emitted directly towards the sky.
(Ord. No. 1813, § I, 8-7-00; Ord. No. 1836, § II, 11-6-00)

Sec. 39-23. Grandfathering.

(a) Existing lighting is exempt from the provision of this chapter except that replacement fixtures must be fully compliant.

(b) Adjustable lighting must be brought into compliance within 90 days.

(c) These grandfathering provisions do not apply to lighting on a property which ceases operations or is unoccupied for more than (12) months, or where $25,000 or more is spent on renovations or remodeling. These must be brought into full compliance before reoccupation or reuse.

(d) All existing lighting installations must be brought into compliance with the provisions of this chapter within ten years of its effective date.
(Ord. No. 1813, § I, 8-7-00)

Sec. 39-24. Variances.

Variances defined as other exemptions from the requirement of this chapter, shall not be permitted unless specifically authorized by the board of adjustment, subject to appeal to the city council in accordance with section 38-11 of this Code.

Procedural requirements for variance requests shall be in compliance with section 38-11, article II, division 5, board of adjustment and procedures for variances to the Municipal Code.
(Ord. No. 1813, § I, 8-7-00; Ord. No. 1929, §§ I, II, 8-5-02)

A.4.3 New Mexico State Statute – Night Sky Protection Act

74-12-2. Purpose.

The purpose of the Night Sky Protection Act [74-12-1 NMSA 1978] is to regulate outdoor night lighting fixtures to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy.

74-12-3. Definitions.

As used in the Night Sky Protection Act [74-12-1 NMSA 1978]:

A. "outdoor lighting fixture" means an outdoor artificial illuminating device, whether permanent or portable, used for illumination or advertisement, including searchlights, spotlights and floodlights, whether for architectural lighting, parking lot lighting, landscape lighting, billboards or street lighting; and

B. "shielded" means a fixture that is shielded in such a manner that light rays emitted by the fixture, either directly from the lamp or indirectly from the fixture, are projected below a horizontal plane running through the lowest point on the fixture where light is emitted.

74-12-4. Shielding of outdoor light fixtures.

All outdoor lighting fixtures installed after January 1, 2000 shall be shielded, except incandescent fixtures of one hundred fifty watts or less and other sources of seventy watts or less.

74-12-5. Nonconforming light fixtures.

A. In addition to other exemptions provided in the Night Sky Protection Act [74-12-1 NMSA 1978], an outdoor lighting fixture not meeting these provisions shall be allowed, if the fixture is extinguished by an automatic shutoff device between the hours of 11:00 p.m. and sunrise.

B. No outdoor recreational facility, whether public or private, shall be illuminated after 11:00 p.m. except for a national or international tournament or to conclude any recreational or sporting event or other activity conducted, which is in progress prior to 11:00 p.m. at a ballpark, outdoor amphitheater, arena or similar facility.

74-12-6. Use of mercury vapor lighting fixtures.

No new mercury vapor outdoor lighting fixtures shall be sold or installed after January 1, 2000.

74-12-7. Exemptions.

A. The following are exempt from the requirements of the Night Sky Protection Act [74-12-1 NMSA 1978]:

(1) outdoor lighting fixtures on advertisement signs on interstates and federal primary highways;

(2) outdoor lighting fixtures existing and legally installed prior to the effective date of the Night Sky Protection Act; however, when existing lighting fixtures become unrepairable, their replacements are subject to all the provisions of the Night Sky Protection Act;

(3) navigational lighting systems at airports and other lighting necessary for aircraft safety; and

(4) outdoor lighting fixtures that are necessary for worker safety at farms, ranches, dairies, feedlots or industrial, mining or oil and gas facilities.

B. The provisions of the Night Sky Protection Act are cumulative and supplemental and shall not apply within any county or municipality that, by ordinance or resolution, has adopted provisions restricting light pollution that are equal to or more stringent than the provisions of the Night Sky Protection Act.

74-12-8. Construction industries division; duties.

The construction industries division of the regulation and licensing department shall review the outdoor lighting provisions in the uniform building codes used in New Mexico and make recommendations for appropriate changes to comply with the provisions of the Night Sky Protection Act [74-12-1 NMSA 1978] and shall permit and inspect, to the standards set forth in the Night Sky Protection Act, all construction of and on state-owned buildings that is subject to permit and inspection under the Construction Industries Licensing Act [60-13-1 NMSA 1978].

74-12-9. Costs of replacement; recovery.

If public utilities are required pursuant to the provisions of the Night Sky Protection Act [74-12-1 NMSA 1978] or by local government ordinances to accelerate replacement of lighting fixtures, the cost of such replacement shall be included in rates approved by the public regulation commission.

74-12-10. Violations; penalty.

Any person, firm or corporation violating the provisions of the Night Sky Protection Act [74-12-1 NMSA 1978] shall be punished as follows:

A. for a first offense, the offender may be issued a warning; and

B. for a second offense or offense that continues for thirty days from the date of the warning, twenty-five dollars ($25.00) minus the replacement cost for each offending fixture.

74-12-11. Enforcement.

In order to promote the purposes of the Night Sky Protection Act [74-12-1 NMSA 1978] and to provide uniform minimum outdoor lighting standards throughout the state, the construction industries division of the regulation and licensing department shall enforce the Night Sky Protection Act as it pertains to public buildings subject to permit and inspection under the Construction Industries Licensing Act and each political subdivision of the state shall fully enforce the provisions of the Night Sky Protection Act.

A.5 Real Estate Disclosures

A.5.1 Realtors Association of New Mexico Property Disclosure Statement – Residential

B Square Real EstateLLC
6739 Academy Rd Ne Ste 140
Albuquerque, NM 87109
505-821-0852 fax 505-821-0854
"Best Agents, Best Service"

REALTORS® ASSOCIATION OF NEW MEXICO
PROPERTY DISCLOSURE STATEMENT – RESIDENTIAL

INSTRUCTIONS AND ACKNOWLEDGMENT REGARDING THIS FORM

This Statement discloses Seller's current, actual knowledge of the condition of the Property as of the date signed by Seller, and is not a substitute for any inspections or warranties that Buyer may wish to obtain. This Statement is designed to assist Seller to provide information about the Property and to assist Buyer in evaluating the Property being considered. Conditions may exist which are unknown to Seller. Buyer is encouraged to address concerns about the Property whether or not included in this Statement. This Statement does not relieve Seller of the obligation to disclose a condition of the Property that may not be addressed on this form or a change in any condition after the date of this Statement, and is not a substitute for inspection by the Buyer. Neither the Broker, nor the board or association of REALTORS® nor the REALTORS® Association of New Mexico warrant or guarantee the information in this disclosure.

_____
Address City Zip Code

_____
Legal Description
or see metes & bounds description attached as Exhibit _____ , _____ County, New Mexico.

OCCUPANCY: Does seller currently occupy the Property? ☐ Yes. If yes, _____ years/months seller occupied.
☐ No. If no, _____ years/months since seller occupied. ☐ Never occupied Property.

TITLE, ZONING, LEGAL INFORMATION

Is the Seller aware of:

1. Any title problems (for example, unrecorded or disputed easements, lot line disputes, liens, encroachments, access issues, third party claims)? ☐ Yes ☐ No
2. Any property taxes that are not current? ☐ Yes ☐ No
3. Any existing or proposed bonds, assessments, liens, mortgages, judgments, deeds of trust, real estate contracts, etc. against the property? ☐ Yes ☐ No If yes, explain: _____
4. Any violations of applicable subdivision laws at the time the property was subdivided? ☐ Yes ☐ No
   If yes, explain: _____
5. Any alleged violations of applicable laws, regulations, ordinances or zoning laws? ☐ Yes ☐ No
6. Any zoning variances/exceptions or non-conforming use of the property? ☐ Yes ☐ No If yes, explain: _____
   _____
7. Any legal issues, proposed buildings, bridges, roadways or real estate developments, etc. in the immediate area? ☐ Yes ☐ No If yes, explain: _____
8. Any restrictive covenants or other limitations on use? ☐ Yes ☐ No If yes, explain: _____
   _____

9. Any violations thereof? ☐ Yes ☐ No If yes, explain: _____
10. Any building code or environmental regulation violations? ☐ Yes ☐ No If yes, explain: _____
11. Any necessary permits, approvals or inspections for all construction, repairs and improvements that have not been obtained? ☐ Yes ☐ No If yes, explain: _____
12. Any existing or threatened legal actions concerning the property or the homeowners association? ☐ Yes ☐ No If yes, explain: _____
13. Any well-sharing, road-sharing or other contract to which the property is subject? ☐ Yes ☐ No If yes, explain: _____
14. Anyone with a right of refusal to buy, to option, or to lease the property? ☐ Yes ☐ No If yes, explain: _____
15. Any other restrictions on resale? ☐ Yes ☐ No If yes, explain: _____
16. Any exemptions you claim to property taxes (i.e., veteran, head of household)? ☐ Yes ☐ No If yes, explain: _____

For additional information or further explanation (indicate item #)_____

BUILDINGS/STRUCTURAL INFORMATION

1. What year was the house built? _____

If a residence on the Property was constructed prior to 1978, federal law and regulations create specific disclosure and information requirements, which are set forth in RANM Form 5112, Lead-based Paint Disclosure Before Sale. Form 5112 must be attached to the Purchase Agreement. The Seller is not permitted to accept a Buyer's offer prior to making the required disclosures and providing the required information.

2. Was this home built entirely on this site? ☐ Yes ☐ No If no, explain: _____
3. Type of construction: _____
4. House is built on ☐ Slab ☐ Crawlspace ☐ Basement ☐ Don't know
5. Type of exterior finish: _____
6. Is there an exterior synthetic stucco system or exterior synthetic coating? ☐ Yes ☐ No ☐ Don't know
7. Type of floor under carpets or linoleum: _____

Is the Seller aware of:

8. Any doors or windows that are inoperable or which may interfere with ingress or egress? ☐ Yes ☐ No
9. Any problems with interior walls, ceilings, doors, windows, floors, or attached floor coverings? ☐ Yes ☐ No
10. Any significant cracks in foundations, exterior walls, interior walls, slab floors, ceilings, chimneys, fireplaces, decks or garage floors? ☐ Yes ☐ No
11. Any major damage that has occurred to the property or to any structure on the property? ☐ Yes ☐ No
12. Smoke damage or a fire on the property? ☐ Yes ☐ No
13. Any problems with driveways, walkways, sidewalks or patios (such as large cracks, potholes or raised sections)? ☐ Yes ☐ No
14. Any structural wood members below soil level? ☐ Yes ☐ No
15. Any history of wood infestation, insects, pests or tree root problems? ☐ Yes ☐ No Specify date and type of last treatment: _____
16. Any water or moisture in ☐ Crawlspace ☐ Basement ☐ Garage?
17. Any flowing or drainage problems on the property? ☐ Yes ☐ No On adjacent properties? ☐ Yes ☐ No ☐ Don't know Any standing water after rainfalls? ☐ Yes ☐ No Any active springs? ☐ Yes ☐ No
18. Any history of moldy conditions or treatment for mold? ☐ Yes ☐ No

19. Any history of water leaks or repairs of conditions involving water leaks, water infiltration, ponding under or around structure/crawlspace or other conditions which could be conducive to mold? ☐ Yes ☐ No
20. Any land on the property that has been filled in? ☐ Yes ☐ No
21. Any problems with retaining walls cracking or bulging? ☐ Yes ☐ No
22. Any earth movement, subsidence, or settlement problems? ☐ Yes ☐ No
23. Any additional structures? ☐ Yes ☐ No If yes, list: _____

For additional information or further explanation (indicate item #): _____

PLUMBING

1. Type of water supply pipes ☐ Lead ☐ Galvanized ☐ Polybutylene ☐ Other _____ ☐ Don't know
2. Approximate age of water heater: _____ Capacity: _____ Fuel source: _____
3. Is there a sump pump? ☐ Yes ☐ No Any problems? _____
4. Is there a water softener? ☐ Yes ☐ No ☐ Owned ☐ Leased Leased from: _____
Transferable? ☐ Yes ☐ No Any problems? _____
5. Is there a reverse osmosis system? ☐ Yes ☐ No ☐ Owned ☐ Leased Leased from: _____
Transferable? ☐ Yes ☐ No Any problems? _____
6. Is there a refrigerator water line? ☐ Yes ☐ No Any problems? _____

Is Seller aware of:

7. Any water pressure problems? ☐ Yes ☐ No
8. Any plumbing system problems, leaks, freezing? ☐ Yes ☐ No
9. Any bathroom ventilation problems? ☐ Yes ☐ No
10. Any domestic hot water problems? ☐ Yes ☐ No

For additional information or further explanation (indicate item #): _____

WATER SUPPLY

1. Is the water supply city/municipal? ☐ Yes ☐ No Any water supply problems? ☐ Yes ☐ No If yes , explain: _____.
2. Any restrictions or regulation concerning water use? ☐ Yes ☐ No If yes, explain: _____.

3 Is the water supply community/subdivision? ☐ Yes ☐ No Name and address of supplier: _____
_____ Any problems? ☐ Yes ☐ No If yes , explain: _____
Fees per month: $ _____ Any restrictions or regulations? ☐ Yes ☐ No If yes , explain _____
Written agreement available? ☐ Yes ☐ No
4. Is water supply to the house private? ☐ Yes ☐ No Any problems with well equipment? ☐ Yes ☐ No Any restrictions or regulations? ☐ Yes ☐ No If shared, is written agreement available? ☐ Yes ☐ No Is well registered with the State Engineer's office? ☐ Yes ☐ No Permit number: _____ Does seller have well record? ☐ Yes ☐ No Is well metered? ☐ Yes ☐ No Is there sufficient water yield at all times? ☐ Yes ☐ No If no, explain: _____
_____.
5. Is there any other water source for the property for any other use? _____
(For more information, please see RANM Form 2308.)

For additional information or further explanation (indicate item #): _____

  Initials: Buyer _____ Seller _____

REALTORS® ASSOCIATION OF NEW MEXICO
PROPERTY DISCLOSURE STATEMENT – RESIDENTIAL

SEWER/ WASTE WATER TREATMENT

1. Is the sewer/wastewater treatment system city/municipal? ☐ Yes ☐ No Any problems? _____
2. Is the sewer/wastewater system community/subdivision? ☐ Yes ☐ No Any problems? __ _____
Name and address of provider: _____ Fees per month? $ _____
Any restrictions or regulations? ☐Yes ☐No Written agreement available? ☐Yes ☐No
3. Is there an on-site liquid waste system? ☐ Yes ☐ No Type: ☐Conventional ☐ Advanced treatment system ☐ Cesspool Any problems? _____ Name and address of service company: _____ Date last pumped: _____ Available installation permit? ☐ Yes ☐ No NMED (EID) certification? ☐ Yes ☐ No NMED (EID) certification number and date: _____ Location of the system: _____

If the property has an onsite liquid waste system, it is subject to the regulations of the New Mexico Environmental Department (NMED), which require inspections and possible repair. Contact the NMED for information regarding appropriate inspection forms and requirements.

(For more information, please see RANM Form 2307.)

For additional information or further explanation (indicate item #): _____

ROOFS, GUTTERS AND DOWNSPOUTS

1. Type of roof and approximate age: ☐Pitched _____yrs. ☐Pueblo/Flat ___yrs. ☐Pitched & Flat ___yrs. If flat, does the roof have a positive slope? ☐Yes ☐No ☐Don't know
2. Type of roofing material (tar & gravel, asphalt shingles, etc.):_____
Additional comments: _____
3. Has all or part of the roof been resurfaced or replaced? ☐Yes ☐No ☐Don't know If yes, what year? _____
By whom? _____ What portions? _____
Additional comments: _____
4. Is there a transferable written guarantee? ☐Yes ☐No ☐Don't know
If yes, until what date? _____ By whom? _____
5. Has the roof ever leaked while you have owned the property? ☐Yes ☐No
If yes, what has been done to correct the problem? _____
6. Do spouts and gutters drain away from the property? ☐Yes ☐No ☐Don't know
7. Are you aware of any faulty drainage or water penetration on the structure? ☐Yes ☐No ☐Don't know If yes, describe: _____

For additional information or further explanation (indicate item #): _____

ELECTRICAL

1. Is the electrical wiring copper? ☐Yes ☐No ☐Don't know Is it aluminum? ☐ Yes ☐No ☐Don't know
If aluminum, has the aluminum wiring been pig-tailed with copper wiring? ☐Yes ☐No ☐Don't know
2. Are you aware of any damaged or malfunctioning receptacles or switches? ☐Yes ☐No If yes, which ones? _____

3. Is the house wired for 220 Volts? ☐Yes ☐No ☐Don't know
4. Are you aware of any extension cords used to create new electrical outlets? ☐Yes ☐No
If yes, explain: _____
5. Are you aware of any defective, malfunctioning, or improperly installed electrical equipment inside or outside the house? ☐Yes ☐No If yes, explain: _____
6. Has electrical service been modified since originally installed? ☐ Yes ☐ No ☐Don't know
Comments: _____
7. Do any circuits trip regularly? ☐ Yes ☐ No If yes, which ones? _____
Comments:_____
8. Are you aware of any electric lines encroaching on the property? ☐ Yes ☐ No ☐Don't know
If yes, explain: _____
9. Are there encroachment agreements with any utility companies? ☐Yes ☐ No ☐ Don't know
If yes, explain: _____

For additional information or further explanation (indicate item #): _____

HEATING AND COOLING

1. Type of heat and approximate age: ☐ Central Forced Air ___yrs. ☐ Hot Water Baseboard ___yrs. ☐ In Floor ☐ Radiant ___yrs. (Type of Hose) _____ Entran II? ☐Yes ☐No ☐Wall Furnace _____yrs. ☐Floor Furnace ____yrs. ☐ Electric Baseboard ___yrs.☐Woodburning ___yrs. ☐Gas logs ___yrs. ☐ Pellet ____yrs. ☐ Other: _____ ____yrs. If applicable, approved for your community's burning restrictions? ☐ Yes ☐ No ☐ Don't know
2. Is the house all electric? ☐Yes ☐ No ☐ Don't know
3. Does the house have ☐Natural gas? ☐ Propane? If propane, is the tank ☐ Owned? ☐ Leased? Lease Co.: _____
4. Are there any rooms without a direct heat source? ☐Yes ☐No ☐Don't know If yes, please provide location: _____
5. Type of cooling and approximate age: ☐ Evaporative ___yrs. ☐ Refrigerated ___yrs. ☐ None ☐Don't know
Number of units: _____ How ducted? _____ Central? ☐ Yes ☐ No ☐Don't know
6. Are there any furnaces, coolers, and/or A/Cs that have been abandoned? ☐Yes ☐No ☐ Don't know.
7. Do all heaters, coolers and A/Cs work properly? ☐ Yes ☐No ☐ Don't know If no, please explain: _____
8. Is there a fireplace? ☐Yes ☐No If yes, type:☐Woodburning ☐Gas logs ☐ Pellet ☐ Insert ☐Other: _____
9. Is there a gas log lighter? ☐Yes ☐No ☐Don't know
10. Does damper work? ☐Yes ☐No ☐Don't know If no, explain: _____
11. Are flues welded open? ☐Yes ☐No ☐Don't know
12. Do you have approved glass enclosure? ☐Yes ☐No ☐Don't know
13. Do all fireplaces work properly? ☐Yes ☐No ☐ Don't know If no, please explain: _____
14. When was the fireplace chimney last swept? _____
15. Any problems with condition or functioning of duct work (such as mildew, restricted air flow, physical deterioration, odor, etc.)? ☐ Yes ☐No ☐ Don't know
If yes, please explain: _____

For additional information or further explanation (indicate item #): _____

POOL, SAUNA , HOT TUB, WATER FEATURE

1. Is there a swimming pool on the property, including filled in? ☐Yes ☐No ☐Don't know
2. When was the pool installed? _____ Is the pool ☐Above ground? ☐In ground?
3. Is the pool ☐Fiberglass? ☐Gunite? ☐Vinyl?
4. Is there a pool heater? ☐Yes ☐No ☐Don't know If yes, is it ☐Gas? ☐Electric? ☐Solar?
5. Is there a pool sweep which conveys? ☐Yes ☐No
6. Is there a cover for the pool? ☐Yes ☐No If yes, specify type: _____ Age: _____ Condition: _____
7. Will the cover convey with the sale of the property? ☐Yes ☐No
8. Is all the pool equipment in good working condition? ☐Yes ☐No ☐Don't know
9. Is the pool maintained by a regular pool service? ☐Yes ☐No If yes, name of service: _____
10. Has the pool been winterized? ☐Yes ☐No If yes, name of service: _____
11. Is there a hot tub or spa? ☐Yes ☐No
12. Is the equipment in good working order? ☐Yes ☐No ☐Don't know
13. Does it have a cover in good condition? ☐Yes ☐No
14. Is there a water feature? ☐Yes ☐No If yes, are there any problems? ☐ Yes ☐ No ☐Don't know If yes, explain: _____

For additional information or further explanation (indicate item #) _____

MISCELLANEOUS

1. Does the property include a landscape watering system? ☐Yes ☐No ☐Don't know
If yes, is it ☐ Auto-timed? ☐Manual? ☐ Front yard? ☐Back yard? ☐ Side yard?
Type: ☐ Sprinklers ☐Bubblers ☐Drip system ☐ Other: _____
2. Are they in good working order? ☐Yes ☐No ☐Don't know
3. Are there any areas where the sprinklers do not properly water? ☐ Yes ☐No ☐ Don't know
If yes, please explain: _____
4. Are there any areas of excessive standing water? ☐ Yes ☐No ☐Don't know
5. Are any areas not served by the watering system? ☐Yes ☐No ☐Don't know
6. Is the drip and/or sprinkler system (if present) on auto-timer? ☐ Yes ☐ No ☐ Don't know
7. Are you aware of any of the above equipment that is in need of repair or replacement or is improperly installed?
☐ Yes ☐No ☐ Don't know If yes, please explain: _____
8. Number of electric garage door operators:_____
9. Is/are the electric garage door operators(s) in good working condition? ☐Yes ☐ No ☐ Don't know
10. How many remote garage door openers will you be giving to the new buyer: _____
11. Is/are garage door openers in good operating condition? ☐Yes ☐No ☐Don't know
12. Are garage doors in good operating condition? ☐Yes ☐No ☐ Don't know If no, please explain: _____
_____
13. Has the garage been modified to alter its original size? ☐ Yes ☐ No ☐ Don't know
14. Does the property have a security system? ☐Yes ☐ No Type:_____ ☐ Owned ☐ Leased
Leased from: _____ Transferable? ☐ Yes ☐ No Any problems? _____
15. Does the property have smoke detectors? ☐ Yes ☐ No How many? _____ ☐110V ☐Battery
16. Does the property have kitchen range hook-up? ☐Yes ☐No ☐Electric ☐Gas
17. Does the property have oven hook-up? ☐Yes ☐No ☐Electric ☐ Gas

18. Does the property have clothes dryer hook-up? ☐ Yes ☐ No ☐ Electric ☐ Gas Vented outside? ☐ Yes ☐ No
19. Does the property have built-in vacuum? ☐ Yes ☐ No If yes, do canisters, hoses and all attachments convey? ☐ Yes ☐ No Any problems? _____
20. Are there any problems in obtaining utility or phone service? ☐ Yes ☐ No ☐ Don't know If yes, explain: _____
21. Can you obtain cable TV service? ☐ Yes ☐ No ☐ Don't know
22. Can you obtain DSL service to your house? ☐ Yes ☐ No ☐ Don't know
23. Have any pets resided in the home? ☐ Yes ☐ No Any pet odors or damage? ☐ Yes ☐ No
24. Are you aware of any past or present existence of any pests (i.e., termites, ants, mice, etc.)? ☐ Yes ☐ No If yes, please explain: _____
25. Have any insurance claims been made in the past five years? ☐ Yes ☐ No ☐ Don't know If yes, explain _____ : _____ _____ Were repairs completed? ☐ Yes ☐ No
26. Has any insurance application or prior coverage regarding all or any part of the property been rejected or will not be renewed? ☐ Yes ☐ No If yes, explain: _____
27. Has notice been received that any existing insurance coverage will be subjected to increased premium rates? ☐ Yes ☐ No

For additional information or further explanation (indicate item #) _____

HOMEOWNERS' AND CONDOMINIUM OWNERS' ASSOCIATIONS

The following questions can be used for various types of Homeowner Associations. If the Property is a residential resale condominium that is subject to the Condominium Act, the Seller should obtain from the Homeowners' Association a resale certificate for the Buyer that includes all the disclosures that are required by law (including some items not listed here). (See RANM Form 2302A.)

1. Name, address and phone number of homeowners' association: _____ _____
2. Does the homeowners' association have a right of first refusal? ☐ Yes ☐ No
3. Association fees? $_____ per yr. What is included in the association fees? ☐ Water/sewer ☐ Trash ☐ Building insurance ☐ Gas utility ☐ Electric utility ☐ Grounds maintenance ☐ Property taxes ☐ Streets ☐ Snow removal ☐ Other: _____
4. Any contemplated future dues increases or special assessments? ☐ Yes ☐ No ☐ Don't know If yes, give details: _____
5. Security: ☐ Intercom ☐ Closed circuit TV ☐ Guards ☐ Electric gate ☐ Other: _____
6. Does each unit have its own designated parking space(s)? ☐ Yes ☐ No ☐ Don't know If yes, how many? _____
7. Please check the existence of the following documents: ☐ Covenants, Conditions and Restrictions or Declaration of Condominium ☐ Regulations currently in force ☐ Current financial statement of Association ☐ Articles of Incorporation of Association ☐ Association Bylaws ☐ Minutes of Board Meetings

For additional information or further explanation (indicate item #) _____

REALTORS® ASSOCIATION OF NEW MEXICO
PROPERTY DISCLOSURE STATEMENT – RESIDENTIAL

ENVIRONMENTAL

Is the Seller aware of:

1. Any noticeable continuous or periodic odors (such as from waste, agriculture, industry, etc.)? ☐Yes ☐No
2. Any excessive noises (such as airplanes, trains, trucks, freeways, etc.)? ☐ Yes ☐ No
3. Any hazards or hazardous materials on or in close proximity to the property (such as asbestos, dumps, pesticides, chemical labs, underground fuel storage tanks or leaks)? ☐ Yes ☐ No
4. Any radon tests performed on the property? ☐ Yes ☐ No Results?_____
   Reports attached? ☐ Yes ☐ No
5. Any part of the property located in a designated special flood hazard zone? ☐ Yes ☐ No
6. Any portion of the property having ever flooded? ☐Yes ☐ No
7. Mine shaft(s) or abandoned well(s) on the property? ☐ Yes ☐ No

For additional information or further explanation (indicate item #) _____

RENTAL INFORMATION

1. Is the property rented or occupied by a tenant? ☐ Yes ☐ No If yes, attach copy of Lease or Rental Agreement.
2. Does the tenant have the right to extend the rental agreement? ☐Yes ☐ No
3. Are security deposits or prepaid rents being held? ☐ Yes ☐No If yes, by whom and how much?
   _____

For additional information or further explanation (indicate item #) _____

IRRIGATION RIGHTS

1. Is the Property irrigated from a ditch or acequia? ☐ Yes ☐ No (See RANM Form 2308)
   Ditch name: _____
   Mayordomo: _____
   Association name: _____
   Fees? $ _____
2. Are Association or ditch fees current? ☐Yes ☐No If no, explain: _____
3. Are water rights registered with the State Engineer? ☐Yes ☐No File/permit number:_____

For additional information or further explanation (indicate item #) _____

OTHER

Does the Seller know of any other information pertaining to the condition of the Property not addressed in the questions listed above? If so, please explain: _____
_____

REALTORS® ASSOCIATION OF NEW MEXICO
PROPERTY DISCLOSURE STATEMENT – RESIDENTIAL

PLEASE NOTE: There is currently no legal or statutory requirement in the State of New Mexico that obligates or requires Sellers or Brokers to disclose to any prospective Buyer that the subject property is or has been: (1) the site of a natural death, homicide, suicide or any other crime classified as a felony; (2) owned or occupied by a person or persons exposed to HIV or diagnosed with AIDS or any other disease not known to be transmitted through the common occupancy of real estate; or (3) located in the vicinity of a convicted sex offender. If Buyer has concerns about any of the conditions cited above, Buyer is urged to conduct his/her own due diligence and contact the appropriate local, state or Federal health and law enforcement authorities to obtain accurate and reliable information.

THIS IS NOT A CONTRACT.

The above disclosures are made to the best of the Seller's knowledge. The person who signed as or on behalf of Seller lacks actual knowledge of the Property for the following reason:
☐ Personal Representative ☐ Administrator of Estate ☐ Trustee ☐ Receiver ☐ Does not occupy the Property ☐ Other

The law does not protect a Seller who makes an intentional misrepresentation.

SELLER

Seller Date Time

Seller Date Time

It is Buyer's responsibility to undertake his/her own due diligence and verify the accuracy of the Property Disclosure Statement. Buyer is not relieved of this responsibility by virtue of delivery of this Statement to Buyer.

BUYER

Buyer acknowledges receipt of this Statement.

Buyer Date Time

Buyer Date Time

A.5.2 Sample Real Estate Disclosure (Source: Scott AFB JLUS)

Sample Real Estate Disclosure

AREA OF AIRCRAFT OPERATIONAL IMPACTS

REAL ESTATE DISCLOSURE FORM

Property at the following location is situated within the vicinity of **XXXXXXXXXXXX** and/ or **XXXXXXXXXXXXXXXX** . The subject property may therefore be exposed to periodic low-level aircraft over-flights, aircraft noise, and impacts associated with airfield activities.

Parcel #: _____ **Deed Book #** _____ **Page #** _____

Address:_____

_____

_____

_____

I, _____, (owner of the subject property) hereby certify that I have informed _____ (prospective purchaser/lessee/renter) that the subject property is located within the vicinity of **XXXXXXXXXXX** and/ or **XXXXXXXXXXXXXXXX** and may therefore be exposed to periodic low-level aircraft over-flights, aircraft noise, and impacts associated with airfield activities.

_____ _____

Owner/ Date

I, _____, (prospective purchaser/lessee/renter of the subject property) herby certify that I have been informed by _____ (owner) that the subject property is located in the vicinity of **XXXXXXXXXXX** and/ or **XXXXXXXXXXXXXXXX** and may therefore be exposed to periodic low-level aircraft over-flights, aircraft noise, and impacts associated with airfield activities.

_____

Purchaser/Lessee/Renter Date

Signed before me on this _____ day of _____, 20___, in the County of _____, **XXXXXXXXXXXX**

_____, Notary Public, State of **XXXXXXXXXXXX**.

My Commission Expires on _____. (SEAL)

A.6 Wind Energy Ordinance/Guidelines

A.6.1 Jefferson County, Idaho

ORDINANCE NUMBER 08-09

Adopted December 8, 2008

WIND ENERGY ORDINANCE

BE IT ORDAINED BY THE BOARD OF JEFFERSON COUNTY COMMISSIONERS OF JEFFERSON COUNTY, IDAHO:

Section 1 Title.

This ordinance may be referred to as the Wind Energy System Ordinance.

Section 2 Authority.

This ordinance is adopted pursuant to authority granted to Jefferson County by Title 67, Chapter 65 of Idaho Code and Article 12, Section 2 of the Idaho Constitution.

Section 3 Purpose.

The purpose of this ordinance is to:

1. Oversee the permitting of wind energy systems.
2. Preserve and protect public health and safety without significantly increasing the cost or decreasing the efficiency of a wind energy system.
3. Ensure that the important environmental features of Jefferson County are protected.

Section 4 Definitions.

In this ordinance:

1. "Administrator" means the Jefferson County Planning and Zoning Administrator.
2. "Board" means the Jefferson County Board of Commissioners.
3. "Building Official" means the Jefferson County Building Official.
4. "Large wind energy system" means a wind energy system that:

   (a) Is used to generate electricity for one or multiple off site customer(s);

   (b) Has a tower height of more than one hundred feet (100').

5. “Meteorological tower” (met tower) is defined to include the tower, base plate, anchors, guy cables and hardware, anemometers (wind indicators), wind direction vanes, booms to hold equipment anemometer and vanes, data logger, instrument wiring, and any telemetry devices that are used to monitor or transmit wind speed and wind flow characteristics over a period of time for either instantaneous wind information or to characterize the wind resource at a given location.

6. “Owner” shall mean the individual or entity that intends to own and operate the wind energy system in accordance with this ordinance.

7. “Rotor diameter” means the cross section dimension of the circle swept by the rotating blades.

8. “Small wind energy system” means a wind energy system that:

   (a) Is used to generate electricity for private use;

   (b) Has a maximum tower height of one hundred feet (100’).

9. “Total height” means the vertical distance from ground level to the tip of a wind generator blade when the tip is at its highest point.

10. “Tower” means the monopole, freestanding, or guyed structure that supports a wind generator.

11. “Wind energy facilities” is defined as an electricity-generating facility consisting of one or more large energy systems under common ownership or operating control that includes substations, met towers, cable/wires and other building accessories to such facility, whose main purpose is to supply electricity to off-site customer(s).

12. “Wind generator” means blades and associated mechanical and electrical conversion components mounted on top of the towers.

Section 5 Standards

A. **Large Wind Energy System** or **Wind Energy Facilities** shall be permitted in an Agricultural Forty Zone (Ag-40) on parcels of land that contain forty (40) acres or more subject to the following requirements:

1. Approval of a Conditional Use Permit.

   (a) The following issues may be considered for a Wind Energy System or Wind Energy Facility:

   The environment.

   The floodplain.

   Wildlife, wildlife corridors, bird migration patterns, and bats.

Endangered species of animals and vegetation.

2. Setbacks. The tower shall be set back a minimum distance equal to its total height from :

(a) Any public road right of way.

(b) Any overhead utility lines.

(c) All property lines.

3. Access

(a) All ground mounted electrical and control equipment shall be labeled or secured to prevent unauthorized access.

(b) The tower shall be designed and installed so as to not provide step bolts or a ladder readily accessible to the public for a minimum height of eight feet (8') above the ground.

4. Electrical Wires. All electrical wires associated with Large Wind Energy Systems , other than wires necessary to connect the wind generator to the tower wiring, the tower to the disconnect junction box, and the grounding wires shall be located underground.

5. Lighting. A Large Wind Energy System shall be artificially light.

6. Appearance, Color, and Finish. The wind generator and tower shall remain painted or finished the color or finish that was originally applied by the manufacturer.

7. Signs. All signs, other than the manufacturer's or installer's identification, appropriate warning signs, or owner identification on a wind generator, tower, building or other structure associated with a wind energy system visible from any public road shall be prohibited.

8. Code Compliance. A large wind energy system including the tower shall comply with all applicable local construction codes and state / National electrical codes.

9. Utility notification and interconnection. Large Wind Energy Systems that connect to the electric utility shall comply with rules for interconnecting distribution generation facilities. No Wind Energy System shall be installed without a written statement with signature and date from the utility company indicating they have been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

10. Met towers shall be permitted under the same standards, permit requirements, restoration requirements, and permit procedures as a Large Wind Energy System.

B. **Small Wind Energy Systems** shall be a permitted use in all zoning districts with parcels containing one-half (1/2) acre or larger subject to the following:

1. One Small wind energy system may be installed for the first half (1/2) acre and one for each additional two (2) acres per parcel.

2. Setbacks. The tower shall be set back a distance equal to its total height (see Section 4 "Definitions", 7) from:

   (a) Any public road right of ways.

   (b) Any overhead utility lines.

   (c) All property lines.

3. Access.

   (a) All ground mounted electrical and control equipment shall be labeled or secured to prevent unauthorized access.

   (b) The tower shall be designed and installed so as not to provide step bolts of a ladder readily accessible to the public for a minimum height of eight feet (8') above the ground.

4. Electrical Wires. All electrical wires associated with a small wind energy system, other than wires necessary to connect wind generator to the tower wiring, the tower wiring to the disconnect junction box, and the grounding wires shall be located underground.

5. Lighting. A wind tower and generator shall not be artificially lighted unless such lighting is required by the Federal Aviation Administration.

6. Appearance, Color, and Finish. The wind generator and tower shall remain painted or finished the color or finish that was originally applied by the manufacturer, unless other colors or finishes (Colors that blend with the natural landscape or background) approved by the Jefferson County Planning and Zoning Administrator.

7. Signs. All signs, other than the manufacturer's or installer's identification, appropriate with a small wind energy system visible from any public road shall be prohibited.

8. Code Compliance. A small wind energy system including the tower shall comply with all applicable local construction codes and state / National electrical codes.

9. Utility notification and interconnection. Small Wind Energy Systems that connect to the electric utility shall comply with rules for interconnecting distribution generation facilities. No Wind Energy System shall be installed without a written statement with signature and date from the utility company indicating they have been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

10. Met towers shall be permitted under the same standards, permit requirements, restoration requirements, and permit procedures as a Small Wind Energy System.

11. Sound. Residential wind energy systems shall not exceed 60 DBA, as measured at the property line. The level, however, may be exceeded during short-term events such as utility outages and/or severe wind storms.

Section 6 Permit Requirements

A. Building Permit. A building permit shall be required for the installation for the installation of a Wind Energy System.

Documentation to be submitted for a building permit.

1. Two Plot Plans which include the following:

   (a) Property lines and dimensions of the property.

   (b) Location, dimensions, and types of existing structures on the property.

   (c) Location of the proposed wind system tower.

   (d) Public roads contiguous with the property.

   (e) Any overhead utility lines.

   (f) Septic, well, drain field, and replacement area.

2. Engineered wind system specifications, including manufacturer and model, rotor diameter, tower height, tower type (freestanding or guyed).

3. Two sets of engineered foundation blueprints or drawings (cross section).

4. Two sets of engineered Tower blueprints or drawings.

5. Recorded warranty deed showing ownership of property (or a letter of approval / lease agreement from the property owner if different than the applicant).

6. Fees. The application for a building permit for a Large or Small Wind Energy System must be accompanied by the proper fees.

7. Expiration. A permit issued pursuant to this ordinance shall expire if:

   (a) The wind energy system is not installed and functioning within 24-months from the date the permit is issued; or,

   (b) The wind energy system is out of service or otherwise unused for a continuous 12-month period.

Section 7 Building Permit Procedure

1. An owner or applicant shall submit the required documentation to the Building Official when applying for a wind energy system.

2. The Building Official shall approve and issue the permit within ten (10) business days of the date the application was submitted to the building department unless additional information is requested by the Building Official to complete the plan review process; and the wind energy system materials meet the requirements of this ordinance.

3. When the building permit is issued the Building Official will return a copy of the stamped / signed sets of the plot plan, and engineered foundation and tower drawings.

4. The owner / applicant shall conspicuously post the building permit number on the premises so as to be visible to the public at all times until construction or installation or the wind energy system is complete and the final building inspection has been approved.

Section 8 Abandonment

1. A wind energy system that is out of service for a continuous 12-month period will be deemed to have been abandoned. The administrator may issue a notice of abandonment to the owner of the wind energy system that is deemed to have been abandoned. The owner shall have the right to respond to the notice of abandonment within 30 days from the notice date. The administrator shall withdraw the notice of abandonment and notify the owner that the notice of abandonment has been withdrawn if the owner provides information that demonstrates the wind energy system has not been abandoned.

2. If the wind energy system is determined to be abandoned, the owner shall remove the wind energy system at the owner's sole expense within three (3) months of the notice date of the notice of abandonment. If the owner fails to remove the wind energy system, the administrator may pursue a legal action to the wind energy system removed at the owner's expense.

Section 9 Violations

It is unlawful for any person to construct, install, or operate a wind energy system or wind energy facility that is not in compliance with:

1. This ordinance.

2. Other County Ordinances / Building Codes, or State and Federal requirements.

3. Any condition contained in a building permit issued pursuant to this ordinance.

4. Wind energy systems installed prior to the adoption of this ordinance are exempt from the requirements of this ordinance, except for the provisions of Section 8 of this ordinance regarding abandonment.

Section 10 Administration and Enforcement

1. This ordinance shall be administered by the Administrator, Building Official, or designee.
2. The Administrator, Building Official or designee may enter any property for which a building permit has been issued under this ordinance to conduct inspections to determine whether the conditions stated in the permit or this ordinance have been met.
3. The Administrator or Building Official may issue orders to abate any violation of this ordinance.
4. The Administrator or Building Official may issue a citation for any violation of this ordinance, other County Ordinances or Building Codes.
5. The Administrator or Building Official may refer any violation of this ordinance to legal counsel for enforcement.

Section 11 Penalties and Severability

1. Any person who fails to comply with any provision of this ordinance or a building permit issued pursuant to this ordinance shall be subject to enforcement and penalties as stipulated in 3.16.2 or the Jefferson County Zoning Ordinance.
2. Nothing in this section shall be construed to prevent the Jefferson County Board of Commissioners from using any other lawful means to enforce this ordinance.
3. The provisions of this ordinance are severable, and the invalidity of any section or other part of this ordinance shall not affect the validity or effectiveness of the remainder of this ordinance.

A.6.2 Morton County, North Dakota

WIND ENERGY FACILITIES
GENERAL PROVISIONS

1. PUBLIC HEARING REQUIRED

A preliminary public hearing shall be conducted in the County concerning site location, needs of the operation and company employees regarding roads, housing, community facilities and County and community services. These hearings are separate from any environmental impact statement process that may be required.

2. DEFINITIONS

"Wind Energy Facility" shall mean one or more wind turbine(s) rated at 100 kilowatts nameplate capacity or larger.

3. GENERAL REQUIREMENTS

a. Wind turbines and related towers shall be painted a non-reflective, non-obtrusive color.

b. Wind turbines and related towers shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the wind energy facility.

c. Each wind tower shall be marked with a visible identification number to assist with provision of emergency services, and the permitee shall file with the local emergency manager, a wind energy facility map identifying wind turbine location and numbers.

d. Wind turbines shall not be artificially lighted, except to the extent required by FAA or other applicable authority.

e. The design of buildings and related structure at wind energy facility sites shall, to the extent reasonably possible, use materials colors, textures and location that will blend the wind energy facility to the natural setting and existing environment.

f. At wind energy facility sites, the location and construction of access roads and other infrastructure shall, to the extent reasonably possible, minimize disruption to farmland, the landscape and agricultural operations with Morton County.

g. The permitee shall promptly replace or repair all fences or gates removed or damaged during all phases of the wind energy facility's life, unless otherwise negotiated with the affected landowner. When the permitee installs a gate where electric fences are present, the permitee shall provide for continuity in the electric fence circuit.

h. The permitee shall ensure that, following completion of construction of a wind energy facility, all County roads will be repaired or restored to a condition at least equal to the condition prior to construction of such facility, as inspected and approved by Morton County Superintendent of Highways.

i. The permitee shall place electrical line, known a collectors, and communication cable underground when located on private property. (Collectors and cables shall place electrical line, known as collectors, and communication cables underground when located on private property. Collectors and cable shall also be placed within or adjacent to the land necessary or wind turbine access roads unless otherwise negotiated with the affected landowner. (Does not apply to feed lines) Overhead collection facilities may be permitted where necessary.

j. The permitee shall not place overhead feeder lines on public road or drainage easement rights of way. When placing feeders on private property, the permtee shall place the feeder in accordance with the easement negotiated with the affected landowner. If the permitee can not place overhead feeder lines on private property a request may be made to place feeder lines on public rights of way with approval from the governmental unit responsible for the affected right of way.

4. SETBACK REQUIREMENTS

a. Each wind turbine shall be set back from the nearest occupied dwelling, commercial building or publicly used structure or facility and state and county parks, a distance not less that 1.25 times it total height or thirteen hundred twenty (1,320) feet; whichever is greater. Morton County has many sensitive sites, which the county may ask the permitee to avoid these sites in granting a special use permit.

b. Each wind turbine shall be set back from the nearest public road or above ground communication or electrical lines a distance not less than two hundred fifty (250) feet from the center line of the existing road right of way.

c. Each wind turbine shall be set back from the wind energy facility perimeter a distance not less than one to one and one half (1 to 1/2) times the rotor diameter of the wind turbine. A variance may be granted if an authorized representative or agent of the permitee and those affected parties of adjoining properties with associated wind rights sign a formal and binding agreement expressing all parties' support for a variance that may reduce the setback requirements.

5. MINIMUM GROUND CLEARANCE

The blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than seventy five (75) feet.

6. RESTORATION OF PROPERTY.

Within six (6) months of termination or abandonment of leases or easements for a wind energy facility in Morton County, the current permitee shall cause, at its own expenses, removal of all structures to a depth of three (3) feet below pre-construction grade. Underground collection cable do not have to be removed.

7. TRANSFER OF PERMIT

Prior to any change in ownership or controlling interest of any entity owning a wind energy facility permitted in Morton County, application shall be made to the Morton County Planning and Zoning Commission, requesting transfer of the wind energy facility siting permit. Approval of such transfer shall be conditioned upon explicit agreement by the new permitee to comply with all provisions of this Ordinance and the original permit. The application may be in letter form and shall be signed by the authorized representatives or agents of both the current permitee and the prospective permitee.

A.7 Existing State Building Guidelines

A.7.1 State of New Mexico Building Permit Guide for Residential Construction

BUILDING PERMIT GUIDE FOR RESIDENTIAL CONSTRUCTION

State of New Mexico ◆ Regulation and Licensing Department ◆ Construction Industries Division

Albuquerque Office:	**5200 Oakland Ave. NE**	**Albuquerque, New Mexico 87113**	**(505) 222-9800**	**FAX (505) 765-5670**
Las Cruces Office:	**505 S. Main, Ste 150**	**P.O. Box 939 Las Cruces, New Mexico 88004-0939**	**(575) 524-6320**	**FAX (575) 524-6319**
Santa Fe Office:	**2550 Cerrillos Rd**	**P.O. Box 25101 Santa Fe, New Mexico 87505**	**(505) 476-4691**	**FAX (505)476-4619**

WHEN BUILDING PERMITS ARE REQUIRED
(New Mexico Residential Code 106.1)
Except as specified in Section 105..2 IRC, no building or structure regulated by this code shall be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished unless a permit has first been obtained from the building official.

WHEN BUILDING PERMITS ARE NOT REQUIRED
(New Mexico Residential Code 106.1)
A building permit shall not be required for the following:

1. One story detached accessory buildings used as tool and storage sheds, playhouses, and similar uses, provided the floor area does not exceed 120 square feet.
2. Fences not over 6 feet high.
3. Retaining walls that are not over 3 feet in height measured form the bottom of the footing to the top of the wall, unless supporting a surcharge
4. Water tanks supported directly upon grade if the capacity does not exceed 5,000 gallons and the ratio of height to diameter or width does not exceed 2:1.
5. Sidewalks and drive way no more then 30 inches above adjacent grade and not over any basements or story below.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work .
7. Prefabricated swimming pools that are less than 24 inches deep.
8. Swings and other playground equipment accessory to a one or two-family dwelling.
9. Window awnings supported by an exterior wall which do not project more than 54 inches from the exterior wall and do not require additional support.

Note: Unless otherwise exempted, separate plumbing, electrical and mechanical permits will be required for the above-exempted items.

SEPTIC TANK PERMIT
Obtain a PERMIT TO MODIFY OR INSTALL AN INDIVIDUAL LIQUID WASTE SYSTEM form from your local New Mexico Environment Department Office. Call 1-800-219-6157 for the nearest location.

PERMIT APPLICATION DATA
To obtain a building permit, the applicant shall fill out an APPLICATION for STATE BUILDING PERMIT form. Applicant must list property owner's name and address, contractor's company name, address and license number (if applicable), architect's name, address and license number (if applicable), specific use of building, county in which the project is located, project address, nearest city/town/village, legal description, written directions to the site, description of work, construction material, and total square footage. The qualifying party for the licensed contractor requesting the permit or the homeowner requesting a homeowner construction permit must sign the application.

The homeowner must also read sign and notarize the HOMEOWNER'S RESPONSIBILITIES FORM, FOR BUILDING A HOME OR FOR ALTERATIONS, REPAIRS OR IMPROVEMENTS TO A HOME WITH A HOMEOWNER'S PERMIT form. ***A homeowner's permit may not be used to permit a project where a GB-2 or GB-98 contractor is acting as a general contractor on the project. Any contractor acting as a general contractor on a project where there is a homeowner's permit must obtain a building permit for his work, and shall be held responsible for any work performed at this site. Further, licensed subcontractors will be held responsible for their work, which also must be permitted separately***. A homeowner may not perform electrical, plumbing or mechanical work unless the homeowner applies for and passes the required CID exam for such work. Call (505) 476-4869 for information on the homeowner electrical and plumbing permits process.

ZONING APPROVAL
Your project may be located in an area requiring zoning approval from a city or county zoning authority. You must obtain zoning approval and signature on the APPLICATION for STATE BUILDING PERMIT *before* applying to this office for the building permit. Contact the Construction Industries Division for zoning requirements in your area.

VALUATION AND FEES

- **Valuation of your project is based CID Rules New Mexico Administrative code 14.5.5.10 . The project does need the signed contract between the project owner and contractor. If you are applying for a homeowner construction permit, the Division will calculate the valuation based on established valuation tables in our office. The fee, which covers plan review, the permit notice and required inspections, is based on the valuation amount. Our office will calculate the valuation and fee for you. If you are mailing the application and plans to your nearest CID office, call any of the offices listed above for the fee prior to mailing.**

PLAN SUBMISSION
Two complete sets of plans at 1/4" = 1'-0 minimum with dimensions, on at least 8 ½ "x 11" paper is required and will provide the following information:

1. __ **SITE PLAN.** Show proposed new structures and any existing buildings or structures on site, including existing adjacent structures within 10 feet of any adjacent property lines, and north arrow. Show property lines with dimensions, all streets, easements and setbacks. Show all water, sewer, electrical points of connection, proposed service routes and existing utilities on the site. Show general drainage and grading information.
2. __ **FOUNDATION PLAN.** Indicate size, location and depth below grade of all footings, piers, and stem walls. *If necessary, provide a geotechnical report, including soil-bearing capacity for the proposed structure at the site.*
3. __ **FLOOR PLAN.** Show all floors including basement. Label all the rooms and provide overall dimensions. Show all doors and windows. Provide door and window schedules. Locate smoke detection systems.
4. __ **FLOOR & ROOF FRAMING PLANS.** Show size, spacing and spans of joists, girders, rafters, beams and headers. Specify grade and species of all wood members. All wood trusses must be engineered and pre-manufactured. The sealed truss engineered specifications must be submitted with the drawings when applying for permit. The manufacturer's instructions on placement and attachment of all wood trusses must be at the job site for the building inspector's review.
5. __ **DETAILS.** Include typical interior and exterior wall sections showing floor, wall and ceiling type, size, spacing and insulation required by the Model Energy Code. Show footing and foundation depth and dimensions; detail anchor bolt size and spacing, and spacing of steel reinforcement in masonry, concrete footings and stem walls. Show stair details showing dimensions of rise and run of steps, handrail location, guardrail spacing, headroom, etc. Show fireplace details and section showing masonry reinforcement; if using pre-fabricated unit, the manufacturer's installation instructions must be at the job site for the building inspector's review and uses.
6. __ **TOTAL SQUARE FOOTAGE.** List the heated, garage, carport, covered porch and patio square footage on your plans. The total floor area square footage must be listed on the APPLICATION for STATE BUILDING PERMIT.
7. __ **MODEL ENERGY CODE.** A package explaining and detailing Model Energy Code requirements, including sample worksheets, is available, as well as one page compliance sheets for your area.

SPECIAL CONDITIONS
1. __ADDITIONS. In addition to the above requirements, the floor plan shall show the addition and all existing rooms, doors and windows that will adjoin the addition. Provide distances on all sides of the addition to property lines and existing structures. Ensure that an existing sleeping room's sole means of egress to the exterior is not blocked by the addition.
2. __ALTERATION/REPAIR. When performing alterations and repairs to an existing residence without performing structural changes, two sets of lists outlining work to be performed and materials to be used will be accepted in lieu of the above requirements. If you suspect this work will entail the handling of asbestos containing materials, call the Air Pollution

Control Bureau at 1-800-224-7009 prior to commencing alterations and repairs for additional information.

3. __RELOCATED RESIDENCE. When relocating an existing residence to new site, the structure will be considered new construction and must comply with all current applicable codes. Submittal shall reflect all the requirements listed under PLAN SUBMITTAL above.

4. __DEMOLITION. Two site plans identifying the structure(s) to be demolished will be accepted in lieu of the above requirements. If you suspect this work will entail the handling of asbestos containing materials, call the Air Pollution Control Bureau at 1-800-224-7009 prior to commencing alterations and repairs for additional information.

5. __ALTERNATIVE METHODS AND MATERIALS. Utilizing alternative methods and materials (other than masonry, wood frame, adobe and rammed earth construction) requires submission of the CERTIFICATION FOR ALTERNATIVE METHODS AND MATERIALS form with the application for state building permit. The certification shall be recorded with the county clerk's office in the county where your project is located.

REQUIRED INSPECTIONS To request an inspection e-mail us at CID.Inspection@state.nm.us our call 505-222-9813 or 877-243-0979

1. **FOUNDATION INSPECTION.** To be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. All materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with approved nationally recognized standards; the concrete need not be on the job. Where the foundation is to be constructed of approved treated wood, additional inspections may be required by the building official.
2. **CONCRETE SLAB or UNDER-FLOOR INSPECTION.** To be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the subfloor.
3. **FRAME INSPECTION.** To be made after the roof, all framing, fire blocking and bracing is in place and all pipes, chimneys and vents are complete and the rough electrical, plumbing, and heating wires, pipes and ducts are approved.
4. **WEATHER-RESISTIVE BARRIER INSPECTION.** To be made after installation of the appropriate weather-resistive barrier and before such barrier is covered.
5. **FINAL INSPECTION.** To be made after finish grading and the building is completed and ready for occupancy. Final electrical, plumbing and mechanical inspections must be conducted prior to final general construction inspection. The Construction Inspector will issue the Certify of Occupancy to the contractor after approving final general construction inspection.
6. **OTHER INSPECTIONS.** In addition to the called inspections specified above, the Construction Inspector may make or require other inspections of any construction work to ascertain compliance with provisions of the New Mexico Building Code and other laws, which are enforced by the code enforcement agency. The licensed plumber and electrician performing the work under the appropriate permits are responsible for coordinating plumbing, mechanical and electrical inspections.

WHEN PROFESSIONAL SEALS ARE NOT REQUIRED
(New Mexico Residential Code 106.1)

The requirement for plans and specifications to be prepared by an architect and/or engineer shall not be required of the following unless, at the discretion of the building official, exception is not in the best interest of public safety or health:

A. Single-family dwelling not more than two stories in height.

B. Multiple dwellings not more than two stories in height containing not more than four dwelling units of wood-frame construction and provided this paragraph is not construed to allow a person who is not an architect to design multiple clusters of four dwelling units each where the total exceeds four dwelling units on each lawfully divided lot.

C. Garages or other structures not more than two stories in height, which are appurtenant to buildings described in paragraphs A or B of this Section.

D. Alterations to buildings or structures that present no unusual condition or hazards or change in occupancy.

WHEN PROFESSIONAL SEALS ARE REQUIRED

The Construction Industries Division requires, as provided under 2006 IRC Section 106., plans and specifications for the following construction methods be prepared and sealed by a New Mexico Registered Architect or Structural Engineer:

1. Construction utilizing steel studs, structural steel members (red iron) and/or steel pipe.
2. All prefabricated, premanufactured and component structures.
3. Residential construction utilizing a wood foundation.
4. All retaining walls over three feet in height measured from the bottom of the footing to the top of the wall.
5. A second story addition to an existing first story (unless proof of previous CID approval shows current construction will support additional second story load).
6. Residential construction utilizing an alternate material, design or method in construction.

CERTIFICATE OF OCCUPANCY

No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the building official has issued a certification of occupancy as provided.

APPLICABLE CODES

The Construction Industries Division currently enforces the following codes:

- 2006 New Mexico Commercial & Residential Building Code
- 2006 International Building Code
- 2006 International Residential Code
- 1997 Solar Energy Code (IAPMO)
- 2006 NM Energy Conservation Code
- ICC/ANSI A117.1-2003
- 2006 New Mexico Plumbing and Mechanical Code
- 2006 Uniform Mechanical Code (IAPMO)
- 2006 Uniform Plumbing Code (IAPMO)
- 1997 Uniform Swimming Pool, Spa and Hot Tub Code
- 2008 New Mexico Electrical Code
- 2008 National Electrical Code
- 2002 National Electrical Safety Code
- Liquefied Petroleum Gas Standards
- 2008 NFPA 58
- 1999 NFPA 57
- 2006 NFPA 54
- 1998 NFPA 52
- 1999 NFPA 1192

CONSTRUCTION INDUSTRIES DIVISION WEB SITE

CID has developed a new information web site with "view only" information at www.rld.state.nm.us/cid. This site includes information of interest to consumers, business and the regulated community.

CONTRACTOR LICENSE LOOK-UP

A license "view only" web site has been developed at public.psiexams.com.This site includes the names, addresses and telephone numbers of licensed contractors and their license classification. It also includes information on licensing and required qualifications for license examination.

MANUFACTURED HOMES

Contact the Manufactured Housing Division, located within the CID office, at 505-476-4770 for guidance on additions, alterations and repairs to manufactured homes.

A.7.2 State of New Mexico Tower-Mounted Small Wind Turbine Systems Guidelines and Procedures for Permitting

New Mexico Regulation and Licensing Department
CONSTRUCTION INDUSTRIES DIVISION
2550 Cerrillos Road ▪ Santa Fe, NM 87505 ▪ (505) 476-4700 ▪ Fax (505) 476-4685
5200 Oakland Ave. NE ▪ Albuquerque, NM 87113 ▪ (505) 222-9800 ▪ Fax (505) 765-5670
505 S. Main St., Suite 150 ▪ Las Cruces, NM 88004 ▪ (505) 524-6320 ▪ Fax (505) 524-6319
www.rld.state.nm.us/cid

TOWER MOUNTED SMALL WIND TURBINE SYSTEMS GUIDELINES AND PROCEDURES FOR PERMITTING

EFFECTIVE DATE: 8 May 2009

The following guidelines and procedures for permitting and installing tower mounted small wind turbine systems in the State of New Mexico are based on the Construction Industries Licensing Act (1978 New Mexico Statutes Annotated (NMSA), Section 60-13-1, et seq.), the Construction Industries Rules, which include the New Mexico Electrical and Building Codes (New Mexico Administrative Code (NMAC), Sections 14.5.5 through 14.5.10).

For purposes of these guidelines, a tower mounted small wind turbine system (TWTS) is a wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electrical equipment that has a rated capacity of not more than 25 KW and which is intended to reduce the consumption of utility-generated power at the site of installation of the TWTS.

LICENSING REQUIREMENTS

1. Any person bidding or contracting for the installation of a TWTS must possess a valid license issued by the Construction Industries Division (CID) in the EE-98 license classification. CID license classifications can be found at NMAC, Section 14.6.6.9.
2. Any person performing the installation of a TWTS, or related work, must possess a valid journeyman certificate issued by CID in the EE-98J classification, or be an apprentice working under the direct supervision of such a certified journeyman.

PERMIT REQUIREMENTS

1. A TWTS may not be installed in New Mexico unless first properly permitted.
   - A general construction building permit for the foundation, base/tower and turbine must be obtained before the work is started.
   - An electrical permit for the electrical wiring must be obtained before the work is started.
2. A permit application for a permit to install a TWTS must be submitted to CID, or the local building permit authority, with two complete sets of foundation, base, tower and turbine construction drawings and specifications, prepared and sealed by a structural engineer or architect who is validly licensed to do business in New Mexico.
3. All aspects of the sealed plans, including installation specifications, must comply with the manufacturer's specification for the equipment and all applicable building codes. **NOTE:**

   The inverter used in a TWTS must be identified and listed or recognized for the application by a nationally recognized testing laboratory.

4. An application for installation of at TWTS permit will not be processed without local planning and zoning approval, if applicable. Please contact the municipal or county authority with jurisdiction in the location of the proposed installation for more information on local building, planning and zoning requirements.

Revision date: 05/2009

Construction Industries Division

TWTS GUIDELINES AND PROCEDURES FOR PERMITTING

INSPECTION REQUIREMENTS

1. TWTS site electrical wiring must be inspected for compliance with the New Mexico Electrical Code in effect at the time of the application for the permit.

2. TWTS system electrical wiring and grounding must be inspected for compliance with the New Mexico Code in effect at the time of application for the permit and the approved plans on which the permit was issued.

3. Foundation, base and anchoring system inspections, including torque verification inspection, must be requested and performed, and each element must pass inspection before this work is covered or concrete is poured.

4. Tower and turbine installation inspections must be requested and performed, and the work must pass inspection before the TWTS will be authorized to operate.

If you have questions regarding the permitting, installation or inspection of tower mounted small wind turbine systems, contact: Construction Industries Division

Permitting:	Foundation Inspections:	Electrical & Tower Inspections:
Plans and Permit Section	General Construction Bureau	Electrical Bureau
505.476.4869	505.476.4672	505.476.4679
505.476.4685 fax	505.476.4685 fax	505.476.4685 fax

Guidelines for Considering Noise in Land Use Planning and Control

Table B.1 | Guidelines for Considering Noise in Land Use Planning and Control (FICUN 1980)

	NZ I		NZ II		NZ III		
	0-55	55-65	65-70	70-75	75-80	80-85	85+
Residential							
Household Units	Yes	Yes*	251	301	No	No	No
Group Quarters	Yes	Yes*	251	301	No	No	No
Residential Hotels	Yes	Yes*	251	301	No	No	No
Manufactured Housing	Yes	Yes*	No	No	No	No	No
Other Residential	Yes	Yes*	251	301	No	No	No
Manufacturing							
Food Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Textile Mill Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Apparel	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Wood Products	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Furniture	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Paper	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Printing	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Manufacturing	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Transportation, Communications, and Utilities							
Railroad	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Motor Vehicle	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Aircraft	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Marine Craft	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Highway & Street	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Parking	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Communications	Yes	Yes	Yes	255	305	No	No
Utilities	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[4]
Other T, C, & U	Yes	Yes	Yes	255	305	No	No
Trade							
Wholesale Trade	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Retail - Building	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Retail - General	Yes	Yes	Yes	25	30	No	No
Retail - Food	Yes	Yes	Yes	25	30	No	No

Table B.1 | Guidelines for Considering Noise in Land Use Planning and Control (FICUN 1980)

	NZ I		NZ II		NZ III		
	0-55	55-65	65-70	70-75	75-80	80-85	85+
Retail - Auto	Yes	Yes	Yes	25	30	No	No
Retail - Apparel	Yes	Yes	Yes	25	30	No	No
Retail - Furniture	Yes	Yes	Yes	25	30	No	No
Retail - Eating	Yes	Yes	Yes	25	30	No	No
Other Retail Trade	Yes	Yes	Yes	25	30	No	No
Services							
Finance, Insurance	Yes	Yes	Yes	25	30	No	No
Personal Services	Yes	Yes	Yes	25	30	No	No
Cemeteries[11]	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	Yes[6]
Repair Services	Yes	Yes	Yes	Yes[2]	Yes[3]	Yes[4]	No
Profess Services	Yes	Yes	Yes	25	30	No	No
Hospitals, Nursing	Yes	Yes*	25*	30*	No	No	No
Other Medical	Yes	Yes	Yes	25	30	No	No
Facilities							
Contract Construction	Yes	Yes	Yes	25	30	No	No
Government Services	Yes	Yes*	Yes*	25*	30*	No	No
Educational Services	Yes	Yes*	25*	30*	No	No	No
Misc Services	Yes	Yes	Yes	25	30	No	No
Cultural, Entertainment, and Recreation							
Churches	Yes	Yes*	25*	30*	No	No	No
Nature Exhibits	Yes	Yes*	Yes*	No	No	No	No
Public Assembly	Yes	Yes	Yes	No	No	No	No
Auditoriums	Yes	Yes	25	30	No	No	No
Amphitheaters	Yes	Yes*	No	No	No	No	No
Outdoor Sports	Yes	Yes	Yes[7]	Yes[7]	No	No	No
Amusements	Yes	Yes	Yes	Yes	No	No	No
Recreational	Yes	Yes*	Yes*	25*	30*	No	No
Resorts	Yes	Yes*	Yes*	Yes*	No	No	No
Parks	Yes	Yes*	Yes*	Yes*	No	No	No
Other	Yes	Yes*	Yes*	Yes*	No	No	No
Resource Product							
Agriculture	Yes	Yes	Yes[8]	Yes[9]	Yes[10]	Yes[10]	Yes[10]
Livestock	Yes	Yes	Yes[8]	Yes[9]	No	No	No
Forestry	Yes	Yes	Yes[8]	Yes[9]	Yes[10]	Yes[10]	Yes[10]
Fishing	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mining	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Resource	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Legend

Yes	*Land use and related structures are compatible without restrictions.*
No	*Land use and related structures are not compatible and should be prohibited.*
ADNL	*A-weighted day-night sound level*
NZ	*Noise Zone*
Yes X	*(Yes with Restrictions) Land use and related structures are generally compatible; see footnotes.*
25, 30, 35	*Land use and related structures are generally compatible; measures to achieve noise level reduction of 25, 30, or 35 must be incorporated into design and construction of structure.*
25, 30*, 35**	*Land use generally compatible with noise level reduction; however, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties; additional evaluation is warranted.*
NLR	*Noise level reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.*

Footnotes

*		*The designation of these uses as "compatible" in this zone reflects individual federal agencies' consideration 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.*
1	*a*	*Although local conditions may require residential use, it is discouraged in 65-70 ADNL and strongly discouraged in 70-75 ADNL. The absence of viable alternative development options should be determined and an evaluation indicated that a demonstrated community need for residential use would not be met if development were prohibited in theses zones should be conducted prior to approvals.*
	b	*Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB (65-70 ADNL) and 30 dB (70-75 ADNL) should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels.*
	c	*NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level transportation sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.*
2		*Measures to achieve NLR or 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.*
3		*Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.*
4		*Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.*
5		*If noise-sensitive, use indicated NLR; if not, use is compatible.*
6		*No buildings.*
7		*Land use compatible provided special sound reinforcement systems are installed.*
8		*Residential buildings require NLR of 25.*
9		*Residential buildings require NLR of 30.*
10		*Residential buildings not permitted.*
11		*In areas with ADNL greater than 80, land use not recommended, but if community decides use is necessary, hearing protection devices should be worn by personnel.*

GUIDELINES FOR CONSIDERING NOISE IN LAND USE PLANNING AND CONTROL

June 1980

Federal Interagency Committee on Urban Noise

FEDERAL
INTERAGENCY COMMITTEE
ON URBAN NOISE

To all local government officials and others interested in noise/land use concerns:

In his Environmental Message to Congress in August, 1979, President Carter announced a new Urban Noise Initiative to reduce urban noise. The Federal Interagency Committee on Urban Noise was thereby established to coordinate various programs, including an interagency program designed "to encourage noise sensitive development, such as housing, to be located away from major noise sources." As a first step in that program, the Committee is pleased to make available this document which presents a broad consolidation of Federal guidance on the incorporation of noise considerations in local development planning and site review operations. We hope that it will facilitate improved communication among all levels of government on noise compatible land use and that you will find it useful in addressing noise/land use concerns in your community.

Douglas Costle
Administrator
U.S. Environmental Protection Agency

Neil Goldschmidt
Secretary
U.S. Department of Transportation

Moon Landrieu
Secretary
U.S. Department of Housing
and Urban Development

Robert B. Pirie, Jr.
Assistant Secretary of Defense
(Manpower, Reserve Affairs & Logistics)
U.S. Department of Defense

Max Cleland
Administrator
Veterans Administration

TABLES

CONTENTS

APPENDICES

Section 1 presents consolidated Federal agency land use compatibility guidelines. Section 2 overviews techniques by which the guidelines can be implemented. Section 3 briefly overviews the major Federal agency noise control policies and programs. The Appendices contain brief descriptions of environmental noise descriptors and annotated bibliographies of selected Federal documents.

Section 1. LAND USE COMPATIBILITY GUIDELINES

This section contains two tables. Table 1 classifies noise levels into a set of noise zones according to the most commonly used environmental noise descriptors. Noise zones are identified in order of increasing noise level by the letters "A" through "D". The descriptors are discussed in Appendix A. The Day-Night Average Sound Level (DNL)[1] descriptor can be used for all noise sources. The Equivalent Sound Level (L_{eq}) is included because some highway noise data can be expected to be in terms of an equivalent sound level for the highway "design hour" — see Table 1 for description of when L_{eq} (design hour) is equivalent to DNL for planning purposes. The L_{eq} descriptor itself is not unique to highways and can be applied to any noise source. The Noise Exposure Forecast (NEF) descriptor is used for aircraft noise only and is being superceded by DNL. The Community Noise Equivalent Level (CNEL) descriptor (for the state of California) uses values similar to DNL. Older descriptors unique to airport noise environments, such as the Composite Noise Rating (CNR), may be encountered. For general comparison purposes L_{dn} 65 = NEF 30 = CNR 100, L_{dn} 75 = NEF 40 = CNR 115.

Table 2 contains suggested land use compatibility guidelines. The table arrays land uses[2] on the left with the noise zones of Table 1 across the top. Land use compatibility is expressed as being "compatible", "incompatible" and "compatible with restrictions." The system as presented in the table is comprised of two digit categories identifying land use activity in the most generalized way (e.g. "10 Residential"). Within some of the two-digit categories here are sub-categories identifying activity in greater detail. Compatibility as expressed in this table represents a consolidation of existing Federal agency guidelines. This table serves as a point of departure in making several kinds of determinations, including whether various land uses should be allowed at particular sites based upon the noise levels at those sites. Detailed planning should be based on the procedures and specific general planning guidance found in appropriate Federal agency documents (Appendix B) as well as the needs, desires and site characteristics of the particular community. Another input to the

[1]Day-Night Average Sound Level is abbreviated as DNL and symbolized mathematically as L_{dn} (e.g., L_{dn} 65, L_{dn} 75, etc.).

[2]Land uses are here categorized according to the standard land use activity categories found in the *Standard Land Use Coding Manual*, Housing and Home Finance Agency (now Department of Housing and Urban Development) and Bureau of Public Roads (now Department of Transportation/Federal Highway Administration), 1965.

planning process is the statement of public health and welfare goals in EPA's "Levels" Document. The levels can be used by individual communities to incorporate public health and welfare goals into the planning process. These levels do not *in themselves,* however, form the sole basis for appropriate land use actions because they do not consider cost, feasibility, the noise levels from any particular source, or the development needs of the community and do include an adequate margin of safety. They should be considered by all communities in their planning, including those who now enjoy quiet and wish to preserve it, as well as those which are relatively noisy and wish to mitigate the problem.

4

TABLE 1. NOISE ZONE CLASSIFICATION

Noise Zone	Noise Exposure Class	Noise Descriptor			HUD Noise Standards
		DNL[1] Day-Night Average Sound Level	L_{eq}(hour)[3] Equivalent Sound Level	NEF[4] Noise Exposure Forecast	
A	Minimal Exposure	Not Exceeding 55	Not Exceeding 55	Not Exceeding 20	"Acceptable"
B	Moderate Exposure	Above 55[2] But Not Exceeding 65	Above 55 But Not Exceeding 65	Above 25 But Not Exceeding 30	
C-1	Significant Exposure	Above 65 Not Exceeding 70	Above 65 Not Exceeding 70	Above 30 But Not Exceeding 35	"Normally Unacceptable"[5]
C-2		Above 70 But Not Exceeding 75	Above 70 But Not Exceeding 75	Above 35 But Not Exceeding 40	
D-1	Severe Exposure	Above 75 But Not Exceeding 80	Above 40 But Not Exceeding 80	Not Exceeding 45	"Unacceptable"
D-2		Above 80 But Not Exceeding 85	Above 80 But Not Exceeding 85	Above 45 But Not Exceeding 50	
D-3		Above 85	Above 85	Above 50	

[1]CNEL — Community Noise Equivalent Level (California only) uses the same values.

[2]HUD, DOT and EPA recognize L_{dn} = 55 dB as a goal for outdoors in residential areas in protecting the public health and welfare with an adequate margin of safety (Reference: EPA "Levels" Document.) However, it is not a *regulatory* goal. It is a level defined by a negotiated scientific consensus without concern for economic and technological feasibility or the needs and desires of any particular community.

[3]The Federal Highway Administration (FHWA) noise policy uses this descriptor as an alternative to L_{10} (noise level exceeded ten percent of the time) in connection with its policy for highway noise mitigation. The L_{eq} (design hour) is equivalent to DNL for planning purposes under the following conditions: 1) heavy trucks equal ten percent of total traffic flow in vehicles per 24 hours; 2) traffic between 10 p.m. and 7 a.m. does not exceed fifteen percent of the average daily traffic flow in vehicles per 24 hours. Under these conditions DNL equals L_{10} - 3 decibels.

[4]For use in airport environs only; is now being superceded by DNL.

[5]The HUD Noise Regulation allows a certain amount of flexibility for non-acoustic benefits in zone C-1. Attenuation requirements can be waived for projects meeting special requirements.

TABLE 2. SUGGESTED LAND USE COMPATIBILITY GUIDELINES

Land Use		Noise Zones/DNL Levels in L_{dn}						
SLUCM No.	Name	A 0-55	B 55-65	C-1 65-70	C-2 70-75	D-1 75-80	D-2 80-85	D-3 85+
10	**Residential**							
11	Household units.							
11.11	Single units — detached	Y	Y*	25[1]	30[1]	N	N	N
11.12	Single units — semidetached	Y	Y*	25[1]	30[1]	N	N	N
11.13	Single units — attached row	Y	Y*	25[1]	30[1]	N	N	N
11.21	Two units — side-by-side	Y	Y*	25[1]	30[1]	N	N	N
11.22	Two Units — one above the other	Y	Y*	25[1]	30[1]	N	N	N
11.31	Apartments — walk up	Y	Y*	25[1]	30[1]	N	N	N
11.32	Apartments — elevator	Y	Y*	25[1]	30[1]	N	N	N
12	Group quarters	Y	Y*	25[1]	30[1]	N	N	N
13	Residential hotels	Y	Y*	25[1]	30[1]	N	N	N
14	Mobile home parks or courts	Y	Y*	N	N	N	N	N
15	Transient lodgings	Y	Y*	25[1]	30[1]	35[1]	N	N
16	Other residential	Y	Y*	25[1]	30[1]	N	N	N
20	**Manufacturing**							
21	Food and kindred products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products made from fabrics, leather, and similar materials — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture) — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N

*The designation of these uses as "compatible" in this zone reflects individual Federal agencies' consideration 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. For an indication of possible community reaction in residential environments at various levels of cumulative noise, Table D-1 in Appendix D should be consulted.

NOTES FOR TABLE 2

1. a) Although local conditions may require residential use, it is discouraged in C-1 and strongly discouraged in C-2. The absence of viable alternative development options should be determined and an evaluation indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones should be conducted prior to approvals.

   b) Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB (Zone C-1) and 30 dB (Zone C-2) should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels.

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

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

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

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

KEY TO TABLE 2

SLUCM	Standard Land Use Coding Manual
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR (Noise Level Reduction)	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
Y^X (Yes with restrictions)	Land Use and related structures generally compatible; see notes 2 through 4.
25, 30, or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structure.
25*, 30* or 35*	Land Use generally compatible with NLR; however, measures to achieve an overall do not necessarily solve noise difficulties and additional evaluation is warranted.

TABLE 2. SUGGESTED LAND USE COMPATIBILITY GUIDELINES (continued)

Land Use		Noise Zones/DNL Levels in L_{dn}						
SLUCM No.	Name	A 0-55	B 55-65	C-1 65-70	C-2 70-75	D-1 75-80	D-2 80-85	D-3 85 +
30	**Manufacturing (cont'd)**							
31	Rubber and misc. plastic products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products — manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal industries	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products — manufacturing.	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks — manufacturing	Y	Y	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y	Y	Y[2]	Y[3]	Y[4]	
40	**Transportation, communication and utilities**							
41	Railroad, rapid rail transit and street railway transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
42	Motor vehicle transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
43	Aircraft transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
44	Marine craft transportation	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
45	Highway and street right-of-way	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
46	Automobile parking	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
47	Communication	Y	Y	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y	Y	Y[2]	Y[3]	Y[4]	Y
49	Other transportation, communication and utilities	Y	Y	Y	25[5]	30[5]	N	N
50	**Trade**							
51	Wholesale trade	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade — building materials, hardware and farm equipment	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
53	Retail trade — general merchandise	Y	Y	Y	25	30	N	N
54	Retail trade — food	Y	Y	Y	25	30	N	N
55	Retail trade — automotive, marine craft, aircraft and accessories	Y	Y	Y	25	30	N	N
56	Retail trade — apparel and accessories	Y	Y	Y	25	30	N	N
57	Retail trade — furniture, home furnishings and equipment	Y	Y	Y	25	30	N	N
58	Retail trade — eating and drinking establishments	Y	Y	Y	25	30	N	N
59	Other retail trade	Y	Y	Y	25	30	N	N

NOTES FOR TABLE 2

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

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

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

5. If noise sensitive use indicated NLR; if not use is compatible.

KEY TO TABLE 2

SLUCM	Standard Land Use Coding Manual
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR (Noise Level Reduction)	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
Y^X (Yes with restrictions)	Land Use and related structures generally compatible; see notes 2 through 4.
25, 30, or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structure.
25*, 30* or 35*	Land Use generally compatible with NLR; however, measures to achieve an overall noise reduction do not necessarily solve noise difficulties and additional evaluation is warranted.

TABLE 2. SUGGESTED LAND USE COMPATIBILITY GUIDELINES (continued)

SLUCM No.	Land Use Name	Noise Zones/DNL Levels in L_{dn} A 0-55	B 55-65	C-1 65-70	C-2 70-75	D-1 75-80	D-2 80-85	D-3 85+
60	**Services**							
61	Finance, insurance and real estate services	Y	Y	Y	25	30	N	N
62	Personal services	Y	Y	Y	25	30	N	N
62.4	Cemeteries	Y	Y	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	Y	Y	25	30	N	N
64	Repair services	Y	Y	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	Y	Y	25	30	N	N
65.1	Hospitals, nursing homes	Y	Y*	25*	30*	N	N	N
65.1	Other medical facilities	Y	Y	Y	25	30	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Governmental services	Y	Y*	Y*	25*	30*	N	N
68	Educational services	Y	Y*	25*	30*	N	N	N
69	Miscellaneous services	Y	Y	Y	25	30	N	N
70	**Cultural, entertainment and recreational**							
71	Cultural activities (including churches)	Y	Y*	25*	30*	N	N	N
71.2	Nature exhibits	Y	Y*	Y*	N	N	N	N
72	Public assembly	Y	Y	Y	N	N	N	N
72.1	Auditoriums, concert halls	Y	Y	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	Y	Y*	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y	Y	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	Y	Y	N	N	N
74	Recreational activities (incl. golf courses, riding stables, water recreation)	Y	Y*	Y*	25*	30*	N	N
75	Resorts and group camps	Y	Y*	Y*	Y*	N	N	N
76	Parks	Y	Y*	Y*	Y*	N	N	N
79	Other cultural, entertainment and recreation	Y	Y*	Y*	Y*	N	N	N
80	**Resource production and extraction**							
81	Agriculture (except livestock)	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5 to 81.7	Livestock farming and animal breeding	Y	Y	Y[8]	Y[9]	N	N	N
82	Agricultural related activities	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities and related services	Y	Y	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities and related services	Y	Y	Y	Y	Y	Y	Y
85	Mining activities and related services	Y	Y	Y	Y	Y	Y	Y
89	Other resource production and extraction	Y	Y	Y	Y	Y	Y	Y

*The designation of these uses as "compatible" in this zone reflects individual Federal agencies' consideration of cost and feasibility factors as well as program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider. For an indication of possible community reaction in residential environments at various levels of cumulative noise, Table D-1 in Appendix D should be consulted.

NOTES FOR TABLE 2

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

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

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

6. No buildings.

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

8. Residential buildings require a NLR of 25.

9. Residential buildings require a NLR of 30.

10. Residential buildings not permitted.

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

KEY TO TABLE 2

SLUCM	Standard Land Use Coding Manual
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR (Noise Level Reduction)	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
Y^X (Yes with restrictions)	Land Use and related structures generally compatible; see notes 2 through 4.
25, 30, or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structure.
25*, 30* or 35*	Land Use generally compatible with NLR; however, measures to achieve an overall noise reduction do not necessarily solve noise difficulties and additional evaluation is warranted.

Section 2. TECHNIQUES FOR DEALING WITH NOISE IN LAND USE PLANNING

There are many techniques that local governments can use to reduce the effect of noise on surrounding land uses. These techniques range from simply increasing public awareness of existing noise levels to the very drastic, but admittedly very effective step of public purchase of severely exposed land uses. The following table outlines some of these techniques. The table is not intended to be exhaustive. Rather it is presented simply to illustrate the range of techniques available to reduce the effect of noise on land uses.

The techniques are arrayed in order of increasing stringency and general effectiveness. The effectiveness of any given technique is, however, very much a function of the specific noise situation and the way in which the technique is applied. It should also be understood that often the most effective approach will be a *combination* of techniques such as enacting both zoning and building code requirements.

The table includes, for each technique, a brief general summary of current experience with the techniques. The column entitled "situation where most applicable" includes indications of inherent limitations to given techniques. The "comments" column is intended to provide general insights on how the techniques work.

TABLE 3. TECHNIQUES FOR DEALING WITH NOISE IN LAND USE PLANNING

TECHNIQUE	SITUATION WHERE MOST APPLICABLE	COMMENTS
	Anywhere	Can be an important factor in determining the marketability of homes and other land uses. Can have a direct effect on developers and builders. Use in combination with other actions.
b. Prior Notice of Noise Levels to Renters and Purchasers	Anywhere	Can be required by local ordinance. Enables renters and purchasers to choose environment with full information. May reduce or eliminate subsequent complaints or damage claims.
II. Coordination		
a. OMB Circular A-95 Process	Anywhere Federal and Federally assisted projects are proposed	Allows identification of noise problems in the review and comment of Federal and Federally assisted plans, programs and projects. Indirect control.
b. Environmental Assessment Process	Anywhere Environmental Impact Analyses are required.	Indirect Control. Increase awareness of noise. May discourage inappropriate projects. Mechanism to propose mitigation measures.
III. Providing Advisory Services		
a. Architectural or Planning Review	Where there is appropriate staff or funding.	Site-specific analysis for each case.
b. Design Assistance	Where there is appropriate staff or funding.	Allows inclusion of noise mitigation measures such as building attenuation, siting modification, berms, and barriers, etc.
c. Information Libraries	Anywhere	Passive advisory service.

Continued on following page

TABLE 3. TECHNIQUES FOR DEALING WITH NOISE IN LAND USE PLANNING (continued)

TECHNIQUE	SITUATION WHERE MOST APPLICABLE	COMMENTS
	Where comprehensive planning process is established particularly where controls (zoning) must implement plan.	Works best when noise is considered a basic suitability factor along with others such as slope, soils conditions, etc. Should be addressed in all types of plans. May require enabling legislation.
V. Incorporating Noise Issues Into Environmental Management Programs	Where programs such as Areawide Waste Management, Air Quality, Coastal Zone Management, Prime and Unique Agricultural Lands and Floodplains and Wetlands are established.	These programs influence land use policy.
VI. Development Codes and Policies		
a. Subdivision Regulations and/or site plan approvals. Require Noise Reduction Considerations in site design (site orientation, buffers, barriers, etc.)	Where portions of development projects fall within noise exposure areas.	May not be applicable for airborne aircraft. May require enabling legislation.
b. Building codes. Require sound insulation, isolation, absorption in building construction	Where interior noise exposure can be reduced to acceptable levels and buildings should otherwise be prohibited.	Noise Level Reduction (NLR) up to 35 dB (15 dB above normal construction). Outdoor environment not protected. May require enabling legislation to use noise zones for building code restrictions. Difficult to apply retroactively. Local opposition to increased building costs possible Related to energy conservation. Requirements might also be incorporated into health and/or occupancy codes.

Continued on following page

TABLE 3. TECHNIQUES FOR DEALING WITH NOISE IN LAND USE PLANNING (continued)

TECHNIQUE	SITUATION WHERE MOST APPLICABLE	COMMENTS
VI. Development Codes and Policies — *continued*		
c. Special Permits and/or Special Planning Districts	Anywhere a permit granting system exists or can be started.	Site-specific analysis would be required for each case. May require enabling legislation.
d. Special Use Designations	Anywhere unique or special land characteristics exist (cultural or historic, scenic, wetlands, floodplains, prime agricultural lands, water supply sources).	Such areas may be noise exposed and those designations will normally assure noise compatibility. May require legislation.
e. Official Map	Anywhere streets exist or are planned.	Planned major streets should avoid noise sensitive areas and should encourage development in areas not exposed to noise.
f. Capital Improvements	Anywhere	Governmental constructed utilities, streets, and facilities should be sited to encourage compatible use and be in themselves compatible.
VII. Land Use Controls		
a. Zoning 1. For compatible land uses	Anywhere	Should be based on a comprehensive plan. May require enabling legislation to use noise as a criterion. Not retroactive and can be removed upon short notice. Most effective for undeveloped areas.
2. To require buffer areas	Where noise source is at ground level.	Easy to implement in low density areas. Not effective for airborne aircraft. May require enabling legislation.
3. To require berms or barriers	Where noise source is at ground level.	Effective but care is needed to insure that it is aesthetically desirable. May require enabling legislation.

Continued on following page

TABLE 3. TECHNIQUES FOR DEALING WITH NOISE IN LAND USE PLANNING (continued)

TECHNIQUE	SITUATION WHERE MOST APPLICABLE	COMMENTS
VII. Land Use Controls — *continued*		
4. To allow cluster or planned unit development	For medium and large developments	Significant potential benefits. Builders can incorporate buffer areas without reducing number of units. May require enabling legislation.
VIII. Purchase Real Property Interests		
a. Fee Purchase		
1. For compatibility	Where noise levels are extreme	Attempts to contain worst noise effects within the right-of-way or site. May require enabling legislation.
2. For public use	Where public use is compatible and needed in that location.	Limited by need for compatible public uses.
b. Fee purchase and resale with development restrictions	Where other measures are impractical	Public authority may be reluctant. Local government may object to controls. Business may object to government becoming developer. Dependent on demand feasibility for compatible use. May require enabling legislation.
c. Easement (development rights) purchase	Where other measures are impractical	May be more practical than Fee Simple purchase. May require enabling legislation.
d. Agricultural Land Preservation District	Where land is suitable.	Requires appropriate legislation. Minimum site size of 50 acres is typical and usually allows a single farm residence. Presents possible bird strike hazards.
IX. Property Tax Incentives (open space, agricultural, etc.)	Where tax pressures exist on owners of undeveloped land.	Requires enabling legislation. Easy in many cases to implement. Cannot prevent incompatible development but can allow economically productive compatible land use.

Section 3. FEDERAL AGENCY PROGRAMS AND POLICIES

The purpose of this section is to briefly overview the noise policies and programs relating to land use of the following agencies:

- Department of Defense (DOD)
- Department of Housing and Urban Development (HUD)
- Environmental Protection Agency (EPA)
- Department of Transportation/Federal Aviation Administration (DOT/FAA)
- Department of Transportation/Federal Highway Administration (DOT/FHWA)
- Veterans Administration (VA)

The Federal noise policies and programs discussed in this section all share the common goal of protecting the public health and welfare with regard to noise. Most policies also state additional goals in recognition that noise is a specific constraint on particular agency missions. DOD, for example, states as a primary goal of its noise policy, the continuance of operational integrity at its airfields.

All of the policies address in varying degrees (and some not exclusively), transportation noise problems, particularly those of highways and airport systems. The policies concentrate on these noise sources not only because their noise problems are among the most pervasive, but because Federal agencies have assisted by providing billions of dollars for their construction and maintenance. Most, however, are actually owned and operated by local and State governments.

The major differences among the policies center upon the noise levels specified and the types of noise measures used or required. There are *four different types of noise levels* used in these policies:

- mitigation levels (e.g., FHWA design levels);
- levels required to protect the public health and welfare (e.g., EPA "levels" document);
- general planning (land use) levels (e.g., DOD);
- levels required for Federal assistance (e.g., HUD, VA) (these are similar to the general planning levels).

As Table 4 shows, a specific purpose is associated with each type of level. *Misuse of a particular type in any situation can produce erroneous results.*

Primarily because of differences in statutory authority, the noise policies differ in the kinds of noise actions and techniques emphasized. The FAA and EPA regulations, for example, stress source and operational controls for aircraft and highway vehicles while the FHWA policy, in the main, stresses noise mitigation (e.g., placement of noise barriers) at noise sensitive locations along highways. HUD and VA, on the other hand, require, in certain cases, that the receiver (e.g., residential development) be provided noise attenuation as a condition for mortgage insurance or assistance.

A brief overview of individual agency noise policies follows.

TABLE 4. FEDERAL AGENCY POLICY AND PROGRAM SUMMARY

AGENCY		1. DEPARTMENT OF DEFENSE (DOD)	2. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)	3. ENVIRONMENTAL PROTECTION AGENCY (EPA)	4. DOT/FEDERAL AVIATION ADMINISTRATION (FAA)	5. DOT/FEDERAL HIGHWAY ADMINISTRATION (FHWA)	6. VETERAN'S ADMINISTRATION (VA)
Type of Program or Policy		Air Installations Compatible Use Zones (AICUZ) Program	HUD Noise Regulations	Health & Welfare Guidance	Aviation Noise Abatement Policy	Highway Noise Policy	VA Noise Policy
Key Documents		DOD Instruction 4165.57 (1977) Installation AICUZ Studies	24 CRF Part 51 Subpart B; Noise Assessment Guidelines (1980)	EPA "Levels" Document (1974)	DOT/FAA Aviation Noise Abatement Policy (1976) Advisory Circular: 150/5050-6 (1977)	FHPM 7-7-3 (1976)	Section VIII Appraisal of residential properties near Airports (1969)
Noise Levels	Title of Levels	Levels used as "reasonable" guidance to communities in planning	Levels which determine whether proposed sites are eligible for HUD insurance or assistance	Levels which are required to protect the public health and welfare with an adequate margin of safety	Levels used as "starting points" in determining noise/land use relationships	Design Noise Levels	Levels determining whether proposed sites are eligible for VA assistance
	Purpose of Levels	Guidance to communities for planning. Reflects cost, feasibility, past community experience, general program objectives and consideration of health and welfare goals.	See above. Levels can be used as general planning levels. Reflects cost, feasibility, general program objectives and consideration of health and welfare goals.	These levels identify in scientific terms the threshold of effect. While the levels have relevance for planning, they do not in themselves form the sole basis for appropriate land use actions because they do *not* consider cost, feasibility or the development needs of the community. The user should make such tradeoffs.	Guidance to communities for planning. Reflects safety, cost, feasibility, general program objectives and consideration of health and welfare goals.	These levels are used in determining where noise mitigation on a particular highway project is warranted. They do reflect cost and feasibility considerations. They are not appropriate land use criteria. Location Specific.	See above. Reflects cost, feasibility general program objectives and consideration of health and welfare goals.
	Source to which applied	Military Airfields	All sources	All sources	Civil Airports	Highways only	Airports only
	Noise Descriptors Used	DNL	DNL	DNL	DNL, L_{eq} (CNEL California only)	L_{eq} or L_{10} for design hour	Various (including DNL)

Department of Defense (DOD)

Department of Defense policy for noise compatible land use guidance is called the Air Installation Compatible Use Zone (AICUZ). Each military service has an AICUZ program to investigate, describe, and study noise exposure and land use at all DOD air installations. AICUZ studies for each installation are prepared and given to the public and local, regional, state, and other federal agencies for use in their land use planning/control and intergovernmental programs and processes. Each study contains noise contours, accident potential zones, existing and future land use compatibilities and incompatibilities, land use planning/control recommendations.

Department of Defense Policy:

- Requires that all reasonable, economical, and practical measures will be taken to reduce and/or control the generation of noise from flying.
- Is to work toward achieving compatibility between air installations and neighboring civilian communities by means of a compatible land use planning and control process conducted by the local community.
- Requires working with local governments, local planning commissions, special purpose districts, regional planning agencies, state agencies, and state legislatures as well as other federal agencies.
- Includes technical assistance to local, regional, and state agencies to assist them in developing their land use planning and regulatory processes, to explain an AICUZ study and its implications, and generally to work toward compatible planning and development in the vicinity of military airfields.

Department of Housing and Urban Development (HUD)

The major purpose of the Department of Housing and Urban Development's (HUD) noise regulations (24 CFR Part 51 Subpart B) is to insure that activities assisted or insured by the Department achieve the goal of a suitable living environment. HUD also supports other agencies efforts in noise control.

The regulations generally apply to all HUD actions and provide minimum national standards to protect citizens against excessive noise in their communities and places of residence. The basic policy is that HUD assistance for construction of new noise sensitive uses is prohibited generally for projects with Unacceptable noise exposures and is discouraged for projects with Normally Unacceptable noise exposure. Unacceptable noise exposure is defined as a noise level above 75 dB (Day-night average sound level (DNL) in decibels). A Normally Unacceptable level is one above 65 dB but not exceeding 75 dB. These noise levels are to be based on noise from all sources, highway, railroad and aircraft.

Attenuation measures are normally required before projects in the Normally Unacceptable zone can be approved. Attenuation measures that reduce the external noise at a site are preferred, whenever practicable, over measures which only provide attenuation for interior spaces. HUD's noise regulations also apply to modernization and rehabilitation. For major or substantial rehabilitation projects in the Normally Unacceptable and Unacceptable

noise zones HUD actively will seek to have noise attenuation features incorporated into the project. In the Unacceptable noise zones, HUD will strongly encourage conversion of noise exposed sites to more compatible land uses.

HUD also requires that Comprehensive Planning Assistance grantees give adequate consideration to noise as an integral part of the urban environment with particular emphasis being placed on the importance of compatible land use planning in relation to airports, highways and other sources of high noise. Recipients of community development block grants under Title I of the Housing and Community Development Act of 1974 must also take into consideration the noise criteria and standards in the environmental assessment process.

Environmental Protection Agency (EPA)

The EPA's Noise program is designed to provide leadership to the national noise abatement effort. The key statutory mandates under which EPA operates are the Noise Control Act of 1972 (PL92-574) and the Quiet Communities Act of 1978 (95-609).

Until recently, EPA's Program has concentrated its efforts in setting noise source emission standards for various products, including transportation vehicles, construction equipment and consumer products. EPA also proposes aircraft/airport regulations to the FAA following a special procedure specified in the Noise Control Act of 1972.

Key to these efforts have been EPA reports defining scientifically the relationships between noise level and human response. The EPA "Levels" Document established threshold levels of impact which, if met, would protect the public "with an adequate margin of safety". As noted in Table 4, while these levels have relevance for planning, they, in themselves, are *not* necessarily appropriate land use planning criteria because they do not consider cost, feasibility, or the development needs of the community.

The emphasis of EPA's program today is on assisting cities, States and others to develop and carry out effective noise programs through various approaches, including noise and land use. In addition to a new grants program under the Quiet Communities Act, EPA has initiated such technical assistance programs as The Quiet Communities Program (QCP) and Each Community Helps Others (ECHO). The QCP is a program focusing EPA guidance and fiscal resources on target communities to achieve total community involvement and action. The ECHO program provides technical assistance to local communities on specific noise problems consulting services from officials of communities who have successfully overcome similar problems. Various other programs emphasizing provision of information on noise to various publics are also being developed and carried out.

Department of Transportation/Federal Aviation Administration (DOT/FAA)

The Federal Aviation Administration's noise program is guided by the 1976 Aviation Noise Abatement Policy and the Aviation Safety and Noise Abatement Act of 1979. The policy defines the responsibilities of the FAA, airport proprietors and users, and land use planning and control authorities in achieving and maintaining airport noise compatibility. The FAA uses two major approaches to implement this policy. The first is aimed at reducing

the noise of the individual aircraft. This includes a program to retrofit engines or equipment on noisy aircraft or to replace them with newer, quieter aircraft. It also includes the development of operational procedures which can reduce the aircraft's noise impacts.

The other major approach to noise compatibility is through planning and development activities at airports under the Airport and Airway Development Act of 1970 (as amended). Airport Noise Control and Land Use Compatibility (ANCLUC) planning studies integrate the master planning study activities, the environmental considerations, and the airport-land use compatibility planning activities at an airport. The objective is to achieve maximum noise and environmental compatibility within the constraints of safety, service, and economic viability. The plan may contain operational controls as well as physical improvements for the airport. It will also recommend, based upon a comprehensive study effort, land uses and strategies for land use control for areas around the airport impacted by noise. FAA's advisory circular, Airport-Land Use Compatibility Planning (AC 150/5050-6), serves as the basic guidance for the land use compatibility portion of an ANCLUC study.

The Aviation Safety and Noise Abatement Act of 1979 strengthens the FAA's noise policy by providing assistance to airport operators to prepare and carry out noise compatibility programs and providing incentives for replacing noisy aircraft with new technology aircraft. In compliance with this Act, the FAA will develop and promulgate an amendment to Part 150 of the Federal Aviation Regulations which will standardize airport noise abatement plans and provide for their review, specify standard noise metrics for use in airport noise assessments, and identify compatible land uses.

Department of Transportation/Federal Highway Administration (DOT/FHWA)

As a result of the Federal Aid Highway Act of 1970[1], the Federal Highway Administration (FHWA) is concerned with traffic and construction noise associated with Federal aid highways. Since 1972, FHWA has had a noise policy applicable to new highway construction. The focus of the policy is to elevate the consideration of noise exposure in Federal-Aid highway location and design decisions by requiring substantive study of future noise exposure in conjunction with standards featuring highway design noise levels. (These levels have a very specific purpose which is explained in Table 4. Since 1976, FHWA's policy has also provided for noise mitigation on existing Federal aid highways. The principal noise mitigation measure has been placement of barriers at noise sensitive locations.

FHWA also recognizes and supports other approaches to highway noise control. Although in the source control area FHWA's authority is limited to implementing interstate motor carrier noise standards issued by EPA, it supports legislation to reduce the noise levels of motor vehicles. In the land use area its authority (like that of the other Federal agencies discussed here) is limited to providing information and guidance.[2]

The FHWA noise policy applies to the Federal Highway program which (unique among the policies discussed here) is a state administrated program receiving Federal assistance. The noise policy is actually carried out as part of the overall environmental assessment process required by the National Environmental Policy Act. For each new highway, FHWA

[1]Act amended in 1973 and 1976.

[2]FHWA's key document in this area is *The Audible Landscape* (1974).

requires that state highway agencies furnish localities information on noise and land use. Furthermore, FHWA will normally not approve funds for barrier construction for areas which have become sensitive after May 24, 1976, unless localities have instituted land use controls over the remaining undeveloped lands adjacent to the highways.

Veterans Administration (VA)

The Veterans Administration (VA) policy for consideration of noise and land use planning is contained in separate statements. One statement is for the VA's Loan Guaranty Program and the other is for both the Department of Medicine and Surgery (DM&S) and the Department of Memorial Affairs (DMA).

The VA Loan Guaranty noise policy governs VA decisions as to whether residential sites in airport environs are "acceptable" for loan guaranty programs to eligible veterans and active duty personnel.

The VA Loan Guaranty noise policy features a set of three noise zones. In the case of new construction, all new developments located in the two higher zones generally are not eligible for VA assistance. There is flexibility in that if a local officer recommends acceptance, the VA Central Office will consider the case in light of geographic factors and proposed attenuation features,[1] as well as marketability. In the middle zone, it, therefore, may be possible to develop properties which will be acceptable for VA loans.

In all cases (existing as well as proposed properties) for sites located in the two higher zones, VA requires that a statement from each veteran purchaser be obtained indicating awareness that (a) the property being purchased is located in an area adjacent to an airport, and (b) the aircraft noise factor may affect normal liveability, value and saleability of the property.

The VA's Loan Guaranty Service conducts its business with veteran purchasers, lenders, builders and other sellers who are interested in VA's guaranty of the loan to an individual veteran purchaser. The Loan Guaranty Service rarely has any direct interaction with local authorities.

The policy for land acquisition and maintenance adhered to by DM&S and DMA considers noise in the environmental planning of all acquisition and construction programs. All new VA Medical Centers, domiciliaries, and other medical facilities are compatible or have been designed with noise attenuation features allowing them to be compatible with zones as defined in Table 2. All new VA National Cemetery Construction has generally been limited to Noise Zones A & B as described on Table 2 because of the nature of outdoor services. Guidelines for planning state facilities which are eligible for grant funds from DM&S or DMA programs are slightly relaxed leaving latitude to local conditions in planning requirements.

[1]Such as soundproofing, year round air conditioning and other treatment.

This page intentionally left blank.

DoD Compatible Land Use Guidelines for CZs and APZs

Table C.1 | DoD Compatible Land Use Guidelines for CZs and APZs

Land Use	Clear Zone	APZ I	APZ II
Residential			
Single Family Unit	No	No	Yes[2]
2-4 Family Units	No	No	No
Multifamily Dwellings (Apartments)	No	No	No
Group Quarters	No	No	No
Residential Hotels	No	No	No
Mobile Home Parks or Courts	No	No	No
Other Residential	No	No	No
Industrial and Manufacturing			
Food and Kindred Products	No	No	Yes
Apparel	No	No	No
Lumber and Wood Products	No	Yes	Yes
Furniture and Fixtures	No	Yes	Yes
Printing, Publishing	No	Yes	Yes
Miscellaneous Manufacturing	No	Yes	Yes
Transportation, Communications, and Utilities			
Railroad, Rapid Rail Transit (on-grade)	No	Yes[4]	Yes
Highway and Street Rights-of-Way	Yes[5]	Yes	Yes
Auto Parking	No	Yes	Yes
Communications	Yes[5]	Yes	Yes
Utilities	Yes[5]	Yes[4]	Yes
Other Transportation, Communications and Utilities	Yes[5]	Yes	Yes
Commercial and Retail Trade			
Wholesale Trade	No	Yes	Yes
Building Materials (Retail)	No	Yes	Yes
General Merchandise (Retail)	No	No	Yes
Food (Retail)	No	No	Yes
Automotive, Marine, and Aviation	No	Yes	Yes
Apparel and Accessories (Retail)	No	No	Yes
Furniture, Home Furnishings (Retail)	No	No	Yes
Eating and Drinking Facilities	No	No	No

Table C.1 | DoD Compatible Land Use Guidelines for CZs and APZs

Land Use	Clear Zone	APZ I	APZ II
Other Retail Trade	No	No	Yes
Personal and Business Services			
Finance, Insurance, and Real Estate	No	No	Yes
Personal Services	No	No	Yes
Business Services	No	No	Yes
Repair Services	No	Yes	Yes
Professional Services	No	No	Yes
Contract Construction Services	No	Yes	Yes
Indoor Recreation Services	No	No	Yes
Other Services	No	No	Yes
Public and Quasi-Public Services			
Government Services	No	No	Yes[6]
Educational Services	No	No	No
Cultural Activities	No	No	No
Medical and Other Health Services	No	No	No
Cemeteries	No	Yes[7]	Yes[7]
Non-profit Organizations including Churches	No	No	No
Other Public and Quasi-Public Services	No	No	Yes
Outdoor Recreation			
Playgrounds and Neighborhood Parks	No	No	Yes
Community and Regional Parks	No	Yes[8]	Yes[8]
Nature Exhibits	No	Yes	Yes
Spectator Sports Including Arenas	No	No	No
Golf Courses[9], Riding Stables[10]	No	Yes	Yes
Water Based Recreational Areas	No	Yes	Yes
Resort and Group Camps	No	No	No
Entertainment Assembly Areas	No	No	No
Other Outdoor Recreation	No	Yes[8]	Yes
Resource Production and Extraction and Open Land			
Agriculture[11]	Yes	Yes	Yes
Livestock Farming, Animal Breeding[12]	No	Yes	Yes
Forestry Activities	No	Yes	Yes
Fishing Activities and Related Services[13]	No[14]	Yes[13]	Yes
Mining Activities	No	Yes	Yes
Permanent Open Space	Yes	Yes	Yes
Water Areas[13]	Yes	Yes	Yes

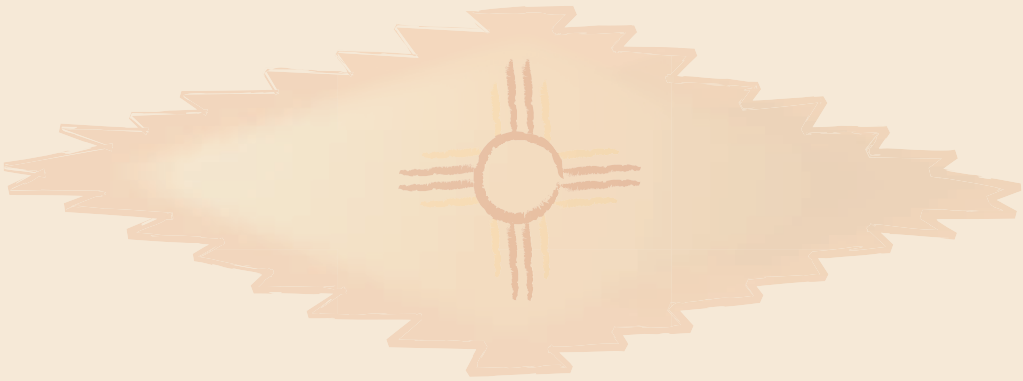
Public Participation

D.1 Public Participation Plan

Please see the following pages.

CURRY COUNTY | CANNON AIR FORCE BASE

JOINT LAND USE STUDY



PUBLIC PARTICIPATION PLAN

6 April 2010

Contents

INTRODUCTION

1.1 JOINT LAND USE STUDY

A Joint Land Use Study (JLUS) is produced by and for the local jurisdictions and is intended to benefit both the local community and the military installation. The purpose of the Cannon Air Force Base (AFB) JLUS is to assist in the implementation of compatible land uses around the Base and Melrose Air Force Range through a cooperative planning effort that includes representatives from Curry and Roosevelt counties, Cannon AFB, and other interested and affected parties. The purpose of this Cannon AFB JLUS is to protect Cannon AFB's mission while increasing the economic diversity and viability of the community. The JLUS planning process uses existing data to understand the current issues of land use compatibility and proposes specific and achievable implementation strategies based upon compatibility criteria.

1.2 PUBLIC PARTICIPATION FOUNDATION

The intended goal of the Public Participation Plan are to make the citizens of both Curry County and Roosevelt County aware of the issues and progress associated with the Cannon AFB JLUS, and to offer the public opportunities to actively participate in plan development. By directly engaging citizens in this process, a foundation has been laid that promotes successful problem solving and new ideas, and gives the public a sense of ownership of the developed solutions. The Cannon AFB JLUS is committed to a public participation process that is proactive and in which the local jurisdictions strive to find innovative ways to identify and engage the affected public. Overall, the public participation plan provides a wide variety of opportunities for interested parties to become involved, and ensures effective communication about how the public contribution influences decisions. To achieve this, Curry County is committed to a public participation process that:

- Involves the public in decisions that affect their businesses and/or property
- Continuously strives to educate and inform affected and interested parties to give them a more meaningful participatory experience
- Ensures that the public's contribution will influence decision making
- Communicates how the public's contribution will influence decisions
- Provides equal access to opportunities, information, and education
- Is adaptable and sensitive to diverse audiences
- Allows for flexibility and use of creative approaches
- Encourages early and active participation
- Ensures timely response to participants

- Maintains honesty and integrity throughout the process.
- Involves process evaluation and monitoring tools.

Increasing Level of Public Involvement

Public Awareness	Public Education	Public Input	Public Interaction	Public Partnership
Objective: *To make the public aware of the comprehensive planning process.*	**Objective:** *To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, and/or solution.*	**Objective:** *To obtain public feed back on issues, alternatives, and/or decisions.*	**Objective:** *To work directly with the public throughout the process to ensure the public issues and concerns are consistently understood and considered.*	**Objective:** *To place decision-making responsibilities in the hands of the public*
Promise to the Public: *We will keep you informed*	**Promise to the Public:** *We will try to help you understand*	**Promise to the Public:** *We will keep you informed, listen to and acknowledge concerns, and provide feedback on how public input influenced decisions.*	**Promise to the Public:** *We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed, and provide feedback on how public input influenced decisions.*	**Promise to the Public:** *We will implement what you decide.*
Example Methods: *Direct mail* *News releases and mass media* *Displays and exhibits* *www.cannonafb jlus.org*	**Example Methods:** *Public education meeting* *Websites* *Newsletters* *www.cannonafb jlus.org*	**Example Methods:** *Open houses* *Public hearings* *Visual preference surveys* *Opinion surveys* *www.cannonafb jlus.org*	**Example Methods:** *Workshops* *www.cannonafb jlus.org*	**Example Methods:** *Technical Committees* *Work Groups* *www.cannonafb jlus.org*
Adapted from the International Association for Public Participation				

1.3 Public Participation Purpose

Education and public outreach are an essential part of fulfilling Curry County's desire and responsibility to successfully inform the public about the JLUS planning process. Public meetings will provide opportunities for the public to openly discuss the issues with policy/technical committee members, local government staff and the consultant. Formal public hearings will also be conducted as part of the plan adoption process to allow public testimony to be made regarding the Cannon AFB JLUS.

1.4 JLUS Planning Process

The JLUS planning process uses existing data to understand the current issues of land use compatibility, and proposes specific and achievable implementation strategies based upon compatibility criteria. To achieve this, the Cannon AFB JLUS will be completed in six Phases:

Phase 1: Project Initiation/Data Collection

Phase 2: Public Outreach and communication

Phase 3: Analysis/Mapping

Phase 4: Recommendations

Phase 5: Document Production

Phase 6: Implementation

1.5 Public Participation Goals

It is Curry County's goal to have significant and ongoing public involvement in the Cannon AFB JLUS planning process. In addition to its informative roles, Curry County also seeks to empower and improve opportunities for the public to voice their ideas and values. Curry County strives to ensure early and continuous public involvement in all major actions and decisions.

The following goals embody these ideas and set out to guide the participation process to successfully achieve the principles that have been outlined.

Goal 1: Inform and Educate the Public

It is Curry County's and the consultant's responsibility to make information accessible to the public and to provide timely public notice. Curry County and the consultant will provide information to the public that is accurate, understandable, and relevant to the Cannon AFB JLUS through the use of varied communication tools. In addition to informing the public, educating the public about the JLUS process supports informed public contribution and continued participation by the public. Education will be enhanced through the use of visualization tools that will help the public understand and relate to the Cannon AFB JLUS.

Goal 2: Reach Out and Build Connections

Curry County recognizes that large segments of the population rarely participate in the planning process, including minority and non-English speaking. It is a priority to increase the diversity and number of participants in previous engagement activities through building new relationships with organizations and communities that serve these under-represented populations.

Goal 3: Engage the Public and Encourage Continued Participation

Curry County and the consultant will encourage continued public participation by ensuring a meaningful process to engage the public. This will include providing various ways to engage and communicate with the public, responding to all comments and questions in a timely manner, presenting a clear process for incorporating public input into the JLUS, and providing other opportunities for further education.

Goal 4: Use Input to Shape Policies, Plans and Programs

Curry County and the consultant will document all input received from the public. This documentation will provide a record of comments received and will assist staff and committees in reviewing public input. This input can then be used in the development the Cannon AFB JLUS. The process of incorporating public input into the Cannon AFB JLUS will be transparent and open to the public. Curry County and the consultant will inform the public of the decision-making process for each planning activity in which public comment is solicited.

Goal 5: Evaluate Public Participation Strategies

In order to sustain best practices in public participation, Curry County and the consultant will continually monitor the public participation process and create a framework for evaluating and improving the process.

JLUS Involvement

2.1 Committees

Two committees will be developed to provide support and guidance during this proposed JLUS: a Policy Committee and a Technical Committee. Appendix A contains the list of committee participants.

Policy Committee

The Policy Committee is responsible for the overall direction of the JLUS, preparation and approval of the study policy and strategy, approval of the draft and final written reports, approval of policy recommendations, and monitoring implementation of the adopted policies.

The Policy Committee will meet initially to understand the purpose and expectations of the JLUS process. They can be helpful in gaining the support of local leaders and should be considered as a useful tool by other JLUS organizers.

The Policy Committee will consist of officials from participating jurisdictions, military installation leadership, and senior representatives from other interested and affected agencies.

Technical Committee

The Technical Committee is formed to report to the policy committee and is responsible for identifying and studying technical issues.

The Technical Committee will consist of area planners, city and county managers and their professional staff, military base planners, representatives from the business and development community, and other subject matter experts as needed.

2.2 Provisions for Public Involvement

Provisions for Open Discussion

Curry County and the consultant will ensure that public meetings allow for an open discussion of the relevant issues at hand. When public meetings or hearings are held, Curry County and the consultant will make every effort to ensure those who want to participate in the JLUS process will have the opportunity to have their opinions heard. To accomplish this, the following actions will be implemented:

Review Meeting

- The consultant will prepare an agenda that clearly defines the purpose of the public review meeting or hearing, the items to be discussed, and any actions that may be taken.
- Consultant to prepare and distribute meeting agendas for County approval at least five business days prior to scheduled meetings. County to review, approve, and distribute agendas to Committee members at least three days prior to meetings.
- Consultant to prepare and provide draft documents and reports in advance of Committee meetings (at least five days prior) for member review and discussion during meetings.
- The scheduled date, time, and place will be convenient to encourage maximum participation of residents and property owners.
- A clearly identifiable chair will conduct the meeting or hearing in an orderly fashion to ensure all attendees have an opportunity to offer comments, discuss issues, or provide testimony. The consultant will be responsible for providing the agenda and informational material.
- The facilitator or chair will provide opening remarks that clearly outline the purpose of the meeting or hearing and describe procedures attendees should use during the meeting or hearing when offering input.
- As appropriate, an overview of documents or proposals provided by the consultant or others as needed to be considered will be discussed.
- All persons attending the meeting or hearing that desire to participate should be allowed to do so. However, specific factors, such as the meeting or hearing purpose, number in attendance, time considerations, or future opportunities to participate may require that appropriate constraints applied. These constraints will be clearly outlined by the facilitator or chair if the need arises.
- All attendees will be encouraged to sign in using a provided sign-in sheet.
- Meeting summaries will be transcribed and made available as soon as possible following the meeting or hearing.
- Special arrangements will be made under the provisions of the Americans with Disabilities Act (ADA) with sufficient advance notice.

Continued Participation

Rudy Bauer, Project Manager
HDR Inc.
2060 Briargate Parkway, Suite 105
Colorado Springs, CO 80920
Phone: (719) 272-8803 | Fax: (719) 272-8801
Email: Rudy.Bauer@hdrinc.com

Connie Harrison, Assistant County Manager
Curry County, New Mexico
Phone (575) 763-6016 | Fax: (575) 763-3656
Email: charrison@currycounty.org

Public Participation Methods

3.1 Public Survey

During the JLUS process, Curry County and the consultant will initiate a public survey to solicit citizen input on a range of Cannon AFB JLUS related issues and topics. The survey will be made available digitally on the Cannon AFB JLUS website. The internet based survey will allow users who favor digital technology to complete the survey on-line or print the survey out and mail or fax it back to the county or consultant. Survey results will be tabulated and a report indicating the key findings will be prepared and provided on the website and in the final JLUS report. A digital copy of the survey results will also be posted on the Cannon AFB JLUS website.

3.2 Information Brochure

The county and the consultant will prepare an informational brochure to educate and inform citizens of JLUS activities. The informational brochure will be available on the website, at public meetings, or by request. Consultant will reproduce and provide copies of the brochure.

3.3 Committee Meetings

The public will be invited to attend meetings of the Cannon AFB Policy Committee. During each meeting, the general public will have the ability to participate and to ask questions about the process. Committee meetings will have a set meeting schedule that will be posted on the Cannon AFB JLUS website (www.cannonafbjlus.org).

3.4 Public Informational Meetings

Invitations to the public meetings will be posted so that the public will be advised about when and where these meetings will be held. The information noting the date, time, and location of the public informational meeting will be posted on the JLUS website. A press release will be created by Curry County and sent to the media contact list, and circulated through the committee members. Committee members will be responsible for assisting with contacting local key participants to inform them of the public meetings.

Several public meetings will be held in the vicinity of the project area at key milestone points in the study for the public to provide input. Emails, websites, and the local newspapers will be a key component in informing the community of upcoming meetings.

Each public meeting agenda will include:

- Definition of JLUS
- Lists of Study Partners and Committee members
- Goals and Objectives

- Overview of Operational Impacts
- Overview of Planning Areas
- Draft Recommendations
- Next Steps

Displays and exhibits, in poster and pamphlet style, will be placed in view during the meetings. The consultant with assistance from Curry County will develop and provide an informational fact sheet for handouts along with a sign-in sheet and name tags for each public forum. The presentation will be followed by an open question and answer session forum where community members will have a chance to speak with the consultants, learn more, and ask questions.

3.5 Draft JLUS Plan Presentation

Public Hearings

When the final draft Cannon AFB JLUS is completed, Curry County with assistance from the consultant will conduct a minimum of 1 (one) public hearing to receive public comment on the proposed plan.

Hearing Notices

Curry County will place legal notice of hearings in the official newspaper(s). Hearing notices will be published in compliance with State requirements.

Prior to the County approving the Cannon AFB JLUS, a hearing shall be conducted. The County may provide additional notice of the hearing by any other means it considers appropriate.

3.6 Public Viewing of Plan-Related Materials

During the planning process, narrative, maps and other educational materials and documents will be made available for public viewing at the Curry County Courthouse in Clovis, New Mexico, during regular business hours. These materials will also be available for public viewing and download on the Cannon AFB JLUS website. Meeting minutes or other project records will be made available to the public and published on the web page.

Public Participation Timeline

- Portales Public Meeting, 6 p.m., City Hall, April 18
- Melrose Public Meeting, 6 p.m., Senior Center, TBD
- Clovis Public Meeting, 6 p.m., Clovis-Carver Library North Annex, TBD
- Policy Committee meetings held as needed, with location and time to be announced.
- Board of County Commissioners' meetings, Grady, May 18.

Appendix A JLUS Committee Members

A.1 Policy Committee

- Chair – Sid Strebeck
- Vice Chair - Hoyt Pattison
- Caleb Chandler
- Wendell Bostwick
- Col. Clark (or designee)
- Col. Kimball (or designee)
- Gayla Brumfield
- Hoyt Pattison
- Randy Crowder
- Lee Malloy
- Sharon King
- Darren Hooker
- Danny Woodward

A.2 Technical Committee

- Chair – Lance A. Pyle
- Vice Chair – Lonnie Leslie
- Darrell Bostwick
- Joe Thomas (or designee)
- Chris Pacheco
- Col. Clark (or designee)
- Col. Kimball (or designee)
- David Kube
- Paul Stout
- Charlene Hardin (or designee)
- Subject matter experts will be invited to the technical committee as needed. This can include but is not limited to federal and state agencies.

Appendix B Media

B.1 Media

Media used to reach the public are intended to include all members of the community. The contacts are listed below:

107.5 Tejano

Amarillo Globe News

Associated Press Albuquerque

Clovis Chamber of Commerce

Tejano

KAMR

KFDA

KOBR

KTQM

KVII

Lobbock Avalanche

Tejas Broadcasting

Eastern New Mexico University

News Channel 10

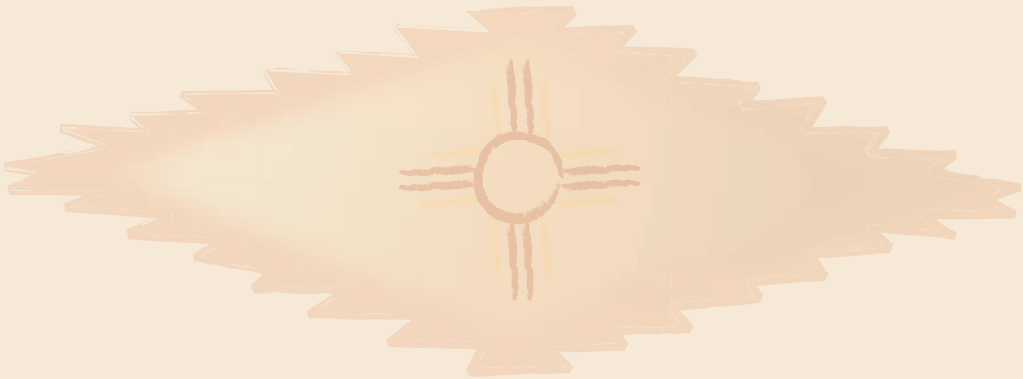
B.2 Mailing

Mailing will be prepared and sent using public information meeting sign-in sheets and e-mail notices from the JLUS site.

B.3 Public Viewing

JLUS materials can be viewed at two locations. in Portales, the _____, at _____, will have the information available. In Clovis, the Courthouse during normal business hours will also have JLUS information:

Comment forms, information brochures, and survey forms will be made available to the public. The latest information from the public meetings will be placed at these locations, as will the draft JLUS report during the stakeholder review period.



D.2 Minutes

Joint Land Use Study Policy Committee
Meeting Minutes – June 21, 2010

Present:

Amanda Fagan, OEA
Col. Steve Kimball, CAFB
Connie Harrison, Curry County
Emily Kizer, Curry County
Steve Hill, CAFB
Rick Draker, RGPO
Sharna Johnson, CNJ
Lonnie Leslie, LGMO
Scott Verhines, ENMRWS
Matt Hamilton, CAFB
John McDonald, CAFB
Michael Poston, CAFB
Lt. Col. Don Treanor, OEA
Sandy Cody, RGPO
Melinda Russ, District 3 candidate
Michael Connelly
Lance Pyle, Curry County

Committee Members Present:

Sid Strebeck
Caleb Chandler
Sharon King
Hoyt Pattison
Wendell Bostwick
Randy Crowder

1. Call to order – Sid Strebeck called the meeting to order at 2:15 p.m. Introductions were made around the room.
2. Approval of Minutes/Agenda – Wendell Bostwick made a motion to approve, seconded by Caleb Chandler, minutes and agenda approved.
3. Public Comment Period for Items Not on the Agenda – Nothing stated.
4. Tech Committee Report – Roupe explained that the Committee didn't get through everything, but learned a lot about turbine limitations, etc. They went over the study area, what it is, where we come from and what we've considered. Now there is a revised boundary and will be asking for approval at this meeting. They started talking about goals and objectives, but never got to those, but would like to have input on those. The committee spent a lot of time talking about growth opportunities for schools, water, etc. By and large, it was constructive and the outcome and sentiment is that there are issues with water, but there is enough to support the current community trending. Other infrastructure concerns are transmission lines. Bostwick asked if RETA was on the technical committee, but Roupe there is not a representative. Emily Kizer said that they discussed having Jeremy Turner in, and that she has passed information along to Kit for him to be invited to the meeting. There was a question about wind turbines in Abilene, but that wasn't gone over in the technical committee meeting but is in today's packet.
5. Military Influence Planning District – Roupe explained that in the last meeting with the technical committee, they reviewed some of the AF activities and operations. She showed the original defined study area and the space that was added for the training area and special height areas. It was discovered that there is a low approach on the FAA restricted area, so a buffer of five miles was added around it. A newly defined space is shown. What they did was properly define the FAA space that covers several counties. Low approaches meant adding a five-mile buffer to the east, north and west to accommodate those approaches of 500 feet and below. Bostwick mentioned concern where there are farmers applying for commercial crop dusters and can't get clearance in that airspace. He wanted to know what is in effect today and where the boundary is going to go. Amanda Fagan said she does not believe there are any changes proposed to the existing restricted airspace. What was being proposed by the technical committee is for that area to be considered and studied. Bostwick, as a commissioner, felt that he needed to know what is currently out there. Roupe said she would do research on that. Bostwick said everyone

needs to be aware of what the restrictions are. He said people are concerned about the JLUS because of their property rights, and that we need to identify restrictions. Roupe recommended adding this to the public outreach process. Roupe said that in the study area, DoD recommended that we do not be swayed by county boundaries when making our boundaries. Pattison asked how far up from Cannon the boundaries are because he understands that the people on the land outside the boundaries have no worries. Roupe said it is pretty far, at least six miles if not more. Bostwick measured and said it is about 15 miles north from Cannon. Pattison thinks it is essential to have those dimensions since they will get a lot of questions and concerns from people asking if they are in or out of the area. Chandler asked if Roupe could have dimensions by the Commission meeting tomorrow. Fagan said that as a suggestion, if the Commission doesn't feel comfortable voting on it, they could try finding more natural boundaries for the area to use geographical references, etc. Chandler agrees that it is a very important issue for people. Michael Poston said an important question is "what does this mean?" Does it mean they are liable for new restrictions? It means we are studying the effects of growth of the base on that property and how we use the land. Roupe said we are protecting the mission and the property rights. Pattison asked for a copy of the map. Strebeck said the committee would table that decision until the next meeting.

6. Goals and Objectives

    a. Purpose and process presentation – Connie Harrison asked if we wanted to do this agenda item since it wasn't done in the technical committee and we want to go back and look at the goals and objectives that were submitted with the grant. Roupe said we could look at it but take no action on it. She wanted both the committees to start thinking in terms of the goals and objectives and wants a framework of where we're going. Roupe explained that Harrison was referencing being able to make sure that the goals and objectives outlined in the OEA contracted are reflected in what we're working on today. She wanted to have the technical committee look at the samples and give feedback on sample land uses. They are simply examples and words on paper. Bostwick said that since he got the packet Friday afternoon and it had 69 pages, he has not had time to comprehend that. Roupe will try not to get too deep. She went over goals and objectives, primary goals for a JLUS, etc. She went over the six phases of the JLUS, including devising recommendations and an implementation plan. We need to make sure that whatever we put forward as our goals and objectives and implementation plan is actually executed effectively. She went over four steps and a list of 30 or 40 strategies. Next we identify the tool to use to implement this. Finally, we prepare the action items to achieve the goals and objectives, as well as who will do them. Then we talk about the timeframe.

    b. Sample goals and objectives table – Roupe explained this as a compilation of different goals and objectives that are at other places. One of the goals was at Davis Monthan. She said she knows it is a lot to digest, but is trying to share the other examples from other jurisdictions since it was a question she was asked. It is an idea of how other jurisdictions have handled it. One of our recommendations could be having a regional advisory board, this would be an action plan. Bostwick said going down this path would mean putting people before the board and the board would have the option of saying no to something like a wind turbine application because of height applications. He said that is still a property right they are dealing with that they have today but might not in three years. Roupe said do not deal in absolutes, but Bostwick said adopting a policy would be an absolute. Roupe said there is a middle ground, such as putting up a wind turbine, but it being only 100 feet due to AF activity. Pattison said we need to try our best to establish criteria for the people out in the country to know what is expected of them. Roupe mentioned Dyess and the fact that people put up wind turbines without consulting with the base first. She said if Cannon gives a no, it's not necessarily a no, they will work to do something about it. Col. Kimball asked what the advisory board would do. Roupe said the final decision-making authority would be Curry County Commissioners. He asked "What if the answer is no? Then what?" Roupe said we need to discuss that in terms of action plans. She said at least we now know the destination that we're going to. Bostwick asked if other jurisdictions have implemented an advisory board, Roupe said in Colorado Springs they do. Bostwick asked for examples other than an advisory board. Roupe said we wanted a little more time to draft our own joint land use goals, but because we didn't get any advisory

from the technical committee, then we thought we would table it, but she thought it would still be worthy of a presentation.

c. Sample recommendations and implementation schedule – Roupe gave a sample objective and Bostwick questioned it. Fagan said the FAA controls access to the airspace whereas the goal is talking about land use on the ground. We are only asking to look at what the county and the other jurisdictions have control over, which is this land use. There was discussion of lighting issues and dairies and finding an amicable solution to where light is not too bright. Roupe asked how much time is practical to make a transition into this kind of solution. Strebeck mentioned limiting future conflicts and having a program of some sort to fix it. She gave an example of a buffer zone and how the element of concern was handled elsewhere. Poston said this is a good idea and is what we asked for last time, since we asked where we're going with it and where we are going with this exercise.

d. Draft Cannon JLUS goals and objectives – this is "Kit's take" on some of the aspects we might want to consider for draft goals and objectives. Roupe read over her draft. She stressed that there should be an open dialogue as one of our principles. She is suggesting basic guiding principles that anyone who comes in will understand as to how we operate. She goes over her draft objectives and how to achieve the goals. She noted that she has pulled these out of her hat. She thought it would be effective for the committee members to look through them themselves and change them later. Pattison asked about business economics becoming included and Roupe said it could be tossed in. Roupe said she was just writing, putting words on paper, and it didn't need to make sense to him at all. Pattison said the effect on the individual financially is essential. Randy Crowder mentioned this in terms of the city as well.

   Draft Strategies Matrix – Roupe explains this as another one of those "words on paper." She looked at what California had for a list of acquisitions, navigation easements, etc. She captured some of the strategies they used. She mentioned County Road R and that it should be on the top of the list. We will go through as a committee to see what's feasible and what isn't.

7. Investigated material

   a. Summary of regulatory information and strategies – Roupe said the regulatory summary is information on the Night Sky Act, the Farm Act, etc. at the state and local level, as well as other communities in New Mexico and outside New Mexico. For encroachment, the state has no regulations. Curry County has easements that were purchased from the clear zone. Roosevelt County and Portales has zoning regulations. Other NM communities are adopting AICUZ regulations and recommendations from a JLUS. She has how lights, noise and tall structures are addressed. She did not have water because Scott said there is no problem there.

   b. Addressed

   c. Wind turbines, radar, solar towers – Roupe had a summary of what the wind farm study showed. Technologies are being addressed in terms of weather and radar effects. What she would like to say is that, essentially, a tower cannot see a plane behind a wind turbine. A turbine creates a blind spot for radar, depending on the height of it and the angle of the radar itself. She said the problem with solar towers is the radio EMF that comes off the towers and that it could affect airplanes flying below that. One of the bigger issues is reflectivity and the blinding of planes. She doesn't know the answers to those problems, but wants to have a conversation about all of them. Pattison said a question still in his mind is how far out the plane is and how high it is, and how far between the plane and the control tower is the wind turbine. It was stated that if you have an airborne radar system, there is almost no impact on wind turbines unless the plane is below the wind turbines. If a radar system is on the ground, anything line-of-sight through that wind turbine is going to be invisible past it. It does not pertain to communication towers. The radar systems are programmed so they ignore the static towers. Fagan said based on the study, a few wind turbines might not have significant impact, but that impact could come when you have multiple turbines. It might not affect a single landowner who

wants to put up a few turbines. Bostwick said if you have one every half mile, it would not be as detrimental as having one every 500 to 1,000 feet. Strebeck said if you want to put one up, notify someone and they can figure it out. Roupe mentioned the last page that mentioned that the FAA lacks land-use control authority. It does not have the authority to prohibit construction of a structure that presents a hazard. That is reserved for states. There was discussion of a map of Dyess and the turbines there that had to be taken out. Lt. Col. Treanor said there is a yellow section, and that section should have been part of the study area if there was a JLUS. Any land area where there is an impact on the mission should be in our boundary. Pattison asked if the boundaries apply to the radar impact. Roupe said yes. Poston said there was discussion with the entities to see if there might be any impact. Just because it's in that area, it doesn't mean things will be prohibited in the area. What we don't want is a big development going up in one of the areas the AF is doing low-level training in. He said no need for panic, but we are going to set up the mechanism to make sure that everybody's concerns are heard, addressed and discussed. Pattison said if a wind farm project with 500-foot blade height was to develop one mile out of that boundary, would it be a problem? Kimball said we're trying to establish a means to answer that question. That question would go to the technical committee for recommendation and comes to the policy committee for resolution. He said we are not at a point where we can come up with and hard and fast rules. Fagan said that normally the way a JLUS works is that you establish a study area, then within the broad study area, you evaluate and identify existing land use or possibly land-use conflicts, tall structures, water lines, general geographic conditions, etc. Once that is identified, you would then evaluate current land-use conflicts and potential future conflicts. Once that is established, you identify recommendations to address those concerns. Right now, we are on the first step, but today we are talking about further down the process in discussing possible recommendations, but homework has to be done before we get to that point. Pattison's main concern is the Tres Amigas project and the potential wind farm development in proximity to that. He thinks having a boundary is excellent because it gives people working on those projects the assurance that it probably won't be a conflict. Lt. Col. Treanor said anything outside that boundary that might be affected should be included in the boundary if it is not already. Roupe needs the technical committee to validate that the boundary is correct and Treanor said it should be conservative. Chandler asked Lance Pyle to get a hold of Tres Amigas and RETA to come to the next meeting. It is pointed out where the Tres Amigas project will be and stated that their lines will be 300 feet.

d. Noise – Roupe gave an extrapolation from the AF environmental impact statement. It explains the noise levels and how they are analyzed. There are three zone areas. The worst zone is that the noise is affecting people's lives. Poston asked if there are complaints downtown regarding noise. Crowder said he's heard grumbles, but they are not really complaints. Poston thought F-16s were noisier, but they didn't cruise over Clovis all the time. He thought education was important, and the BRAC process has increased the value of military installations. It was explained that the F-16 was much noisier than the planes in the new mission. Bostwick asked about the gunships going in at a different elevation than the F-16s and being noisier when they discharge their weaponry. Kimball said looking at the information, it only talks about engine noise, not gun noise. He said the noise contours at Cannon proper is different than that of all the aircraft at the base.

e. Water – There is a summary given of the general trend in the area, and by the account of Scott Verhines, the water demand is satisfied. Roupe gave a summary from John Redmon on the needs at the base.

8. Adjournment

Joint Land Use Study Policy Committee
Meeting Minutes – May 17, 2010

Present:
Belinda Wright, CAFB Matt Hamilton, CAFB
Denise Leavelle, CAFB John McDonald, CAFB
Connie Harrison, Curry County
Emily Kizer, Curry County
Michael Poston, CAFB
Committee Members Present:
Danny Woodward Sid Strebeck
Caleb Chandler Wendell Bostwick
Sharon King Randy Crowder
Chase Gentry
Darren Hooker

1. Call to order – Sid Strebeck called the meeting to order at 3:05 p.m.
2. Approval of Minutes/Agenda – Danny Woodward made a motion, seconded by Darren Hooker, minutes and agenda approved.
3. Opening Statement by Kit Roupe regarding Joint Land Use Study
4. Public Comment Period for Items Not on the Agenda
5. Summary of Tech Committee – Roupe explained that the Committee went over the Air Force's activities in the two county area. In the process, it was discovered that there are areas that could be affected by certain land uses. The Committee also talked about aircraft coming in and out of the airfield and how different elevations should be considered when talking about wind turbines, power lines, etc. They also found that there are a number of things that are important: wind turbines, power lines and lighting issues. Whether or not the area needs glow globes on power lines was also discussed. Connie Harrison said it was made clear to the Technical Committee that not just the height of the wind turbines, but the effect on the radar is also an issue and concern of the Air Force. She also mentioned information that Col. Kimball had regarding these effects.
6. Military Influence Planning District – Roupe explained that she would like to talk about the influence area and some of the changes that we saw. She was hoping that redefining the area of influence could happen at this meeting, but Roupe is not sure we can do that without a little more detail. Caleb Chandler asked to take a recess to look at the newly drawn map. Again, Roupe's recommendation was to table the final decision until the next meeting.
7. Investigated Material
    a. Roupe shared an email from Mr. Doerr's office detailing the use of the terms "ordinance" and "zoning" and a better way to apply that. Wendell Bostwick said that zoning, in his opinion, is zoning regardless of how big the area is. Chandler said it's hard to know what we should do until we have defined the geographical area. Mike Poston explained that these issues are not unique to our base. General Hanson Scott has worked with Kirtland and Holloman, and they have been actively researching these issues. The number one thing he took away from it was that there is very little the state can do and the only power lies with the counties to do anything. He said we're fortunate to be bringing up these issues now, as it's hard to tell when we would've done it if not now. He discussed an airspace chart in California that could be useful that uses different colors to decipher between different elevations and land uses. Chandler mentioned that some place should have coordinated the organization of this information. There was mention of finding out about these issues at

Dyess AFB in Abilene.

There is further discussion about getting away from the term zoning. No one wants to take away someone's rights.

Poston described an ordinance that was passed by the Curry County Commission in 1978 regarding compatible use zones. A civil suit was filed in 1985 and the ordinance was later invalidated, so he can see the trepidation with ordinances. Property rights and national security must be considered.

Poston said the wind energy guys are lining up a lot faster than the solar guys. Col. Kimball discussed the latest technology in solar out of Arizona which is taking towers that already exist to do solar. There are height considerations there, as well. Poston discussed a request by Kirtland, Holloman and Cannon to do a JLUS and look at training routes. He said it is a matter of the bases working together again and presenting it. Many think this is very far into the future.

b. Roupe shared a study on wind towers and impact to radar. It was saying that the height and radar effect are issues. If they are too close together, they can cause interference. New technologies are trying to mitigate that effect.

   Bostwick asked if the interference was reduced by increased aircraft elevation. Col. Kimball said that in general, the further away you are from the tower, the less effect there is. This is also in concurrence with the discussion of concentric rings around the base.

c. Roupe said the bottom line is that lighting obviously affects the military, on base and in training. Our questions are what makes sense for football fields, dairies, etc. There is no expectation to change all lights at once. This might happen over a period of 10 to 15 years. Roupe said there could also be operational solutions. Chandler asked if there are current problems, and Hamilton said any type of light has an effect on NVGs. Chandler asked for research on problems there are, what they are and where they are.

   There was discussion of the Night Sky Act and the exemption of agriculture from it. Has this been helpful in New Mexico? Roupe mentioned times for lights to be on and off.

   Bostwick asked what was decided for noise at the Bombing Range. He is not getting complaints, but many more comments about the bombing out there. He said it shuts down by 10 or 10:30 p.m. Roupe mentioned the changing use of the Range and questioned whether that would change things. It is decided that this should be part of the study. Col. Kimball said it is a good time to ask these questions and capture concerns since they are now looking into the future uses of the Range. Poston mentioned the change of the name to Melrose Air Force Range and the future use by many other entities. He said it is better that it won't be strictly a bombing range, and what AFSOC does is lighter than before. Bostwick mentioned a move of the impact zones to closer to Melrose. His point is that decibels change at different elevations. There is discussion of getting parameters for future land uses, such as building a house.

8. Items Owed by HDR – Roupe mentioned that most of the locations of wind farms and tower have been received.

9. Draft items to be investigated by Technical Committee – Roupe asked what the Committee would like the Technical Committee to look into additionally. Harrison went back to the Subdivision Regulations owed by HDR and Roupe said she would get those. The State Statute Subdivision Act was mentioned and Roupe mentioned that she had looked at it, but still owed the Committee information. Strebeck mentioned that Curry County is more restrictive than the state. Bostwick agreed, but it turns out a certain one had not been voted on by the Commission. Strebeck mentioned that if you want your subdivision approved, you are giving up some rights. It is

discussed that if someone complains about noise it is no longer a nuisance since it previously existed and was part of a previous ordinance. Further discussion of writing a county ordinance that includes what a nuisance is, even if it is a smell. More information needed on Right to Farm Act.

Strebeck asked if a permit is needed to build a wind tower or if there was regulation in place about building. Bostwick mentioned that the FAA needs to look at those for any tower over 150 ft., as they are regulated then. A letter will be received if towers are too high. Towers by the landfill are just under the necessary requirement.

10. Communications – Roupe asked about easements owned by Curry County and other deeds that are owned by the Air Force. Curry County did purchase easements in the APZs and the Real Property Office just received a copy of these. Bostwick said state or federal money was available for the county to purchase those. There was discussion of the restrictive easements on the boundaries of Melrose Range. Roupe said what we haven't gotten a chance to go over are goals and objectives. She will ask what we are trying to do and how we're going to do it. What things would help us define the study. Roupe wanted to have maybe 30 minutes in the next meeting to do brainstorming for those goals and objectives. What would be a good goal and outcome? Strebeck said we might take a look at farm ownership and the rights they had before Cannon was there. It would be unreasonable to think you would not be affected if you bought land around Cannon today. Roupe mentioned again taking 30 minutes to look at goals.

    There was a question about water use and Roupe said that is not generally look at it in a JLUS, but if there is enough consumption of water and we think it is something we should look at, we could. Strebeck said we should look at it, Roupe said we certainly could. Roupe mentioned look at development and where it will be going in Clovis, especially in which direction, and how to manage that.

    Poston asked if Roupe had examples of other Joint Land Use Studies from bases similar to Cannon. Roupe said she does have a few and will do more research and will get some of the other ones. Poston said he thought we'd be further along by now and have things more defined, but if we could look at previous ones to see what they captured, we could make sure we're not missing something. Roupe was focusing more on New Mexico, but looking at other communities will open up other possible studies. She mentioned several army bases. Poston mentioned OEA meetings and the discussions there, and that we should speak with some representatives. Harrison mentioned that we can use our contact with OEA to find that out. Chandler mentioned that state laws would be different, but the basic issues are the same.

    Website – Roupe went over the website with the attendees.

11. With nothing further to discuss, the meeting was adjourned.

Joint Land Use Study Policy Committee
Meeting Minutes – April 19, 2010

Present:
Connie Harrison, Curry County
Michael Poston, CAFB
Anthony Fruchtl, HDR
Emily Kizer, Curry County
Committee Members Present:
Hoyt Pattison
Danny Woodward
Caleb Chandler
Sharon King
Chase Gentry
Matt Hamilton, CAFB
Steven Hill, CAFB
Frank Blackburn, Curry County Commission

1. Call to order – Sid Strebeck called the meeting to order at 3:15 p.m.
2. Approval of Agenda – Danny Woodward made a motion, seconded by Caleb Chandler, agenda approved.
3. Introductions from attendees
4. Election of Vice-Chair
   Chandler and Strebeck discussed that Hoyt Pattison had been recommended to take over the vice-chair position, and he agreed that he was willing to serve. Chandler made a motion to elect Pattison the vice-chair, Sharon King seconded, the motion was approved.
5. Public Comment Period for Items Not on the Agenda
6. Summary of Tech Committee
   Emily Kizer explained that the technical committee heard from Xcel Energy, Farmer's Electric, New Mexico Gas Company and representatives from the Ute Pipeline Project on issues in Curry and Roosevelt Counties and how those will affect our land uses. They discussed other issues and other representatives from Tres Amigas, BNSF, FAA, RETA and a few other entities that will be asked to speak to the technical committee. Anthony Fruchtl added that the technical committee was given homework.
7. Summary of Existing Community codes, ordinances and regulations
   a. Land Growth Management Plan
      Fruchtl is in the process of obtaining the Land Growth Management Plan to see what information he can glean from it. He explained that this was the study undertaken by Lonnie Leslie and the LGMO and the LGMC. Chandler said they are charged with implementing whatever the committee comes up with. Strebeck would like copies of the plan for all of the committee members. Chase Gentry mentioned that it is a PDF on the website, with a summary.
   b. Curry and Roosevelt Counties
      Fruchtl said HDR, in cooperation with both counties, has been looking at ordinances that pertain to regulations on land use that might affect the overall drafting of the JLUS. One of the things that has been brought up is the resolution to support the dairies in both counties. He also mentioned the Nuisance Ordinance that is being reexamined in Curry County. Those will play into the drafting of the JLUS documents. He mentioned that one of the questions that came up from the technical committee is the dairies and the current uses, future uses and how the overall uses will shape the counties and the land use of Cannon AFB. Pattison asked about wind farms and how they're involved. Fruchtl is in the process of data collection

of existing locations of wind farms, and information in regards to height and studies for radar impact. They will present this information to the technical committee. Pattison said there are plans for wind farms all the way down to southern Curry County. Further along, there will be geo-reference data for all of this, including growth, etc.

Frank Blackburn mentioned those with beef farms and the area where his farm is situated. He is asking the committee to honor their rights and not to restrict the use of their land. Fruchtl said the study will be derived from the community and the counties. Strebeck said there may be situations, such as lighting issues that interfere with the mission, where we come up with a resolution that might affect his private property, but gives solutions to fix the issues.

c. Clovis

d. Portales

e. Villages Melrose and Floyd

8. Draft elements to be investigated by Tech Committee
Fruchtl said the homework assignment for the technical committee is to look at lighting ordinances for other Air Force bases in New Mexico and seeing how other communities have dealt with those issues.

Strebeck mentioned the wind farms and turbines.

Poston said the concerns that the Air Force has regarding wind energy is making sure they are not in military training routes where they do or could fly low-level as that would be a big concern. A whole wind farm would have a Doppler effect on the radar and skew the ability to navigate. He mentioned studies that the technical committee might get into regarding those issues, and that Hanson Scott could help with them. Pattison mentioned the need for hard data. -- Chandler asked Col. Kimball if we're looking at the same concerns for both Cannon and the Bombing Range. Poston believes they need someone from the Range to visit the technical committee to discuss those concerns, especially that 10 miles out from the range is their primary concern with low-level exercise and drop zones being out there. Kimball said the other question is the different types of airplanes and the different missions they fly. The C-130s do one thing and the CV-22s have different missions with more altitude, infiltration and exfiltration. Predators and Reapers and small aircraft are also at the base. Different missions and capabilities and requirements mean looking more closely at the aviation side to make sure their concerns are represented. Chandler asked for a recommendation of someone to speak with to represent the Bombing Range, Poston said there is a name in mind and they will check with his boss and give the information to Kizer.

Kizer is working on getting a representative from RETA in to speak on renewable energy issues that they have already briefed the base on.

Fruchtl suggested looking at compatible land uses and buffer zones that could be looked at. Chandler said Col. Clark has spoken about that and the concern about the buffer zones immediately surrounding the base to prevent effect on radar, and other areas in the county where they could be. Kimball suggested sitting down with owners, developers and planners to negotiate before committing to construction and resources if it would have a major impact on Cannon. It would be difficult to say "do it here, don't do it here" as negotiation must happen. Poston mentioned the map from California that would be a good tool for developers. He also mentioned the premier training airspace in New Mexico and that they want to preserve the mission and training routes to the best extent possible, and that Hanson Scott is dedicated to doing that.

Chandler mentioned the Ute Water Pipeline and how that would affect the base, Kizer mentioned that Scott Verhines spoke with the technical committee regarding those issues. Poston said it would be low level and

Chandler agreed that it would likely not be a problem.

Kimball said we need to ensure that we capture the negotiations and discussions that happen outside the committee meetings to make sure any agreements or understandings are rolled into the committee forum. For example, Tres Amigas and the base talk often, and it hasn't been rolled into the JLUS yet, but it is important that everyone in the meetings have all the cards on the table to better discuss issues.

Pattison asked if there is a height restriction for the dairies, including wind farms on them. Poston said there is a narrow area that the military is concerned about. Blackburn mentioned the county's deed to a quarter-mile-wide area of a clear zone where nothing can be built on the approach of each runway. Poston said the Air Force doesn't have easements of all of those, but on some of them. These areas haven't been a problem at this point in time. He would like to document what Blackburn was speaking about. Kimball asked Fruchtl to look into what an easement could do for us and if it is sufficient to accomplish what we would like to.

9. Communications

Steve Hill said there will be 6,000 people total at Cannon over the next two to three years. Encroachment issues are still the main concern. Poston said Cannon is far ahead of other bases.

Chandler asked if extra-territorial zoning that the city has would play into this anywhere as the city has a one-mile right of way rule for subdivisions. He said this should be looked at as we move along. Mention of Ned Houk Park was made as the city has it connected to its limits by an extension of its city limits on Norris.

Hill asked about zoning, and all said there is no zoning in the county. He said if someone lives around the base, they could do whatever they want with it, except build a subdivision. Kimball said one of the things they saw at Hurlburt was that as they were trying to build up the local housing market, a lot of apartment complexes popped up right outside the gate. It could happen here since housing, especially apartments, is a noted issue. Blackburn noted that an issue there would be lack of sewage in the area. Pattison noted subdivision restrictions that would control housing toward the base. Strebeck discussed the fact that an ordinance could not tell people what they can and cannot build, but that we would have to be careful what we restrict. The height restrictions on television towers and other buildings on base have to meet those restrictions as well. Strebeck noted that the technical committee would need to look into those types of restrictions. Chandler mentioned looking at the county subdivision rule. Fruchtl and Strebeck discussed the city standards when it comes to roads, and that the city must approve it. Hill asked if an option would be to put a buffer or overlay zone a certain distance around Cannon and have the same type of rule where someone who owns a piece of land in that zone who comes to the Commission and wants to develop it, they should know that the landowner went to Cannon or the Commission invited Cannon down to discuss it and hear what they are doing. Strebeck said that is something they could look at and it would be wise. Hill said that Davis-Monthan in Tucson extended out on each of the approaches and has different fans that run out. Within those, you can do certain things. Straight out is no vertical development, next would be industrial with population, then outside of that might be a subdivision, then outside of that is based on city zoning. He said it has worked pretty well and they did it with an overlay zone. Zoning was not changed. While the Commission doesn't want to hear about changing zoning, other words such as overlay or buffer zone, would be more palatable. Strebeck mentioned purchasing certain land outside base and making a deal with landowners for that area. Hill said that Luke in Phoenix purchased land that extended out from the base and put restrictions on it. Kimball said it would be good for us to know what our legal options are so we can suggest the appropriate venue to achieve the affect that we all recognize we need to achieve. If zoning is not the option, maybe we need someone with a legal opinion to tell us what our options are. Blackburn mentioned that the county clerk has copies of the easements in Curry County. Chase Gentry asked about an executive order that was signed by the governor making height restriction in certain areas. Strebeck and Chandler said there is, but we need to find out

the legalities of it. Hanson Scott would have that information. Gentry mentioned the strip annexation of Ned Houk and asked if the city could accomplish the same thing with the base so the county wouldn't have to have its own subdivision ordinance. It would put the one-mile rule that the city has out at the base.

Chandler asked if the ordinances discussed would be gotten from the rest of the state. Fruchtl said yes, including the dark skies ordinance.

10. Adjournment

Commission takes lead in Cannon growth study

By Sharna Johnson: CNJ staff writer
2009-01-06 18:07:34

Commissioners voted unanimously Tuesday to take the lead in a Joint Land Use Study into expansion and a changed mission at Cannon Air Force Base.

As community sponsors, the county will act as the lead, local agency and partner with the Office of Economic Adjustment in obtaining grant money and collecting information from the community for a study focusing on issues that could impact Cannon's mission as a special operations wing.

At issue are busy roads, train whistles and the potential of future wind farm development, among other things.

Community leadership and "stake-holders", such as land owners, business persons, school representatives and residents, are required for creation of a working group for the project, according to JLUS project manager Amanda Fagan.

The county is also responsible for 10 percent of the cost of the study, Fagan said, which can be offset or consist of the value of staff hours spent on the project.

Evaluating and documenting "What are the existing and potential future land use and encroachment issues," Fagan said the study could cost between $80,000 and $200,000 and take anywhere from 12 to 18 months depending on the scale of concerns.

Based on a working knowledge of Cannon and the surrounding area, Fagan said OEA representatives expect to be on the low-end of the time and financial estimates.

Currently in the organizational phase, the study seeks to, "preserve and protect (Department of Defense) missions and assets and protect public health and safety", Fagan said in her presentation.

Elements presenting possible joint land use issues already identified are "clear zone violations" presented by Curry Road R's proximity to the base, the potential development of night lighting, wind farms and other things incompatible with low-level special operations missions and rail traffic adjacent to base housing, OEA Associate Director David Witschi told commissioners.

27th Special Operations wing Mission Support Group Commander Col. Babette Lenfant told commissioners issues with Curry Road R, which parallels the base's western perimeter, have grown over the years as the road has been transformed from a rarely used dirt road to a well-traveled thoroughfare.

And the whistle of trains passing by a base housing area, she said, have prompted numerous complaints from residents.

The OEA provides financing, technical assistance and works with the community on the project, Fagan and Witsche said.

Through coordination with local, state and federal stakeholders, it is the community's role to resolve issues once they are identified, according to Fagan's presentation.

City Manager Joe Thomas and Clovis Mayor Gayla Brumfield, in attendance at Tuesday's meeting, said they supported the study.

Press release: Curry and Roosevelt counties to hold policy committee meeting for joint land use study

2010-06-14 16:09:39

June 14, 2010

Curry and Roosevelt counties will host a policy committee meeting as part of the Cannon Air Force Base Joint Land Use Study on Monday, June 21, 2010, from 2 p.m. to 4:30 p.m. in the Commission Room at the Curry County Courthouse, located at 700 N. Main St., Clovis, New Mexico.

The Joint Land Use Study Policy Committee will meet to discuss issues regarding land uses in Curry and Roosevelt counties, as well as at Cannon Air Force Base.

A Joint Land Use Study (JLUS) is produced by and for the local jurisdictions and is intended to benefit both the local community and the military installation. The purpose of the Cannon Air Force Base (CAFB) JLUS to assist in the implementation of compatible land uses around the Base and Melrose Bombing Range. A cooperative planning effort that includes representatives from Curry and Roosevelt counties, Cannon AFB, and other interested parties will be carried out over the next several months. As with all such studies, the goal is to protect Cannon AFB's mission while increasing the economic diversity and viability of the community.

This meeting is open to the public and a copy of the final agenda will be made available to the public 24 hours before the meeting online at www.currycounty.org or by calling (575) 763-6016.

###

Contact:

Emily Kizer

Curry County Administration

(575) 763-6016

ekizer@currycounty.org

Meetings Watch: Joint Land Use Committee to meet

Freedom New Mexico
2010-06-14 16:27:06

Curry and Roosevelt counties will host a policy committee meeting as part of the Cannon Air Force Base Joint Land Use Study 2 p.m. to 4:30 p.m. Monday in the commission room at the Curry County Courthouse.

The Joint Land Use Study Policy Committee will meet to discuss issues regarding land uses in the counties, as well as at Cannon Air Force Base.

A Joint Land Use Study (JLUS) is produced by and for the local jurisdictions to benefit both the local community and the military installation with the implementation of compatible land uses around the Base and Melrose Bombing Range.

The group's goal is to protect the base's mission while increasing the community's economic diversity and viability.

This meeting is open to the public and a copy of the final agenda will be made available to the public 24 hours at www.currycounty.org or by calling 763-6016.

Land use committee approves conflict reduction list

Argen Duncan
2010-08-23 19:35:25

The Joint Land Use Study Policy Committee on Monday approved presentation of a proposed study-area map and a list of possible actions to reduce conflicts in land and airspace use between Cannon Air Force Base and other communities.

The map and suggested actions will be presented to the public in a 6 p.m. Aug. 31 meeting at the Melrose Senior Citizens Center.

The committee wasn't endorsing the proposed actions, but allowing further exploration and public comment on them, said Rudy Bauer of consulting company HDR Engineering Inc.

The proposed study area includes the base, the Melrose Bombing Range, associated protected air space and other areas.

The committee voted to have the public consider all but three of the 42 possible actions. They removed options to establish deed restrictions, identify and reduce dust impacts creating alternative energy source regulations.

Remaining options included such things as coordinating military vehicle routes, considering water issues, developing an ordinance dealing with tall structures where military planes might fly and developing wind and solar energy guidelines

"Wind power's here to stay," Bauer said. "You've got to co-exist."

Larger wind turbines can scramble radar, said Deputy Base Civil Engineer Mike Poston.

Meeting attendees discussed whether to require people wanting to build structures taller than 75 feet in a mission-critical area to get approval or to only notify the base.

Col. Steve Kimball said sometimes the base needs to be able to require approval to have the ability to prevent construction of a problematic structure. Committee member and Curry County Commissioner Wendell Bostwick said requiring approval might retard property development because people wouldn't want to go through the process.

The committee didn't make a decision on the issue.

"You know, the height (of structures) and noise are two of the issues that are going to be critical," Bostwick said.

He said he believed those issues could be handled as long as no one took away private property rights or gave the perception of doing so.

Public meeting information: Curry County Manager Lance Pyle at 763-6016.

CNonline.com
Your Community, Your News

Residents express concerns over wind turbines

Jared Tucker
2010-08-31 21:59:40

Talk early, talk often. That was the message during Tuesday's public meeting in Melrose to discuss the findings and recommendations of a joint land use study.

The $140,000 federally funded study is geared at preventing incompatible land uses between entities, such as Curry County and Cannon Air Force Base, according to Rudy Bauer, who supervised the study.

"The study is an effort to have Cannon Air Force Base and the surrounding jurisdictions to live together harmoniously," Bauer said.

Bauer said the study produces recommendations that various communities can adopt as policy.

Among the recommendations are comprehensive land use planning, the creation of a regional coordination committee and an implementation committee and new sub-division and zoning regulations.

Bauer said a regional coordination committee would consist of representatives from area communities who would review building proposals, and the implementation committee would see that the study recommendations are followed through.

One of the concerns expressed by area residents was building wind turbines on their property, Bauer said.

Bauer said Cannon AFB officials must be notified if turbines are built, because anything taller 75 feet tall can potentially interfere with the base's radar systems.

Curry County Manager Lance Pyle said the same presentation by Bauer will be presented at the Sept. 8 Curry County Commission meeting.

The public is invited to attend and offer their feedback.

Curry Road R discussed at Joint Land Use meeting

Freedom New Mexico
2010-09-08 20:44:48

Discussion centered around procedures needed to close Curry Road R at a Wednesday afternoon meeting of the Joint Land Use Study's policy committee.

More than a dozen people attended the meeting, which was held at the Curry County Courthouse, County Manager Lance Pyle said.

Pyle said County Attorney Stephen Doerr gave a presentation outlining the procedures needed to close the road, an action that would ultimately have to be taken by the county commission.

Rudy Bauer also gave a report on the Joint Land Use Study, Pyle said.

The JLUS was commissioned to evaluate the area and provide information to assist Cannon Air Force Base and surrounding communities in coexisting.

Cannon officials have said Curry Road R's proximity to the base perimeter creates security risks and have asked that it be closed.

The JLUS policy committee will next meet at 2 p.m. Sept. 27, Portales City Hall and at 6 p.m. JLUS public meeting in the Ingram Room at the Clovis Carver Library to obtain feedback from the community on the study.

Information on the JLUS: www.cannonafbjlus.org

D.4 Resolution Establishing a Joint Land Use Committee

Resolution No. 2010-43
Resolution Establishing a Joint Land Use Committee

As of 2009 the Department of Defense (DOD) awarded a community planning grant to Curry County to conduct a Joint Land Use Study (JLUS) for Cannon Air Force Base (Cannon) and the surrounding jurisdictions, including Curry County, the City of Clovis, Village of Melrose, Village of Floyd, City of Portales and Roosevelt County.

WHEREAS, Curry County is to act as the sponsor of the JLUS Study and;

WHEREAS, the JLUS program is a basic planning process designed to identify existing and potential land use conflicts that have the potential to impair Cannon's mission and impact to public health and safety confronting both the civilian communities and the military installation and;

WHEREAS, the JLUS process is a civilian-driven process that is community controlled and community directed and;

WHEREAS, Curry County wishes to encourage public participation in this JLUS which will include a variety of partners, including local professional planners, elected officials, business and development representatives, land owners, natural resource protection organizations, Cannon Air Force Base and other subject matter experts as needed and;

WHEREAS, the recommendations that come from this JLUS will be used as a guide for the local jurisdictions and the growth and implantation of future land use and development.

BE IT RESOLVED, by the Curry County Commission, which is the duly elected governing board of Curry County as follows:

1. **Purpose:** The overall purpose of this study is to ensure the operational effectiveness of Cannon Air Force Base and the training range. This JLUS is intended to mitigate or preclude land use incompatibility between the military, Curry and Roosevelt Counties, local land owners and governmental agencies. Its purpose is to put in place land use strategies between the military and the local communities that will foster better planning and consistent land use development in Curry and Roosevelt County.

2. **Delegation of Authority:** It is not the intent of this document to create or establish a separate governmental agency. Nothing in this document shall constitute or be considered as a delegation of any power or authority by Curry County to formulate public policy, including the development of any new rules, regulations or ordinances or to take any final action. The

Page 1 of 4

Committees created under this Resolution are study committees and are to make recommendations only.

3. **Administration:** It is acknowledged and recognized that Curry County shall be responsible for the operation and administration of the JLUS program and process. Curry County shall be solely responsible for providing the staff for administrative services hereunder, except as may be provided by written agreement from time to time. Two (2) advisory committees shall be formed and shall act independently from one another, under the direction and guidance of Curry County. The first committee shall be referred to as the JLUS Policy Committee and the second committee shall be referred to as the JLUS Technical Committee.

4. **JLUS Policy Committee:** The JLUS Policy Committee shall consist of fifteen (15) members which shall include two (2) members from the Curry County Commission, two (2) members from the City of Clovis, two (2) members from Roosevelt County, one (1) member from the City of Portales, and one (1) member from Cannon Air Force Base. There shall also be five (5) public members from Curry County and two (2) public members from Roosevelt County. All public members shall be appointed by Curry County with input from each affected area.

   The JLUS Policy Committee shall assemble and approve a final report that is to be submitted to the Curry County Board of Commissioners for their review. The JLUS Policy Committee shall also guide the overall direction of this study. The JLUS Policy Committee has the authority to make recommendations or submit policies to Curry County for its review and consideration. The JLUS Policy Committee is not given the authority to adopt any policy, procedures or take any formal action without the prior approval from the Curry County Commission.

   The chairman of the JLUS Policy Committee, shall be appointed by the Curry County Commission, shall run and conduct all meetings of the policy committee. In an event that the chairman is unavailable, the vice-chair, appointed by the Policy Committee, shall conduct the meeting.

   All meetings of the JLUS Policy Committee shall be conducted in an orderly manner, following parliamentary rules and procedures. While Robert's Rules of Order is not adopted, and there is no need to follow such rigid rules of procedure, in the event of a disagreement or conflict, the chair or vice-chair may use Robert's Rules of Order as a guide.

   While public participation is critical to this study, members of the public, the media and others shall not be allowed to disrupt, delay or otherwise interfere with the orderly process of the JLUS Policy Committee Meetings. In that regard, the chair is to establish rules to ensure the orderly receipt of

public input, which may include limiting the number of speakers, limiting the time when the public may present or limiting the time when each individual participant may speak and/or requiring written input instead of comments during the meetings. These rules shall not be used to impede public input but, are intended to allow the JLUS Policy Committee to function in an orderly manner.

5. **JLUS Technical Committee:** The JLUS Technical Committee shall be comprised of local community officials, to include Cannon and other individuals with specific technical experience. Membership to the JLUS Technical Committee shall be appointed by the Curry County Commission and may be expanded at any time during the study when new technical issues emerge. The Technical Committee will be chaired by the Curry County Manager or his designee and will be comprised of nine (9) members. Additional technical experts may participate with the Technical Committee Chair's approval.

   The JLUS Technical Committee shall be responsible for studying technical issues, either independently or in conjunction with other committees. The Technical Committee identifies and addresses technical issues and alternatives, provides feedback on report developments and assists in the development and evaluation of implementation strategies and tools.

6. **Open Meetings Act:** Neither the Curry County JLUS Policy Committee nor the Technical Committee shall be a New Mexico governmental entity as defined in the New Mexico Open Meetings Act, Section 10-15-1 *et. seq.* NMSA (2008). Nonetheless, public awareness is an integral part of the JLUS program and advance notification for any and all JLUS Policy Committee and/or subcommittees of the JLUS Policy Committee are to be given to the press for dissemination to the public at least seven (7) days prior to any meeting.

7. **Development of a Work Plan:** Curry County has contracted with HDR Engineering, Inc. to assist the JLUS Policy Committee and JLUS Technical Committee in the development of a final plan. This plan will be submitted to the Curry County Commission for their review. No plan or recommended plan will be effective until and unless it is approved by a majority vote of the Curry County Board of Commissioners at a public meeting.

8. **Ownership of Data and Documentation:** Neither the Policy Committee nor the Technical Committee shall release or distribute any written reports, drafts, recommendations or other data without the prior approval of Curry County. The release of information that is incorrect or which has not been adopted by this Curry County Commission could create unintended

problems, concern and confusion that would be contrary to the purposes hereinabove stated.

RESOLVED this 17th Day of August, 2010.

BOARD OF COUNTY COMMISSIONERS
CURRY COUNTY, NEW MEXICO

Robert Sandoval, Chairman

Caleb Chandler, Vice Chairman

(SEAL)

Frank Blackburn, Member

Daniel Stoddard, Member

Wendell Bostwick, Member

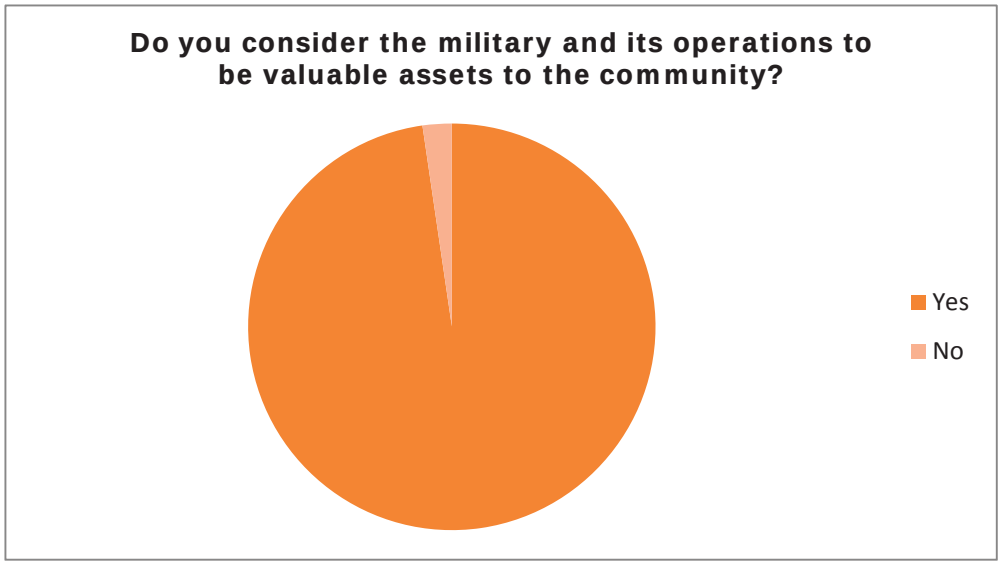
ATTEST:

Coni Jo Lyman, Curry County Clerk

Survey Results

Curry Counry - Cannon AFB Joint Land Use Study Survey

Question 1: Do you consider the military and its operations to be valuable assets to the community?		
Answer Options	**Response Percent**	**Response Count**
Yes	97.7%	42
No	2.3%	1
	answered question	43
	skipped question	0

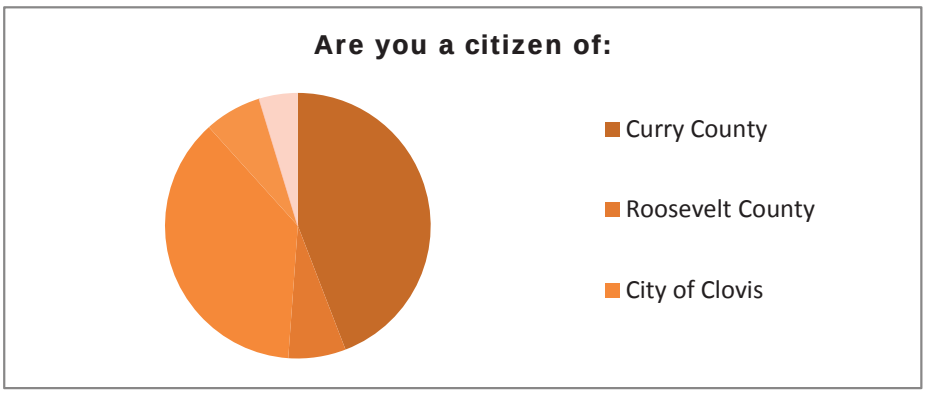


Curry County - Cannon AFB Joint Land Use Study Survey

Question 2: Are you a citizen of:

Answer Options	Response Percent	Response Count
Curry County	44.2%	19
Roosevelt County	7.0%	3
City of Clovis	37.2%	16
City of Portales	7.0%	3
Village of Melrose	0.0%	0
Village of Floyd	0.0%	0
I live outside of the areas listed above	4.7%	2
Comments		4
	answered question	43
	skipped question	0

Number	Response Date	Comments
1	May 5, 2010 1:27 PM	tretretretret
2	Sep 9, 2010 2:59 PM	I see no problem with closing the county road next to the base. The people in Grady are trying to get the road paved from Ranchvale to Grady to help them boost their economy and school enrollment so why not give Cannon the property along county road R in exchange for helping pay to pave the county road going from Ranchvale to Grady. It looks like a win situation for the base, the county and Grady all at the same time.
3	Oct 8, 2010 10:14 PM	Village of Dora
4	Oct 26, 2010 1:08 PM	I feel that the need for National Security is a 1st priority, and that our community must be proud of having such an impact on the battle on this front.



Curry County - Cannon AFB Joint Land Use Study Survey

Question 3: Do you believe that Cannon AFB has a positive impact on the surrounding community and the quality of life within the community?

Answer Options	Response Percent	Response Count
Yes	85.4%	35
No	12.2%	5
Unknown	2.4%	1
Comments		13
	answered question	41
	skipped question	2

Number	Response Date	Comments
1	May 5, 2010 1:27 PM	rtrtretretret
2	Sep 9, 2010 2:59 PM	A military base has a positive economic impact on any community they are located close to.
3	Sep 28, 2010 4:26 PM	By bringing in people from different areas we live in a more diversified culture. Our children learn from each other in school and church.
4	Oct 8, 2010 5:02 PM	Provides jobs, brings in money to stimulate the economy and expand businesses, brings in service-oriented people to contribute.
5	Oct 8, 2010 5:10 PM	Major part of local economy and protection of our nation.
6	Oct 8, 2010 5:19 PM	The economic influence definitely increases the standard of living in this area. The Air Force personnel add an important experienced and leadership ability to the area. A large percentage of the personnel help the community through their service to local communities by being an important part of the volunteer ranks.
7	Oct 8, 2010 5:49 PM	Military volunteers in our community in many areas, they protect our country, and their presence have has a positive economic impact on the communities.

Curry County - Cannon AFB Joint Land Use Study Survey

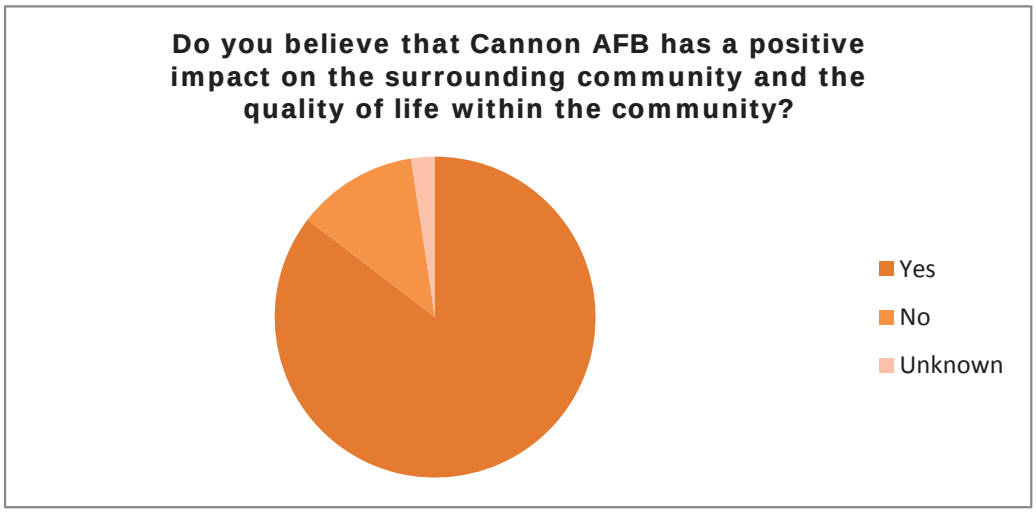
Question 3: Do you believe that Cannon AFB has a positive impact on the surrounding community and the quality of life within the community?

Answer Options	Response Percent	Response Count
Yes	85.4%	35
No	12.2%	5
Unknown	2.4%	1
Comments		13
	answered question	41
	skipped question	2

8	Oct 8, 2010 5:59 PM	I have grown up a military dependent all my life and know how valuable the military is to any and all communities, to not just this area. The impact is not just financially positive, it also gives a chance to the people of our area to learn more about other countries from all of the people transferred into our community. It also gives the opportunity of influence to our young adults to join the military to protect our future.
9	Oct 8, 2010 6:30 PM	Stability of employment and base growth contribute to the city and county growth. It appears the Special Forces mission brings quality military personnel to our area.
10	Oct 8, 2010 9:33 PM	Economically. Protect our freedom.
11	Oct 8, 2010 9:50 PM	More money brought into Clovis. Not where I live - the air base flights disturb the peace.
12	Oct 8, 2010 10:20 PM	Jobs and revenue.
13	Oct 26, 2010 1:08 PM	Yes, and one main reason. is that our young Citizens have a first hand look at what the responsibility of each and every American should be. The interaction of community and base personnel is great.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 3: Do you believe that Cannon AFB has a positive impact on the surrounding community and the quality of life within the community?		
Answer Options	**Response Percent**	**Response Count**
Yes	85.4%	35
No	12.2%	5
Unknown	2.4%	1
Comments		13
	answered question	**41**
	skipped question	**2**



Curry County - Cannon AFB Joint Land Use Study Survey

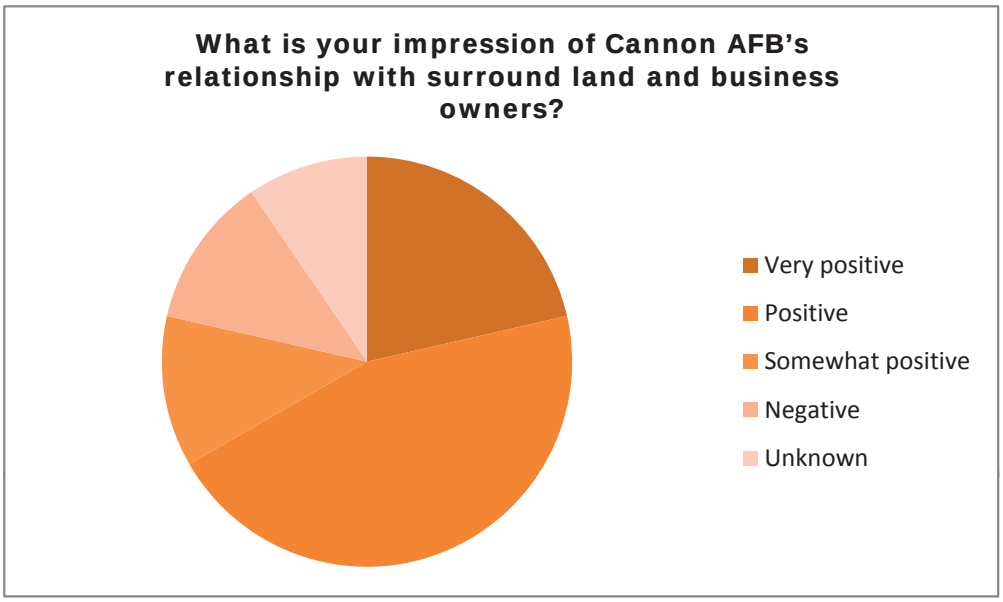
Question 4: What is your impression of Cannon AFB's relationship with surround land and business owners?

Answer Options	Response Percent	Response Count
Very positive	21.4%	9
Positive	45.2%	19
Somewhat positive	11.9%	5
Negative	11.9%	5
Unknown	9.5%	4
Comments		13
	answered question	42
	skipped question	1

Number	Response Date	Comments
1	Apr 16, 2010 9:07 PM	fdgffb
2	May 5, 2010 1:27 PM	tretretretre
3	Sep 26, 2010 4:42 PM	I've seen a very parasitic relationship from this community; very unhelpful and unwilling to work with the base.
4	Sep 28, 2010 4:26 PM	Businesses seem to be happy with with the increased income. Most land owners are tolerable aslong as it doesn't affect their private operations or way of life.
5	Oct 8, 2010 5:02 PM	I've heard few complaints about the base and people seem to want it here.
6	Oct 8, 2010 5:10 PM	Misconceptions by both community and AF have created some friction.
7	Oct 8, 2010 5:19 PM	Overall, the Air Force tries to work with local communities, but sometimes the desires of the Air Force puts some pressure on the landowners and governments to meet its needs.
8	Oct 8, 2010 5:59 PM	Many of the landowners are not as positive as the local businesses. Honestly Clovis would not have grown as it has without the base and its people to support our local businesses, and drawing many of the businesses in.
9	Oct 8, 2010 6:30 PM	Not a direct landowner/business owner, so it is from afar.
10	Oct 8, 2010 9:33 PM	People around here love our country!
11	Oct 8, 2010 9:50 PM	There is no relationship.
12	Oct 8, 2010 10:14 PM	Think it is positive, but unsure.
13	Oct 26, 2010 1:08 PM	It seems now. That land owners are more money hungry than ever. During the so called, "Save Cannon", campaign commitments were made and I don't see where they are being kept.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 4: What is your impression of Cannon AFB's relationship with surround land and business owners?		
Answer Options	**Response Percent**	**Response Count**
Very positive	21.4%	9
Positive	45.2%	19
Somewhat positive	11.9%	5
Negative	11.9%	5
Unknown	9.5%	4
Comments		13
	answered question	42
	skipped question	1



Curry County - Cannon AFB Joint Land Use Study Survey

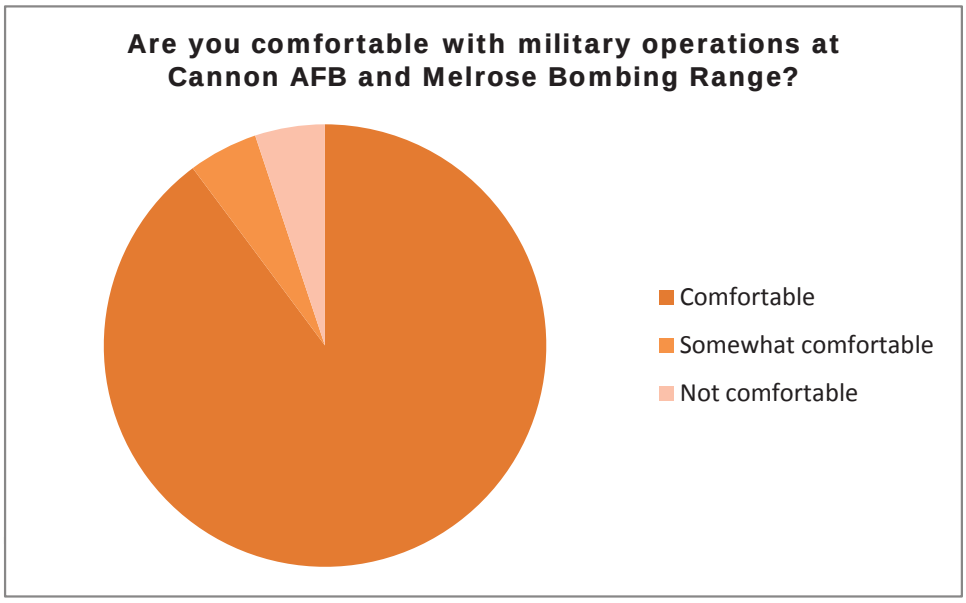
Question 5: Are you comfortable with military operations at Cannon AFB and Melrose Bombing Range?

Answer Options	Response Percent	Response Count
Comfortable	89.7%	35
Somewhat comfortable	5.1%	2
Not comfortable	5.1%	2
Comments:		11
	answered question	39
	skipped question	4

Number	Response Date	Comments:
1	Sep 9, 2010 3:06 PM	We have them in Fort Sumner too. They use our little airport for training and I do not know anyone that objects to their exercises here.
2	Sep 28, 2010 4:37 PM	I have lived in Clovis all my life and seldom notice the plane noise. I'm really proud to have Cannon AFB here.
3	Oct 8, 2010 4:54 PM	Very comfortable.
4	Oct 8, 2010 5:04 PM	I know of no danger to the community in the operations, and I haven't been disturbed by them.
5	Oct 8, 2010 5:22 PM	I enjoy the aircraft that are using Cannon AFB as their home base or some of the aircraft that visit Cannon. I think it is very interesting to watch the aircraft fly over our area.
6	Oct 8, 2010 6:18 PM	I've lived with military operations all my life, they are necessary for our safety as a country.
7	Oct 8, 2010 9:22 PM	Intrucive.
8	Oct 8, 2010 9:43 PM	Whatever our military needs!
9	Oct 8, 2010 9:51 PM	The bombing range is risky and the base operations are very close to my home.
10	Oct 8, 2010 10:15 PM	I feel everything is OK, but when they had a fire they wouldn't let anyone (fire trucks) on the range.
11	Oct 26, 2010 1:16 PM	My family has roots that go back many decades, and it is not only a part of this area it is a need for this area.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 5: Are you comfortable with military operations at Cannon AFB and Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Comfortable	89.7%	35
Somewhat comfortable	5.1%	2
Not comfortable	5.1%	2
Comments:		11
	answered question	39
	skipped question	4



Curry County - Cannon AFB Joint Land Use Study Survey

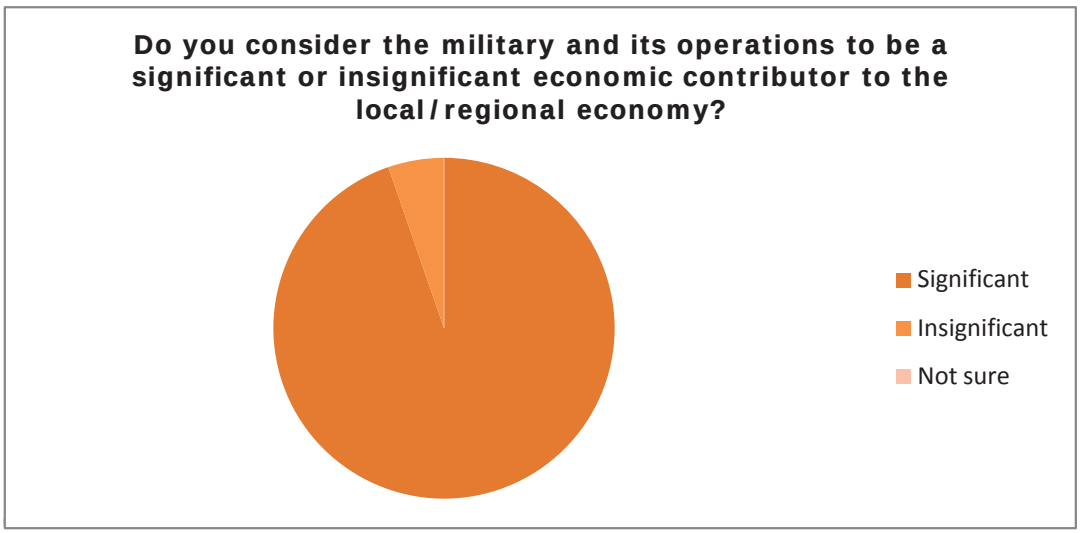
Question 6: Do you consider the military and its operations to be a significant or insignificant economic contributor to the local/regional economy?

Answer Options	Response Percent	Response Count
Significant	94.7%	36
Insignificant	5.3%	2
Not sure	0.0%	0
Comments		11
	answered question	38
	skipped question	5

Number	Response Date	Comments
1	May 5, 2010 1:27 PM	tertret
2	Sep 26, 2010 4:57 PM	The local economy enjoys an annual payroll over $300 million a year.
3	Sep 28, 2010 4:37 PM	Any facility this large has to be a major contribitor to the income of the area. I also consider the men & women an asset to the community. They are always some of the first to volunteer in the community when we need help. For instance cleanupwhen the tornado hit, Trek for Trash and Homes for Humanity.
4	Oct 8, 2010 5:04 PM	The base brings a lot of people and activity to stimulate the economy.
5	Oct 8, 2010 5:22 PM	I would hate to see this area without the Air Force personnel supporting our economy. We would not have a real estate market, we would be closing businesses and schools.
6	Oct 8, 2010 5:52 PM	Highly significant economic impact to area economy. If the base closed, not only would the military leave but so would a lot of veterans who utilize the base.
7	Oct 8, 2010 6:18 PM	The local economy does depend on the everyday spending of the community as a whole. A large percent off local people are either active or retired military.
8	Oct 8, 2010 9:27 PM	Clovis would be ghost town without base.
9	Oct 8, 2010 9:43 PM	More people, more buyers! Retail, restaurants, cars and on and on.
10	Oct 8, 2010 9:51 PM	Cheese plant and dairy farms bring in more jobs.
11	Oct 26, 2010 1:16 PM	Our community would suffer dramatically without this companionship. The economic impact of not having the base would be earth shattering.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 6: Do you consider the military and its operations to be a significant or insignificant economic contributor to the local/regional economy?		
Answer Options	**Response Percent**	**Response Count**
Significant	94.7%	36
Insignificant	5.3%	2
Not sure	0.0%	0
Comments		11
	answered question	38
	skipped question	5



Curry County - Cannon AFB Joint Land Use Study Survey

Question 7: What do you believe is the largest economy contributor to the local/regional economy?	
Answer Options	**Response Count**
	33
answered question	**33**
skipped question	**10**

Number	Response Date	Response Text
1	May 5, 2010 1:27 PM	rtertretretret
2	Sep 4, 2010 4:17 AM	Farming/Dairy Industry
3	Sep 7, 2010 9:34 PM	Agriculture
4	Sep 9, 2010 3:06 PM	All military familys have to eat, buy gas for their cars, buy a car, get them worked on, rent a place to live off base and pay for utilities. Military families help the local economies everywhere we have a base located.
5	Sep 9, 2010 10:27 PM	The military base. It seems that Clovis would hardly exist without it.
6	Sep 17, 2010 3:16 PM	BNSF CANNON AIR FORCE BASE
7	Sep 26, 2010 4:57 PM	Cannon easily provides the most direct amount of money to the area.
8	Sep 28, 2010 4:24 PM	Military Installation is the largest single contributor
9	Oct 6, 2010 5:49 PM	Dairy Industry
10	Oct 8, 2010 4:32 AM	CAFB
11	Oct 8, 2010 4:59 PM	Not sure between base, railroad, schools, or ENMR.
12	Oct 8, 2010 5:04 PM	I don't know.
13	Oct 8, 2010 5:10 PM	Agriculture and military.
14	Oct 8, 2010 5:13 PM	Agriculture.
15	Oct 8, 2010 5:15 PM	The money spent in the stores locally.
16	Oct 8, 2010 5:22 PM	I don't have the knowledge or factual information to answer this question with one answer. 1. Air Force is a tremendous factor. 2. Agriculture is very important as a total unit. 3. The railroad is a critical company to our economy. 4. Educational units, from K-12, to CCC, to ENMU.
17	Oct 8, 2010 5:52 PM	CAFB. They constitute 33% of the area's economy.
18	Oct 8, 2010 6:18 PM	Split between military/dairy/railroad
19	Oct 8, 2010 6:37 PM	The base - single largest employer in the area period.
20	Oct 8, 2010 9:18 PM	CAFB, BNSF, Dairy's, etc.
21	Oct 8, 2010 9:22 PM	Agriculture
22	Oct 8, 2010 9:25 PM	It takes all.
23	Oct 8, 2010 9:27 PM	Air base.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 7: What do you believe is the largest economy contributor to the local/regional economy?		
Answer Options		**Response Count**
		33
	answered question	**33**
	skipped question	**10**
24	**Oct 8, 2010 9:30 PM**	Cannon AFB, during the BRAC hearings, Clovis would have been one of the top communities hardest hit if the base closed.
25	**Oct 8, 2010 9:43 PM**	CAFB Ay and Railroad
26	**Oct 8, 2010 9:48 PM**	(regional) Agriculture and associated businesses.
27	**Oct 8, 2010 9:51 PM**	Dairy, cattle, agriculture
28	**Oct 8, 2010 10:15 PM**	Affordable, reliable electricity
29	**Oct 8, 2010 10:17 PM**	Cannon AFB
30	**Oct 8, 2010 10:21 PM**	Ag and dairy production, railroad.
31	**Oct 26, 2010 1:16 PM**	Without a doubt, Cannon.
32	**Oct 27, 2010 1:08 PM**	Agriculture
33	**Nov 1, 2010 9:48 PM**	The military, since it provides a wide economic base

Curry County - Cannon AFB Joint Land Use Study Survey

Question 8: Are you worried/concerned about a possible closure at Cannon AFB or Melrose Bombing Range?

Answer Options	Response Percent	Response Count
Only Cannon AFB	5.1%	2
Only Melrose Bombing Range	2.6%	1
Both	30.8%	12
Neither	61.5%	24
Comments:		17
	answered question	39
	skipped question	4

Number	Response Date	Comments:
1	May 5, 2010 1:27 PM	retretre
2	Sep 9, 2010 3:06 PM	There are very few locations in our country with as much open land for the pilots and crew to train as we have right here in New Mexico.
3	Sep 26, 2010 4:57 PM	I hope they close it down. I've yet to see any support from the community here asside from local prices shooting up after the new mission arrived.
4	Sep 28, 2010 4:37 PM	I try to be very optimistic. Cannon has been here as long as I can remember and I cann't imagine her leaving.
5	Oct 8, 2010 5:04 PM	There are housing availability problems, but those don't seem to be an immediate reason to close the base.
6	Oct 8, 2010 5:13 PM	Wish to see them operating.
7	Oct 8, 2010 5:22 PM	I have concerns, but I also feel like Cannon has a slim chance of being closed at this time. But anything funded by the federal government can be cut. I do not have great confidence in the ability of Congress (both Democrats and Republicans) to make reasonable decisions at the current time.
8	Oct 8, 2010 5:52 PM	Missions can change with administrations at a federal level. The current mission of Cannon is geared to special ops, and conflicts in the Middle East. This could change.

Curry County - Cannon AFB Joint Land Use Study Survey

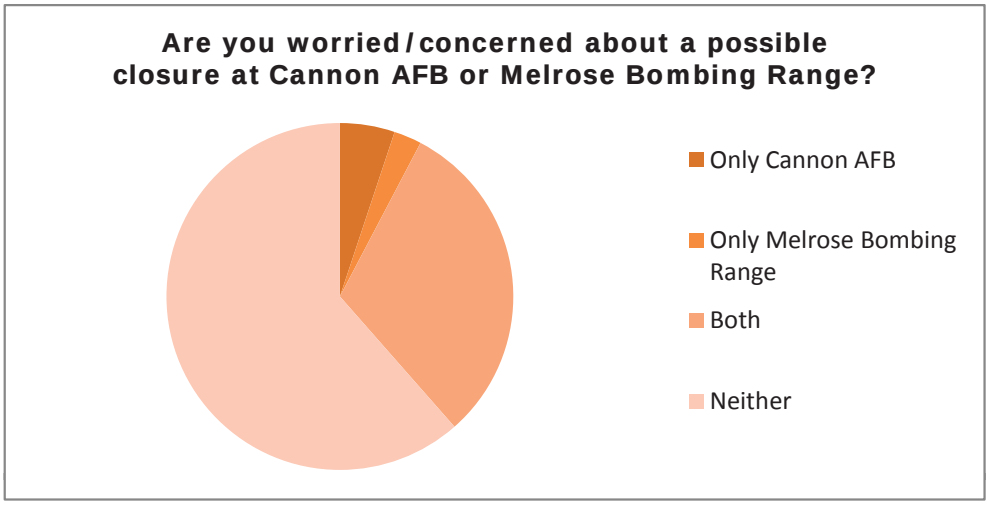
Question 8: Are you worried/concerned about a possible closure at Cannon AFB or Melrose Bombing Range?

Answer Options	Response Percent	Response Count
Only Cannon AFB	5.1%	2
Only Melrose Bombing Range	2.6%	1
Both	30.8%	12
Neither	61.5%	24
Comments:		17
	answered question	39
	skipped question	4

9	Oct 8, 2010 6:18 PM	I feel Clovis has not quite given the full representation of our city to the incoming military. Many of them are accustomed to more places to patronize, not being limited as Clovis is. The housing is not up to the standards they are used it.
10	Oct 8, 2010 6:26 PM	At this time.
11	Oct 8, 2010 6:37 PM	We are already seeing that the attempt to fly low over very now populated areas between Clovis and Southern Colorado are bringing protests. This is the perfect area for this training. Won't find any better in the USA.
12	Oct 8, 2010 9:27 PM	Both are very secure.
13	Oct 8, 2010 9:43 PM	Both are too vital to national security.
14	Oct 8, 2010 9:48 PM	I believe they will stay.
15	Oct 8, 2010 10:17 PM	Cannon would have huge impact (negative).
16	Oct 8, 2010 10:21 PM	If it has to, they do
17	Oct 26, 2010 1:16 PM	One may be worth nothing without the other. It's a marraige that should not be challenged and/or threatened in any way.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 8: Are you worried/concerned about a possible closure at Cannon AFB or Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Only Cannon AFB	5.1%	2
Only Melrose Bombing Range	2.6%	1
Both	30.8%	12
Neither	61.5%	24
Comments:		17
	answered question	39
	skipped question	4



Curry County - Cannon AFB Joint Land Use Study Survey

Question 9: Do you have any concerns about military installation operations with regard to noise, traffic, or other issues around Cannon AFB and Melrose Bombing Range? Please select all that apply?

Answer Options	Response Percent	Response Count
Noise	10.3%	4
Traffic	12.8%	5
Neither	71.8%	28
Other	5.1%	2
Comments:		17
	answered question	39
	skipped question	4

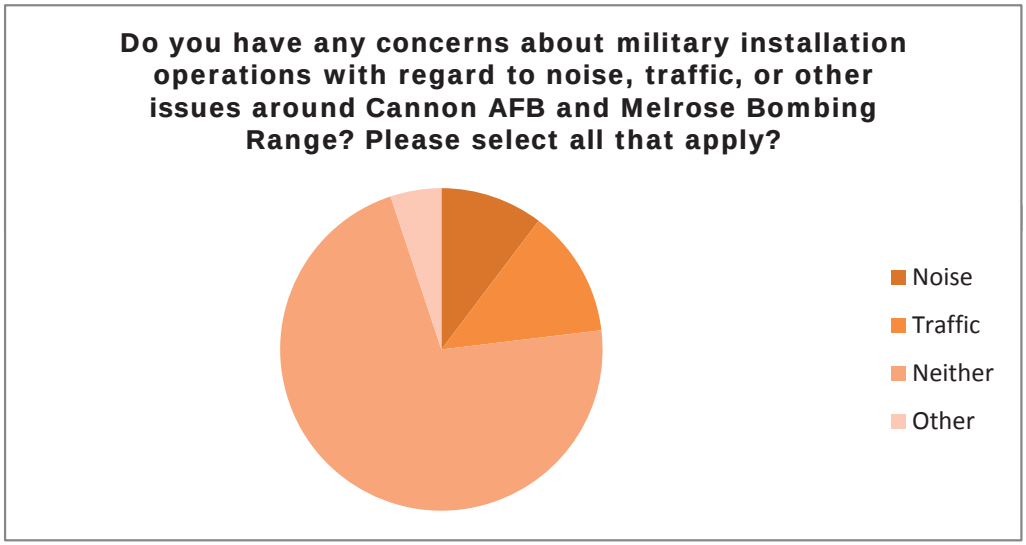
Number	Response Date	Comments:
1	May 5, 2010 1:27 PM	tetretre
2	Sep 4, 2010 4:17 AM	County Road R needs to be closed.
3	Sep 8, 2010 4:23 AM	I Live right by cannon
4	Sep 26, 2010 4:57 PM	Noise complaints come in on a daily basis, despite all the "support" these people like to talk about. It's forced flights to go higher and has affected their ability to train over the local area.
5	Sep 28, 2010 4:24 PM	Concerned about the close proximity of some roads to operational areas on the base.
6	Sep 28, 2010 4:37 PM	I have heard the planes all my life and have grown accustomed to the sound. It doesn't bother me. I don' live close enough to the base to be affected by the traffic.
7	Oct 8, 2010 5:04 PM	Things seem to be going well so far.
8	Oct 8, 2010 5:22 PM	I can hear the aircraft flying over us, but it doesn't bother me.
9	Oct 8, 2010 5:52 PM	Concerned about proximity of roads adjacent to the base.
10	Oct 8, 2010 6:18 PM	It is not new!
11	Oct 8, 2010 6:37 PM	It is a fact the traffic and noise will increase ... it is like buying a house next to an airport and then complaining it is noisey. Just a fact - the way it is!
12	Oct 8, 2010 9:22 PM	Late night and low flights that rattle my windows.
13	Oct 8, 2010 9:43 PM	Love the sound of freedom.
14	Oct 8, 2010 9:51 PM	The flying planes at night hours.
15	Oct 8, 2010 10:15 PM	Noise, traffic, wind turbines, transmission lines, local land owners.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 9: Do you have any concerns about military installation operations with regard to noise, traffic, or other issues around Cannon AFB and Melrose Bombing Range? Please select all that apply?

Answer Options	Response Percent	Response Count
Noise	10.3%	4
Traffic	12.8%	5
Neither	71.8%	28
Other	5.1%	2
Comments:		17
	answered question	39
	skipped question	4

16	Oct 8, 2010 10:21 PM	Sound of freedom and protection
17	Oct 26, 2010 1:16 PM	During my service years in another country, I can not recall our leaders concerned of nothing more than the mission at hand, noise traffic, were not a priority. At least Cannon leaders have a concern and act.



Curry County - Cannon AFB Joint Land Use Study Survey

Question 10: Do you have concerns about military installation operations with regard to public health, safety, housing, or general welfare around Cannon AFB and Melrose Bombing Range? Please select all that apply.

Answer Options	Response Percent	Response Count
Public health	5.3%	2
Safety	10.5%	4
Housing	23.7%	9
General welfare	5.3%	2
All of the above	15.8%	6
None of the above	55.3%	21
Comments:		10
	answered question	38
	skipped question	5

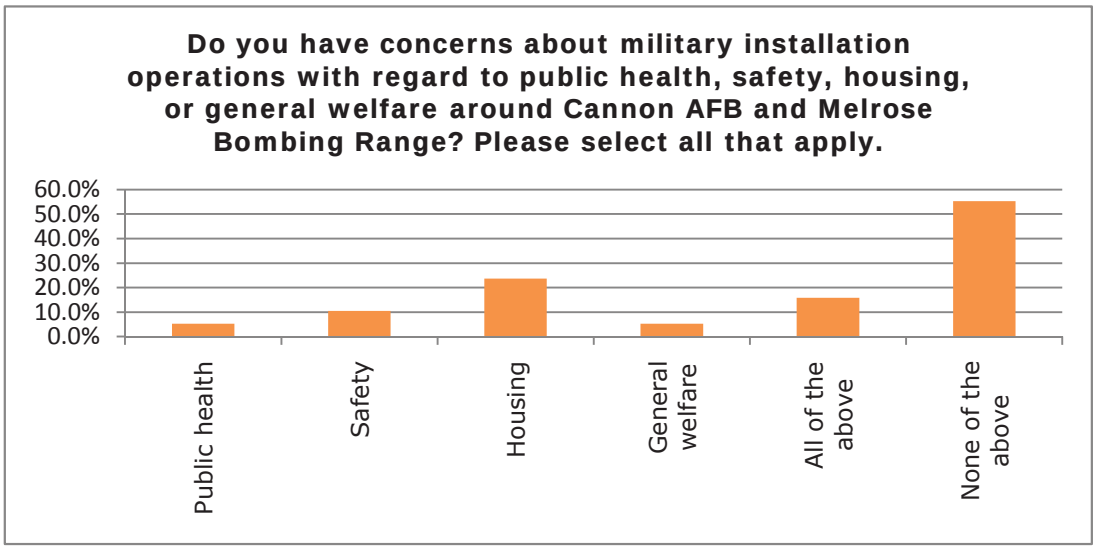
Number	Response Date	Comments:
1	May 5, 2010 1:27 PM	etretret
2	Sep 26, 2010 5:13 PM	The base is expanding yet the community refuses to do anything to prepare for it. Health wise, PRMC is a joke of a hospital to the point people have to go to Lubbock or Albuqurque for something as simple as a fracture. I've had people wait for hours just to see someone. Safety is also an issue. County road-R lies within FAA height restrictions, which denies the use of the runway it passes near. Despite the fact that 467 directly bypasses the base, this community continues to balk at the idea of closing off Cr-R to traffic. The housing situation is dismal. There are plenty of $300,000 houses available, but nothing young airmen can afford and absolutely nothing affordable in the rental market. I know for a fact there are airmen living in campers just off base because it's affordable.
3	Sep 28, 2010 4:47 PM	I'm concerned about the safety of the people who live close to the base and on the base because constant airplane flights. I understand this is necessary and we have to accept the risks. I also know that there is not enough affordable housing for the airmen with lower income.
4	Oct 8, 2010 5:05 PM	The only problem seems to be a shortage of desirable, affordable housing.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 10: Do you have concerns about military installation operations with regard to public health, safety, housing, or general welfare around Cannon AFB and Melrose Bombing Range? Please select all that apply.

Answer Options	Response Percent	Response Count
Public health	5.3%	2
Safety	10.5%	4
Housing	23.7%	9
General welfare	5.3%	2
All of the above	15.8%	6
None of the above	55.3%	21
Comments:		10
	answered question	38
	skipped question	5

5	Oct 8, 2010 5:25 PM	I am hoping that we will eventually catch up with the housing needs of the personnel at Cannon, especially the construction of dorms needed on base and rentals in the communities.
6	Oct 8, 2010 6:20 PM	I feel safer knowing Cannon is here.
7	Oct 8, 2010 6:47 PM	The military will be a good neighbor within the confines of its mission, won't compromise the mission though ... we must accept that!
8	Oct 8, 2010 9:31 PM	We need more affordable housing.
9	Oct 8, 2010 9:44 PM	Good neighbors.
10	Oct 26, 2010 1:29 PM	Operations are a part of what we must accept, and as long as the leaders on base express and act on limitations, we must adjust and apply these changes to our way of living.



Curry County - Cannon AFB Joint Land Use Study Survey

Question 11: Do you support building codes for new construction that reduces or mitigates noise entering homes around Cannon AFB and Melrose Bombing Range?

Answer Options	Response Percent	Response Count
Yes	50.0%	19
No	50.0%	19
Other (please specify)		15
	answered question	38
	skipped question	5

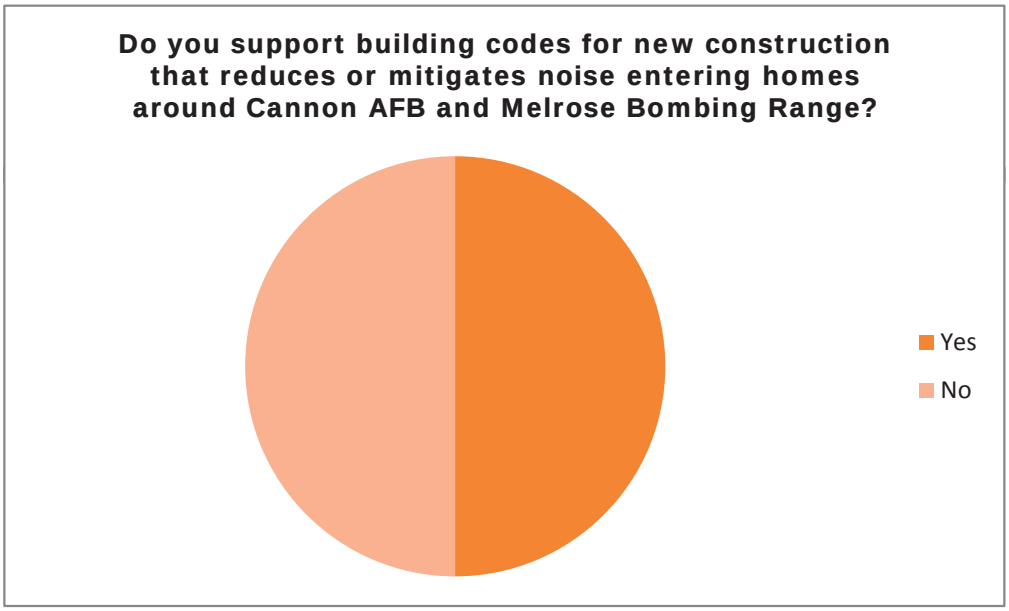
Number	Response Date	Other (please specify)
1	May 5, 2010 1:27 PM	retretret
2	Sep 9, 2010 3:10 PM	If you don't want to hear aircraft taking off and landing do not buy a home near an airport or Airforce Base. It's that simple.
3	Sep 26, 2010 5:13 PM	I don't think this is an issue, but then again with all the whining about C-130 noise this may be a good idea.
4	Sep 28, 2010 4:47 PM	I do, but I think cannon should be strongly involved in all decision making because who would know better than the people who deal with it every day.
5	Oct 8, 2010 4:55 PM	Keep it voluntary.
6	Oct 8, 2010 5:00 PM	Too many unnecessary codes and rules now. Maybe as an option for the homebuilder.
7	Oct 8, 2010 5:05 PM	Within reason, reducing noise is a way to make the living more pleasant.
8	Oct 8, 2010 5:52 PM	I think this should be an option for new construction around these areas.
9	Oct 8, 2010 6:20 PM	We as a community need to make our military personnel feel comfortable and at home just as we do people in town.
10	Oct 8, 2010 6:27 PM	Changes to building codes often add unnecessary costs to other area of building. If a person constructing near Cannon or Melrose Range wants to take measures to reduce noise it is by choice, not regulation.
11	Oct 8, 2010 6:47 PM	For sure I am fortunate to live in a well constructed home and noise including our "nations" wind is not an issue. Building codes to well insulate will assist with all types of noise including WIND!
12	Oct 8, 2010 9:44 PM	CAFB needs to protect air space.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 11: Do you support building codes for new construction that reduces or mitigates noise entering homes around Cannon AFB and Melrose Bombing Range?

Answer Options	Response Percent	Response Count
Yes	50.0%	19
No	50.0%	19
Other (please specify)		15
	answered question	38
	skipped question	5

13	Oct 8, 2010 10:15 PM	Not big on codes.
14	Oct 26, 2010 1:29 PM	For safety reasons. This is a tool that should be mandated, it is a necessity, and will play a bigger role in the solution of the reduction of not only noise, but of the movement of buildings as larger and more aircraft arrives. Constructionally sound buildings will be needed.
15	Nov 1, 2010 9:49 PM	The market will necessitate this anyway



Curry County - Cannon AFB Joint Land Use Study Survey

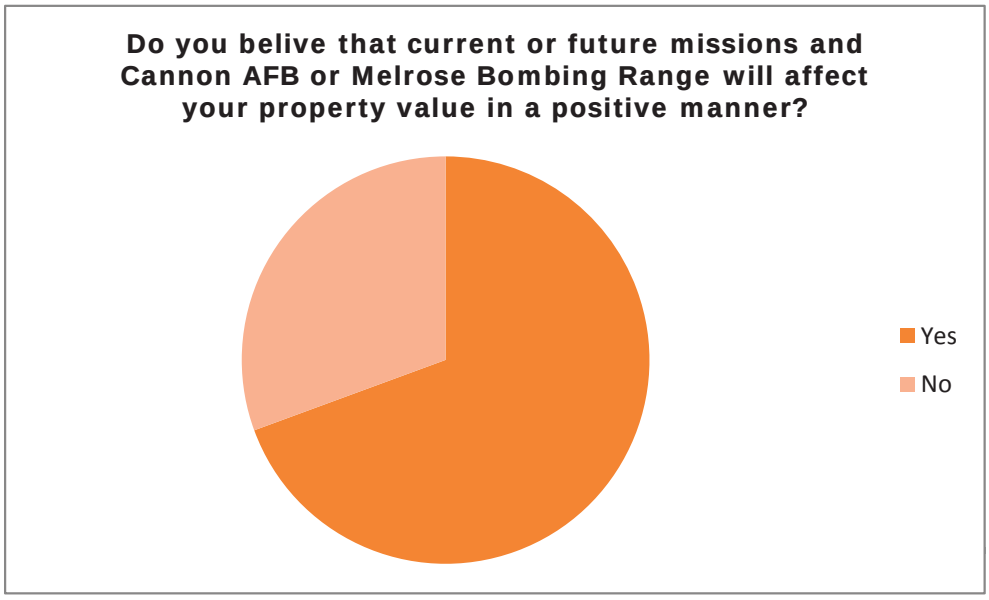
Question 12: Do you belive that current or future missions and Cannon AFB or Melrose Bombing Range will affect your property value in a positive manner?

Answer Options	Response Percent	Response Count
Yes	69.4%	25
No	30.6%	11
Comments:		12
	answered question	36
	skipped question	7

Number	Response Date	Comments:
1	May 5, 2010 1:27 PM	etretert
2	Sep 9, 2010 3:10 PM	You should have had a "maybe" to select. I live almost 70 miles from the base, at Lake Sumner, and their presence may or may not affect the value of my property.
3	Sep 28, 2010 4:47 PM	Any type of growth in the area is sure to increase property value.
4	Oct 8, 2010 5:05 PM	I don't own property.
5	Oct 8, 2010 5:25 PM	The personnel at Cannon are providing a needed part of the demand for homes in the Clovis/Portales areas. I would hate to see the real estate market without this demand.
6	Oct 8, 2010 6:20 PM	Any military installation should increase the feeling of safety and stability of the community as well as the continued economic income. I don't think values should increase I do feel there should be more properties available.
7	Oct 8, 2010 9:19 PM	My property will be disposed of, CR R property
8	Oct 8, 2010 9:44 PM	Keep property values from falling.
9	Oct 8, 2010 9:51 PM	No because no one wants to live as close as I do to the base.
10	Oct 8, 2010 10:22 PM	People effect property value, more people value goes up, less goes down.
11	Oct 26, 2010 1:29 PM	The primary example became a reality. When the base was ordered for closure, property values plummeted, and now they are somewhat where they need to be, a little high, but affordable.
12	Nov 1, 2010 9:49 PM	my property is not in that area

Curry County - Cannon AFB Joint Land Use Study Survey

Question 12: Do you belive that current or future missions and Cannon AFB or Melrose Bombing Range will affect your property value in a positive manner?		
Answer Options	**Response Percent**	**Response Count**
Yes	69.4%	25
No	30.6%	11
Comments:		12
	answered question	36
	skipped question	7



Curry County - Cannon AFB Joint Land Use Study Survey

Question 13: Do you believe that future missions and associated growth at Cannon AFB will have a significant effect on the following infrastructure capacity? Please check all that apply.

Answer Options	Response Percent	Response Count
Water	41.7%	15
Sewer	11.1%	4
Electricity	13.9%	5
All of the above	44.4%	16
None of the above	16.7%	6
Comments:		14
	answered question	36
	skipped question	7

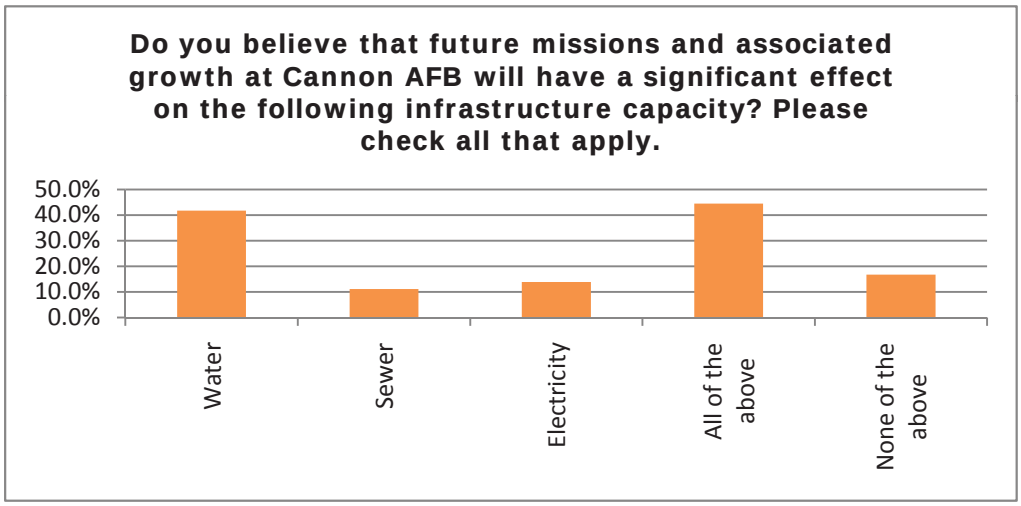
Number	Response Date	Comments:
1	May 5, 2010 1:27 PM	rtreter
2	Sep 9, 2010 3:10 PM	The base is just like a town. The more growth you have, the more utilities will be affected.
3	Sep 28, 2010 4:47 PM	An influx of people and new housing will definately put a load on utilities.
4	Oct 8, 2010 5:05 PM	Infrastructure may need to be upgraded to handle more people.
5	Oct 8, 2010 5:25 PM	We will need additional sources of water to supply water to the increasing number of personnel and their families. Our sewer infrastructure is going to need to be expanded. Electrical needs will increase with a larger population. I also believe the road system/transportation needs will continue to increase/change, the size of major streets might need to be expanded from 4 lanes, with a turning lane to 6 lanes with a turning lane. I think all future major streets should have a turning lane in the middle. It will be a waste of money to build 4 lane avenues without the middle turning lanes.
6	Oct 8, 2010 6:20 PM	We are limited to what the aquafur can supply.
7	Oct 8, 2010 6:47 PM	Water is the single biggest issue of this area. Power and sewer are managable. Without water, it is a no go for anything.
8	Oct 8, 2010 9:19 PM	It calls for more capacities, which can be good.
9	Oct 8, 2010 9:31 PM	We have to insure we have water. Ute pipeline should be fully funded.
10	Oct 8, 2010 9:44 PM	Have enough to support CAFB
11	Oct 8, 2010 9:51 PM	I think their usage of water is more than they need.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 13: Do you believe that future missions and associated growth at Cannon AFB will have a significant effect on the following infrastructure capacity? Please check all that apply.

Answer Options	Response Percent	Response Count
Water	41.7%	15
Sewer	11.1%	4
Electricity	13.9%	5
All of the above	44.4%	16
None of the above	16.7%	6
Comments:		14
	answered question	36
	skipped question	7

12	Oct 8, 2010 10:18 PM	All to some extent.
13	Oct 8, 2010 10:22 PM	Same basis - more people more infrastructure.
14	Oct 26, 2010 1:29 PM	With utility technology and investments that are being brought in to this region, it will never be a problem. As a matter of fact, it will positively enhance the future of our region and our citizens not only will it add employment, but it should impact our untility costs to lower themselves.



Curry County - Cannon AFB Joint Land Use Study Survey

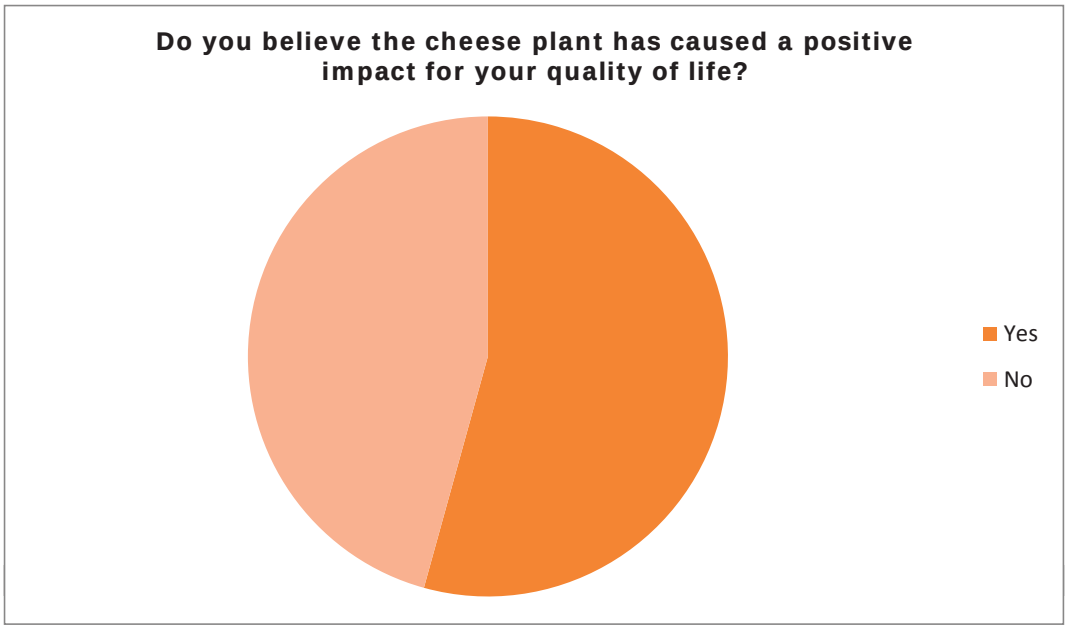
Question 14: Do you believe the cheese plant has caused a positive impact for your quality of life?

Answer Options	Response Percent	Response Count
Yes	54.3%	19
No	45.7%	16
Comments:		14
	answered question	35
	skipped question	8

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	etretretre
2	Sep 9, 2010 3:16 PM	I don't work there and live too far away.
3	Sep 28, 2010 4:26 PM	Boost to the economy in general
4	Sep 28, 2010 4:59 PM	It has created jobs & revenue in our area.
5	Oct 8, 2010 4:56 PM	However the overseas folks have been nice.
6	Oct 8, 2010 5:07 PM	The cheese plant probably hasn't had a significant affect - I don't think it's harmed anything or brought in enough people to increase property values.
7	Oct 8, 2010 5:28 PM	It has added to our economy, has provided jobs with benefits and donates to the needs of the area.
8	Oct 8, 2010 5:53 PM	The cheese plant has provided a boost to the area economy through job creation and construction.
9	Oct 8, 2010 6:22 PM	I don't feel directly affected.
10	Oct 8, 2010 7:09 PM	Yes and no - Dairy is a costly water user. Not necessarily the cheese plant, yet it promotes dairy in the area.
11	Oct 8, 2010 9:20 PM	More jobs.
12	Oct 8, 2010 9:45 PM	More people, more buyers.
13	Oct 8, 2010 10:12 PM	The jobs that the cheese plant has brought in for the common person.
14	Oct 26, 2010 1:36 PM	Not necessarily, it will become a bigger asset to us, once our utility technology kicks in.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 14: Do you believe the cheese plant has caused a positive impact for your quality of life?		
Answer Options	**Response Percent**	**Response Count**
Yes	54.3%	19
No	45.7%	16
Comments:		14
	answered question	35
	skipped question	8



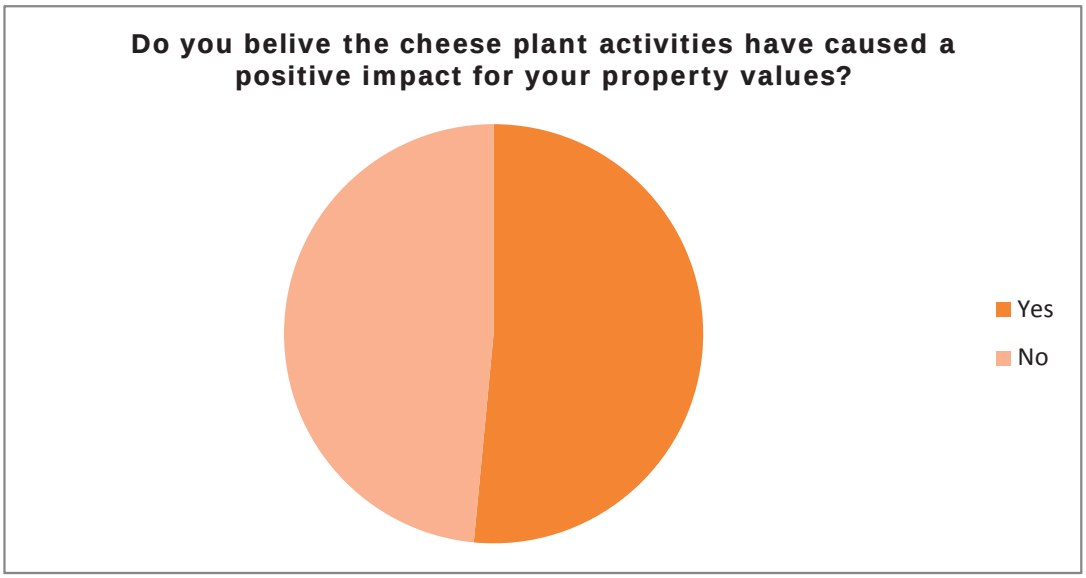
Curry County - Cannon AFB Joint Land Use Study Survey

Question 15: Do you belive the cheese plant activities have caused a positive impact for your property values?		
Answer Options	**Response Percent**	**Response Count**
Yes	51.5%	17
No	48.5%	16
Comments:		11
	answered question	33
	skipped question	10

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	ertretretre
2	Sep 28, 2010 4:59 PM	Because of jobs created on the south side of Clovis my home is in a more sellable ares.
3	Oct 8, 2010 5:07 PM	The cheese plant probably hasn't had a significant affect - I don't think it's harmed anything or brought in enough people to increase property values.
4	Oct 8, 2010 5:28 PM	See #14.
5	Oct 8, 2010 5:53 PM	The cheese plant's operations have boosted the economy and helped the area housing market by providing well-paying jobs so their workers can afford good housing in Clovis.
6	Oct 8, 2010 6:22 PM	It has provided jobs for many local people, keeping them in the community.
7	Oct 8, 2010 7:09 PM	Neutral on this.
8	Oct 8, 2010 9:32 PM	Not sure.
9	Oct 8, 2010 9:45 PM	Kept property values from falling.
10	Oct 8, 2010 10:12 PM	It doesn't really effect me.
11	Oct 26, 2010 1:36 PM	Yeah sure, why not.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 15: Do you belive the cheese plant activities have caused a positive impact for your property values?		
Answer Options	**Response Percent**	**Response Count**
Yes	51.5%	17
No	48.5%	16
Comments:		11
	answered question	33
	skipped question	10



Curry County - Cannon AFB Joint Land Use Study Survey

Question 16: Do you believe dairy farming activities have had a positive impact on your quality of life?

Answer Options	Response Percent	Response Count
Yes	60.6%	20
No	39.4%	13
Comments:		14
	answered question	33
	skipped question	10

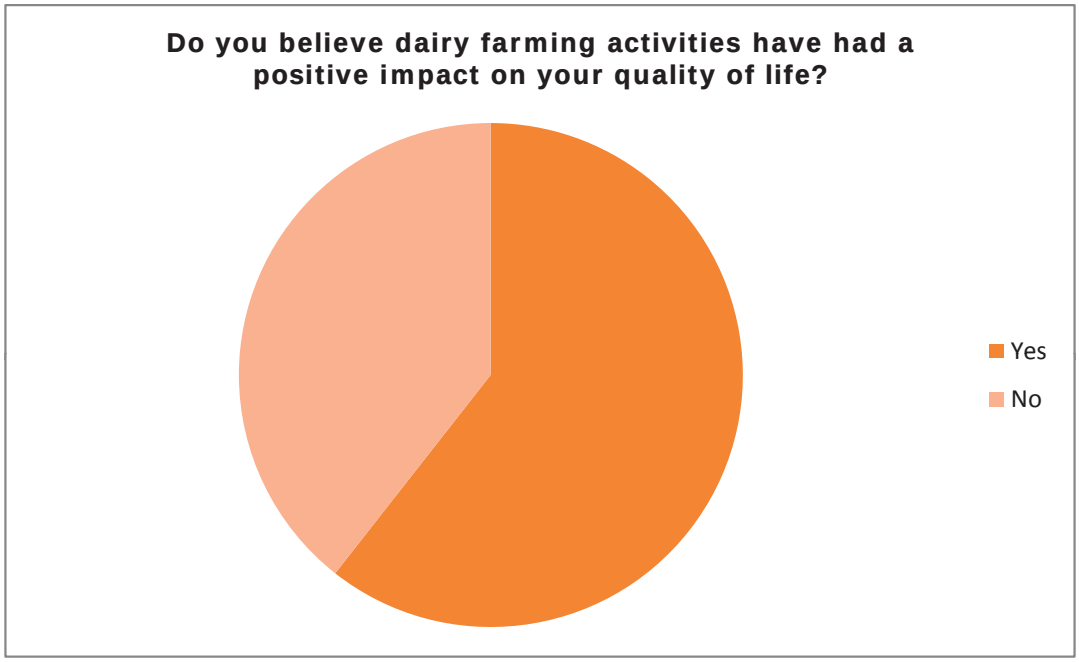
Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	rtretertre
2	Sep 26, 2010 5:18 PM	My families allergies are a constant problem. My wife may have to have surgery to help alleviate some of her symptoms. The constant odor and the flies are disgusting to have to deal with. I feel like an Ethiopian sometimes.
3	Sep 28, 2010 4:59 PM	The have created more jobs & revenue
4	Oct 8, 2010 4:56 PM	Negative impact - odor, insects, pollution, contamination, and water table depletion.
5	Oct 8, 2010 5:07 PM	I don't think dairies have hurt quality of life for me so far, but available water could be an issue later. They probably increase value of land good for dairies.
6	Oct 8, 2010 5:14 PM	Not sure.
7	Oct 8, 2010 5:28 PM	This business has been beneficial to the local community through money, jobs, and donations. This industry has been hurting due to the low price of milk. This industry has had to cut back, effecting the economic atmosphere, due to a decrease in spending.
8	Oct 8, 2010 6:22 PM	Both. It has kept some monies local yet, many of the monies are spent out of our community and the air and water issues are a concern.
9	Oct 8, 2010 7:09 PM	Water usage is excessive and the economic cost is very high, including the order and fly issues.
10	Oct 8, 2010 9:20 PM	All country living have a positive impact with dairy's.
11	Oct 8, 2010 9:32 PM	I don't think I have seen any positive impacts from the dairies.
12	Oct 8, 2010 9:45 PM	More in our community. Churches and schools.
13	Oct 8, 2010 10:12 PM	More jobs.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 16: Do you believe dairy farming activities have had a positive impact on your quality of life?

Answer Options	Response Percent	Response Count
Yes	60.6%	20
No	39.4%	13
Comments:		14
	answered question	33
	skipped question	10

14	Oct 26, 2010 1:36 PM	Not alot of employment. A heck of alot of air pollution, and too much water usage. I am in the process of selling and moving on the recommendations of the medical community because of the negative impact on my wifes health. The air is just too dangerous.



Curry County - Cannon AFB Joint Land Use Study Survey

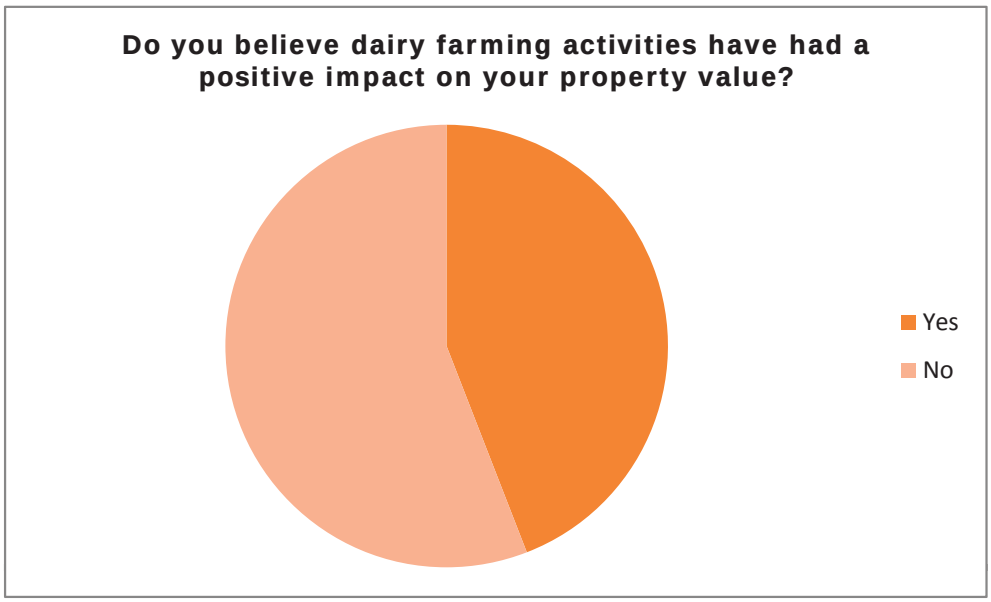
Question 17: Do you believe dairy farming activities have had a positive impact on your property value?

Answer Options	Response Percent	Response Count
Yes	44.1%	15
No	55.9%	19
Comments:		15
	answered question	34
	skipped question	9

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	tretretre
2	Sep 28, 2010 4:59 PM	Since they are located all around Clovis, they have pretty much affected all property values.
3	Oct 8, 2010 4:56 PM	Dairy farming would have a positive impact only if the dairies were prohibited.
4	Oct 8, 2010 5:07 PM	I don't think dairies have hurt quality of life for me so far, but available water could be an issue later. They probably increase value of land good for dairies.
5	Oct 8, 2010 5:14 PM	Not sure.
6	Oct 8, 2010 5:28 PM	Many owners and employees of the dairy industry have bought homes in this area.
7	Oct 8, 2010 6:22 PM	I live in town.
8	Oct 8, 2010 7:09 PM	As above.
9	Oct 8, 2010 9:20 PM	My property is not affected.
10	Oct 8, 2010 9:28 PM	And I live 1 mile from dairy!
11	Oct 8, 2010 9:32 PM	The smell turns a lot of people off. Even if it is the smell of money, it is not my money or my neighbors'.
12	Oct 8, 2010 9:45 PM	More workers buying homes, keeps property values from dropping.
13	Oct 8, 2010 10:12 PM	These farmers want land and cattle.
14	Oct 8, 2010 10:15 PM	Unsure.
15	Oct 26, 2010 1:36 PM	That part is a no brainer. Wages on these farms have historically been not so high. Whether they want to admit it or not, the hiring of illegals is still a problem with this industry and until this situation is eliminated, the farmers just do not care.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 17: Do you believe dairy farming activities have had a positive impact on your property value?		
Answer Options	**Response Percent**	**Response Count**
Yes	44.1%	15
No	55.9%	19
Comments:		15
	answered question	34
	skipped question	9



Curry County - Cannon AFB Joint Land Use Study Survey

Question 18: Do you believe renewable resources such as wind and solar energy are vital to Curry and Roosevelt counties?

Answer Options	Response Percent	Response Count
Only Curry County	2.8%	1
Only Roosevelt County	0.0%	0
Both	77.8%	28
Neither	19.4%	7
Comments:		15
	answered question	36
	skipped question	7

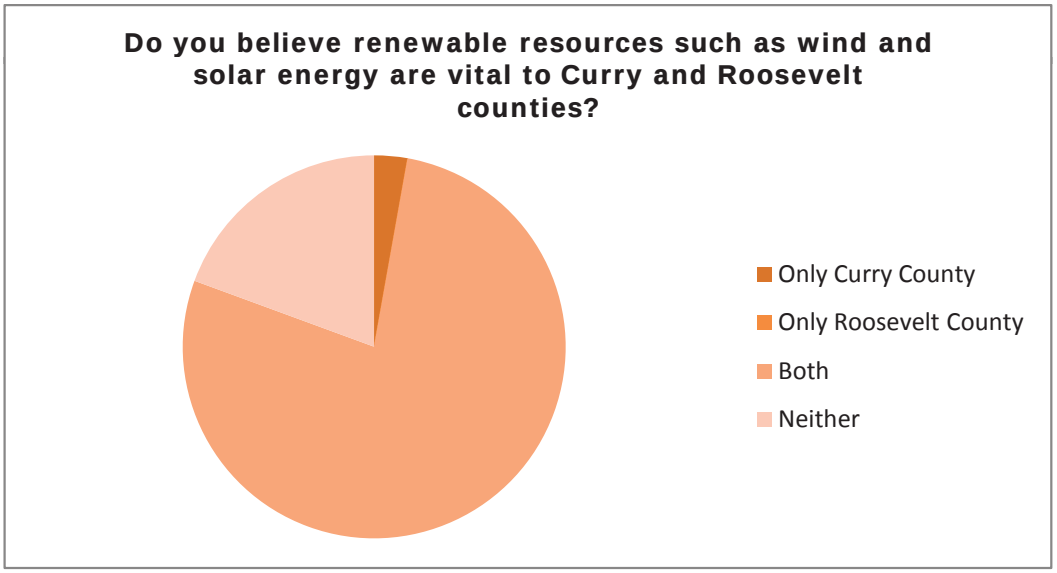
Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	tretretre
2	Sep 9, 2010 3:16 PM	There isn't enough land in both counties to build enough solar plants or wind generators to supply either county with a reliable source of electricity. Only a coal, gas or nuclear generating plant would be able to keep up with the growth of both counties and their largest towns.
3	Sep 26, 2010 5:18 PM	Define vital. In regards to renewables this community has an "if you build it they will come" attitude, but doesn't do anything to create an infrastructure to support it. Any jobs it creates will mostly be out of the area when instead we should be focusing on programs at CCC and ENMU that will help to generate local jobs. I also see wind energy as being in conflict with the mission at Cannon AFB.
4	Sep 28, 2010 4:59 PM	The need for new sources of energy in both counties is important for for costs down.
5	Oct 8, 2010 4:56 PM	Energy diversity is always a winner.
6	Oct 8, 2010 5:07 PM	I don't believe it's vital, but I believe it could be beneficial.
7	Oct 8, 2010 5:28 PM	I think the renewable energy industry is an important part of energy industry, but I also think that our current producers of energy will remain the most important part of this industry.
8	Oct 8, 2010 6:22 PM	Both are renewable and don't deplete any commodity we need to be careful of using up.
9	Oct 8, 2010 7:09 PM	Wind and solar are very costly energy systems. Cost in energy to build exceeds other forms by many times per kilowatt.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 18: Do you believe renewable resources such as wind and solar energy are vital to Curry and Roosevelt counties?

Answer Options	Response Percent	Response Count
Only Curry County	2.8%	1
Only Roosevelt County	0.0%	0
Both	77.8%	28
Neither	19.4%	7
Comments:		15
	answered question	36
	skipped question	7

10	Oct 8, 2010 9:20 PM	Don't have the infrastructure to maintain either. Within the county, traveled power is vital to an extent.
11	Oct 8, 2010 9:45 PM	We have wind, we can use.
12	Oct 8, 2010 10:12 PM	Natural resources is what this country needs and we have great land access to use wind energy.
13	Oct 8, 2010 10:19 PM	They are good, but not really vital.
14	Oct 8, 2010 10:22 PM	Cannot hurt.
15	Oct 26, 2010 1:36 PM	Our future may rely on these industries, bring em on, they will not only be an exprience, but one hell of an asset to all of us.



Curry County - Cannon AFB Joint Land Use Study Survey

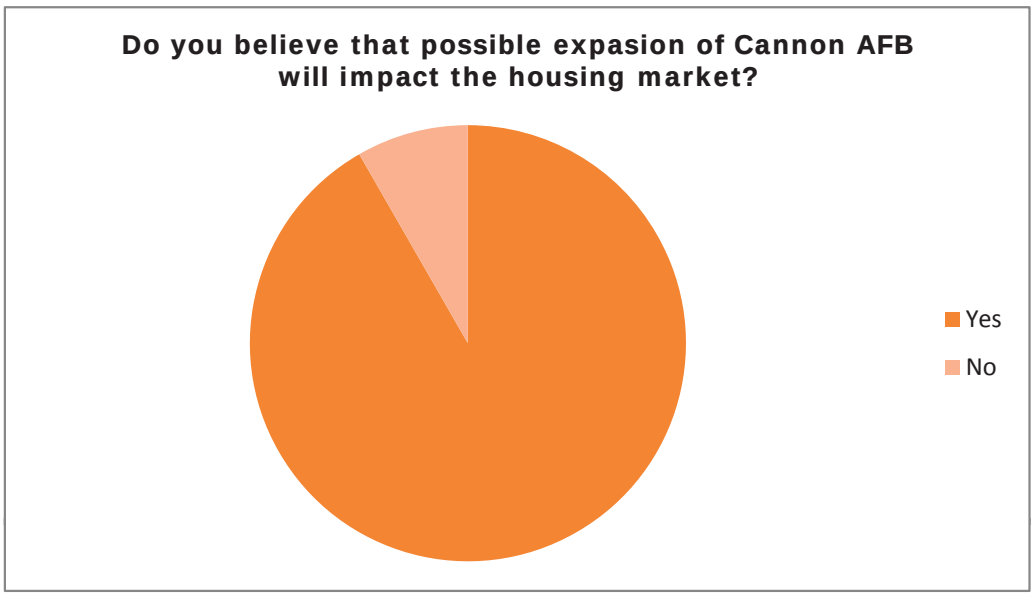
Question 19: Do you believe that possible expasion of Cannon AFB will impact the housing market?

Answer Options	Response Percent	Response Count
Yes	91.7%	33
No	8.3%	3
Please explain:		15
	answered question	36
	skipped question	7

Number	Response Date	Please explain:
1	May 5, 2010 1:28 PM	tretretre
2	Sep 9, 2010 3:27 PM	More people means more affordable housing will be needed. Now all you city leaders need to do is talk to all the slumlords in the area and convince them to fix up the places they own and rent them to military families for a reasonable price. I know airmen that rent in Melrose, even Fort Sumner, because the cost of housing in Clovis and Portales is so high.
3	Sep 26, 2010 12:49 AM	what housing market? there is already a shortage of livable housing.
4	Sep 26, 2010 5:26 PM	It already is. How about some apartments? Duplexes? Townhomes?
5	Sep 28, 2010 5:03 PM	The more people that come in will mean more housing needs.
6	Oct 8, 2010 5:08 PM	There will surely be an increase in demand, so maybe in prices, as long as people can afford it.
7	Oct 8, 2010 5:11 PM	Positively.
8	Oct 8, 2010 5:14 PM	At first.
9	Oct 8, 2010 5:30 PM	More personnel - more houses, rentals will be needed.
10	Oct 8, 2010 6:24 PM	More families want to live downtown than in base housing. It gives them the opportunity to buy a home and be a part of the community.
11	Oct 8, 2010 6:28 PM	Positively.
12	Oct 8, 2010 7:11 PM	Somewhat as the cost of housing in Clovis is very high for the area. So if it keeps going up, it will impact the ability of military to live here.
13	Oct 8, 2010 9:46 PM	More people, more buyers.
14	Oct 8, 2010 10:12 PM	Clovis doesn't have the housing to support expansion.
15	Oct 26, 2010 1:50 PM	Another no brainer. More personnel, more housing.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 19: Do you believe that possible expasion of Cannon AFB will impact the housing market?		
Answer Options	**Response Percent**	**Response Count**
Yes	91.7%	33
No	8.3%	3
Please explain:		15
	answered question	36
	skipped question	7



Curry County - Cannon AFB Joint Land Use Study Survey

Question 20: Are you concerned that expasion or changes at Cannon AFB will affect future commercial airline services to the Clovis Municipal Airport?		
Answer Options	**Response Percent**	**Response Count**
Greatly concerned	2.8%	1
Somewhat concerned	11.1%	4
Not concerned	86.1%	31
Please explain:		17
	answered question	36
	skipped question	7

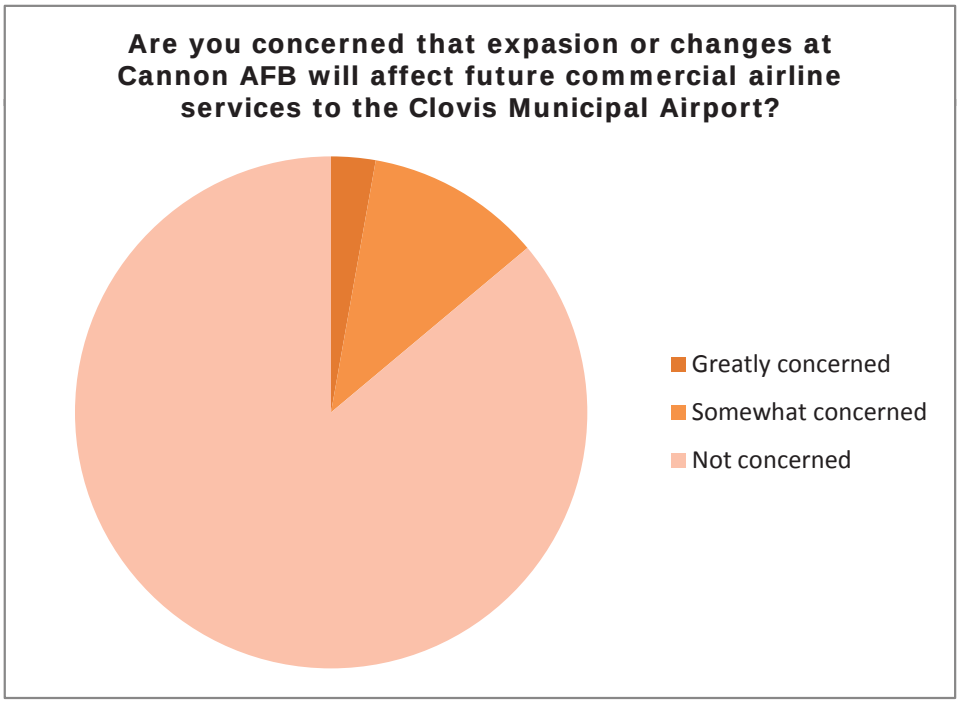
Number	Response Date	Please explain:
1	May 5, 2010 1:28 PM	retretret
2	Sep 7, 2010 9:37 PM	It would be great to have more flights out of Clovis Municipal
3	Sep 9, 2010 3:27 PM	I don't fly.
4	Sep 26, 2010 5:26 PM	What commercial airline services? If there were a real industry here I might be, but what little is at Clovis International doesn't come anywhere close to having enough traffic to interfere with Cannon, or vice versa.
5	Sep 28, 2010 4:31 PM	If CAFB brings about a need for commercial airline services to Clovis, it would be a positive thing for all.
6	Sep 28, 2010 5:03 PM	I would hope it would increase the need for an airline because of people flying back and forth to their hometowns and other bases.
7	Oct 8, 2010 5:08 PM	I don't think there's much air traffic to those airports. Surely we can work around it.
8	Oct 8, 2010 5:11 PM	All effects should be positive.
9	Oct 8, 2010 5:30 PM	I think the expansion of Cannon will help increase the commercial airline service to Clovis. Example: The increasing of the length of the runway at our airport. Also, more people, more customers for the commercial business. I think it should benefit the private service.
10	Oct 8, 2010 5:55 PM	If having CAFB brings an eastbound flight that would be great.
11	Oct 8, 2010 6:24 PM	In a positive note, it could help expand our airline service which in turn would help the economy.
12	Oct 8, 2010 9:29 PM	Affect for better.
13	Oct 8, 2010 9:32 PM	I hope we have expanded services!
14	Oct 8, 2010 9:46 PM	If anything it will help the airport grow with partnership with CAFB.
15	Oct 8, 2010 10:20 PM	If it does, I don't really care.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 20: Are you concerned that expasion or changes at Cannon AFB will affect future commercial airline services to the Clovis Municipal Airport?

Answer Options	Response Percent	Response Count
Greatly concerned	2.8%	1
Somewhat concerned	11.1%	4
Not concerned	86.1%	31
Please explain:		17
	answered question	36
	skipped question	7

16	Oct 26, 2010 1:50 PM	From what I understand, not that many people utilize this service, and the only way that this will become a situation is if our base personnel decide to use it more often. And if that happens, just like any thing else, we can deal with it, grants and bonds are available that will address the need.
17	Oct 27, 2010 1:12 PM	It will increase the availability of airline service to the Clovis Muniucipal Airport which not only can be used by Cannon people but by all of the community memebers.



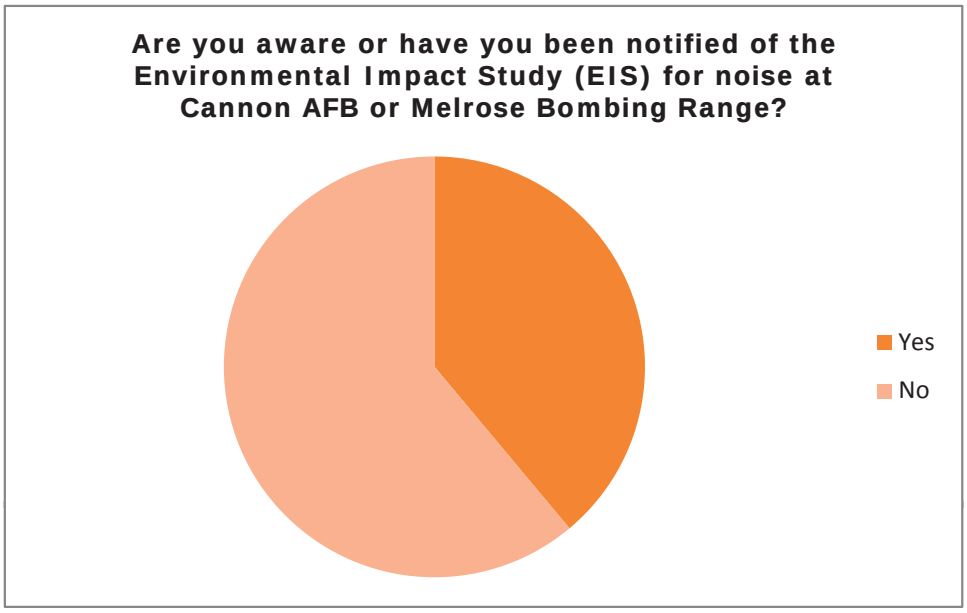
Curry County - Cannon AFB Joint Land Use Study Survey

Question 21: Are you aware or have you been notified of the Environmental Impact Study (EIS) for noise at Cannon AFB or Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Yes	38.9%	14
No	61.1%	22
Comments:		8
	answered question	36
	skipped question	7

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	tertret
2	Sep 9, 2010 3:27 PM	It's an Airforce Base! Of course there will be noise, they do fly big old things called jet planes in and out of the base don't they? I am positive you would not like what I have to say about any kind of EPA study so I will leave it at that.
3	Sep 26, 2010 5:26 PM	Yes, and yet there are still noise complaints.
4	Sep 28, 2010 5:03 PM	No Comment
5	Oct 8, 2010 7:11 PM	And that is a given in this day and age. We study everything.
6	Oct 8, 2010 9:46 PM	Have not been notified.
7	Oct 8, 2010 10:23 PM	Great sound to me, called freedom and protection - love that sound.
8	Oct 26, 2010 1:50 PM	I do not interest myself in a matter that my fellow citizens never talk about. It's a study that only concerns individuals that see the all mighty dollar going into their pockets with its results.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 21: Are you aware or have you been notified of the Environmental Impact Study (EIS) for noise at Cannon AFB or Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Yes	38.9%	14
No	61.1%	22
Comments:		8
	answered question	36
	skipped question	7

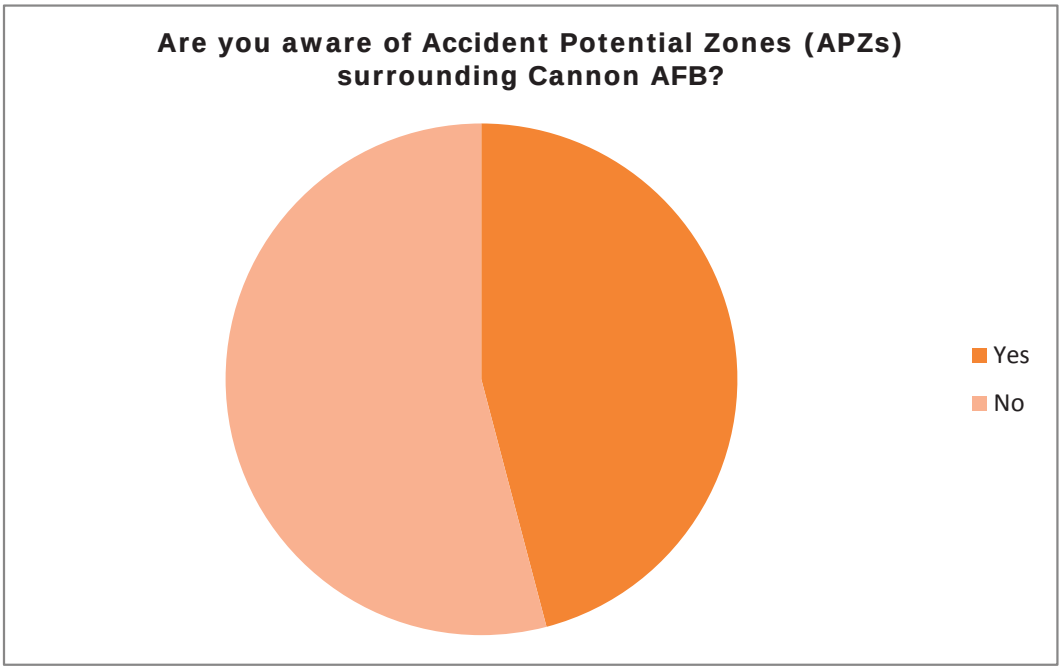


Curry County - Cannon AFB Joint Land Use Study Survey

Question 22: Are you aware of Accident Potential Zones (APZs) surrounding Cannon AFB?

Answer Options	Response Percent	Response Count
Yes	45.9%	17
No	54.1%	20
Comments:		7
	answered question	37
	skipped question	6

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	rtretret
2	Sep 4, 2010 4:21 AM	Why have we been informed on this?
3	Sep 26, 2010 5:26 PM	I think this should be better advertised to give people a better understanding. Posting signs where roads approach it might help.
4	Sep 28, 2010 5:03 PM	No comment
5	Oct 8, 2010 6:28 PM	Limited knowledge.
6	Oct 8, 2010 9:46 PM	Not been informed.
7	Oct 26, 2010 1:50 PM	And as an 100% disabled American Vet, I frequent the base. I should be aware, but, not being aware is a problem with me not questioning, not a problem with the system making the info available.



Curry County - Cannon AFB Joint Land Use Study Survey

Question 23: Where do you see current and future land use conflicts occuring around Cannon AFB and Melrose Bombing Range?

Answer Options	Response Count
	27
answered question	27
skipped question	16

Number	Response Date	Response Text
1	May 5, 2010 1:28 PM	ertre
2	Sep 4, 2010 4:21 AM	Closing Curry Road R, Wind and Cell towers and the County needs to adopt zoning or a land use ordinance.
3	Sep 7, 2010 9:37 PM	Along border roads at Cannon AFB and with Melrose
4	Sep 9, 2010 3:27 PM	No conflicts I can see. Melrose, Fort Sumner, Grady, House, Floyd, all the surrounding communities are slowly dying due to lack of economic development. Within another twenty years there will be even fewer people in the surrounding area so there should be no conflict.
5	Sep 26, 2010 5:26 PM	I see encroachment becomming an issue. Discussions about wind energy will become a problem for operations around the base. Base expansion has been a problem and it doesn't appear to be slowing down any time soon. Infrastructure, housing, schools etc. are not being expanded to match.
6	Sep 28, 2010 4:31 PM	If zoning is not imposed new construction could encroach on needed space for the base or be in conflict.
7	Sep 28, 2010 5:03 PM	Not familiar enough to comment
8	Oct 6, 2010 5:52 PM	Adjacent to federal lands
9	Oct 8, 2010 4:34 AM	Range expansion
10	Oct 8, 2010 4:56 PM	We asked for CAFB to remain open - give them the land and access they need; otherwise we will face the BRAC again.
11	Oct 8, 2010 5:08 PM	I suppose air space could be an issue, but solutions can be found.
12	Oct 8, 2010 5:14 PM	Farm to market routes.
13	Oct 8, 2010 5:17 PM	To keep the base open during BRAC, the land owners around the base said they would give or sell to the base.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 23: Where do you see current and future land use conflicts occuring around Cannon AFB and Melrose Bombing Range?

Answer Options		Response Count
		27
	answered question	27
	skipped question	16
14	Oct 8, 2010 5:30 PM	County Road R is upsetting some individuals. From what I have seen at other bases, there will be a need to keep the immediate area around Cannon from being developed, such as housing/subdivisions, etc. There is a need for this, but it also could effect the value of the surrounding private land in a negative effect.
15	Oct 8, 2010 5:55 PM	If there is no zoning in the county, businesses could construct more property next to the base which will conflict with the mission and potential growth.
16	Oct 8, 2010 6:24 PM	Only with the farming community!
17	Oct 8, 2010 7:11 PM	Only if those around the facilities don't want the base and then they will create an issue ... it is mostly worthless land.
18	Oct 8, 2010 9:21 PM	CR R Travel concerns and personal concerns. My property.
19	Oct 8, 2010 9:23 PM	Loss of quality of life.
20	Oct 8, 2010 9:29 PM	Duh! I'm seeing it at this meeting.
21	Oct 8, 2010 9:46 PM	Property owners just west of flight line!
22	Oct 8, 2010 10:12 PM	The flight paths.
23	Oct 8, 2010 10:20 PM	Possibly similar conflicts as Comet
24	Oct 8, 2010 10:23 PM	None.
25	Oct 26, 2010 1:50 PM	Security will become a great big issue. The more complex the special ops training, the more land must be utilized. I was a crypto top secret comm specialist in Germany, and security demands, not only land, but air, and communication waves must have an intense control by our base leaders. The importance of these controls is immeasurable.
26	Oct 27, 2010 1:12 PM	Areas contingent to the base if the base needs that land for expansion or security.
27	Nov 1, 2010 9:50 PM	I see conflicts with the landowners over possible holdouts

Curry County - Cannon AFB Joint Land Use Study Survey

Question 24: Would land use regulations be effective in reducing land use conflicts between military operations and the surrounding communities?

Answer Options	Response Percent	Response Count
Yes	62.5%	20
No	37.5%	12
Comments:		17
	answered question	32
	skipped question	11

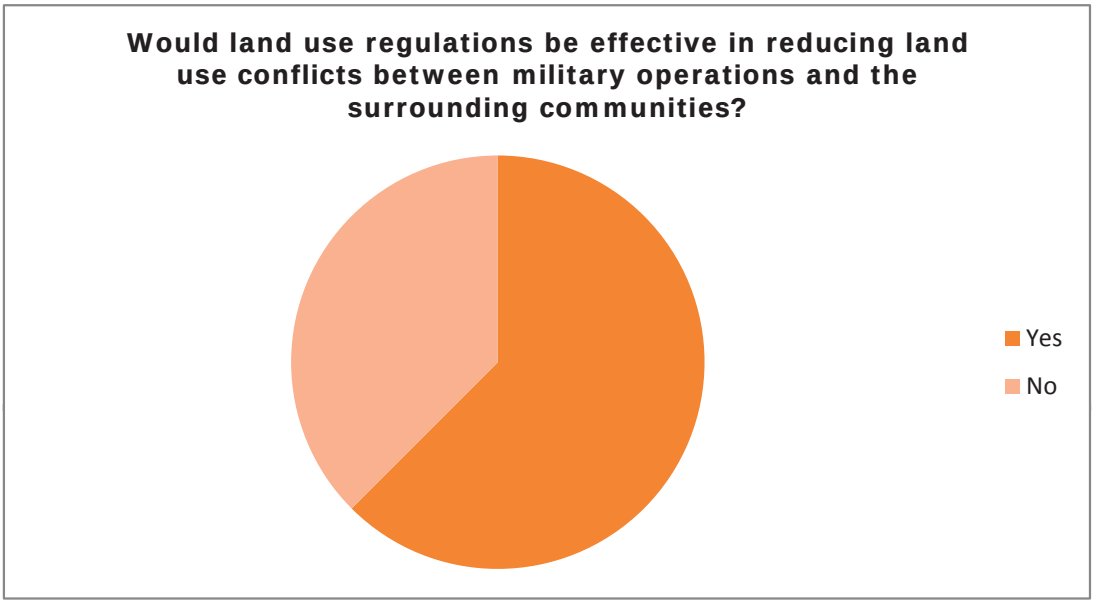
Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	tretrete
2	Sep 4, 2010 4:23 AM	Good Luck - The County Commissioners will never adopt them.
3	Sep 9, 2010 3:40 PM	All such regulations would do is line the pockets of a few lawyers.
4	Sep 26, 2010 5:33 PM	Zoning (and enforcing it)has always been a problem here. Use of zoning regulations may be effective to help forestall land use conflicts before they arrise. I dont like that houses and buildings can be built right up against the base without any consideration to base operations.
5	Sep 28, 2010 5:07 PM	Yes, if everyone knows what to expect they don't seem to be as upset when something comes up.
6	Oct 8, 2010 4:36 AM	Private property rights will prevail.
7	Oct 8, 2010 5:01 PM	Don't know
8	Oct 8, 2010 5:09 PM	Everyone wold know what was allowed and what to expect in advance, so there would be less opportunity for conflict.
9	Oct 8, 2010 5:32 PM	My answer is explained in #23. Regulations could help stop future conflicts concerning flight lanes, but some land owners will always be upset with regulations which would control how their land could be used, decreasing the value of their land or the possibility of that happening.
10	Oct 8, 2010 6:25 PM	I don't know.
11	Oct 8, 2010 7:26 PM	Do regulations really work? NO!
12	Oct 8, 2010 9:29 PM	Duh!
13	Oct 8, 2010 9:47 PM	Everyone needs to know the rules so we all know how to play!
14	Oct 8, 2010 10:20 PM	Not sure
15	Oct 8, 2010 10:24 PM	Only if Cannon needs it - they should control.
16	Oct 26, 2010 2:07 PM	The regulatory part of our government will have to be brought in and most importantly, it must be enforced. Without the land, the regs will protect the integrity of mission training. Make them very strict, and enforce.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 24: Would land use regulations be effective in reducing land use conflicts between military operations and the surrounding communities?

Answer Options	Response Percent	Response Count
Yes	62.5%	20
No	37.5%	12
Comments:		17
	answered question	32
	skipped question	11

17	Oct 27, 2010 1:15 PM	I think ther needs to be the option of land use by the Air Force if it is essentila to the mission. If land use regulations prevented that then you risk the loss of the base.



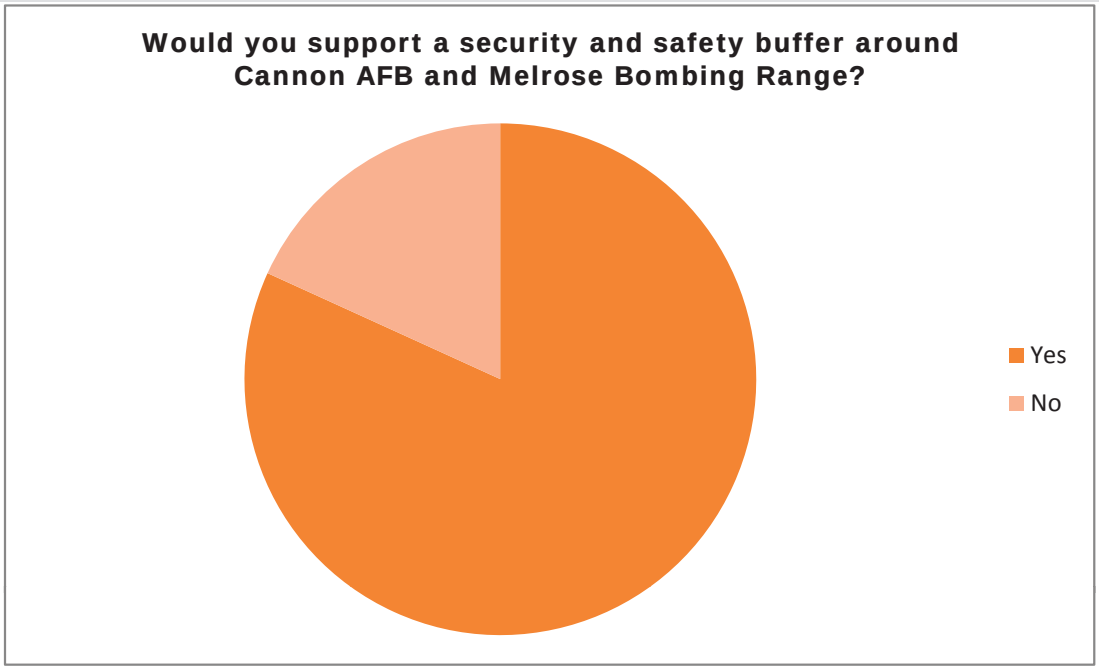
Curry County - Cannon AFB Joint Land Use Study Survey

Question 25: Would you support a security and safety buffer around Cannon AFB and Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Yes	81.8%	27
No	18.2%	6
Comments:		14
	answered question	33
	skipped question	10

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	ertretret
2	Sep 9, 2010 3:40 PM	The land belongs to the rightfull owners. If the Airforce wants it for a security or buffer zone they can buy it. If the rancher or farmer does not want to sell, tough.
3	Sep 26, 2010 5:33 PM	Absolutely.
4	Sep 28, 2010 5:07 PM	Don't know enough about it to say yes or no.
5	Oct 8, 2010 4:57 PM	Give CAFB what they need.
6	Oct 8, 2010 5:01 PM	Not familiar with this
7	Oct 8, 2010 5:09 PM	If base personnel or community leaders feel it's needed, it would be a good step just to make sure there is safety.
8	Oct 8, 2010 5:55 PM	This is needed to protect area residents and military personnel.
9	Oct 8, 2010 6:25 PM	Anything for safety is a good move.
10	Oct 8, 2010 7:26 PM	Yes if the mission is to be able to accomplish their training.
11	Oct 8, 2010 9:47 PM	Need to secure the higher level of security at CAFB.
12	Oct 8, 2010 10:16 PM	Unsure at this time.
13	Oct 8, 2010 10:20 PM	?
14	Oct 26, 2010 2:07 PM	No brainer, security for this country is the reason for the operation, therefore this community must relinquish what is needed. As long as the leaders on base do not go crazy, go for it. I remember being escorted to an area that was prohibited to "all" personnel without at least my level of clearance. And the area was miles away from our assigned base. We had to do it and it was done. At least, our base is not constantly patroled by armed personnel.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 25: Would you support a security and safety buffer around Cannon AFB and Melrose Bombing Range?		
Answer Options	**Response Percent**	**Response Count**
Yes	81.8%	27
No	18.2%	6
Comments:		14
	answered question	33
	skipped question	10



Curry County - Cannon AFB Joint Land Use Study Survey

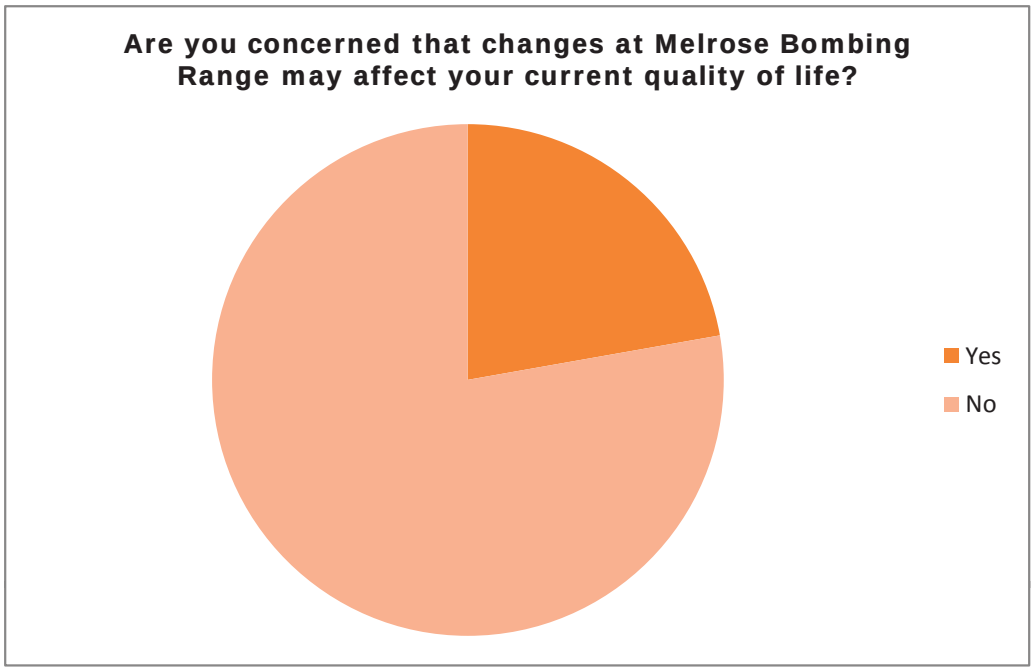
Question 26: Are you concerned that changes at Melrose Bombing Range may affect your current quality of life?

Answer Options	Response Percent	Response Count
Yes	22.2%	8
No	77.8%	28
Comments:		12
	answered question	36
	skipped question	7

Number	Response Date	Comments:
1	May 5, 2010 1:28 PM	retretret
2	Sep 26, 2010 5:33 PM	I wish they would expand operations at Melrose. I love hearing them over head.
3	Sep 28, 2010 5:07 PM	Somewhat concerned. I'm satified with my life in Clovis. To much growth to fast concerns me.
4	Oct 8, 2010 4:36 AM	I want to know WHERE it is going to be expanded?
5	Oct 8, 2010 5:14 PM	Somewhat concerned.
6	Oct 8, 2010 5:32 PM	I think it is a needed part of Special Ops.
7	Oct 8, 2010 6:25 PM	I don't see how it would.
8	Oct 8, 2010 9:24 PM	Very concerned.
9	Oct 8, 2010 9:26 PM	Depends on what you mean by change.
10	Oct 8, 2010 10:16 PM	Somewhat.
11	Oct 8, 2010 10:20 PM	Somewhat
12	Oct 26, 2010 2:07 PM	Our leaders should not let this happen, todays technological way of war shouldn't have any impact on our quality of life. Smart bombs, shoulder weapon technology, drone technology is getting more sophisticated day by day. Bases have studies that will limity negative affects on our "quality of life".

Curry County - Cannon AFB Joint Land Use Study Survey

Question 26: Are you concerned that changes at Melrose Bombing Range may affect your current quality of life?		
Answer Options	**Response Percent**	**Response Count**
Yes	22.2%	8
No	77.8%	28
Comments:		12
	answered question	36
	skipped question	7



Curry County - Cannon AFB Joint Land Use Study Survey

Question 27: What are three main issues with regards to Cannon AFB and Melrose Bombing Range and surrounding communities that the Joint Land Use Study should address? Please Explain:

Answer Options	Response Count
	27
answered question	27
skipped question	16

Number	Response Date	Response Text
1	May 5, 2010 1:28 PM	ertret
2	Sep 4, 2010 4:23 AM	Cell and Wind Towers, Issues with Curry Road R, and the County needs to develop land use ordinances.
3	Sep 7, 2010 9:47 PM	Creation of buffer zones, enable growth of the area and the base by investing in shared infrastructure and future base expansion concerns
4	Sep 9, 2010 3:40 PM	Instead of worrying about "land use", something that has been going on for over 50 years now without too many complaints, I would think Curry County and the base would be working on: Affordable housing for Airforce personnel. Good, paved roads to the surrounding communities to give them an economic boost and the airmen more choices of where to live. Looking to the future with positive, realistic energy solutions to insure a plentiful supply of electricity and water for future growth. Those are the three things I would be looking at.
5	Sep 17, 2010 3:21 PM	TRAFFIC HOUSING AND LOUD NOISE
6	Sep 26, 2010 5:33 PM	Encroachment & zoning Housing Shutting down CR-R
7	Sep 28, 2010 4:34 PM	zoning, closing of County Road R or alternate solution to provide security for CAFB.
8	Sep 28, 2010 5:07 PM	Housing Curry Rd R Railroad Noise at base
9	Oct 8, 2010 4:57 PM	1. Support the land needs of CAFB. 2. Support current and future missions. 3. Follow CAFB recommendations.
10	Oct 8, 2010 5:01 PM	Does not impact me where I live.
11	Oct 8, 2010 5:12 PM	1. Prevention of encroachment. 2. Community quality of life. 3. Housing.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 27: What are three main issues with regards to Cannon AFB and Melrose Bombing Range and surrounding communities that the Joint Land Use Study should address? Please Explain:

Answer Options		Response Count
		27
	answered question	27
	skipped question	16
12	Oct 8, 2010 5:14 PM	1. Water 2. Impact on agriculture 3. Roads
13	Oct 8, 2010 5:17 PM	1. Lack of housing for a growing base. 2. Cost of housing in community.
14	Oct 8, 2010 5:32 PM	I cannot think of anything else. I think I stated my concerns on #14 where I added an increase need of transportation/road projects.
15	Oct 8, 2010 5:55 PM	1. Zoning around CAFB. 2. Zoning in Curry County.
16	Oct 8, 2010 6:25 PM	1. What areas will be directly affected? 2. What long term affect will it have on the land used for the bombing range? 3. How beneficial will it be to have the bombing range where it is for the planes using it as compared to any other area?
17	Oct 8, 2010 7:26 PM	1,2&3. Cleanring the space for the military to do their job - the real main issue the military has everywhere is "NO IN MY BACKYARD"!
18	Oct 8, 2010 9:21 PM	CR-R Closure
19	Oct 8, 2010 9:24 PM	Don't overreact to please every whim of the base.
20	Oct 8, 2010 9:29 PM	Make peace!
21	Oct 8, 2010 9:47 PM	1. Needs 2. Security 3. Airspace
22	Oct 8, 2010 9:49 PM	Private property rights.
23	Oct 8, 2010 10:13 PM	1. Unable to use wind turbines in the future. 2. Closing of important paved roads (CR-R). 3. Paving a new road to replace CR R.
24	Oct 8, 2010 10:24 PM	None.

Curry County - Cannon AFB Joint Land Use Study Survey

Question 27: What are three main issues with regards to Cannon AFB and Melrose Bombing Range and surrounding communities that the Joint Land Use Study should address? Please Explain:		
Answer Options		**Response Count**
		27
	answered question	**27**
	skipped question	**16**
25	**Oct 26, 2010 2:07 PM**	1 Security for the training elements on base. 2 Availble affordable housing, shopping, utility and water resources and one thing that all are failing to address is the, "recreational concerns", for the families on base. It is a reief to look forward to get off base and take the family out for a fun evening or fun day in your community off base. 3. More communities/base interaction, it will bring all of us closer, and it will allow us the time to communicate. Listen to more than the shifty fifty, we all have ideas on having a safe and good time. Planning committees on annual events are needed, figure out a way to make the base personnel proud of us and us even more proud of them.
26	**Oct 27, 2010 1:15 PM**	Housing, housing, housing
27	**Nov 1, 2010 9:50 PM**	1. relations with the community 2. integrating airment with the community 3. safety issues

Existing Clear Zone Documents

See the following pages.

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 1

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
CANNON AIR FORCE BASE	LEWTER CATTLE COMPANY LEWTER JAMES T	1 382	2558	07/17/1997	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 91-1 & 94-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 37.3114 ACRES SECTION-08 TOWNSHIP-02N RANGE-35E PT 15.4124 ACRES
CANNON AIR FORCE BASE	LEWTER CATTLE COMPANY LEWTER JAMES T	1 382	2562	07/17/1997	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 94-2 SECTION-08 TOWNSHIP-02N RANGE-35E PT 109.6992 ACRES
CANNON AIR FORCE BASE	CLOVIS FEED YARDS INC LEWTER JAMES T	1 382	2566	07/17/1997	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 93-2 SECTION-08 TOWNSHIP-02N RANGE-35E PT 31.5387 ACRES
CANNON AIR FORCE BASE	CLOVIS FEED YARDS INC LEWTER JAMED T	1 382	2570	07/17/1997	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 90-1B & 93-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 17.2895 ACRES SECTION-08 TOWNSHIP-02N RANGE-35E PT 82.7964 ACRES
CANNON AIR FORCE BASE	ALLRED WILLIAM DAVID	1 157	258	08/28/1996	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 25-2 SECTION-34 TOWNSHIP-02N RANGE-34E N/2N/2 TR 44.684 ACRES
CANNON AIR FORCE BASE	ROZZELL RUTH	1 143	557	05/17/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 24-2 TRACT 26-2 SECTION-35 TOWNSHIP-02N RANGE-34E PT 7.0462 ACRES SECTION-34 TOWNSHIP-02N RANGE-34E PT 211.2829 ACRES
CANNON AIR FORCE BASE	ADAMSON NANCY KATHLEEN CHAPMAN MARY BELLE ADAMSON	1 151	248	07/24/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 22-1 SECTION-35 TOWNSHIP-02N RANGE-34E PT 7.0825 ACRES
CANNON AIR FORCE BASE	ALVARADO PATRICIO ALVARADO RACHEL V	1 151	252	07/24/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 77-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 0.7472 ACRES
CANNON AIR FORCE BASE	ARMIJO EDWARD E ARMIJO BOB ARMIJO SHEILA ESTATE ARMIJO CECELIA ESTATE ARMIJO EUNICE B	1 404	2103	04/09/2001	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 70-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 2.7478 ACRES

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 2

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
CANNON AIR FORCE BASE	ASHLEY LAVELLE ASHLEY VERA M	1	148	800 03/06/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 64-1 SECTION-07 TOWNSHIP-02N RANGE-35E PT 4.3472 ACRES
CANNON AIR FORCE BASE	AT&SF RAILWAY COMPANY ATCHISON TOPEKA SANTA FE RAILWAY HAGBERG RUSSELL E	1	151	123 07/18/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 65-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 12.2081 ACRES
CANNON AIR FORCE BASE	AT&SF RAILWAY COMPANY ATCHISON TOPEKA SANTA FE RAILWAY HAGBERG RUSSELL E	1	151	119 07/18/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 53-1 SECTION-18 TOWNSHIP-02N RANGE-35E PT 2.1361 ACRES
CANNON AIR FORCE BASE	AT&SF RAILWAY COMPANY ATCHISON TOPEKA SANTA FE RAILWAY HAGBERG RUSSELL E	1	151	115 07/18/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 40-2 SECTION-10 TOWNSHIP-02N RANGE-34E PT 16.7947 ACRES
CANNON AIR FORCE BASE	BAILEY DUDLEY S	1	147	505 12/12/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 43-2 SECTION-10 TOWNSHIP-02N RANGE-34E PT 107.4119 ACRES
CANNON AIR FORCE BASE	BARNES TOMILOU A	1	143	471 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 96-2 SECTION-09 TOWNSHIP-02N RANGE-35E PT 5.8557 ACRES
CANNON AIR FORCE BASE	BARNETT K & SONS INC BARENTT WILLIAM D	1	386	1462 03/12/1998	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 38-2 SECTION-10 TOWNSHIP-02N RANGE-34E PT 34.2645 ACRES
CANNON AIR FORCE BASE	BLACKBURN FRANK H BLACKBURN MARCELLA	1	143	793 05/27/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 99-2 SECTION-09 TOWNSHIP-02N RANGE-35E PT 117.2234 ACRES
CANNON AIR FORCE BASE	BLACKBURN FRANK H BLACKBURN MARCELLA	1	143	797 05/27/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 102-2 SECTION-04 TOWNSHIP-02N RANGE-35E PT 193.9379 ACRES
CANNON AIR FORCE BASE	BLACKBURN FRANK H BLACKBURN MARCELLA	1	143	801 05/27/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 97-2 SECTION-09 TOWNSHIP-02N RANGE-35E PT 1.1324 ACRES

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 3

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
CANNON AIR FORCE BASE	BONNER DONALD R BONNER ANNA GUSTENIA	1	144	474 06/29/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 9-2 SECTION-05 TOWNSHIP-01N RANGE-35E PT 88.1777 ACRES
CANNON AIR FORCE BASE	BRADBURN GEORGE L BRADBURN ANITA LUCILLE	1	150	621 06/19/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 100-2 SECTION-09 TOWNSHIP-02N RANGE-35E PT 6.9707 ACRES
CANNON AIR FORCE BASE	BUNCE MARY JANE	1	148	618 02/23/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 80-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 0.0340 ACRES
CANNON AIR FORCE BASE	BURNSIDE ROBERT BURNSIDE DARLA KAY	1	143	459 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 88-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 0.5058 ACRES
CANNON AIR FORCE BASE	CARRASCO MATILDA	1	150	525 06/15/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 95-2 SECTION-08 TOWNSHIP-02N RANGE-35E PT 4.1321 ACRES
CANNON AIR FORCE BASE	CAVINESS FAMILY TRUST CAVINESS HERSCHEL	1	148	622 02/23/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 2-1 SECTION-30 TOWNSHIP-02N RANGE-35E PT 65.6671 ACRES
CANNON AIR FORCE BASE	CLEGG GEORGE L CLEGG GEORGE	1	152	568 10/12/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 90-1A SECTION-08 TOWNSHIP-02N RANGE-35E PT 8.5582 ACRES
CANNON AIR FORCE BASE	COUNTESS ENTERPRISES INC TOMLINSON ROBERT TOMLINSON MARY	1	152	777 11/01/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 59-1 SECTION-07 TOWNSHIP-02N RANGE-35E PT 0.2677 ACRES
CANNON AIR FORCE BASE	DEBUSK MONROE	1	148	692 02/28/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 60-1 & 62-1 & 63-1 SECTION-07 TOWNSHIP-02N RANGE-35E PT 0.6752 ACRES SECTION-07 TOWNSHIP-02N RANGE-35E PT 0.4173 ACRES SECTION-07 TOWNSHIP-02N RANGE-35E PT 0.0256 ACRES
CANNON AIR FORCE BASE	DEBUSK MONROE ELLISTON SAM	1	148	688 02/28/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 4

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
						TRACT 61-1 SECTION-07 TOWNSHIP-02N RANGE-35E PT 0.0058 ACRES
CANNON AIR FORCE BASE	DIXON BILLY J DIXON BILLIE JOHANNA	1	145	156 08/01/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 27-2 SECTION-03 TOWNSHIP-01N RANGE-34E PT 7.0314 ACRES
CANNON AIR FORCE BASE	DOBBINS VIOLET	1	148	445 02/09/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 84-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 2.5038 ACRES
CANNON AIR FORCE BASE	SNELL BERTHA A	1	149	374 04/03/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 35-1 SECTION-14 TOWNSHIP-02N RANGE-34E PT 332.2675 ACRES
CANNON AIR FORCE BASE	SNELL BERTHA A	1	149	382 04/03/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 35-2 SECTION-14 TOWNSHIP-02N RANGE-34E PT 36.1077 ACRES
CANNON AIR FORCE BASE	DOUANGCHAMPA KHAPHOUK DOUANGCHAMPA VANHNALY	1	143	505 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 76A-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 2.7692 ACRES
CANNON AIR FORCE BASE	SNELL BERTHA A	1	149	378 04/03/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 47-2 SECTION-11 TOWNSHIP-02N RANGE-34E PT 12.571 ACRES
CANNON AIR FORCE BASE	STICKLEY ROLLIE JR STICKLEY JOYCE J	1	143	501 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 98-2 SECTION-09 TOWNSHIP-02N RANGE-35E PT 4.0000 ACRES
CANNON AIR FORCE BASE	FIELDS JACK L DUNN ERNESTINE FIELDS GORDON T DALLAS EDITH FIELDS CHARLES N FIELDS BERTHA L ESTATE	1	147	411 12/06/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 4-1 SECTION-31 TOWNSHIP-02N RANGE-35E PT 87.6724 ACRES
CANNON AIR FORCE BASE	FAHSHOLTZ FRED C FAHSHOLTZ DELLA V	1	146	900 11/09/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 74-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 5.4801 ACRES

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 5

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
CANNON AIR FORCE BASE	GARCIA ALEX PAUL	1 146	751	11/01/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 75-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 9.1568 ACRES
CANNON AIR FORCE BASE	THOMPSON MARK R THOMPSON TONYA M	1 151	533	08/07/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 76-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 4.8843 ACRES
CANNON AIR FORCE BASE	GOODNIGHT PATRICIA TIMMONS BARBARA BOYDSTUN DONALD	1 150	589	06/19/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 8-2 SECTION-33 TOWNSHIP-02N RANGE-35E PT 25.1059 ACRES
CANNON AIR FORCE BASE	GRUBAGH MURIEL GRUBAGH ELSTON GRUBAUGH IMA JOE	1 143	479	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 5-1 SECTION-32 TOWNSHIP-02N RANGE-35E PT 149.3613 ACRES
CANNON AIR FORCE BASE	GRUBAGH MURIEL GRUBAGH ELSTON GRUBAUGH IMA JOE GRUBAUGH ELSTON	1 143	484	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 5-2 SECTION-32 TOWNSHIP-02N RANGE-35E PT 82.9389 ACRES
CANNON AIR FORCE BASE	GUTIERREZ JOSE A GUTIERREZ LORENE D	1 151	331	07/27/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 66-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 0.4077 ACRES
CANNON AIR FORCE BASE	HENRY JAMES A HENRY EVA	1 143	708	05/24/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 71-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 2.1088 ACRES
CANNON AIR FORCE BASE	HODGE JERRY HODGE CINDY	1 151	604	08/10/1995	EASEMENT	ZONE I AIR EASEMENT ACCIDENT POTENTIAL TRACT 78-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 1.6167 ACRES
CANNON AIR FORCE BASE	LAIRD OMA C	1 148	808	03/06/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 23-1 SECTION-35 TOWNSHIP-02N RANGE-34E PT 23.9762 ACRES
CANNON AIR FORCE BASE	LAIRD OMA C	1 148	804	03/06/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 23-2

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 6

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
						SECTION-35 TOWNSHIP-02N RANGE-34E PT 97.6835 ACRES
CANNON AIR FORCE BASE	VANNATTA CHARLES VANNATTA KAY	1 148	449	02/09/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 10-2 SECTION-04 TOWNSHIP-01N RANGE-35E PT 115.9152 ACRES
CANNON AIR FORCE BASE	LANEY S E LANEY JEWEL B	1 144	606	07/06/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 19-1 SECTION-26 TOWNSHIP-02N RANGE-34E PT 92.8601 ACRES
CANNON AIR FORCE BASE	VIGIL CLIFFORD E VIGIL FRANCES R	1 143	497	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 87-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 0.9058 ACRES
CANNON AIR FORCE BASE	WILKINS ANN WILKINS EDWARD W ESTATE	1 151	107	07/18/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 28-2 SECTION-03 TOWNSHIP-01N RANGE-34E PT 8.1831 ACRES
CANNON AIR FORCE BASE	WILLIS ARTHUR CARLON WILLIS ARTHUR C	1 143	463	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 46-2 SECTION-09 TOWNSHIP-02N RANGE-34E PT 0.4122 ACRES
CANNON AIR FORCE BASE	WILLIS LOLA IRENE WILLIS IRENE	1 143	467	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 42-2 SECTION-10 TOWNSHIP-02N RANGE-34E PT 73.3775 ACRES
CANNON AIR FORCE BASE	WILLMON FAMILY TRUST WILLMON W E WILLMON WILLIAM EARL	1 143	475	05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 3-1 SECTION-29 TOWNSHIP-02N RANGE-35E PT 25.0893 ACRES
CANNON AIR FORCE BASE	LEATHERS VIRGINIA JOHNSTON VIRGINIA L PACHECO ROBERT L	1 145	1	07/26/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 56-1 SECTION-18 TOWNSHIP-02N RANGE-35E PT 2.4709 ACRES
CANNON AIR FORCE BASE	WORRELL RAYMOND TRUST WORRELL JIMMIE D	1 146	712	10/31/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 101-2 SECTION-05 TOWNSHIP-02N RANGE-35E PT 7.2985 ACRES
CANNON AIR FORCE BASE	WRIGHT LAURINE C	1 144	279	06/20/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 36-1

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 7

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
						SECTION-15 TOWNSHIP-02N RANGE-34E PT 5.7985 ACRES
CANNON AIR FORCE BASE	WRIGHT LAURINE C	1	144	283 06/20/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 36-2 SECTION-15 TOWNSHIP-02N RANGE-34E PT 84.6711 ACRES
CANNON AIR FORCE BASE	LUBITZ VALERIE BUNCE LLOYD L ESTATE	1	143	489 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 79-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 0.7335 ACRES
CANNON AIR FORCE BASE	MAES LARRY	1	388	1437 07/01/1998	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 72-1 & 73-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 1.3484 ACRES SECTION-17 TOWNSHIP-02N RANGE-35E PT 2.5536 ACRES
CANNON AIR FORCE BASE	MARTINEZ FELIPE	1	156	939 08/14/1996	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 21-2 SECTION-27 TOWNSHIP-02N RANGE-34E PT 7.4128 ACRES
CANNON AIR FORCE BASE	MERRILL LESTER MERRILL ANITA C VANDERDUSSEN RANDY VANDERDUSSEN JENISE	1	152	446 10/05/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 104-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 18.7259 ACRES
CANNON AIR FORCE BASE	READ LAWSON	1	150	594 06/19/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 20-1 SECTION-26 TOWNSHIP-02N RANGE-34E PT 23.0627'
CANNON AIR FORCE BASE	READ LAWSON	1	150	598 06/19/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 20-2 SECTION-26 TOWNSHIP-02N RANGE-34E PT 13.7980 ACRES
CANNON AIR FORCE BASE	MONTAGUE D RAY MONTAGUE RONNIE D	1	148	288 01/31/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 44-2 & 45-2 SECTION-10 TOWNSHIP-02N RANGE-34E PT 75.8167 ACRES SECTION-09 TOWNSHIP-02N RANGE-34E PT 0.0710 ACRES
CANNON AIR FORCE BASE	MONTAGUE RONNIE D MONTAGUE DONNA L	1	148	876 03/10/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 37-2 SECTION-15 TOWNSHIP-02N RANGE-34E PT 0.3947 ACRES

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 8

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
CANNON AIR FORCE BASE	SANDOVAL OSCAR SANDOVAL MARGARETT A	1	143	493 05/13/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 85-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 1.8113 ACRES
CANNON AIR FORCE BASE	MITCHELL RONNIE G	1	145	444 08/19/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 33-1 SECTION-23 TOWNSHIP-02N RANGE-34E PT 6.2866 ACRES
CANNON AIR FORCE BASE	SANDOVAL OSCAR L SANDOVAL MARGARET A	1	150	765 06/28/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 86-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 1.3058 ACRES
CANNON AIR FORCE BASE	MOORE BILLY W JAYNE BERTA M MOORE FRED S	1	148	956 03/16/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 14-1 & 17-1 & 18-1 SECTION-25 TOWNSHIP-02N RANGE-34E PT 0.5437 ACRES SECTION-26 TOWNSHIP-02N RANGE-34E PT 69.6404 ACRES SECTION-26 TOWNSHIP-02N RANGE-34E PT 120.1018 ACRES
CANNON AIR FORCE BASE	PRIGDEN PHYLLIS JEAN	1	150	585 06/19/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 92-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 41.9366 ACRES
CANNON AIR FORCE BASE	SAYLOCK DAVID P SAYLOCK EILEEN M	1	146	869 11/07/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 83-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 8.5709 ACRES
CANNON AIR FORCE BASE	SCHAAP ARTHUR	1	145	436 08/19/1994	EASEMENT	AIR EASEMENT ADDIDENT POTENTIAL ZONE I TRACT 6-1 SECTION-32 TOWNSHIP-02N RANGE-35E PT 1.0312 ACRES
CANNON AIR FORCE BASE	SCHAPP ARTHUR	1	145	440 08/19/1994	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE II TRACT 6-2 SECTION-32 TOWNSHIP-02N RANGE-35E PT 169.0976 ACRES
CANNON AIR FORCE BASE	ENCHANTED FARMS WARE RANDY	1	156	710 07/31/1996	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 15-1 SECTION-25 TOWNSHIP-02N RANGE-35E PT 5.3635 ACRES
CANNON AIR FORCE BASE	BARNETT OIL COMPANY	1	151	355 07/27/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 67-1

DATE: 9/30/10 10:59:25 **CURRY COUNTY** PAGE: 9

GRANTEE	GRANTOR	BOOK	PAGE	DATE	INSTRUMENT	DESCRIPTION
						SECTION-17 TOWNSHIP-02N RANGE-35E PT 1.1024 ACRES
CANNON AIR FORCE BASE	DEATS LILLIE MAE HALLIDAY HARVEY W E JR HARVEY BEATRICE	1 387	2623	05/22/1998	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 89-1 SECTION-08 TOWNSHIP-02N RANGE-35E PT 0.1169 ACRES
CANNON AIR FORCE BASE	LASSITER CHARLES H LASSITER SHIRLEY A	1 151	348	07/27/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 68-1 SECTION-17 TOWNSHIP-02N RANGE-35E PT 1.4325 ACRES
CANNON AIR FORCE BASE	TROTTER MICHAEL J TROTTER DORIS H	1 151	341	07/27/1995	EASEMENT	AIR EASEMENT ACCIDENT POTENTIAL ZONE I TRACT 55-1 SECTION-18 TOWNSHIP-02N RANGE-35E PT 4.0507 ACRES

APZ I

EASEMENT

LEWTER CATTLE COMPANY, whose address is Clovis, New Mexico, 88101, for and in consideration of One Dollar and other valuable consideration, in hand paid, hereby sell and convey to the COUNTY OF CURRY, NEW MEXICO, and its assigns, the use of the property which is the subject matter of this easement to certain uses determined to be permissible and compatible to the operation of aircraft to and from Cannon Air Force Base. Specifically, the property subject to this easement has been determined to be within Accident Potential Zone I as defined by the Cannon Air Force Base Air Installation Compatible Use Zone Study. The property may not be used for any purpose other than those which have been determined to be permissible and compatible, which are identified as follows:

1. Industrial and/or manufacturing uses: lumber and wood products manufacturing, furniture and fixtures manufacturing, paper and allied products manufacturing, printing and publishing, stone, clay and glass products manufacturing, primary metal industries, fabricated metal industries and comparable miscellaneous manufacturing of a nature that does not constitute a population density hazard.
2. Transportation, communications and utilities.
3. Commercial and retail trade: All types of wholesale trade; and building materials and automotive retail sales.
4. Personal and business services: Repair and contract construction services.
5. Cemeteries.
6. Outdoor recreation: Parks, golf courses, riding stables and other comparable

APZ II

EASEMENT

FRANK H. BLACKBURN and MARCELLA BLACKBURN whose address is Rt. 2 Box 147, Clovis, New Mexico 88101, for and in consideration of One Dollar and other valuable consideration, in hand paid, hereby sell and convey to the COUNTY OF CURRY, NEW MEXICO, and its assigns, the use of the property which is the subject matter of this easement to certain uses determined to be permissible and compatible to the operation of aircraft to and from Cannon Air Force Base. The property subject to this easement has been determined to be within Accident Potential Zone II as defined by the Cannon Air Force Base Air Installation Compatible Use Zone Study. The property may not be used for any purpose other than those which have been determined to be permissible and compatible which are identified as follows:

1. Industrial and/or manufacturing uses: lumber and wood products manufacturing, furniture and fixtures manufacturing, paper and allied products manufacturing, printing and publishing, stone, clay and glass products manufacturing, primary metal industries, fabricated metal industries and comparable miscellaneous manufacturing of a nature that does not constitute a population density hazard. Food and kindred products and textile mill products manufactured.

2. Transportation, communications and utilities.

3. Commercial and retail trade: All types of wholesale trade; and building materials and automotive retail sales.

Flight Profiles and Altitude Distribution Tables

Table G.1 | Flight Profiles and Altitude Distribution for Military Operations Areas

Aircraft Type (Modeled As)	Average Profile (Modeled As)			Average Altitude Distribution (Estimated Feet AGL)					
	Power Setting	Speed (KIAS)	Sortie Duration (Minutes)	500-1,000	1,000-2,000	1,500-2,000	2,000-5,000	5,000-10,000	10,000 and Over
Mount Dora (North, East, West)									
AC-130H	850 CTIT	180	60				10%	80%	10%
MC-130H	850 CTIT	180	60			70%	10%	10%	10%
MC-130P	850 CTIT	180	60			70%	10%	10%	10%
MC-130W	850 CTIT	180	60			70%	10%	10%	10%
CV-22									
C-47 (DC-3)[1]									
UH-1									
NSA[2, 3] (GA Single-Engine Prop)									
F-16	94% NC	465	25			6%	5%	40%	49%
Transient (F-16)	94% NC	465	25			6%	5%	40%	49%
Pecos (North, South)									
AC-130H	850 CTIT	180	60				10%	80%	10%
MC-130H	850 CTIT	180	60	40%	30%		10%	10%	10%
MC-130P	850 CTIT	180	60	40%	30%		10%	10%	10%
MC-130W	850 CTIT	180	60	40%	30%		10%	10%	10%
CV-22	70%	110	60	50%	30%		20%		
C-47 (DC-3)[1]	(120.5% CNT)	160	60	10%	25%		25%	25%	15%
UH-1	N/A	80	60	70%	15%		10%	5%	
NSA[2, 3] (GA Single-Engine Prop)	(95% CNT)	150	60	10%	25%		25%	25%	15%
F-16	94% NC	465	25	1%	5%		5%	40%	49%
Transient (F-16)	94% NC	465	25	1%	5%		5%	40%	49%
Taiban									
AC-130H	850 CTIT	180	60				10%	80%	10%
MC-130H	850 CTIT	180	60	40%	30%		10%	10%	10%
MC-130P	850 CTIT	180	60	40%	30%		10%	10%	10%
MC-130W	850 CTIT	180	60	40%	30%		10%	10%	10%
CV-22	70%	110	60	50%	30%		20%		
C-47 (DC-3)[1]	(120.5% CNT)	160	60	10%	25%		25%	25%	15%
UH-1	N/A	80	60	70%	15%		10%	5%	

Table G.1 | Flight Profiles and Altitude Distribution for Military Operations Areas

Aircraft Type (Modeled As)	Average Profile (Modeled As)			Average Altitude Distribution (Estimated Feet AGL)					
	Power Setting	Speed (KIAS)	Sortie Duration (Minutes)	500-1,000	1,000-2,000	1,500-2,000	2,000-5,000	5,000-10,000	10,000 and Over
NSA[2, 3] (GA Single-Engine Prop)	(95% CNT)	150	60	10%	25%		25%	25%	15%
F-16	94% NC	465	25	1%	5%		5%	40%	49%
Transient (F-16)	94% NC	465	25	1%	5%		5%	40%	49%
Bronco (1, 2, 3, and 4)									
AC-130H	850 CTIT	180	60					80%	20%
MC-130H	850 CTIT	180	60					80%	20%
MC-130P	850 CTIT	180	60					80%	20%
MC-130W	850 CTIT	180	60					80%	20%
CV-22									
C-47 (DC-3)[1]									
UH-1									
NSA[2, 3] (GA Single-Engine Prop)									
F-16	94% NC	465	25					40%	60%
Transient (F-16)	94% NC	465	25					40%	60%

Source: SAIC, 2006
[1]DC-3 noise data estimated using the Integrated Noise Model
[2]GA Single-Engine Prop noise data estimated using the Integrated Noise Model
[3]NSA = nonstandard aircraft
KIAS = knots indicated airspeed
CTIT = turbine inlet temperature in degrees centigrade
Q = torque
NC = compressor speed
CNT = corrected net thrust
Sub-area stories are proportional to their area in square feet.

Table G.2 | Flight Profiles and Altitude Distributions for Restricted Areas

Aircraft Type (Modeled As)	Average Profile (Modeled As)			Average Altitude Distribution (Estimated Feet AGL)				
	Power Setting	Speed (KIAS)	Sortie Duration (Minutes)	500-1,000	1,000-2,000	2,000-5,000	5,000-10,000	10,000 and Over
R-5104A								
AC-130H	850 CTIT	180	120			10%	80%	10%
MC-130H	850 CTIT	180	60	40%	30%	10%	10%	10%
MC-130P	850 CTIT	180	60	40%	30%	10%	10%	10%
MC-130W	850 CTIT	180	60	40%	30%	10%	10%	10%
CV-22	70% Q	140(110)	60	50%	30%	20%		
C-47 (DC-3)[1]	(120.5% CNT)	160	60	10%	25%	25%	25%	15%
UH-1	N/A	80	90	70%	15%	10%	5%	
NSA[2, 3] (GA Single-Engine Prop)	(95% CNT)	150	60	10%	25%	25%	25%	15%
UAS[4] (not modeled)	N/A	N/A	N/A					
F-16	94% NC	465	30	1%	5%	5%	40%	49%
Transient (F-16)	94% NC	465	30	1%	5%	5%	40%	49%
R-5104B								
AC-130H	850 CTIT	180	60					100%
MC-130H	850 CTIT	180	60					100%
MC-130P	850 CTIT	180	60					100%
MC-130W	850 CTIT	180	60					100%
CV-22								
C-47 (DC-3)[1]								
UH-1								
NSA[2, 3] (GA Single-Engine Prop)								
UAS[4] (not modeled)	N/A	N/A	N/A					100%
F-16	94% NC	465	30					100%
Transient (F-16)	94% NC	465	30					100%
R-5105								
AC-130H	850 CTIT	180	60		10%	90%		
MC-130H	850 CTIT	180	30	80%	10%	10%		
MC-130P	850 CTIT	180	30	80%	10%	10%		
MC-130W	850 CTIT	180	30	80%	10%	10%		
CV-22	70% Q	110	60	80%	10%	10%		
C-47 (DC-3)[1]	(120.5% CNT)	160	60	80%	10%	10%		
UH-1	N/A	80	60	90%	10%			
NSA[2, 3] (GA Single-Engine Prop)	(95% CNT)	150	60	80%	10%	10%		
UAS[4] (not modeled)	N/A	N/A	N/A					
F-16	94% NC	465	6	10%	20%	70%		
Transient (F-16)	94% NC	465	6	10%	20%	70%		

Source: SAIC, 2006
[1]DC-3 noise data estimated using the Integrated Noise Model
[2]GA Single-Engine Prop noise data estimated using the Integrated Noise Model
[3]NSA = nonstandard aircraft

Table G.3 | Flight Profiles and Altitude Distributions for Military Training Routes

Aircraft Type (Modeled As)	Average Profile (Modeled As)		Average Altitude Distribution (Estimated Feet AGL)				
	Power Setting	Speed (KIAS)	100-250	250-500	500-1,000	1,000-2,000	2,000-5,000
IR-107, IR-109, IR-111, VR-100, VR-108, VR-114, VR-125							
AC-130H	850 CTIT	220	4%	60%	16%	10%	10%
MC-130H	850 CTIT	220	4%	60%	16%	10%	10%
MC-130P	850 CTIT	220	4%	60%	16%	10%	10%
MC-130W	850 CTIT	220	4%	60%	16%	10%	10%
CV-22	70% Q	210	4%	60%	16%	10%	10%
C-47 (DC-3)[1]							
UH-1							
NSA[2, 3] (GA Single-Engine Prop)	(95% CNT)	150			80%	10%	10%
F-16	94% NC	465			80%	10%	10%
Transient (F-16)	94% NC	465			80%	10%	10%

Source: SAIC, 2006
[1]DC-3 noise data estimated using the Integrated Noise Model
[2]GA Single-Engine Prop noise data estimated using the Integrated Noise Model
[3]NSA = nonstandard aircraft
KIAS = knots indicated airspeed
CTIT = turbine inlet temperature in degrees centigrade
Q = torque
NC = compressor speed
CNT = corrected net thrust

The Effect of Windmill Farms on Military Readiness

See the following pages.

This page intentionally left blank.

REPORT TO THE CONGRESSIONAL DEFENSE COMMITTEES

The Effect of Windmill Farms On Military Readiness

2006

Office of the Director of Defense Research and Engineering

EXECUTIVE SUMMARY

SECTION 358, NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2006 (PUBLIC LAW 109-163)

REPORT ON EFFECTS OF WINDMILL FARMS ON MILITARY READINESS.

Not later than 120 days after the date of the enactment of this Act, the Secretary of Defense shall submit to the Committee on Armed Services of the Senate and the Committee on Armed Services of the House of Representatives a report on the effects of windmill farms on military readiness, including an assessment of the effects on the operations of military radar installations of the proximity of windmill farms to such installations and of technologies that could mitigate any adverse effects on military operations identified.

Overview

There is growing public and private sector interest in generating electrical power using wind energy. According to the Department of Energy, over 60,000 megawatts of wind power capacity is in operation worldwide with over 10,000 megawatts installed in the United States. These systems are largely comprised of installations of up to several hundred wind turbines with rotating blades reaching to heights of up to 500 feet. The numbers, height and rotation of these wind turbines present technical challenges to the effectiveness of radar systems that must be carefully evaluated on a case-by-case basis to ensure acceptable military readiness is maintained. For many cases, processes are in place to allow responsible federal authorities to complete determination of acceptability of wind turbine impacts on military readiness. However, since wind energy use in the United States is dramatically increasing, research and interagency coordination is warranted to enhance capability for completing timely determinations and developing measures for mitigating readiness impacts. This report focuses on the effects of wind farms on air defense and missile warning radars and the resulting potential impact on military readiness. Its scope is limited to these specific subjects and is based on the current level of understanding regarding interactions between such defense systems and state-of-the-art wind turbines.

The report begins with a brief introduction of the key principles of radar systems, describes in what circumstances wind farms might cause problems for the Department and under what circumstances such wind farms would not cause problems. Radar test results from multiple flight trials near wind farms performed by the United Kingdom Ministry of Defence are discussed. The results from those flight trials documented that state-of-the-art utility-class wind turbines can have a significant impact on the operational capabilities of military air defense radar systems. The results demonstrated that the large radar cross section of a wind turbine combined with the Doppler frequency shift produced by its rotating blades can impact the ability of a radar to discriminate the wind turbine from an aircraft. Those tests also demonstrated that the wind farms have the potential to degrade target tracking capabilities as a result of shadowing and clutter effects.

The Department sponsored a testing campaign as a part of this study to establish a technical database on the radar cross section and Doppler behavior of a modern utility-class wind turbine that can be used to support development of future mitigation approaches. This testing was performed using the state-of-the-art Air Force Research Laboratory Mobile Diagnostic Laboratory (MDL) which is certified to perform radar measurements to the most stringent national standards. The test procedures, samples of the experimental test data, and calibration methodology have been documented in a report. The full data set has been made available to U.S. radar contractors and government-sponsored researchers.

The report discusses a number of mitigation approaches that might be employed to reduce the impact wind turbines can have on an air defense radar. Only three methods so far have been proven to be completely effective in preventing any impairment of primary radar systems. Employment of these or other approaches that could produce marginal, but acceptable, impacts on defense capabilities need to be assessed on a case-by-case basis.

The report discusses potential wind farm impacts on Department test and training capabilities, security on and around defense installations, through introduction of electromagnetic noise in special electronic system testing areas, and the general environment.

The Department recognizes that wind energy use is dramatically increasing in the United States. Development of additional mitigation technologies is important to enable robust expansion of wind generation capacity to continue while concurrently maintaining defense capabilities for our Nation. The also describes exploratory development efforts initiated by the Department to advance the state of maturity of other mitigation approaches that could be employed in the future are also described in the report.

Appendices are provided describing the policies employed in several NATO countries to govern wind farm development and how wind farms can impact the performance of U.S. Comprehensive Test Ban Treaty monitoring systems.

Conclusions and Recommendations

Given the expected increase in the U.S. wind energy development, the existing siting processes as well as mitigation approaches need to be reviewed and enhanced in order to provide for continued development of this important renewable energy resource while maintaining vital defense readiness. The Department of Defense strongly supports the development of renewable energy sources and is a recognized leader in the use of wind energy. As one of the largest consumers of energy, the Department is keenly aware of the budgetary pressures that recent increases in the cost of energy have created for all Americans and continues to invest in the development of alternative energy sources. However, the Department is also mindful of its responsibility to maintain its capabilities to defend the nation.

Consequently, the Department, as a result of this study, makes the following conclusions and recommendations regarding the challenges and areas for further attention, in coordination with other Federal agencies, to allow for construction of wind turbines while maintaining defense readiness capabilities:

- Although wind turbines located in radar line of sight of air defense radars can adversely impact the ability of those units to detect and track, by primary radar return, any aircraft or other aerial object, the magnitude of the impact will depend upon the number and locations of the wind turbines. Should the impact prove sufficient to degrade the ability of the radar to unambiguously detect and track objects of interest by primary radar alone this will negatively impact the readiness of U.S. forces to perform the air defense mission.
- The mitigations that exist at present to completely preclude any adverse impacts on air defense radars are limited to those methods that avoid locating the wind turbines in radar line of sight of such radars. These mitigations may be achieved by distance, terrain masking, or terrain relief and requires case-by-case analysis.
- The Department has initiated efforts to develop additional mitigation approaches. These require further development and validation before they can be employed.
- The analysis that had been performed for the early warning radar at Cape Cod Air Force Station was overly simplified and technically flawed. A more comprehensive analysis followed by development of appropriate offset criteria for fixed-site missile early warning radars should be performed on an expedited basis.
- Wind turbines in close proximity to military training, testing, and development sites and ranges can adversely impact the "train and equip" mission of the Department. Existing processes to include engagement with local and regional planning boards and development approval authorities should be employed to mitigate such potential impacts.
- Wind turbines located in close proximity to Comprehensive Test Ban Treaty monitoring sites can adversely impact their ability to perform this mission by increasing ambient seismic noise levels. Appropriate offset distance criteria should be developed to mitigate such potential impacts.
- The Federal Aviation Administration (FAA) has the responsibility to promote and maintain the safe and efficient use of U.S. airspace for all users. The Department defers to the FAA regarding possible impacts wind farms may have on the Air Traffic Control (ATC) radars employed for management of the U.S. air traffic control system. The Department stands prepared to assist and support the FAA in any efforts the FAA may decide to undertake in that regard.
- The National Weather Service (NWS) has the primary responsibility to provide accurate weather forecasting services for the nation. The Department defers to the NWS regarding identification of impacts wind farms may have on weather radars and development of appropriate mitigation measures. The Department stands prepared to work with the NWS in this area on NWS identified mitigation measures that have the potential to benefit Department systems.

Table of Contents

List of Figures

List of Tables

1. INTRODUCTION

Focus of Study

This report has been prepared in response to Section 358 of the National Defense Authorization Act for Fiscal Year 2006 concerning the impacts wind farms may have on U.S. military readiness, to include an assessment on operation of military radar installations and technologies that could mitigate any adverse effects identified. The intent is to ensure that the accelerating development of wind energy systems within the United States will occur in a manner that also preserves the capability of U.S. military forces to protect the homeland.

This report specifically discusses how megawatt (MW) class state-of-the-art (SOA) wind turbines can impact domestically sited U.S. air defense and missile warning radar systems. Wind turbines of this size are typically considered to be "bulk-power utility-scale" units often employed in "wind farms" to provide electricity for local or regional power grids. Within the context of this report, the term "wind farm" will be employed to denote a collection of two or more megawatt class wind turbines within a geographical area that may range in size from a few acres to hundreds of acres.

The report does not attempt to consider impacts that could occur from small "homeowner" type wind turbine systems. Modern versions of such units are relatively small in physical size, with generating capacities in the low kilowatt (kW) range. They are not anticipated to have significant impact unless located directly adjacent to a domestic defense system. This is not considered to be a highly probable occurrence since land directly adjacent to domestic defense systems is generally under the positive control of the federal government.

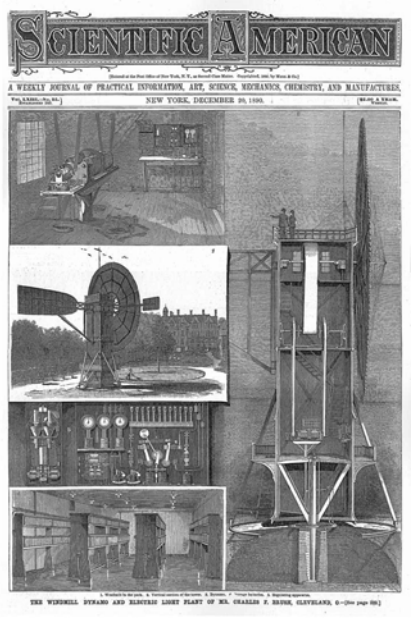
The report describes existing as well as possible future mitigation techniques that could be employed to mitigate impacts for megawatt wind turbines. Finally, it describes science and technology efforts already being pursued to develop additional future mitigation approaches.

Brief History of the Development of Wind Energy Systems

According to the history page of the Danish Wind Industry Association (www.windpower.org), the first automatically operated windmill employed to generate electricity was built in Cleveland, Ohio, in 1888. Figure 1 provides an illustration of this system that appeared on the front page of the 20 December 1890 edition of *Scientific American.* While physically large, the 17 m diameter rotor was only able to generate 12 kW of power.

For the next 40 years a variety of low-power wind turbine designs were developed. Some were employed to provide power to local electrical grids or at remotely located farms not connected to electrical grid networks. The development of bulk power utility-scale turbines, units with generating capacities on the order of 100 kW or more, appears to have begun in earnest in the 1930s in multiple nations but this did not lead to the development of any major commercially operated "wind farms" for bulk power

generation. Subsequent advances in turbine technologies during the 1960s and 1970s did, however, provide the technical basis for current approaches.


SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

NEW YORK, DECEMBER 29, 1888.

THE WINDMILL DYNAMO AND ELECTRIC LIGHT PLANT OF MR. CHARLES F. BRUSH, CLEVELAND, O.—[See page 402.]

Figure 1. *Scientific American* illustration of the 1888 Brush Windmill in Cleveland, Ohio

One of the earliest large wind farms in the United States was built, starting in 1982, in the Altamont Pass area of California. The wind farm is actually a collection of a number of different turbine designs owned and operated by several different organizations. The Altamont Pass Wind Farm currently consists of more than 4700 units; the vast majority being older 100 kW capacity units with, in 2003, a reported combined net generating capacity on the order of 494 MW [1]. The significantly greater per-unit generating capability of current SOA turbines means that far fewer, but physically much larger, turbines can be employed to generate this level of power. For size comparison purposes, note that a typical 1980s vintage 100 kW capacity wind turbine, such as those at Altamont Pass, has a blade length on the order of 8 m and is mounted on towers 24 to 30 m high. In contrast, a SOA 1.5 MW unit may have blades on the order of 35 to 40 m in length mounted on support towers 60 to 80 m or more high.

In terms of future trends, a recent report by the European Wind Energy Association [2] discussed the numerous technical factors related to growth in turbine sizes and capacities over the past several years. While it was expected that rotor sizes and rated capacities may continue to increase as higher strength materials are employed in fabrication of turbine blades and other components, it also indicated that economic and operational factors could exert limitations. Consequently, the report concluded that significant growth in size beyond the 5 MW class units currently in development would not be automatic. Table 1 provides typical dimensions for SOA megawatt class turbines currently available from two manufacturers. Similar size/capacity units are also produced by a number of other firms.

Table 1. Physical data for representative SOA turbines

Manufacturer & Data Source	Rated Capacity (MW)	Rotor Diameter (m)	Rotor Speed (rpm)	Tower Height (m)
GE (www.gepower.com)	1.5	77	10-20	65-100
GE (www.gepower.com)	3.6	104	8.5-15	Site dependent
Vestas (www.vestas.com)	1.65	82	11-14	59-78
Vestas (www.vestas.com)	4.5	120	10-15	Site dependent

Fundamentals of Radar*

Radar systems are widely employed for many commercial and defense applications. In its simplest form (Figure 2), a radar is a sensor system utilizing electromagnetic radiation in the radio frequency (rf) spectral region, spanning from approximately 3 MHz to around 100 GHz, and consisting of a transmitter, an antenna, a receiver, and a processor. The transmitter emits pulses of energy in the form of rf waves that propagate through the atmosphere. An object, typically referred to as the target, in this radar beam will reflect some of this energy back to the radar. This reflected energy is collected by a receiving antenna for processing. The basis of operation of a specific radar sensor system is determined by the content of the information contained in the reflected radiation and how it is processed.

The degree of difficulty encountered in processing the radar reflection from the target of interest depends upon the strength and variability of the signal at the receiver relative to other sources. For example, the strength of the reflected signal received by the radar will depend on the power of the transmitter, the distance to the target, atmospheric effects, the radar cross section (RCS) of the target, the possible presence of intervening physical objects, and the antenna geometry. The radar may also receive reflected radiation from other objects such as trees, buildings, vehicles, and hills, as well as direct radiation emitted by other natural and man-made rf sources, such as the atmosphere, cell phone towers, television and radio antennas, and electrical generators.

Signal variability can occur due to motion of the target and changes in the intervening physical environment, such as those caused by rain or hail, as well as reflections from wind-blown trees. A number of other effects arising from the inherent thermal electronic noise in the radar sensor, the physics of antenna systems, the atmosphere and intervening objects on the propagation of electromagnetic radiation also

* The term “RADAR” was an American acronym created in 1941, with the letters selected from the words **ra**dio **d**etection **a**nd **r**anging. The use of this acronym has become so prevalent that it is now generally accepted as a common word in English and rarely capitalized.

must be taken into account in determining the performance fidelity of a radar sensor system.

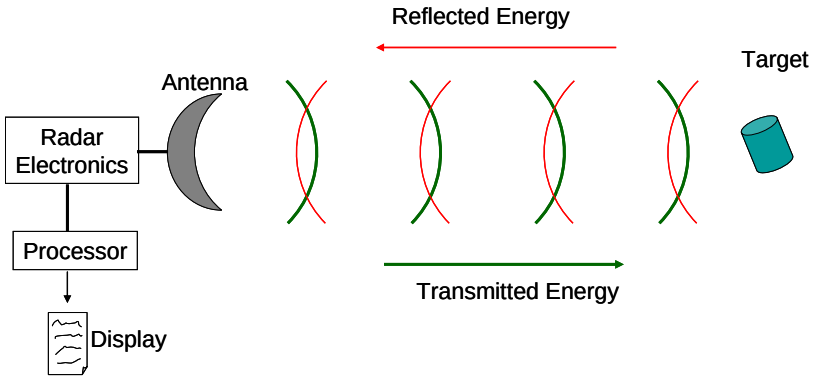


Figure 2. Illustration of a basic radar system

The term "clutter" has been established to encompass any unwanted reflected signal that enters the radar receiver and can interfere with the determination of the desired attributes of the target of interest. Discussions in following sections of this report will provide examples of the effects of clutter that interfere with resolving behavior, such as detecting the presence of a valid target, discriminating between two closely spaced targets, and subsequently tracking the motion of all targets of interest.

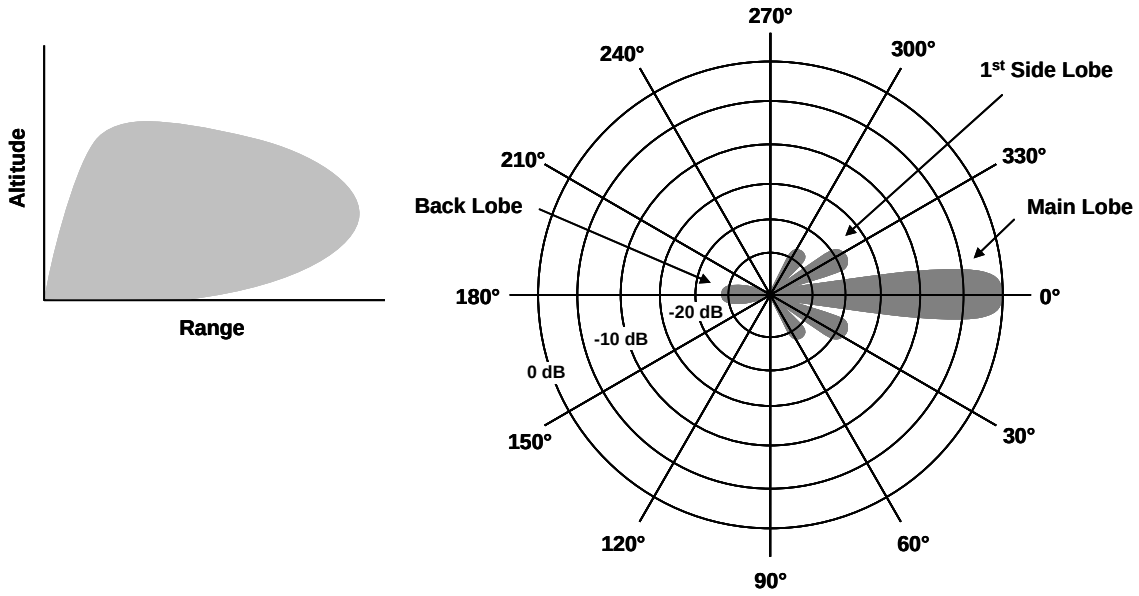
At the most basic level, the ability to successfully process the reflected radiation depends on the strength of this signal relative to the background noise inherent in the radar electronics. This is characterized as the signal-to-noise ratio (SNR). Increasing the radar-to-target distance dramatically decreases the intensity of the received signal. For example, if the distance between the radar and the target is doubled, the signal returned decreases by a factor of 16. Since a design goal for a defense radar is to detect targets at the maximum range possible, the ability to sense very low signal strengths is essential. At the extreme, the absolute minimum level of noise that can occur in a system is fundamentally limited to the thermally induced noise in the sensor electronic components and thermal radiation from the atmosphere. However, the actual level of noise, to include clutter effects, that a radar sensor must deal with are significantly greater than this theoretical limiting case.

Many of the attributes characterizing a radar system involve values spanning many orders of magnitude. For example, the SNR for a radar system can vary by more than 1 million during operation. The decibel (dB), a logarithmic ratio of two quantities, is used to describe these ratios in terms of smaller numerical values. For example, an SNR value of -30 dB means that the signal strength is 1/1000 of the strength of the noise. Similarly, for a value of 10 dB, the signal would be 10 times greater than the noise. The dB unit will be used frequently in the sections to follow. For convenience to the reader, Table 2 provides examples of the conversion of dB to the equivalent factor.

Table 2. Decibel (dB) equivalents for some common numerical ratios

dB	-50 dB	-30 dB	- 10 dB	-3 dB	0 dB	3 dB	10 dB	30 dB
Factor	1/100,000	1/1,000	1/10	½	1	2	10	1,000

Due to the finite size and shape of an antenna, the emitted power is distributed in a lobe-shaped pattern. The center (or main) lobe contains the majority of the radar power, but the secondary, tertiary, etc., lobes (side lobes) can have sufficient energy to introduce clutter into the system. Figure 3 illustrates the main, side, and back lobes for a 2-dimensional (2-D) radar. Figure 3a provides a range versus elevation plot of the -3 dB (half power) point of the beam relative to the peak power level. Figure 3b provides an azimuth beam shape plot, where power level as a function of azimuth angle is plotted relative to peak main lobe power.



a. Main lobe as function of range and altitude

b. Main, side, and back lobe amplitudes as a function of azimuth angle

Figure 3: Notional main, side, and back lobes of a 2-D radar

Multiple side lobes can exist in both the vertical and azimuth directions with respect to the axis of the main lobe. In a well-designed radar system, the power level of the side lobes will be significantly below that of the main lobe.

Radars can detect sufficiently strong reflections from objects located in the antenna side lobes. Side lobe suppression methods have been developed to reduce the influence of such signals. The ultimate effectiveness of the side lobe attenuation provided will depend significantly upon the power level of the side lobe beam and the strength of the reflected signal in comparison to the primary signal of interest.

The range of an optical viewing systems is ultimately limited by the optical or "geometric" horizon. For radar systems, the electromagnetic radiation propagating through the atmosphere is refracted (effectively bent), with the result that a radar beam can be reflected by an object beyond the geometric horizon. Analysis of this refraction effect has indicated that for radar frequencies, the radar horizon can be reasonably approximated by employing a "4/3 earth model." In this approximation, a geometric line of sight is calculated, but using an "effective" radius for the earth equal to the actual radius of the earth multiplied by the factor 1.33, as illustrated in Figure 4.

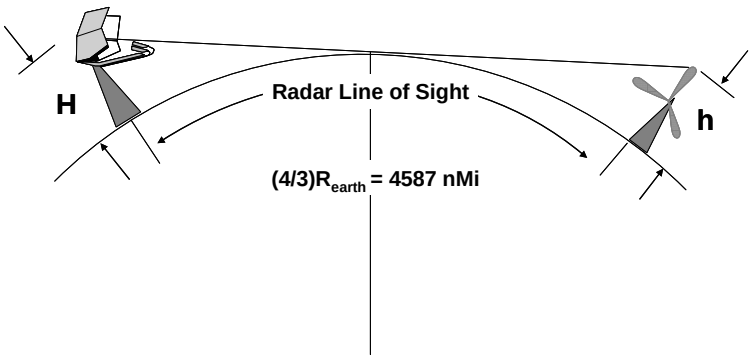


Figure 4. Geometric approximation to estimate radar line of sight

Objects in the path of an electromagnetic wave affect its propagation characteristics. This includes actual blockage of wave propagation by large individual objects and interference in wave continuity due to diffraction of the beam by individual or multiple objects. The effect caused by either of these is often termed to cause "shadowing" of the radar beam.

The presence of a single tall building within the radar field of view provides a typical example for blockage. Since a tall building effectively blocks all propagation of a radar rf wave, the zone immediately behind the building will not be illuminated by the radar. If the building is close to the radar there will be zones of complete and partial shadowing. This is illustrated in Figure 5.

In the region where the radar wave is completely blocked it is impossible to detect any object in that region. In contrast, detection is still possible in the zone of partial blockage but with greater difficulty. In this region both the level of illumination from the radar and the reflected signal from the target will be weakened by the partial blockage. This is one form of the shadowing effect.

The second form of disruption occurs because of a phenomenology referred to as "diffraction." Near-field and far-field diffraction effects were first studied by the Danish physicist Christian Huygens and the French physicist Augustin-Jean Fresnel. As illustrated by Figure 6, whenever a traveling wave encounters a line of objects, the objects will disrupt the propagation of the wave in that locale. This phenomena can be illustrated as propagation of spherical waves from each of the objects. These waves will combine constructively and destructively on the far side of the objects. In the zone of the

disrupted waves the reflection of the radar signal is significantly different from areas where it has not been disturbed. These differences include variations in intensity and phase angle and are a function of original frequency and the spacing of the objects causing disruption.

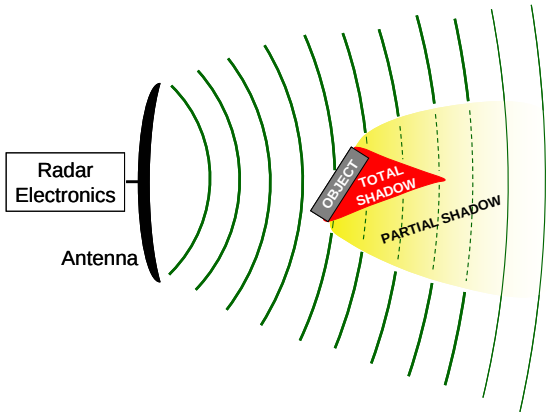


Figure 5. Regions of partial and complete blockage of radar illumination

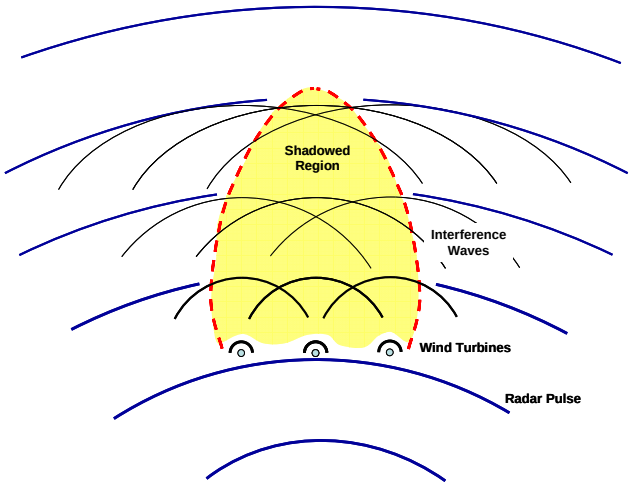


Figure 6. Effect of a diffraction grating on a propagating wave

These disruption effects will occur both for the original transmitted wave and the wave reflected back to the radar by a target. As such, the ability to detect a target in this zone will be degraded. This is the form of shadowing that has been raised as a concern in relation to wind farms since the spacing of turbines over a field of view can create this type of diffraction effect for a radar.

The strength of the reflected signal, whether the object is illuminated by the main lobe or by one or more side lobes, depends not only upon the power level of that illumination but how “large” a reflector of radar energy the object is. This “size” factor is commonly referred to as its radar cross section (RCS). Objects with a large RCS will

reflect, proportionately, a larger amount of radar energy than an object with a lower RCS and thus be easier to detect. RCS is normally expressed in terms of “decibel square meters” (dBsm), a logarithmic expression of an object’s radar reflecting surface area. Figure 7 provides typical RCS values, in terms of both square meters and dBsm, for a number of common items, including that of a 1.5MW SOA wind turbine. Unlike the other objects depicted in Figure 7, the RCS for the wind turbine is a combination of a near-zero Doppler reflecting surfaces consisting of the tower and nacelle and variable Doppler reflecting surfaces consisting of the turbine blades. The near-zero Doppler portion of the reflected signal generally will not cause a problem in a well designed radar. However, the broadly spread variable Doppler portion of the reflected signal from the wind turbine can often exceed that produced by an aircraft.

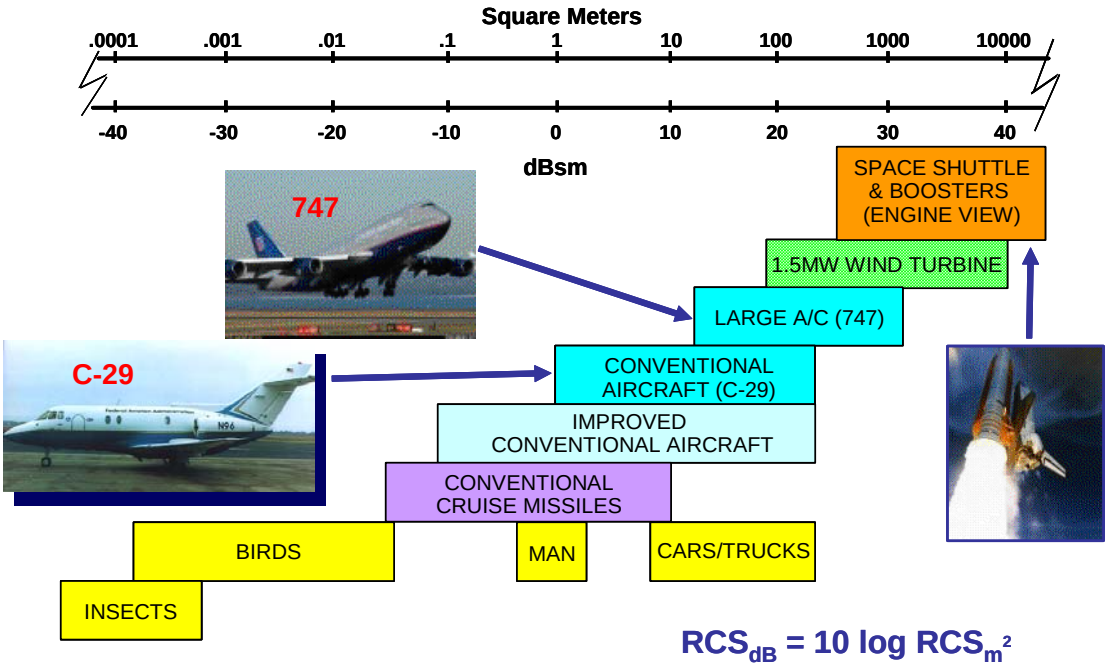


Figure 7. RCS values for several common objects

The magnitude of the RCS of an object is dependent upon the angle, both in bearing and elevation, from which it is observed by the radar. Figure 8 illustrates how the RCS value for the C-29 “business jet” included in Figure 7 varies as a function of bearing angle, where observing the airplane from a nose-to-tail perspective is denoted as a 0-degree bearing angle. These values were measured at 2.9 GHz, with a “look down” angle from the vertical of 15 degrees. Modifying the viewing angle or changing the frequency band used for the measurement will change the measured RCS characteristics.

Radar systems have been designed and deployed for a wide variety of applications and missions. These include air defense radars, air traffic control (ATC) radars, missile warning radars, and weather radars. The design of each of these radar sensor systems depends on the mission requirements, the phenomenology to be exploited, and the

available technology. For example, current generations of weather radar systems exploit the Rayleigh scattering properties of precipitation, i.e., scattering of radiation having wavelengths, on the order of 10 cm, much larger than the characteristic size of rain, hail, and snow particles. The computational schemes employed are designed to reduce the effects of "clutter" to obtain the desired weather information. Surveillance radars, in addition to having a capability to sense weather-related phenomena as just described, exploit the scattering properties of objects much larger than the wavelength of the radar. They also employ computational schemes specifically tailored to produce desired surveillance information. The mission challenges introduced by clutter to the performance of radar systems are discussed in the following sections of this report.

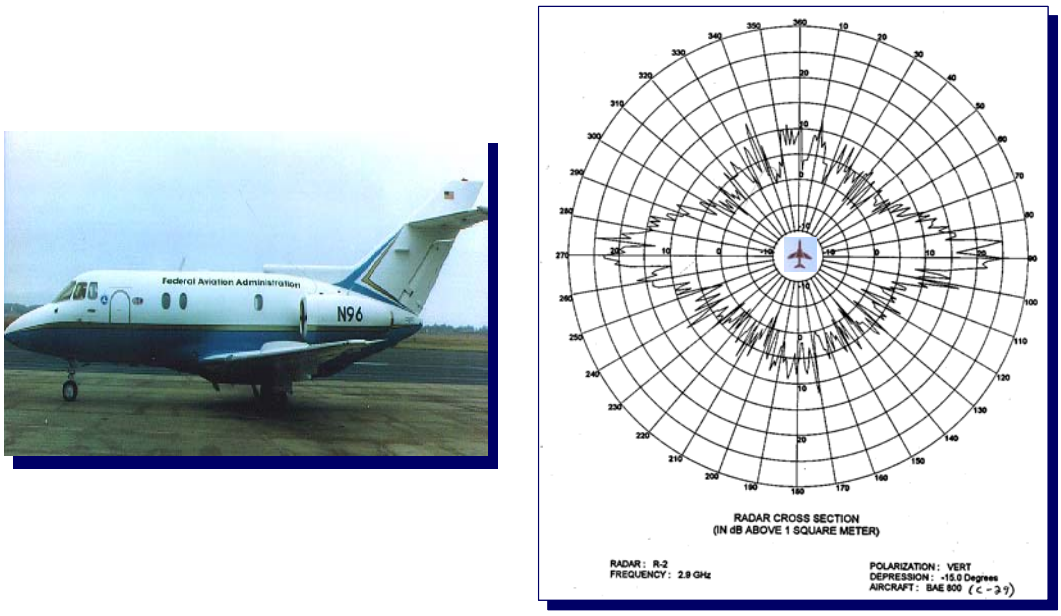


Figure 8. RCS values for C-29 aircraft as a function of view angle

Advances in electronics, processor, and computational technologies have enabled a number of radar system performance enhancements. A key capability provided by these advances and employed in virtually all modern radar systems today is the capacity to sense pulse-to-pulse phase differences, thus enabling the Doppler effect to be exploited.

The Doppler effect, specifically the shift in frequency of the reflected signal that occurs when an object is moving, was first discovered by Christian Doppler. It applies to all propagating waves and is particularly useful for radars. This Doppler shift results from the fact that the frequency of a signal received by an observer will depend upon whether the source of that signal is stationary, moving toward, or moving away from the observer. For radar applications, the "source" of the signal is the radar wave reflected by the target. If the target is moving away from the radar, the frequency of the reflected

signal will be lower than the originally transmitted frequency. Conversely, if the object is moving toward the radar the frequency will be higher. Additionally, the magnitude of the signal frequency shift is directly proportional to the radial velocity between the object and the radar. Only objects that are stationary or moving perfectly tangentially to the radar wave will not produce a Doppler shift.

The development of high-performance processing capability, along with innovative computational techniques tailored to extract desired information from the massive amounts of data available, has provided desired radar enhancements, particularly for defense capabilities.

2. TYPES OF RADAR SYSTEMS

Primary Surveillance Radar

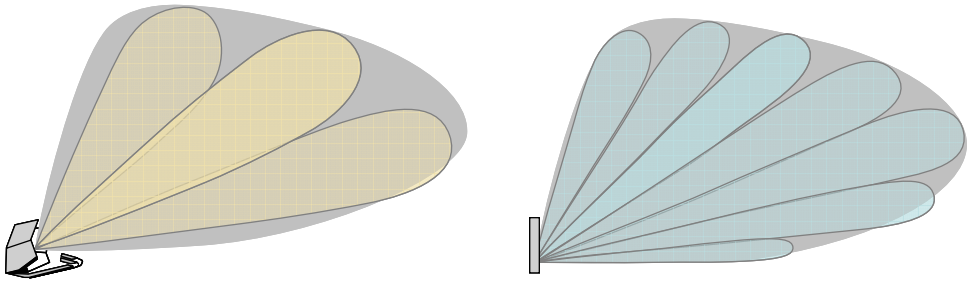
Air defense radars typically operate in what is termed a "Primary Surveillance" mode. When operated in that manner they are referred to as a "Primary Surveillance Radar" (PSR). A PSR will send out rf waves (radar energy) focused by the antenna to provide an "illuminated" volumetric region of coverage. For a radar with a single transmitting element, the characteristics of this volume of coverage will be governed primarily by the shape of the antenna and whether or not the antenna can be rotated about one or two axes.

Figure 3 illustrated a radar coverage pattern where the antenna has been shaped to produce an illuminated area that is broad in altitude and radial distance (range) but rather narrow in width in terms of azimuth angle coverage. This type of radar is generally rotated about a vertical axis to extend the volume of coverage. The angle of rotation may be as little as a few degrees to observe a small sector or up to 360 degrees to cover the entire airspace surrounding the radar. Alternatively, the antenna may oscillate back and forth over a small angle to cover only a sector of airspace. Systems of this type able to rotate a full 360 degrees can often be observed in use around airports.

Radars of the type illustrated in Figure 3 are often referred to as 2-D radars since they are able to determine the position of an aircraft in terms of range and bearing angle (angular position of the aircraft with respect to north) but are unable to determine the height at which the airplane is above the surface of the earth. In contrast, most radars designed to inherently determine aircraft range, bearing, and altitude employ multiple beams. Radars able to determine all three aircraft parameters are typically referred to as being three-dimensional (3-D) radars. Figure 9 illustrates two different types of multibeam 3-D radars. The first employs several "stacked" transmit units to produce overlapping illumination lobes. Similar to the 2-D radar illustrated in Figure 2, the entire antenna would be rotated about a vertical axis to sweep the illuminated area over the volume of airspace to be covered.

The second type of 3-D radar is known as a phased-array radar. In a phased-array radar, hundreds to thousands of small transmitters and receivers make up the face of the antenna. Radar beam patterns are formed by precisely adjusting (shifting) the phase angle of the signal sent to each transmit element. Employing a similar technique, the receive beam can also be "electronically steered" over an area to cover a specific volume

of airspace. Mechanical steering can also be employed to increase the "field of regard" for a phased-array radar.



a. Stacked Beam b Phased Array

Figure 9. Two common types of 3-D radar

Phased-array radars also have side lobes. Multiple side lobes can exist in both the vertical and azimuth directions with respect to the axis of a main beam lobe. In a well-designed radar system, the power level of the side lobes will be significantly below that of the main lobe. Figure 10 illustrates the first elevation side lobe for the fifth beam of a planar phased-array radar.

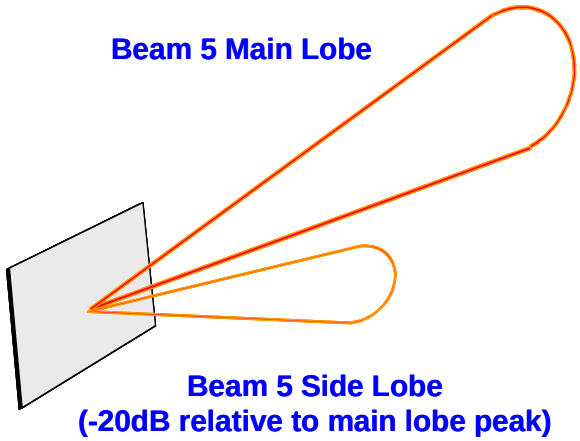


Figure 10. Notional elevation side lobe for fifth beam of the Figure 9b phased-array radar

Secondary Surveillance Radar

Secondary Surveillance Radar (SSR) is an "interactive" radar in that it requires the cooperation of the target aircraft. SSR traces its origins to the Identification Friend or

Foe (IFF) systems first developed during World War II to help air defense personnel to clearly distinguish between friendly and hostile airplanes. SSR systems are sometimes referred to as “beacon tracking” systems.

An SSR operates by sending out a coded signal (interrogation) that is received by a transponder system on an aircraft. The airplane’s transponder system translates the interrogation and responds by transmitting a coded signal back to the radar. This coded signal will contain identification information about the aircraft and other data such as its flight altitude. The frequencies of the interrogation and response are different, and both are different from the primary radar frequency so that the signals do not interfere with each other. The operating frequencies, signal strength, message format, and other key parameters influencing the performance of transponders are defined by published standards [3].

A major advantage of SSR is that the return from the aircraft transponder is much stronger than the typical primary (skin) radar return and is generally unaffected by clutter sources that can affect the primary radar return. This is because the SSR system does not depend upon the “reflection” of its interrogation message. Instead, it receives a different signal actually broadcast by the aircraft. Thus, wave propagation losses in each direction are minimized. This in turn allows a much smaller antenna to be employed for SSR. Figure 11 illustrates both the PSR and SSR antennas for the United Kingdom (UK) Watchman series of Air Traffic Control (ATC) radar.

A disadvantage of the SSR is that the aircraft must have a functioning transponder. Not all aircraft are required to have transponders. Additionally, even for transponder-equipped airplanes, if the transponder fails or is turned off, the SSR will not be able to track the airplane. Under these circumstances, only a primary surveillance radar will be able to detect or track the aircraft.

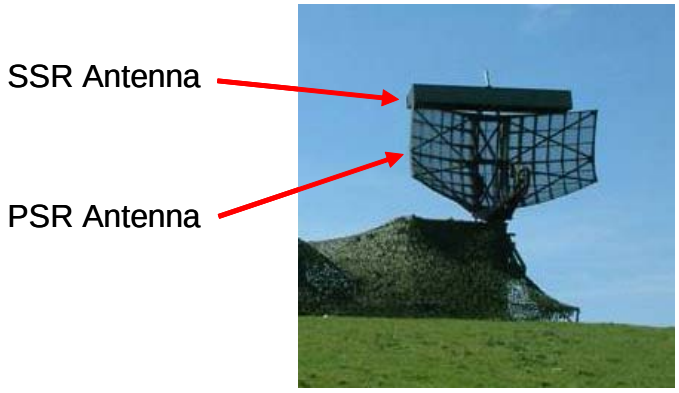


Figure 11. PSR and SSR antennas of the UK Watchman ATC radar

Missile Early Warning Radar

There are two fixed-site missile Early Warning Radars (EWR) within the continental United States. One is located at Cape Cod Air Force Station (AFS), MA. The

other, an upgraded version, is located at Beale Air Force Base (AFB), CA. These two fixed-site, ground-based radars are large phased-array systems that are housed in a three-sided 32 m high building (Figure 12). The radars have two distinct radiating antennas, each capable of covering a 120-degree sector. Each antenna can generate a narrow (2.2 degrees) primary radar beam that can be electronically steered between elevation angles ranging from 3 to 85 degrees above the horizontal over the entire 120-degree field of view. These radars have a maximum range in excess of 5000 km. The far-field region for the primary radar beam begins approximately 439 m from the face of the radar.

Figure 12. Upgraded Early Warning Radar at Beale AFB, CA

Table 3 provides the elevation of the lower edge (-3 dB power level) of the primary beam of an EWR as a function of distance from the radar referenced to the center of the array face. The effect of a 3-degree upward angle in conjunction with the narrow width of the beam produces a primary beam illumination pattern that is significantly above the surface of the earth, even at short distances from the radar unit.

Table 3. Approximate radar primary beam elevation for an EWR

Distance from radar (km)	Elevation of bottom of primary beam (m)	Elevation of centerline of beam (m)
5	167	263
10	338	530
15	510	799
20	687	1072
25	866	1347

Calculations employ 4/3 earth approximation to account for atmospheric refraction effects. All elevations are relative to the center of array face. Beam size based on -3 dB power level.

The early warning radars, similar to others, also have side lobes. The first side lobe forms a concentric circle about the main beam. The second and higher side lobes are similar in character to the main beam and arranged about that beam. The power density level of the first side lobe is 1/100 (-20 dB) of the power of the main lobe, whereas the power density level of the second side lobe is 1/1000 (-30dB) of main beam power

density. The first and second side lobes do intercept the ground in front of the array [4]. The distance away from the radar at which this intersection will occur varies based upon how far above the horizontal the main beam is pointed.

Weather Radar

Radar can also be employed to monitor weather conditions. In the United States, the NEXRAD WSR-88D represents the current generation of ground-based weather radars. The NEXRAD network at present consists of 158 WSR-88D radars situated across the country, with a few at various overseas locations. Figure 13 illustrates the first NEXRAD WSR-88D radar, which was installed in Norman, OK, in 1988.

The phenomenology employed by a weather radar is Rayleigh scattering. Weather radars do employ Doppler but not in the same way as air defense radars. Generally, when monitoring weather conditions such as rain, hail, or snow, the Doppler frequency shift, a function of particle velocity, will be too small to measure accurately with a single pulse. Thus, weather radars such as the WSR-88D employ timed pairs of pulses. The phase-angle difference between the reflections of two sequential pulses is directly proportional to particle velocity in the direction toward or away from the radar. By combining these measurements for multiple sequential pulse pairs over broad sweep angles, the radar is able to construct a Doppler map illustrating the rain, hail, or snowfall pattern.

Figure 13. First NEXRAD WSR-88D radar, Norman, OK

3. GENERAL PRINCIPLES OF OPERATION

Use of Clutter Cells and Background Averagers

As noted previously, the term “clutter” is defined as any undesired reflected signal return that enters the radar receiver. For a primary radar seeking to track aircraft, the earth’s surface and any man-made objects on the earth’s surface are sources of clutter. Weather effects such as rain or hail can also cause clutter for an air defense radar. Modern air defense radars normally include special algorithms to attenuate the effects of such weather phenomena on tracking performance.

The level of clutter a radar may see is highly dependent on the viewing geometry of the radar in relation to the clutter sources. In general, the level of clutter will increase when the radar views a larger area of the earth's surface or of objects on the earth's surface. Clutter can occur at any angle within the radar field-of-view angle and at any range within the radar line of sight. Clutter returns can be spread in Doppler frequency due to the motion of the radar platform or motion of the source of clutter.

Traditionally, clutter for an air defense radar has been considered to be either stationary or possessing a low velocity. Cars and trucks moving on roads, trees, buildings, and even flags waving in a breeze can create this type of clutter. Stationary or nearly stationary objects result in a return signal with a fluctuating near-zero Doppler frequency shift. Since quasi-stationary objects will generally provide nearly identical radar returns from successive scans, methods have been developed to eliminate such returns from further processing and thereby reduce their influence on tracking capability.

The use of clutter "maps" and clutter cells has been one such technique commonly employed. Figure 14 provides an example of how clutter cells are employed within a radar to support target detection. This figure illustrates a portion of an area, in terms of range (radial distance) and bearing angle (angular offset from north) under observation. Such a plot is called a Plan Position Indicator (PPI) display and is one of the most commonly recognized formats for displaying radar data.

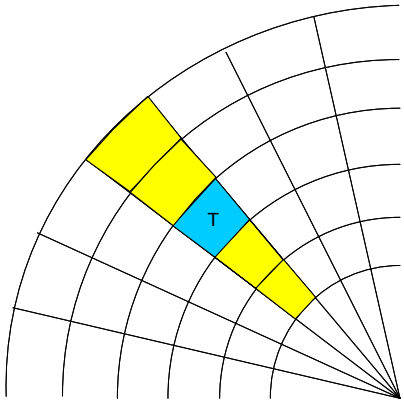


Figure 14. Clutter cell example

In this particular example the radar is seeking to determine if there is an aircraft (T) in the blue colored area. A key element in performing that task is determining whether the magnitude of the signal being reflected from that small region includes reflections from trees, buildings, and other objects (clutter) of no interest to aircraft tracking (clutter), as well as reflections from one or more aircraft. Using a grid pattern of "clutter cells," the radar compares the magnitude of reflected signals from a series of prior sweeps for that cell to the signal level now being received to determine if there has been an "above threshold" increase in reflected intensity.[*] The assumption here is that

[*] Specific target detection and tracking methods are described in greater detail in the following sections

typical clutter signals, representing reflections from stationary or nearly stationary objects, will not change significantly over a short period time and thus will produce a relatively stable history of clutter. Consequently, any sudden increase in received signal level would imply that a new object has now appeared in this cell.

This "clutter history" for a given clutter cell is also usually averaged, using weighting factors, with current clutter levels being observed in other cells in front of and behind the cell of interest. In some cases, current clutter levels in cells adjacent to the cell of interest also may be included in this weighted-averaging process. The yellow colored cells in Figure 14 provides a simplified example of cells included in the process. This weighting of clutter levels in adjacent cells enables the radar to adapt its performance to short-term variations in atmospheric wave propagation parameters and other environmental factors such as rain. Averaging of clutter cells is typically employed only when the radar is operated in a surveillance mode. When in surveillance mode, the radar will be sweeping over large volumes of airspace to determine how many aircraft are in that region and where they are located.

While clutter cells are used by radars to monitor clutter in the field of view, actual aircraft tracking employs "resolution cells." Resolution cells are generally smaller than clutter cells to enable the radar to accurately establish the actual position of an aircraft. Figure 15 illustrates the relationship between clutter cells and resolution cells. Here, the clutter cell is assumed to be 6 km in range length and 1 degree wide in azimuth angle. In this hypothetical example, each clutter cell contains 6 resolution cells 1 km in range length with the same 1 degree angular width.

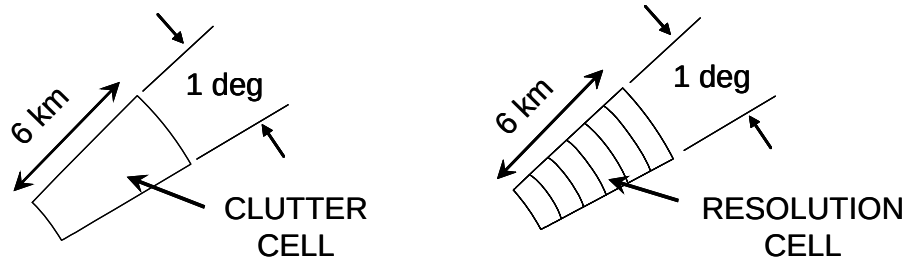


Figure 15. Relationship between clutter and resolution cells

If this hypothetical radar were a 2-D radar with an operating range from 6 to 600 km over a 360-degree field of regard, there would be 35,640 separate clutter cells that the radar processor would have to retain, and update the history of, with every sweep. If, instead, it were a three-beam radar with individual clutter maps for each beam, the number of clutter cells would increase to 106,920. As this example indicates, radar processing loads are very dependent upon the size and number of clutter cells employed for the clutter map.

As mentioned previously, the accuracy with which the radar can track the position of an aircraft depends upon the size of the resolution cell. In this example, the 2-D radar would be able to locate a non-cooperative airplane to only within a fraction of 1 km and 1

degree of its exact position depending upon signal-to-noise ratio. Additionally, it would be unable to tell if there is more than one aircraft in that small region since its tracking ability is based only on detecting an above-threshold level of signal return in a given resolution cell. Thus, a precision flight team flying in very close formation could appear to the radar as a single target without other aids such as transponder returns.

This report noted earlier that certain types of air defense radars have the capability to track individual aircraft. These are generally 3-D phase-array radars, but other arrangements are possible as well. When operated in this mode, the radar will focus an individual radar beam on the aircraft of interest much like a spotlight is used to illuminate a small area on a stage. Rather than employing "clutter maps" as described above, such target tracking systems often employ a "background averager" methodology to reduce the impacts of clutter around the target. With this technique, the radar electronics and processor systems will create a relatively small "sliding window" that is passed over the volume of airspace where the target is located. Unlike a clutter cell, these sliding windows are typically on the order of a few resolution cells in size. For the Figure 15 example, a two-cell size window could be "slid" over a few cells in front of and a few cells behind the resolution cell of interest to establish a "background" level of average clutter in that small zone. That is then used to set a clutter threshold level subsequently employed in the target tracking algorithm.

Note that a key difference between a clutter-map approach and the background-averager techniques is that a clutter map will be based on clutter levels observed over multiple sequential scans, whereas the "clutter levels" determined by a background averager are based only on observed clutter in the present scan and thus are a measure of "instantaneous" clutter surrounding the target.

Moving Target Indication/Moving Target Detection Principles.

Moving target indicator (MTI) and subsequently moving target detection (MTD) techniques have been developed to assist in the process of separating radar returns from moving objects from those produced by stationary items. A radar employing the simplest form of MTI compares two consecutive received pulses. The first pulse is stored in memory and is subsequently subtracted from the second received pulse. Consecutive return pulses from a nonmoving object will appear almost identical. Thus, subtracting one pulse from the other produces a near-zero net result. On the other hand, the Doppler shift from a moving target will have a relative change in the phase between consecutive pulses. In this case, subtracting the first pulse from the second does not yield a near-zero result. The remaining signal from the moving target is then processed to determine particular characteristics about the moving target, such as target speed and direction. This method is called filtering, where zero- (or low-) Doppler frequency signals are rejected but high-Doppler frequency signals are passed for further processing. There are alternative MTI filters that process more than two pulses, but in general they are limited to five pulses or fewer.

While MTI filters cancel the stationary land clutter, they do not provide good performance against moving clutter like rain. They also do not provide an indication of the moving target's radial velocity. Such performance can be obtained using banks of Doppler filters. Typical designs use cascaded filtering systems, where MTI is used to

remove most of the very strong land clutter and banks of Doppler filters are used to provide improved detection in rain and improve estimates of the target's radial velocity.

With the development of digital technology in the mid-1970s, several versions of this technique were developed and implemented in laboratories. By the late-1970s, improved systems were developed and procured to replace the older radars then being used for long-range air surveillance. A similar Doppler radar approach to address the short-range air surveillance needs was also developed. This particular radar used an MTI followed by a bank of specially weighted Doppler filters to provide near-optimum detection of moving targets. It also employed a zero-Doppler filter that passed the land clutter, but used a clutter map to float the detection threshold just above the land clutter return. This clutter-map technique prevented the land clutter from being detected, but provided "super clutter visibility," the ability to detect stronger aircraft returns over areas of weak stationary land clutter. This enhanced radar-processing technique was subsequently called a "Moving Target Detector" (MTD) method. With the increased use of digital hardware, modern radar signal processing could now create near-optimum Doppler filters directly.

Doppler filters do have drawbacks and limitations. For instance, Doppler filters also have side lobes analogous to the range side lobes in pulse compression waveforms. Most current air defense radars are designed to use a low-Doppler side lobe weighting such that the Doppler side lobes of one aircraft are below the noise level and do not inhibit the detection of another aircraft in the same range cell. However, since the clutter models used in the design and procurement of these radars did not provide any strong moving-clutter sources, the Doppler side lobes of some of these radar filters will be inadequate in the presence of strong moving clutter.

The output signals of the Doppler filters will still contain noise and clutter, as well as targets. The detection and track initiation process is started when a detection threshold is exceeded by one of the output signals. Since a radar has limited resources for performing the detection process, it is desirable to limit the tracking processes initiated by noise and clutter (false alarms) while allowing all target signals to cross the detection threshold. Modern radars are designed with resources to handle a limited number of false alarms and make use of processing that tries to float the detection threshold just above the noise and clutter, but low enough to detect the presence of an aircraft target. This processing is called Constant False Alarm Rate (CFAR) processing. The specific objective of CFAR processing is to set the detection thresholds so that the radar can successfully track the most challenging targets of interest while keeping false target declarations (false alarms) due to noise and clutter at a constant but manageable rate.

The two figures of merit that are used to rate the detection ability of a radar are probability of detection (P_d) and probability of false alarm (P_{fa}). Probability of detection is the likelihood that a target is detected when a target is present. Probability of false alarm is the likelihood that a target is detected when no target is present. Note that a third option, the probability that a target is not detected when a target is present, is also possible. This is called probability of miss (P_m). Since P_m is directly related to P_d by the equation: $P_m = 1 - P_d$, only probability of detection and the probability of false alarm are required to specify CFAR performance.

In the CFAR processing scheme, a constant P_{fa} is established for the radar. Typical values for P_{fa} range from 10^{-4} (1 false alarm in 10,000 samples) to 10^{-6} (1 false alarm in 1,000,000 samples). A typical cell-averaging CFAR routine uses values from either the clutter map or the background averager to estimate the clutter and noise background. The threshold for target detection is then set at a level above the average background, based on the clutter and noise statistics, to ensure a very low probability that a background signal will cross the threshold and be declared a target. This processing does presume that all the received signal values have the same noise and clutter statistics as the cell under test and that the values used to determine the threshold level do not contain a target.

Target Declaration and Tracking

Once a detection threshold is crossed, the detection and track initiation process is started. This involves the estimation of the detected signal's range, azimuth, height, Doppler velocity, and other features. This information is passed to a tracker as a target file and the tracker prepares a filter to correlate this return with future returns to confirm the presence of a valid target. Once a track has been established, the tracker can predict the expected location of the target during the next scheduled beam in the target's direction and even instruct the radar to lower the detection threshold at the expected range, azimuth, and elevation to provide a higher probability of detection.

The trackers used in modern air defense radars have a large, but still limited, target-handling capability. Furthermore, multiple detections in the same range-azimuth-elevation volume create problems with track integrity. Therefore, it is important to limit the number and frequency of false alarms that are passed to the tracker. On the other hand, the most important criterion for air defense radar systems is the ability to provide an acceptable probability of detection, track initiation, and track maintenance for all targets within a certain range and within a specific velocity window. If a new clutter source is created that cannot be controlled by the radar's filtering and CFAR processing, target detection, track initiation, and track maintenance will be severely impaired in the vicinity of that clutter source. Maintaining a low false-alarm rate at the expense of sacrificing detection and tracking performance is not an acceptable option for air defense radars.

4. CHARACTERISTICS OF WIND TURBINES APPLICABLE TO RADARS

Modern SOA "utility-class" wind turbines consist of three major elements, as shown in Figure 16. The actual power-generating unit is located in a nacelle mounted at the top of a vertical column. Most columns today are tapered hollow cylindrical structures fabricated from steel. The height of the tower is, at times, adapted to the specific site conditions where the turbine is to be located. Increasing tower height can position the turbine blades in more favorable wind conditions but conversely can increase construction costs. Table 1 provides representative tower heights for some common SOA wind turbines. The towers of the wind turbines tested at Fenner, NY, were approximately 113 m tall. From the perspective of a radar, the tower will appear as a stationary reflector with no Doppler.

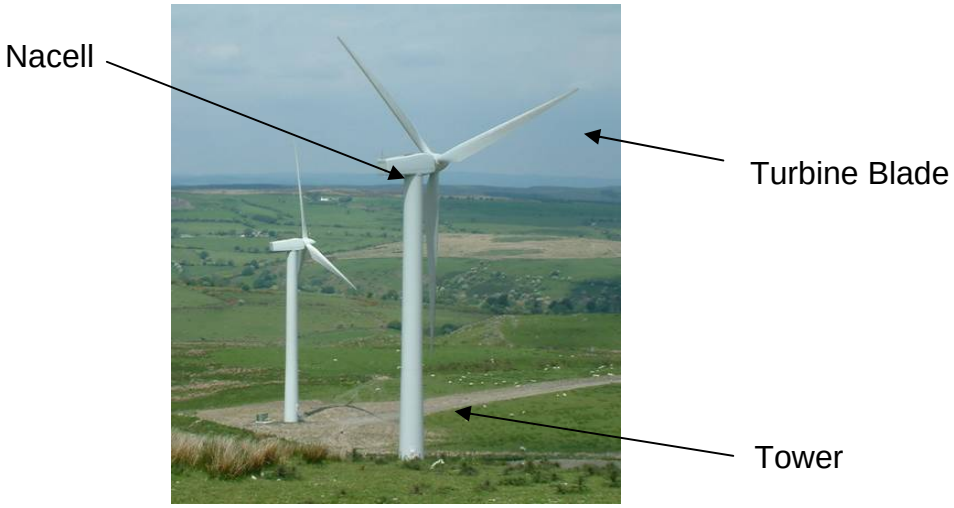


Figure 16. Picture of SOA wind turbines located in Wales, UK

The nacelle houses the power generator. For the wind turbines at Fenner, NY, the nacelle is approximately 10 m long, 4 m wide, and 3 m high. In SOA turbines, the nacelle can rotate a full 360 degrees to enable the turbine blades to face into the wind and provide maximum efficiency. Rotation rates for the nacelle tend to be relatively low. Thus the nacelle will appear to the radar as a virtually stationary object even when rotating. The nacelle housing may be fabricated from a metal or glass-reinforced plastic (GRP) to reduce its weight. Materials such as GRP can be partially transparent to rf waves. This means that some of the radar energy striking the nacelle surface can be transmitted to and reflected by the components within the nacelle. Since the majority of these internal components will also be nearly stationary (moving only when the nacelle rotates) these internal reflections should have only a second-order impact with little apparent Doppler.

The turbine blades are large, aerodynamically shaped structures that operate on the same principle as the wing of an airplane. In accordance with Bernoulli's Law, the flow of air over the surface of the turbine blade creates a pressure differential due to differences in flow path length. This pressure differential creates a net force which, in the case of the turbine blades, causes them to rotate. In SOA turbines, the blade angle of attack is usually computer controlled to maximize power production while maintaining blade rotation rates within a relatively narrow range.

Typical SOA turbine blades are fabricated using GRP and can include surface-mounted metal inserts and internal wiring for lightning protection as well as internal damping systems to control blade vibration. Again, due to the partial transparency of GRP, the internal elements within the blade can serve as secondary reflection sources for radar waves.

Most SOA turbines, including those tested at Fenner, NY, are "upwind" designs. In this arrangement, the nacelle rotates so that the blades always remain on the windward side of the tower, thus providing the blades an undisturbed flow of air. As indicated in Table 1, blade rotation rates generally fall within a speed range of approximately 10 to 20

rpm. For the two GE systems listed in Table 1, tip velocities fall in the range of 40 to 80 m/s (78 to 158 knots). Faster rotation rates, and thus tip velocities, are generally avoided to limit centripetal acceleration forces and to minimize generation of acoustic noise.

The significant physical size of the turbine blades results in a substantial RCS target irrespective of whether the blades are viewed face on or edge on by a radar. The tip velocities for these blades fall within a speed range applicable to aircraft. Consequently, the turbine blades will appear to a radar as a "moving" target of significant size if they are within the radar line of sight. The following section provides specific technical data on the RCS and Doppler characteristics for a 1.5 MW wind turbine based on field testing conducted at Fenner, NY, in May 2006.

DOD-Sponsored Field Testing of an SOA Wind Turbine

The first comprehensive effort to measure the RCS and Doppler characteristics of an SOA wind turbine reported in the literature [5] was performed by QinetiQ, a research organization in the UK. Sponsored by the UK Department of Trade and Industry, QinetiQ performed analytic modeling, compact range (scale model) tests, and actual field measurements of SOA turbines under that effort. QinetiQ's results documented that SOA wind turbines possess a significant RCS signature and create Doppler frequency shifts that will impact the ability of a radar to distinguish them from actual aircraft.

While this report provided important insights, the field test data were taken at only a single frequency, 3.0 GHz (S-band), with only the upper portion of the tower in the line of sight and at just one look-up angle. It also did not measure behavior when two or more turbines were in the line of sight to determine whether or not effects added in a linear manner. Instead, QinetiQ employed compact range testing and analytic models to evaluate some of these other factors. However, it is well recognized that compact range testing is very difficult to perform accurately for such large structures due to the difficulty in replicating fine details at the extremely large scaling factors that are required. Thus, their ability to predict with confidence behavior for other commonly employed radar bands is limited. Finally, all the QinetiQ data were only available in the form of charts and tables. This format is useful in describing behavior but inadequate as a source of data to directly insert into radar performance models.

Consequently, the Department, as part of this study, undertook an effort to create a digital database of actual radar signatures for an SOA wind turbine for all of the common radar bands. This testing was performed using the Air Force Research Laboratory's (AFRL) Mobile Diagnostic Laboratory (MDL) (Figure 17). The MDL is an SOA radar signature measurement and characterization van. It has been in use since 1997 to measure the radar reflectivity of aircraft (B-2, F/A-22) and, recently, to characterize the Space Shuttle Orbiter Discovery for susceptibility to radar interference prior to returning to space. It is currently certified to perform radar measurements to the most stringent national standards, ANSI-Z-540-1994-1.

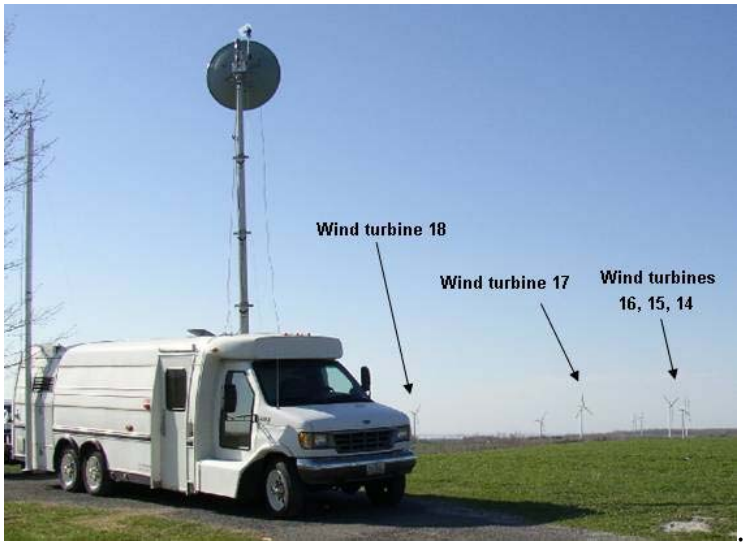


Figure 17. AFRL Mobile Diagnostics Laboratory measuring wind turbines at Fenner, NY

The wind farm at Fenner, NY, was selected for the testing site because it contained 20 modern GE 1.5 MW wind turbines, was located in close proximity to the AFRL Rome Research Site, included both locally flat and rolling terrain combinations typical of many proposed U.S. wind farms, and had co-located GE personnel. The cooperation of GE in providing access to turbine operating data during the test period was vital to the success of the measurement campaign and is gratefully acknowledged. Figure 18 provides a map of the overall layout of the wind farm at Fenner, NY, with red circles employed to indicate the turbines measured during the testing.

RCS and Doppler characteristics were obtained for a total of 10 different wind turbines tested during the 10-day test window from 29 April 2006 through 9 May 2006. A total of 479 individual calibrated measurements of turbines at L-, S-, C-, and X-bands[*] for both horizontal and vertical polarization were obtained. Figure 19 provides a graphical representation of the data obtained as a function of the approximate radar aspect angle to the axis of the turbine and radar frequency band (L-band: blue, S-band: yellow, C-band: green, X-band: orange).

The test procedures, samples of test data, and calibration methodology are documented in a report [6]. The full data set, in a digital format directly employable in radar analysis routines, has been made available to U.S. radar contractors and government-sponsored researchers.

[*] The test frequencies used for these bands were 1.3 GHz, 3.3 GHz, 6.8 GHz and 9.7 GHz, respectively

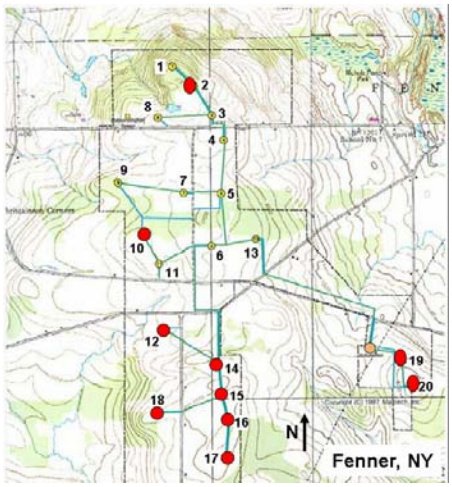
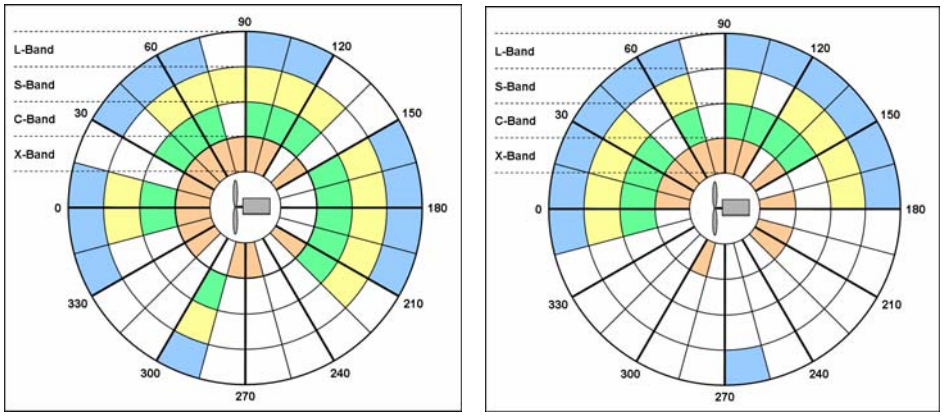


Figure 18. Layout of the wind farm at Fenner, NY, and locations of the turbines tested



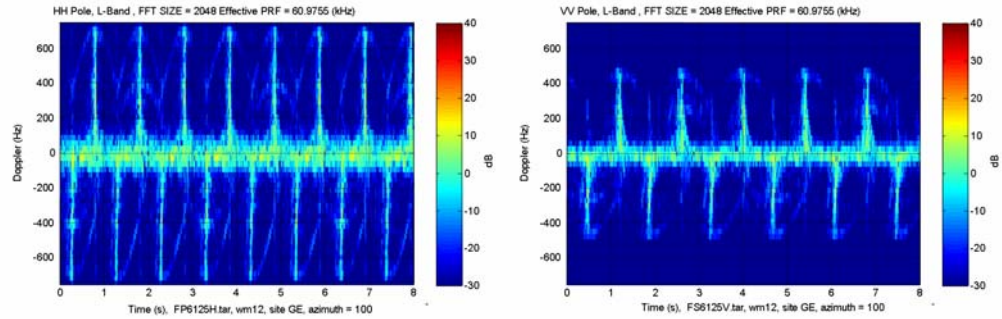
Vertical Polarization Horizontal Polarization

Figure 19. Graphical representation of data obtained during field tests at Fenner, NY

Figure 20 provides one example of the actual measured Doppler characteristics for one of these turbines. These particular results were obtained at L-band, observing the turbine blades almost edge on. Each positive peak represents the Doppler behavior as each blade rotates into the line of sight while moving toward the top of its arc of rotation. The negative peak that follows is produced by the change in Doppler shift as the blade passes below the center of rotation and begins to move away from the radar.

Although difficult to see in this illustration, there is also a second, fainter return at twice the apparent maximum Doppler shift. This signifies a “multi-bounce” reflection of the radar wave. Multi-bounce of this nature occurs when the radar wave is reflected off two different surfaces with relative velocity to one another before it returns to the radar receiver. In the case of wind turbines, multi-bounce can occur, for example, when a radar

wave is reflected by the turbine blade, then the turbine tower, and then again by the blade before returning to the radar.



Horizontal Polarization Vertical Polarization

Figure 20. Example of Doppler characteristics of a wind turbine at L-band

Figures 21 and 22 provide graphical summaries of the RCS and "apparent velocities," as deduced from Doppler-frequency shifts, for some select cases. The RCS values indicated on Figure 21 are dominated by the tower and nacelle at the lower look-up angles. However, at the larger look-up angles, where scattering from the rotating blades dominates, the RCS values are comparable to or greater than typical RCS values for aircraft. As mentioned earlier, a full summary of test results are provided in [6].

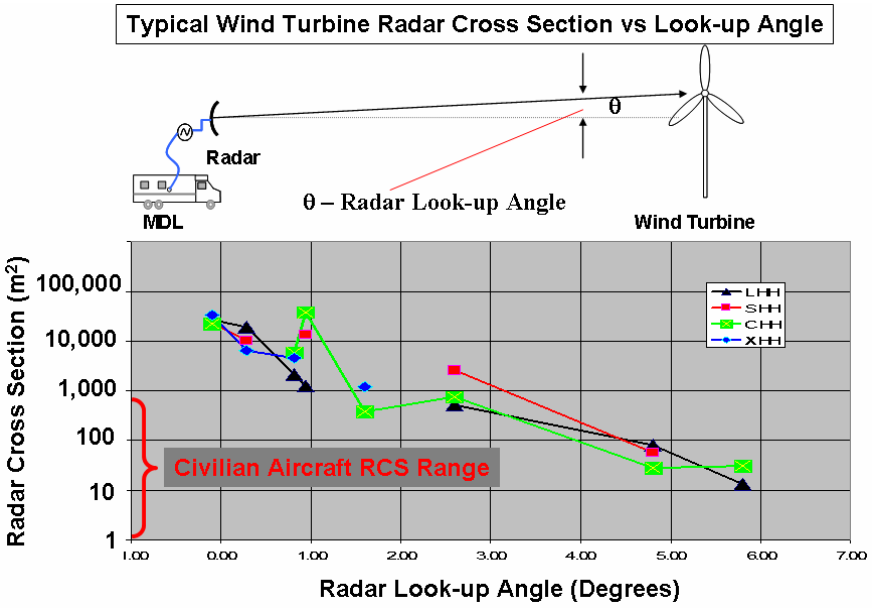


Figure 21. Graphical summary of RCS measurements for L-, C-, S-, and X-bands

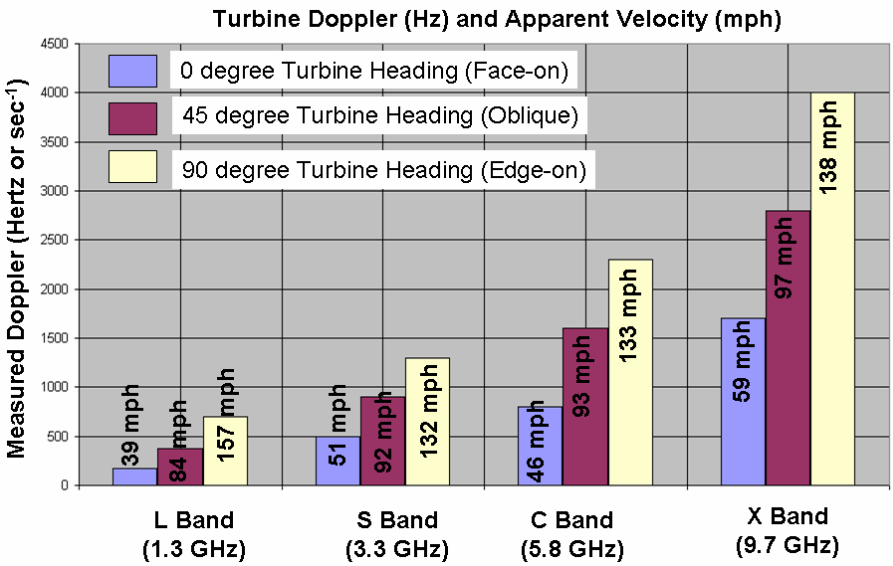


Figure 22. Doppler frequencies and derived tip velocities from measurements at L-, C-, S-, and X-band frequencies

5. OBSERVATIONS OF IMPACTS ON RADAR SYSTEMS

During the past several years there has been an increased effort to explore and document impacts that wind turbines have on operational air defense and ATC radar systems. This has been a direct result of the increase in the number of wind farms already built, the number of wind farms now being proposed for construction, and the number of wind turbines included in these wind farms, as well as the dramatic increase in their physical size. The first documented structured flight trials and analyses of these potential impacts were conducted by the UK Ministry of Defence (MoD) in 1994 [7]. This set of trials conducted ground measurements and flight trials using an ATC radar located near a small wind turbine farm. Starting in 2004 and continuing through this year, the UK MoD has sponsored an extensive series of subsequent trials employing both mobile air defense and ATC radar systems placed within a radar line of sight of several wind farms. Behavior observed during the UK tests correlates well with observations made at an operational U.S. long-range air defense radar site where wind farms have been constructed within radar line of sight.

United Kingdom Flight Trials and Analyses

The 1994 trials undertaken by the UK MoD were conducted to understand the characteristics and impacts of the radar interference observed immediately following construction of a wind farm consisting of fourteen 300 kW wind turbines located about 7 km away and in the radar line of sight of a Watchman ATC radar. The significant interference that was being observed in the radar primary surveillance mode of operation had led to a degradation in detection performance.

This was a relatively small-scale trial that involved flying a Sea King Helicopter over and around the wind turbines. This trial was structured to focus on the shadowing

effect that the turbines could have on targets just above or behind the wind farm, to estimate the RCS of the turbines and to investigate the Doppler shift they would produce.

The primary conclusion of that study [7] was

> Wind turbines cause interference to primary surveillance radars. The responses appear as valid targets on the radar display. Responses cannot be inhibited using normal MTI based techniques since they are generated by a moving structure.

As a result of the trial, the MoD decided it needed to be consulted on all proposals for wind turbines closer than 60% of the maximum instrumented range of military radars. This 60% range was translated to be within 66 km (35.6 nmi) of an ATC radar and within 74 km (40 nmi) of an air defense radar.[*]

In 2004, the policy of carefully scrutinizing wind turbine proposals so far away from operational radars was increasingly being questioned by wind farm developers, especially in light of much less restrictive constraints imposed by other European countries. Consequently, the UK MoD commissioned additional studies to ascertain the impact of wind farms on air defense and ATC radar systems in more detail. The studies were conducted in 2004 and 2005 by the Air Command and Control Operational Evaluation Unit (Air C2 OEU)[**] of the Royal Air Force (RAF) Air Warfare Centre (AWC). Details of the flight trials, results, and recommendations are presented in the three RAF reports completed in 2005 [8,9,10].

The first of these trials took place over two periods, 28–29 August 2004 and 14–16 September 2004.[***] Several different types of aircraft (Hawk T Mk 1A, Tucano T Mk 1, Dominie T Mk 1A, and a King Air) flew sorties over and around two wind farms within the radar line of sight of a mobile Commander AR327 - Type 101 air defense radar (Figure 23). The study observed shadowing (masking the target when directly behind the wind farm), clutter (unwanted primary radar returns), and tracking interference (inability of the system to initiate and maintain a track on a target aircraft because of the shadowing and clutter effects). Observations during the trial showed significant obscuration of primary radar returns above wind turbines. This effect was observed independent of the height of the aircraft throughout the full height range used for the trial (2000 ft - 24,000 ft above mean sea level) and represented the most significant operational effect of wind turbine farms on air defense operations. Figure 24, for example, provides a representative result from this trial. In this figure, the blue circles denote where both the primary radar return and the SSR return agreed on the position of the test aircraft. The purple diamonds denote where the location of the plane could be determined by SSR but was not detected by the primary radar. The yellow dots denote other returns by the primary radar that do not correspond to an actual aircraft.

[*] The origin of the 74 km threshold is not clear since it is significantly less than the 60% maximum instrumented range of a typical air defense radar.

[**] Designation of this group was recently changed to Air Command and Control, Intelligence, Surveillance and Reconnaissance Operational Evaluation Unit (Air C2ISR OEU).

[***] Hereafter referred to as the Fall 2004 trial

Figure 23. Commander AR327 - Type 101 air defense radar

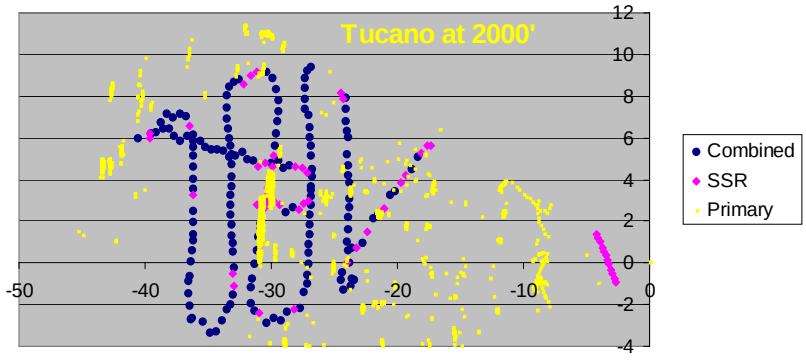


Figure 24. Example of data obtained during Fall 2004 flight trial

These results provided incontrovertible evidence that the ability to track aircraft by primary radar return alone was degraded over wind farms. In addition, it revealed that numerous false primary radar returns were occurring over the wind farm. Finally, it was found that the degradation in ability to track aircraft and the appearance of false returns occurred at all altitudes. This was an unanticipated result as the Type 101 radar is a multi-beam phased-array radar with separate beams employed to cover specific altitude regions. The specific conclusions of the report [8] on this trial included, in part:

> Overall, the Trial established that there is a significant operational impact of wind turbines in line of sight of AD (Air Defense) radars. This effect was independent of radar to turbine range and aircraft height. Where a target aircraft does not squawk SSR it is highly likely that the associated track would drift when the aircraft overflies a wind turbine farm or flies through the shadow area. Provided that the aircraft does not manoeuvre and the track is not seduced then the system should resume normal tracking as soon as primary radar returns are available. The existing MoD guideline safe-range for wind turbine farms of 74 km from AD radar when in line of sight was deemed to be irrelevant. Line of sight was assessed to be the only relevant criterion when considering objections to wind farm development.

As a result of this trial, the MoD replaced the 66 km and 74 km thresholds with a requirement for consultation on all wind development proposals within the radar line of sight of an air defense or ATC radar, regardless of distance.

The second of these studies was conducted over three separate periods, 3–4 November 2004, 23–25 November 2004, and 13–14 December 2004. This trial was very similar to the Fall 2004 trial described above but was intended to determine the effect that wind turbine farms had on ATC radars. As in the prior trial, several aircraft types (Hawk T Mk 1A, Tucano T Mk 1, Dominie T Mk 1A, Griffin HT1, and Gazelle AH Mk 1) flew sorties over and around several wind farms within the radar line of sight of a mobile Watchman ATC radar. This trial confirmed the presence of shadowing effects for the Watchman. Also, throughout the trial, clutter was displayed to the operator as a result of the rotation of the turbines blades. This displayed clutter was assessed as highly detrimental to the safe provision of air traffic services.

The third trial took place from 29 March 2005 through 8 April 2005 (Spring 2005 trial). This trial looked in greater detail at the obscuration above wind farms that was observed in the Type 101 air defense radar employed in Fall 2004 trial. Again, several different aircraft types (Hawk T Mk 1A, Tucano T Mk 1, and Dominie T Mk 1A) were flown over wind turbine farms within the radar line of sight of a Type 101 air defense radar. The results of this trial supported the theories formed as a result of the previous trials and increased understanding of the causes for the loss of detection of aircraft above wind farms.

Specifically, these tests demonstrated that the clutter produced by wind turbines directly impacted the performance of not only the "ground" (lowest elevation) lobe of the radar but also the shared aloft clutter map and the side lobe beams with line of sight to the turbines. Figure 25 illustrates a small section of the clutter cells for this radar as measured during the trial. The designation of the types of radar returns employed in this figure are identical to those employed in Figure 24.

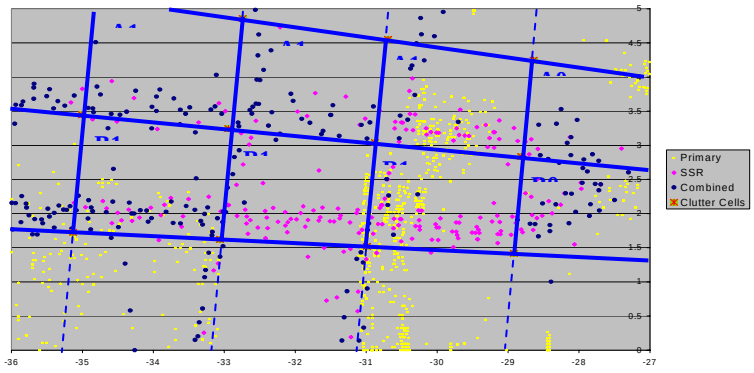


Figure 25. Sector of clutter cells superimposed on flight trial data obtained during Spring 2005 flight trial

As a result of the understanding and insights gained from these trials, the MoD and a few defense contractors conceived some potential mitigation concepts to reduce the problem of target obscuration about wind farms. Two additional studies were performed in May and June of this year to examine these mitigation concepts for 2-D radars in more detail. The concepts and trial results will be discussed in more detail in Section 6 of this report.

The results presented in the UK reports clearly demonstrate degradation in the target detection and tracking performance of the primary radar for air defense and ATC radar systems. These flight trials constitute a reasonable set of operational tests to enable identification of the probable failure mechanisms when combined (as these were) with post-trial analyses. However, since by their very nature, they can only include a limited number of flight sorties, aircraft types, variety of deceptive maneuvers employed, and other relevant factors, they do not provide a sufficiently robust statistical database to enable quantitative computations to be performed in terms of actual reduction in probability of detection, increase in probability of loss of track, and increase in probability of false alarms. Only analytic tools able to incorporate wind turbine behavior as part of their input can accomplish that task. Such tools are currently unavailable.

Observations of Wind Turbine Impacts on U.S. Operational Radars

The testing described in the preceding section involved only UK radar systems. Those tests demonstrated that wind farms would disrupt the ability to track aircraft using only primary radar returns through two distinct phenomena. The first was that the presence of a number of turbines within a limited zone would produce shadowing due to diffraction effects. This is expected based on well-established physics principles. The second disruption was due to increasing clutter levels, which adversely impacted the clutter cell threshold levels and background average performance in ways that inhibited the ability of the radar to distinguish aircraft from that clutter. From a behavioral perspective, the UK systems operate on the same basic principles as U.S. air defense and ATC radars. Thus, it would be reasonable to expect that similar performance degradation would occur for U.S. systems.

There have been two limited opportunities where DOD has been able to obtain some data from testing of operational U.S. long-range air defense radars to investigate this question. These were at King Mountain, TX, in 2002 and Tyler, MN, in 2004. Results from both of these are described in the following sections.

Testing Performed at King Mountain, TX

King Mountain, TX, provided a fledgling opportunity for a U.S. radar optimization team to explore performance of an air defense long-range radar before and after construction of a wind farm within the radar line of sight. Upon learning that a very large wind farm was proposed for construction within the radar line of sight of the Air Route Surveillance Radar-4 (ARSR-4) radar located at King Mountain, TX, a joint team from the USAF 84th Radar Evaluation Squadron (84th RADES) and the Federal Aviation Administration (FAA) conducted a very limited number of flight tests before and after partial construction of the wind farm. The ARSR-4 is a modern long-range radar with sophisticated clutter-control automation.

The wind farm proposed for construction was to consist of 214 1.3 MW turbines arranged in several nearly linear groups at distances running from 7 to 20 nmi from the radar over an azimuth sector spanning from 80 to 180 degrees with respect to north. Figure 26 provides a topographical view of the relative locations of those turbines with respect to the King Mountain radar. Approximately 80 of the 214 proposed turbines had been installed at the time that the second set of flight tests was performed.

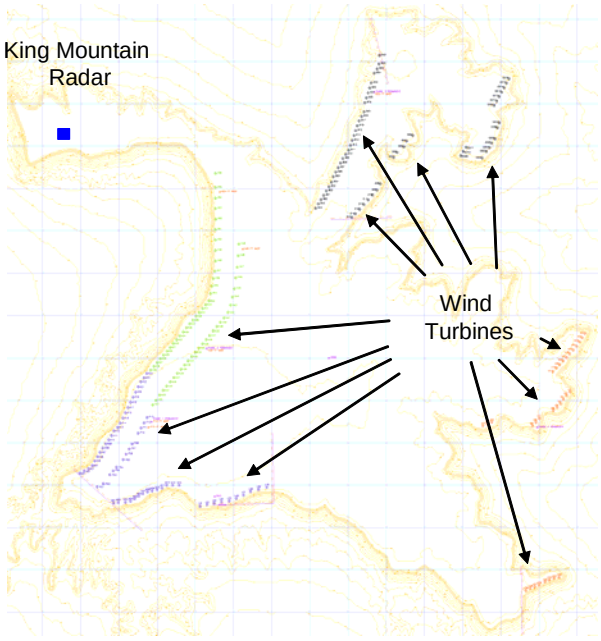


Figure 26. Location of wind turbines with respect to ARSR-4 radar at King Mountain

The U.S. team decided to employ tangential flight paths 50 nmi and 175 nmi away from the radar. Thus, the test aircraft were 30 to 155 nmi away from the turbine closest to the flight paths. These flight paths had been selected because the team had anticipated that the primary impact of the wind turbines would be shadowing and that this effect would extend a considerable distance beyond the turbines.

At the time of this "first of its kind" U.S. field test, the U.S. team was not aware of the 1994 flight trials that had been conducted by the UK MoD. Thus, they were not able to benefit from the insights provided by the UK data or to incorporate lessons learned during the UK tests in the development of their plans. The unfortunate consequence was that the very few dedicated flight trials they had funding to perform were too distant from the turbines to assess actual impacts. As indicated in Figure 6 and demonstrated in the 2004 and 2005 UK flight trials, shadowing is an effect that is localized to the vicinity around a wind farm. Additionally, the UK flight trials revealed that the predominant impact of a wind farm is to the increase clutter levels in the clutter cells around their location, thereby artificially raising detection and tracking thresholds as well as producing false target returns. By their very nature, the distant tangential flight paths employed in the King Mountain tests did not result in the aircraft flying even near those clutter cells containing the wind turbines and thus would never reveal this type of impact.

Not surprisingly, these shortfalls in the testing methodology employed at King Mountain led the team to erroneously conclude that wind turbines in the radar line of sight would not adversely impact radar performance [11]. In actuality, the most that

might be concluded from those tests was that wind farm impacts on the ability of a radar to track objects at significant distances beyond the wind farm are slight. Results obtained from flight testing at Tyler, MN, would, however, lead to different conclusions regarding impacts of wind farms on radar performance.

Testing Performed at Tyler, MN

In April 2004, the 84th RADES and the FAA performed a radar evaluation and optimization of the ARSR-2 radar at Tyler, MN [12]. Upon arriving at the site, the team discovered that several hundred wind turbines had been built within a 30 nmi radius along a ridge line running approximately North-West (NW) to South-East (SE). The Tyler ARSR-2 is also located on this ridge line. Thus the wind farm straddled the radar. The closest turbine was approximately 0.75 nmi from the radar. Figure 27 is a picture of a portion of that wind farm taken from the platform where the radar is mounted. Figure 28 provides a topographical view of the relative locations of the majority of the turbines with respect to the Tyler radar.

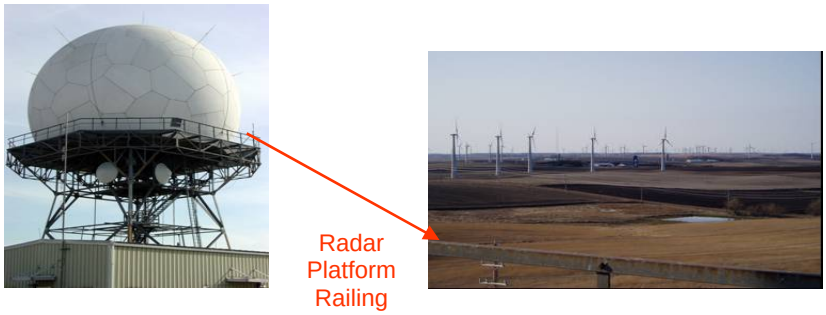


Figure 27. Picture of wind turbines and ARSR-2 radar at Tyler, MN

During the radar evaluation and optimization process, the team found that significant "constraints" had to be put in place in the radar to compensate for the elevated clutter levels created by the wind turbines. The constraints employed required that a target was not declared unless a predefined number of sequential positive returns had been observed. This is also known as a runlength discriminator. When employed, a typical constraint number is on the order of ten to sixteen sequential returns. The Tyler radar constraint had to be set at 21 for ranges from 0 to 15 nmi and at 18 for distances from 15 to 25 nmi to retain some useful capability. Use of such high runlength discriminators severely degrades radar performance; in particular, the ability to track low RCS targets.

A few dedicated flights were conducted after the radar had been optimized to evaluate its performance. One flight path used in these tests was approximately in the North-North-East direction and thus at an offset angle of approximately 70 degrees from the axis of the wind farm. Track 5 in Figure 29 demonstrates the degraded performance of the radar on April 20, 2004, when unfavorable weather conditions existed. The green segments of this track denote the portions of that flight track where the position of the aircraft determined from the primary radar return matched the position given by the SSR

system (beacon). The red portions of that track indicate where primary radar return was lost and aircraft position could only be determined by beacon.

Figure 28. Location of wind turbines with respect to ARSR-2 radar at Tyler

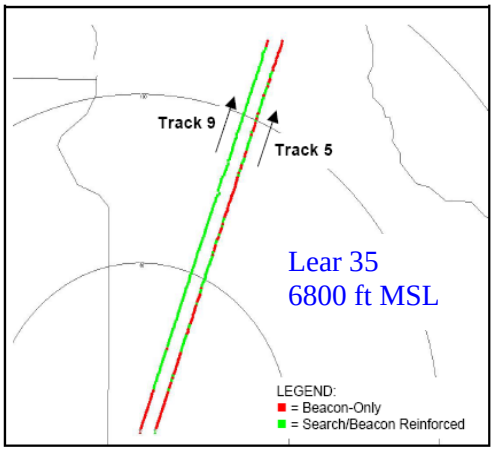


Figure 29. Tracking performance of ARSR-2 radar over wind farm at Tyler, MN

In contrast, Track 9, flown on April 21, 2004, when there were no unfavorable weather conditions, demonstrates a more typical level of performance expected for such an air defense radar. There is a small segment of lost track capability for Track 9 when the aircraft is very close to the radar. This track loss was attributable to the imposed constraints.

The clutter impacts observed at Tyler, MN, are consistent with the behavior observed in the multiple flight trials conducted by the UK in 2004 and 2005. Specifically,

the radar experienced elevated clutter levels in the NW and SE directions corresponding to the locations of the wind turbines. Since the Tyler radar is an operational radar, constraints, desensitizing the radar, needed to be imposed to retain a degree of acceptable functionality.

The Tyler flight tests also revealed a collateral impact when constraints of such magnitude are imposed to accommodate wind farm induced clutter for at least this particular radar. Specifically, aircraft tracking capability in the presence of adverse weather conditions will be degraded even for flight paths not along the axis of the wind farm. This indicates that remedial measures employed to mitigate one challenge can create other forms of degradation.

Other Observations About U.S. Radar Systems

It has been noted by some individuals that a number of other U.S. radar systems have wind farms within their radar line of sight yet there are no "problems" being reported for them. As such, the question is raised as to why some air defense radars are so prone to this and others are not.

In point of fact, those other radars with line of sight to large wind farms are generally ATC radars. Two other radars sometimes mentioned in this context are space surveillance radars employed to monitor objects in space. ATC radars can rely on both primary radar returns and SSR (beacon) returns to ensure safe airspace operations. As Figure 29 and the UK flight trials demonstrates, the presence of a wind farm does not appear to significantly affect the performance of SSR systems. This is not surprising since SSR systems are actually two-way communications systems between the "tracking radar" and the aircraft. As described earlier, the SSR unit sends out an "interrogation" pulse to the aircraft. The aircraft transponder then replies with its own independent signal to the SSR. Note that even the UK flight trials relied on SSR returns to document actual aircraft positions during the tests.

The DOD has obtained proprietary information for at least one U.S. ATC radar that provides documentary evidence that a large wind farm in the radar line of sight does cause significant loss of primary radar tracking capability for aircraft flying over that wind farm. Unfortunately, due to the proprietary nature of that data, the Department is legally prohibited from publicly sharing that information.

Comments Regarding Air Traffic Control and Weather Radars

Air defense and missile warning radars must be able to unambiguously detect and track all objects of interest by primary radar alone. Thus, these detection and tracking capabilities must be maintained whether or not the object being observed is "cooperative" in sense of providing SSR signals. This requirement is distinctly different than the primary radar tracking capability that may be required for an ATC radar. ATC primary radars are only one element of a system employed to ensure safe use of the U.S. airspace. Other elements of this system include use of SSR, flight rules, and published approach and departure procedures, to name a few.

The Department is but one of a number of users of U.S. airspace in this regard, sharing that use with others such as the commercial and general aviation sectors. The FAA has the responsibility to provide for and promote the safe and efficient use of U.S.

airspace. Since ATC radars are an integral contributor to that overarching mission, the Department does not believe it would be appropriate to independently evaluate how the presence of wind farms in the radar line of sight of those ATC radar could influence the air traffic management system. Instead, the Department is prepared, as one of multiple stakeholders, to work with the FAA in such evaluations and, as appropriate, develop mitigation approaches that would be mutually applicable to air defense and ATC radars.

In a similar manner, the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA/NWS) has the primary responsibility to provide weather forecasts for the United States. These weather forecasts do, in part, depend upon proper operation of the WSR-88D (NEXRAD) system of weather radars. The Atmospheric Radar Research Center at Oklahoma University (http://arrl.ou.edu) is currently conducting studies to examine potential impacts of wind turbines on ground-based weather radars for NOAA/NWS. As such, the Department defers to NOAA/NWS regarding assessment of potential impacts of wind turbines on ground-based weather radars. The Department, as a consumer of their product, is prepared to assist NOAA/NWS in development of mitigation measures where they have mutual applicability for air defense and missile warning radars.

6. POTENTIAL MITIGATION APPROACHES

The following sections will describe a number of potential mitigation approaches that could be employed to reduce or eliminate the adverse impacts wind turbines can have on air defense and missile warning radars. For the purposes of this section, the word "mitigation" is specifically defined to include either an approach that completely prevents any negative impact from occurring or an approach that sufficiently attenuates any negative impacts so that there is no significant influence on the capability of an air defense or missile warning radar. Additionally, it is noted that the ability to describe a technique as a potential mitigation is not equivalent to saying that this technique has been tested and verified. Significantly, only a few of the techniques described in the following sections have been proven to actually work and can be employed today. All of the others are best characterized as "works in progress" still requiring further development and field or analytic validation of effectiveness.

Line of Sight Mitigation Techniques

The performance of a radar will not be affected by objects that do not appear within its line of sight unless exceptional circumstances exist. With respect to objects projecting upward from the surface of the earth, such as wind turbines, radar line of sight is determined by four factors when there is no intervening terrain. These factors are the height of the focal point of the radar above the earth's surface, the height of the wind turbine, its distance from the radar, and how much the atmosphere will refract the radar beam. Figure 30 illustrates how these parameters interact. The yellow zone outlines the portion of the airspace that will be in the radar line of sight. Thus, the two turbines closest to the radar are in the radar line of sight. The third turbine, on the far right-hand side, is not. In fact, in colloquial terminology, this particular turbine would be described as being "below the radar."

Atmospheric refraction of the radar beam is indicated by the dashed curved line at the bottom of the yellow zone. Note that the curvature of the earth influences the line of sight. As an estimating rule (described in an earlier section of this report), radar engineers often use a “4/3rds earth” approximation to account for the effect of atmospheric refraction near the surface of the earth. When doing this, they multiply the radius of the earth by the factor 4/3 when performing the tangent line calculation to determine if an object is in a radar line of sight.

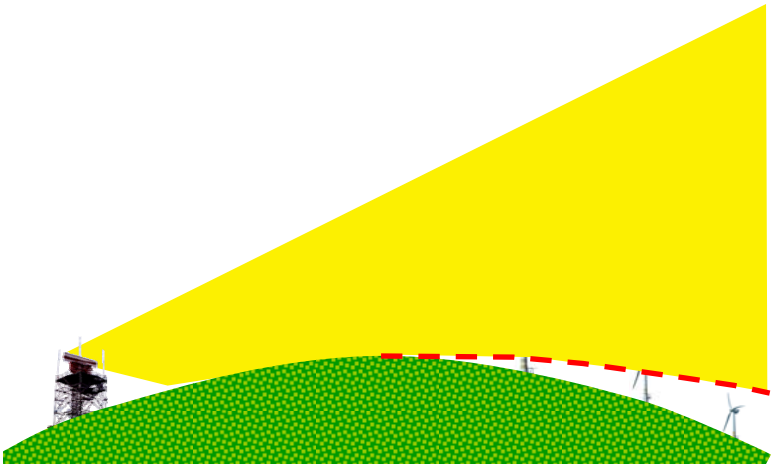


Figure 30. Illustration of “bald earth” line-of-sight mitigation approach

Figure 4 illustrated the basic geometry employed to estimate radar line of sight near the surface of the earth when using this approximation technique. Figure 31 provides an illustrative set of results that would be obtained using this method for the particular situation where the focal point of the radar is approximately 50 ft above the local elevation of the surrounding terrain. Note that in this case, a turbine where the tip of the blade at the apex of the arc of rotation is less than 300 ft above the local terrain elevation would need to be approximately 30 nmi away from the radar to be out of the radar line of sight. Turbines with lower peak elevations could be closer whereas those with blades extending higher would need to be farther away. This is a proven method of mitigation.

Figure 32 illustrates a line of sight mitigation when there is elevated terrain located between the radar and the wind turbines. This form of mitigation is sometimes called “terrain masking.” Note that here only the turbine closest to the radar will be in the radar line of sight. The turbine in the middle of the drawing is no longer in the line of sight due to the “masking” effect provided by the intervening terrain. The third turbine, on the far right, is not in the line of sight due to both terrain masking and distance from the radar.

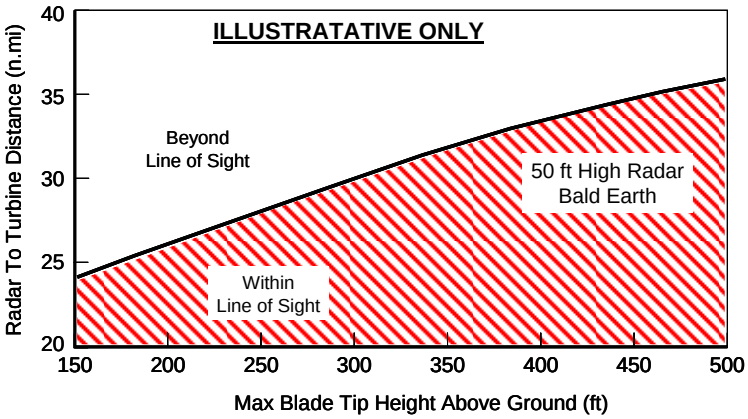


Figure 31. Illustrative results of line of sight distance offsets using a "bald earth" approach

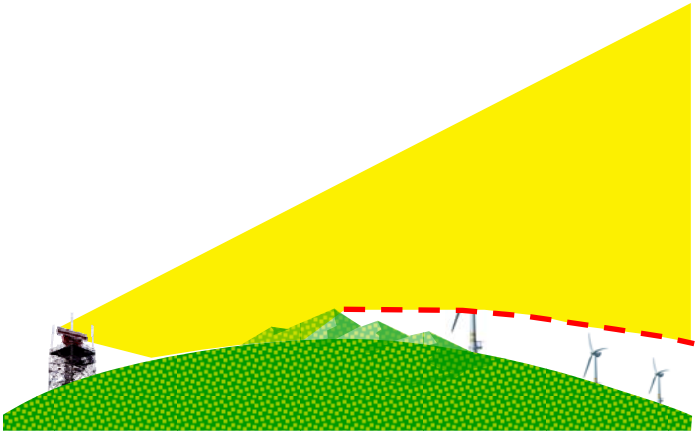


Figure 32. Illustration of "terrain masking" line of sight mitigation approach

Unlike the "bald earth" approach, there is no simple "back of the envelope" method to quickly estimate whether or not intervening elevated terrain will mask an item from a radar line of sight. In general, "beam propagation" techniques used in conjunction with terrain elevation databases must be employed to determine if this form of mitigation will apply. Figure 33 illustrates this type of analysis. This particular analysis was performed to determine if the wind turbines at Fenner, NY, would be within the radar line of sight of the research radar located at the AFRL Rome Research Site. In that case, the intervening terrain was very close to completely masking the wind turbines.

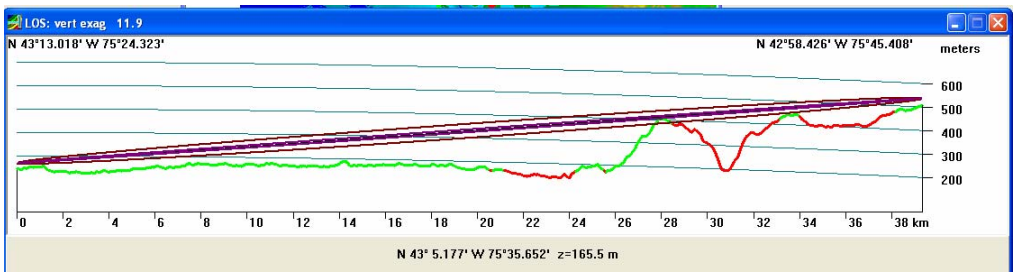


Figure 33. Illustration of "beam propagation" analysis to evaluate "terrain masking"

While not difficult to perform, these computations can be time consuming when multiple sites must be evaluated. This method is a proven mitigation technique and may be exploited, in select cases, to allow wind turbines to be constructed closer to air defense and missile warning radars than what the "bald earth" approach would permit.

"Terrain relief", a variant of the "terrain masking" mitigation approach, can be employed when the elevation of the radar is significantly greater than the elevation of the wind turbines. An example would be a radar located on a mountain ridge overlooking a valley that contained wind turbines. Those wind turbines, provided they are not located within either the main lobe or any side lobes of the radar, would not impact radar performance. Effectively, this is an alternative methodology to keep the wind turbines out of the radar line of sight. This is another effective mitigation technique that can be used today.

Returning to Figure 30, it can be noted that the middle turbine in that illustration is only partially in the line of sight of the radar. This raises the question of whether a portion of a wind turbine could be in the radar line of sight without causing significant degradation in radar performance. Analytic models able to predict the radar signature of a partially visible turbine and simulation tools capable of artificially injecting such signatures into operational radar processors would be needed to evaluate this potential mitigation concept. Software routines have been developed to predict radar signatures. These can be employed to develop appropriate models for wind turbines. The Department already has an effort underway to develop just such a model for the wind turbines tested at Fenner, NY.

Software routines also have been developed to enable aircraft radar signatures to be artificially injected into digital processors of modern operational radars. This enables assessments of the ability of that radar to detect and track aircraft under "real world" clutter and other environmental conditions. Following this paradigm, the Department has also initiated an effort to explore the feasibility of adapting such an approach to determine if representative wind turbine generated clutter could also be artificially injected. If such a methodology can be developed, it would enable air defenders to assess to what extent a wind farm proposed for construction within a radar line of sight would affect the probability of detection and the probability of false alarm for that radar. These are the critical factors air defenders must know to determine if a proposed wind farm in a radar line of sight would create an unacceptable degradation in their capabilities.

Until such models and tools are available, the potential mitigation approach of partially masking turbines must be categorized as unproven, requiring further development and validation testing.

Wind Turbine Radar Signature Suppression Concepts

The development and deployment of radar signature suppression technologies for military aircraft naturally leads to the question of whether or not a similar approach could be employed to suppress the radar signature of a wind turbine. An excellent discussion of a number of techniques that might be employed to accomplish this is available in a report prepared by Alenia Marconi Systems Limited in 2003 [13]. Thus, they are not discussed in detail here. Instead, two key points are noted.

First, as indicated in Figure 7, the RCS of an SOA utility-class wind turbine can exceed that of a long-haul wide-body commercial airliner such as the Boeing 747. The RCS of such an item would have to be reduced by 30 to 40 dB to be "relatively invisible" to most air defense and missile warning radars. This is equivalent to reductions on the order of 1/1000 to 1/10,000 of current RCS values. While lesser reductions in RCS may be beneficial, the absence of tools to enable RCS clutter values for wind farms employing suppressed signatures to be injected into radar processors means that there is no current capability to assess how effective this would be.

The second point is that such radar signature suppression methods generally require modifications to the shape of objects and use of special materials in their construction. Some of these may be relatively cost neutral for a wind farm developer. For example, increasing the angle of taper of the turbine tower will reduce its RCS and be unlikely to result in a significant change in cost. Use of a radar-absorbing material in the construction of the turbine blades, on the other hand, will significantly increase both first and life cycle costs as these materials are more expensive to procure and less weather durable than the GRP currently used.

As such, this approach ultimately becomes a cost-trade issue for the wind turbine manufacturer and the wind farm developer. Specifically, would the increase in costs to use radar suppression signature techniques counterbalance the possible increases in transmission line costs and losses resulting from locating those turbines a greater distance from an air defense or missile warning radar? Questions such as these should be addressed by the wind turbine industry and not the Department. To date, radar signature suppression techniques for SOA utility-class wind turbines have not been employed or field tested.

Thus, this potential mitigation approach must be categorized as unproven, requiring further development and validation testing.

Concepts for Radar Hardware/Software Modifications

A variety of approaches have been suggested for both hardware and software modifications to radars that would reduce their sensitivity to wind farm generated clutter. These include use of finer clutter cells, use of more and/or adaptive Doppler filters, use of special post-processor track file maintenance routines to prevent track drops, use of enhanced adaptive-detection algorithms, and use of special clutter suppression algorithms developed for other applications.

There is ongoing development work on some of these approaches being conducted by the radar industry under internal research and development efforts. In most cases, this work is focused on developing enhancements for existing products. Outputs from some of these development activities are being tested in "engineering" units, but to date none appear to have been deployed into operational units.

The Department is supporting these efforts by providing U.S. radar companies access to, and free use of, the database the Department obtained from the testing efforts conducted at Fenner, NY. In fact, this government-owned nonproprietary database was created for this specific purpose.

In May and June of this year, the UK MoD conducted independent flight trials of two proposed approaches developed for 2-D radars. Representatives from the Department were invited to, and did observe, portions of those trials. The impression of the Department's observers was that both approaches showed promise, but neither was fully successful.

Consequently, as a result of the above, it is concluded that all of the hardware and software approaches described above must still be categorized as unproven, requiring further development and validation testing.

Concepts for Gap Filler Mitigation Approaches

The underlying idea for this concept is exceptionally simple: if one radar cannot see an object due to obscuration created by a wind farm, then use a second radar that provides overlapping coverage. Figure 34 illustrates how such an arrangement would operate. The lines denote the limits of the areas beyond the blocking item where radar coverage would be inhibited. As indicated by this drawing, the radar zone of coverage for the radar on the left-hand side covers all the area blocked from the view of the radar on the right. Conversely, the radar on the right-hand side covers all the region where the view of the radar on the left has been blocked.

Coordinating two radars by software does present a number of challenges. First, a radar can locate the position of a target only within a finite level of accuracy determined by the size of the resolution cell. In the example, the resolution cells for one radar unit will never align with those of the other due to the offset positioning. Thus, inherent uncertainties are created in actual position when returns from one must be compared with returns from the other.

Second, it is unrealistic to expect that the radar beams from each unit will sweep the exact same area of interest at precisely the same moment. As such, relative target motion will always occur between the observations made by each radar. The coordination software would need to account for that as well.

If the "blocking area" is a wind farm, each radar will also experience false returns due to the rotation of the turbine blades and bleed through from the clutter map. There are no data available at present to determine if such false returns will be seen by both radars concurrently. If they are not, then the coordination software also will face the challenge of determining if the changes in observed position are due only to positional uncertainty and relative motion of the target or represent track "seductions" caused by false returns seen by one radar but not the other. This further increases the coordination challenge.

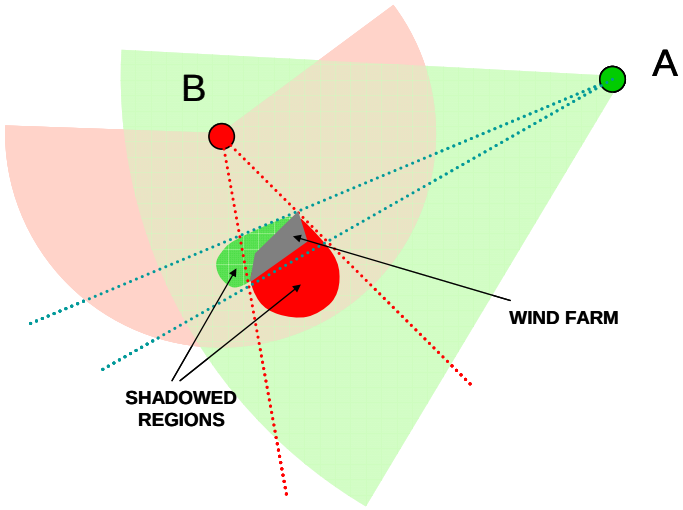


Figure 34. Overlapping radar coverage example

The Department is aware of only one study that explored such a concept in any detail [14]. This study concluded that multiple significant changes would be required to the radars that would be employed. Additional radar sensors would need to be procured, and the physical layout (shape) of that wind farm would need to be "optimized" from a radar perspective. Ultimately, the study concluded there would still be some negative impacts.

An alternate approach would be to employ a "gap filler" radar positioned within the wind farm but sufficiently high above the arcs of rotation of the turbine blades so as not to be affected by the clutter they can create. Certain types of small tactical radars developed for other applications may be suitable candidates. The use of such small tactical radars in this manner is a new concept developed during the course of this study. Analyses, including the susceptibility of such radars to clutter generated beneath them as well as the capability of the air defense system to accept the additional input, need to be performed to determine if there are merits in pursuing this concept further.

Based on the above discussions, it must be concluded that concepts that employ gap filler or supplemental radars are still immature and cannot be categorized as proven mitigations.

Testing and Verification Factors

A critical issue regarding validation of potential future mitigation approaches is how to verify their effectiveness. As noted earlier, the key performance factors for any air defense or missile warning radar are probability of detection, probability of false alarm, and probability of loss of track. By their very nature, these are statistical metrics. Accurate computation of these require numerous test cases to be examined to provide the necessary statistical reliability. Such test cases are generally analyzed using computational models with Monte Carlo techniques employed to replicate influences of variances in key parameters. However, all these models are anchored with actual test data to ensure they accurately replicate true system behavior.

With regard to wind farms, the Department has initiated efforts to develop an analytic model to replicate the RCS and Doppler characteristics of a specific SOA utility-class wind turbine. Ultimately, additional models may need to be developed to replicate other brands, styles, and sizes of wind turbines. This will ensure that wind turbine models used in analytic simulation tools will be sufficiently robust to capture the key characteristics of all current generation SOA utility-class wind turbines in an appropriate statistical manner.

The Department also has initiated efforts to explore the feasibility of creating simulations of wind farms that could be numerically injected into the processors of operational radars. These would provide important tools to assess impacts that could result from construction of future wind farms within radar line of sight of an air defense or missile warning radar.

The final issue that must be addressed is how to anchor these models and tools with test data to ensure they accurately replicate real-world behavior. The testing the Department has already performed at Fenner, NY, should be sufficient to validate that analytic RCS and Doppler models can be created for an SOA utility-class turbine. Flight trials using radars that already have wind farms within the radar line of sight can provide another critical validation tool. However, the selection of what specific site or sites that should be used for this purpose requires careful consideration.

For example, the Altamont wind farm contains a very large number of wind turbines where the overwhelming percentage are “out-of-date” designs with relatively small turbine blades. The RCS characteristics of those blades inherently will be significantly lower than current generation systems. Additionally, many of those wind turbines are mounted on relatively short tubular truss towers. Those towers will have significantly different RCS characteristics than the tapered cylindrical towers being used now. Finally, the older model turbines at Altamont rotate at higher rate than that used for more modern designs. All of these factors suggest that this particular location would not serve as the best test site to explore or verify any proven mitigation strategy.

Consequently, an effort will need to be undertaken to establish appropriate criteria for selection of test sites to conduct flight trials. Such an effort should be performed before U.S.-sponsored flight trials are attempted to ensure the results obtained will provide the data required for modeling and simulation purposes.

7. OTHER POTENTIAL IMPACTS ON DOD READINESS

This section of the report describes other areas where the presence of wind turbines or wind farms have the potential to influence Department readiness. These generally fall under the requirements associated with the Department mission to train and equip U.S. forces. The discussions in this section are specifically limited to those aspects as they pertain to Department facilities and sites within the 50 states and U.S. territories and possessions. Possible impacts at overseas locations are not included as they must be evaluated in light of existing agreements with host nations.

The Department must carry out its national security missions effectively with careful attention to the safety of the general public and Department personnel. The presence of wind turbines in the vicinity where these military missions occur has the potential to impact the effectiveness of such missions and thus military readiness.

It is important to note that while this section discusses potential areas of impact to readiness it would be inappropriate to draw sweeping or broad-based conclusions that these would occur at all facilities and sites employed by the Department. As operational requirements at different locations vary, the particular characteristic of a wind farm may present a challenge in one location but not others. Consequently, within the context of this section, potential impacts on readiness due to any particular proposed wind farm development need to be evaluated on a case-by-case basis. Where possible impacts to readiness could occur it is important to ensure that appropriate measures to mitigate risk are identified and implemented.

Finally, it should be noted that many of the potential impacts discussed in this section are similar to those that can be posed by other tall objects such as radio antennas, cell phone towers, and buildings proposed for construction in the vicinity of Department sites and facilities. The Department has developed and employed, for many years, strategies and mitigation techniques to effectively address those possible impacts. To date, the Department has not identified any specific information that would lead to the conclusion that those methods would not be similarly effective for addressing potential impacts from proposed wind farm developments as they relate to the items in this section of the report. As such, these items have been included in the report only to ensure completeness of this overall assessment.

The potential impacts to readiness are generally categorized into the following areas: 1) Overflight and Obstruction, 2) Security, 3) Signature, and 4) Environment. Potential impacts to flying safety are considered in the area of overflight where obstructions are introduced. Potential security issues during and after development are addressed near installations or where the Department conducts operations. Potential impacts related to the electromagnetic signature associated with wind turbines are evaluated. Finally, possible impacts related to the responsibilities of the Department with regard to environmental stewardship are discussed.

Overflight and Obstruction

The potential overflight obstruction hazard impact to readiness is a shared potential impact to all aviation users including the Department, commercial, business, and general aviation users. As with other large vertical construction projects, such as telecommunication towers, the Department considers the potential impacts of wind farm development on flight safety from obstructions introduced near Department airfields and in other areas used for military flight operations.

The potential impact of any tall vertical development near Department airfields is virtually identical to the risks associated with development near civilian airports such as potential interference with flight operations during take off, departure, approach and landing. In relation to flight operations away from airfields, excessive development of

wind turbines in, under or adjacent to airspace, test ranges and training ranges where low-flying operations are conducted may adversely affect the altitude at which operations can be conducted. There is a potential increased risk due to the increased likelihood of encountering tall vertical structures during low altitude flight operations. The nearby location of overhead transmission lines to connect the wind turbines to the local power grid can also present a flight hazard to low altitude flight operations. The individual evaluation of any proposal considers such impacts of any specific development on a specific section of airspace. Further, the Department must consider the potential for wind farm development to obstruct or restrict military surface missions, ground maneuver operations; sea surface and sub-surface operations.

Effective management procedures already are in place to deal with questions that may arise from potential obstruction of airspace due to the proposed construction of wind turbines. As a general rule, specific Department installations are assigned management responsibilities for a section of airspace. If a proposed wind turbine is to extend more than 199 ft above local elevation, a notification of proposed construction should come through the FAA's Obstruction Evaluation / Airport, Airspace, Analysis (OE/AAA) process. The FAA will notify the managers of any affected military flying routes. The affected Services evaluate the proposal for any possible detrimental impacts to operations.

Security

In some circumstances, wind farm developments near Department facilities and sites may pose temporary or long-term security risks of various degrees. Similar to other large construction projects near Department installations, the increased level of personnel and activity during construction requires increased monitoring for security purposes. Additionally, similar to other tall vertical development, wind turbines can provide increased visual and sensor access to sensitive Department areas and activities.

The Department, as part of its normal practices, adapts its security measures in such situations. Thus wind farm development is not anticipated to create any special challenges in this regard.

Signature

As discussed in other sections of this report, a wind turbine has a unique electromagnetic "signature" that can vary based on environmental conditions. The specific signature characteristics of a given development may have potential impact on certain types of Department systems. Examples of the areas of potential impact include, among others, systems specifically designed to operate in or influence the electromagnetic spectrum such as electronic warfare activity for communications, surveillance, threat, and radar systems. Further, the Department must determine potential impacts to space launch activities and telemetry operations. The potential impact of the signature may be increased in areas where the Department conducts high fidelity developmental testing and evaluation in the electromagnetic spectrum.

Additionally, the electromagnetic signature of a given development either created by the wind turbine itself or as a result of reflection from other sources should be evaluated for potential electromagnetic interference with electronic systems routinely employed in military missions. The potential impact could be on Department installations or in areas where the Department conducts operations. This includes systems under development as well as those already fielded.

Special analyses will need to be conducted to evaluate situations where potential electromagnetic signature impacts could occur.

Environment

Military installations, testing and training facilities expend considerable effort to ensure adequate measures are being taken to conserve and protect the nation's environment and natural resources. Under the Readiness and Environmental Protection Initiative (REPI), 10 USC 2684a, many Department installations have, or are developing, encroachment and conservation buffer partnerships on lands in the vicinity of, or ecologically related to, a military installation or training/testing area. These partnerships are aimed at relieving encroachment pressure from either incompatible development and/or loss of natural habitat, which could adversely impact military operations. This program applies to installations, airspace, and coastal waters within the United States and its territories.

Where such encroachment and conservation buffer partnerships exist or are in development, proposals to develop wind farms in or adjacent to those areas should be carefully evaluated to ensure compatibility with such partnerships and related activities.

Summary of Potential Mitigation Approaches

General recommendations for mitigation of potential impact include establishment of multi-agency stakeholder groups to improve the processes used by developers and the federal, state and local governments in the proposal and evaluation phases. This will involve establishing stakeholder groups with other federal agencies that have equities in this subject area. Such interagency forums should review and evaluate existing processes and adjust those as necessary to identify and address potential impacts.

As a general rule, Department installations are assigned management responsibilities for specific sections of airspace. In many cases, proper documentation and charting of the location will provide sufficient mitigation. Methods to provide aircrew with development notices and updates to air navigation charts that are prepared and distributed expeditiously as wind power development continues to accelerate will be reviewed and revised as appropriate to mitigate the potential risks associated with overflight and obstruction.

Potential security risks identified may be mitigated through increased awareness by Department personnel during and after construction depending on the nature of the potential impact. Any unique, site-specific impact, would be addressed by the appropriate Department organization and the potentially impacted facility.

Additionally, at the regional and local installation level, community-outreach programs provide viable venues for installation commanders to work with wind farm developers to mitigate potential impacts. One successful Department initiative has been the development of "Red/ Yellow/ Green," traffic light charts to be used by both the Department and developers for discussion and dialog. These charts identify specific areas around installations where Red is employed to designate areas where a wind farm development is highly likely to impact readiness, Yellow to denote areas where collaboration is needed to avoid or mitigate impact and, Green to identify areas where there is no anticipated impact to Department readiness. It is critical to note that this approach is applicable to the topics discussed in this section but not appropriate to address impacts on air defense and missile warning radars that were discussed elsewhere in this report.

8. SUMMARY

Air Defense Radars - Shadowing

Wind turbines are physically large structures that will block the transmission of radar waves in a manner similar to tall buildings. The blockage caused by a single turbine, due to its slender shape, will be relatively small, resulting in a negligible shadow area behind that single turbine. Multiple turbines located in proximity of each other will also cause diffraction of radar waves. Decreasing the separation distance between the turbines increases the diffraction effect.

The diffraction of the radar waves will reduce the intensity of the propagating wave directly behind the turbines (see Figure 6) as well as the reflected signal from a target. This two-way reduction in signal strength will increase the difficulty in detecting and tracking targets flying at low altitude in the immediate vicinity of the wind turbines. This effect will be most pronounced for targets with a small RCS. Such targets inherently are the most challenging in all circumstances, and this added burden will result in a noticeable reduction in probability of detection for them.

Predicting the reduction in signal strength due to diffraction effects is potentially a mathematically tractable problem when it is assumed the turbine blades are stationary. This has been the basis for the "spacing algorithms" employed by a few nations. No method exists at present to accurately calculate the reduction in signal strength that will occur when the turbine blades are rotating.

Turbine blade rotation will also create false returns when attempting to detect and track targets at very low altitudes. This further complicates the situation, leading to the potential that low-RCS targets can successfully employ wind turbines to execute a "covert" approach to a high-value asset. This will compromise the ability of on-site or nearby security forces to detect such a possible attack with sufficient lead time to react. Consequently, special case-by-case analyses will be required to assess potential impacts on local air defense systems for high-value assets to determine if a nearby wind farm could compromise reaction capability. In such cases, any proposed wind farm should be located at a sufficient distance so that the on-site defense forces are able to identify any potential threat with sufficient warning time to enable them to react as required. Failure

to incorporate such considerations in locating wind turbines either on site or in the nearby vicinity will degrade military readiness for this mission.

Air Defense Radars - Clutter

Modern utility-class wind turbines, due to their large size, possess a significant RCS at all common radar bands. Based on the data obtained during this study, the RCS for one particular turbine ranged from that of a “business class” airplane to a value greater than that of a long-haul, wide-body aircraft. In addition, the rotating blades of such wind turbines create Doppler shifts equivalent to the velocities of aircraft.

Since the wind turbines in a wind farm are geographically stationary and near the surface of the earth, these two effects will combine to appear as “clutter” to an air defense radar. The amount of clutter produced will increase in direct proportion to the number of turbines within the line of sight of the air defense radar. A single turbine located a reasonable distance away from an air defense radar will have minimal impact on the ability of that radar to successfully detect and track all potential targets of interest to include challenging low-RCS targets. However, a large number of wind turbines spread over a wide sector of coverage for that radar will significantly degrade the ability of that radar to perform its mission. This form of impact has been documented in numerous UK MoD-sponsored trials.

At present no tools exist to accurately determine where the transition point lies between the minimal impact created by a single turbine and the unacceptable level of degradation that will be produced by a large wind farm located in radar line of sight. The Department has initiated efforts to develop such tools. Until such tools have been developed and validated, the Department will be unable to ensure that fixed-site U.S. air defense radars are not compromised in their performance should a wind farm be constructed within the radar line of sight. Degradation in the detection and tracking ability of long-range air defense radars will reduce their mission effectiveness and thereby degrade the ability to defend the nation.

As discussed in a prior section of this report, the only currently proven mitigation techniques to prevent compromising U.S. air defenses is to ensure wind farms are not within radar line of sight of fixed-site air defense radars. As illustrated by Figures 4 and 31, radar line of sight near the surface of the earth is dependent upon the height of the radar unit, the height of the wind turbine, and the separation distance between them. Additionally, terrain irregularities, of the type illustrated in Figure 32, between the radar and the wind farm can significantly reduce the distance to where the wind turbines will no longer be within radar line of sight. Alternatively, a substantial elevation difference between the radar and the wind farm can produce a similar effect. Since all these parameters are site specific, each proposed wind farm would need to be evaluated on a case-by-case basis for the present.

The DOD/DHS Long Range Radar Joint Program Office already has established an informal consultation service to work with wind farm developers to assist them in identifying locations where radar line of sight concerns could exist. This approach should be continued and possibly expanded to include other defense-related concerns. This

informal advisory assistance should remain optional and not replace or supplant existing regulatory review processes.

A special note needs to be mentioned regarding protection provided during "special events." As part of its support to the homeland security mission, the Department will, at times, deploy supplemental air defense assets to provide additional protection during special events such as the Super Bowl, the World Series, Olympic type sporting events, political conventions, and other major gatherings that could be targets for terrorists. Air defenders providing such supplemental coverage will require knowledge of the locations of all nearby wind farms so that they can optimally position and operate those supplemental assets. The assistance of the wind energy industry to compile and maintain a database that can provide such information in a readily accessible manner by air defenders would be highly desirable.

Missile Early Warning Radars

The EWR fixed-site radars are required to be able to detect and track exceptionally low-RCS objects at extreme ranges with high confidence and accuracy. This also includes a requirement to be able to accurately discriminate between closely spaced objects so that Inter-Continental Ballistic Missile delivered nuclear weapon reentry vehicles can be distinguished from potential countermeasures specifically employed to confuse defensive systems.

The early warning radars are large, high-power phased-array radar systems specifically designed to accomplish this task. The high power level is required to ensure adequate illumination of potential threat complexes at very long ranges. The phased-array antenna is designed to enable the main beam to be focused on such complexes. The critical technical performance requirement is to ensure that the signal-to-noise ratio (SNR) is sufficient to accomplish the detect, track, and discriminate functions.

A simplified analysis had been performed for the early warning radar at Cape Cod AFS to assess if a wind farm being proposed for construction in the Nantucket Sound area would impact that radar. This simplified analysis contained three specific faults. First, it incorrectly employed the sine function rather than the tangent function to calculate beam elevation as a function of distance. This particular error, however, was numerically insignificant since, for the small angle considered, the values for sine and tangent of that angle are almost equal.

The second error in that analysis was the failure to account for atmospheric refraction of the beam and curvature of the earth. At low altitudes, such as in the immediate vicinity of the radar antenna, the main beam will be refracted by the atmosphere. The result of this flaw is to incorrectly predict the elevation of the high sensitivity region of the main beam as a function of distance from the radar. This was a more significant error.

The third error was that the analysis assumed a wind turbine would only impact radar performance if it was located in the main beam. In point of fact, a wind turbine could provide "clutter" reflections to the radar if any portion of that turbine appears in any portion of the main beam or in the side lobes, were the resulting level of the reflected

signal to exceed allowable noise thresholds. If that were to occur, it would reduce the SNR and thereby degrade the ability of the radar to detect, track, and discriminate the most challenging threat objects. This error, too, is a potential source of significant error.

Consequently, a more comprehensive analysis needs to be performed for these radars. Such an analysis should also include consideration of whether range gating or other possible approaches can be employed to mitigate impacts. This analysis should also seek to establish generalized "red zone" areas for U.S.-based fixed-site early warning radars so that locations for future wind farms can be selected without requiring additional studies. In this regard, such "red zones" should also consider impacts on "back lobes," to the extent they may exist, so as to guide placement of turbines on either Cape Cod AFS or Beale AFB. The Department will be unable to assess if wind farms in the nearby vicinity of either fixed-site early warning radar will impact their performance until such a more comprehensive investigation is performed.

Air Traffic Control Radars

As with air defense radars, wind turbines within the radar line of sight of ATC radars can cause reduction in their capability to track aircraft by primary radar return. However, the primary radar element in an ATC radar employed for air traffic management is only one part of a system developed to ensure the safe and efficient use of U.S. airspace. Other elements of this system, for example, include SSR systems, flight rules, and published approach and departure procedures for military airfields and civilian airports.

The FAA has the responsibility for promoting and maintaining the safe and efficient use of U.S. airspace for all users, to include the military. The Department, consistent with the long tradition of cooperation with the FAA, is prepared to assist the FAA in any subsequent investigations or analyses the FAA believes may be required to assess how wind turbines in radar line of sight of ATC radars might influence the U.S. air traffic control management system. As such, the Department defers any recommendations in relation to this particular aspect to the FAA. As is standard practice, the Department will adjust its processes and operating procedures for U.S.-based ATC radars operated by the military consistent with any subsequent guidance developed by the FAA.

Weather Radars

A number of studies have been performed to explore the impact wind turbines can have on the performance of ground-based weather radars when located within their radar line of sight. The bibliography provides just a few references [15-18] for some studies that have been performed in both the United States and Europe on this topic.

The National Weather Service (NWS) of the National Oceanic and Atmospheric Administration has been exploring this aspect and sponsoring efforts to develop mitigation techniques. As such, the Department defers to the NWS regarding identification of impacts on weather radars and development of any necessary mitigation

approaches. The Department is willing to provide technical assistance, when appropriate, where potential mitigation measures under development have specific applicability to air defense and missile warning radar systems.

Other Potential Impacts on DOD Readiness

The Department conducts its operations in an increasingly complex environment. Wind farm development has the potential to influence Department activities in such diverse areas as military training, testing and development of current and future weapon and other systems, security, and land use to name a few. As operational requirements vary from location to location, any particular characteristic of a wind farm may present a challenge in one location but not at others. In this regard, the challenges that may be posed often but not always, will be similar to those associated with construction of other large objects such as telecommunication towers and in this respect, are not, in fact, unique to wind farms. For example, the de-confliction of land or airspace is an issue that the Department manages in concert with other stakeholders on a daily basis.

The Department has developed and employed, for many years, strategies and mitigation techniques to effectively address those possible impacts. To date, the Department has not identified any specific information that would lead to the conclusion that those methods would not be similarly effective for addressing potential impacts from proposed wind farm developments as they relate specifically to the subject of Other Potential Impacts on DOD Readiness.

Treaty Compliance Sites

The Department, in conjunction with the National Nuclear Security Agency (NNSA) of the Department of Energy, employs special sites to monitor compliance with the Comprehensive Test Ban Treaty. Those sites that employ seismic type sensors to accomplish this task are sensitive to background seismic noise. Increasing the ambient level of seismic noise will degrade the ability of these sites to perform their required task.

The UK has a similar site at Eskadalemuir and has conducted an in-depth study [19] to establish guidelines to ensure adequate offset distances for any wind turbines proposed for construction in that local area. The Department believes an effort should be undertaken to develop similar guidelines for U.S. sites employed to monitor treaty compliance. Additional information on this subject is provided in Appendix 2.

9. CONCLUSIONS

1. Wind farms located within radar line of sight of an air defense radar have the potential to degrade the ability of that radar to perform its intended function. The magnitude of the impact will depend upon the number and locations of the turbines. Should the impact prove sufficient to degrade the

ability of the radar to unambiguously detect and track objects of interest by primary radar alone this will negatively influence the ability of U.S. military forces to defend the nation.

2. The currently proven mitigations to completely prevent any degradation in primary radar performance of air defense radars are limited to methods that avoid locating wind turbines within their radar line of sight. These mitigations may be achieved by distance, terrain masking or by terrain relief and must be examined on a case-by-case basis.

3. The Department has initiated research and development efforts to develop additional mitigation approaches that in the future could enable wind turbines to be within radar line of sight of air defense radars without impacting their performance. Such development efforts should be continued. Such future mitigation techniques will require adequate test and validation before they can be employed.

4. A more comprehensive analysis is required to determine how close wind turbines can be built to early warning radars without causing negative impacts on their performance.

5. The FAA has the responsibility to promote and maintain the safe and efficient use of U.S. airspace for all users. The Department defers to the FAA regarding possible impacts wind farms may have on the Air Traffic Control (ATC) radars employed for management of the U.S. air traffic control system. The Department is prepared to assist the FAA in efforts the FAA may decide to undertake in this regard.

6. The Department is prepared to assist the NWS, where appropriate, in its efforts to develop mitigation techniques for ground-based weather radars where such techniques may have mutual benefit for Department systems.

7. Wind turbines in close proximity to military training ranges, as well as test and development sites, can adversely impact the “train and equip” mission of the Department. Existing processes to include engagement with local and regional planning boards and development approval authorities can be employed to mitigate potential concerns in relation to this.

8. Construction of wind turbines near Comprehensive Test Ban Treaty monitoring sites can adversely impact their performance by increasing ambient seismic noise levels. Analyses should be performed to develop appropriate guidelines regarding how close wind turbines may be built to such sites.

9. Given the expected increase in the U.S. wind energy development, the existing siting processes as well as mitigation approaches need to be reviewed and enhanced in order to provide for continued development of this important renewable energy resource while maintaining vital defense readiness.

REFERENCES

1. Wind Performance Report Summary 2002-2003, California Energy Commission, June 06
2. Wind Energy--THE FACTS: An Analysis of Wind Energy in the EU-25, European Wind Energy Association, circa 2003
3. Technical Standard Order C74c: Airborne ATC Transponder Equipment, Federal Aviation Administration, February 20, 1973
4. Upgraded Early Warning Radar Supplement to the National Missile Defense (NMD) Deployment Draft Environmental Impact Statement, US Army Space and Missile Defense Command, January 21, 2000
5. Wind Farms Impact on Radar Aviation Interests-Final Report, QinetiQ, September 2003
6. The Air Force Research Laboratory (AFRL) Mobile Diagnostics Laboratory (MDL) Wind Farm Turbine Measurements Fenner, NY – Final Report, July 20, 2006
7. Study Into the Effects of Wind Turbines On Radar Performance, UK Royal Air Force Signals Engineering Establishment Technical Report 94010, December 1994.
8. The Effects of Wind Turbine Farms on AD RADARS, Air Warfare Center, Royal Air Force, January 6, 2005
9. The Effects of Wind Turbine Farms on ATC RADARS, Air Warfare Center, Royal Air Force, May 10, 2005
10. Further Evidence of the Effects of Wind Turbine Farms on AD RADARS, Air Warfare Center, Royal Air Force, August 12, 2005
11. Special Evaluation Report to Assess Effect of Wind Turbine Farm on Air Route Surveillance Radar-4, at King Mountain, Texas, USAF 84 RADES & FAA, May 30, 2002
12. Baseline Evaluation of the ARSR-2 RADAR at Tyler, MN, FAA and USAF 84 RADES, September 10, 2004
13. Feasibility of Mitigating the Effects of Windfarms on Primary Radar, Alenia Marconi Systems Limited, 2003
14. Technical and Operational Feasibility Study on the Use of Additional Sensor(s) to Mitigate Round 2 Offshore Windfarms in the Greater Wash Area, BAE Systems, August 2005
15. Anomalous Propagation (AP) Ground Clutter in WSR-88D Base Data, Pratte, ERL/FSL and NCAR/ATD, November 15, 1996
16. Developments in the DWD radarnetwork, Hafner, et al, Proceedings of the Second European Conference on Radar Meteorology (ERAD 2004), 2004
17. The AP Ground Clutter Mitigation Scheme for the WSR-88D, Kessinger, NCAR, undated
18. Impact of Wind Turbines on Weather Radars, EUMETNET, March 31, 2005
19. Microseismic and Infrasound Monitoring of Low Frequency Noise and Vibrations from Windfarms (Eskdalemuir), Final Report and Summary & Recommendations (2 items), Styles, Keele University, 18 Jul 05

APPENDIX 1. POLICIES EMPLOYED BY SELECT NATO COUNTRIES

Several European governments have developed policies and procedures to address the siting of wind turbines in locations to reduce their impact on air defense and air traffic control radars. The policies vary considerably, reflecting different degrees of understanding that government policymakers have of the effects that wind turbines have on radar, different radar systems employed by that country, and different relationships between the military and industrial communities of that country. This appendix briefly describes the current policy employed by each of several NATO governments in regulating/influencing the placement of wind turbines in the vicinity of radar systems.

In November 2005, the Department, in cooperation with the UK Ministry of Defence, co-sponsored a NATO research and development study on this topic. The specific goal of that study is:

> To assess studies, analyses and field trials already conducted by the participating member nations to enable identification of gaps in understanding of underlying phenomenology. To develop a coordinated approach to address these gaps and any other concerns raised by participants. Finally, to develop a coordinated plan to conduct the necessary studies, analyses, or field trials to obtain any additional data deemed to be essential to fully comprehend this issue.

United Kingdom

As a result of several years of extensive flight trials and analysis described elsewhere in this report, the United Kingdom has the most robust understanding of the various effects that wind turbines have on their specific air traffic control (ATC) and air defense radar systems. Their regulatory process has undergone considerable evolution to reach its current state.

For UK ATC radars, the civilian operators must always honor the presence of displayed radar returns. Thus, displayed returns from wind turbines must be treated as real aircraft. Under instrumented meteorological conditions, ATC must be used to ensure safe separation between aircraft, including returns from wind turbines. On this basis the UK policy is that a wind farm close to an airfield is not compatible with ATC operations. A minimum lateral separation of 5 nmi should be maintained where critical ATC operations take place.

For UK air defense radars, the radar operators must be able to reliably track all aircraft that could pose a threat. The operators must include the ability to track by primary radar alone if necessary. UK studies to date have concluded that the radar's probability of detection is reduced in air space over wind turbines due to technical aspects of radars and the large radar cross section of wind turbines, and no mitigation solutions have yet proven to provide the required level of radar coverage. On this basis, the UK Ministry of Defence must be consulted on all proposed wind turbines that are within the radar line of sight of an air defense radar, regardless of distance.

Germany

The major concern of the German government was the shadowing of targets by wind turbines when it developed its wind farm policy. A "protection zone" of 10 km around all military ATC radars is protected by German law. An "area of interest" is defined as the region up to 18 km from the ATC radars. The German policy is that specific permission for construction of obstacles (buildings, high-voltage lines, wind farms, etc.) must be granted by the German Defense Administration. For wind turbine proposals the Bundeswehr Air Traffic Services Office evaluates potential impacts to radar performance. Proposed construction within the "area of interest" is evaluated for line of sight, height, distance, turbine size, existing obstacles, radar frequency, and local topography. Technical comments and recommendations are requested from responsible military commands and a determination, including potential mitigation options, is communicated to the proposer by the German Defense Administration.

Netherlands

The Royal Netherlands Air Force (RNLAF) was concerned about the impact that shadowing by wind turbines had on radars. The policy of the Netherlands' government is that plans for wind turbines within 15 nmi of military radars must be submitted to the RNLAF, which then requests an impact analysis from The Netherlands Organisation for Applied Scientific Research (TNO). TNO then performs analyses based on modeling and simulation, helicopter-based field tests, and laboratory experiments and provides these to RNLAF, who makes the final determination.

Austria

The Austrian Air Force, based on limited field tests, is concerned about wind farms causing electromagnetic interference to radars, radio relays, and high-frequency direction finders as well as being obstacles to low-flying routes. Austrian policy is for wind turbine construction proposals to be evaluated by local authorities (mayor, district governor) in consultation with the Austrian Ministry of Defense. For turbine proposals further than 10 km from an air-defense radar no objections are raised; between 5 and 10 km an objection is raised unless the mast and gondola are outside the coverage volume (i.e., the radar line of sight of the area that the radar surveils) and the angle of obstruction is less than 5%; inside 5 km an objection is raised unless the whole turbine is outside the coverage volume.

Norway

Norway is concerned about false tracks from wind farms within 50 km of a military radar. Approval for construction is obtained from the Ministry of Oil and Energy after consultation with the Ministry of Defense and its research establishment and defense components. Possible mitigations that are considered include adjustments to the wind farms, adjustments to the radar (if the cost is less than $3M), or moving the radar/purchasing a new radar (if the costs to adjust the radar are greater than $3M).

APPENDIX 2. IMPACTS ON TREATY COMPLIANCE SYSTEMS

In addition to impacts on defense radar systems, wind turbines generate seismic and infrasound noise that could potentially contaminate monitoring stations providing data to support the Comprehensive Test Ban Treaty (CTBT) and U.S. nuclear explosion monitoring efforts.

United Kingdom Eskdalemuir Seismometer Array

The longest operating steerable seismometer array in the world is located at Eskdalemuir, in Scotland. The array is one of a global network that monitors compliance with the CTBT. This area has very little background seismological noise, and the seismometer array is very accurately calibrated, having monitored approximately 400 nuclear explosions at distances up to 15,000 km and numerous other seismic events (including detonations of conventional explosives, earthquakes etc.). It has recorded explosions from detonations as small as 100 tons of conventional explosives in Kazakhstan (about 5250 km away).

The Eskdalemuir area happens to be attractive to wind energy developers because of a high average wind speed, the availability of good connections to the national grid, and relatively few people living in the area who could object.

UK Microseismic and Infrasound Monitoring Studies

To assess the potential impact of wind turbines, in early 2004 the UK Ministry of Defence, the Department of Trade and Industry, and the British Wind Energy Association funded a study by Professor Peter Styles of the School of Earth Sciences and Geography at Keele University to collect and analyze data about wind farms and their seismic and infrasound noise generation. The study included review of existing research in the United Kingdom and United States, and empirical tests at Dun Law and Ardrossan wind farms. The Styles study reported their results and recommendations in July 2005. [19]

The Styles study included the installation and almost continuous 6-month operation of 10 three-component seismic sites at increasing distances away from the Dun Law wind farm, the deployment of 4 infrasound stations at certain distances from Dun Law, and the installation of accelerometers on wind turbine towers and strong motion detectors in the immediate vicinity of turbines at Dun Law and Ardrossan. The study analyzed the seismic background noise levels recorded at Eskdalemuir at different times and with different weather conditions. Seismic background noise results from several different sources including: cultural, which includes vehicle and railroad traffic; coastal noise, which results from ocean waves and surf, and local weather and seasons, which are storm and wind-produced. Styles concluded that seismic and infrasound noise was produced by wind turbines, the seismic noise is at a primary frequency related to the frequency at which the turbine blades pass in front of the support post of the turbine, this frequency covers a broad range from about 0.5 Hz to about 10 Hz, and this noise can be detected at distances greater than 10 km from the turbines. Styles found that at Eskdalemuir, wind was the predominant factor in noise and determined the median root-

mean-square vertical displacement of a seismometer on windy days is 0.336 nanometers thereby establishing the level of anticipated background noise.

UK Government Policy Concerning Wind Farm Development near Eskdalemuir

The Styles study also developed a method to estimate the seismic noise created by wind farms. The study made recommendations concerning the amount of additional noise that the Eskdalemuir array could tolerate, what impact that would have on its operational performance, and how best to constrain wind farm development near it to maximize wind energy output while remaining under this tolerable additional noise amount.

The study assumed that the maximum additional noise "budget" that could be accepted from wind farm development near the array to be 0.336 nanometers. This means a potential doubling of the background noise level and with the model of noise and detectability they present, the threshold of detection would rise from 100 tons in Kazakhstan (distance 5250 km) to about 160 tons.

As a result of this research the UK Ministry of Defence has prohibited the construction of wind turbines within 10 km of Eskdalemuir. Turbine development between 10 and 50 km is constrained to not exceed the cumulative noise "budget" outlined above. There are no restrictions on wind farm development outside of 50 km.

United States Monitoring Activities

In contrast to the single International Monitoring System (IMS) auxiliary monitoring station in the United Kingdom, there are 4 primary IMS seismic stations and 10 auxiliary IMS seismic stations located in the United States. In addition to the IMS stations, there are several stations of the U.S. Atomic Energy Detection System (USAEDS) located in the United States. The USAEDS stations provide data for the U.S. nuclear explosion monitoring effort.

Recommended U.S. Approach

The methodology used by Styles in measuring the noise spectrum of wind turbines and assessing their effect on array sensitivity is comprehensive and based on sound scientific principles.

The United States should adopt a similar methodology to assess the impact of wind farms on U.S. monitoring activities and to develop objective criteria for evaluating wind farm development activities near their location. Since seismic background noise varies from site to site, site-unique measurements are needed for U.S. sites. A decision about what level of additional noise is acceptable also needs to be made. In addition, the measurements of seismic noise generated by wind turbines that Styles made must be updated to reflect the increased size of SOA wind turbines. This recommended approach should undergo a peer review within the seismic monitoring community to ensure all concerns and possible alternative courses of action are robustly examined.

References

Association of American Railroads, http://www.AAR.org (March 2011)

City of Clovis Comprehensive Plan, 2007

Curry County Comprehensive Plan, 2007

City of Portales Comprehensive Plan, February 2005

U.S. Census Population and Population Estimates

New Mexico County Population Projections July 1, 2005 to July 1, 2035, Bureau of Business and Economic Research, University of New Mexico. Released August 2008

Regional Growth Management Plan Encompassing Military Growth at Cannon AFB, April 2009

http://www.cannon.af.mil (July 2010)

Cannon AFB 2010 Base Guide

http://www.npwd.org/Ogallala.htm (July 2010)

U. S. Department of Energy, http://www.windpoweringamerica.gov/maps_template.asp?stateab=nm (July 2010)

http://www.cannon.af.mil/library/factsheets (August 2010)

FICUN 1980 "Guidelines for Considering Noise in Land Use Planning and Control"

Air Force Handbook 32-7084 (March 1999) "AICUZ Program Manager's Guide"

UFC (November 2008) "Airfield and Heliport Planning and Design"

Federal Aviation Regulations, Part 77 (March 1993) "Objections Affecting Navigable Airspace"

State of New Mexico Executive Order No. 2004-046

Noise Reports Produced as Part of AFSOC Assets Beddown at Cannon AFB, New Mexico Environmental Impact Analysis Process, January 2008

27th Fighter Wing AICUZ, 2005, Volume I\

http://www.airforcetimes.com/news/2008/06/ap_melrose_cannon_062408/25-Jun-08

Wildlife Damage Management, Internet Center for Bird Control Seminars Proceedings

United States Department of Agriculture, http://www.usda.gov (March 2011)

University of Nebraska - Lincoln Year 1976
Bird Strikes and the Air Force
Portia R. McCracken
Air Force Civil Engineering Center, Tyndall AFB, Florida

Air Force Pamphlet 91-212
1 February 2004
Bird/Wildlife Aircraft Strike Hazard (Bash) Management Techniques

http://www.nmdairy.org/

2002 Roosevelt County Compressive Plan

http://aces.nmsu.edu/ces/dairy/index.html

http://www.goportales.com/

http://www.developclovis.com/

This page intentionally left blank.