AD-A270 881

Draft Environmental Impact Statement

Auxiliary Airfield for Williams Air Force Base, Arizona

DTIC
ELECTE
OCT 15 1993
S A D

This document has been approved for public release and sale; its distribution is unlimited.

U.S. AIR FORCE
Headquarters Air Training Command
Randolph Air Force Base, Texas

December 1989

93-23112

Air Force
Environmental Planning Division
(HQ USAF/CEVP)

Room 5B269
1260 Air Force Pentagon
Washington, DC 20330-1260

16 JUL 93

MEMORANDUM FOR DTIC (Acquisition)
(ATTN: Pat Mauby)

SUBJ: Distribution of USAF Planning Documents Forwarded on 1 July 93

All the documents forwarded to your organization on the subject date should be considered Approved for Public Release, Distribution is unlimited (Distribution statement A).

Jack Bush, GM-14

Mr. Jack Bush
Special Projects and Plans
703-697-2928
DSN 227-2928

DRAFT ENVIRONMENTAL IMPACT STATEMENT

AUXILIARY AIRFIELD FOR WILLIAMS AIR FORCE BASE, ARIZONA

Accesion For
NTIS CRA&I
DTIC T.B
Unannounced
Justification
By ltr
Distribution /
Availability Codes
Dist | Avail and / or Special
A-1

December 1989

DTIC QUALITY INSPECTED 8

U.S. AIR FORCE
Headquarters Air Training Command
Randolph Air Force Base, Texas

93-24132

COVER SHEET

Responsible Agency: United States Air Force

Proposed Action: The proposed action evaluated in this environmental impact statement is the construction and operation of an auxiliary airfield and associated facilities for Williams Air Force Base, Arizona, in one of three candidate areas southwest of Phoenix, Arizona. Approximately 600 acres would be needed for construction of the airfield. Facilities would include a runway, fire station, two runway supervisory units, access roads, and utilities.

Contact for Further Information:

Catherine Hitchins
HQ ATC/DEEV
Randolph Air Force Base,
Texas 78150-5001

FOREWORD

The United States Air Force has proposed construction of a new auxiliary airfield to be used in the training mission of Williams Air Force Base, Chandler, Arizona. The airfield would be located in one of three large candidate areas in Pinal County, Arizona, southeast of Phoenix. The airfield would be used to train pilots in T-37 jet aircraft. A new auxiliary airfield is needed in large part because of the increase in private and commercial aviation activities at the present auxiliary airfield, Coolidge Municipal Airport.

This environmental impact statement (EIS) has been prepared pursuant to the National Environmental Policy Act (NEPA) and analyzes the potential environmental impacts of constructing and operating a 600-acre auxiliary airfield in one of three candidate areas. No specific location for the auxiliary airfield has been determined within each of the three candidate areas, and in general the analyses in this EIS encompass all of each of these areas. Portions of the candidate areas have been eliminated from further consideration as sites for the proposed airfield because of safety, operational, and construction considerations. This EIS provides environmental information that can be used to further narrow the potential locations acceptable for an auxiliary airfield. Impacts related to land use, water resources, air quality, noise, terrestrial and aquatic resources, threatened and endangered species, socioeconomics, recreation, and cultural resources were evaluated for all portions of the three candidate areas.

Considerable airspace in the Phoenix area and in much of the rest of southern Arizona already is committed to military operations, and available airspace is limited. Comments received during the NEPA scoping process for this EIS indicate significant concern by local residents over potential airspace conflicts with a future Metropolitan Regional Jetport (MRJ) being considered for the Phoenix area. Should the MRJ become a reality, it could affect military aircraft operations in the entire Phoenix area, including those of the Williams, Luke, and Davis-Monthan Air Force Bases and the Yuma Marine Corps Air Station. In comparison, the potential effect on an auxiliary airfield is a minor concern. The Air Force believes it is inappropriate to consider that the proposed auxiliary airfield could, of itself, seriously affect the MRJ project.

The Arizona Department of Transportation has yet to initiate a study to determine the need for an MRJ. This implies that approval and construction are 10 to 20 years in the future. Therefore, the U.S. Air Force does not consider the MRJ to be a reasonable, foreseeable action. For this reason, any potential impacts on construction and operation of the MRJ attributable to the proposed auxiliary airfield are not evaluated in this EIS. Conversely, the construction and operation of the auxiliary airfield would not necessarily foreclose the option of constructing the MRJ in Pinal County.

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

TABLES

TABLES (Cont'd)

FIGURES

FIGURES (Cont'd)

ABBREVIATIONS AND ACRONYMS

AAMRL	Armstrong Aerospace Medical Research Laboratory
ACAH	Arizona Commission of Agriculture and Horticulture
ACZ	airstrip containment zone
ADC	Arizona Department of Commerce
ADEQ	Arizona Department of Environmental Quality
ADES	Arizona Department of Economic Security
AFB	Air Force Base
AGE	aerospace ground equipment
AGFD	Arizona Game and Fish Department
AGL	above ground level
AICUZ	air installations compatible use zone
ANL	Argonne National Laboratory
ASM	Arizona State Museum
Assoc.	association
BLM	Bureau of Land Management
CAP	Central Arizona Project
CFR	Code of Federal Regulations
CNR	composite noise rating
CO	carbon monoxide
Co.	company
Corp.	corporation
CUD	compatible use district
dB	decibels
DOD	Department of Defense
EIS	environmental impact statement
EPA	Environmental Protection Agency
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Air Regulations
ft	feet
h	hour
HC	hydrocarbons
HQ-ATC	Headquarters Air Training Command
IFR	instrument flight rules
in.	inches
Inc.	incorporated
IR	instrument route
J.	journal
km	kilometers
LAP	localized area plans
L_{dn}	day-night average sound level
mi	miles
mi^2	square miles
$\mu g/m^3$	micrograms per cubic meter
µm	micrometers

MLS	Multiple Listing Service
MOA	military operating area
MRJ	Municipal Regional Jetport
MSL	mean sea level
NEF	noise exposure forecast
NEPA	National Environmental Policy Act
NLR	noise-level reduction
NO_x	nitrogen dioxide
PM_{10}	particulate matter with an aerodynamic diameter of less than 10 micrometers
pp.	pages
PPZ	Pinal planning/zoning (map)
R	range
RZA	residentially zoned area
Sec.	section
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
T	township
t	metric tons
TSP	total suspended particulates
USAF	U.S. Air Force
V	Victor
VFR	visual flight rules
VR	visual route

SUMMARY

The proposed action evaluated in this environmental impact statement (EIS) is the construction and operation of an auxiliary airfield and associated facilities for Williams Air Force Base (AFB), Arizona, in one of three candidate areas southeast of Phoenix. A new auxiliary airfield is needed because of (1) conflicting activities at the existing auxiliary airfield and (2) the high density of air traffic at Williams AFB. The U.S. Air Force (USAF) proposes to use the auxiliary airfield in pilot training by the 82nd Flying Training Wing stationed at Williams AFB, near Chandler, Arizona. The new facilities would be used for the training activities currently conducted at the Coolidge Municipal Airport.

Approximately 600 acres would be needed for the auxiliary airfield. Facilities would include a runway, fire station, two runway supervisory units (a small building near the runway containing meteorological and radio communications equipment from where USAF personnel control military touch-and-go operations), access roads, and utilities (electric transmission and telephone lines, domestic water system, and sewer system).

The USAF initially identified four large areas (ranging in size from 12,160 to 44,000 acres) in Pinal County southeast of Williams AFB as possible locations for the airfield. Three of the areas met all the USAF criteria for operational capability of training flights and jet aircraft. However, the fourth area was eliminated from further consideration because of potential for collisions of aircraft with birds from a nearby reservoir.

Major towns in the vicinity of the areas investigated include Coolidge, Florence, Eloy, and Casa Grande, all within Pinal County. Pinal County, with about 107,000 residents, accounts for about 3% of the total population of Arizona.

Alternatives to the proposed action include (1) obtaining a long-term lease of the Coolidge Municipal Airport, (2) obtaining a restrictive lease of the Coolidge airport, (3) purchasing the Coolidge airport, (4) relocating operations to a different existing airport, and (5) taking no action. Federal Aviation Administration (FAA) regulations prevent the City of Coolidge from entering into a restrictive lease agreement with the USAF. Also, deed restrictions prevent the sale of the airport to the USAF. The USAF did not find any of the other nearby airports suitable for the T-37 training. Therefore, the long-term lease and no action were the only alternatives considered viable. Since a long-term lease would be similar to no action in that both would involve continued use of Coolidge Municipal Airport for both USAF and civilian activities, only the no-action alternative is discussed in this document.

Land in the region is owned primarily by the federal and state governments, with some land in private ownership for agricultural use and residential development. Surface water is restricted to intermittent streams (washes), a few tanks (artificial ponds), and irrigation canals. Groundwater is available from three separate aquifers. Water quality of the groundwater is generally good, but depends on location of the aquifer. Air quality in the area is good and is believed to meet applicable ambient air quality standards.

Estimates of existing noise levels in the candidate areas range from extremely low levels of 20 decibels day-night average sound level (dB L_{dn}) in uninhabited areas to 45 dB L_{dn} along some of the nearby roads.

The natural flora and fauna of the areas consist mainly of drought-adapted plant and animal species typical of the Sonoran Desert. Principal wildlife species include mule deer, javelina, desert cottontail, Gambel's quail, and mourning and white-winged doves. Several federal and state threatened and endangered species could occur in the region, including the bald eagle, peregrine falcon, desert tortoise, gila monster, Tumamoc globeberry, needle spine pineapple cactus, and the Acuna valley cactus. In addition, several plant species occurring throughout the area are protected by the Arizona Native Plant Law.

All candidate areas appear likely to possess archeological sites that meet eligibility criteria for the *National Register of Historic Places*. In addition, numerous archaeological sites and historic structures, some of which are listed on the *National Register*, are located outside the candidate areas but on potentially affected lands.

If located in any of the three candidate areas examined (A, B, or C), the proposed auxiliary airfield could cause significant environmental impacts. However, most of these impacts could be reduced by proper siting of the airfield and implementation of planned mitigative measures.

The proposed project would increase the day-night average sound level by 20-30 dB over the existing 20- to 45-dB baseline levels in Area A, by 15-45 dB over the 20- to 45-dB baseline in Area B, and by 15-40 dB over the 30- to 50-dB baseline levels in Area C.

If constructed on cultivated lands of Area A, the proposed project would remove about 600 acres of land from agricultural use. If constructed on land covered with native vegetation in Areas A, B, or C, the project would eliminate about 600 acres from grazing leases and wildlife use. From 2 to 10 acres of riparian vegetation would be lost by clearing land for the runway and associated facilities. In addition, an unknown amount of riparian vegetation would be affected downstream of the proposed project. Also, construction in areas with natural vegetation would destroy native plants, some of which (e.g., saguaro cactus) are protected under the Arizona Native Plant Law. With implementation of planned mitigative measures, such as relocation of plants, this impact would be reduced. A potential would exist for significant impact to the threatened and endangered species (especially the plant species) if the auxiliary field were constructed either in Areas B or C. Potential impacts to threatened and endangered species could eliminate from consideration for the proposed airfield any portions of Areas B and C where such species occur.

Implementation of the no-action alternative would consist of continued use of the Coolidge Municipal Airport by the USAF in conjunction with continued civilian activities. No impacts to environmental resources would be expected beyond those already occurring in the area of the airport. However, airspace conflicts between military and civilian flight operations would likely increase. Thus, if the no-action alternative were implemented, it is still likely that an auxiliary airfield would still have

to be built somewhere within a 30-mi radius of Williams AFB at some time in the future. When this occurred, environmental impacts similar to those discussed in this EIS would result, depending on the specific location selected for this future auxiliary airfield.

The proposed auxiliary airfield could be constructed in portions of any of the three candidate areas examined, and potentially significant impacts could be avoided through careful selection of the site. Construction and operation of the airfield would cause the least impact to the environment of each of the three areas if the facility is located in either the central-eastern portion of Area A, the central or southwestern portions of Area B, or any portion of Area C except the extreme northern portion.

1. PURPOSE AND NEED FOR ACTION

The U.S. Air Force (USAF) proposes to construct and operate an auxiliary airfield and associated support facilities (two runway supervisory units, a crash fire station, access road, and necessary utilities) for use in training of pilots by the 82nd Flying Training Wing stationed at Williams Air Force Base (AFB) near Phoenix, Arizona (Figure 1.1). The new facilities would be located in Pinal County and would be used for training activities now conducted at the Coolidge Municipal Airport, near Coolidge, Arizona. The Coolidge airport would no longer be used by the USAF. A new auxiliary airfield is needed because of (1) the high density of air traffic at Williams AFB and (2) conflicting activities at the existing auxiliary airfield.

On an average day, about 170 T-37 sorties (individual flights), 190 T-38 sorties, and 20 F-5 sorties are flown from Williams AFB. This results in more than 600,000 takeoffs and landings annually at the base. To accommodate this large volume of air traffic, Williams AFB uses three parallel runways. One is dedicated to T-37 aircraft,

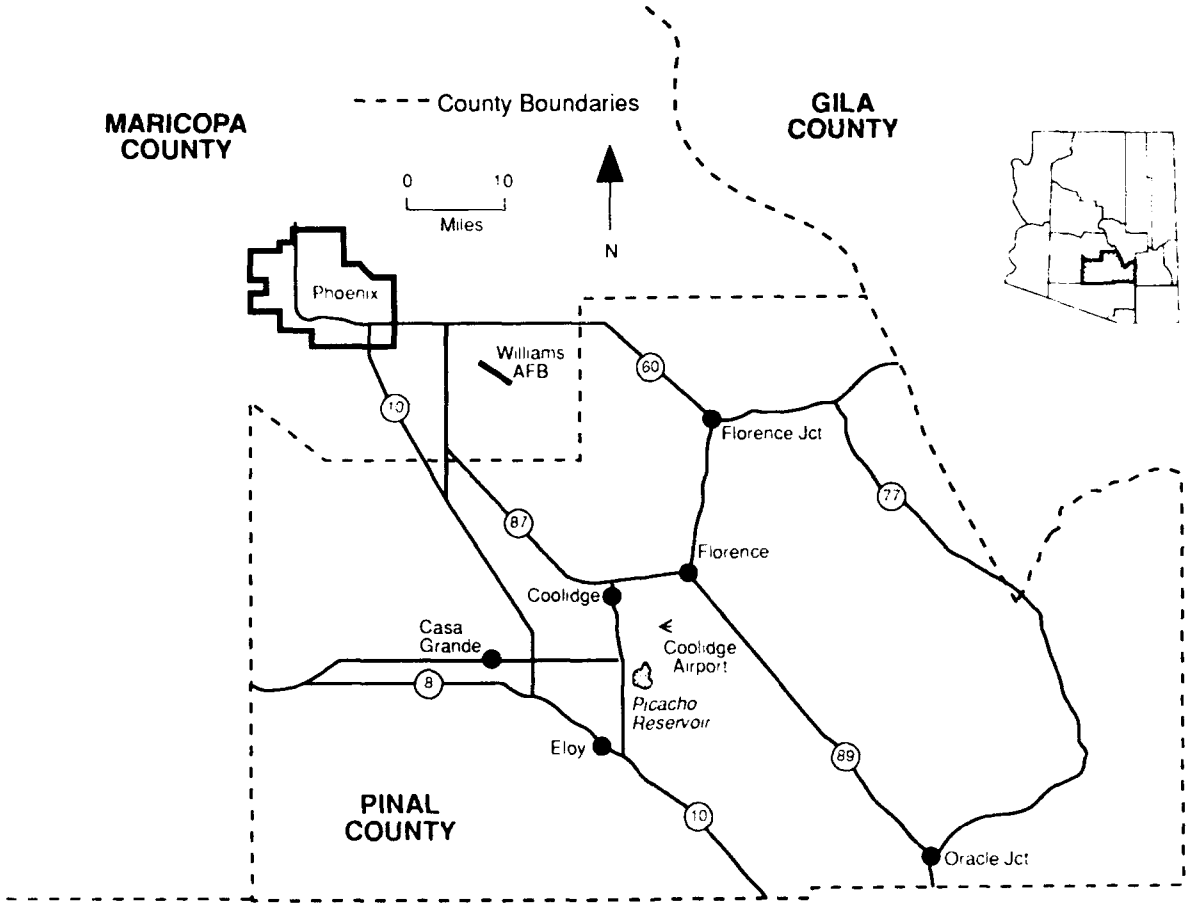

FIGURE 1.1 Regional Location of Williams AFB and the Coolidge Municipal Airport

another to the T-38, and the third to instrument departures and arrivals by T-38 and F-5 aircraft. The T-37 and T-38 aircraft cannot effectively use the same runway because of the speed differential between them. The high volume of takeoff and landing training dictates the need for each aircraft (T-37 and T-38) to have two runways.

The side-by-side seating of the T-37 aircraft used in training creates different visual perceptions for left- and right-hand patterns. Each pattern requires different flying techniques. Also, the USAF's Pilot Training Syllabus of Instruction requires pilots to be proficient both in left and right patterns. The three runways at Williams AFB cannot accommodate overhead patterns in both directions, and T-38 aircraft stationed there already use one runway. Therefore, about 40% of all T-37 patterns are flown from the current auxiliary airfield (Coolidge Municipal Airport).

The primary civilian user of the Coolidge airport is a parachute school that conducts extensive jump operations during the fall, winter, and spring. These activities interrupt USAF flight training operations at the auxiliary airfield during actual jumps. The pressures for more extensive civilian use of the Coolidge Municipal Airport may increase in the future. Civilian air traffic accounted for 9% of the airport's total operations in 1988. This is approaching the 12% upper limit the USAF believes is safe for jointly operated T-37/civilian airfields (Owendoff 1989). Increased civilian use would further hamper USAF pilot training operations. The joint use of the Coolidge airport increases safety hazards and diminishes pilot training effectiveness.

REFERENCE

Owendoff, J.M., 1989, base civil engineer, Headquarters Air Training Command, Williams Air Force Base, Ariz., letter to J.S. Irving, Argonne National Laboratory, Argonne, Ill., April.*

*Copy available upon request from J.S. Irving, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, Argonne, Ill.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

As indicated in Section 1, the proposed action analyzed in this EIS is the construction and operation of an auxiliary airfield for use by T-37 aircraft in the pilot-training program conducted by the 82nd Flying Training Wing stationed at Williams AFB, Arizona.

2.1.1 Location

The USAF initially identified four large areas southeast of Williams AFB as possible locations for the auxiliary airfield. The locations of these areas, referred to as Areas A, B, C, and D, are shown in Figure 2.1. Areas A, B, and C met initial screening criteria for flight training, airspace and groundspace limitations, and aircraft capability. (These criteria are summarized in Appendix A.) The USAF concluded,

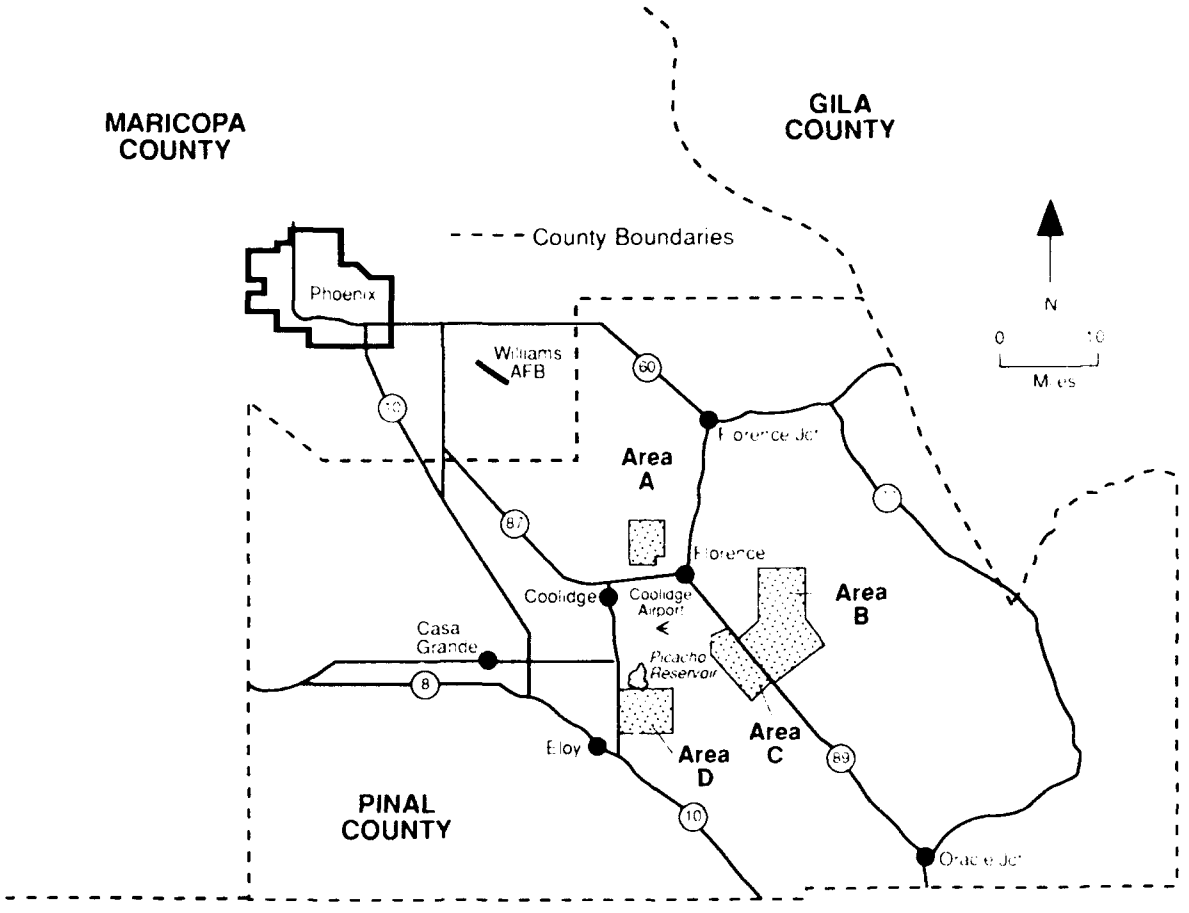

FIGURE 2.1 Candidate Areas for Location of an Auxiliary Airfield Southeast of Williams AFB, Arizona

however, that Area D did not meet criteria for groundspace. Area D is relatively close to a major water body (Picacho Reservoir) that supports a diverse bird population, thus posing a potential safety hazard of bird strikes. Consequently, Area D was eliminated from further consideration, and only Areas A, B, and C are evaluated in this report as candidate areas for the auxiliary airfield.

An exact location for the auxiliary airfield within each candidate area has not been identified. However, a more site-specific screening of the candidate areas based on criteria applied in Appendix A and on construction constraints resulted in a further reduction of land under consideration for the auxiliary airfield (Figures 2.2, 2.3, and 2.4). The site-specific location of the airfield within the remaining land in each area would depend in part on the environmental criteria analyzed in this EIS.

2.1.2 Facilities

The proposed auxiliary airfield would require a runway 5,000-6,000 ft long, 150 ft wide, with 1,000 ft of overrun on each end (Figure 2.5). A tract of land approximately 1/2 mi wide by 2-1/4 mi long would be required. Support facilities would include an access road, an aircraft parking ramp and taxiway, a fire station, two runway supervisory units (moved from the existing auxiliary airfield), electrical and telephone connections, water supply and septic systems, and a security fence.

2.1.3 Operations

Figure 2.6 shows a typical arrival and departure track (path) of a T-37 mission from Williams AFB to an auxiliary airfield and back. The mission covers about 100 nautical miles and lasts about 30 minutes (Table 2.1). Altitude of the mission along the track ranges from ground level (takeoffs, landings, and touch-and-go training) to 15,000 ft (Table 2.1).

On an average training day, T-37 aircraft would perform approximately 375 flight operations at the auxiliary airfield. Most of these would be touch-and-go operations. Five basic flight patterns would be used: (1) right- and left-turn departures, (2) straight-in arrivals, (3) closed patterns, (4) overhead landings, and (5) rectangular patterns (Figure 2.7). These are the same patterns currently used at Coolidge Municipal Airport (U.S. Air Force 1985). These patterns have been developed through years of operation and are the best possible in accord with safety considerations, USAF directives, and the aerodynamic characteristics of the T-37 aircraft.

Climb-out procedures are designed for an optimum balance between safety, T-37 aircraft effectiveness, and pilot-training requirements. Low-power takeoffs are not feasible. The typically high temperatures of the area reduce air density, which, in turn, reduces jet engine efficiency and aerodynamic effectiveness. This combination requires maximum power settings and results in long takeoff rolls. These operational data were used with the computer program NOISEMAP to generate L_{dn} noise-level contours for flight operations at an auxiliary airfield (see Appendix B). These contours are illustrated in Figure 2.8. At any candidate site, flight operations would be identical to those

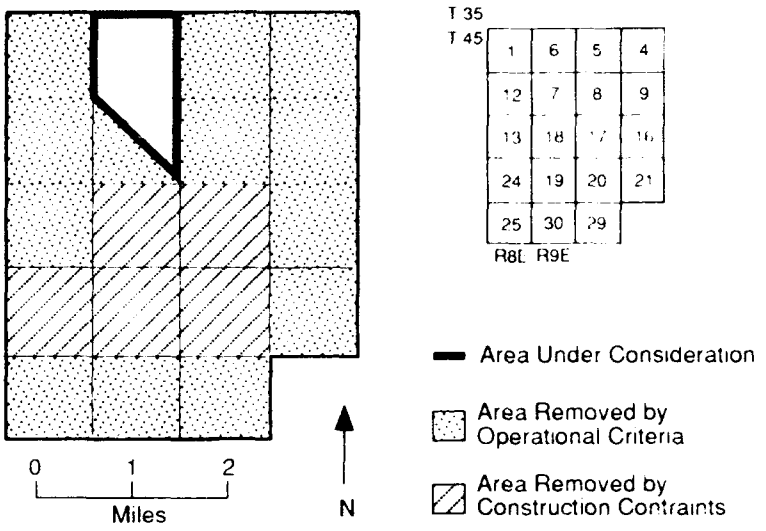

FIGURE 2.2 Land in Candidate Area A Eliminated from Consideration for the Auxiliary Airfield .

currently used by USAF pilots at Coolidge Municipal Airport. Ground operations rarely occur at the training field.

Direction of runway would be determined by four factors: (1) safety considerations, (2) prevailing winds, (3) training requirements, and (4) other aircraft traffic patterns. Direction of traffic is changed 180 degrees when the tail wind exceeds 5 knots.

Changes to departure tracks or turns immediately after takeoff are not feasible for several reasons. Takeoffs require a straight-ahead climb to clear traffic patterns adjacent to the runway. Also, a turn immediately after takeoff would jeopardize safety to an unacceptable degree because it would place the aircraft too close to a stall speed.

Changing the current approach procedures is not possible because of the nature of pilot-training requirements and T-37 aircraft characteristics. A steeper approach, for example, would increase the difficulty of touchdown maneuvers. Thus, optimum approach angles are used to decrease the danger of practice landings and takeoffs.

Low-power approaches are not an effective technique for jet aircraft. The acceleration time of jet engines is slow compared with other aircraft engines. Thus, during practice landings and takeoffs, relatively high power settings are used to provide a margin of safety. The higher power settings result in quicker response times. Quick-reacting speed brakes, spoilers, and flaps are used to keep speed down. These high-drag configurations counteract the high power settings.

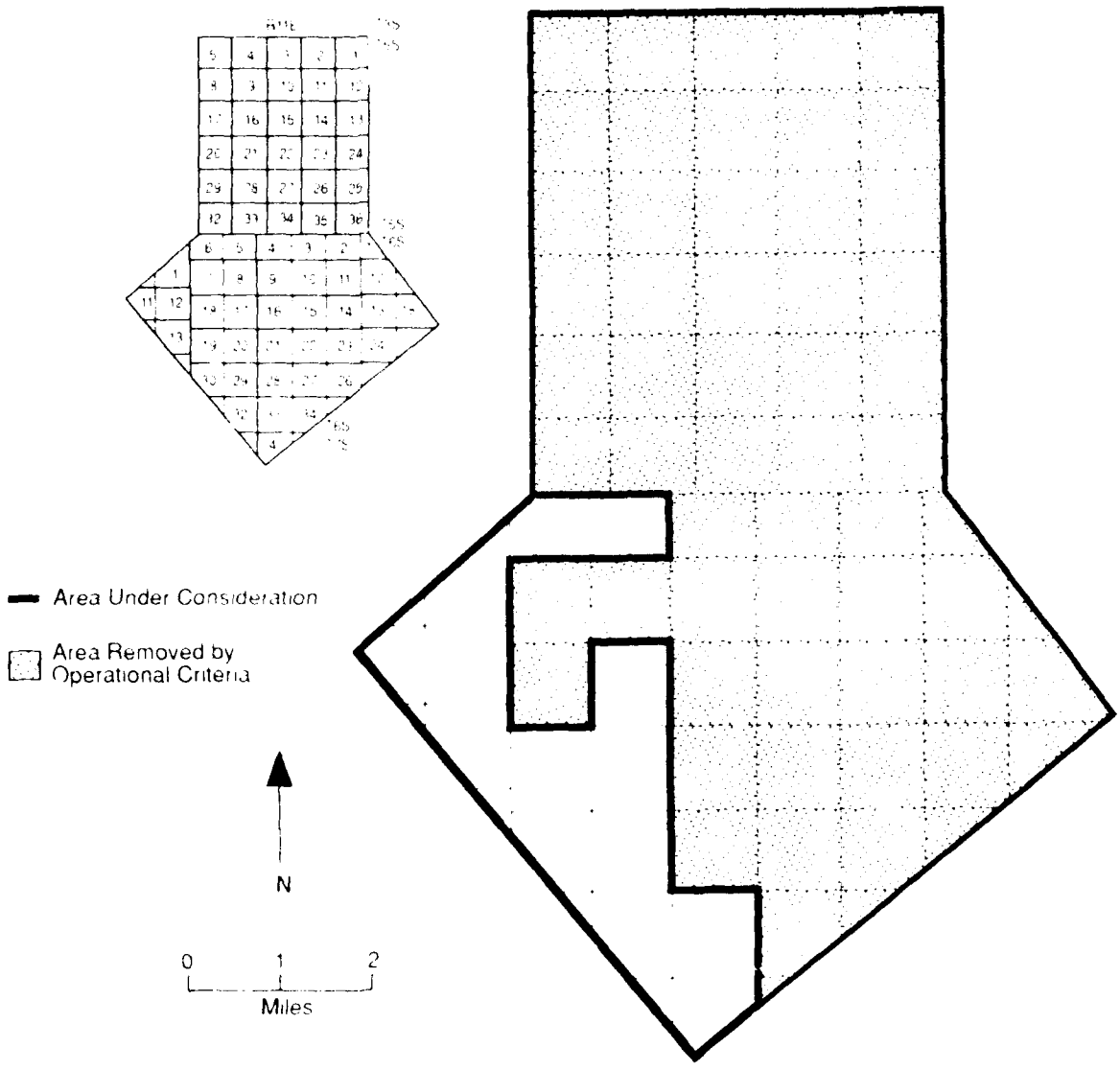

FIGURE 2.3 Land in Candidate Area B Eliminated from Consideration for the Auxiliary Airfield

2.2 ALTERNATIVES

Five alternatives to the proposed action have been considered. Three of the alternatives would require continuing training activities at the existing auxiliary airfield (Coolidge Municipal Airport). These three are (1) a long-term lease, (2) a restrictive lease, and (3) purchase of the airport by the USAF. A fourth alternative would be operating training flights from a different existing airfield. The fifth alternative, no-action, would be similar to the long-term lease of the present auxiliary airfield. Each of these alternatives is reviewed in more detail below.

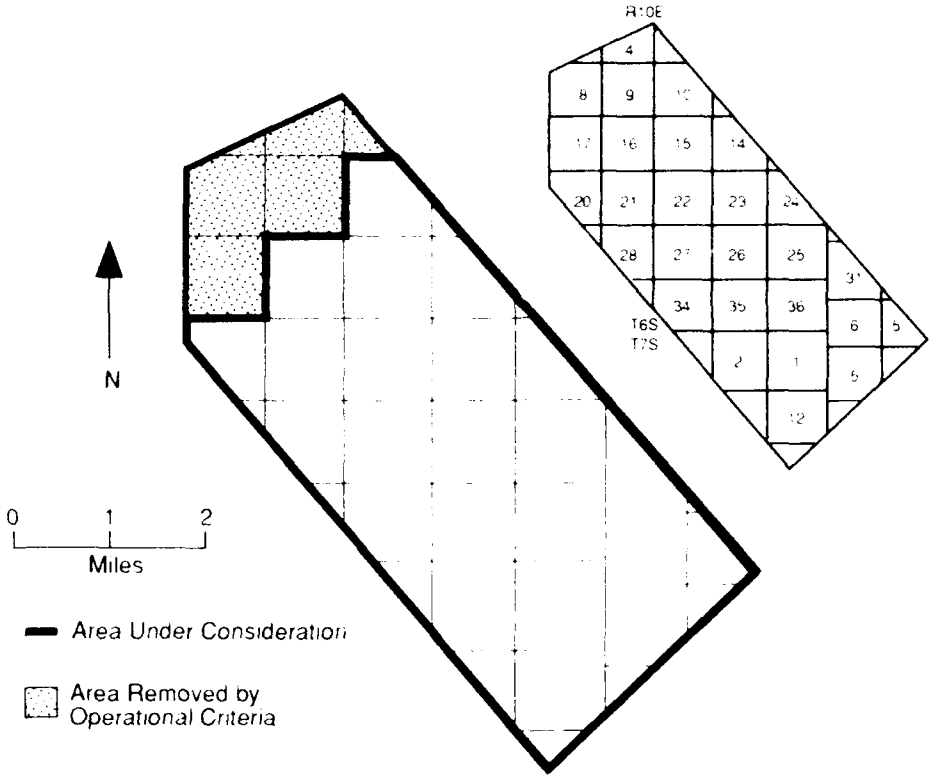

FIGURE 2.4 Land in Candidate Area C Eliminated from Consideration for the Auxiliary Airfield

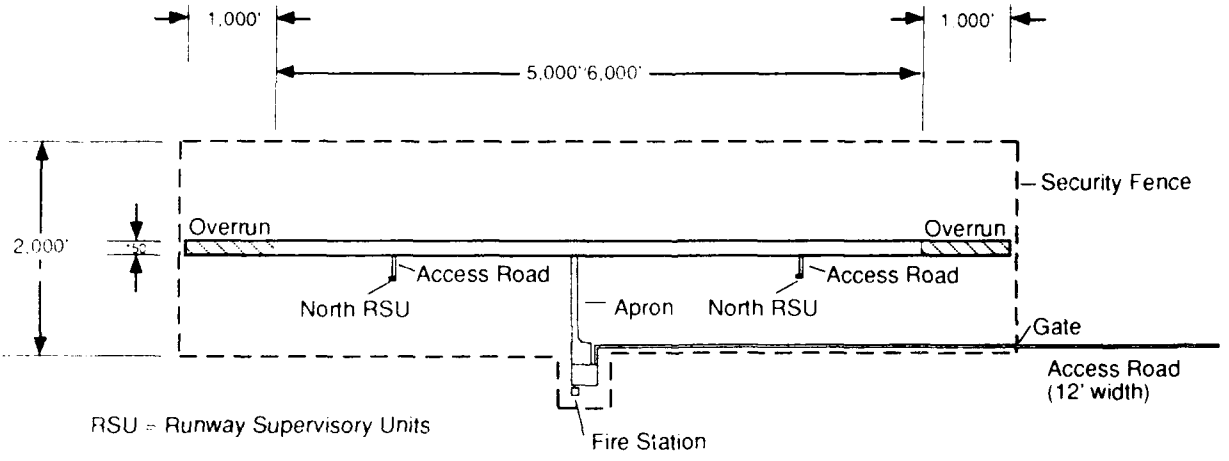

FIGURE 2.5 Typical Layout of an Auxiliary Airfield

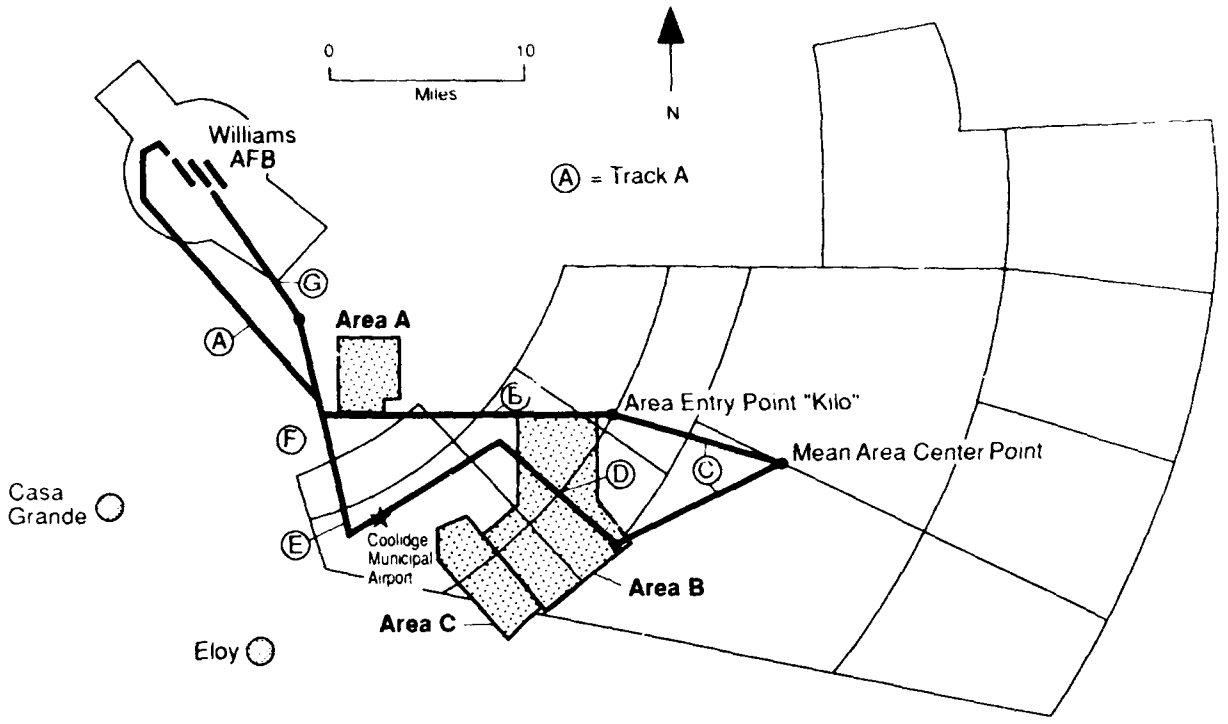

FIGURE 2.6 Typical Arrival and Departure Tracks (paths) Flown by Pilots in a T-37 between Williams AFB and an Auxiliary Airfield (example is for Coolidge Municipal Airport) (See Table 2.1 for the flight profile of each track [A-G])

TABLE 2.1 Typical Mission Profile Flown by Pilots in T-37 Aircraft between Williams AFB and an Auxiliary Airfield[a]

Track Segment[b]	Description	Distance (nautical miles)	Time (min:s)
A	Climb to 15,000 ft	22	8:00
B	Level off to area entry	15	3:30
C	Cruise to and from assigned area	20	5:05
D	Descend to auxiliary airfield	17	5:00
E	Climb for return to base	6	1:20
F	Cruise at 5,000 ft	9	2:30
G	Descend to Williams AFB	11	3:20

[a]Example is for auxiliary airfield at Coolidge Municipal Airport.

[b]See Figure 2.6 for orientation of flight tracks.

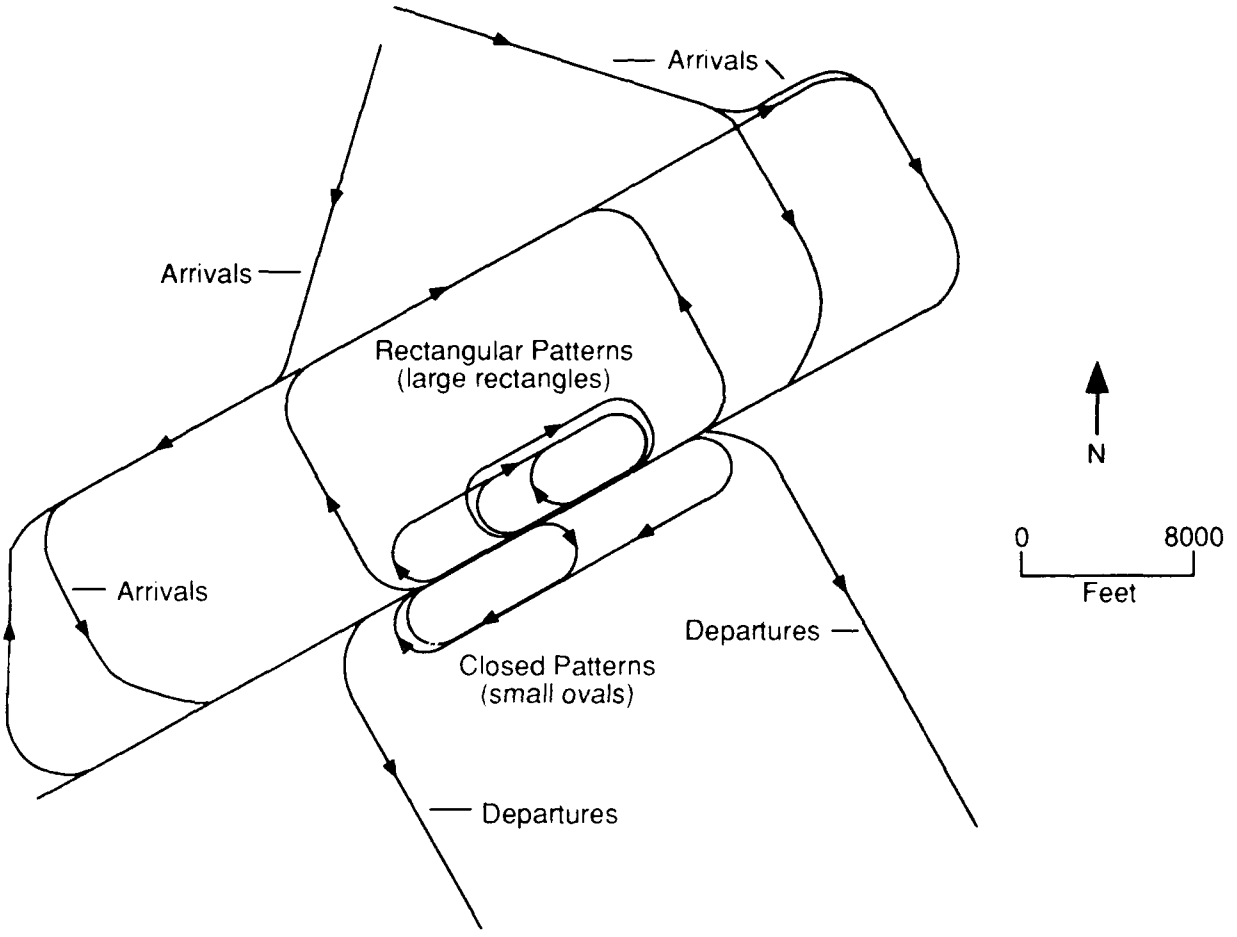

FIGURE 2.7 Five Basic Flight Patterns that Would Be Used in Operations at an Auxiliary Airfield

2.2.1 Long-Term Lease, Restrictive Lease, or Purchase of the Coolidge Municipal Airport

The USAF is currently operating under a long-term lease with the City of Coolidge that expires in the year 2002. There appear to be no institutional difficulties with extending the lease beyond that year. This alternative would not, however, solve the problems associated with the present use of the airport. Encroachment of incompatible land uses, such as residential construction, has become a problem in the vicinity of Coolidge Municipal Airport, and concerns are growing regarding noise and safety issues. However, the City of Coolidge could prevent encroachment from occurring by redrafting its master plan, eliminating land-use conflicts. Congestion and conflicts with civilian aircraft would continue to be a problem. Studies by Headquarters Air Training Command (HQ-ATC) indicate that when the civilian air traffic at joint civilian/T-37 auxiliary airfields exceeds 12% of the total air traffic, it is impractical to use the auxiliary airfield for T-37 training (Owendoff 1989). In 1988, the civilian air traffic at the Coolidge Municipal Airport was 9% of the total operations (Owendoff

1989). By 1992 or 1993, civilian air traffic is likely to exceed 12% of the total operations (Kolland 1989).

A lease that restricts use of Coolidge Municipal Airport to allow only military aircraft at specified times, or grants exclusive use of the airport to the USAF, would appear at least in principle to be an excellent alternative from the standpoint of the USAF. This would decrease the conflicts between civilian air traffic and USAF training flights. However, residential construction would continue to be a conflict, and the City of Coolidge cannot legally grant exclusive use of the airfield to anyone without the approval of the Federal Aviation Administration (FAA) because of deed restrictions inserted when the property was conveyed by the FAA to the city. The City of Coolidge is reluctant to restrict civilian air traffic, especially the private parachute jump operations (Owendoff 1989). Also, it would likely be difficult for the city to obtain FAA approval for a restrictive lease. Public airfields are generally available to any airplane user. If a lease restricting civilian air traffic were granted, the Arizona Department of Transportation and the FAA might require the City of Coolidge to pay back funds previously granted to help pay for airport improvements.

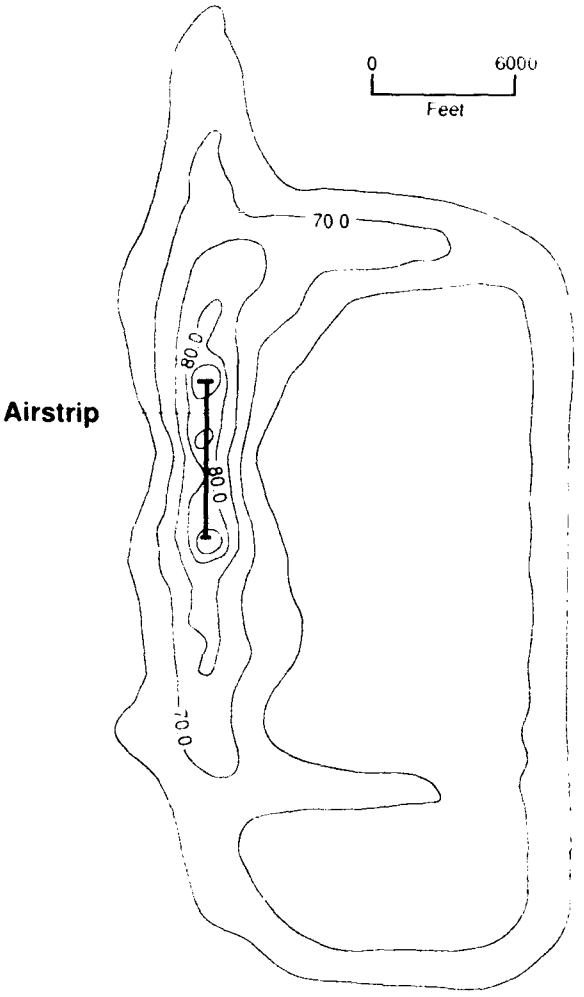

FIGURE 2.8 Expected L_{dn} Noise Contours around a Typical Auxiliary Airfield (contour interval is 5 dB)

The purchase of the Coolidge Airport by the USAF would ensure acceptable training standards by eliminating conflicts with increased civilian aircraft activities; however, potential conflicts with encroachment of incompatible land uses near the airport would not be eliminated. The USAF has extensively researched the alternative of purchasing the Coolidge Municipal Airport. Currently, selling of the airport would be economically infeasible because of FAA regulations and would violate deed restrictions. Violation of the deed restrictions would result in the city's forfeiting the airport properties and being required to reimburse funds other entities (e.g., FAA) have expended for airport improvements.

The Coolidge airport originally was an Army airfield that was subsequently conveyed by the FAA to the City of Coolidge sometime after World War II. Until 1984, the Department of Defense (DOD) had the right to regain possession of (*recapture*) the

property in the event of a national emergency. Although the DOD no longer has that right, the FAA retains certain restrictions on the use of the airport. The property must be used exclusively as an airport, and the City of Coolidge cannot grant anyone exclusive use of the runways. The FAA can recapture or confiscate the airport if the city fails to comply with these restrictions.

It is possible for the City of Coolidge and the FAA to enter into negotiations to remove these deed restrictions. However, this type of negotiation has rarely, if ever, been successful in the past. There are legal provisions that make it difficult for a city to realize profits from such sales. All sales of FAA-sponsored airfield property must be public sales (offered on the the open market, not just to the USAF). Revenues generated from such sales are returned to the FAA or used by the city to support development and/or improvement of other airports. If negotiations with the FAA allow the sale of the airport to the USAF, it would be difficult for the city to profit. Incentives for the City of Coolidge to enter into such negotiations appear lacking.

Regardless of the above, the city is currently precluded by deed restrictions from selling the airport, and although the USAF has condemnation authority, condemnation would not solve all of the legal and practical problems described above.

The viability of any of these three alternatives -- a long-term lease, a restrictive lease, or purchase of the Coolidge Airport -- is questionable. Of the three, a long-term lease is the most viable. However, a long-term lease would not solve the problems of increased conflicts between civilian aircraft and USAF training flights. Although a restrictive lease or purchase of the Coolidge Airport would decrease or eliminate the conflicts, legal problems associated with such alternatives likely would not allow the USAF to secure an auxiliary training field in a timely manner.

2.2.2 Location at a Different Existing Airfield

Another alternative would be to move the USAF training flights to a different existing airfield. Other airfields in the area were surveyed to evaluate the feasibility of this alternative, but none was found suitable for pilot-training operations (see Appendix C). In addition to the previously discussed problems encountered at joint-use airfields, these other existing facilities had a combination of heavy civilian traffic, encroachment from growing communities, and operational limitations (e.g., short runways, high terrain) that would restrict or prohibit effective pilot training.

2.2.3 No-Action Alternative

The no-action alternative would consist of the continued use of the Coolidge Municipal Airport on a joint-use lease basis. Because of the growth of the area and the increased demand for civilian aviation facilities, the 82nd Flying Training Wing may eventually lose the use of the auxiliary airfield at Coolidge. Pilot training at Williams AFB would, in that case, be adversely affected. The cost of the lease can be expected to rise in the future, and the no-action option would require that the USAF continue to share the airfield with civilian users.

2.3 COMPARISON OF ALTERNATIVES AND CANDIDATE AREAS

Three of the five alternatives considered are not viable. These are (1) restrictive lease of Coolidge Municipal Airport, (2) purchase of the Coolidge airport, and (3) relocation to a different existing airport. The restrictive lease and purchase alternatives may not be possible because of institutional and legal concerns. The City of Coolidge does not appear willing to limit civilian air traffic with a restrictive lease. Also, the FAA would have to approve a restrictive lease or sale of the Coolidge airport. Historically, the FAA has been reluctant to restrict civilian air traffic. In addition, the City of Coolidge might have to pay the FAA back for the public funds used to improve the airport in the past.

Relative to use of a different existing airport, no airports in the vicinity of Williams AFB meet the minimum requirements for safety, noise abatement, distance to urban areas, and training requirements. These three alternatives are not further considered in the EIS.

Two of the the five alternatives -- the long-term lease of the Coolidge airport and no-action -- are considered viable, but only for a limited period. By 1992 or 1993, civilian air traffic is likely to exceed 12% of the total operation (see Section 2.2.1), and conflicts between civilian air traffic and USAF flight training would create safety problems (Call 1989). In essence, these two alternatives would do nothing to solve the potential problems that the USAF is attempting to preclude with the proposed action. However, this potential long-term safety problem does not preclude the environmental viability of these two alternatives. Since both alternatives would result in essentially the same situation (i.e., continued joint use of the Coolidge Airport by the USAF and civilian operations) the no-action alternative is included in the following analyses as representative of this situation.

In the following subsections, potential environmental impacts are compared among the three candidate areas proposed for construction of the auxiliary airfield. These comparisons are based on data presented in Section 4 and take into account the entire portion of each candidate area. The no-action alternative (continued operation of training missions from the Coolidge Municipal Airport) would not restrict or change current impacts on land use, water resources, ecology, threatened and endangered species, socioeconomic factors, or cultural resources. Selection of the no-action alternative would mean that at least for the short-term, the impacts discussed in Section 4.1 would not occur in the three candidate areas. For the long-term, however, these same impacts might become an issue. This comparison of the proposed project (by candidate area) and the no-action alternative is summarized in Table 2.2.

2.3.1 Land Features and Use

The proposed action would remove about 600 acres of land from agricultural use or from grazing in Area A. Areas B and C contain undisturbed lands used mostly for grazing leases. No cultivated or fallow lands occur within Areas B and C.

TABLE 2.2 Summary of Potential Environmental Impacts within the Three Candidate Areas and for the No-Action Alternative

Environmental Resources/Factors	Area A	Area B	Area C	No-Action[a]
Land Features and Use	• Disruption of roads, railroads, and canals • Loss of 600 acres of cultivated lands or grazing leases • Indirect impact on use of rural farm residences • Disruption of mining claims and utility rights-of-way	• Disruption of roads • Loss of 600 acres of land used for grazing leases • Indirect impact on residentially zoned areas • Disruption of mining claim, utility rights-of-way	• Loss of 600 acres of land used for grazing leases • Indirect impact on residentially zoned areas • Disruption of utility rights-of-way, pipelines	• No loss of land • No impact on residentially zoned areas • No disruption of rights-of-way, etc.
Water Resources	• Minor soil erosion • Disruption of intermittent streams and ability of ponds to receive water	• Same as Area A	• Same as Area A	• No soil erosion
Air Quality	• Minor increases in concentrations of air pollutants	• Same as Area A	• Same as Area A	• No air quality problems
Noise	• Increases of 20-30 dB in L_{dn} noise levels above existing ambient levels • Potential noise impacts to rural farm residences	• Increases of 40 dB in L_{dn} noise levels above existing ambient levels • Potential noise impacts to residentially zoned developments with existing residences	• Increases of 40 dB in L_{dn} noise levels above existing ambient levels • Potential noise impacts to residentially zoned development without existing residences[b]	• No increase in noise levels • No impacts to existing residences
Airspace	• Potential conflict between USAF training and about 3,000 general aviation flights each year • Potential conflict between USAF training and use of military training routes VR 267, 268, and 269	• Potential conflict between USAF training and about 2,300 general aviation flights per year • Potential conflict between USAF training and Coolidge Municipal Airport Unique Area	• Potential conflict between USAF training and about 700 general aviation flights per year	• Conflict between civilian and military use of airport would increase; military might be forced to curtail or cease training flights
Ecology	• Loss of 600 acres of wildlife habitat, including 2-10 acres of riparian habitat, if constructed in undisturbed native habitat	• Loss of 600 acres of undisturbed native habitat, including 2-10 acres of riparian habitat	• Same as Area B, except potential impact to high-density javelina habitat	• No impact to terrestrial or aquatic flora or fauna

TABLE 2.2 (Cont'd)

Environmental Resources/Factors	Area A	Area B	Area C	No-Action[a]
Ecology (Cont'd)	• Indirect loss of unknown amount of riparian habitat downstream of auxiliary airfield if constructed in undisturbed native habitat • Short- and long-term disturbance of wildlife	• Indirect loss of unknown amount of riparian habitat downstream if constructed in undisturbed habitat • Potential impact to high-density mule deer habitat		
Threatened and Endangered Species	• Potential impact to transient/migrating bald eagles and peregrine falcons • Loss of large saguaro cacti	• Potential impact to migrating bald eagles and peregrine falcons • Potential loss of endangered tumamoc globeberry • Potential loss of listed species -- needle spine pineapple cactus and Acuna valley cactus • Loss of large saguaro cacti	• Same as Area B	• No impact to threatened or endangered species
Socioeconomics	• No significant impacts	• No significant impacts	• No significant impacts	• Increased conflicts between military training and civilian use of airfield (especially the parachute jump school)
Recreation	• Some disturbance of hunters	• Same as Area A	• Same as Area A	• No significant impacts
Cultural Resources	• No significant impacts	• Same as Area A	• Same as Area A	• No impacts

[a]Based on the assumption that no-action would be the continued use of the Coolidge Municipal Airport and that the military operations would not change from present (especially no increases in training flights). Impacts are only stated if they would be in addition to those already occurring at the present auxiliary airfield under the present training program.

[b]Also could cause impacts to the residentially zoned developments with existing residences adjacent to area boundary. Same residentially zoned development located in Area B.

The proposed action could disrupt major transportation networks in Areas A and B. Arizona Farms and Felix roads, the Hunt Highway, and the Southern Pacific Railroad are located in Area A. A major road (the Florence-to-Kelvin Road) crosses the northern part of Area B. Disruption of any of these routes would likely require major mitigative measures (such as rerouting). However, flexibility in site selection should make it possible to avoid these major transportation features. Area C does not contain any major transportation routes.

The proposed airfield could have direct and indirect impacts on rural residences in Area A and residentially zoned developments in Area B. Several rural residential buildings and farms are located in Area A near the junction of Arizona Farms and Felix roads. A small residential development is located in the western part of Area B. A small residentially zoned development is located in the northeastern part of Area C; however, no houses have been built there. Depending on the actual location of the proposed airfield, impacts to residential developments in Areas A and B could be significant.

Mineral exploration permits, mining claims, and public utility rights-of-way occur in all three areas. Some oil and gas exploration permits have been issued in Area C. In addition, two large canals are located in Area A. Depending on actual site selection, these uses could be affected by the proposed action.

2.3.2 Water Quantity and Quality

Without implementation of proper mitigative measures, construction of the proposed airfield in Areas A, B, or C could result in flooding from disruption of major wash systems. The filling of water tanks or small ponds in Areas B and C could be disrupted by construction of the proposed airfield. No impacts to groundwater are expected for any of the areas.

2.3.3 Air Quality and Noise

2.3.3.1 Air Quality

No significant air quality impacts are expected in any of the three candidate areas from construction or operation. The proposed airfield and training flights should comply with all air quality standards at all three areas.

2.3.3.2 Noise

The potential environmental noise impacts in the three proposed areas can be compared and summarized in at least three different ways -- (1) by determining noise impact to residentially zoned areas or rural residences, (2) by determining the greatest L_{dn} levels produced along the boundary of each area, and (3) by comparing the proposed and baseline environmental noise levels. Another basis for comparison is to audit the greatest L_{dn} level predicted to occur as a result of the proposed airfield at residentially

zoned areas adjacent to or near each site. The L_{dn} levels would be compared with baseline noise levels to determine the relative magnitudes of the impacts. Evaluation of environmental impact on the nearest off-site residentially zoned areas is the methodology used for this study.

The greatest noise impacts to residentially zoned areas or rural residences would occur in Area A (Table 2.3). Rural residences along the Arizona Farms and Felix roads could be exposed to noise levels as high as 80 dB L_{dn} if the airfield were constructed nearby. This level represents about a 40-dB increase over existing ambient level and exceeds the USAF acceptable residential limit of 65 dB L_{dn}.

Locating the airfield in the southeastern portion of Area A would lower the L_{dn} level at the rural residences along Arizona Farms and Felix roads to no higher than 60 dB. However, to the southeast, the 65-dB L_{dn} contour would be within a half mile of the town of Florence.

The residentially zoned development along the western boundary of Area B, near U.S. Highway 89, could be exposed to noise levels as high as 60 dB L_{dn} if the airfield were constructed nearby (Table 2.3). This represents about a 35-dB L_{dn} increase over existing ambient levels.

The residentially zoned development adjacent to the northeastern boundary of Area C, near U.S. Highway 89, could be exposed to noise levels as high as 71 dB L_{dn} if the airfield were constructed nearby (Table 2.3). This represents about a 20-dB L_{dn} increase over existing ambient levels. This L_{dn} level exceeds the USAF acceptable limits of 65 dB L_{dn}.

The greatest noise impacts to native and domestic animals would likely occur in Areas B and C. More habitat for native animals occurs in those two areas than in Area A, where much of the land is cultivated. However, native and domestic animals are expected to adapt to aircraft noise; therefore, no long-term impacts to native or domestic animals are expected from noise in any of the candidate areas.

2.3.4 Airspace and Safety

Area A has the highest volume of general aviation air traffic (at least 3,000 flights per year). Area A is crossed by several general aviation routes, and three military training routes (VR 267, VR 268, and VR 269) cross the area from west to east. Area B also has a heavy volume of general aviation air traffic (at least 2,300 flights per year). Most of the general aviation routes cross the northern portion of Area B. Area C has the lowest volume of general aviation air traffic (at least 700 flights per year). All the general aviation routes cross the northern portion of Area C. Also, the northwestern portion of Area C is within Coolidge Municipal Airport Unique Area.

Potential conflicts between USAF training routes at a new auxiliary airfield and general aviation routes would be highest for Area A and the northern portion of Area B. The least potential for conflict between training routes and general aviation routes would result if the auxiliary airfield was constructed in the southern portions of Area B or C.

TABLE 2.3 Summary of Environmental Noise Impacts of Flight Operations in the Candidate Areas on Residentially Zoned Areas (RZAs) and along the Site Boundary

Criteria	Area A	Area B	Area C
	Number		
RZAs within area	0	1	1
RZAs adjacent to area	0	1	1
	L_{dn} level (dB)		
Baseline L_{dn} level at adjacent RZA	-[a]	50	50
Greatest L_{dn} at adjacent RZA after site activation[b]	-	60	71
Greatest increase at adjacent RZA[b]	-	10	21
Greatest L_{dn} produced along the site boundary[b]	80	65	71
Greatest increase along site boundary[b]	40	35	21

[a]A dash (-) indicates not applicable.

[b]Assuming that the proposed airfield is constructed near the residentially zoned developments.

2.3.5 Biotic Resources

Construction of the proposed airfield in cultivated portions of Area A would have less impact on native plants and animals than if the facility were constructed in Areas B or C, which consist entirely of native vegetation. About 600 acres of undisturbed lands would be affected by construction of the proposed airfield in Areas B or C. This total includes 2-10 acres of riparian habitat. In addition, an unknown amount of riparian habitat would be affected downstream of the proposed airfield in the uncultivated portion of Area A and most of Areas B and C. If the airfield were constructed in areas of native vegetation, impacts to the plants and animals would be qualitatively similar among the three areas, except for impacts to high-density populations of mule deer and javelina and to saguaro cacti (see Section 2.3.6).

Locating the airfield in Area A would not impact high-density populations of mule deer or javelina. However, construction of the airfield in the southeastern portion of Area B or the northwestern portion of Area C would impact high-density populations of mule deer and javelina, respectively.

2.3.6 Threatened, Endangered, and Other Protected Species

Construction of the proposed airfield in Area A would not likely affect populations of federal threatened and endangered species or state species of special concern. Construction in Areas B or C could have significant impacts on the Tumamoc globeberry, needle spine pineapple cactus, and Acuna valley cactus. Although the desert tortoise and gila monster may occur in Areas B and C, their critical habitat is on mountain slopes where location of the airfield is not practical.

Construction of the proposed airfield in any of the three areas except in the cultivated portions of Area A could have a significant impact on several native plant species protected by the Arizona Native Plant Law. Relatively greater densities of large saguaro cacti that could not be relocated occur in Areas B and C than in uncultivated portions of Area A; hence, more saguaro would be destroyed by construction of the proposed airfield in Areas B or C.

2.3.7 Socioeconomic and Institutional Factors

The socioeconomic analysis provides no basis for selecting among Areas A, B, or C since socioeconomic impacts would be essentially identical regardless of which candidate area was selected.

2.3.8 Recreational Resources

No significant differences exist for selecting among the three areas based on recreational impacts. However, continued long-term use of the Coolidge Municipal Airport (no-action alternative) would require some adjustments in the use of airspace and recreational activities. Private and commercial use of the Coolidge airport would likely continue to expand. As these activities increase, the potential exists for a greater number of military and private or commercial aircraft interactions.

2.3.9 Cultural Resources

All three areas under consideration contain archaeological sites. No sites within the three areas are currently listed on the *National Register*; however, some are likely to meet eligibility criteria for nomination. Archaeological sites in any of the three areas could be subject to indirect adverse effects from vandalism due to increased access to that area.

In Area A, adverse effects would be limited to sites on the relatively flat alluvial deposits that cover the northern portions of the area. Placing the airfield on the cultivated lands would likely cause the least impact to any archaeological sites. Historic structures outside Area A in the town of Florence could be exposed to indirect adverse effects (noise, vibration) during operation of the proposed airfield.

Portions of Area B and all of Area C possess high potential for archaeological sites of varying characteristics. In Areas A and C, existing archaeological data could be used to avoid known sites that are likely to be determined as significant. No information exists on archaeological sites within Area B.

2.4 REFERENCES

Kolland, P.F., 1989, chief, Operations Division, Williams Air Force Base, Ariz., letter to J.S Irving, Argonne National Laboratory, Argonne, Ill., Oct.*

Owendoff, J.M., 1989, base civil engineer, Headquarters Air Training Command, Williams Air Force Base, Ariz., letter to J.S. Irving, Argonne National Laboratory, Argonne, Ill., April 17.*

U.S. Air Force, 1985, *Air Installations Compatible Use Zone Study, Coolidge Municipal Airport*, Headquarters 82nd Flying Training Wing, Williams Air Force Base, Ariz., Dec.

*Copy available upon request from J.S. Irving, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, Argonne, Ill.

3. AFFECTED ENVIRONMENT

3.1 PROPOSED PROJECT

This section describes existing environmental conditions within Candidate Areas A, B, and C. The acreage within each area under consideration for construction of an auxiliary airfield has been reduced from that described during the scoping meetings (see Section 2.2.1); however, this section provides information on the existing environment of each candidate area based on its original size.

All three candidate areas for the 600-acre auxiliary airfield are in the central portion of Pinal County, Arizona (Figure 2.1). The county occupies 3.5 million acres in the south-central part of Arizona and has a population of more than 107,000 people. Florence (the county seat), Casa Grande, Coolidge, and Eloy are the principal towns of the county. The area from Apache Junction to Florence Junction is becoming part of the Phoenix metropolitan area. The topography ranges from nearly level or slightly sloping (valleys and floodplains) to steep on hills and mountains. Intermittent tributaries of the San Pedro, Gila, and Santa Cruz rivers cross the county. The average annual rainfall ranges from 4 to 9 in. in the desert and from 14 to 25 in. in the higher mountains. The mean annual air temperature of the county ranges from about 71°F in the desert areas to 57°F at mountaintop elevations (approximately 5,500 ft mean sea level [MSL]).

3.1.1 Land Features and Use

Pinal County is within the Eloy-Coolidge drainage basin. The basin is underlain by granite bedrock that outcrops to form the nearby mountains. The valleys are filled with alluvial deposits stratified over the bedrock. Land subsidence and earth fissures are present in the area (mostly in the southern part) and have been attributed to groundwater depletion and subsequent compaction or settling of deeply buried alluvial sediments.

The area receives water from the Central Arizona Project to irrigate about 39,000 acres. Irrigated soils are used to grow crops, mostly for commercial use. Principal cash crops are cotton, alfalfa, small grains (wheat and barley), vegetables, grapes, citrus and other fruits, and pecans. Unirrigated areas in the county are used for rangeland, recreation, wildlife habitat, and urban facilities. Mining, especially for copper, molybdenum, silver, and gold, is an important industry in Pinal County.

Of the combined total of 72,800 acres of surface area included in the three candidate areas, about 56% is administered by the State of Arizona and 25% by the Bureau of Land Management (BLM). The remaining acreage (19%) is owned by others, including private owners (Corps of Engineers 1987). Land ownership and land use in the three areas are detailed in Tables 3.1, 3.2, and 3.3. Land features, soil characteristics, and land ownership and use patterns within each candidate area are briefly discussed below.

Pinal County and the towns of Florence and Coolidge do not have formalized land use plans. Pinal County is, however, working on several localized area plans (LAPs), two

TABLE 3.1 Land Ownership in the Three Candidate Areas

Area	Total Acreage	State of Arizona		BLM		Others[a]	
		Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
Area A	12,160	896	7.4	1,280	10.5	9,984	82.1
Area B	44,000	24,960	56.7	16,640	37.8	2,432	5.5
Area C	16,640	15,040	90.4	0	0	1,600	9.6
Combined	72,800	40,896	56.2	17,920	24.6	14,016	19.2

[a]Includes private owners.

Source: Adapted from Corps of Engineers 1987.

of which are include land within the candidate areas. The Cactus Forest LAP involves land within Areas B and C. The Valley Farms LAP involves land within Area A. Only the Cactus Forest LAP has been completed (Irving 1989).

3.1.1.1 Area A

Land Features and Soils

Area A is located about 4 mi northwest of Florence and occupies 12,160 acres (Figure 3.1). The Southern Pacific Railroad crosses the area from the northwestern corner to the southeastern corner, and the Hunt Highway and Arizona Farms Road border the western and northern boundaries, respectively. Felix Road crosses the area from north to south. Several smaller, unpaved roads and trails make most of the area accessible by car or jeep. The North Side Canal crosses the lower portion of Area A south of the Hunt Highway. Another irrigation canal crosses the northeastern corner of the area. A buried natural gas pipeline crosses the southeastern corner.

Area A is relatively flat, with elevations generally varying from 1,450 to 1,575 ft MSL. Exceptions are four steep hills or buttes in the northwestern and southwestern parts of the area with elevations of about 1,600-1,650 ft MSL. The southeastern corner of the area contains washes 10-50 ft deep caused by the erosive action of intermittent creeks. A large wash crosses the area from the northeast to southwest. Limited erosion occurs around this wash.

TABLE 3.2 General Land Use Patterns in the Three Candidate Areas

	Area A		Area B		Area C	
Land Use	Acreage	Percent[a]	Acreage	Percent[a]	Acreage	Percent[a]
Residential[b]	65	0.5	152[c]	0.3	413[c]	2.5
Grazing	1,315	10.8	16,424	37.3	15,925	95.7
Cultivated	4,352	35.8	0	0	0	0
Utilities	0.2	<0.1	4.5	<0.1	131.5	0.8
Miscellaneous[d]	6,428	52.9	27,420	62.3	171	1.0
Total[e]	12,160		44,000		16,640	

[a]Percentage of total acreage in that area; percentages may not equal exactly 100 because of rounding.

[b]Source: Master Zoning Map, Pinal County, Arizona (Pinal County 1985); actual observation during site visits (July and November 1988); and aerial photographs of Pinal County (March 1987). Includes homestead, ranch, general business, and farm houses.

[c]Total acreage zoned residential. Currently there are 45 acres (0.1%) of residential development in Area B, and no residential development in Area C.

[d]Includes unknown land use acreage, probably owned by BLM or State of Arizona, but not leased for grazing.

[e]Totals are rounded.

Three soil associations (Mohall-Vecont, Gunsight-Cavelt-Rillito, and Laveen-Rillito) and the Granite and Schist Rock Outcrop unit occur within the area (Figure 3.2) (Soil Conservation Service 1972). The Mohall-Vecont association occurs in the northern part of the area on lower portions of valley slopes. Mohall soils have slow water permeability, moderate surface water-holding capacity (high in subsoil), and slight flooding and erosion potentials (see Table 3.4 for definitions of terms). Vecont soils have slow water permeability, high water-holding capacity, and slight flooding and erosion potentials (except near drainages, where potentials are moderate).

The Gunsight-Cavelt-Rillito soil association occurs along the eastern border of Area A. Gunsight soils have moderately rapid water permeability, low water-holding capacity, no flooding potential, and moderate erosion potential. Cavelt soils have moderate water permeability (slow in hardpan), moderate water-holding capacity, no flooding potential, and moderate erosion potential. Rillito soils have moderate water permeability, low to moderate water-holding capacity, and slight flooding and erosion potentials.

TABLE 3.3 Utility and Miscellaneous Land Use in the Three Candidate Areas

Area/Use	Acreage	Location[a]
Area A		
Mineral claims	-[b]	T4S, R8E, Sec. 12 SE 1/4[c]
Central Arizona Project	320.00	T4S, R9E, Sec. 9 E 1/2
Salt River Project	0.02	T4S, R9E, Sec. 30
Mountain States Telephone & Telegraph	0.20	T4S, R9E, Sec. 25
Unpatented mining claims		
Private	-	T4S, R8E, Sec. 12
Sugar Creek Mining	-	T4S, R8E, Sec. 12
Conoco Corp.	-	T4S, R8E, Sec. 13 T4S, R9E, Secs. 17, 18, 21
Exxon Corp.	-	T4S, R9E, Secs. 7, 8, 9
Area B		
Government material sites[d]	192.07	T6S, R10E, portions of Secs. 24, 30-32; T7S, R11E, portions of Secs. 5-7
Mineral claims	16.16	T5S, R11E, Sec. 2
American Telephone & Telegraph[d]	9.25	T6S, R10E, Secs. 10, 14, 24; T6S, R11E, Secs. 30-32
Special use land permit	1.00	T7S, R11E, Sec. 4
Bureau of Reclamation[d]	46.89	T6S, R10E, Sec. 24; T6S, R11E, Secs. 30-32; T7S, R11E, Sec. 5
Patented mining claims	-	T6S, R11E, Sec. 18
Unpatented mining claims	-	T5S, R11E, Sec. 5
Area C		
Government material sites[d]	(see Area B)	
Oil and gas	1,120.00	T6S, R10E, Secs. 20-23
El Paso Natural Gas	56.65	T6S, R10E, Secs. 20, 27, 28, 34-36; T7S, R10E, Sec. 1
All-American Pipeline	40.85	T6S, R10E, Secs. 20, 27, 34-36; T7S, R10E, Sec. 1; T7S, R11E, Secs. 6, 7
American Telephone & Telegraph	0.04	T6S, R11E, Sec. 14 (also see Area B)
Bureau of Reclamation[d]	(see Area B)	

[a]See Figures 3.3, 3.6, and 3.9 for location of state and federal grazing allotments.

[b]A dash (-) means that the acreage is unknown.

[c]Township 4 South, Range 8 East, Section 12, southeast quarter.

[d]Parts of sections occur both in Areas B and C.

Source: Adapted from Corps of Engineers 1987.

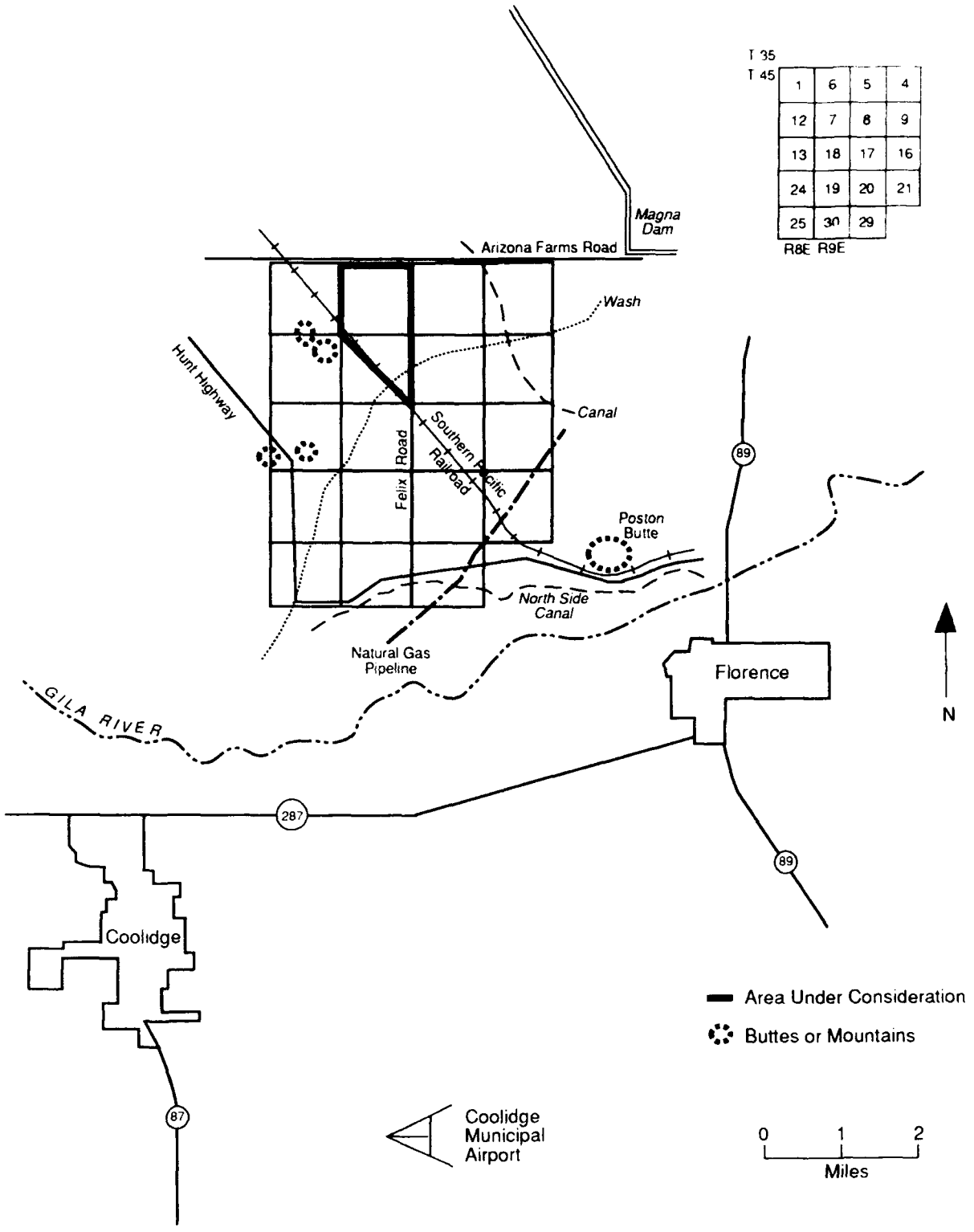

FIGURE 3.1 Major Features within Area A

TABLE 3.4 Definitions of Terms Used to Characterize Soils

Term	Definition
Permeability	The quality of a soil layer that enables water or air to move through it; expressed as distance moved over time, ranging from very slow (<0.06 in./h) to very rapid (>20.0 in./h).
Water-holding capacity	The capacity of the soil to store water for use by plants; usually expressed in linear depths of water per unit of soil, ranging from high (>0.13 in./in.) to low (<0.04 in./in.).
Flooding potential	The susceptibility of a soil, generally due to its location, to overflow or inundation, usually as a result of excess drainage from streams or other channels.
Erosion potential	The susceptibility of a soil to accelerated erosion resulting from disturbance or destruction of the vegetation.
Hardpan	A hardened or cemented soil layer.

Source: Adapted from Soil Conservation Service 1972.

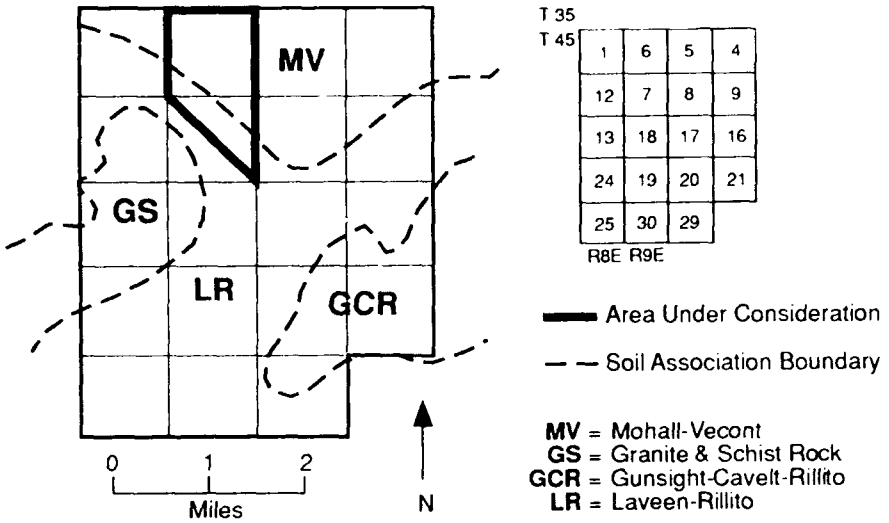

FIGURE 3.2 Soil Associations within Area A (Source: Adapted from Soil Conservation Service 1972)

The Laveen-Rillito soil association occurs in the middle of the area in an enormous "Y"-shape, with the base occupying the southern portion of the area. Laveen soils have moderate water permeability, high water-holding capacity, slight flooding potential, and slight to moderate erosion potential.

The Granite and Schist Rock Outcrop unit occupies the middle of the western side of the area. This unit (not an association) includes mountainous land of granite and schist, of which 60-75% is rock outcrop with slopes ranging from 15% to 75%. In addition to the rock outcrop, this unit consists of shallow, gravelly, cobby, and/or stony soils with small areas of moderately deep soils.

Land Ownership and Use

Private owners control about 82% (9,984 acres) of the land within Area A, the BLM controls about 11% (1,280 acres), and the State of Arizona controls 7% (896 acres) (Table 3.1 and Figure 3.3). The area includes a number of farms, some with residences, especially along Arizona Farms and Felix roads. The area contains about 30 buildings, including rural farm houses occupying about 65 acres (less than 1% of Area A) (Table 3.2).

As shown in Tables 3.2 and 3.3, the BLM and State of Arizona have granted grazing leases for about 1,315 acres (10.8%) of Area A; about 4,400 acres (35.8%) in the area are cultivated with cotton, alfalfa, and grains; and less than 0.2 acre (less than 0.1%) of Area A is used for utilities (Salt River Project and Mountain States Telephone and Telegraph). Pinal County records indicate that several unpatented mining claims are

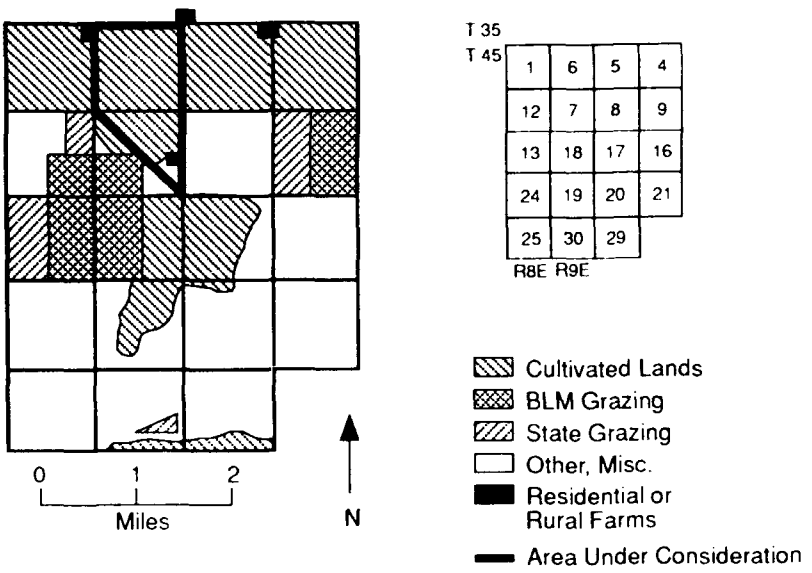

FIGURE 3.3 Land Use within Area A

located within Area A (Table 3.3). The area has been characterized as *general rural* by the Board of Supervisors of Pinal County (Pinal County 1985, site PPZ-4S89E*).

3.1.1.2 Area B

Land Features and Soils

Area B is located about 7 mi southeast of Florence and occupies an area of about 44,000 acres (Figure 3.4). To the southwest, U.S. Highway 89 separates Area B from Area C. Smoke Road crosses the southern portion of Area B; in the northern portion, the Florence-to-Kelvin Road crosses the area west-east. Several other unimproved roads also cross the area. A power line parallels U.S. Highway 89 along the southwestern border of the area.

The elevation of Area B varies from 1,930 to 2,811 ft MSL. On the southeastern corner of Area B, the Ninetysix Hills have elevations ranging between 2,761 and 2,811 ft MSL. The Middle Mountains, located in the south-central part of the area, have elevations of 2,654-2,701 ft MSL. Two smaller hills with elevations of 2,180 and 2,204 ft MSL occur in the west-central part of the area. The Cat Hills are located in the northern portion of the area with elevations up to 2,275 ft MSL.

The northeastern corner of the area is crossed by the Box-O Wash, which extends southeast-northwest for 2 mi within the area. The wash is about 1/5 of a mile wide and has very steep banks (dropping 200 ft over a distance of 100 ft). The Paisano Wash is in the southern portion of the area. It is very narrow and the banks are not steep. A number of other intermittent, shallow streams also cross the area east to west.

Four soil associations occur within the area: Chiricahua-Rock Outcrop, Gunsight-Cavelt-Rillito, Gilman-Antho-Pimer, and the White House-Caralampi (Figure 3.5) (Soil Conservation Service 1972). The Chiricahua-Rock Outcrop association occurs along rolling foothills on the northeastern and southeastern corners of Area B. Chiricahua soils have moderately slow permeability to bedrock, moderate water-holding capacity above bedrock, no flooding potential, and high erosion potential. Weathered granitic bedrock occurs at a depth of 10-20 in., becoming harder with depth. The shallow and very shallow soil materials are on the steeper portions of the slopes. The rock outcrop occurs as low ledges, ridges, and boulder piles.

The Gunsight-Cavelt-Rillito soil association occurs in the northwestern corner of the area. The characteristics of these soils were described for Area A (Section 3.1.1.1).

The Gilman-Antho-Pimer soil association occupies an area along the western portion of Area B. Gilman soils have moderate permeability, high water-holding capacity, slight flooding potential, and slight to moderate erosion potential. Antho soils have moderately rapid permeability, moderate water-holding capacity, slight flooding

*PPZ-4S89E = Pinal Planning/Zoning, Township 4 South, Ranges 8 and 9 East.

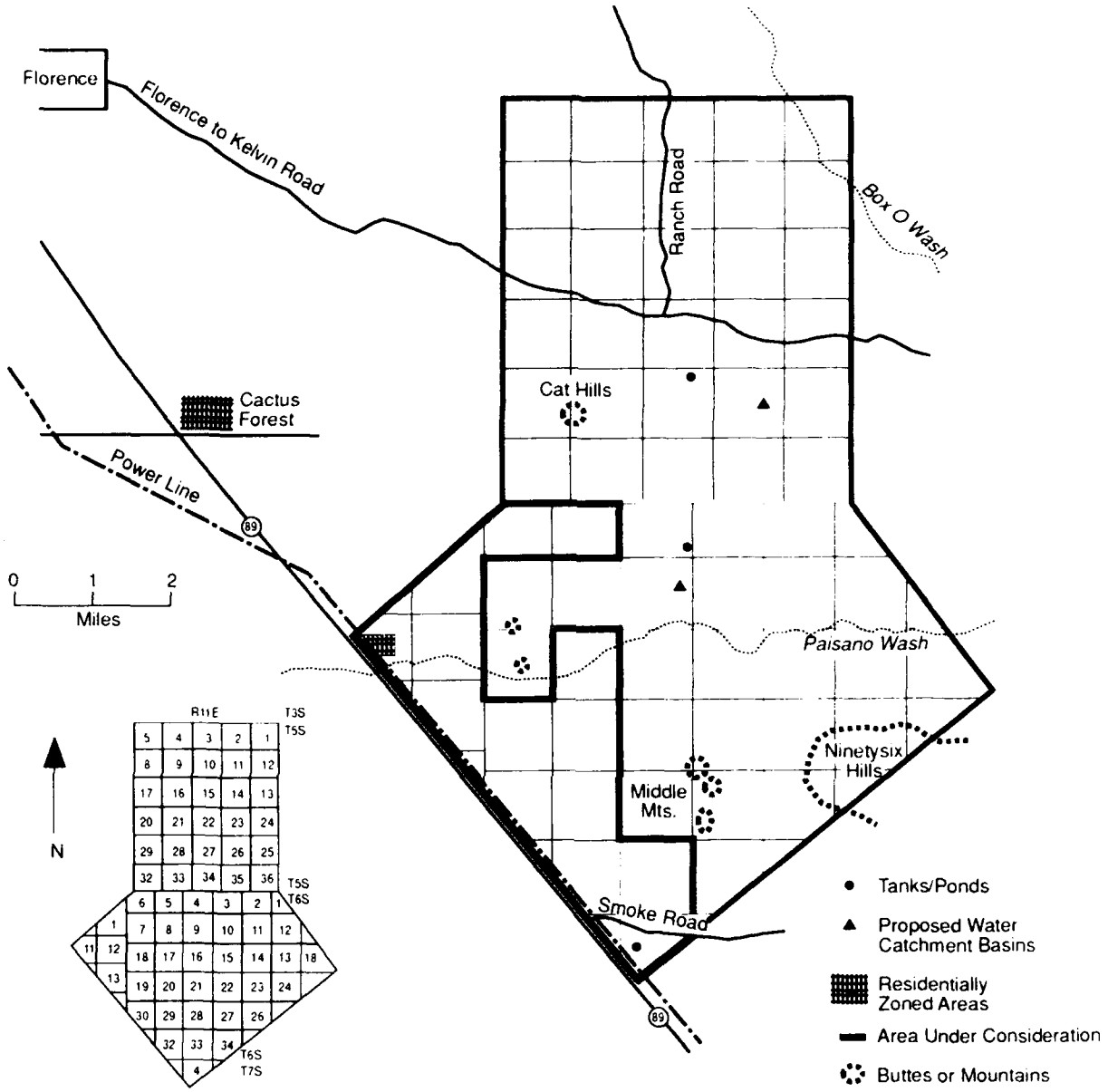

FIGURE 3.4 Major Features within Area B

potential, and slight to moderate erosion potential. Pimer soils have moderately slow permeability, high water-holding capacity, and slight to moderate flooding and erosion potentials.

The White House-Caralampi soil association occurs between the areas occupied by the Gilman-Antho-Pimer and Chiricahua-Rock Outcrop associations. White House soils have slow permeability, high water-holding capacity, and slight to moderate erosion potential. Caralampi soils have moderately slow permeability, low to moderate water-holding capacity, and slight to moderate flooding and erosion potentials.

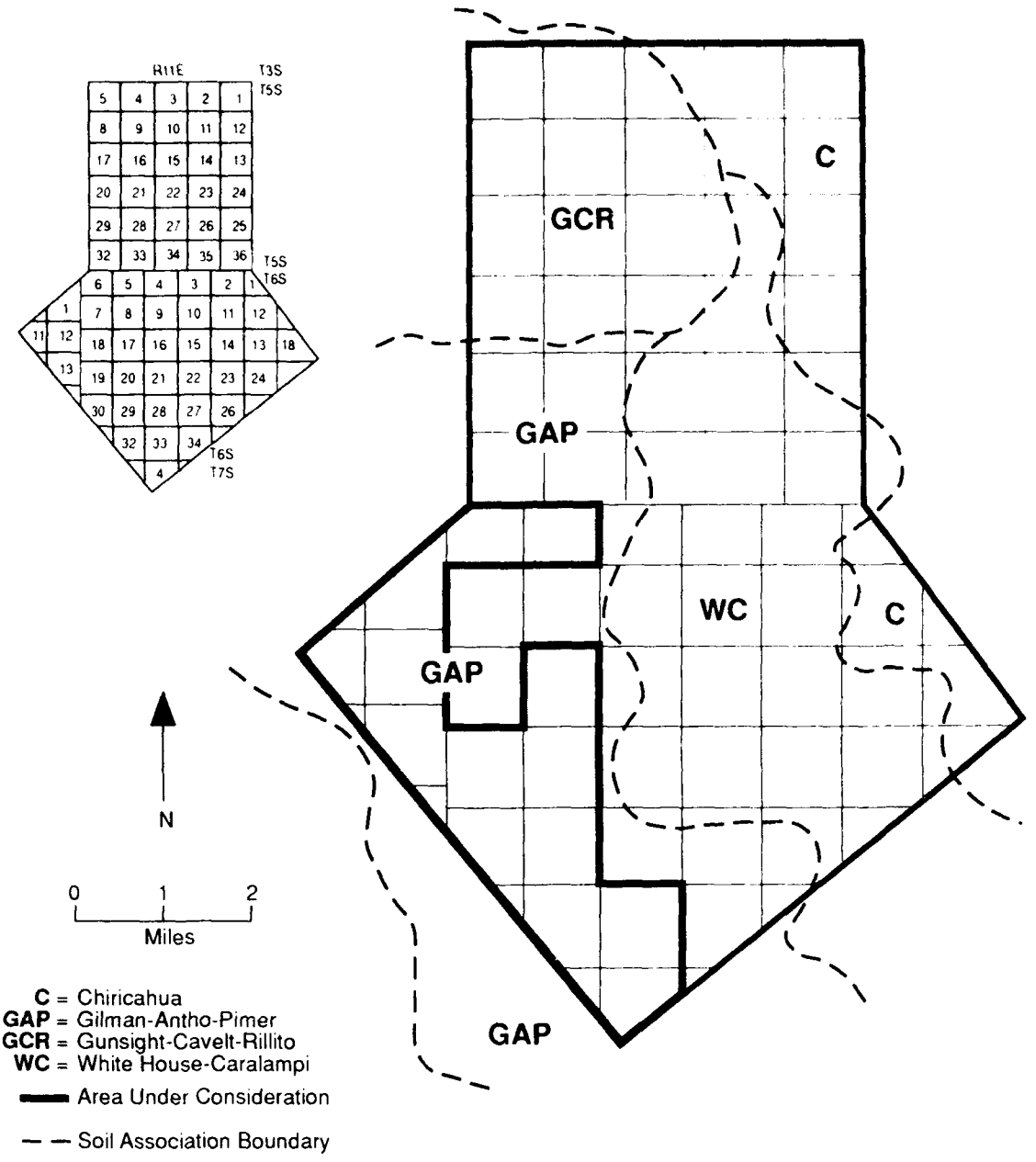

FIGURE 3.5 Soil Associations within Area B (Source: Adapted from Soil Conservation Service 1972)

Land Ownership and Use

The State of Arizona controls about 57% (24,960 acres) of the land within Area B, the BLM 38% (16,640 acres), and others 5% (2,432 acres) (Table 3.1 and Figure 3.6). The area has been characterized as generally rural, except the western corner (an area of less than 0.5 mi^2) has been characterized as suburban homestead land (Pinal County 1985). About 14 permanent buildings are located in the northwestern corner of the area. A small residential development of 152 acres (0.3% of the total area) is located on the western corner of the area, along Highway 89, but only 45 acres (0.1%) are currently being used for residences (Table 3.2). The BLM and State of Arizona have granted grazing leases for about 16,424 acres (37.3%) within Area B (Table 3.2). The state also has granted mineral permits and has leased land to several individuals and

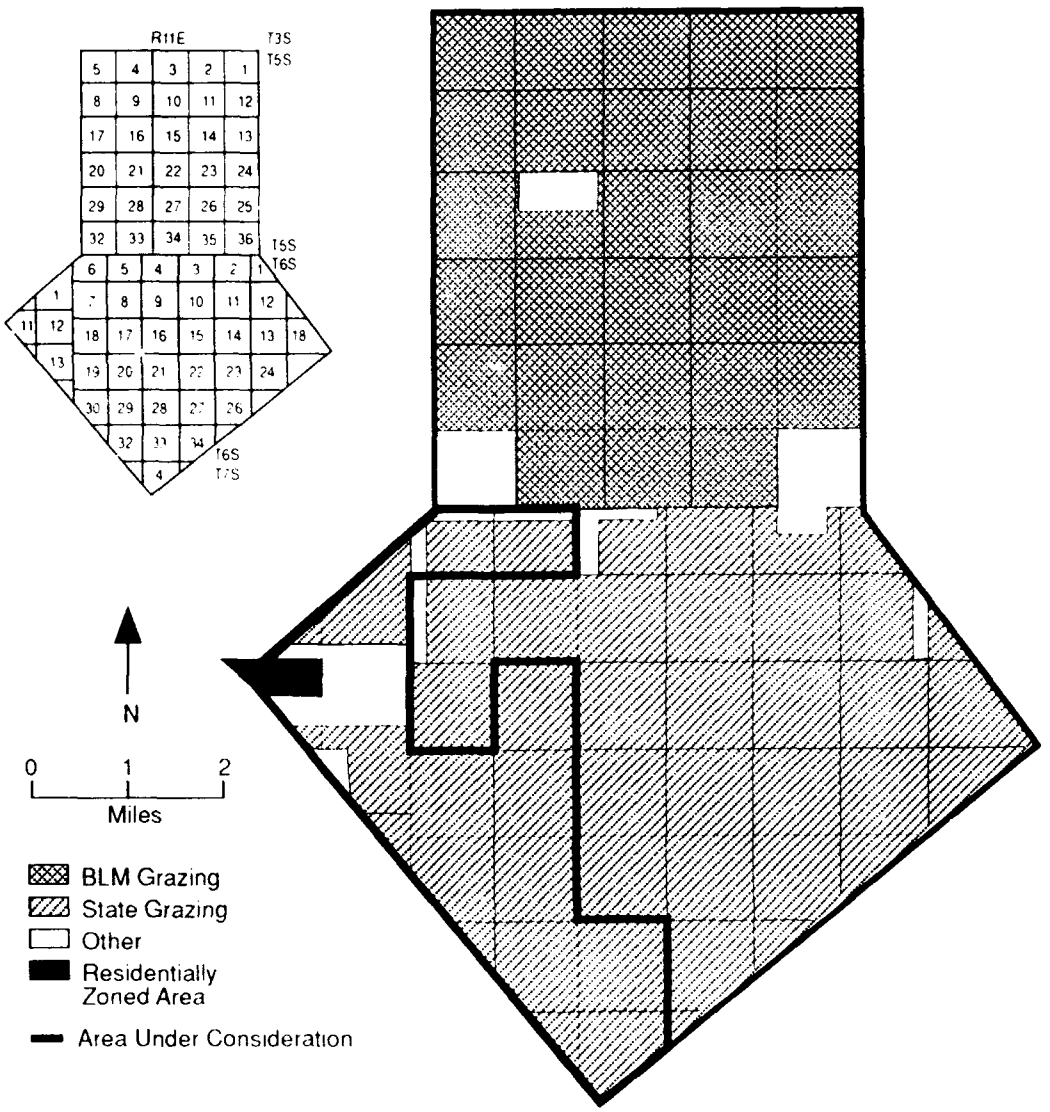

FIGURE 3.6 Land Use within Area B (Source: Adapted from Corps of Engineers 1987)

companies within the area (Table 3.3). These leased areas range from less than 1 acre to 47 acres. Two mining claims have been recorded within Area B.

About 3.5 mi^2 of land on the western portion of Area B is within the Cactus Forest LAP. Portions of Section 11 are zoned for residential development (DeVine and Ross 1986) (Figure 3.6).

3.1.1.3 Area C

Land Features and Soils

Area C is about 6 mi southeast of Florence and occupies about 16,640 acres (Figure 3.7). U.S. Highway 89 borders the eastern side of the area. One unpaved road enters the area from the southwest and continues into the area for 2-3 mi. A jeep trail crosses the southern portion of the area. An El Paso Natural Gas Co. pipeline crosses from the southeastern border to the western border of the area. The elevations of the area range from 1,760 ft MSL at the northwestern corner to 2,210 ft MSL at the southeastern corner. The Picacho Mountains are to the southwest. More than 20 intermittent streams cross the area from east to west.

Two soil associations occur in the area: the Gilman-Antho-Pimer and the Mohall-Vecont (Figure 3.8) (Soil Conservation Service 1972). The Gilman-Antho-Pimer association occurs on the eastern side of the area. It extends from north to south, starting as a narrow strip about 1 mi wide and expanding to about 2 mi wide toward the southeastern border. This association also occurs in Area B, and the characteristics of the soils are described in Section 3.1.1.2. The Mohall-Vecont soil occupies the western portion of Area C. The characteristics of the soils of this association are described in Section 3.1.1.1.

Land Ownership and Use

The State of Arizona controls 90% (15,040 acres) of the land in Area C. The remaining 10% (1,600 acres) is privately owned (Table 3.1 and Figure 3.9). The area has been characterized as generally rural, except that parts of Sections 10 and 11 are classified for suburban ranch use and light industry, respectively (Pinal County 1985). Although Area C contains no buildings, about 413 acres have been zoned residential (Table 3.2). The state has granted grazing leases for about 15,925 acres (95.7%) (Table 3.2). The leases range in size from less than 1 acre to 1,120 acres.

The northern third (about 7.3 mi^2) of Area C is part of the Cactus Forest LAP. This area covers about 55 mi^2 and is located 1 mi southeast of Florence (DeVine and Ross 1986). On August 1986, the Pinal County Board of Supervisors adopted a plan to develop 8 mi^2 in the center of the Cactus Forest LAP (DeVine and Ross 1986). A residential development (currently without dwellings) exists in the Cactus Forest section of Area C in Section 10 (Figure 3.9) (DeVine and Ross 1986).

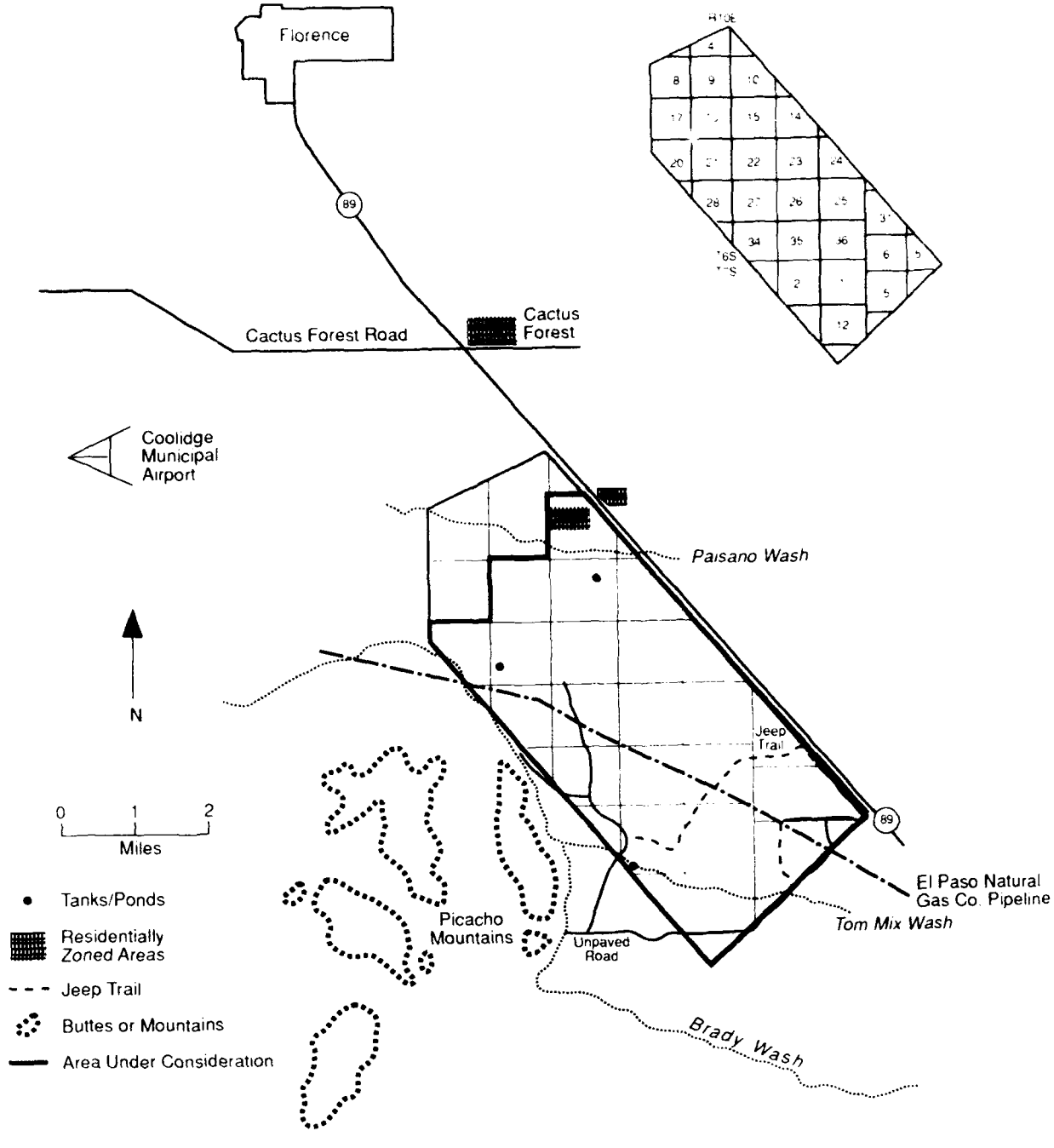

FIGURE 3.7 Major features within Area C

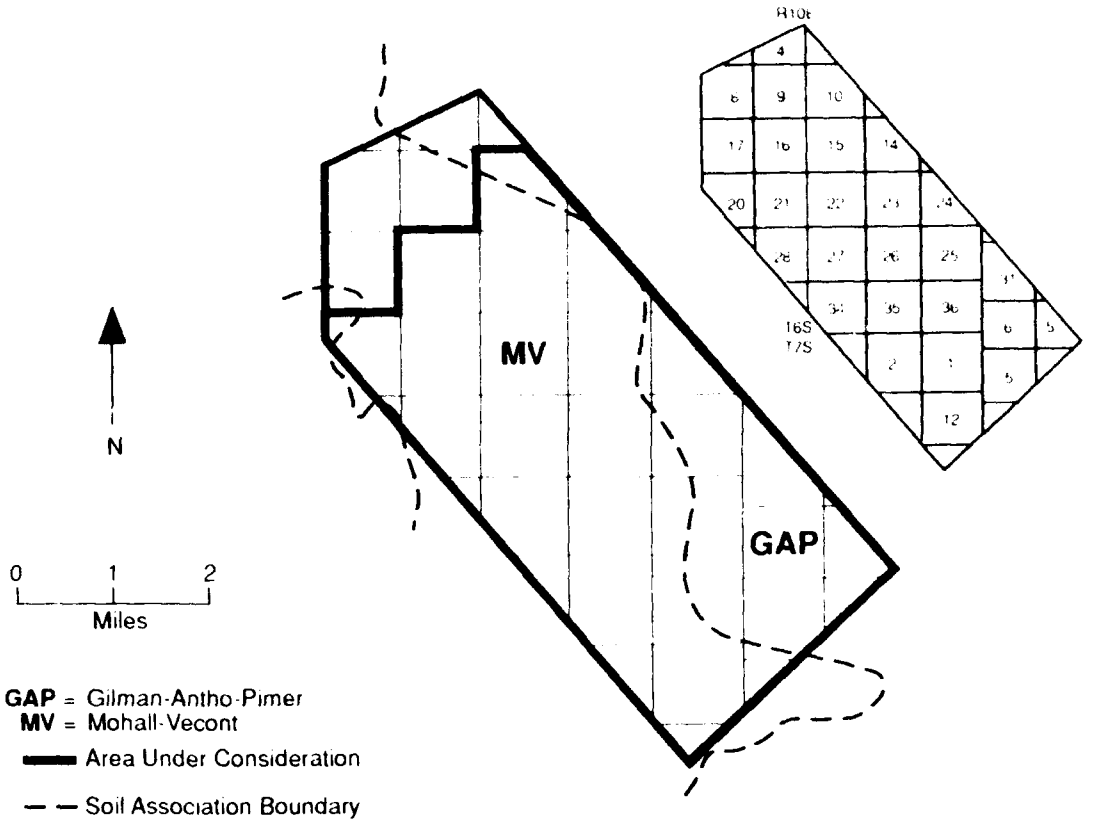

FIGURE 3.8 Soil Associations within Area C (Source: Adapted from Soil Conservation Service 1972)

3.1.2 Water Quantity and Quality

3.1.2.1 Regional Setting

The major water body in the region is the Picacho Reservoir, 2 mi east of Highway 87 (along the Selma Highway alignment) and about 5 mi northeast of Eloy. The reservoir is a regional recreational facility, provides excellent waterfowl habitat, and attracts fishermen from throughout the state.

Other major water bodies in the area include several canals operated by various irrigation districts and the federal government (Greiner 1988; Bureau of Reclamation 1979). Three of the canals are part of the Central Arizona Project (CAP). These three canals -- the CAP, Hohokam, and Santa Rosa -- are managed by the Central Arizona Irrigation and Drainage District and Hohokam Irrigation and Drainage District. The rights-of-way for these canals are controlled by the BLM. The Picacho Reservoir, Florence Canal, and Florence-Casa Grande Canal are managed by the San Carlos Irrigation Project under the jurisdiction of San Carlos Irrigation and Drainage District. The rights-of-way (except for Picacho Reservoir) are controlled by the Bureau of Indian Affairs. The water from these canals is used for crop irrigation. In addition, the Arizona

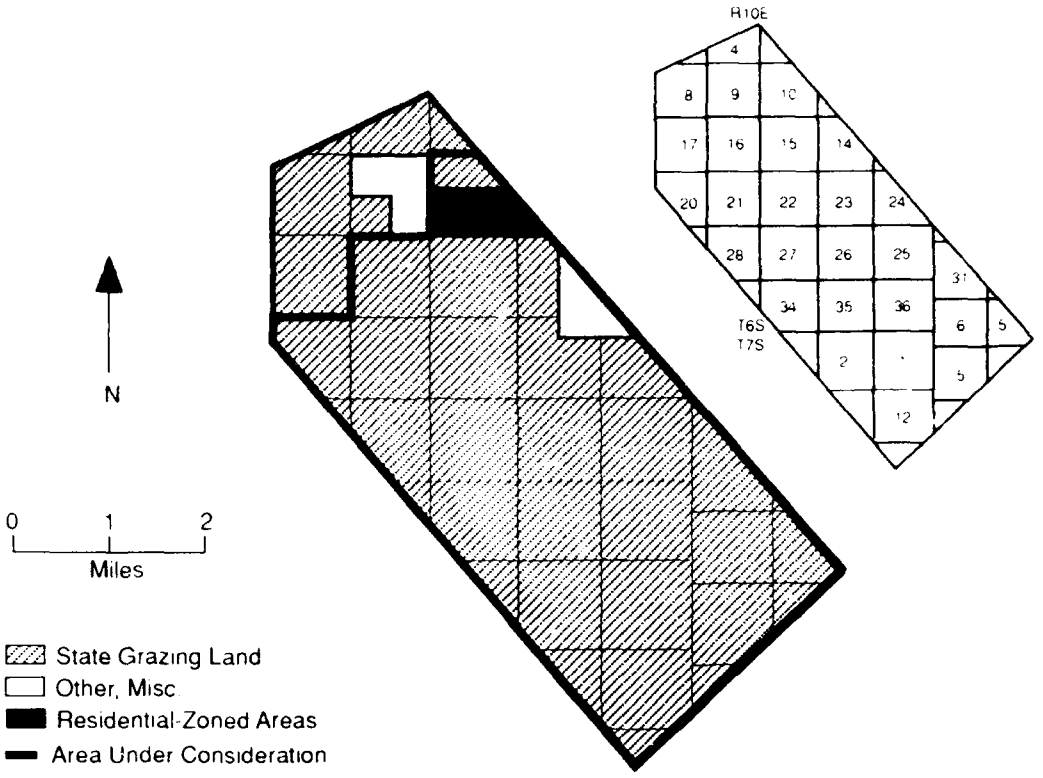

FIGURE 3.9 Land Use and Ownership within Area C

Water Co. and the City of Eloy provide water for municipal and industrial uses in the area.

The Picacho Reservoir drains more than 220 mi^2 along the western slopes of the Picacho Mountains and the southern slopes of the Ninetysix Hills. Drainage in the region is generally from east to west into Picacho Reservoir and the Florence-Casa Grande Canal. Brady Wash is the largest intermittent stream flowing into Picacho Reservoir (Figure 3.10).

Intermittent streams and washes that occur throughout the region provide riparian habitat for wildlife. Many wells and several small, temporary ponds and tanks also exist in the area. The annual precipitation of 6-10 in. in Pinal County contributes to intermittent and temporary flow of streams and supplies water to the ponds and tanks.

Hydrogeologic characteristics and groundwater conditions vary considerably across the region. Three principal aquifers underlie the region -- the upper alluvial unit, the middle fine-grained unit, and the lower conglomerate unit (Greiner 1988; Bureau of Reclamation 1979). Yields range from high in the upper alluvial unit to low in the lower conglomerate unit. Quality varies considerably with location and depth, but is generally relatively good in the upper alluvial and lower conglomerate units but poor in the middle fine-grained unit. The upper alluvial unit increases from a few feet thick up to 900 ft thick from north to south across the region. Groundwater occurs under unconfined

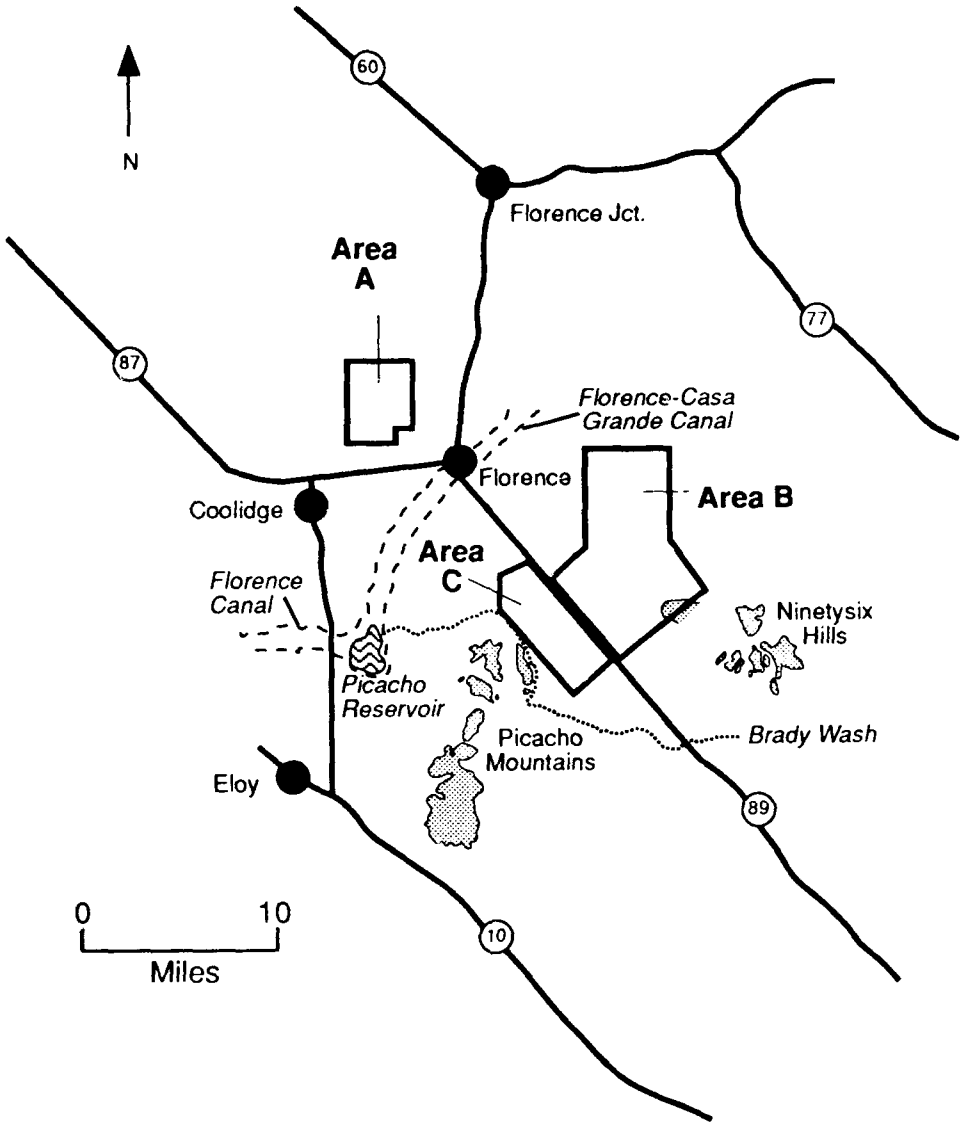

FIGURE 3.10 Picacho Reservoir Drainage System

(water table) or semiconfined conditions. Groundwater recharge to this unit most likely originates from unlined canals and the Picacho Reservoir.

The hydrogeologic characteristics of the middle fine-grained unit are similar to those of the upper alluvial unit. Several irrigation wells extend into the upper zone of the middle unit. The thickness of this unit increases from about 600 ft in the east to 1,600 ft in the west. Groundwater in the middle fine-grained unit is under confined or semiconfined conditions. The oldest and lowest unit, the lower conglomerate, contains groundwater under confined conditions. Only a few wells within the Eloy-Coolidge basin tap this unit, which is more than 2,000 ft thick.

The quality of groundwater in the local aquifers varies greatly with depth (Greiner 1988). In general, water from the upper alluvial unit is of good quality and contains low levels of sodium chloride and calcium sulfate. In areas of recharge from a surface water source, the water quality is even better and has a lower mineral salt content. Water from the middle fine-grained unit is generally of poor quality, with higher concentrations of mineral salts. The water quality in the lower conglomerate unit is typically similar to that of the upper alluvial unit, but fluoride levels are significantly higher in the lower conglomerate.

3.1.2.2 Area A

Surface Water

Surface water sources within Area A include precipitation and irrigation water transported by the canals. More than 76 mi of mostly intermittent streams drain the area. One of the main intermittent streams originates from the Magma Dam, more than 1 mi beyond the northeastern corner of the candidate area. The stream crosses the area diagonally, exiting through the southwestern corner, and empties into the Gila River (Figure 3.1). Riparian vegetation is well established along the banks of the stream and in adjacent areas. Four to five other intermittent streams cross the southeastern quarter of the area from north to south and empty into the North Side Canal.

Two irrigation canals also cross Area A (Figure 3.1). About 2.5 mi of the Salt-Gila Aqueduct crosses the northeastern portion of the area. This aqueduct conveys Colorado River water from the terminus of the Granite Reef Aqueduct to the beginning of the Tucson Aqueduct. It is one segment of the CAP aqueduct system. The other canal is the North Side Canal, which parallels the southern border of Area A for about 2 mi. It is a side canal of the Florence-Casa Grande Canal, which originates at the Ashurst-Hayden Dam on the Gila River. The area is protected from temporary flooding by the Magma floodwater dam to the northeast, which was constructed by the Soil Conservation Service.

Groundwater

Groundwater conditions in Area A are similar to those described above for the region in general. Within the area, the upper alluvial unit is a few hundred feet thick. Several of the irrigation wells in Area A pass through the upper alluvial unit and extend into the upper zone of the middle fine-grained unit. It is possible that some of the wells have reached the lower conglomerate unit as well. Of the 47 deep water wells located within Area A, 19 provide water primarily for irrigation, 4 supply water both for domestic and irrigation purposes, and 24 are unused. Several of the active wells are used to supply water tanks.

3.1.2.3 Area B

Surface Water

Surface water in Area B is provided primarily by precipitation. More than 10 water tanks are located within the area. About 200 mi or more of intermittent streams cross the area. These intermittent streams and a few shallow and temporary ponds supplement the hydrologic resources of Area B. No canals occur in the area.

During intermittent rainfall, several streams drain the slopes of the Ninetysix Hills westward through the Paisano Wash. The Box-O Wash drains the northern portion of the area to the Gila River (Figure 3.4). Drainage in the western portion of the area toward the Florence-Casa Grande Canal. In most cases, any water that reaches the streams is absorbed quickly by the ground.

Groundwater

Groundwater conditions in Area B are likely similar to those described for Area A (see Section 3.1.2.2). Seven deep water wells have been drilled in the area -- two provide water for domestic use, one for livestock, and the rest are no longer in service.

3.1.2.4 Area C

Surface Water

Precipitation is the only surface water source in Area C. The area is crossed by approximately 80 mi of intermittent streams. In general, the streams drain to the west. In the southern corner of the area, the Tom Mix Wash, which rarely has water, joins the Brady Wash. The Paisano Wash in the northern portion of the area rarely has water (Figure 3.7). Five to six tanks collect runoff from adjacent streams during rains and hold water for part of the year. The tanks are used by livestock and wildlife.

Groundwater

The groundwater conditions in Area C are similar to those in Area A. Only three deep water wells have been drilled in the area. One supplies water for domestic consumption, and the other two are not in service.

3.1.3 Air Quality and Noise

3.1.3.1 Air Quality

The closest air-monitoring station to the three candidate areas is at Apache Junction (about 30 mi to the northwest). This station monitors only particulate matter with aerodynamic size equal to or less than 10 μm (PM_{10}) and total suspended particulates (TSP). The candidate areas are located in agricultural areas with no industrial sources of pollution. Particulate matter represents the major air pollutant in this area of Arizona. The major source of particulates in the area is windblown dust generated by agricultural tillage. Blowing dust from natural erosion makes little contribution to the particulate concentrations in the area. Despite this, 7-10 major dust storms pass through the area each year, mainly during July and August. Since PM_{10} and TSP are measured only once every six days, it is likely that the monitors record only one or two of these storms per year.

Although no monitoring data exist, it is expected that the other criteria air pollutants are well within air quality standards (Policastro 1989). No industrial sources of pollutants are located in the region, and the three candidate areas are relatively distant from the greater Phoenix area. Phoenix, the Williams AFB, and the Maricopa County metropolitan area are in a nonattainment area (i.e., a location that does not meet standards) for ozone. However, the candidate areas are outside the nonattainment area. All of Pinal County is designated as in attainment for nearly all pollutants, except the San Manuel and Winkelman areas are in nonattainment for SO_2. The San Manuel area is in the southeastern portion of Pinal County and includes the towns of San Manuel, Mammoth, and Oracle. The Winkelman area is in the northeastern portion of Pinal County and is part of the larger Hayden nonattainment area that contains the towns of Winkelman and Hayden. The candidate areas are well outside these nonattainment areas and should be well within air quality regulations for all gaseous pollutants (Policastro 1989).

Federal and state air quality standards are listed in Appendix D. Included in the appendix are primary standards established to protect public health and secondary standards set to protect public welfare. In addition, emergency episode levels are tabulated in the appendix. These are levels at which state and county air pollution control officials take appropriate advisory and regulatory action in the event of an air pollution emergency, such as a severe atmospheric stagnation.

Table 3.5 compares 1987 PM_{10} and TSP monitoring data from Apache Junction with federal and state standards. The Apache Junction monitoring station provides the most representative data for the three candidate areas (Arizona Department of Environmental Quality [ADEQ] 1988). Only one of the TSP 24-hour standards was exceeded during 1987. Since July 1987, the PM_{10} standards have replaced the TSP standards for airborne particulate concentrations. So far, the area has been in compliance with PM_{10} standards. As noted above, gaseous pollutants are considered to be well within air quality standards [ADEQ 1988].

TABLE 3.5 Comparison of 1987 PM_{10} and TSP Measurements at Apache Junction with State of Arizona Standards

	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	
Averaging Period	Measured	Standard	Measured	Standard
24 Hours[a]	51	150	161	260/150[b]
Annual[c]	22	50	79	75

[a]Second highest of the 24-hour averages measured during 1987.

[b]Primary/secondary standards.

[c]Includes all data collected during 1987 only.

Source: ADEQ 1988.

3.1.3.2 Noise

Noise from jet aircraft operations has received national attention for many years because the relatively great acoustic power generated by jet aircraft can cause various stressful effects on residents of communities near airports and military air bases. These effects can include speech and sleep interference, startle, and other forms of irritation.

The USAF has developed the air installations compatible use zone (AICUZ) concept, which is designed to promote land use development near USAF airfields in a manner that will protect adjacent communities from the noise and safety hazards associated with aircraft operations while preserving the operational integrity of those facilities (USAF 1984). The AICUZ program defines specific noise zones, delineated by contours of equal noise level, and provides land use compatibility guidelines for those zones.

The methodology used to produce the AICUZ noise-zone contours is termed the *day-night average sound level* (L_{dn}) system. It is a method of assessing the amount of community exposure to aircraft noise. The method has been endorsed by all member agencies of the Federal Interagency Committee on Urban Noise. These agencies include the U.S. Environmental Protection Agency, the Federal Aviation Administration, and the U.S. Department of Housing and Urban Development. The L_{dn} contours for military aircraft operations are computed by use of the NOISEMAP computer program, which takes into account the type of aircraft, its departure and approach profiles, engine power settings, flight tracks, speed, runway utilization, operations per day per track, and ground (maintenance) run-up operations. A more detailed description of the L_{dn} contour computation methodology is given in Appendix B.

The L_{dn} values used for planning purposes and for which contours are shown in this study are 65, 70, 75, and 80 decibels (dB). The USAF considers L_{dn} levels below 65 dB to be compatible with residential land use (USAF 1984). Residential land use is discouraged for areas with noise levels in the range of 65-70 dB on the L_{dn} scale, is strongly discouraged for areas in the 70-75 dB L_{dn} range, and is unacceptable for areas that exceed 75 dB L_{dn}. Table 3.6 lists these criteria, as well as the compatibility of various general land uses with these exposure levels.

Baseline (preconstruction) environmental noise levels are estimated based on various field-measurement studies for locations similar to the candidate areas in terms of distance from highways and population centers (Eldred 1971; Fidell et al. 1981; Miller 1968; Edison Electric Institute 1984; Galloway et al. 1974).

Area A

Area A contains no residentially zoned areas, but several rural residences are located along the Arizona Farms and Felix roads. The area is bounded on three sides by roads with only periodic, light traffic and is bisected by a railroad line. Existing L_{dn} values are likely to vary greatly across this area, ranging from an estimated low level of 20 dB in the central portion of the area to 45 dB along some of the bounding roads (Eldred 1971) (Figure 3.3).

Area B

One residentially zoned location occurs in the extreme western corner of Area B adjacent to U.S. Highway 89. A few roads with very light traffic occur in the northern sector. The existing L_{dn} values throughout this area are also likely to vary greatly because of the variation in distance from nearest localized sources of ambient noise, such as traffic and human activity. Levels are estimated to vary from an extreme low of about 20 dB in the eastern corner to about 50 dB along the southwestern boundary (U.S. Highway 89) (Eldred 1971) (Figure 3.6).

Area C

One residentially zoned area is located in the northern portion of Area C adjacent to U.S. Highway 89. Most of the area is within about 3 mi of that highway. The existing L_{dn} values throughout this area are estimated to range from about 30 dB along the southwestern boundary to about 50 dB along the northeastern boundary (U.S. Highway 89) (Eldred 1971) (Figure 3.9).

3.1.4 Airspace

A detailed report on airspace in the vicinity of the candidate areas is presented in Appendix G. The following subsections summarize the current airspace conditions.

TABLE 3.6 Land Use Compatibility Guidelines

Land Use	Land Use Compatibility by L_{dn} Levels in dB[a]				
	>85	80-85	75-80	70-75	65-70
Residential	I	I	I	30[b]	25[b]
Industrial/manufacturing	I	35	30	25	C
Transportation, communication, and utilities	C	C	C	C	C
Commercial and retail trade	I	I	30	25	C
Personal and business services	I	I	30	25	C
Public and quasi-public services	I	I	I	30	25
Outdoor recreation	I	I	I	C[c]	C
Resources production, open space	C	C[d]	C[d]	C	C

[a]Alphanumeric entries have the following meanings:

- I - Incompatible: The land use and related structures are not compatible and should be prohibited.
- C - Compatible: The land use and related structures are compatible without restriction and should be considered;
- 35, 30, or 25: The land use is generally compatible; however, a noise-level reduction (NLR) of 35, 30 or 25 must be incorporated into the design and construction of the structure.

[b]Although local conditions may require residential uses in a compatible use district (CUD), this use is strongly discouraged in L_{dn} 70-75 and discouraged in L_{dn} 65-70. The absence of viable development alternatives should be determined, and it should be shown that a demonstrated community need for residential use would not be met if development were prohibited in these CUDs.

[c]Facilities must be low intensity, and a NLR of 25 must be incorporated into buildings for this use.

[d]Residential structures not permitted.

Most military aircraft training activities are conducted in *military operation areas* (MOAs), which are designated airspaces of defined vertical and lateral dimensions. Five MOAs (designated as Williams 1-MOA, 2-MOA, 3-MOA, 3A-MOA, and 4-MOA) are used for Williams AFB activities. The three candidate areas are all located under Williams 1-MOA and 2-MOA (Figure 3.11). The Albuquerque Air Route Traffic Control Center controls air traffic in all five MOAs.

The MOAs serve to separate or segregate certain military activities, such as pilot training, from instrument-flight-rule (IFR) traffic. They also identify for visual-flight-rule (VFR) traffic the locations where military activities are being conducted. Nonparticipating IFR traffic may traverse MOAs only if air traffic control can keep them separate from IFR-participating aircraft. Uncontrolled airspace identified in this report includes that airspace underlying the lateral limits of the MOAs. Aircraft operating within the confines of this uncontrolled airspace are subject to the rules stated in the Federal Air Regulations (FAR), Part 91.

Williams AFB MOAs are bordered by airspace designated under FAR Parts 71 and 77. The Williams MOAs are bordered by Federal airways identified as Victor (V) 528 on the north, V 16 on the west, and V 94 on the south (Figure 3.11). Airway V 190 traverses the Williams 4-MOA from the northeast to southwest. In addition, other low-level traffic patterns occur in the general area. These include instrument route (IR) 273 and IR 274 east of Williams AFB; visual route (VR) 1219 and VR 239 southeast of Williams AFB; and VR 267, VR 268, and VR 269 south of Williams AFB (Figure 3.11). Routes VR 267, VR 268, and VR 269 transverse Area A; IR 273 and IR 274 are east of Area A and north of Area B; and VR 1219 and VR 239 are south and east of Areas B and C.

Several local airports have been identified as probable origin/destination points for VFR traffic traversing the Williams AFB MOAs (see Table 2.2.9.1 in Appendix G). The Coolidge Municipal Airport is the nearest to the candidate areas (Figure 3.12). Flight paths to and from area airports are shown in Figure 3.12.*

All aircraft are requested to maintain a minimum altitude of 2,000 ft above the ground for special areas restricted by the National Park Service, U.S. Fish and Wildlife Service, or Forest Service. These include, by agency, (1) National Park Service -- designated national parks, monuments, seashores, lakeshores, recreation areas, and scenic riverways; (2) U.S. Fish and Wildlife Service -- national wildlife refuges, big game refuges, and game and wildlife ranges; and (3) Forest Service -- wilderness and primitive areas. Although several of these restricted areas are located under the Williams MOAs (see Appendix G, Table 2.2.6.1), only the Casa Grande Ruins National Monument is located near the candidate areas. That monument is located 5 mi southwest of Area A and more than 12 mi from the western boundaries of Areas B and C. No training flights are expected to occur over this national monument.

*Flight paths were derived from pilot questionnaire responses -- see Appendix G.

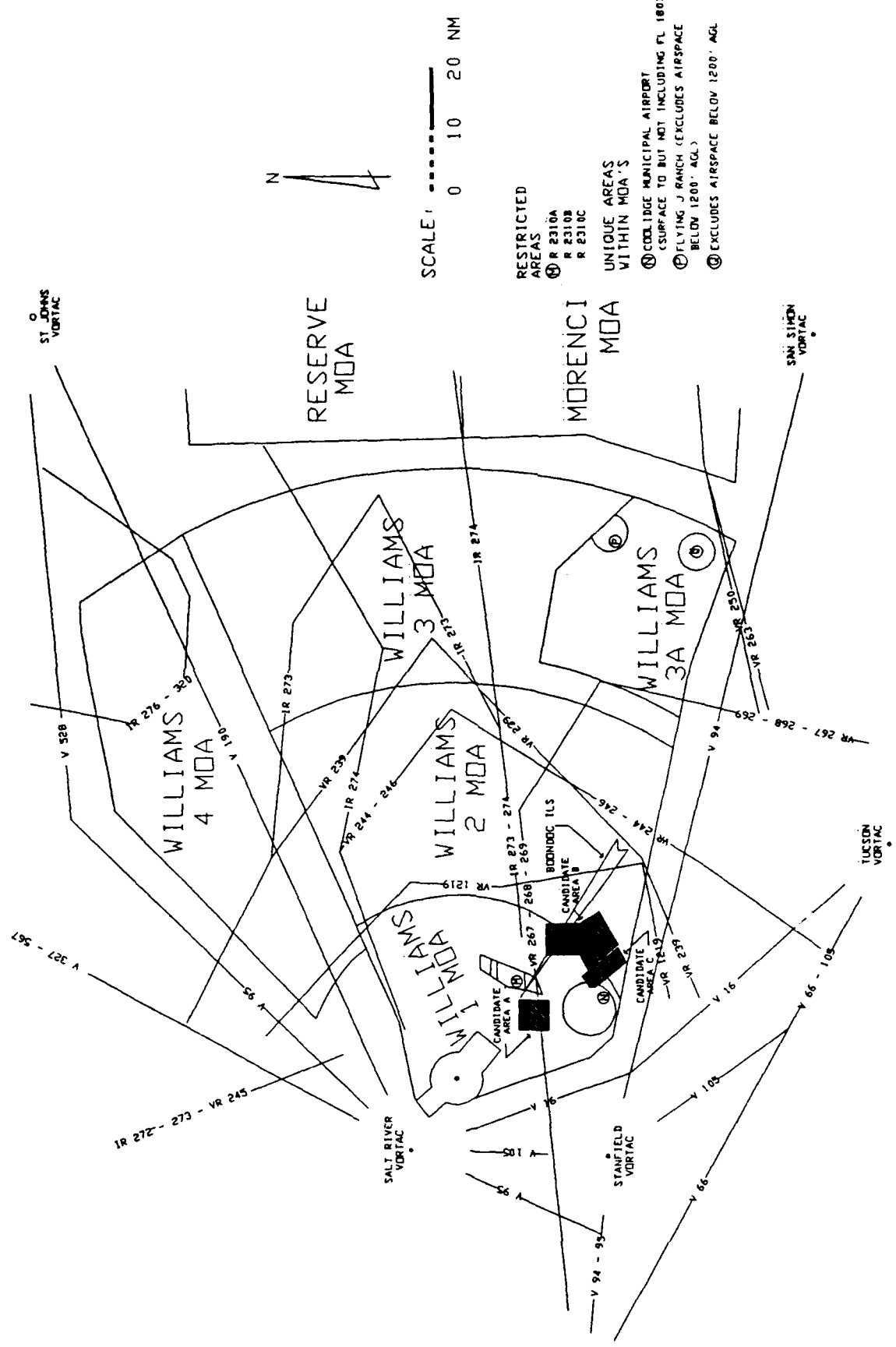

FIGURE 3.11 Locations of the Three Candidate Areas in Relationship to the Williams AFB Military Operation Areas and Designated Flight Routes

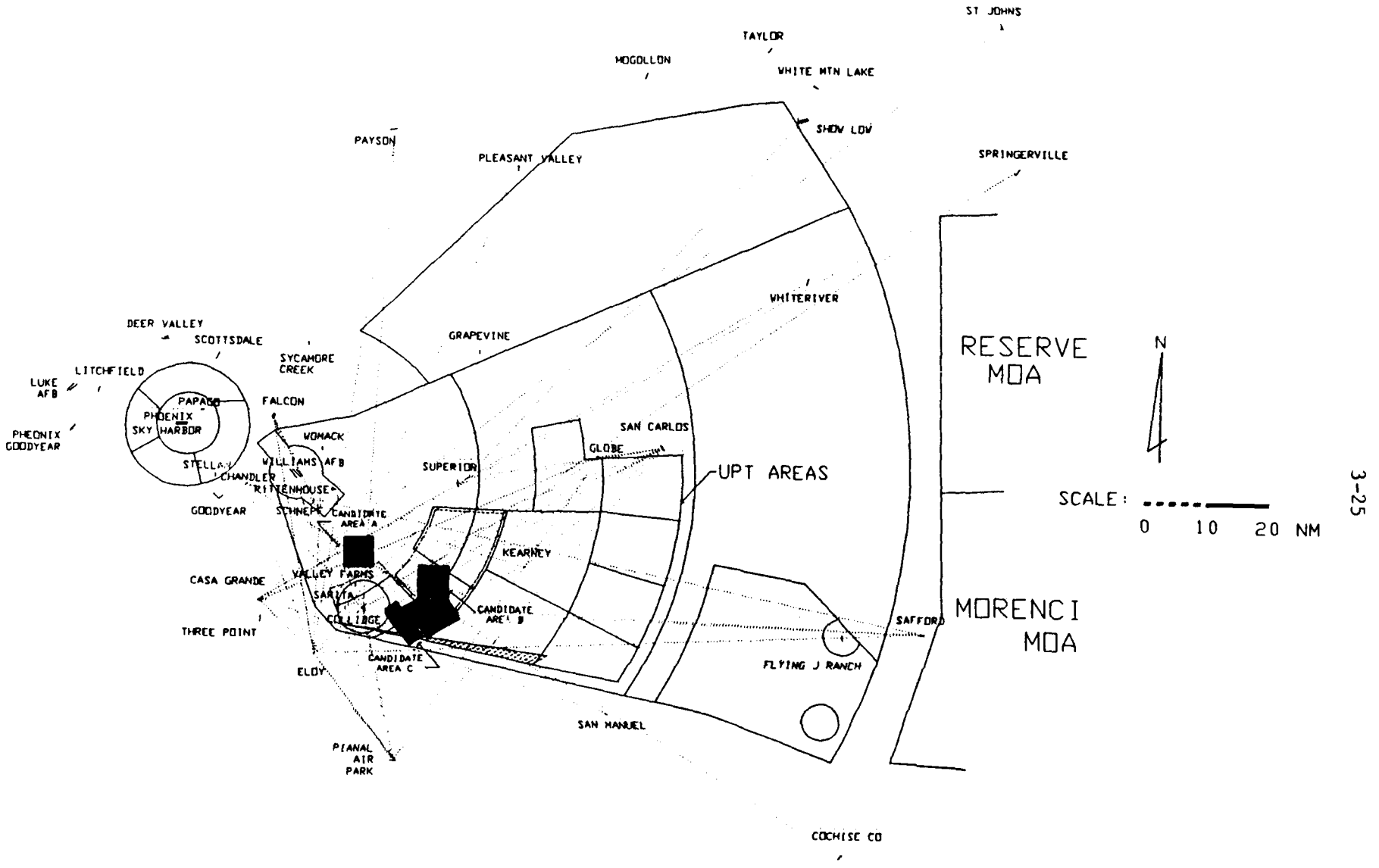

FIGURE 3.12 Locations of the Three Candidate Areas in Relationship to Local Airports and Probable Civilian Aviation Flight Paths (dashed lines)

3.1.5 Biotic Resources

3.1.5.1 General

The region under study is located in the northeastern portion of the Sonoran Desert, which is characterized by subtropical sites of low elevation that support drought-adapted animals and thorny plants that are adapted to grow with a limited water supply (xerophytic flora) (Turner and Brown 1982). The area is a small part of the Basin and Range Province -- Sonoran Unit. The physiography consists mainly of a basin dotted with a few playas and bordered by mountain ranges on the east. The area is crossed by many intermittent streams, and the main surface water body is the Picacho Reservoir. Irrigation canals also occur throughout the agricultural areas of the region. Most of the vegetation is native and well adapted to the harsh conditions of a warm desert.

The soils of the area are arid and have little organic matter. In several portions of the area, hardpans have been formed by the cementing action of calcium carbonate, silica, and similar compounds. The presence of calcium in the soils has influenced the distribution of plant species. The creosote bush, which prefers high-calcium soils, is one of the dominant shrubs (Turner and Brown 1982).

This area has a warm desert climate with low rainfall, high rates of evaporation, and high daytime temperatures. The precipitation follows a mostly biseasonal pattern, with winter rains of long duration and low intensity, and localized summer cyclonic thunderstorms of short duration and high intensity. The temperature extremes, ranging from very high (120°F) in the summer to below freezing in the winter, make survival difficult for plants and animals. Evaporation and blowing wind are also important factors affecting distribution of vegetation in the area.

The special plant associations (i.e., climax plant communities) that have developed qualify the area for classification as part of the Lower Colorado Valley subdivision of the Sonoran Desert, one of the most xeric (requiring a small amount of water to survive) subdivisions, as well as partially part of the Arizona Upland subdivision (Turner and Brown 1982). Because of the stress imposed on the vegetation by the high summer and low winter temperatures and the scant and irregular rainfall, vegetational species composition is simple. The predominant vegetation over large parts of the area consists of bursage, creosote bush, and a few other perennial bushes, with occasional saguaros and other cacti.

Some specialized plant associations occur where conditions differ, such as the vegetation (referred to as *riparian*) found along the banks of water bodies (e.g., washes, canals, and intermittent streams). The most striking example of riparian vegetation is that associated with the Picacho Reservoir. In addition, various trees occur where conditions are favorable.

The foothills and mountain slopes of the area are dominated by saguaros and also contain bursage, several species of chollas and other cacti, and various trees and grasses (Turner and Brown 1982). In addition to the perennial vegetation in the area, several annual plant species complete the floral community (see Appendix E, Table E.1 for a list of plant species present).

Principal animals inhabiting the area are several species of game and nongame mammals (e.g., javelina, mule deer, and desert cottontail), as well as numerous species of birds (e.g., Gambel's quail, mourning dove, and white-winged dove), reptiles, and amphibians. (See Appendix E, Tables E.2-E.4, for lists of animal species present in the region.) Because of the intermittent nature of the streams in the area, fish occur only in the Picacho Reservoir.

3.1.5.2 Area A

Terrestrial

Approximately 6,800 acres (55.8%) of Area A are undisturbed (native) and used as rangeland and wildlife habitat. The remainder of the area is disturbed, with about 5,377 acres in cultivation, residential development, or miscellaneous uses (Table 3.7). More than 30% of the land in Area A is covered with irrigated crops (Table 3.2). The native plant and animal populations consist primarily of drought-adapted species typical of the Sonoran Desert. In contrast, hydrophytic forms (plants growing in water or water-saturated soils) occur along the canals and irrigation networks in the area.

Three principal plant communities can be identified in the undisturbed portions of Area A: the creosote bush community, the paloverde-saguaro community, and the mesquite community. The creosote bush community consists primarily of creosote bush and bursage, with some tree species occurring along the banks of intermittent streams. Little-leaf paloverde and Anderson wolfberry often are associated with the desert riparian habitats within the creosote bush community areas. The mesquite community consists primarily of mesquite, turpentinebush, and some wolfberry. Mesquite only occurs where groundwater is available. The paloverde-saguaro community includes paloverde, saguaro, and ironwood, with an understory dominated by bursage.

TABLE 3.7 Native and Disturbed Land in Candidate Areas

	Native Area		Disturbed Area		
Areas	Acres	Percent	Acres	Percent	Total Acres
A	6,783	55.8	5,377	44.2	12,160
B	43,770	99.5	230	0.5	44,000
C	15,925	95.7	715	4.3	16,640

Source: Adapted from Pinal County 1985.

An apparent ecotone (a transition between two adjacent ecological communities) between the Lower Colorado section of the Lower Sonoran Life Zone and the Arizona Upland section occurs along the hilly slopes in some portions of the area. Creosote bush associations predominate on the sandy and loamy soils of the flat plains of the Lower Colorado section. These give way to paloverde-saguaro associations on coarser soils of the low hills and slopes that belong to the Arizona Upland section. The frequent occurrence of creosote bush in the paloverde-saguaro community is an indication of this transitional status. The predominant vegetation of the various soil associations in Area A is listed in Table 3.8.

The dominant cacti (saguaros and chollas) are present in both the flats and slopes. However, their density increases with elevation. Based on field observations, the density of saguaros in Area A appears to be lower than in Areas B and C.

Approximately 60 mammal species are known to inhabit desert regions similar to Area A, including a number of large and small game and nongame mammals and predators (Appendix E, Table E.2). Mammals listed by the Arizona Game and Fish Department (AGFD) as game animals for the area include mule deer, desert cottontail, raccoon, badger, coyote, gray fox, and striped skunk. The desert cottontail is the most abundant game animal in the area.

The Arizona Upland sections of Area A provide habitat for javelina, mule deer, and many smaller species. The Lower Colorado sections on the flatlands provide poor habitat for the larger species. Many of the mammals found in the area have adapted to high daytime temperatures by spending much of the day underground; examples are burrowing rodents (ground squirrels, kangaroo rats) and the kit fox.

TABLE 3.8 Vegetation Occurring with Soil Associations in Area A

Soil Association	Dominant Vegetation
Mohall-Vecont	Creosote bush, mesquite, paloverde, ironwood, and annual grasses
Gunsight-Cavelt-Rillito	Creosote bush, paloverde, ironwood, mesquite, cacti (saguaro, cholla, barrel), and grasses (three-awns and annuals)
Laveen-Rillito	Creosote bush, paloverde, mesquite, cacti, bursage, and annual grasses
Granite and Schist Rock Unit	Creosote bush, mesquite, cacti, paloverde, ironwood, catclaw, and grasses (three-awns, gamma, bush muhly, and annuals)

More than 120 species of birds have been reported from the area (Schwartzmann et al. 1976) (see Appendix E, Table E.3). The most common species are Gambel's quail, mourning dove, white-winged dove, cactus wren, and verdin. The highest density of birds and the highest number of breeding species are found in the plant communities along washes in the area, followed by the mesquite community, paloverde-saguaro community, and creosote bush community (Schwartzmann et al. 1976). Both the density and number of bird species are highest during March and April.

Several species of snakes, more than a dozen species of lizards, and two tortoise species constitute the reptilian fauna of the area (Schwartzmann et al. 1976) (see Appendix E, Table E.4). The most common snakes are the western diamondback rattlesnake and the coachwhip, and the most common lizards are the western whiptail and desert spine lizard. Greatest reptile density occurs in the paloverde-saguaro community. In contrast, greatest species diversity occurs in the creosote bush and wash communities (Schwartzmann et al. 1976).

Amphibians in the area are found primarily in ponds and along irrigation canals (see Appendix E, Table E.4). In addition, eight species are likely to inhabit stock tanks. These species are the Couch's spadefoot, western spadefoot, Colorado River toad, Woodhouse's toad, red-spotted toad, Great Plains toad, leopard frog, and bullfrog (Stebbins 1966; Schwartzmann et al. 1976).

Although the arthropod population of the area has not been studied in detail, arthropods in general represent an essential component of the desert ecosystem. They provide food for vertebrates, provide means for distribution and pollination of plants, in some cases limit the distribution of plants (e.g., by preventing seed germination and defoliating plants), and contribute to the breakdown and distribution of litter.

The most important of the habitat types found in Area A is the riparian habitat along the intermittent streams. In the desert environment, riparian habitat provides important cover and food for many species of wildlife. While the other community types provide habitat for desert animals, most, if not all, wildlife species in the desert depend on riparian habitat for their existence.

Approximately 76 mi of intermittent streams cross Area A. Associated with these intermittent streams or washes are about 116 acres of riparian habitat (Table 3.9). The amount of habitat associated with a stream depends on the size of the channel. Large channels, such as the one crossing Area A from the northeast to the southwest, are the widest and contain riparian vegetation from 25 to 30 ft across. Most of the other riparian habitat is associated with smaller streams in the southeastern portion of the area. Riparian habitat makes up about 1.7% of the total native habitat within Area A.

Aquatic

No permanent natural water bodies exist in Area A. Aquatic ecosystems of Area A are restricted to temporary ponds, stock tanks, rain-filled washes, irrigation ditches, and canals. As a result, the aquatic flora and fauna are mostly ephemeral.

TABLE 3.9 Estimates of Riparian Habitat in Area A

Type[a]	Length (mi)	Width (ft)	Area	
			Acres	Percent[b]
Narrow	59	10	71	62
Intermediate	12	20	28	24
Wide	5	30	17	14
Total	76		116	100

[a]Riparian habitat was classified by width: narrow (10 ft), intermediate (20 ft), and wide (30 ft).

[b]Percentage of total riparian habitat in the area.

Source: Calculated from aerial photographs.

However, some algae, aquatic insects, hydrophilic plants, and a few amphibians colonize these temporary aquatic habitats and have become adapted to the seasonal and temporal nature of these areas.

3.1.5.3 Area B

Terrestrial

Area B contains approximately 43,800 acres of undisturbed land used as rangeland and wildlife habitat (Table 3.7). This acreage constitutes 99.5% of the land in the area. The remaining acreage consists of residential development, utility rights-of-way, or leases. No agricultural lands occur in Area B.

The vegetation in Area B is composed of Arizona Upland associations that are intermixed in the western portions of the area with Lower Colorado River associations. The paloverde-saguaro community dominates the eastern portion of Area B and includes paloverde, ironwood, creosote bush, saguaro, other cacti (such as chollas and barrel cacti), wolfberry, bursage, and grasses. Mesquite communities occur along the ephemeral streams of Area B. Dominant plants of these communities include mesquite, Anderson's wolfberry, giant bursage, and some grasses. In the southwestern portion of Area B, desert broom, bursages, and grasses are prevalent, with some mesquite communities present in the riparian areas. Principal species occurring in the each of the

soil associations of Area B are listed in Table 3.10. The dominant cacti (saguaros and chollas) are present on both the flats and slopes; however, density increases with elevation. Based on field observation, density of saguaros in Area B appears to be greater than in Areas A and C.

The fauna of Area B is similar to that described for Area A. Principal animal species include javelina, mule deer, Gambel's quail, mourning and white-winged doves, desert cottontails, and a variety of nongame birds, mice, snakes, and lizards. The eastern part of Area B is designated as high-density mule deer habitat (Bureau of Land Management 1987) (Figure 3.13).

Of the habitat types occurring in Area B, the most important for wildlife is the riparian habitat found along the intermittent streams and around the ponds and tanks. Approximately 821 mi of intermittent streams cross Area B, and associated with these intermittent streams or washes are about 1,440 acres of riparian habitat (Table 3.11). The amount of habitat associated with a stream depends on the size of the channel. Large channels, such as the Box-O Wash in the northeastern portion of Area B, are the widest and contain riparian vegetation from 25 to 30 ft across. Intermediate-sized channels, such as the Paisano Wash, are moderate in width and contain riparian vegetation from 15 to 20 ft across. Most of the other riparian habitat is associated with smaller washes throughout Area B. Riparian habitat makes up about 3.3% of the total native habitat within Area B.

Two wildlife water catchments are being proposed within Area B (Ellis 1989). The water catchments will collect and store water for use by a variety of wildlife in the area. The Bureau of Reclamation is committed to construction of these facilities as mitigation for impacts to wildlife from construction of the Salt-Gila Aqueduct. The Arizona Game and Fish Department will construct the structures. The Paisano Wash

TABLE 3.10 Vegetation Occurring with Soil Associations in Area B

Soil Association	Dominant Vegetation
Gunsight-Cavelt-Rillito	Creosote bush, mesquite, paloverde, cacti, bursage, and three-awn and annual grasses
Gilman-Antho-Pimer	Creosote bush, mesquite, paloverde, cacti, and annual grasses
White House-Caralampi	Gramma and annual grasses, lovegrass, dropseeds, mesquite, catclaw, bursage, and cacti
Chiricahua-Rock Outcrop	Catclaw; false mesquite; whitethorn; mesquite; paloverde; cacti; and gramma, curly mesquite, lovegrass, muhly, and three-awn grasses

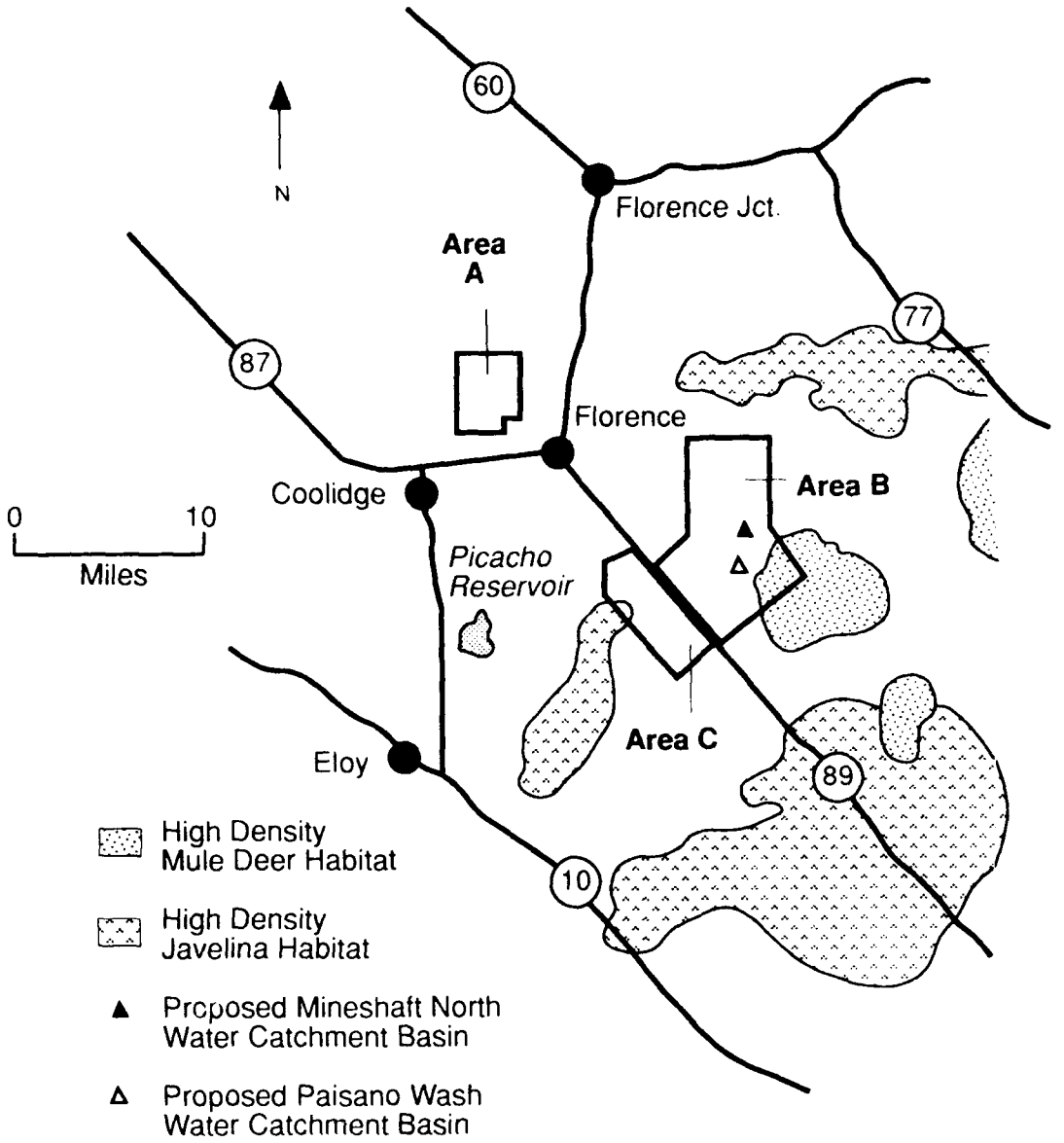

FIGURE 3.13 Areas Designated as High-Density Mule Deer and Javelina Habitat (Source: Adapted from Bureau of Land Management 1987)

TABLE 3.11 Estimates of Riparian Habitat in Area B

Type[a]	Length (mi)	Width (ft)	Area	
			Acres	Percent[b]
Narrow	604	10	732	51
Intermediate	68	20	164	11
Wide	149	30	543	38
Total	821		1,439	100

[a]Riparian habitat was classified by width: narrow (10 ft), intermediate (20 ft), and wide (30 ft).

[b]Percentage of total riparian habitat in the area.

Source: Calculated from aerial photographs.

catchment will be located in the central portion of Area B (T6S, R11E, Sec. 10, NW 1/4, NW 1/4) (Figure 3.13). The Mineshaft North catchment will be in the north-central portion of the area (T5S, R11E, Sec. 26, NE 1/4, SE 1/4) (Figure 3.13). The entire catchment project probably will occupy less than half an acre.

Aquatic

No permanent natural water bodies exist in Area B. Aquatic ecosystems are restricted to temporary ponds, rain-filled washes, and stock tanks. As a result, the aquatic flora and fauna are mostly ephemeral. However, some algae, aquatic insects, hydrophilic plants, and a few amphibians colonize these temporary aquatic habitats. These species have become adapted to the seasonal and temporal nature of these areas.

3.1.5.4 Area C

Terrestrial

Area C contains approximately 15,900 acres of undisturbed land used as rangeland and wildlife habitat (Table 3.7). This acreage represents 95.7% of the area. The remaining 715 acres (4.3% of the total area) consist of residential development and utility rights-of-way. However, none of the 413 acres designated as residential has been

TABLE 3.12 Vegetation Occurring with Soil Associations in Area C

Soil Association	Dominant Vegetation
Gilman-Antho-Pimer	Creosote bush, mesquite, paloverde, cacti, bursage and grasses
Mohall-Vecont	Bursage, creosote bush, paloverde, ironwood, mesquite, cacti, and grasses

developed, and the land remains essentially undisturbed. No agricultural lands occur in Area C.

Plant associations in Area C are generally similar to those of Area B. Principal plant species in the two major soil associations in the Area C are listed in Table 3.12. Based on field observation, the density of saguaro cacti in Area C appears to be greater than in Area A, but less than in Area B.

Principal animal species in the area include javelina, mule deer, Gambel's quail, mourning and white-winged doves, and desert cottontails. A designated high-density javelina habitat is located adjacent to the northwestern border of Area C (Figure 3.13) (Bureau of Land Management 1987).

Of the habitat types occurring in Area C, the most important to wildlife is the riparian habitat along the intermittent streams and around the ponds and tanks. Approximately 306 mi of intermittent streams or washes cross Area C, and about 440 acres of riparian habitat are associated with these intermittent streams or washes (Table 3.13). Intermediate-sized channels, such as the Paisano Wash, are moderate in width and contain riparian vegetation from 15 to 20 ft across. Most of the other riparian habitat is associated with smaller washes (riparian habitat 10 ft in width) throughout Area C. Riparian habitat makes up about 2.8% of the total native habitat within Area C.

Aquatic

No permanent natural water bodies exist in Area C. Aquatic ecosystems are restricted to temporary ponds, stock tanks, and rain-filled washes. As a result, the aquatic flora and fauna are mostly ephemeral. However, as in the other candidate areas, some algae, aquatic insects, aquatic and hydrophilic plants, and a few amphibians colonize these temporary aquatic habitats and have become adapted to the seasonal and temporal nature of these areas.

TABLE 3.13 Estimate of Riparian Habitat in Area C

Type[a]	Length (mi)	Width (ft)	Area	
			Acres	Percent[b]
Narrow	272	10	329	75
Intermediate	10	20	24	5
Wide	24	30	88	20
Total	306		441	100

[a]Riparian habitat was classified by width: narrow (10 ft), intermediate (20 ft), and wide (30 ft).

[b]Percentage of total riparian habitat in the area.

Source: Calculated from aerial photographs.

3.1.6 Threatened, Endangered, and Other Protected Species

Three plant species occurring in Arizona are federally listed as endangered; 15 species are candidates for listing (see Table F.1, Appendix F); and 25 species are protected under the State Natural Heritage Program (see Table F.2, Appendix F). In addition, several native plant species and species groups are protected by the Arizona Native Plant Law. This law, administered by the Arizona Commission of Agriculture and Horticulture (ACAH), includes plants from the Liliaceae (lily), Crassulaceae (orpine), and Cactaceae (cactus) plant families, as well as the primrose, ocotillo, desert holly, crucifixion thorn, honey mesquite, little leaf and blue paloverdes, and ironwood trees. The Arizona Native Plant Law prohibits removal of protected species without a permit from the ACAH (Appendix F, Section F.2).

Nine animal species within the state are federally listed as endangered, and 13 species are candidates for listing. The State of Arizona lists nine additional species as *threatened native wildlife* (see Table F.3, Appendix F). The AGFD considers four categories of threatened native wildlife: (1) extinct, (2) endangered, (3) threatened, and (4) candidate species. The list is based on the degree to which habitats or populations are threatened and on the probability of extirpation in Arizona. Most species are listed because of significant loss of habitat.

3.1.6.1 Area A

No threatened or endangered plant species are known to occur in Area A (Table 3.14), but several species protected by the Arizona Native Plant Law are present. Although no threatened or endangered animal species reside in Area A, the bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus anatum*) may be found at Picacho Reservoir (35 mi south) during the winter, and individuals of these species may occur in Area A as transients or migrants.

3.1.6.2 Area B

Plant Species

The AGFD has identified two federally listed plant species, the needle spine pineapple cactus (federal category 2) and the Acuna valley cactus (federal category 1), that may occur in Area B (see Table 3.14 for listing and definitions of status categories). Needle spine pineapple cacti are usually found on alluvial fans and hills in desert scrub to desert grassland communities. Acuna valley cacti are found on hills and flats in paloverde-saguaro desert scrub communities. Saguaro cacti are present in high abundance (see Section 3.1.4.3), along with other state-protected cacti.

The Tumamoc globeberry (federally listed as endangered) may occur in naturally vegetated habitats within Area B. Its known population size is about 2,000 individual plants (Bureau of Reclamation 1979); 66% of these occur on lands managed or protected by federal agencies (Figure 3.14). The plant grows on lower mountain bajadas (ridges) or in valley areas. It is normally found in the shade of trees and shrubs (such as mesquite, ironwood, catclaw, and whitethorn acacias), which serve as nurse plants as well as support for the vines (Reichenbacher 1985). Although the most northern extent of the Tumamoc globeberry range is thought to be 8-9 mi south of the southern border of Area B, individual plants of this species could be found in naturally vegetated portions within Area B (Spiller 1988).

Animal Species

The endangered bald eagle and peregrine falcon may be found at Picacho Reservoir in the winter, and individuals of these species may occur in Area B as transients or migrants. The desert tortoise (*Gopherus agassizi*) and the gila monster (*Heloderma suspectum*), both category 2 species, may be found in Area B (Walker 1988). Desert tortoises are usually found on mountain slopes and upper bajadas (mountain ridges). Gila monsters are usually found on upper bajadas.

3.1.6.3 Area C

The listed plant and animal species discussed above for Area B may also occur in Area C (Table 3.14). However, saguaro cacti are present in moderate abundance rather than high abundance as in the case in Area B (see Sections 3.1.4.4 and 3.1.6.2).

TABLE 3.14 Federally Listed Plant and Animal Species in Vicinity of Candidate Areas A, B, and C

Area	Species	Status[a]	Habitats
A	Bald eagle	E	Migrant/transient
	Peregrine falcon	E	Migrant/transient
B and C	Bald eagle	E	Migrant/transient
	Peregrine falcon	E	Migrant/transient
	Desert tortoise	C-2	Mountain slopes and upper bajadas[b]
	Gila monster	C-2	Upper bajadas
	Tumamoc globeberry	E	Mountain slopes or valley areas
	Needle spine pineapple cactus	C-2	Alluvial fans and hills in desert scrub; desert grassland communities
	Acuna valley cactus	C-1	Hills and flats in paloverde-saguaro desert scrub communities

[a]E: Endangered species (any species that is in danger of extinction throughout all or a significant portion of its range).

T: Threatened species (any species that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range).

C-1: Candidate species for which the U.S. Fish and Wildlife Service has sufficient information to support listing of the species.

C-2: Candidate species for which the U.S. Fish and Wildlife Service has information indicating the probable appropriateness for listing but for which sufficient information to support a proposed rule is lacking.

[b]Mountain ridges

Sources: Spiller 1988; Walker 1988.

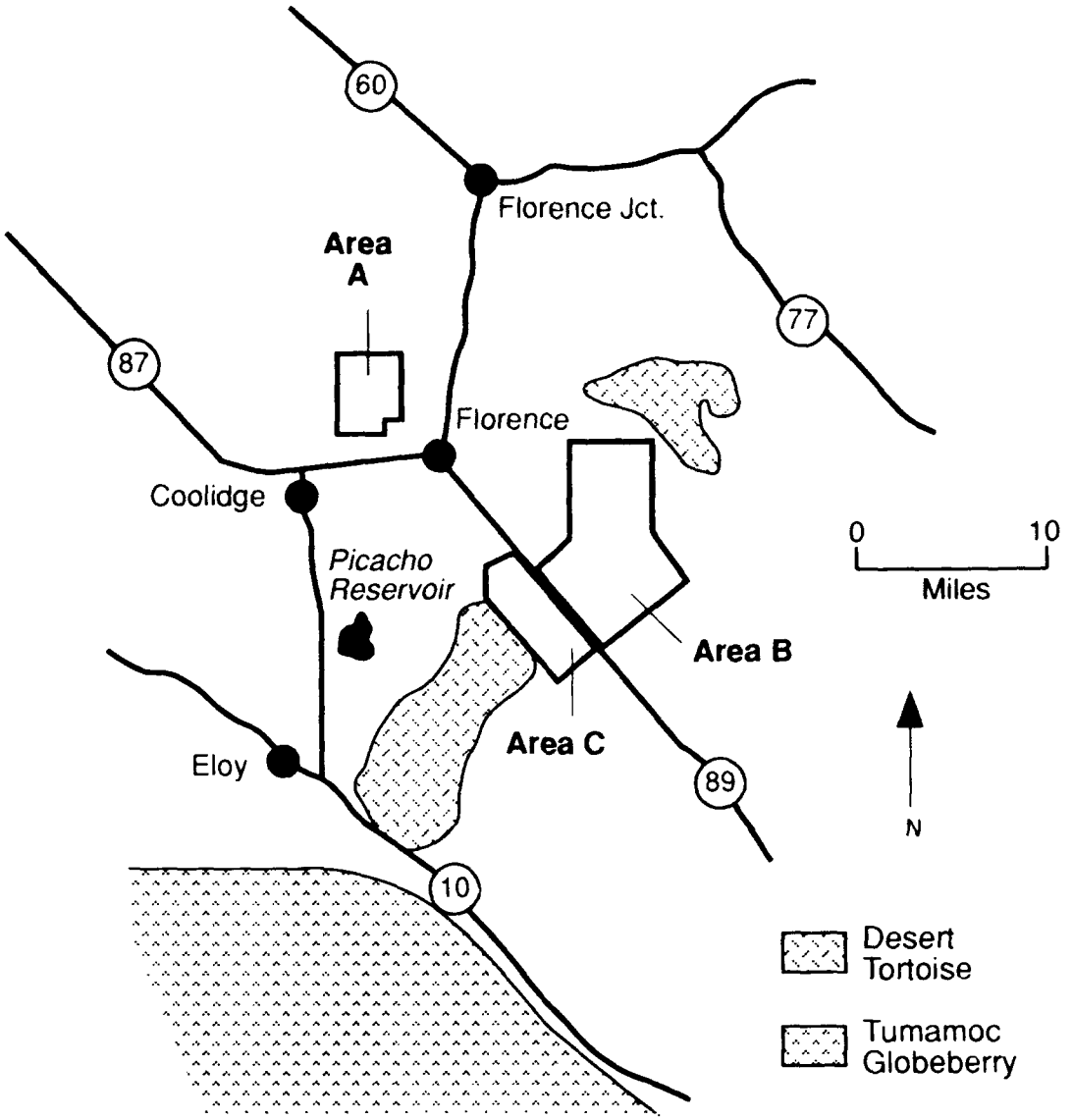

FIGURE 3.14 Known Ranges of Tumamoc Globeberry (*Tumamoca macdougalii*) and Desert Tortoise (*Gopherus agassizi*) in Vicinity of Candidate Areas

3.1.7 Socioeconomic and Institutional Factors

This section presents information on the economy, population, labor force, fiscal structure, institutional infrastructure, housing, and transportation of Pinal County. The discussions highlight the towns of Coolidge (the location of the current auxiliary airfield operations at Coolidge Municipal Airport) and Florence (an area likely to be affected by construction of a new auxiliary airfield and supporting facilities). Casa Grande, the other major town of Pinal County, is not expected to be affected because each of the candidate areas is farther from Casa Grande than is the current location.

3.1.7.1 Economic Profile

Pinal County's principal economic base is agriculture and, to a lesser extent, mining (Arizona Department of Economic Security [ADES] 1986). The Central Arizona Project Canal provides adequate water supplies for the production of cotton, cattle, sugar beets, grains, and grapes. Agriculture accounts for about 10% of the employment of Pinal County, about five times the state average. The county is home to the Arizona State Prison, the State Courthouse, Central Arizona College, and the Arizona Training Program. In addition to agriculture, mining, and government sector employment, the county and communities there are placing increased emphasis on winter tourism and retirement living.

Florence, the county seat, has significant government sector employment, with nearly 1,500 employees working for the county (Arizona Department of Commerce [ADC] 1987a). The Arizona State Prison employs about 1,700 persons, and other government agencies are located in the community. Florence describes itself as a "Main Street Community" that provides business assistance to support economic growth. Coolidge is a regional trade and service center for agricultural producers. It provides equipment, supplies, and services to farm families. Coolidge is considered the commercial center for Arizona's cotton industry. However, Coolidge is attempting to decrease its dependence on agriculture and mining by encouraging manufacturing. The community has recently completed the 500-acre Pima-Coolidge Industrial Park just north of Coolidge on the Gila River Indian Reservation (ADC 1987b).

3.1.7.2 Population

Pinal County, with about 107,000 people, accounts for about 3% of the total population of Arizona (Table 3.15). The combined populations of Coolidge and Florence account for less than 0.5% of the total population of Arizona. The population of Pinal County has been growing at an annual average rate of about 2.4%, somewhat lower than the rate of growth for Arizona as a whole. Coolidge has been growing at the rate of 1.5% per year, which is less than half the 3.3% annual growth rate of Florence.

Population projections are not available for Coolidge, but the population of Florence is expected to increase by 1,700 persons by 1995. The Arizona Department of Economic Security (ADES 1986) projects the population of Pinal County to increase to 132,900 persons by 1990, 149,100 persons by the year 2000, and 223,700 by 2020. These rates of growth correspond to historical rates of the last 10 years and suggest the county's population will double in about 30 years.

3.1.7.3 Labor Force and Employment

The labor force of Pinal County totals about 37,000 persons; 3,209 and 1,453 of these are located in Coolidge and Florence, respectively (Table 3.16). Florence has maintained an unemployment rate of about 5%, about one-quarter of the unemployment rate of Coolidge. Unemployment in Pinal County during July 1988 was about 9% with seasonal adjustments.

Agriculture and mining is the largest employment category in Pinal County (Table 3.17), but not in Coolidge and Florence. Employment ratios in those two towns are similar, except Coolidge has a much larger proportion of employees in retail trade, and Florence has a much higher proportion of employees working for the government.

3.1.7.4 Fiscal Structure

The principal sources of tax revenue in Pinal County are sales and property taxes (Arizona Tax Research Assoc. 1988). Coolidge sales taxes are 1.5% on single items over $10,000 and 2% on single items less than that amount. Florence has a 2% sales tax on all items. Pinal County itself imposes no sales tax. Based on taxable sales in the respective

TABLE 3.15 Population and Growth Rates, 1980-1987

Political Unit	Population 1980	Population 1987	Growth Rate (%)[a]
Coolidge	6,851	7,490	1.5
Florence	5,331	6,690	3.3
Pinal County	90,918	107,200	2.4
Arizona	2,718,215	3,480,300	3.6

[a]1980-1987 compound percentage growth.

Source: ADES 1986, 1988b,c.

TABLE 3.16 1987 Labor Force Data

Category	Coolidge	Florence	Pinal County
Civilian labor force	3,209	1,453	36,941
Employed	2,607	1,387	33,665
Unemployed	602	66	3,276
Unemployment rate	19%	5%	9%

Source: ADES 1987, 1988d,e.

TABLE 3.17 1987 Employment Structure

Category	Percent of Total Employment		
	Coolidge	Florence	Pinal County
Agriculture and mining	10	11	26
Construction	4	2	4
Manufacturing	3	1	11
Transportation, communications, and utilities	6	3	4
Wholesale trade	2	1	2[a]
Retail trade	18	9	14[a]
Finance, insurance, and real estate	2	3	2
Services	37	36	12
Public administration	18	34	25

[a]Analyst estimate.

Source: ADES 1988a-e.

municipalities, Coolidge should have received almost $700,000 in sales tax receipts in 1987 and Florence about $200,000.

Property tax rates are shown in Table 3.18 for Coolidge and Florence. School taxes and county taxes are somewhat lower in Florence than in Coolidge. Florence is part of a flood control district that imposes a $0.17 levy in that town. Overall, Florence's property tax rates are $1 per $100 of valuation lower than those of Coolidge. In 1987, Coolidge reported more than $12 million in net assessed valuation, and Florence reported about $8.5 million. Based on tax rates published by the Arizona Tax Research Assoc. (1988), property tax receipts should total almost $2 million in Coolidge and $1.2 million in Florence.

3.1.7.5 Institutional Infrastructure

The communities of Coolidge and Florence are served by two hospitals -- a 95-bed general hospital in Florence and a 100-bed facility in Casa Grande. The area supports a full complement of nursing homes, residential care services, and more than 50 physicians.

Recreational facilities include two parks in Florence, six parks in Coolidge, one swimming pool in each community, a public auditorium in Coolidge, two museums in Florence, two golf courses in Florence and one in Coolidge, a number of softball fields (some lighted), two libraries in Florence and one in Coolidge, and a public auditorium in Coolidge.

TABLE 3.18 1987 Property Tax Rates ($/$100 assessed valuation)

Taxing Unit	Coolidge	Florence
Unified School District	6.32	-[a]
School District #1	-	5.41
Community College	1.74	1.74
Pinal County	5.52	5.35
State of Arizona	0.38	0.38
Subtotal	13.96	12.88
City	1.31	1.21
Flood Control District	-	0.17
Total	15.27	14.26

[a]Not applicable.

Source: ADC 1987a,b.

3.1.7.6 Transportation

Coolidge Municipal Airport is 6 mi southeast of the city of Coolidge, west of U.S. Highway 89, and east of Arizona Highway 87 (Figure 1.1). Pinal County (including the towns of Coolidge and Florence) has rail access (Southern Pacific Railroad), trucking firms (Pacific Motor Trucking, United Parcel, and Purolator), and bus service (Continental Trailways).

3.1.7.7 Housing

Residential property values in Pinal County are dominated by the three principal towns of Coolidge, Florence, and Casa Grande. During the 1980s, both Coolidge and Florence have experienced economic recessions from which the housing markets have not fully recovered. Consequently, a high percentage of low-income residents who cannot afford to buy a home have put upward pressure on the rental markets in both communities. However, multiple-family dwellings only constitute 1-2% of the total rental market. Rental rates and other residential property values are quite similar in Coolidge and Florence (Table 3.19).

Sales of single-family residences have remained steady over the past 2 years, but the market has been quite slow. Sales volumes are under $1 million per year in both communities. Sales volume throughout Pinal County was down about 30% in 1988 from 1987. This is true even in Casa Grande, which has seen considerable economic prosperity and a correspondingly prosperous housing market. Residential property values in Casa

Grande average about $20,000 higher per house than in Florence or Coolidge (see Table 3.20). Casa Grande has experienced growth in population and income that has put upward pressure on both rental and single-family housing prices. Three new apartment complexes totaling 600 units also have been completed. A 20% increase in population since 1986 is, in part, a reflection of the increasing role of Casa Grande as a bedroom community for Phoenix. Housing sales volume in Casa Grande is more than 10 times that of Florence or Coolidge.

The composition of the residential housing markets is strikingly similar in all three communities. About 1-5% of properties are multifamily dwellings, 5-10% are mobile homes, and the rest are rental or owner-occupied, single-family permanent dwellings.

TABLE 3.19 Rental Rates in the Major Towns of Pinal County

Town	Monthly Rental ($)
Florence	225-400
Coolidge	225-400
Casa Grande	
Multiple-family	350-525
Single-family	550+

Source: Data provided by Economic Development Board.

TABLE 3.20 Residential Housing Prices in the Major Towns of Pinal County

	Price (10^3/unit)	
Category	Florence/ Coolidge	Casa Grande
Midrange	40-50	55-75
Range	20-170	30-200
Median	45	69

Source: Data provided by Coolidge Economic Development Board.

3.1.8 Recreational Resources

Recreational opportunities in the three candidate areas are limited principally to hunting. Other activities (e.g., sightseeing and bird watching) may occur, but on a small scale. Hunting for mule deer, javelina, quail, and dove occurs in the parts of all three candidate areas where native vegetation occurs. No water-based recreation occurs in any of the candidate areas.

3.1.9 Cultural Resources

The prehistory and history of the area may be divided into the following major periods: Historic (A.D. 1700-present), Protohistoric (A.D. 1450-1700), Hohokam (A.D. 0-1450), Archaic (ca. 7000 B.C. - A.D. 0), and Paleoindian (>7000 B.C.). Remains from all periods except the Paleoindian have been reported from the area. However, the known distribution of sites in the region suggests that Paleoindian remains may be present as well. Overviews of local and regional prehistory and history have been presented by Ackerly and Rieger (1976), Haury (1976), Berry and Marmaduke (1982), and others.

A literature and file search* conducted by the Arizona State Museum (ASM) indicates that the project area has been subject to substantial prior archaeological survey (Deaver undated). Areas A and C (but not Area B) have been partially surveyed, and 28 archaeological sites are currently listed in the files. Sensitivity maps also were prepared by ASM in order to predict the distribution of sites on unsurveyed land. All areas appear likely to possess sites that meet eligibility criteria for the *National Register of Historic Places.* In addition, numerous archaeological sites and historic structures, some of which are listed on the *National Register,* are located outside the three areas but on potentially affected lands (e.g., historic structures in the Casa Grande National Monument or the town of Florence could be affected by jet aircraft noise in the vicinity).

3.1.9.1 Area A

Of the three candidate areas, Area A has been subject to the most extensive prior survey. The previous work includes a survey of Hohokam canal systems on the Gila River floodplain (Midvale 1965), a survey of a portion of the Central Arizona Project Salt-Gila Aqueduct route in the northeastern portion of the area (Dittert et al. 1969; Stein 1979; Deaver and Gardner 1982), and a sample-plot survey of many sections for the CONOCO Florence Project (Doelle 1975, 1976). Approximately 45% of Area A has been surveyed to date (Deaver undated). Follow-up investigations at several sites discovered during these surveys have yielded additional data (Hull and Dart 1983).

Fifteen sites in Area A have been recorded in the files (Table 3.21). The sites vary widely in size, contents, and topographic setting (Deaver undated, pp. 22-26). A large village site (associated with an irrigation system) has been excavated on the floodplain of the Gila River (U:15:9‡), while smaller sites (possible foraging camps) occur on the Pleistocene terrace that occupies the southeastern quadrant of the area (e.g., U:15:34, U:15:38). The basalt hills in the northwestern portion of Area A also contain smaller sites (U:15:34 and U:15:35). The remaining portions of the area are on relatively flat terrain and contain a variety of sites, including a large village (NA 12561) and some smaller occupation sites (e.g., U:15:18, U:15:51, U:15:93). It should be noted, however, that much of this land has been disturbed by modern agricultural activity. Occupations from the Archaic, Hohokam, and historic periods are thought to be represented.

Although none of these sites is currently listed on the *National Register,* some appear to be potentially eligible.§ Furthermore, the unsurveyed portions of Area A may

---

*The search included files at the Museum of Northern Arizona, Northern Arizona University, Arizona State University, State Historic Preservation Office, and the Arizona State Museum (including the AZSITE computer files). Additional information was obtained from the ongoing Tucson Basin Survey being conducted by the Arizona State Museum (Deaver undated, p. 2).

‡This (and similar) coding is an archaeological site designation assigned for identification purposes.

§Potential eligibility of sites was based on professional judgment of the Arizona State Museum.

TABLE 3.21 Known Archaeological Sites in the Candidate Areas

Area	Site Number[a]	Period	Contents
Area A	U:15:9(ASU)*[b]	Hohokam	Pit houses, canal
	U:15:16	Hohokam	
	U:15:18	Hohokam	
	U:15:34	Hohokam	
	U:15:35	Archaic/ Hohokam	Former hearth, cobble rooms
	U:15:36	Archaic	
	U:15:37*	?	Cairns, stone circles
	U:15:38	Hohokam	
	U:15:51	Hohokam	
	U:15:66	?	Redeposited from U:15:67
	U:15:67*	?	
	U:15:68	Hohokam	
	U:15:93	Hohokam	
	NA 12561(MNA)	Hohokam	Debris mounds, canal(?)
	24(SHPO)	Historic (modern)	Highway
Area B	Not listed	Prehistoric	Artifacts observed on surface
Area C	AA:3:6 (ASM)	Hohokam	
	AA:3:17	Hohokam	Debris mounds
	AA:3:28	Hohokam	
	AA:3:40	Hohokam	Platform mound, pit house
	AA:3:128	Hohokam	
	AA:3:195	Hohokam	
	G-1(TBS)	Hohokam	Rock concentration
	G-2(TBS)	Hohokam	Rock concentrations
	G-5(TBS)	Hohokam	Rock concentrations
	G-8(TBS)	Hohokam	Former hearth
	G-10(TBS)	Hohokam	Structure
	G-12(TBS)	Hohokam	
	G-13(TBS)	Hohokam	Rock concentrations

[a]Coding such as U:15:9 is an archaeological site designation assigned for identification purposes. The abbreviations in parentheses include: ASU = Arizona State University; MNA = Museum of Northern Arizona; SHPO = State Historic Preservation Office, ASM = Arizona State Museum, and TBS = Tucson Basin Survey.

[b]An asterisk (*) following the site number indicates that at least partial collection or excavation of remains has been undertaken.

Source: Based on data in Deaver (undated, pp. 4-6, Table 2).

be expected to yield additional sites according to the patterns evident among the known sites. Some of these sites may also be potentially eligible for the *National Register*. It would be necessary to conduct a survey of any unexamined land that would be affected by the proposed action in order to properly inventory and evaluate the sites.

Numerous archaeological sites and historic structures are located close to the boundary of Area A. These include many prehistoric sites on the floodplain and terraces of the Gila River (e.g., the Escalante Ruin Group [Doyel 1974]) and many historic structures in the town of Florence. Several of these sites and structures are listed in the *National Register* (Gasser 1988).

3.1.9.2 Area B

No systematic archaeological surveys have been conducted within Area B. However, both Argonne National Laboratory and ASM staff have inspected portions of this area and have noted the presence of isolated artifacts on the surface (Hoffecker 1988) and traces of large sites (Deaver undated, p. 8).

Although no sites in Area B currently are listed in the files, the distribution of known sites in the surrounding region permits general predictive statements about the type and location of sites that may be expected to occur within the area (Deaver undated, pp. 26-27). Most of Area B is characterized by broad alluvial fan surfaces, which are likely to contain a variety of sites, ranging from small debris scatters to large villages. It should be noted that a village site (covering about 0.25 mi^2) occurs immediately west of the Area B boundary (AA:3:1 [ASM]). The larger sites tend to be concentrated along the washes. The terrain in Area B also includes several small volcanic hills, which may be expected to contain various types of small sites. Finally, a portion of Box-O Wash traverses two sections in the northeastern corner of the area; various types of small sites, including habitation sites, for exploitation of local plant and animal resources are likely to occur there.

Area B may be expected to contain a large number and variety of sites, and some of these seem likely to be eligible for the *National Register*. However, it would be necessary to conduct field surveys of any areas that would be affected by the proposed action in order to properly inventory and evaluate the sites.

3.1.9.3 Area C

Several previous archaeological surveys have examined portions of Area C, although the total percentage of land surveyed is limited. The surveys include the West Coast/Mid-Continent Pipeline Project (Lensink 1976), two surveys for the Central Arizona Project Tucson Aqueduct (Kayser and Fiero 1969; McCarthy 1982), surveys for state land leases (Roth 1988), and ongoing investigations by the Tucson Basin Survey (Deaver undated, p. 8).

Thirteen sites, about half of them reported by the Tucson Basin Survey, are listed in the files (see Table 3.21). Although these sites have not been subject to collection or excavation, much information is available concerning their contents. The sites range

from small loci without observed features (e.g., AA:3:128) to a large village site (covering more than 0.25 mi^2) containing a platform mound and compound (AA:3:40). Most of the sites are of moderate size and contain one or more features (e.g., rock concentration). All of these sites have been assigned to the Hohokam period and appear to represent a variety of functional types, including small foraging camps, occupations related to agricultural activities, and permanent villages (Deaver undated, p. 28). The topography of Area C is highly uniform (broad alluvial fans), and its unsurveyed portions may be expected to yield more of these types of sites, as well as small sites from other periods (Deaver undated, p. 28).

Although no sites in Area C are currently listed on the *National Register*, it is apparent that some of the known sites in the area are potentially eligible, and the unsurveyed portions may also contain potentially eligible sites. It would be necessary to conduct a survey of any previously unexamined portions of the area that would be affected by the proposed action in order to properly inventory and evaluate their cultural resources.

3.2 NO-ACTION ALTERNATIVE

The no-action alternative would result in the continued use of the Coolidge Municipal Airport for USAF training flights. Under this alternative, there would be no change in military operations at the Coolidge airport for the short-term. The same number of touch-and-go landings and takeoffs and other maneuvers would continue at the airport. The existing environment around the Coolidge Municipal Airport is generally similar to that described for the three candidate areas. However, there are specific differences in land use, water quality and quantity, noise, threatened and endangered species, and recreational and cultural resources. The following descriptions (as summarized from Coffman Assoc. 1987) highlight these differences.

Land use in the vicinity of the Coolidge Municipal Airport is mostly rangeland, with the nearest residential developments 5 mi north. The area surrounding the airport is zoned vacant by the county. The only surface water in the area is the Gila River, 6 mi north, and the Florence-Casa Grande Canal, 1.5 mi north and 0.75 mi west.

The existing 65-dB L_{dn} noise contour encompasses about 11 mi^2 around the airport. This contour extends beyond the airport's boundaries to the northeast, southwest, and west. A few rural farm homes (low population density) are located within the 65-dB L_{dn} contour. However, much of the area surrounding the airport is vacant.

No threatened or endangered wildlife species or their habitats are known to occur in the immediate area surrounding the airport. Threatened or endangered plant species listed in Section 3.1.5 may occur in natural areas around the airport. Recreation surrounding the airport is likely similar to that described in Section 3.1.7; however, a parachute jump school operated at the Coolidge Municipal Airport is a popular recreational opportunity in the area.

The airport is in an area of low potential for discovery of archaeological sites. No known property or sites are listed on the National Register of Historic Places or the state inventory.

3.3 REFERENCES*

Ackerly, N., and A. Rieger, 1976, *An Archaeological Overview of Southwest Pinal County, Arizona*, Arizona State Museum Archaeological Series 104, University of Arizona, Tucson.

Arizona Department of Commerce, 1987a, *Florence Community Profile, 1987*, Phoenix.

Arizona Department of Commerce, 1987b, *Coolidge Community Profile, 1987*, Phoenix.

Arizona Department of Economic Security, 1986, *Population Statistics*, Population Statistics Unit, Phoenix, Dec.

Arizona Department of Economic Security, 1987, *Labor Market Information and Occupational Employment Forecasts — Pinal County*, Research Administration, Phoenix, Jan.

Arizona Department of Economic Security, 1988a, *Labor Market Information Newsletter*, Vol. XII, No. 8, Phoenix, Aug.

Arizona Department of Economic Security, 1988b, *Arizona Population Projections — Counties and Places*, Population Statistics Unit, Phoenix, April.

Arizona Department of Economic Security, 1988c, *Population Estimates*, Population Statistics Unit, Phoenix, Aug.

Arizona Department of Economic Security, 1988d, *Labor Market Information, 1987 Job Bank Wages*, Research Administration, Phoenix, March.

Arizona Department of Economic Security, 1988e, *Pinal County Labor Force and Employment in 1988*, Research Administration, Phoenix, Jan.

Arizona Department of Environmental Quality, 1988, *1987 Air Quality Control for Arizona, Annual Report*, Office of Air Quality, Phoenix, Aug.

Arizona Tax Research Assoc., 1988, *Listing of Sales Tax Rates and Codes*, Phoenix.

Berry, C., and W.S. Marmaduke, 1982, *The Middle Gila Basin: An Archaeological and Historical Overview*, Northland Research Inc., Flagstaff, Ariz.

Bureau of Land Management, 1987, *Phoenix-Resource Management Plan and Environmental Impact Statement*, U.S. Department of the Interior, Washington, D.C., Dec.

*Copies of all memoranda and letters cited in this list can be obtained upon request from J.S. Irving, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, Argonne, Ill.

Bureau of Reclamation, 1979, *Final Environmental Statement on Salt-Gila Aqueduct, Central Arizona Project*, U.S. Department of the Interior, Washington, D.C.

Coffman Assoc., 1987, *Environmental Assessment for the Proposed Development at Coolidge Municipal Airport*, prepared by Coffman Assoc., Phoenix, for the City of Coolidge, Ariz., July.

Corps of Engineers, 1987, *Brief Real Estate Planning Report, Alternate Sites, New Auxiliary Airfield, 600 Acres, Pinal County, Arizona, Williams Air Force Base, Arizona*, Los Angeles District, Dec.

Deaver, W.L, undated, *A Class I Archaeological Overview of Areas under Consideration for Federal Air Training Command Auxiliary Airfields in the Vicinity of Florence and Picacho, Arizona*, Arizona State Museum, Cultural Resource Management Division, Tucson.

Deaver, W.L., and R. Gardner, 1982, *Site Reevaluation*, Arizona State Museum Archaeological Series *150*(1):29-48, University of Arizona, Tucson.

DeVine, D., and D. Ross, 1986, *Cactus Forest Study Area Land Use Plan*, prepared for Pinal County Department of Planning and Development Services, Florence, Ariz.

Dittert, A.E., P.R. Fish, and D.E. Simmonis, 1969, *A Cultural Inventory of the Proposed Granite Reef and Salt-Gila Aqueducts*, Arizona State University, Tempe, Ariz.

Doelle, W.H, 1975, *Prehistoric Resource Exploitation within the CONOCO Florence Project*, Arizona State Museum Archaeological Series 62, University of Arizona, Tucson.

Doelle, W.H., 1976, *Desert Resources and Hohokam Subsistence: The CONOCO Florence Project*, Arizona State Museum Archaeological Series 103, University of Arizona, Tucson.

Doyel, D.E., 1974, *Excavations in the Escalante Ruin Group*, Arizona State Museum Archaeology Series 37, University of Arizona, Tucson.

Edison Electric Institute, 1984, *Electric Power Plant Environmental Noise Guide*, Vol. 1, 2nd Ed., Washington, D.C.

Eldred, K.M., 1971, *Community Noise*, U.S. Environmental Protection Agency Report NTID 300.3, Washington, D.C., Dec.

Ellis, B.D., 1989, chief, Environmental Division, Bureau of Reclamation, Phoenix, letter to J.S. Irving, Argonne National Laboratory, Argonne, Ill., March 31.

Fidell, S., R. Horonjeff, and D.M. Green, 1981, *Statistical Analysis of Urban Noise*, Noise Control Engineering, *16*(2):75-80.

Galloway, W.J., et al., 1974, *Population Distribution of the United States as a Function of Outdoor Noise Level*, U.S. Environmental Protection Agency Report 550/9-74-009-A, Washington, D.C., June.

Gasser, R.E., 1988, archaeologist and compliance coordinator, State Historic Preservation Office, Arizona State Parks, Phoenix, letter to J.M. Owendoff, base civil engineer, Williams Air Force Base, Arizona, Dec.

Greiner, Inc., 1988, *City of Mesa/Pinal County Water Farm Project*, prepared in association with ERA, Inc., Mesa, Ariz., June.

Haury, E.W., 1976, *The Hohokam: Desert Farmers and Craftsmen*, University of Arizona Press, Tucson.

Hoffecker, J.F., 1988, Argonne National Laboratory, memorandum to J.S. Irving, Argonne National Laboratory, Argonne, Ill., July.

Hull, F., and A. Dart, 1983, *Reach 3 Specialized Activity Sites*, Arizona State Museum Archaeological Series *150*(3):91-208, University of Arizona, Tucson.

Irving, J.S., 1989, *Summary of Information Provided on June 14, 1989, by M. Springfield, Pinal County Planning and Zoning Commission, Florence, Arizona, Regarding Status of Land-Use Plans in Pinal County, Arizona*, memorandum to project file, Argonne National Laboratory, Argonne, Ill., June.

Kayser, D.W., and D. Fiero, 1969, *An Archaeological Survey of the Tucson Aqueduct, Central Arizona Project*, Arizona State Museum Library, University of Arizona, Tucson.

Lensink, S.C., 1976, *An Archaeological Survey of the West Coast/Mid-Continent Pipeline Project, El Paso Natural Gas Company*, Arizona State Museum Archaeological Series 105, University of Arizona, Tucson.

McCarthy, C.H., 1982, *An Archaeological Sample Survey of the Middle Santa Cruz River Basin, Picacho Reservoir to Tucson, Arizona: A Class II Survey of the Proposed Tucson Aqueduct Phase A, Central Arizona Project*, Arizona State Museum Archaeological Series 148, University of Arizona, Tucson.

Midvale, F., 1965, *Prehistoric Irrigation of the Casa Grande Ruins Area*, The Kiva, *30*(3):82-86.

Miller, L.N., 1968, *The Noise of Cooling Towers*, Baltimore Aircoil Co. Bulletin 250, Baltimore, March.

Pinal County, 1985, *Master Zoning Map*, Board of Supervisors, Pinal County, Florence, Ariz.

Policastro, A.J., 1989, Argonne National Laboratory, memorandum regarding nonattainment areas to J.S. Irving, Argonne National Laboratory, Argonne, Ill., Aug. 23.

Reichenbacher, F.W., 1985, *Status and Distribution of the Tumamoc Globeberry (*Tumamoca macdougali *Rose)*, F.W. Reichenbacher and Assoc., Tucson, May.

Roth, B., 1988, Arizona State Museum, Tucson, letter to G. Slusher regarding surveys for application numbers 04-95259-08 and 04-95260-08.

Schwartzmann, J.L., et al., 1976, *Field Studies of the Nongame Mammals, Birds, Herpetofauna and Vegetation Analysis of the Proposed Salt-Gila Aqueduct*, Department of Zoology, Arizona State University, Tempe, Ariz.

Soil Conservation Service, 1972, *General Soil Map, Pinal County, Arizona*, U.S. Department of Agriculture, March 1971, revised April 1972.

Spiller, S.F., 1988, field supervisor, U.S. Fish and Wildlife Service, Phoenix, letter to J. Irving, Argonne National Laboratory, Argonne, Ill., Dec. [Reproduced in Section F.3 of Appendix F.]

Stebbins, R.C., 1966, *A Field Guide to Western Reptiles and Amphibians*, Houghton Mufflin Co., Boston.

Stein, P.H., 1979, *Archaeological Investigations along the Salt-Gila Aqueduct*, Museum of Northern Arizona, Flagstaff, Ariz.

Turner, R.M., and D.E. Brown, 1982, *Sonoran Desert Scrub*, in Biotic Communities of the American Southwest United States and Mexico, D.E. Brown, ed., a special issue in Desert Plants, *4*(1-4):181-221, The University of Arizona, Tempe, Ariz.

U.S. Air Force, 1984, *Air Installations Compatible Use Zone Handbook*, Directorate of Engineering and Services, USAF/LEEV, Washington, D.C., July.

Walker, D.L., 1988, habitat specialist, Arizona Game and Fish Department, Mesa, Ariz., letter to A.A. Antonopoulos, Argonne National Laboratory, Argonne, Ill., Nov. [Reproduced in Section F.3 of Appendix F.]

4. ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED PROJECT

No specific location for the auxiliary airfield has been determined within each of the three candidate areas, and in general these analyses encompass all of each of the areas. This chapter provides environmental information that can be used to further narrow the potential locations acceptable for an auxiliary airfield. However, impacts to all resources were evaluated for all portions of the candidate areas.

4.1.1 Land Features and Use

About 600 acres of land would be required for the runways, support facilities, an access road, and utility rights-of-way (e.g., transmission line) for the proposed auxiliary airfield. The most significant and long-term impacts to land use would result from the clearing of land for the airfield and access road. The exact area affected by the road would depend on its length. Long-term impacts would occur to the extent that construction and operation of the airfield interfered with or prevented other land uses (e.g., residential development, transportation networks, grazing leases).

Construction of the airfield on or near residentially zoned land could adversely affect the future use of that land as residential property (see Section 4.1.3.2). Construction of the airfield without regard for the location of major transportation routes could have significant impacts on transportation networks within the area selected for the project. Construction would also preclude use of the airfield site for grazing leases or as wildlife habitat.

Short-term impacts would result to the extent that construction activities interfered with or prevented use of nearby land (e.g., for grazing or hunting) during the construction period.

4.1.1.1 Area A

Various construction and operational considerations preclude use of most of the land within Area A for the auxiliary airfield, but a small part of the northwestern portion of Area A remains under consideration for the facility (Figure 2.2).

Construction of the airfield in the northwestern portion of Area A would remove 600 acres from cultivation. No residentially zoned areas exist within Area A; however, several rural farm houses located along the Arizona Farms and Felix roads would be indirectly affected (e.g., from noise) by construction and operation of the airfield in this portion of Area A (Figure 3.3). If constructed near these residences, the proposed airfield could significantly affect the future use of these properties (see Section 4.1.7). Locating the airfield in the northwestern portion of Area A also could affect the Arizona Farms and Felix roads and the Southern Pacific Railroad line (Figure 3.1).

Construction of the proposed airfield in the southwestern portion of Area A would remove 600 acres of wildlife habitat. Construction could adversely affect the Hunt Highway corridor, which crosses the southwestern portion of Area A. Several unpatented mining claims also could be affected if the airfield were built in this portion of Area A (see Figure 3.1 and Table 3.3).

Construction of the proposed airfield in the east-central portion of Area A would remove 600 acres of a combination of cultivated lands, grazing leases, and wildlife habitat. Location of the airfield in this portion of Area A could impact the Felix Road, the Southern Pacific Railroad line, and the Central Arizona Project (canal). Several unpatented mining claims also could be affected (see Figures 3.1 and 3.3 and Table 3.3).

The length of access roads and utility connections for any location within Area A would be less than 1-1.5 mi because of the proximity of existing transportation routes and transmission lines. About 5.5 acres of land would be used for pavement and rights-of-way for construction of a 1- to 1.5-mi access road.

4.1.1.2 Area B

Construction of the proposed airfield in any portions of Area B would remove 600 acres of grazing leases and wildlife habitat. Also, in the northwestern and north-central portions of Area B, construction could affect the Florence-to-Kelvin Road, several minor roads, and an unpatented mining claim (see Table 3.3 and Figure 3.4).

Construction in the west-central portion of Area B could adversely affect a small residential development located along Highway 89 (Figure 3.4). Construction in this portion of Area B also could adversely affect government material sites and utility rights-of-way located along Highway 89 (Table 3.3).

Several water tanks are located in the central portion of Area B, and the AGFD proposes to construct two water catchment basins there for wildlife. Construction of the airfield in this portion of Area B could impact the existing water tanks and preclude the construction of the proposed catchment basins (Figure 3.4). Construction of the auxiliary airfield in the southwestern portion of Area B could affect Smoke Road, government material sites, and utility rights-of-way along Highway 89 (Figure 3.4 and Table 3.3).

The length of access road and utility connections for any location within Area B could range from 1 to 10 mi. Access roads for an airfield located in the northern or western portions of the area would be less than 1-1.5 mi long because of the proximity of existing transportation routes (Highway 89). In contrast, access roads for an airfield located in the central or east-central portions of Area B would be 7-10 mi long. Construction of a 1.5- to 10-mi-long access road would require from 5.5 to 37 acres. Transmission line rights-of-way would be long except for a facility constructed in the central and southwestern portions of the area.

4.1.1.3 Area C

Construction of the proposed airfield in Area C would remove 600 acres of grazing leases and wildlife habitat. In the northeastern portion of Area C, a residentially zoned area could be affected by construction of the airfield. However, no residences currently exist in that area. Construction along the eastern portion of Area C could adversely affect government material sites and utility rights-of-way along Highway 89 (Figure 3.7 and Table 3.3). A natural gas pipeline right-of-way crosses from the northwestern corner to the southeastern corner of Area C (Figure 3.7).

The length of access roads and utility connections for any location within Area C could range from less than 1 to 5 mi. Access roads for an airfield located in the eastern portion of the area would be less than 1-1.5 mi long because of the proximity of existing transportation routes (Highway 89). A 4- to 5-mi-long access road would be needed for an airfield located in the western portion of Area C. Construction of a 1.5- to 5-mi-long access road would require from 5.5 to 18 acres. Transmission line rights-of-way would be less than 5 mi long.

4.1.1.4 Mitigation

Impacts on land use would be mitigated by avoiding residentially zoned areas, to the greatest extent possible, and major irrigation and transportation networks. The USAF would negotiate with public utilities and federal, state, and private landowners for purchase, lease, or relocation of property or features affected by construction of the airfield.

4.1.2 Water Quantity and Quality

Construction of an airfield across stream beds would disrupt the natural flow and drainage in the area. The intermittent streams in the region receive large quantities of water during rainstorms, and disruption of their natural flow could cause flooding. Erosion of soils along the intermittent streams could increase as a result of the flooding. Flooding and the subsequent erosion could increase soil loss, decrease water quality, and potentially impact existing or proposed facilities. Disruption of intermittent streams also could affect the ability of the water tanks or ponds to receive and hold water.

The northwestern portion of Area A would be the least likely to have flooding and erosion problems. This area is mostly cultivated and has no intermittent streams. However, disruption of the large intermittent stream that crosses Area A diagonally northeast to southwest could cause more serious flooding and erosion.

Many small, intermittent streams cross Areas B and C from east to west. Disruption of these streams could cause minor flooding and erosion during rainstorms. However, disruption of the larger wash systems could cause more serious flooding. Construction and operation of the proposed airfield would not cause significant erosion problems in Areas A, B or C, as the facilities would be properly sited and appropriate erosion controls implemented.

Several water tanks in Areas B and C depend on the wash systems and rain to supply water. In an area where water is in short supply, these tanks provide an important source of water for domestic and native animals. Two water tanks are located in the central portion and one in the extreme southern portion of Area B (Figure 3.4).

The probability of contaminating surface and groundwater supplies with fuel spilled from vehicles, storage tanks, or parked planes would be remote because of the small amount of fuel present at any one time. Proper care and storage would reduce the risk of contaminating local water supplies with these fuels.

Potable water would be supplied by drilling a well or connecting to existing supplies. A 6,000-gal water tank would be filled periodically from the well or other source. Continuous pumping would not be required; therefore, impacts to the local groundwater supplies would be minimal.

Water control structures (e.g., culverts, ditches) would be used to prevent flooding by maintaining the proper flow of water around the proposed airfield. Proper erosion control methods would be used to reduce soil erosion. Large intermittent streams or washes would be avoided in the siting of the airfield. To prevent contamination of surface water or groundwater, hazardous chemicals and fuels would be controlled and monitored during construction and operation of the airfield.

4.1.3 Air Quality and Noise

4.1.3.1 Air Quality

The major air quality impacts during the construction of the auxiliary airfield would generate fugitive dust during site-clearing activities. A total of about 600 acres would need to be cleared and a lesser amount graded. Discussions with the Arizona Department of Environmental Quality about the project reveal that no air quality permit is required for an action of this size (Policastro 1989). However, use of a water truck to minimize generation of dust is required. If construction occurred during the summer, the water truck would likely be in continuous use because of the hot (sometimes up to 106°F) and dry climate of the area. Personnel from the Pinal County Air Quality Control District would inspect the construction activity to ensure that dust was being reasonably controlled. The Pinal County Air Quality Control District does not require modeling of the air quality impacts for this construction activity to ensure that National Ambient Air Quality Standards (Appendix D) would be met. It is anticipated, however, that the required dust-suppression activities would be sufficient to meet those standards at the site boundary.

The projected annual air pollutant emissions from the T-37 aircraft that would use the new auxiliary airfield are estimated to include 262 metric tons (t) of carbon monoxide (CO), 33 t of hydrocarbons (HC), 6 t of nitrogen oxides (NO_x), 1 t of total suspended particulates (TSP), and 3 t of sulfur dioxide (SO_2). These emission values are based on estimates that T-37 aircraft would fly approximately 81 sorties and 213 closed

patterns at the auxiliary field each day.* Annual emission rates were estimated for the T-37 on the basis of data on emissions per landing/takeoff and touch-and-go operation presented in a study by Seitchek (1985). The emission totals would be the same for each of the three candidate areas since the same amount of aircraft activity would occur regardless of the site selected. These emissions are not new, but rather are the same as are now occurring during USAF training activities at Coolidge Municipal Airport.

The predicted impacts from the estimated emissions, in terms of air pollutant concentrations generated, are listed in Table 4.1. The airborne concentrations at ground level for SO_2, TSP, NO_x, and CO on a worst-hour basis were predicted based on estimates of 60 takeoffs, landings, and closed patterns at the auxiliary field during that hour. This would result from 20 aircraft flying 3 takeoffs, 3 landings, and 3 closed patterns. Aircraft flights at the auxiliary field would vary significantly in intensity on an hour-by-hour basis. From those 1-hour maxima, estimates were made of the airborne pollutant concentrations that would occur at the site boundary for 3-hour (for SO_2), 8-hour (for CO), and 24-hour (for TSP and SO_2) periods. These worst-hour predictions and the estimates for other averaging times were made using the methods described by Seitchek (1985). The results would be the same for each candidate area since the distance from the runway to the site boundary would be the same.

Annual averages cannot be reliably estimated from worst-hour predictions. However, the worst-hour predictions would necessarily be greater than annual values or 24-hour values because of variation in wind direction with time and the fact that the worst-hour conditions would prevail only a very small portion of a day or a year.

The addition of the emissions from T-37 training flights at each candidate area would add only a very small increment to the pollution levels already occurring there. As indicated in Table 4.1, these incremental concentrations would be substantially less than the regulatory standards. No significant difference would exist in air quality between the three locations. Even with the T-37 operations added, the air quality at all three areas would meet current standards.

The addition of carbon monoxide (262 t), hydrocarbons (33 t), and nitrogen oxides (6 t) to the air each year at the auxiliary airfield would appear to add to ozone production downwind of the airfield. However, these amounts of pollutants would be small compared with regional emissions (Arizona Department of Environmental Quality 1988), and, more importantly, these amounts are not new emissions but are simply transfers of the same emissions from the area of the Coolidge Municipal Airport to the area of the new airfield.

4.1.3.2 Noise

The initial step in the analysis of the environmental impact of airfield noise is preparation of average daily flight-operations data. These operations would be identical

*A sortie is an individual flight, it includes a departure, an approach, and possibly one or more closed patterns. A closed pattern is a maneuver that starts and ends at the same location.

TABLE 4.1 Comparison of Standards with Incremental Air Pollutant Concentrations and Worst-Hour Concentrations at the Site Boundary of an Auxiliary Airfield from T-37 Training Flights[a]

Pollutant	Averaging Period	Concentration[b] ($\mu g/m^3$)	Federal/State Standard[c] ($\mu g/m^3$)
CO	1 hour	145.3	40,000
	8 hours	102.0	10,000
	Worst hour[d]	145.3	N/A[e]
NO_x	Annual	2.0	100
	Worst hour[d]	3.5	N/A
HC	Worst hour[d]	18.8	N/A
TSP[f]	24 hours	0.1	150
	Worst hour	0	N/A
SO_2	3 hours	1.0	1,300
	24 hours	0.7	365
	Annual	0.7	80
	Worst hour	1.2	N/A

[a]Site boundary is approximately 0.6 km away.

[b]Annual predictions would be less than the 24-hour, 8-hour, 3-hour, or 1-hour predictions provided here.

[c]The standards column includes ambient values. Totals resulting from the addition of these small incremental concentrations from T-37 aircraft to the ambient levels would be in compliance with standards.

[d]Worst-hour ground-level airborne pollutant concentrations at site boundary for each candidate area. Worst-hour conditions are specified in the text.

[e]Not applicable.

[f]PM_{10} values would be less than the TSP values presented here by definition of PM_{10}.

at any site and were described in Section 2. As previously discussed in Section 3.1.3.2, this information is used with the computer program NOISEMAP to generate L_{dn} noise-level contours relative to the 6,000-ft-long training airstrip (Figure 2.8).

To define all possible options for airstrip placement, within each candidate area, *airstrip containment zones* (ACZs) were determined. These are areas where the airfield could be placed without the noise level exceeding 65 dB L_{dn} at residentially zoned locations. These ACZs were calculated based on L_{dn} levels at residentially zoned areas without regard for limitations on airstrip placement imposed by railroads, topography, or any other physiographic features. Site-specific conclusions for each candidate area are presented below.

Area A

A few rural residences exist at intervals along Arizona Farms Road (the northern boundary of Area A) and at the southeastern corner of Section 13 (Figure 4.1). Consequently, the ACZ shown in the figure is based upon restricting the L_{dn} level to 65 dB at these specific residential sites. However, practical limitations imposed by the combination of railroad proximity and topography make the feasibility of locating the airfield within the 65-dB L_{dn} ACZ questionable. Even if such location were feasible, the L_{dn} at some of the rural residences could increase by 20-30 dB. However, the facility would still be within the indicated 65-dB ACZ.

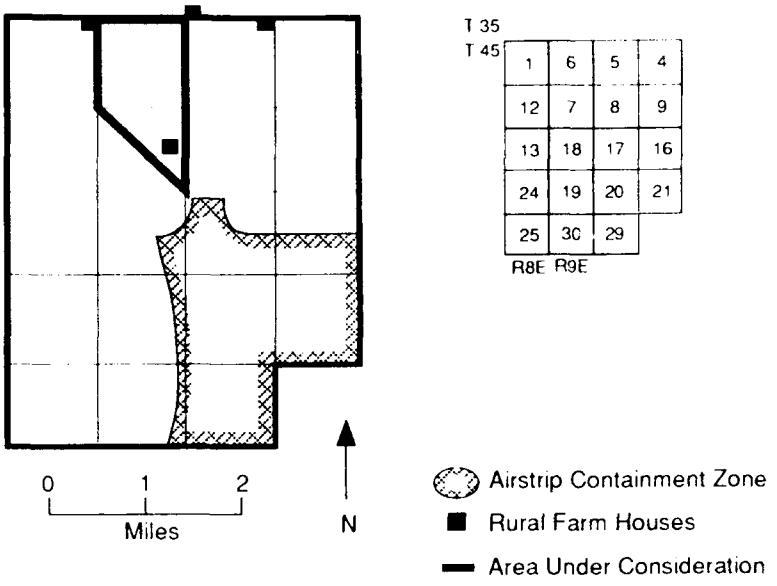

FIGURE 4.1 Airstrip Containment Zone within Candidate Area A (based on not exceeding 65 dB L_{dn} at rural farm houses)

Area B

The residentially zoned area in the western corner of Area B could receive in excess of 65 dB L_{dn} if the proposed auxiliary airfield were located nearby. Figure 4.2 illustrates the ACZ limits that would avoid excessive noise (above 65 dB L_{dn}) at the residentially zoned area. Operation of the airfield in the southwestern portion of Area B, along U.S. Highway 89, could increase noise levels by 15-20 dB L_{dn} above the estimated existing level of 50 dB L_{dn} (see Section 3.1.3.2). In the remaining portions of Area B, away from traffic and human activity, noise levels could increase by 40-45 dB L_{dn}. However, these portions of Area B are uninhabited and have little human activity.

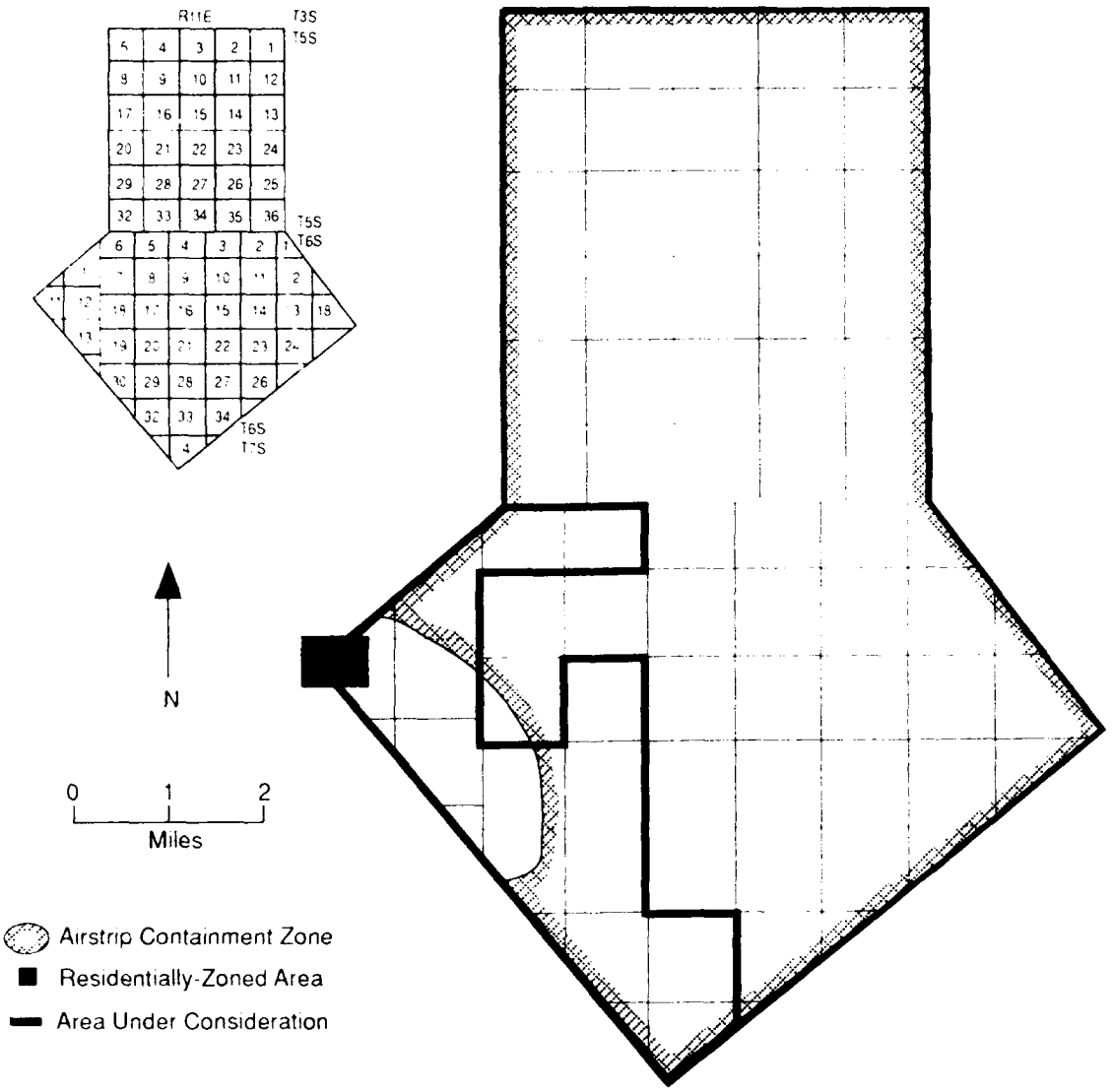

FIGURE 4.2 Airstrip Containment Zone within Candidate Area B (based on not exceeding 65 dB L_{dn} at residentially zoned sites)

Area C

The residentially zoned area in the northeastern corner of Area C and the southwest corner of Area B could receive L_{dn} levels in excess of 65 dB if the proposed auxiliary airfield were located nearby. Figure 4.3 illustrates the ACZ limits that would avoid excessive noise (above 65 db L_{dn}) at these residentially zoned areas. Operation of the airstrip in the southeastern portion of Area C, along U.S. Highway 89, could increase noise levels up to 15-20 dB L_{dn} above the estimated existing level of 50 dB L_{dn} (see Section 3.1.3.2). In the remaining portions of Area C, away from traffic and human activity, noise levels could increase by 35-40 db L_{dn}. However, these portions of Area C are uninhabited and have little human activity.

4.1.3.3 Noise Affects on Native and Domestic Animals

No long-term impacts to native or domestic animals are expected from construction and operation of the airfield. Many types of animals (native and domestic) adapt to the presence of humans and human-caused noises. For example, many animals have adapted to living next to airports (Busnel 1978). In general, there is an overall trend for domestic animals to adapt to intermittent noise under 120 dB (Dufour 1980). The predictability, familiarity, and harmlessness of human activities determine how well an animal will adapt to the noise and its source (Speich et al. 1987; Moen et al. 1982). Once construction of the airfield is complete, operation would be fairly routine and predictable. Except the jet aircraft operation, little human activity would occur at the base. Human activity on the ground would include vehicular traffic to and from the airfield and general maintenance (e.g., mowing, building maintenance). The primary purpose of the auxiliary airfield is to practice touch-and-go maneuvers and not to actually land. Jet aircraft would occasionally land at the facility, but this would not be a regular occurrence. Native and domestic animals in the area would likely adapt to noise from these types of activities.

The impact on native and domestic animals from noise during construction of the airfield and support facilities would be short-term. Noise from construction activities is unlikely to be a major source of harassment, except in the immediate vicinity of the construction site. Animals that are some distance away would not likely be affected. For example, in a study of the impacts of noise, MacArthur et al. (1982) found that mountain sheep were not seriously affected when exposed to vehicular and other human activity at a distance (3,000 ft). Large animals would likely leave the immediate area of construction until noise and other human-related activities diminished. Edge and Marcum (1985) found that deer and elk will reenter favorable habitat once the intrusions have disappeared. Some animals may even adjust to a daily schedule, reentering important habitat early in the morning or late at night after construction has stopped (Campbell and Remington 1981).

In summary, no long-term impacts to native and domestic fauna are expected from noise caused by aircraft operations or other human-related activity. Construction activity would likely cause some disturbance of native and domestic animals, but this type of disturbance would be short-term. Animals would probably reenter the area following construction.

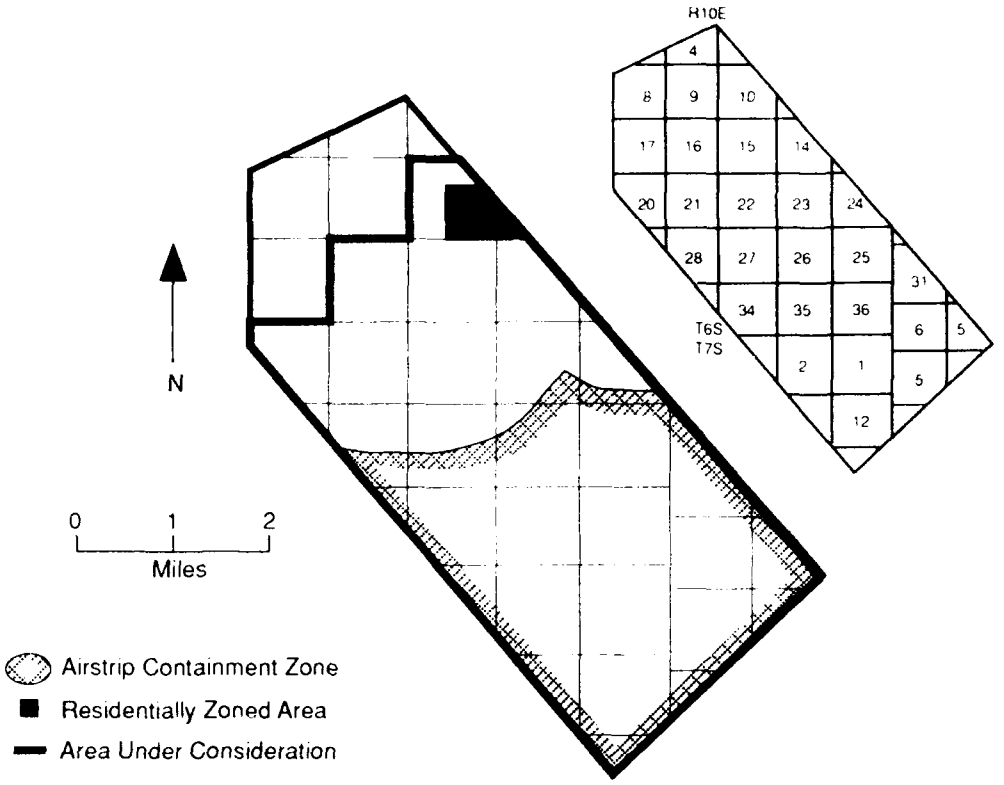

FIGURE 4.3 Airstrip Containment Zone within Candidate Area C (based on not exceeding 65 dB L_{dn} at residentially zoned sites)

4.1.3.4 Mitigation

The proposed auxiliary airfield would be located such that the noise level at residentially zoned developments would be as far below 65 dB L_{dn} as is consistent with training efficiency and cost effectiveness. However, Area A does not appear to provide any mitigative options to reduce noise impacts to rural farm homes.

4.1.4 Airspace

4.1.4.1 Airspace Study

Airspace in the vicinity of the candidate areas was studied to determine flight paths and air traffic volumes. This was done to identify potential impacts of USAF training flights on general aviation flights over the candidate areas. Civilian pilots using the study area were surveyed to determine the paths and number of flights they flew in the vicinity of the candidate areas. Pilots were asked questions related to their origin, destination, frequency, flight path, etc. (see Appendix G). Of the 683 questionnaires sent to pilots, 158 were returned (9 of these were unusable). The pilots living in the Phoenix Metro area were screened to narrow the data base to those living in the East Valley, east

and south of Mesa, Arizona. This area includes Mesa, Apache Junction, Chandler, and Gilbert. The rest of the pilots lived in the vicinity immediately surrounding the study area.

Figure 3.12 illustrates the flight paths of air traffic that crosses the Williams AFB MOAs. Most pilots (81.6%) responding to the questionnaire fly direct routes between their origin and destination. Also, most flights (91.9%) were during daylight hours. The average altitude reported by pilots responding to the questionnaire was 4,386 ft above ground level (AGL).* The minimum altitudes ranged from 1,000 ft AGL over desert to 2,000 ft AGL over mountainous terrain. Most pilots (96%) responding were aware of the MOAs, and one-third of these pilots indicated that they have changed course to avoid military aircraft in the training areas. Most pilots (69.8%) responding to the survey do not file flight plans; however, many (37.8%) participate in visual flight rules with air traffic control.

Each year, an estimated minimum of 3,000, 2,300, and 700 general aviation aircraft fly over Areas A, B, and C, respectively (Figure 3.12). The altitudes that these aircraft fly vary, but responses from the pilot survey indicate that they could conflict with the flight paths and altitudes of the T-37 aircraft climbing or descending from the pilot training areas or in the traffic pattern should an auxiliary airfield be located in any of the candidate areas. Also, about 1,200 military sorties per year fly in the military training routes VR 256, VR 268, and VR 269 above Area A at 6,500 ft MSL. These military sorties are flown at high speeds and could conflict with T-37 traffic in the vicinity of Area A. In addition, military aircraft performing practice approaches to the Boondock Instrument Landing Site (ILS) fly over the northern portion of Area A at altitudes of from 5,500 ft MSL down to 1,910 ft MSL. These practice approaches to the Boondock ILS are at high speeds and could conflict with any T-37 traffic there. Apparently no general aviation air traffic flies over the southern portions of Areas B and C, and no published military training routes occur there, except for the departure, recovery, and traffic pattern routes now used by the T-37 aircraft (Figure 3.12). However, these routes would change as a result of relocating the auxiliary airfield.

4.1.4.2 Mitigation

Mitigative measures that would reduce the potential conflicts between military and civilian air traffic include:

- Request that the area flight service station brief pilots of the air traffic activity in the vicinity of the auxiliary airfield during weather briefing or flight plan recording conducted for general aviation flights,

- Coordinate with the FAA to publish a flyer to distribute to all registered pilots in Arizona and New Mexico describing the location

*Above ground level (AGL) refers to the distance above the existing terrain; mean sea level (MSL) refers to the distance above sea level.

of the auxiliary airfield and stating the procedures for evaluating existing activity and contacting USAF personnel manning the runway supervisory units if flight is planned in the vicinity, and

- Emphasize in local civilian pilot training (through normally scheduled seminars and in appropriate publications) the practice of filing flight plans and utilizing VFR when crossing the MOAs.

- Prohibit training flights over the Casa Grande Ruins National Monument.

4.1.5 Biotic Resources

An important resource in the candidate areas is the complex plant and animal community of the desert environment. Construction and operation of the proposed airfield could cause long-term consequences to the plants and animals in the affected area. Construction activities could destroy or disturb vegetation; eliminate wildlife habitat; destroy or displace wildlife; disrupt migration patterns; and disrupt nesting, mating, and other wildlife activities. Airfield operational activities could disrupt migration patterns of birds and other wildlife and displace or disrupt wildlife. The severity of the impacts would depend on the specific location of the auxiliary field within a candidate area.

As described in Section 3.1.4, three major habitat types occur in the region: (1) creosote bush community, (2) paloverde-saguaro community, and (3) mesquite community. In addition, riparian vegetation occurs along the intermittent streams and washes. In a desert environment, riparian habitat is the most important, as well as the most rare, habitat type. Many wildlife species depend on riparian vegetation for cover and food. Disruption or elimination of this habitat could significantly affect populations of game species in the area. The other plant community types also provide habitat for many desert animals. However, most, if not all, wildlife species in this area depend on riparian habitat for their existence.

Potential impacts to the terrestrial biotic resources of each candidate area are summarized below. The proposed action would not significantly affect aquatic flora or fauna in any of the areas.

4.1.5.1 Area A

Construction of the proposed airfield in the northwestern cultivated portion of Area A would cause little, if any, loss of native flora and fauna. However, impacts would increase if the airfield was constructed in portions of Area A covered with native vegetation. Construction of the airfield in undisturbed portions of Area A would result in a loss of about 600 acres of wildlife habitat. This represents about 11% of the land covered with native vegetation in Area A.

The most important loss would be to riparian habitat along intermittent streams or washes. A large wash system occurs in the east-central portion of Area A. This desert riparian habitat is important to native fauna as a source of food and cover. Construction of the auxiliary airfield in the northwestern portion of the area would cause no loss of riparian habitat because no riparian habitat exists in the cultivated portion of the area. However, in other portions of Area A, the direct loss of riparian habitat from clearing land for the runway and other facilities could range from 2 to 10 acres.

Indirectly, additional riparian habitat could be lost downstream of the proposed airfield. Desert riparian habitat is dependent on intermittent streams for a supply of moisture. Any long-term impediment of intermittent streams (or wash systems) by construction or other related activities could adversely affect riparian habitat downstream from the proposed airfield.

Long-term impacts to wildlife populations and wildlife habitat (especially riparian vegetation) would result from construction and operation of the proposed airfield in the southwestern, southeastern, and east-central portions of Area A.

Construction in the creosote bush community would cause fewer impacts to native fauna and flora. The creosote bush community contains low numbers of saguaros and other protected cacti, as well as paloverde and mesquite trees.

Construction and operation of the airfield would disturb native fauna within the 600-acre site and the surrounding vicinity. Construction of runways, buildings, and access roads would displace or destroy some native fauna. Noise and other human-related activities could disrupt the nesting, reproduction, movement, and feeding of native fauna within Area A and the surrounding vicinity (see Section 4.1.3.3). However, no important habitats (i.e., high-density areas) for mule deer or javelina are located within Area A (Figure 3.13). Considerably less disturbance of native fauna would occur in the cultivated portion of Area A.

4.1.5.2 Area B

Long-term impacts to wildlife populations and wildlife habitat (especially riparian vegetation) would result from construction and operation of the proposed airfield in most portions of Area B. Construction of the proposed airfield in undisturbed portions of Area B would result in a loss of 600 acres of wildlife habitat. The most important loss would be to the riparian habitat along the intermittent streams or washes. Two large wash systems cross Area B -- in the northeastern portion the Box-O Wash crosses from southeast to northwest, and in the central portion the Piasano Wash crosses from east to west. The riparian habitat associated with these washes is important to native fauna for cover and food.

Construction of the auxiliary airfield in most portions of Area B would result in the direct loss of from 2 to 10 acres of riparian habitat. Indirectly, additional riparian habitat could be lost downstream of the proposed airfield as a result of long-term impediment of intermittent streams or wash systems by construction or other related activities.

The paloverde-saguaro community dominates the eastern part of Area B. This community type contains paloverdes, ironwood, saguaros, and several other cacti (such as chollas and barrel cacti). Some of the plant species in the area are protected by the Arizona Native Plant Law. Construction of the airfield in this type of plant community could destroy some large saguaro (those unable to be relocated) and other protected cacti.

High population densities of mule deer occur in southeastern portions of Area B (Figure 3.13). Construction and operation of the airfield would disturb and displace native fauna, including high-density populations of mule deer, within the 600-acre site and surrounding vicinity. However, hills and other topographical anomalies prevent location of the airfield in most parts of Area B where large numbers of mule deer occur. Noise and other human-related activities could disrupt the nesting, reproduction, movement, and feeding of native fauna within Area B and the surrounding vicinity (see Section 4.1.3.3).

4.1.5.3 Area C

Construction of the airfield in undisturbed portions of Area C would result in the loss of 600 acres of wildlife habitat. The most important loss would be to the riparian habitat along the intermittent streams and washes. Many washes cross Area C from east to west. The riparian vegetation associated with these washes provides important habitat for native fauna. The impact on the riparian vegetation in Area C would be the same as for Areas A and B. Long-term impacts to wildlife populations and wildlife habitat (especially riparian vegetation), would result from construction and operation of the proposed airfield in most portions of Area C. The northern part of Area C is covered with the paloverde-saguaro community type. Impacts to this community type were discussed above for Area B.

High-density populations of javelina occur near the northwestern portion of Area C (Figure 3.13). Impacts to native fauna, including high-density populations of javelina, caused by noise and other human activities would be similar to those described for Areas A and B (see Section 4.1.3.3).

4.1.5.4 Mitigation

Mitigative measures would be taken to reduce noise and other human activities during construction and operation of the proposed airfield to lessen the disturbance of the native fauna. Construction activities would be avoided during periods when wildlife are nesting or migrating in the vicinity of the proposed airfield. Areas with high numbers of saguaro cacti would be avoided (see Section 4.1.6.2).

4.1.6 Threatened, Endangered, and Other Protected Species

4.1.6.1 Impacts

No federal- or state-listed threatened or endangered species are known to reside in Area A (Spiller 1988; Walker 1988), but several listed species could be affected by construction of the proposed airfield in Areas B or C. The Tumamoc globeberry (endangered), needle spine pineapple cactus (Category 2), and Acuna valley cactus (Category 1) may be found in Areas B and C. Without proper mitigation, construction activities could destroy individual plants.

The bald eagle and peregrine falcon are likely to forage in areas surrounding Picacho Reservoir and may occur as transients in Areas A, B, and C. However, because of the distance from Picacho Reservoir (30 mi for Area A and 8-9 mi for Areas B and C), no impacts to these predators are expected from construction of the proposed airfield.

The desert tortoise and gila monster could occur in Areas B and C; however, critical habitats are on mountain slopes or upper bajadas. The proposed airfield would not be constructed in these types of habitat; therefore, no significant impacts to these species from construction of the proposed airfield are expected.

In any of the candidate areas, clearing and construction activities could affect several plant species protected by the Arizona Native Plant Law. These species are listed in Section 3.1.5. Without proper mitigative measures (see below), construction activities would likely destroy individual plants that are protected by state law.

4.1.6.2 Mitigation

The USAF is committed to the protection of threatened and endangered species and would seek to avoid areas where they occur. Surveys for federally listed plant species would be conducted before construction of the proposed airfield. Consultation with the U.S. Fish and Wildlife Service would be necessary if any federally listed plant species are found at the proposed construction site. Location of any of these threatened or endangered plant or animal species in the proposed construction site would likely eliminate that site from consideration for the auxiliary airfield.

The Arizona Native Plant Law does not apply to the USAF; however, the USAF would seek to protect native plants. Surveys for plant species protected by the Arizona Native Plant Law would be conducted before construction of the proposed airfield. If possible and practical, the USAF would relocate native plants protected by the Arizona Native Plant Law (especially saguaro cacti).

4.1.7 Socioeconomic and Institutional Factors

Construction and operation of the proposed airfield would not affect net employment, population, income, or county finances in Pinal County. Development of

the airfield would simply transfer the impacts of an existing facility to a new location within the same county. However, based upon comments received at the EIS scoping meetings, impacts on housing prices are a major concern of local residents. The principal concern of residential property owners adjacent to the proposed airfield would be the effect of perceived noise levels on market values of their property.

The impacts of current military operations at Coolidge Municipal Airport on residential market values were examined using the hedonic price equation methodology (Flaim 1989). This analysis found that current use of Coolidge Municipal Airport as a jet training facility does not have a significant effect on residential property values in the Coolidge area. Currently, the Coolidge Municipal Airport has a 5-mi buffer between runways and the nearest residential development. Therefore, the proposed airfield should not have a significant impact on property values since it would be in a more remote location elsewhere in Pinal County. However, impacts to property values could occur if the proposed airfield were located within 12,000 ft (2.3 mi) of residential development (Flaim 1989).

4.1.8 Recreational Resources

The construction and operation of the proposed airfield could affect recreational resources in the three candidate areas. Construction activities could interfere with hunting of big game and migratory birds, and touch-and-go landings and other flight operations of the T-37 jet aircraft would likely interfere with recreational activities in the vicinity of the proposed airfield. Noise and other human-related activities (e.g., jet operation, maintenance of the airfield, travel of ground crews to and from the airfield) would detract from the quality of recreational activities (hunting, site-seeing). While these impacts would be long-term, they are not expected to be significant. However, avoidance of potential high-use recreational areas (i.e., high-density mule deer and javelina areas) would reduce the impacts from operation of the auxiliary airfield.

4.1.9 Cultural Resources

The proposed auxiliary airfield could have direct and indirect adverse effects on significant cultural resources in any of the three candidate areas. Direct adverse effects could include damage or destruction of archaeological sites during construction of the proposed airfield, associated facilities, and access roads. Indirect effects could include damage to historic structures from increased noise levels and to archaeological sites from vandalism (Gasser 1988). Impacts could be mitigated through a combined strategy of surveys, avoidance, and data recovery.

A file search conducted by the Arizona State Museum (ASM) indicates that all candidate areas under consideration for the proposed airfield contain archaeological sites (Deaver undated). According to the predictive maps prepared by ASM, many additional sites probably occur in unsurveyed portions of the areas. No sites within the three areas currently are listed on the *National Register*; however, some are likely to meet eligibility criteria for nomination (as defined in 36 CFR 600). If significant sites would be adversely affected, mitigative action would be required under the provisions of the

National Historic Preservation Act. Many sites located outside the three areas that could be adversely affected by the proposed airfield are listed in the *National Register*.

Archaeological sites of varying size, content, age, and topographic setting could be subject to direct adverse effects in any of the three areas. Construction of the airfield and support facilities could displace, damage, or destroy artifacts and features. These artifacts and features could be located on the ground surface or buried below the surface. Construction of the proposed access road and ramp could also displace, damage, or destroy archaeological remains on the surface and, to a lesser extent, below the surface.

Archaeological sites in any of the three areas could be subject to indirect adverse effects from vandalism due to increased access to that area. Vandalism (unauthorized collection of artifacts) has been reported from at least one site in Area C (Deaver undated). Vandalism seems most likely to occur at large, complex sites (e.g., Hohokam villages). These sites are easier to find and contain a wider array of artifacts.

Historic structures outside the areas under consideration for the proposed airfield could be subject to indirect adverse effects. Increased levels of noise and vibration caused by operation of the airfield could damage structures (Gasser 1988).

4.1.9.1 Area A

The relatively flat alluvial deposits that cover the northern portions of Area A are potential sites for the airfield. In these areas, existing data could be used to avoid known archaeological sites likely to be determined as significant (e.g., NA 12561). In the unsurveyed areas, avoidance of the washes would reduce the possibility of impacts to a large village site. Archaeological sites located on cultivated lands are likely to have already been disturbed. Sites located outside the wash systems on the alluvial flats would probably be limited to smaller occupations (Deaver undated, p. 25).

4.1.9.2 Area B

Area B possesses high potential for archaeological sites of varying characteristics (Deaver undated, pp. 26-27). Avoidance of the wash systems would reduce the likelihood of impacts to a large village site.

4.1.9.3 Area C

Area C is characterized by relatively flat, uniform topography. Existing data could be used to avoid known archaeological sites in some areas likely to be determined as significant (e.g., AA:3:40). In unsurveyed portions of Area C, avoidance of the washes would reduce the likelihood of impacts to large sites.

4.1.9.4 Mitigation

In general, adverse effects to archaeological sites and historic structures would be mitigated through a cultural resources management plan developed in consultation with the State Historic Preservation Officer (SHPO). This plan would emphasize avoidance of impacts to significant sites to the fullest extent feasible because alternative mitigation measures could be time-consuming and costly. Information on the known and predicted distribution of archaeological sites would be used in selecting a location among the remaining topographic settings. Certain landscape features (e.g., washes) should be avoided, because their potential for archaeological sites is especially high. Disturbed land (e.g., cultivated fields) would be preferred because it is more likely that sites have already been disturbed or destroyed. (However, it should be noted that several recent studies have found the extent of damage caused by agricultural activity to archaeological sites to be less than previously thought [e.g., McManamon 1984; Odell and Cowan 1987].)

Once a general location is selected, a field survey would be conducted to inventory and evaluate any archaeological sites on the affected land. The USAF would retain some flexibility in siting until completion of the survey in order to incorporate the survey results into the final site decision. Unavoidable adverse effects to significant sites due to construction activities would be mitigated by data recovery (collection or excavation). Recovery of data from any archeological site requires consultation with the SHPO. Impacts on significant sites exposed to vandalism would be mitigated by protection (e.g., restricted access, monitoring) or through data recovery. Impacts on historic structures subject to damage by increased noise and vibration could probably be mitigated by avoidance. Increased levels of noise and vibration could damage these structures (Gasser 1988).

For Area A, further mitigation of adverse effects would probably require a field survey of that portion of the area selected for the proposed airfield, including those locations subject to prior survey or disturbance. Historic structures located outside Area A in the town of Florence could be exposed to indirect adverse effects during operation of the proposed airfield. These impacts could be mitigated by avoidance (i.e., avoid locating the proposed airfield and operating aircraft near Florence).

A field survey of Area B would be necessary because of the lack of prior investigation. Impacts to sites probably could be mitigated by data recovery. A field survey would also be necessary in Area C. A field check on the location and condition of sites in Area C would be required for previously surveyed areas.

4.2 NO-ACTION ALTERNATIVE

The no-action alternative would result in the continued use of the Coolidge Municipal Airport as the only auxiliary training field for Williams AFB. Over the short-term, implementation of the no-action alternative would increase conflicts between military and private airspace needs. As the civilian use of the airspace increases (e.g., by parachute clubs, recreational flying, etc.) the military might be forced to curtail, or cease, its training flights at the Coolidge airport.

For the long-term, implementation of the no-action alternative would force the military to look for another location for an auxiliary airfield. This airfield would likely be constructed in an area similar to those being described as Candidate Areas A, B, and C in this EIS. Hence, similar environmental impacts would occur as have been described for Areas A, B, and C.

4.3 RELATIONSHIP TO LAWS AND POLICIES

The analyses presented in this EIS indicate that the proposed action and mitigative measures would fulfill applicable requirements of the following laws: the National Environmental Policy Act (and amendments), the Clean Air Act, the Clean Water Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, Executive Order on Wetlands, Executive Order on Floodplains, and the Arizona Native Plant Law.

This evaluation of the environmental impacts of the proposed project has been undertaken in full compliance with all federal legislation pertinent to the protection of cultural resources. This includes the National Historic Preservation Act and the Archeological and Historic Preservation Act, which govern the protection of archeological and historic sites. Native American religious sites are protected under the American Indian Religious Freedom Act.

4.4 UNAVOIDABLE ADVERSE IMPACTS

Construction and operation of the proposed project in one of the three areas would result in the following unavoidable adverse impacts. The listing takes into account all mitigative measures included in the EIS.

4.4.1 Area A

Construction on Cultivated Lands:

- Loss of 600 acres of agricultural land.
- Minor soil erosion due to construction-related activities.
- Minor increase in concentrations of air pollutants due to construction and operation of proposed airfield.
- Increase of 20-30 dB L_{dn} over existing ambient noise levels.

Construction on Lands Covered with Native Vegetation:

- Loss of 600 acres of undisturbed land covered with native vegetation and used for grazing of domestic livestock and wildlife habitat.

- Minor soil erosion due to construction-related activities.

- Minor increase in concentrations of air pollutants due to construction and operation of proposed airfield.

- Increase of 20-30 dB L_{dn} over existing ambient noise levels.

- Significant impact to native flora and fauna at the construction site; displacement of native fauna and elimination of many individual plants (e.g., saguaro cacti and other protected plant species) due to construction-related activities (e.g., clearing land for support facilities, runway, access road).

- Loss of 2-10 acres of riparian habitat due to construction-related activities (e.g., clearing for support facilities, runway, access roads).

- Temporary, minor disturbance of nesting, reproduction, movement, and feeding of native fauna due to construction-related activities. Long-term disturbance from aircraft and ground support operations.

4.4.2 Areas B and C

- Loss of 600 acres of wildlife habitat.

- Minor soil erosion due to construction-related activities.

- Minor increase in concentrations of air pollutants due to construction and operation activities.

- Increase of 35-40 dB L_{dn} over existing ambient noise levels due to jet aircraft noise.

- Significant impact to native flora and fauna at the construction site; displacement of native fauna and elimination of many individual plants (e.g., saguaro cacti and other protected plant species) due to construction-related activities (e.g., clearing area for support facilities, runway, access road).

- Direct loss of 2-10 acres of riparian habitat due to construction-related activities (e.g., clearing land for support facilities, runway, access road, etc.).

- Temporary disturbance of nesting, reproduction, movement, and feeding of native fauna due to construction-related activities. Long-term disturbance from aircraft and ground support operations.

4.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed runway, buildings, utilities (water, sewer, and electrical facilities), and access roads would occupy the land for the life of the project. Therefore, these resources would be committed for the period of time that the proposed project was in use. However, because the project facilities could be removed at the end the useful life of the project, the commitment of local natural resources would not be irreversible or irretrievable. Nevertheless, the desert community is fragile and slow to recover from disturbances. It is likely that the habitats occupied by project facilities could be reclaimed to preproject functions, but it would almost certainly require several decades. Some minor, but permanent, alteration of the physical character of the resources would likely remain. Also, protected plants that could not be relocated, such as large saguaro cacti, would be permanently lost. Small rodents and other less mobile animals would be killed during construction of the airfield.

4.6 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Construction and operation of the proposed project in any of the three candidate areas would provide the USAF with an auxiliary field capable of training pilots in T-37 jet aircraft. This training could continue indefinitely. The benefits would be at the expense of commitment of natural resources to project facilities for the operational life of the airfield. However, as stated in Section 4.5, these commitments of natural resources would not be irreversible or irretrievable, except for the loss of large saguaro cacti and small, less mobile animals during construction. Adverse impacts on the environment could be considered short-term, or at least temporary, if project structures and facilities were removed and the project area reclaimed to preproject uses when the useful life of the airfield ended. If, however, preproject uses could not be established upon project termination, impacts on environmental productivity must be considered permanent.

4.7 REFERENCES*

Arizona Department of Environmental Quality, 1988, *1987 Air Quality Control for Arizona, Annual Report*, Office of Air Quality, Phoenix, Aug.

Busnel, R.G., 1978, *Introduction*, in Effects of Noise on Wildlife, J.L. Fletcher and R.G. Busnel, eds., Academic Press, New York.

Campbell, B., and R. Remington, 1981, *Influence of Construction Activities on Water-use Patterns of Desert Bighorn Sheep*, Wildlife Society Bulletin, *9*(1):63-65.

*Copies of all memoranda and letters cited in this list can be obtained upon request from J.S. Irving, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, Argonne, Ill.

Deaver, W.L., undated, *A Class I Archaeological Overview of Areas under Consideration for Federal Air Training Command Auxiliary Airfields in the Vicinity of Florence and Picacho, Arizona*, Arizona State Museum, Cultural Resource Management Division, Tucson.

Dufour, P.A., 1980, *Effects of Noise on Wildlife and Other Animals, Review of Research Since 1971*, Environmental Protection Agency Report EPA 550/9/30-100 [PB82-139973], Washington, D.C.

Edge, W.D., and C.L. Marcum, 1985, *Movement of Elk in Relation to Logging Disturbances*, J. of Wildlife Management, *49*(4):926-930.

Flaim, S.J., 1989, Argonne National Laboratory, memorandum regarding evaluation of property values to J.S. Irving, Argonne National Laboratory, Argonne, Ill., Oct. 16.

Gasser, R.E., 1988, archaeologist and compliance coordinator, State Historic Preservation Office, Arizona State Parks, Phoenix, letter to J.M. Owendoff, base civil engineer, Williams Air Force Base, Ariz., Dec.

MacArthur, R.A., V. Geist, and R.H. Johnston, 1982, *Cardiac and Behavioral Responses of Mountain Sheep to Human Disturbance*, J. of Wildlife Management, *46*(2):351-358.

McManamon, F.P., 1984, *The Integrity of Plowzone Sites*, American Archaeology, 4:70-76.

Moen, A.N., S. Whittemore, and B. Buxton, 1982, *Effects of Disturbance of Heart Rate of Captive White-Tailed Deer*, New York Fisheries Journal, *29*(2):176-183.

Odell, G.H., and F. Cowan, 1987, *Estimating Tillage Effects on Artifact Distributions*, American Antiquity, 52(3):456-484.

Policastro, A.J., 1989, Argonne National Laboratory, memorandum regarding nonattainment areas to J.S. Irving, Argonne National Laboratory, Argonne, Ill., Aug. 23.

Seitchek, G.D., 1985, *Aircraft Engine Emissions Estimator*, Engineering and Services Laboratory Report SL-TR-85-14, Air Force Engineering and Services Center, Tyndall Air Force Base, Fla., Nov.

Speich, S.M, et al., 1987, *Evaluation of Military Flight Operations on Wildlife of the Copalis National Wildlife Refuge, 1984-1985*, Center for Marine Studies Technical Report 80-1, prepared by San Diego State University and Hubbs Marine Research Center for the U.S. Air Force, Space Division.

Spiller, S.F., 1988, field supervisor U.S. Fish and Wildlife Service, Phoenix, letter to A.A. Antonopoulos, Argonne National Laboratory, Argonne, Ill. [Reproduced in Section F.3 of Appendix F.]

Walker, D.L., 1988, habitat specialist, Arizona Game and Fish Department, Mesa, Ariz., letter to J.S. Irving, Argonne National Laboratory, Argonne, Ill. [Reproduced in Section D.3 of Appendix D.]

5. CONCLUSIONS

5.1 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

5.1.1 Proposed Project

Construction and operation of the proposed auxiliary airfield in Area A, B, or C would affect land use, water quality and quantity, airspace, ecology, air quality, noise, and threatened and endangered species. The following sections summarize the potential impacts of the proposed auxiliary airfield with implementation of the mitigative measures discussed in Section 4 and summarized in Section 5.3. The evaluation addresses all portions of each candidate area. In cases where impacts would be different for different candidate areas, separate subsections are provided. For topics with no subsection headings, the impacts would be the same in all three areas.

5.1.1.1 Land Features and Use

Area A

- Removal of about 600 acres of land from agricultural use, or 600 acres of land covered with native vegetation from domestic livestock grazing, or some combination totaling 600 acres for the proposed airfield, support facilities, and access roads.

Area B or C

- Removal of about 600 acres of land covered with native vegetation from domestic livestock grazing for the proposed airfield, support facilities, and access roads.

5.1.1.2 Water Quantity and Quality (Area A, B, or C)

- Minor erosion of soil as a result of construction-related activities.

5.1.1.3 Air Quality and Noise (Area A, B, or C)

- Some generation of fugitive dust during construction, especially in the site-clearing phase.

- Small increases in concentrations of air pollutants from aircraft emissions during operation.

- Increase in L_{dn} noise levels from aircraft operations by 20-30 dB in Area A, 40-45 dB in Area B, and 35-40 dB in Area C.

5.1.1.4 Airspace and Safety

Area A

- Potential conflict between USAF training and about 3,000 general aviation flights per year.
- Potential conflict between USAF training and use of military training routes VR 267, VR 268, and VR 269.

Area B

- Potential conflict between USAF training and about 2,300 general aviation flights per year.

Area C

- Potential conflict between USAF training and about 700 general aviation flights per year.
- Potential conflict between USAF training and Coolidge Municipal Airport Unique Area.

5.1.1.5 Biotic Resources

Area A

Construction on cultivated lands:

- Temporary disturbance of nesting, reproduction, and feeding of native fauna due to construction activities; long-term disturbance from aircraft and ground support operations.

Construction on lands covered with native vegetation:

- Significant impact to native flora and fauna; displacement of some native fauna and elimination of many plants (e.g., saguaro cactus and other protected plant species).

- Loss of 600 acres of undisturbed native vegetation (wildlife habitat).
- Loss of 2-10 acres riparian vegetation due to construction-related activities.
- Indirect loss of unknown amount of riparian habitat downstream of the proposed auxiliary airfield.
- Temporary disturbance of nesting, reproduction, movement, and feeding of native fauna due to construction activities; long-term disturbance from aircraft and ground support operations.

Area B or C

- Significant impact to native flora and fauna; displacement of some native fauna and elimination of many flora (e.g., saguaro cactus and other protected plant species).
- Loss of 600 acres of undisturbed native vegetation (wildlife habitat).
- Loss of 2-10 acres of riparian vegetation due to construction-related activities.
- Indirect loss of unknown amount of riparian habitat downstream of the proposed auxiliary airfield.
- Temporary disturbance of nesting, reproduction, movement, and feeding of native fauna due to construction activities; long-term disturbance from aircraft and ground support operations.

5.1.1.6 Threatened, Endangered, and Other Protected Species

Area A

Construction on cultivated lands:

- No impact to threatened or endangered species, sensitive species, or species of special concern.

Construction on lands covered with native vegetation:

- No impact to threatened or endangered species.

- Significant impact probable on native flora protected by the Arizona Native Plant Law (e.g., saguaro cacti and other protected native plants).

Area B or C

- Significant impact possible to federally listed plant species -- Tumamoc globeberry, needle spine pineapple cactus, and the Acuna valley cactus -- if they occur there.

- Significant impacts probable to some native flora protected by the Arizona Native Plant Law (e.g., saguaro cacti and other protected native plants).

5.1.1.7 Socioeconomic and Institutional Factors (Area A, B, or C)

- No significant impacts on employment, population, income, county finances, or property values.

5.1.1.8 Recreational Resources (Area A, B, or C)

- No significant impact to hunters, sightseers, and others during construction and operation activities.

5.1.1.9 Cultural Resources (Area A, B, or C)

- Adverse effects to significant cultural resources will be mitigated, but not necessarily eliminated.

5.1.2 No-Action Alternative

Implementation of the no-action alternative would consist of continued use of the Coolidge Municipal Airport by the USAF. Continued use of the Coolidge airport would not cause any additional environmental impacts, but over the long-term, the USAF would likely be forced to abandon the Coolidge airport as a site for training operations. Private use of the airport is expected to increase, creating more conflicts between military and civilian operations. As these conflicts increase, the airport would become unsafe to both civilian and military operations.

It is likely that in the future an auxiliary airfield would be built somewhere within a 30-mi radius of Williams AFB. Environmental impacts of the kind discussed in this report could then occur, depending on the specific location of this future auxiliary airfield.

5.2 RECOMMENDED ACTION

Construction of the proposed auxiliary airfield would cause some impacts to most environmental resources within the three candidate areas. The specific combination of impacts would depend on the specific location selected within any of the three candidate areas. The most important environmental factors or resources include land features and use, water, noise, ecology, and threatened and endangered species. Air space conflicts between USAF training activities and general aviation also are important. Through implementation of a site-selection process designed to avoid areas of potentially significant impact and the use of proper mitigative techniques, the auxiliary airfield could be located in portions of at least two candidate areas. The following sections discuss this site-selection process.

5.2.1 Candidate Area A

Within Area A, construction and operation of the airfield in the east-central portion of the area would cause the least impact to most environmental resources and factors discussed in this document. However, this portion of Area A is not included in the area selected on the basis of construction constraints and operational criteria (Figure 5.1).

Land uses restrict location of the proposed airfield in portions of Area A -- irrigation canals (northeast and south), rural farm houses (north), and several roads and a railroad (north, central, southwest, and south). Also, jet aircraft noise in excess of 65 dB L_{dn} would occur at several rural farm residences in the northern portion of Area A. However, even if the airfield was located within the central-eastern portion of Area A, noise impacts might occur at the rural residences. Jet aircraft would have little margin for flight path deviation; thus, noise levels greater than 65 dB L_{dn} would occasionally occur at the rural residences in the northern portion of Area A. Furthermore, to the southeast, the 65 dB L_{dn} noise contour would be within one-half mile of the town of Florence.

Air training flights involving touch-and-go landings and other training maneuvers at an auxiliary airfield in Area A could conflict with general aviation flights. At least 3,000 general aviation flights cross Area A each year. In addition, some conflicts could occur with other military activity because military training routes VR 267, VR 268, and VR 269 cross Area A.

5.2.2 Candidate Area B

Within Area B, construction and operation of the airfield in the northwestern, central, and parts of the southwestern portions of the area would cause the least impact to most environmental resources and factors discussed in this document. This includes some of the area selected on the basis of operational criteria (Figure 5.2). The southwestern portion of Area B remains under consideration for an auxiliary airfield (Figure 5.2).

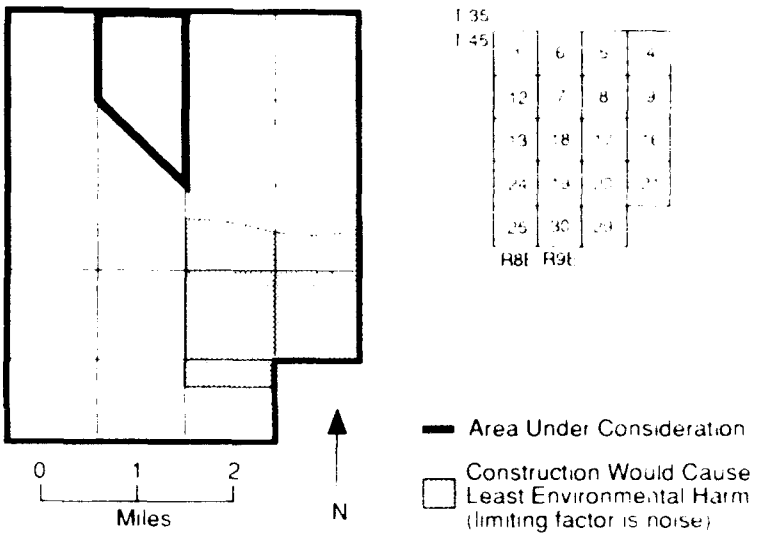

FIGURE 5.1 Portion of Area A where Construction of the Proposed Airfield Would Cause the Least Environmental Impact

Land features and uses restrict location of the proposed airfield in portions of Area B -- knoll, hills, mountains (south, southeast), large wash systems (northeast), residentially zoned development (west), and a county road (north-central). Jet aircraft noise in excess of 65 dB L_{dn} would restrict location of the airfield in the western portion of Area B, where a residentially zoned development occurs.

Air training flights performing touch-and-go landings and other training maneuvers at an auxiliary airfield in Area B could conflict with general aviation flights. At least 2,300 general aviation flights cross Area B each year. Most of these flights cross the northern part of Area B. Locating the auxiliary airfield in the southern portion of the area would decrease the potential conflicts between military and general aviation aircraft.

Locating the airfield in the southeastern portion of Area B would affect a high-density mule deer population. Potential impacts to threatened and endangered species could eliminate from consideration for the proposed airfield any portions of the area where such species occur (see Section 4.1.6).

5.2.3 Candidate Area C

Within Area C, construction and operation of the airfield in any portion of the area except the extreme northern portion would cause the least impact to most environmental resources and factors discussed in this document (Figure 5.3). This area includes all of the lower portion of the area selected on the basis of operational criteria. The southern half of Area C remains under consideration for the auxiliary airfield (Figure 5.3).

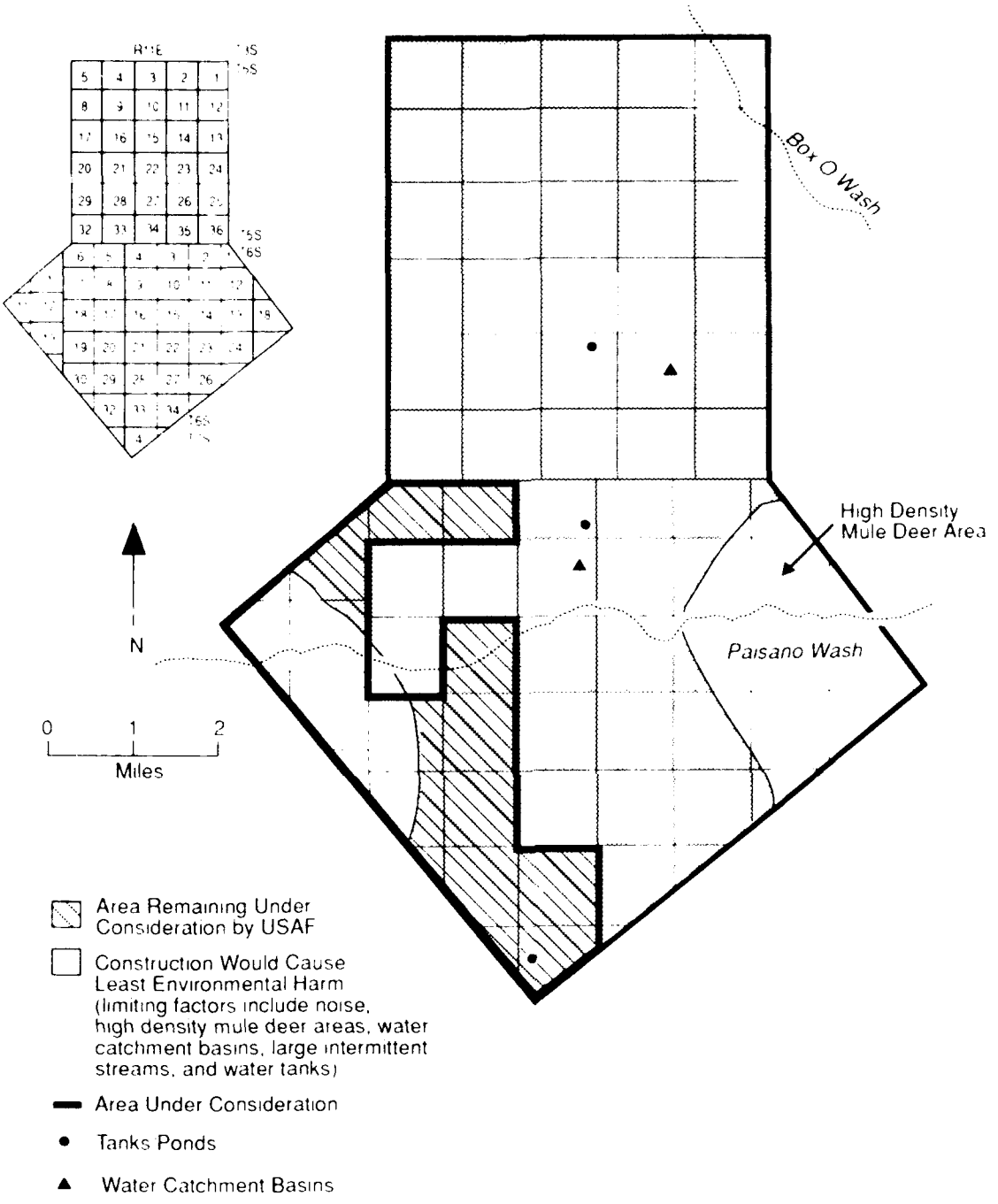

FIGURE 5.2 Portions of Area B where Construction of the Proposed Airfield Would Cause the Least Environmental Impact

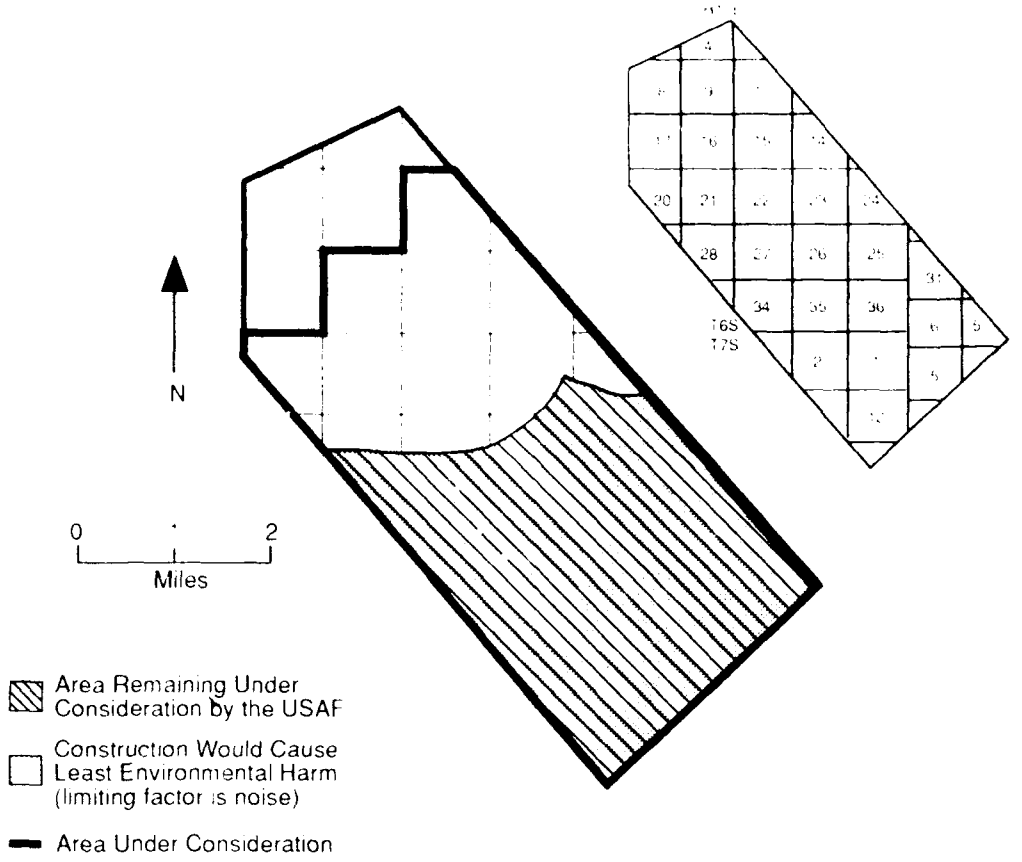

FIGURE 5.3 Portions of Area C where Construction of the Proposed Airfield Would Cause the Least Environmental Impact

No distinct land features restrict the location of the proposed airfield within Area C. However, the presence of a residentially zoned development (without existing residences) would restrict the location of the proposed airfield in the northern portion of Area C because of potential land use and noise impacts. Also, jet aircraft noise in excess of 65 dB L_{dn} would affect an adjacent residentially zoned development (with residences) in Area B if the airfield were placed in the northern portion of Area C.

Air training flights performing touch-and-go landings and other training maneuvers at an auxiliary airfield in Area C could conflict with general aviation flights. At least 700 general aviation flights cross Area C each year, primarily in the northern part of Area C. In addition, some conflicts could occur with the Coolidge Municipal Airport Unique Area. Locating the auxiliary airfield in the southern portion of Area C would decrease the potential conflicts between military and general aviation aircraft.

Locating the airfield in the extreme northwestern portion of Area C could impact a high-density javelina population. Potential impacts to threatened and endangered species could eliminate from consideration for the proposed airfield any portions of the area where such species occur (see Section 4.1.6).

5.3 MITIGATIVE MEASURES

The following mitigative actions would minimize the impacts of constructing and operating an auxiliary airfield. The USAF would:

- Negotiate with public utilities and federal, state, and private land owners for purchase, lease, or relocation of property affected by construction of the airfield.

- Use construction techniques that reduce soil disturbance, erosion, and dust generation.

- Use water-control structures (e.g., culverts, ditches) to prevent flooding of existing or proposed facilities.

- Locate the airfield such that noise from jet aircraft would not exceed the USAF-acceptable L_{dn} limit of 65 dB for residentially zoned areas.

- Request that the area flight service station brief pilots of the air traffic activity in the vicinity of the auxiliary airfield during weather briefing or flight plan recording conducted for general aviation flights.

- Coordinate with the FAA to publish a flyer to distribute to all registered pilots in Arizona and New Mexico describing the location of the auxiliary airfield and stating the procedures for evaluating existing activity and contacting personnel operating the runway supervisory units if flight is planned in the vicinity.

- Emphasize in local civilian pilot training (through normally scheduled seminars and in appropriate publications) the practice of filing flight plans and utilizing VFR when traversing the MOAs.

- Consult with the Arizona Department of Game and Fish and the U.S. Fish and Wildlife Service to determine if it is necessary to restrict construction activities to prevent disruption of critical nesting or reproductive behavior of native fauna.

- Consult with the Arizona Commission of Agriculture and Horticulture (ACAH) to determine the presence of species protected by the Arizona Native Plant Law. If possible and practical, plants identified as protected would be moved to other locations as requested by the ACAH.

- Consult with the U.S. Fish and Wildlife Service and conduct vegetation surveys to locate any threatened or endangered plant species in Areas B and C.

- Consult with the State Historic Preservation Officer and conduct surveys for archaeological sites.

6. COMPLIANCE WITH ENVIRONMENTAL STATUTES

The evaluation of the proposed action and the assessment of environmental impacts have been conducted in accordance with the National Environmental Policy Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the Clean Water Act, the Clean Air Act, the Archaeological and Historical Preservation Act, Executive Order on Wetlands, Executive Order on Floodplains, and the National Historic Preservation Act.

7. LIST OF PREPARERS

This EIS has been prepared by the U.S. Air Force, Headquarters Air Training Command, with contractual assistance from the Environmental Assessment and Information Sciences Division, Argonne National Laboratory (ANL), and private subcontractors. Members of the ANL staff and subcontractors who contributed to preparation of this EIS are listed below.

7.1 ARGONNE NATIONAL LABORATORY

John S. Irving (M.S., Fisheries; Ph.D., Limnology). Fourteen years experience in fisheries research and management, 5 years experience in aquatic and terrestrial resource assessment. [Project leader; Proposed Action and Alternatives; Biotic Resources; Threatened, Endangered, and Other Protected Species; Recreational Resources]

Anthony A. Antonopoulos (Ph.D., Plant Pathology). Fourteen years experience in plant pathology teaching, research, and extension service; 2 years experience in environmental assessment. [Land Features and Use; Water Quantity and Quality; Biotic Resources; Threatened, Endangered, and Other Protected Species]

John DePue (M.S., Biology). Twenty years experience in technical editing and journalism. [Editor]

Silvio J. Flaim (Ph.D., Resource Economics). Twenty years of applied research experience in the areas of resources and environmental economics, program management and technical project leadership. [Socioeconomic and Institutional Factors]

John F. Hoffecker (B.A., Archeology; M.A., Ph.D., Anthropology). Fifteen years experience in archaeological research; 5 years experience in cultural resources assessment. [Cultural Resources]

Richard E. Liebich (B.E.E. Electrical Engineer, P.E.). Thirty-five years experience in applied acoustics and electroacoustics. [Noise]

Anthony J. Policastro (M.S., Ph.D., Civil Engineering). Eighteen years experience in modeling environmental transport processes in the air and water. [Air Quality]

7.2 SUBCONTRACTORS

Richard L. Harding (B.S., Civil Engineering, P.E., L.S.). Fourteen years experience in civil engineering planning and design, including 7 years with airport/heliport siting and design; 19 years flying experience with over 3,000 hours of fight time and former military instrument flight examiner. [Air Space and Safety]

Matt Morey (Ph.D., Economics). Fifteen years of experience in econometrics; 5 years experience in impact assessment. [Socioeconomic and Institutional Factors]

8. LIST OF RECIPIENTS

8.1 CONGRESSIONAL

Sen. Dennis DeConcini
700 E. Jefferson, Room 200
Phoenix, AZ 85034

Rep. Jim Kolber
222 E. Cottonwood Lane, Suite 113
Casa Grande, AZ 85222

Rep. Jon Kyl
4250 E. Camelback Road
Suite 140K
Phoenix, AZ 85018

Sen. John McCain
5353 N. 16th Street
Suite 190, Madison Square
Phoenix, AZ 85016

Rep. John J. Rhodes, III
2345 S. Alma School Road
Suite 108
Mesa, AZ 85202

Rep. Bob Stump
230 N. First Ave.
Room 5001, Federal Bldg.
Phoenix, AZ 85025

Rep. Morris K. Udall
522 W. Roosevelt
Phoenix, AZ 85003

8.2 FEDERAL GOVERNMENT

Bruce D. Ellis
Chief Environmental Division
U.S. Department of the Interior
Bureau of Reclamation
Arizona Projects Office
23636 North 7th St.
Phoenix, AZ 85024

Barbara Hollway
U.S. Department of the Interior
Bureau of Land Management
5050 N. 19th Avenue, Suite 300
Phoenix, AZ 85015

Michael J. Spear
Regional Director
U.S. Fish and Wildlife Service
500 Gold Avenue, SW
Room 9018
Phoenix, AZ 85017

Donald L. Spencer
Superintendent
U.S. Department of the Interior
National Park Service
Casa Grande Ruins National Monument
Coolidge, AZ 85228

Sam Spiller
U.S. Fish and Wildlife Service
Ecological Services
3616 W. Thomas Rd., Suite 6
Phoenix, AZ 85019

John C. York
U.S. Department of Agriculture
Soil Conservation Service
201 East Indianola, Suite 200
Phoenix, AZ 85007

8.3 STATE GOVERNMENT

Roy P. Drachman
Chairman
Commission on the Arizona Environment
1645 West Jefferson, Suite 416
Phoenix, AZ 85007

Richard Gerhardt
Arizona Game and Fish Department
555 North Greasewood
Tucson, AZ 85745

STATE GOVERNMENT (Cont'd)

M.J. Hassell
State Land Commissioner
State Land Department
1624 W. Adams Street
Phoenix, AZ 85007

Lee Jaeger
Manager Sales Section
State Land Department
1616 West Adams
Phoenix, AZ 85007

Melinda Lewis
State Land Department
1616 W. Adams
Phoenix, AZ 85007

C. Laurence Linser
Acting Director
Department of Water Resources
99 E. Virginia Avenue, Suite 160
Phoenix, AZ 85009

Dr. Edgar J. McCullough, Jr.
Bureau of Geology and Mineral Technology
845 North Park Avenue
Tucson, AZ 85719

Dr. Roy Rausmkolb
Director
Cooperative Extension Service
University of Arizona
Forbes Bldg., Room 301
Tucson, AZ 85721

Temple A. Reynolds, Director
Arizona Game and Fish Department
2222 W. Greenway Rd.
Phoenix, AZ 85023

Larry Richards
Arizona Commission of Agriculture
and Horticulture
1688 West Adams
Phoenix, AZ 85007

Ron Ruziska
Manager Commercial Leasing
State Land Department
1616 West Adams
Phoenix, AZ 85007

Michael Skinner
Arizona Department of Water Resources
15 S. 15th Ave.
Phoenix, AZ 85007

Dr. Gerald H. Teletzke
Department of Environmental Quality
2005 North Central Avenue
Phoenix, AZ 85004

Dave Walker
Arizona Game and Fish Department
7200 E. University
Mesa, AZ 85205

8.4 LOCAL AGENCIES

Scott Barber
Airport Manager
300 East Fourth Street
Casa Grande, AZ 85222

Ed Beasley
City Manager, Eloy
Eloy, AZ 85231

Roger Bennett
City Manager, Casa Grande
300 E. 4th Street
Casa Grande, AZ 85222

Jerry Bogan
Aviation Consultant
P.O. Box 3354
Newport News, CA 92663

Bob Bresnahan
City of Mesa
Falcon Field Airport
4800 Falcon Drive
Mesa, AZ 85205

LOCAL AGENCIES (Cont'd)

Ken Buchanan
City Manager, Florence
Florence, AZ 85232

Richard Dugan
Mayor
25 S. Arizona Pl.
Chandler, AZ 85225

Jim Farley
Mayor
119 N. Gilbert
Gilbert, AZ 85234

Wilbur K. Freeman, Jr.
Mayor
1207 Main Street
Florence, AZ 85232

Terry Goddard
Mayor
251 W. Washington
Room 900
Phoenix, AZ 85003

Keith Hilgendorf
Chamber Director
P.O. Box 1747
Apache Junction, AZ 85220

Norman Hill
Mayor
1018 N. Desert View Dr.
Apache Junction, AZ 85220

Jimmie B. Kerr
Mayor
300 East Fourth Street
Casa Grande, AZ 85222

Dick McComb
City Manager, Coolidge
130 W. Central
Coolidge, AZ 85228

Harry Mitchell
Mayor
31 E. 5th Street
Tempe, AZ 85281

Loras Rauch
City of Mesa Planning Department
Mesa, AZ 85205

Peggy Ruback
Mayor
P.O. Box 1466
Mesa, AZ 85201

Florine Serda
Mayor
413 W. 12th Street
Eloy, AZ 85231

Ken Shook
Tempe Chamber of Commerce
510 E. Geneva Drive
Tempe, AZ 85282

Tom Shope
Mayor
130 W. Central Avenue
Coolidge, AZ 85228

Don Whitwell
Chairman, Economic Development Corp.
P.O. Box 637
Casa Grande, AZ 85222

R.E. Glos
Sanitation Program Director
Pinal County Health Department
P.O. Box 807
1301 Pinal Administration Building II
Florence, AZ 85232

Phil C. Hogue
Director of Planning and Development Services
Pinal County
P.O. Box 232
Florence, AZ 85232

LOCAL AGENCIES (Cont'd)

Dean Weatherly
Pinal County Board of Supervisors
820 E. Cottonwood Lane
Building A
Florence, AZ 85232

8.5 CONSERVATION GROUPS AND MISCELLANEOUS

James Colley
Chairman
Outdoor Recreation Coordinating Commission
800 W. Washington, Suite 415
Phoenix, AZ 85007

James Gillum
Florence-Coolidge Natural Resource Conservation District
695 E. Cottonwood Lane, Suite C
Casa Grande, AZ 85222

Paul R. Krausman
President
Wildlife Society Arizona Chapter
P.O. Box 11135
Phoenix, AZ 85017

Jack Simon
President
Arizona Wildlife Federation
6401 S. 44th Street
Phoenix, AZ 85040

William E. Smeltz
President
Arizona Assoc. of Conservation Districts
P.O. Box 423
Payson, AZ 85541

8.6 PRIVATE INDIVIDUALS/ LANDOWNERS

Ross Anderson
P.O. Box 724
Coolidge, AZ 85228

B&W Ltd Partnership
7539 E. Indian School Road
Scottsdale, AZ 85251

Bradley Bartlett
Rt. 1, Box 8R
Coolidge, AZ 85228

Robert W. Brown
3625 E. Meadowbrook
Phoenix, AZ 85018

Capitana Investments
4300 N. Miller Road
Suite 120
Scottsdale, AZ 85251

Ann Edwards
1214 Palm Circle
Coolidge, AZ 85228

Gloria M. England
England Cattle Company
Box 1268
Coolidge, AZ 85228

Lawrence E. Hill
P.O. Box 2089
Coolidge, AZ 85228

Preston C. Holland
P.O. Box 517
Coolidge, AZ 85228

Dick and Norma Hoover
P.O. Box 5666
Carefree, AZ 85377

J/T's Kirby
8303 NW Eastside Drive
Kansas City, MO 64152

PRIVATE INDIVIDUALS/LANDOWNERS (Cont'd)

Ruth K. Janzik
Execo Wet
Realty Specialists
5040 East Shea Blvd.,
Suite 252
Scottsdale, AZ 85254

Charles D. Larkin
c/o Network
1333 W. Broadway, Suite 1
Tempe, AZ 85282

Charles Moody
P.O. Box 357
Coolidge, AZ 85228

Albert Moore
P.O. Box 1563
Apache Junction, AZ 85220

Peter Nalbandian
Nalbandian Farms
P.O. Box 845
Glendale, AZ 85311

Michael R. Ondrish
Box 1819
Florence, AZ 85232

E.A. Peters
Rt. 2, Box 3
Florence, AZ 85232

Quad Four Investments
4300 N. Miller Road
Suite 120
Scottsdale, AZ 85251

Ms. Patsy Reed
P.O. Box 424
Coolidge, AZ 85228

Rudy & Judie Rowe
Rt. 2, Box 3
Florence, AZ 85232

Mr. & Mrs. Jack Schalberg
P.O. Box 321
Glendale, AZ 85311

Marvin F. Sprague
8811 E. Apache Trail
Mesa, AZ 85202

Robert G. Stryker
P.O. Box 1535
Florence, AZ 85237

Joseph S. Szczepanski
1820 S. 7th Street
Coolidge, AZ 85228

Mike Urton
240 N. 6th Street
Coolidge, AZ 85228

Mr. & Mrs. R. W. Walker
21 Cable Deslo
Pueblo, CO 81008

Mr. & Mrs. Herbert White
4701 W. Greenway Road
Glendale, AZ 85306

Glenn Whitlock
Sun Valley Farms Unit 5 Property
Owners Assoc.
P.O. Box 189
Coolidge, AZ 85228

Lynn W. Wilson
Rt. 2 Box 48
Florence, AZ 85232

9. AGENCIES CONTACTED

Arizona Commission of Agriculture and Horticulture, Phoenix

Arizona Commission of Agriculture and Horticulture, Pinal County District, Casa Grande

Arizona Department of Commerce, Phoenix

Arizona Department of Economic Security, Phoenix

Arizona Department of Environmental Quality, Office of Air Quality, Phoenix

Arizona Game and Fish Department, Regional Office, Mesa

Arizona Game and Fish Department, Regional Office, Tucson

Arizona Water Resources Department, Basic Data Office, Phoenix

Arizona Water Resources Department, Phoenix Active Management Area, Phoenix

Arizona Water Resources Department, Pinal County Active Management Area Office, Casa Grande

Casa Grande Chamber of Commerce, Casa Grande

Coolidge Economic Development Board, Coolidge

Desert Botanical Garden, Phoenix

Pinal County Planning and Development Service, Pinal County, Florence

U.S. Department of Agriculture, Soil Conservation Service, Phoenix

U.S. Department of Agriculture, Soil Conservation Service, Pinal County Office, Casa Grande

U.S. Fish and Wildlife Service, Ecological Services, Phoenix

University of Arizona, Arboretum Affairs, College of Agriculture, Tucson

University of Arizona, Cooperative Extension Service, Tucson

University of Arizona, Curator of Herbarium, Tucson

APPENDIX A:

OPERATIONAL CONSIDERATIONS IN THE SITE-SELECTION PROCESS

APPENDIX A:

OPERATIONAL CONSIDERATIONS IN THE SITE-SELECTION PROCESS

A number of operational factors must be considered in the selection of a site for a new auxiliary field; these include training flight criteria, airspace criteria, groundspace criteria, and aircraft capabilities.

A.1 TRAINING FLIGHT CRITERIA

The majority of flights requiring the use of a training area are referred to as *contact* missions. A normal contact training flight is one that teaches the pilot basic flying skills, takeoffs and landings, aerobatics, aircraft flight characteristics, and general airmanship. The Air Force Pilot Training Syllabus requires that each pilot accomplish many items to a certain level of proficiency. The syllabus also requires the use of training areas in conjunction with the auxiliary field on most flights. For maximum efficiency, the auxiliary field must be located as centrally as possible to all T-37 training areas and as close to the home field as possible without interfering with other training activities. This would limit location of the auxiliary airfield to within or very near the military operating area (MOA) and not beyond 35 nautical miles (NM) from Williams AFB.

A.2 AIRSPACE CRITERIA

It is important for safety and training efficiency that (1) training activities be isolated from areas of heavy civilian air traffic and from areas where other types of conflicting or incompatible military flight operations are being conducted and (2) the auxiliary field be sufficiently close to training areas to minimize the flight time between the various facilities and training areas. To reduce potential conflicts with private and commercial aircraft, the auxiliary field should be as far as possible from other airports. Airspace currently allocated by the Federal Aviation Administration (FAA) for commercial aircraft was identified to determine potential candidate areas unsuitable for the proposed project. Airspace dedicated to commercial aircraft cannot be used jointly in the training of pilots. Therefore, in order to stay clear of Falcon Field and Sky Harbor Airport traffic, Williams AFB pilots cannot use the areas north and west of the base during training exercises. The T-37 aircraft operate in a defined environment, to include specific altitudes, airspeeds, and radio calls; civilian aircraft cannot be forced or expected to abide by a strict set of rules designed for the training of pilots.

Airspace maps of the Phoenix area were reviewed to identify the airspace currently allocated to military flying operations, and those areas considered infeasible were eliminated from further consideration. The basic decision made in this case was that only airspace currently allocated to Williams would be used for this project.

A critical shortage of airspace exists for allocation to current and future flight operations in the Phoenix area. For this reason, it appears prudent that the Air Training Command (ATC) should select a site that is within its existing MOAs, which consist of

areas of airspace dedicated for flight training and other activities by specified military units. Selection of a site from candidate locations within the T-37 MOA would maximize the amount of training time available for conducting the activities provided for in the syllabus. A fixed number of hours is included in the syllabus, and repetition of maneuvers produces a more proficient pilot. If the pilot is required to fly to a more remote location to perform landings, much time is lost to straight and level flying in lieu of practicing required maneuvers. Therefore, the optimum site would be one that lies under the current MOA used by the T-37 aircraft.

In addition, the auxiliary field should be positioned so that it does not interfere with the radar traffic or visual patterns at Williams AFB. The radar traffic pattern contains T-38, T-37, F-5, and transient traffic performing instrument approach training controlled by FAA controllers. The auxiliary airfield traffic cannot overlap or mix with this traffic because the two types of traffic would be controlled by different controllers who are not in contact with each other.

Safety considerations and a lack of simultaneous control over aircraft at the auxiliary field and on low-level routes also dictate an auxiliary airfield location that does not conflict with low-level traffic. The auxiliary field traffic patterns should remain clear of low-level instrument routes (IR) IR 273 and IR 274, which are east of Williams AFB, and visual routes (VR) VR 1219 and VR 239, which are southeast of Williams AFB. The two instrument routes (IR 273 and IR 274) are at lower altitudes than the T-37 training areas. Low-level altitudes are from the earth's surface to 8,000 ft above mean sea level (MSL). These IR and VR routes are used extensively by T-38 aircraft based at Williams AFB and Tactical Air Command aircraft based at Davis-Monthan AFB in Tucson. In addition, the auxiliary airfield traffic pattern cannot interfere with the Boondock Instrument Landing System (ILS) training pattern. This ILS is located near the city of Florence and requires a radar pattern of similar dimension to the one in existence at Williams AFB. Further, this pattern encompasses airspace to the east and south of the ILS site.

Mixing the T-37 and T-38 aircraft in the traffic pattern at Williams AFB is incompatible for safety reasons. The T-37 operates in the range of 90-200 knots, while the T-38 sustains airspeeds of 160-300 knots. The density of air traffic within the vicinity of Williams AFB must be restricted to reduce the potential for midair collisions. Therefore, training missions must be conducted in an area that is at least 20 NM from the Williams AFB. This will separate aircraft flying in the Williams AFB area under the terminal instrument radar pattern from the auxiliary field traffic, which is operating under visual flight conditions. Finally, the airfield should be within or near the existing MOAs, southeast of Williams AFB, to minimize conflict with civil aviation and to maximize USAF pilot training time.

A.3 GROUNDSPACE CRITERIA

An auxiliary airfield must be in a relatively uninhabited area because of the potential noise impacts. This constraint limits consideration of sites to the north and west of Williams AFB and favors sites to the south and east. The airfield must be accessible by an all-weather road to permit fire and maintenance crews to reach the site

as needed. The land should be relatively flat to keep construction costs to a minimum. Utilities (e.g., water and electricity) should be available. The surrounding land should not contain any activities or features that attract large numbers of birds or that produce other hazards to aviation.

A.4 AIRCRAFT CAPABILITY CRITERIA

Capabilities of the T-37 aircraft dictate that the auxiliary airfield should be located within 35 NM of Williams AFB and very near the training areas. The T-37 is a small, twin-engine jet trainer that is relatively slow and has a limited fuel supply. The 35-NM limit allows a complete training mission to be conducted in the training area in conjunction with the auxiliary field. Each training mission (normally more than 130 missions are conducted each day at Williams AFB) would lose some training capability if the airfield was located beyond 35 NM from Williams AFB. For example, for each 10 NM flown from Williams at low altitude, approximately 50 pounds of fuel are used. This is the same amount required for one traffic pattern. During a typical contact mission, four to five traffic patterns will be performed. The current auxiliary airfield is 25 NM from Williams. Another criterion is that the airfield should be below 3,300 ft field elevation because of aircraft performance considerations.

A.5 SITE-SPECIFIC SCREENING

A more detailed screening of Candidate Areas A, B, and C resulted in a further reduction of locations considered for the auxiliary airfield (Table A.1). The three areas were screened based on the following criteria: (1) high terrain, (2) proximity to Boondock Instrument Landing System (ILS), (3) presence of hills or mountains, (4) high-pressure altitude, (5) proximity to Coolidge Municipal Airport, and (6) proximity to power lines.

TABLE A.1 Site-Specific Screening of Candidate Areas A, B and C

Location[a]	Acceptable[b]	Justification for Elimination
Area A[c]		
T4S, R8E		
1	No	High terrain to southwest
12-13	No	Hills in section
24	No	Construction-related problems
25	No	Power line in section
T4S, R9E		
4-5	No	High terrain to southwest, proximity to Boondock ILS radar pattern
6-7[d]	Yes	
8-9	No	Proximity to Boondock ILS
16	No	Proximity to Boondock ILS
17-20	No	Construction-related problems
21	No	Proximity to Boondock ILS
29-30	No	Power line in section
Area B[e]		
T5S, R11E		
1-5	No	Proximity to Boondock ILS
8-17	No	Proximity to Boondock ILS
20-29	No	Proximity to Boondock ILS
32-36	No	Proximity to Boondock ILS
T6S, R11E		
1-4	No	High-pressure altitude (areas of high atmospheric pressure)
5-6	Yes	
7	No	Hills in section, proximity to Boondock ILS
8	No	Proximity to Boondock ILS
9-12	No	Proximity to Boondock ILS, high-pressure altitude
13	No	Hills in section, proximity to Boondock ILS
14-16	No	High-pressure altitude
17	Yes	

TABLE A.1 (Cont'd)

Location[a]	Acceptable[b]	Justification for Elimination
Area B[e] (Cont'd)		
17	Yes	
18	No	Hills in section
19-20	Yes	
21-23	No	Hills in section
24-26	No	High-pressure altitude
27-28	No	Hills in section
29-33	Yes	
34	No	Hills in section
T7S, R11E		
4	Yes	
T7S, R12E		
18	No	Hills in section
T6S, R10E		
1	Yes	
11-14	Yes	
24	Yes	
Area C[f]		
T6S, R10E		
3-4	No	Power line in section
8-9	No	Proximity to Coolidge Municipal Airport
10	Yes	
14-16	Yes	
17	No	Proximity to Coolidge Municipal Airport
20-28	Yes	
34-36	Yes	
T7S, R10E		
1-3	Yes	
11-12	Yes	
T7S, R11E		
5-7	Yes	

TABLE A.1 (Cont'd)

Location[a]	Acceptable[b]	Justification for Elimination
Area C[f] (Cont'd)		
T6S, R11E		
31	Yes	

[a]Locations within each candidate area are given by township (T), range (R), and section. For example, the first complete entry under Area A is Section 1 of Township 4 South, Range 8 East.

[b]"Yes" and "No" indicate whether the area is an acceptable location for the auxiliary airfield based on operational and construction constraints.

[c]Assumes a runway orientation of 34/16.

[d]The southwest portion of Section 7 is not acceptable because of high terrain to the southwest.

[e]Assumes a runway orientation of 31/13.

[f]Assumes a runway orientation of 31/13.

APPENDIX B:

COMPUTATION OF AIR INSTALLATIONS COMPATIBLE USE ZONE NOISE-LEVEL CONTOURS

APPENDIX B:

COMPUTATION OF AIR INSTALLATIONS COMPATIBLE USE ZONE NOISE-LEVEL CONTOURS

In a study of airport and aircraft noise, two different types of noise measures are needed -- one to measure the noise of individual noise events, such as that from an individual aircraft flyover, and another to describe the noise environment resulting from a complex combination of noise events, such as the total noise effect of aircraft operations at an air base.

B.1 L_{dn} NOISE ENVIRONMENT DESCRIPTOR

The methodology used to produce air installations compatible use zone (AICUZ) noise contours is designated as the day-night average sound level (L_{dn}) system. It is a method of assessing the amount of exposure to aircraft noise and predicting the community response to the various levels of exposure. The L_{dn} values used for planning purposes and for which contours are shown in the body of this report are 65, 70, 75, and 80 decibels (dB). Land use guidelines are based on the compatibility of various uses with these noise exposure levels.

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

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

B.2 SINGLE-EVENT NOISE DESCRIPTOR

The single-event noise energy descriptor used in the L_{dn} system is the sound exposure level (SEL). The SEL measure is an integration of the A-weighted sound-pressure level over the total time period of a single event (such as an aircraft flyover), corrected to an equivalent level for a reference period of 1 second. Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are acquired for various types of aircraft and engines at different power settings and phases of flight.

The SEL values are derived from flyover measurements made by the Armstrong Aerospace Medical Research Laboratory (AAMRL), located at Wright-Patterson AFB, Ohio. These standard-day, sea-level values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, altitude, and variations from standard aircraft flight profiles and power settings. Ground-to-ground sound propagation characteristics are used for ground run-up activities. Air-to-ground propagation characteristics are used whenever the aircraft is airborne and the line-of-sight from the observer to aircraft is 7 degrees or greater above horizontal. Ground-to-ground propagation characteristics are used if the line-of-sight is 4 degrees or less. Between these angles, propagation characteristics are interpolated (Speakman et al. 1977).

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

B.3 NOISE CONTOUR PRODUCTION

Data describing flight tracks, flight profiles, power settings, flight path and profile utilization, and ground run-up information by type of aircraft (or engine) are assembled by the air base. These data are screened by the major command, Headquarters Air Force, and trained personnel process the data for input into a central computer. Flight track and utilization data are input to the computer program NOISEMAP, and flight track check plots are generated for verification by the base and major command. After verification and incorporation of any required changes, L_{dn} contours are generated using the base-supplied operational data and the standard-source noise data corrected to local conditions.

Additional technical information on the L_{dn} procedure is available in the following publications:

- *Community Noise Exposure Resulting from Aircraft Operations: Application Guide for Predictive Procedures*, Armstrong Aerospace Medical Research Laboratory Report AMRL-TR-73-105, Nov. 1974. (Available from National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151.)

- *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, U.S. Environmental Protection Agency Report 550/9-74-004, March 1974. (Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

3.4 REFERENCE

Speakman, J.D., R.G. Powell, and J.N. Cole, 1977, *Community Noise Exposure Resulting from Aircraft Operations, Vol. I: Acoustic Data on Military Aircraft*, Armstrong Aerospace Medical Research Laboratory Report AMRL-TR-73-110(1), Wright-Patterson Air Force Base, Ohio, Nov.

APPENDIX C:

SUMMARY OF SURVEY OF EXISTING AIRPORTS FOR LOCATION OF AN AUXILIARY AIRFIELD

APPENDIX C:

SUMMARY OF SURVEY OF EXISTING AIRPORTS FOR LOCATION OF AN AUXILIARY AIRFIELD

Airport	Acceptable[a]	Summary
Memorial	No	The residential community of Sun Lakes would receive adverse noise impact (within 3 nautical miles [NM] of the airfield). The airfield is located 11 NM southeast of Phoenix Sky Harbor Airport and is within the Phoenix Airport Radar Service Area, which would restrict arrival and departure tracts. Conflicts with civilian traffic at Chandler and Stellar Airpark are likely. The runway is in poor condition and would need resurfacing.
Kearny	No	T-37 operations may not be practical because of the high terrain close to the airport. The runway (2,800 ft × 50 ft) is too small for T-37 aircraft. The runway could not be lengthened to more than 4,000 ft because of the presence of the Gila River. The location is optimum because it is in the flight training area.
Superior	No	The runway is dirt, with cracks and a steep grade. Power lines and close mountains (within 2 NM) make this a hazardous site for jet training. There are no control or fire/safety facilities at the airport. Airfield is an acceptable distance from Williams AFB and the military operation areas (MOAs).
Casa Grande	No	The airfield is used extensively for civilian instrument approach practice. Civilian traffic is light to moderate. A T-37 traffic pattern would affect a trailer park adjacent to the airfield and possibly the town of Casa Grande, 5 mi to the south. Facilities include ILS/DME and Unicom (24 hours/day).
Rittenhouse	No	A T-37 traffic pattern would adversely alter current radar operations to the center runway. The airfield is closed, and runways are in a state of disrepair.

Airport	Acceptable[a]	Summary
San Manuel	No	Although the airfield is located within the MOA, the field is 65 NM from Williams AFB. Flying to San Manuel would reduce the flight time available for training missions. Area terrain poses no problems. The runway would need resurfacing.
San Carlos	No	The airport is privately owned and located on a mesa with prevailing crosswinds. It is too far for effective training purposes and has no fire/safety services. The airport has a long runway and receives light air traffic.
Falcon Field	No	Falcon Field is overcrowded with both civilian operations and helicopter operations from McDonnell Douglas. Falcon Field is one of the nation's fastest growing airports. Also, Falcon Field is surrounded by residential areas, which would cause major problems with safety and noise abatement. Existing civilian traffic patterns have already been altered because of noise complaints.
Scottsdale	No	The airport is too close to heavily populated urban areas. Noise abatement would be a problem. Scottsdale has 200,000 annual traffic movements.
Stellar Airpark	No	Stellar is located in a congested residential area. The runway is not long enough and there is no room to lengthen it. Noise abatement is a severe problem because of proximity to homes.
Globe	No	Globe is 50 NM from Williams AFB. The airfield is located in mountainous terrain. Also, the airfield has no tower or fire/safety equipment.
Eloy	No	The runway at Eloy would need to be extended beyond its current length of 3,900 ft and width of 50 ft. The minimum T-37 runway requirement is 5,000 ft by 150 ft. The town of Toltec would receive adverse noise impact, and this concern would require further study. The airfield is 30 NM from Williams AFB but is outside of the MOAs. The airfield is directly under a federal airway (Victor 94), which would necessitate an airspace impact study for arrival and departure tracks.

Airport	Acceptable[a]	Summary
Chandler	No	The airport is near a rapidly expanding metropolitan area. The airport receives heavy civilian air traffic (135,000 operations annually). Noise abatement and encroachment issues would become increasingly important as the population of Chandler increased.

[a]Acceptable for location of an auxiliary airfield.

APPENDIX D:

SUMMARY OF ARIZONA AND FEDERAL AMBIENT AIR QUALITY STANDARDS

TABLE D.1 Arizona and Federal Ambient Air Quality Standards[a]

Pollutant	Averaging Time	Standards[b] Primary	Standards[b] Secondary
Carbon monoxide	1 hour	40,000 (35)	40,000 (35)
	8 hours	10,000 (9)	10,000 (9)
Nitrogen dioxide	Annual	100 (0.05)	100 (0.05)
Ozone	1 hour	235 (0.12)	235 (0.12)
Total suspended particulates[c]	24 hours/annual	260/75	150/60
PM_{10}[d]	24 hours/annual	150/50	150/50
Sulfur dioxide	3 hours	--	1,300 (0.5)
	24 hours	365 (0.14)	--
	Annual	80 (0.03)	--
Lead	Calendar quarter	1.5 (-)	1.5 (-)

[a]Standards are not to be exceeded more than once per year with two exceptions. In the case of ozone and PM_{10}, compliance is determined by the number of days on which the ozone or PM_{10} standard is exceeded. The number of exceedance days per year, based on a 3-year running average, is not to exceed 1.0.

[b]Values outside parentheses are $\mu g/m^3$, values inside parentheses are ppm.

[c]State.

[d]Federal.

TABLE D.2 Summary of Emergency Episode Levels — State and Federal[a]

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon monoxide	1 hour	-	-	-	(125)
	4 hours	-	-	-	(75)
	8 hours	(15)	(30)	(40)	(50)
Nitrogen dioxide	1 hour	1,130 (0.6)	2,260 (1.2)	3,000 (1.6)	3,750 (2.0)
	24 hours	282 (0.15)	565 (0.3)	750 (0.4)	938 (0.5)
Ozone	1 hour	400 (0.2)	800 (0.4)	1,000 (0.5)	1,200 (0.6)
TSP	24 hours	375	625	875	1,000
PM_{10}	24 hours	350	420	500	600
Sulfur dioxide	24 hours	800 (0.3)	1,600 (0.6)	2,100 (0.8)	2,620 (1.0)
Sulfur dioxide and particulates combined[b]	24 hours	65,000	261,000	393,000	490,000

[a]Except as noted, values outside parentheses are in $\mu g/m^3$, values inside parentheses are ppm.

[b]In $(\mu g/m^3)^2$.

APPENDIX E:

PLANT AND ANIMAL SPECIES COMMONLY OCCURRING IN THE CANDIDATE AREAS

TABLE E.1 Plant Species Commonly Occurring in the Candidate Areas

Scientific Name	Common Name
Acacia constricta	Whitethorn acacia
Acacia greggii	Catclaw acacia
Ambrosia confertiflora	Bursage
Ambrosia dumosa	White bursage
Ambrosia deltoidea	Bursage
Baccharis sarothroides	Desert-broom
Bromus rubens	Red brome
Calliandra eriophylla	False-mesquite
Cercidium floridum	Blue paloverde
Cercidium microphyllum	Little-leaf paloverde
Chilopsis linearis	Desert willow
Condalia spathulata	Squawbush
Encelia farinosa	Brittlebush
Eriophyllum lanosum	Whooly-daisy
Erodium cicutarium	Filaree
Ephedra sp.	Jointfir
Eriogonum fasciculatum	Buckwheat
Haplopappus sp.	Turpentinebush
Hymenoclea monogyra	Burrobrush
Krameria grayi	White ratany
Larrea tridentata	Creosotebush
Lycium sp.	Wolfberry
Lycium andersonii	Anderson wolfberry
Lycium pallidum	Wolfberry
Oneya tesota	Ironwood
Plantago sp.	Plantain
Plantago insularis	Plantain
Plantago purshii	Plantain
Prosopis velutina	Honey mesquite
Schismus arabicus	Schismus
Cereus giganteus	Saguaro
Echinocereus engelmannii	Hedgehog cactus
Ferocactus wislizeni	Barrel cactus
Mammilaria sp.	Fishhook cactus
Opuntia acanthocarpa	Buckhorn cholla
Opuntia arbuscula	Pencil cholla
Opuntia bigelovii	Teddybear cactus
Opuntia leptocaulis	Christmas cactus
Opuntia phaeacantha	Engelmann prickly pear
Fouguieria splendens	Ocotillo

Source: Modified from Bureau of Reclamation 1979.

TABLE E.2 Mammals Occurring in the Candidate Areas

Scientific Name	Common Name
Ammospermophilus harrisi	Harris' antelope ground squirrel
Canis latrans	Coyote
Dicotyles tajacu[a]	Javelina
Dipodomys deserti	Desert kangaroo rat
Erethizon dorsatum	Porcupine
Lepus alleni	Antelope jackrabbit
Lepus californicus	Black-tailed jackrabbit
Lynx rufus	Bobcat
Mephitis mephitis	Striped skunk
Neotoma albigula	White-throated woodrat
Odocoileus hemionus[a]	Mule deer
Onychomys torridus	Southern grasshopper mouse
Perognathus amplus	Arizona pocket mouse
Perognathus baileyi	Bailey's pocket mouse
Perognathus intermedius	Rock pocket mouse
Perognathus penicillatus	Desert pocket mouse
Peromyscus eremicus	Cactus mouse
Peromyscus maniculatus	Deer mouse
Procyon lotor	Raccoon
Sigmodon hispidus	Hispid cotton rat
Spermophilus tereticaudus	Round-tailed ground squirrel
Sylvilagus auduboni	Desert cottontail
Taxidea taxus	Badger
Thomomys bottae	Valley pocket gopher
Urocyon cinereoargenteus	Gray fox
Vulpes macrotis	Kit fox

[a]Species with high population density areas within or near the candidate areas.

Source: Schwartzmann et al. 1976.

TABLE E.3 Bird Species Occurring in the Candidate Areas

Scientific Name	Common Name
Agelaius phoeniceus	Red-winged blackbird
Amphispiza belli	Sage sparrow
Amphispiza bilineata	Black-throated sparrow
Archilochus alexandri	Black-chinned hummingbird
Auriparus flavipes	Verdin
Bubo virginianus	Great horned owl
Buteo jamaicensis	Red-tailed hawk
Buteo lagopus	Rough-legged hawk
Charadrius vociferus	Killdeer
Calamospiza melanocorys	Lark bunting
Calypte costae	Costa's hummingbird
Campylorhynchus brunneicapillus	Cactus wren
Cardinalis cardinalis	Cardinal
Carpodacus mexicanus	House finch
Centurus uropygialis	Gila woodpecker
Chlorura chlorura	Green-tailed towhee
Chondestes grammacus	Lark sparrow
Chordeiles acutipennis	Lesser nighthawk
Colaptes auratus	Common flicker
Columbina passerina	Ground dove
Dendrocopos scalaris	Ladder-backed woodpecker
Dendroica coronata	Yellow-rumped warbler
Dendroica petechia	Yellow warbler
Dendroica townsendi	Townsend's warbler
Empidonax sp.	Empidonax flycatcher
Eremophila alpestris	Horned lark
Falco sparverius	Sparrow hawk
Geococcyx californianus	Roadrunner
Icterus cucullatus	Hooded oriole
Icterus galbula	Northern oriole
Icterus parisorum	Scott's oriole
Lanium ludovicianus	Loggerhead shrike
Lophortyx gambelii	Gambel's quail
Mimus polyglottes	Mockingbird
Molothrus ater	Brown-headed cowbird
Myiarchus cinerascens	Ash-throated flycatcher
Myiarchus tyrannulus	Wied's crested flycatcher
Oporornis tolmiei	MacGillivray's warbler
Oreoscoptes montanus	Sage thrasher
Otus asio	Screech owl
Parabuteo unicinctus	Harris hawk
Passer domesticus	House sparrow
Passerculus sandwichensis	Savannah sparrow
Petrochelidon pyrrhonata	Cliff shallow
Phainopepla nitens	Phainopepla
Pheuticus melanocephalus	Black-headed grosbeak

TABLE E.3 (Cont'd)

Scientific Name	Common Name
Pipilo aberti	Albert's towhee
Pipilo erythrophthalmus	Rufous-sided towhee
Pipilo fuscus	brown towhee
Piranga ludoviciana	Western tanager
Polioptila caerulea	Blue-gray gnatcatcher
Polioptila melanura	Black-tailed gnatcatcher
Pooecetus gramineus	Vesper sparrow
Pyrrhuloxia sinuata	Pyrrhuloxia
Regulus calendula	Ruby-crowned kinglet
Salpinctes obsoletus	Rock wren
Sayornis saya	Say's phoebe
Scardafella inca	Inca dove
Speotyto cunicularia	Burrowing owl
Spizella breweri	Brewer's sparrow
Spizella passerina	Chipping sparrow
Stelgidopteryx ruficollis	Rough-winged swallow
Sturnella sp.	Meadowlark
Sturnus vulgaris	Starling
Tachycineta thalassina	Violet-green swallow
Thryonames bewickii	Bewick's wren
Toxostoma bendirei	Bendire's thrasher
Toxostoma curvirostre	Curve-billed thrasher
Toxostoma dorsale	Crissal thrasher
Troglodytes aedon	House wren
Turdus migratorius	Robin
Tyrannus verticalis	Western kingbird
Tyrannus vociferans	Cassin's kingbird
Vermivora luciae	Lucy's warbler
Vireo bellii	Bell's vireo
Vireo gilvus	Warbling vireo
Vireo vicinior	Gray vireo
Wilsonia pusilla	Wilson's warbler
Xanthocephalus xanthocephalus	Yellow-headed blackbird
Zenaida asiatica	White-winged dove
Zenaida macroura	Mourning dove
Zonotrichia leucophrys	White-crowned sparrow

Source: Schwartzmann et al. 1976.

TABLE E.4 Amphibians and Reptiles Occurring in the Candidate Areas

Scientific Name	Common Name
Amphibians	
Bufo alvarius	Colorado river toad
Bufo cognatus	Great Plains toad
Bufo punctatus	Red-spotted toad
Bufo woodhousei	Woodhouse's toad
Rana catesbeiana	Bullfrog
Rana pipiens	Leopard frog
Scaphiopus couchi	Couch's spadefoot
Scaphiopus hammondi	Western spadefoot
Reptiles	
Arizona elegans	Glossy snake
Chilomeniscus cinctus	Banded sand snake
Chionactis occiptalis	Western shovel-nosed snake
Crotalus atrox	Western diamondback rattlesnake
Crotalus cerastes	Sidewinder
Crotalus molossus	Black-tailed rattlesnake
Crotalus scutulatus	Mojave rattlesnake
Crotalus tigris	Tiger rattlesnake
Crotalus viridis	Arizona black rattlesnake
Hypsiglena torguata	Night snake
Lampropeltis getulus	Common kingsnake
Leptotyphylops humilis	Western blind snake
Masticophis bilineatus	Sonora whipsnake
Masticophis flagellum	Coachwhip
Micruroides euryxanthus	Arizona coral snake
Phyllorhynchus browni	Saddled leaf-nose snake
Phyllorhynchus decurtatus	Spotted leaf-nose snake
Pituophis melanoleucus	Gopher snake
Rhinochelius lecontei	Long-nosed snake
Salvadora hexalepis	Western patch nosed snake
Sonora semiannulata	Western ground snake
Tantilla phaniceps	Western black-headed snake
Thamnophis cryptopsis	Black-necked garter snake
Thamnophis eques	Mexican garter snake
Thamnophis marcianus	Checkered garter snake
Trimorphodon lambda	Sonoran lyre snake
Callisaurus draconoides	Zebra-tailed lizard
Cnemidophorus tigris	Western whiptail
Coleonyx variegatus	Banded gecko
Crotaphytus wislizenii	Leopard lizard
Dipsosaurus dorsalis	Desert iguana
Heloderma suspectum[a]	Gila monster
Holbrookia texana	Greater earless lizard

TABLE E.4 (Cont'd)

Scientific Name	Common Name
Reptiles (Cont'd)	
Phrynosoma platyrinos	Desert horned lizard
Phrynosoma solare	Regal horned lizard
Sauromalus obesus	Chuckwalla
Sceloporus magister	Desert spiny lizard
Urosaurus graciosus	Long-tailed brush lizard
Urosaurus ornatus	Tree lizard
Uta stansburiana	Side-blotched lizard
Gopherus agassizi[a]	Desert tortoise

[a]Species that are of concern in the proposed candidate areas (see Appendix F.3, p. F-11).

Sources: Schwartzmann, et al. 1976; Stebbins 1966; Cross 1978

REFERENCES

Bureau of Reclamation, 1979, *Final Environmental Statement on Salt-Gila Aqueduct, Central Arizona Project*, U.S. Department of the Interior, Washington, D. C.

Cross, J.K., 1978, *Annotated Literature Review on the Ecology of Gila Monster* (Heloderma suspectum), University of Arizona, Tucson, prepared for U.S. Department of the Interior, Bureau of Reclamation.

Schwartzmann, J.L., et al., 1976, *Field Studies of the Nongame Mammals, Birds, Herpetofauna and Vegetation Analysis of the Proposed Salt-Gila Aqueduct*, Department of Zoology, Arizona State University, Tempe, Ariz.

Stebbins, R.C., 1966, *A Field Guide to Western Reptiles and Amphibians*, Houghton Mufflin Co., Boston.

APPENDIX F:

THREATENED, ENDANGERED, AND OTHER PROTECTED SPECIES

F.1 SPECIES LISTS

TABLE F.1 Federally Listed Threatened, Endangered, and Candidate Plant Species of Arizona

Scientific Name	Common Name	Status[a]
Agave parviflora	Santa Cruz striped agave	C-2
Amsonia kearneyana	Kearney's amsonia	C-1
Amsonia peeblesii	Peebles blue star	C-2
Astragalus xiphoides	Sword milkvetch	C-1
Cheilanthes pringlei	Pringle's lip fern	C-2
Coryphantha scherri var. *robustispina*	Stout needle mulee	C-1
Cynanchum wigginsii	Wiggins milkweed mulee	C-2
Dalea tentaculoides	Gentry's indigo bush	C-1
Echinocactus horizonthalonius var. *nicholii*	Nichol Turk's head cactus	E
Graptopetalum bartramii	Bartram's stonecrop	C-2
Mammillaria thornberi	Thornber fishhook cactus	C-2
Neolloydia erectocentra* var. *acunensis[b]	Acuna valley cactus	C-1
Neolloydia erectocentra* var. *erectocentra[b]	Needle spine pineapple cactus	C-2
Notholaena lemmonii	Lemmon's lipfern	C-2
Pediocactus papyracanthus	Paperspined cactus	C-2
Pediocactus peeblesianus var. *peeblesianus*	Peebles Navajo cactus	E
Peniocereus greggii	Desert night-blooming cereus	C-2
Phacelia cephalotes	Badlands phacelia	C-2
Tumamoca macdougalii[b]	Tumamoc globeberry	E

[a]Status codes:

C-1 = Category 1: candidate plant species for which the U.S. Fish and Wildlife Service presently has sufficient information to support its being listed as threatened or endangered.

C-2 = Category 2: candidate plant species for which the U.S. Fish and Wildlife Service has information indicating the probable appropriateness for listing but for which sufficient information to support a proposed rule is lacking.

E = Endangered species: any species that is in danger of extinction throughout all or a significant portion of its range.

[b]Species that are of concern in the proposed candidate areas (see Appendix Section F.3, page F-11).

Source: Bureau of Land Management 1987.

TABLE F.2 Plant Species on the Arizona Natural Heritage List Program

Scientific Name	Common Name
Abutilon reventum	Yellow Indian mallow
Abutilon thurberi	Thurberi Indian mallow
Agastache rupestris	Baboquivari giant hyssop
Agave murpheyi	Murphy agave
Allium plummerae	Plummer onion
Anoda abutiloides	Anoda
Astragalus barnebyi	Barneby milkvetch
Bacopa rotundifolia	Disk water hyssop
Cardiospermun corindum	Balloon vine
Ceterach dalhousiae	Dalhouse spleenwort
Cynanchum sinaloense	Sinaloa milkweed vine
Errazurizia rotundata	Roundleaf errazurizia
Hexalectris spicata	Crested coral root
Lagascea decipiens	Beguiling Mexican daisy
Malvastrum bicuspidatum	Mexican shrub mallow
Mammillaria viridiflora	Greenflower fishhook cactus
Mammillaria wrightii var. *wrightii*	Wright fishhook cactus
Manihot davisiae	Arizona manihot
Matelea arizonica	Rincon milkweed vine
Maurandya acerifolia	Mapleleaf false snapdragon
Muhlenbergia dubioides	Box Canyon muhly
Muhlenbergia xerophila	Sycamore Canyon muhly
Roldana hartweggii	Seeman groundsel
Zuckia arizonica	Navajo zuckia

Source: Bureau of Land Management 1987.

TABLE F.3 Federal and State Listed Threatened and Endangered Animal Species

Scientific Name	Common Name	Status[a]
Federal Listed/Proposed Species		
Colinus virginianus sridgwayi	Masked bobwhite	E(S-II)
Cyprinodon macularius macularius	Desert pupfish	E(S-I)
Falco peregrinus anatum	Peregrine falcon	E(S-III)
Haliaeetus leucocephalus	Bald eagle	E(S-II)
Lepidomeda vittata	Little Colorado River spinedace	P(S-III)
Mustela nigripes	Black-footed ferret	E(S-I)
Plagopterus argentissimus	Woundfin	E(S-III)
Poeciliopsis occidentalis occidentalis	Gila topminnow	E(S-III)
Rallus longirostris yumanesis	Yuma clapper rail	E(S-III)
Federal Candidate Species		
Buteo regalis	Ferruginous hawk	C-2
Buteo swainsoni	Swainson's hawk	C-2
Daihiribaentes arizonensis	Arizona giant sand-treader cricket	C-2
Euderma maculatum	Spotted bat	C-2
Eumeces gilberti	Gilbert's skink	C-2(S-IV)
Eumops perotis californicus	Greater mastiff bat	C-2
Eumops underwoodi sonoriensis	Underwood mastiff bat	C-2
Gila intermedia	Gila chub	C-1(S-IV)
Gopherus agassizi[b]	Desert tortoise	C-2(S-III)
Heloderma suspectum[b]	Gila monster	C-2
Leptonycteris sanborni	Little long-nosed bat	C-2
Numeicus americanus	Long-billed curlew	C-2
Perognathus flavus goodpasteri	Silky pocket mouse	C-2
State Listed Species		
Buteogallus anthracinus anthracinus	Common black hawk	(S-III)
Casmerodius albus egretta	Great egret	(S-IV)
Egretta tinula brewsteri	Snowy egret	(S-IV)
Eumeces callicephalus	Mountain skink	(S-IV)

TABLE F.3 (Cont'd.)

Scientific Name	Common Name	Status[a]
Gila robusta robusta	Colorado River roundtail chub	(S-III)
Ictinia mississippiensis	Mississippi kite	(S-III)
Nycticorax nycticorax	Black-crowned night heron	(S-IV)
Ovis canadensis mexicana	Desert bighorn sheep	(S-III)
Pandion haliaetus carolinensis	Osprey	(S-III)

[a]Federal status is outside parentheses and state status is inside parentheses. Coding is as follows:

Federal Listing:

- E Endangered species: any species that is in danger of extinction throughout all or a significant portion of its range.
- P Proposed species.
- C-1 Category 1: candidate plant species for which the U.S. Fish and Wildlife Service presently has sufficient information on hand to support its being listed as threatened or endangered.
- C-2 Category 2: candidate plant species for which the U.S. Fish and Wildlife Service has information indicating the probable appropriateness for listing but for which sufficient information to support a proposed rule is lacking.

State Listing:

- S-I Animals known or suspected to have extirpated (eliminated) from Arizona but which still exist elsewhere.
- S-II Animals whose continued presence in Arizona is now in jeopardy and extirpation from the state is highly probable if no recovery efforts are made.
- S-III Animals whose continued presence in Arizona could be in jeopardy in the foreseeable future.
- S-IV Animals for which there is a moderate threat to the habitat they occupy.

[b]Species that are of concern in the proposed candidate areas (see Appendix Section F.3, page F-11).

F.2 PERMIT PROCEDURE FOR SPECIES PROTECTED UNDER ARIZONA NATIVE PLANT LAW*

The procedure to be followed in obtaining a permit for the removal and transportation of protected native plants, including most cacti, Mesquite, Palo Verde and Ironwood trees and their wood, are explained below.

1. Obtain an application form by calling, visiting or writing any Commission office.

2. The application form must be completely filled out by the landowner, or agent for the landowner, and it must include all information requested.

3. When the application is completed, it is to be presented either in person or by mail at a Commission office for verification of information and approval. The landowner, or agent for the landowner, must determine the boundaries on the property and clearly mark the corners so that Commission personnel can make an accurate inventory of the kind and number of plants on the property. If it is determined that all information given is accurate, your permit will be issued.

4. The law requires each protected native plant removed from its original growing site to have a native plant tag and seal firmly affixed to the plant with the string provided by the Commission before the plants are removed from the permit site. These tags are to remain on the plants until they are placed in the landscape. After planting, the tag, string and seal should be removed from the plant and kept in a safe place as proof that the plant was obtained legally.

5. The cost for the native plant tags is $3.00 for each saguaro, $2.00 each for all other protected native plants and trees . . . .

6. As a landowner you have the right to destroy or remove any plant growing from your land, but if you are going to destroy these plants, you must notify the Commission thirty days before you plan to initiate this action. You also have the right to sell or give away any plant growing on your land. However, no person may legally transport protected native plants from any land without first obtaining a permit from the Commission of Agriculture and Horticulture.

---

*Reproduced from Arizona Commission of Agriculture and Horticulture Pamphlet AH-N.509 REV. 12-82, *Our Protected Plants.*

7. Private property owners are reminded that State or Federal land leased to you does not give you the authority to remove these plants unless official permission is given by the United States Department of Agriculture, Bureau of Land Management, or the Arizona State Land Department.

F.3 LETTERS CONCERNING THREATENED AND ENDANGERED SPECIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES 2-21-89-I-028
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

December 7, 1988

Antonios A. Antonopoulos
Energy and Environmental Systems Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Dear Dr. Antonopoulos:

This responds to your request of November 30, 1988 for information on species listed or proposed to be listed as threatened or endangered that may be in the vicinity of a proposed new auxiliary field for Williams Air Force Base at one of four sites in Pinal County, Arizona.

The endangered bald eagle (Haliaeetus leucocephalus) and peregrine falcon (Falco peregrinus anatum) may be found during the winter in the vicinity of Picacho Reservoir adjacent to site D. The endangered Tumamoc globeberry (Tumamoca macdougalii) may be found in naturally vegetated habitats around sites B, C, and D. This perennial vine grows under shrubs and small trees and is winter-dormant.

Waterfowl and shorebirds utilize the wetland formed by Picacho Reservoir. Use of a site near this wetland for the project increases the risk of collision with birds. Picacho Reservoir is the major water body in the overall area and has important wetlands values.

The Fish and Wildlife Service is concerned about the desert riparian habitats that flank washes and arroyos. The additional water available in these areas results in a lusher, more complex vegetative structure than in the surrounding uplands. This habitat type would be located on all naturally vegetated sites.

If we may be of further assistance, please contact Ms. Lesley Fitzpatrick or me (Telephone: 602/261-4720).

Sincerely,

Sam F. Spiller

Sam F. Spiller
Field Supervisor

ROSE MOFFORD, Governor
(Commissioner)
LARRY D. ADAMS, Buttfield City, Chairman
FRANCES W. WERNER, Tucson
THOMAS G. WOODS, JR., Phoenix
PHILLIP W. ASHCROFT, Eagar
GORDON K. WHITING, Klondyke

Director
TEMPLE A. REYNOLDS

Deputy Director
DUANE L. SHROUFE

ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

Mesa Regional Office
7200 East University
Mesa, Arizona 85207
(602 981-9400

November 21, 1988

Mr. John Irving
Energy and Environmental Systems Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinios 60439

Dear Mr. Irving:

I am sorry that we were unable to meet last week and that the special status species list that I promised you was unavailable when you stopped by the Mesa Regional Office. I sincerely regret any inconvenience you may have suffered due to the miscommunication. I understand you were able to talk with Rick Gerhart, of our Tucson Regional Office, and I trust that the remainder of your trip was both enjoyable and productive.

I have enclosed a list of special status species that our Nongame Branch has identified as being present in the vicinity of the proposed air field sites. Also enclosed for your information is a complete listing of Arizona's Threatened Native Wildlife (TNW). This list will provide you with additional information on the species in question as well as definitions for the various categories (endangered, threatened and candidate).

Thank you for your patience and cooperation. I would appreciate your forwarding of this information to Mr. LaGory, and I hope Argonne National Laboratory will continue to coordinate the development of the E.I.S. with our Department. If I can be of any further assistance, please do not hesitate to contact me at (602) 981-9400.

Sincerely,

David L. Walker
Habitat Specialist
Mesa Regional Office

DLW:jdc
LtrDW12/2

Encl.

An Equal Opportunity Agency

cc: Rick Gerhart, Habitat Specialist, Tucson Regional Office
Robert Weaver, Habitat Evaluation Coordinator

Region 6 Headquarters
7200 E University
Mesa, AZ 85207

Site A:
No special status species

Site B & C:
Gopherus agassizi (Desert tortoise)
Usually found on mountain slopes and upper bajadas
USFWS Cat 2; TNW candidate species
Heloderma suspectum (Gila monster)
Usually found on upper bajadas
USFWS Cat 2
Neolloydia erectocentra erectocentra (needle spine pineapple cactus)
Usually found on alluvial fans and hills in desertscrub to desert grassland communities.
USFWS Cat 2
Neolloydia e. acuensis (Acuna valley cactus)
Usually found on hills and flats in Palo verde-Saguaro desertscrub.
USFWS Cat 1

Site D:
Gopherus agassizi (Desert tortoise)
See above
Heloderma suspectus (Gila monster)
See above
Note on Site D: If the project action will affect Picacho Reservior in any capacitiy the following special status species are potential issues:
Haliaeetus leucocophalus (Bald Eagle)
Wintering birds only.
USFWS Endangered; TNW State Endangered
Rallus longirostris yumanensis (Yuma Clapper Rail)
Nests in marshland habitats.
USFWS Endangered; TNW State Threatened
Ixobrychus exilis (Least Bittern)
Nests in marshland habitats.
TNW State Candidate
Egretta thula (Snowy Egret)
Nests in colonies in quiet wetland habitats.
TNW State Threatened

F.4 REFERENCE

Bureau of Land Management, 1987, *Phoenix-Resource Management Plan and Environmental Impact Statement*, U.S. Department of the Interior, Washington, D.C., Dec.

APPENDIX G:

AIRSPACE STUDY*

*The following final report was prepared for Argonne National Laboratory by R.L. Harding, a private consultant in airport and heliport siting, and is reproduced as submitted.

D R A F T R E P O R T

AIRSPACE STUDY
FOR
WILLIAMS AIR FORCE BASE

PREPARED FOR

ARGONNE NATIONAL LABORATORY

BY

RICHARD L. HARDING, P.E., L.S.
CFII(ASMEL - HEL)

Professional Engineer
Registered Land Surveyor

Federal Aviation Administration
Certified Flight Instructor Instruments
Airplane, Single and Multi Engine Land - Helicopters

OCTOBER 1989

TABLE OF CONTENTS

AIRSPACE STUDY,
WILLIAMS AIR FORCE BASE

Acronyms Used In This Report

ACRONYM	MEANING
AC	Advisory Circular
AGL	Above Ground Level
ARSA	Airport Radar Service Area
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
DH	Decision Height
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FL	Flight Level
FLIP	Flight Information Publication
FSS	Flight Service Station
IFR	Instrument Flight Rules
IR	Instrument Routes
M-F	Monday through Friday
Mach 1.2	1.2 times the speed of sound
MOA	Military Operating Area
MSL	Mean Sea Level
MTR	Military Training Route
NM	Nautical Mile
NOTAM	Notices to Airmen
RSU	Runway Supervisory Unit
Squawk	Code set in transponder to respond to radar interrogations
SR-SS	Sunrise to Sunset
T-37	Training Aircraft Model 37
TAC	Tactical Air Command
TRACON	Terminal Radar Approach Control
UPT	Undergraduate Pilot Training
VFR	Visual Flight Rules
Victor	Designated Federal Airway
VR	Visual Route
ZAB	Three letter indentifier for Albuquerque Center

1 INTRODUCTION

1.1 Objective of Report

In 1986 Williams AFB determined the need to relocate the auxiliary airfield used to support its T-37 Undergraduate Pilot Training (UPT) Program. This report [1] represents field data gathered from December 88 through February 89. Recommendations are presented based on the existing and anticipated impact of air traffic on operations in the vicinity of the relocated auxiliary airfield.

1.2 History of Williams AFB

Williams Air Force Base, Arizona, approximately 30 miles southeast of Phoenix, is in the area known as the Valley of the Sun. Since early 1942, Williams has been involved in various aspects of flying training. More than 350 students graduate from pilot training at Williams each year, under the direction of the host unit on base, the 82 Flying Training Wing. Nine tenant organizations are involved either with pilot training or as support units. Also, 15 free-world allied nations send their pilots to Williams for training.

The 82nd Flying Training Wing is organized under the tri-deputy concept. The three deputy commanders are Operations, Maintenance and Resource Management. The wing has but one job---to produce quality Air Force pilots. Aircraft assigned to Williams include the Cessna T-37 and Northrop T-38.

Four units are directly involved in the Undergraduate Pilot Training mission of the wing. The 96th and 98th Flying Squadrons conduct the initial phase of flying training in the T-37 aircraft. After completing the T-37 phase of training, the student pilot advances to the 97th or 99th Flying Training Squadron and the T-38 advanced jet trainer aircraft.

1.3 Undergraduate Pilot Training

The training program at undergraduate pilot training bases includes approximately 700 hours of scheduled activities and lasts 52 weeks. It usually includes 189.7 flying hours, 450 hours of ground training, and 61.9 hours in the flight simulators and cockpit familiarization trainers. This does not include additional hours of preflight and postflight briefings or individual student preparation.

---

[1]Prepared for Argonne National Laboratory, Contract No. 83512401, 9700 Cass Avenue, Argonne, IL, 60439, by Richard L. Harding, P.E., L.S., Air Transportation Facilities Consultant, 3336 Bradshaw Road, Suite 140, Sacramento, CA, 95827-2697, Ph (916) 362-3251.

Initial training is conducted in the twin-engine, subsonic T-37 jet, a rugged aircraft that is equal in maneuverability to most of the fighters of World War II. Students receive 80.9 hours of flying instruction in the T-37.

Each student and instructor, seated side-by-side in the T-37, are assigned a specific practice area. During training flights---each lasting approximately 80 minutes---students learn characteristics of the aircraft; emergency procedures; takeoffs and landing techniques; aerobatics; and formation flying. Students also practice night, instrument, and cross-country/navigation flying.

After the T-37 phase of training, students make the transition to the T-38 Talon, the Air Force's first supersonic undergraduate pilot training aircraft. Its twin jet engines can boost the Talon to a speed in excess of 800 miles per hour (Mach 1.2) and to an altitude near 50,000 feet. The T-38 provides excellent preparation for future transition to high-speed operational aircraft.

Of the 108.8 flying hours in the T-38, students spend 36 hours on contact missions, 15.6 to 21.2 hours on navigational training, from 10.7 to 16.8 hours on instruments, and from 35.5 to 35.9 hours on formation flying. Time spent in each training category varies according to the student's follow-on assignment.

The future needs for the flying training program at Williams Air Force Base will include a third aircraft used in place of the T-38 for tanker and transport pilot training. Students destined for all other aircraft types will continue to train in the T-38.

1.4 Primary Aircraft

The T-37 Tweet is a twin-engine jet used for undergraduate pilot, undergraduate navigator and tactical navigation training. It is used to train students in the fundamentals of aircraft handling and instrument, formation and night flying. The Tweet is the first aircraft designed specifically for this purpose. Most of the Air Force's T-37 -- about 650 aircraft -- are used by Air Force's Air Training Command (ATC).

SPECIFICATIONS (T-37)

Primary Function: primary jet trainer
Prime Contractor: Cessna Aircraft Co.
Engine Manufacturer: two Continental J69-T-25 turbojet engines
Thrust: 1,025 lb. each engine
Dimensions: wingspan 33.8 ft., length 29.3 ft., height 9.2 ft.
Speed: 275 knots (315 mph)
Service Ceiling: 35,000 ft.
Range: approximately 400 NM
Crew: two (student pilot and instructor pilot)
Max. T/O Weight: 6,625 lb.
Status: operational

2 DESCRIPTION OF EXISTING CONDITIONS

2.1 Summary

Within the airspace surrounding Williams Air Force Base, There are Three major jurisdictional categories, for air traffic control purposes, which relate to the national/regional, metropolitan, and local levels. Each of these three jurisdictional categories has its own designated volume of controlled airspace.

Special Use Airspace: Within the national airspace classification of controlled airspace, the following areas are included:

- Control Areas
- Continental Control Area
- Control Zones
- Terminal Control Area
- Transition Areas
- Airport Radar Service Areas
- Positive Control Areas
- Special Use Airspace

Special use airspace is further broken down into categories designated as:

- Prohibited Areas
- Restricted Areas
- Warning Areas
- Military Operations Areas
- Alert Areas

Military Operations Area (MOA) is an airspace designation of defined vertical and lateral dimensions established outside positive control areas and specifically assigned. It is intended to separate or segregate certain military activities, such as undergraduate pilot training, from IFR traffic and to identify for VFR traffic where these activities are conducted. Non participating IFR traffic may transit MOA's only if IFR separation can be provided by air traffic control from participating aircraft. Federal regulations do not prohibit civil aircraft from operating under visual flight rules (VFR) in the MOA's; however, pilots are alerted to the fact that there may be military aircraft utilizing the area.

2.2 Classification of Airspace in the Study Area

2.2.1 Air Route Traffic Control Center Airspace

Air route traffic control centers (ARTCC) control all enroute aircraft in the United States which are operating under instrument flight rules and are not under the control of military or other facilities. The centers provide separation service, traffic advisories, and weather information to pilots while they are enroute between airports. The ARTCC's also provide traffic advisories and weather information to pilots participating in VFR flight following procedures and operating under visual flight rules (VFR).

Nationally, there are some twenty-five air traffic service areas which each have Air Route Traffic Control Center (ARTCC) facilities located within the particular region. Within the regions, ARTCC controllers provide air traffic services. Williams Air Force Base, along with the majority of the States of Arizona and New Mexico, is located in the Albuquerque ARTCC (referred to as Albuquerque Center).

2.2.2 Terminal Radar Approach Control Airspace

Approach control facilities provide separation services to aircraft during the arrival and departure phases of flights in a larger amount of airspace surrounding airports.

A center may delegate airspace to local facilities for instrument flight rules (IFR) approach and departure control. The Albuquerque Center has delegated certain airspace overlying the Phoenix area at 17,000 feet above mean sea level (MSL) and below (the altitude limit of some portions of the airspace varies) to the Phoenix Terminal Radar Approach Control (TRACON) facility located at Phoenix Sky Harbor International Airport.

2.2.3 Airport Traffic Control Tower Airspace

Airport traffic control towers separate and sequence aircraft in the airspace immediately surrounding airports and on the airport's surface.

The airspace under the jurisdiction of an Airport Traffic Control Tower (ATCT or "Tower") is called an airport traffic area. An airport traffic area is generally defined as the area within a 5-statute-mile radius of an airport that has an operating control tower and from the ground up to, but not including, 3,000 feet above the airport. Within the Phoenix TRACON airspace area, there are airport traffic areas at the following airports which relate to the possible air traffic conflicting with that at Williams AFB.

Phoenix	Sky Harbor International Airport
Mesa	Falcon Field Municipal Airport
Military	Williams Air Force Base

In addition, the Phoenix Airport Radar Service Area (ARSA) has been established to provide radar air traffic sequencing and separation service around Sky Harbor International Airport. The Phoenix ARSA consists of the airspace within 5 nautical miles (NM) of the airport, extending from the surface to 4,000 feet above ground level (AGL), and that airspace within 10 NM of the airport, extending from various altitudes to the same 4,000 foot altitude cap as the inner circle. All aircraft operating within the Phoenix ARSA are required to maintain two-way radio communications with the controlling air traffic control facility.

2.2.4 Williams Military Operating Areas (Figure 1)

2.2.4.1 Williams 1 MOA

Williams 1 MOA surrounds the airbase and extends eastward. It encompasses approximately 1,170 square miles and extends from 1,000 feet above ground level (AGL) to flight level (FL) 180 (18,000 feet above mean sea level (MSL)). An area 10 statute miles in diameter overlying the Coolidge Municipal Airport extends the MOA down to the surface. It is active from 0600 (6:00 AM) to 2100 (9:00 PM) week days (Monday - Friday). The agency controlling the air traffic in the MOA is Albuquerque (ZAB) Air Route Traffic Control Center (ARTCC). This MOA is used primarily for T-37 training.

2.2.4.2 Williams 2 MOA

Williams 2 MOA joins Williams 1 MOA along its eastern boundary and extends eastward. It encompasses approximately 2,380 square miles and extends from 7,000 MSL to FL 180. It is active from 0600 to 2100 week days. The agency controlling the air traffic in the MOA is Albuquerque Center. This MOA is used primarily for T-37 training.

2.2.4.3 Williams 3 MOA

Williams 3 MOA joins Williams 2 MOA along its eastern boundary and extends eastward. It encompasses approximately 3,270 square miles and extends from 11,000 MSL to FL 180. It is active from 0600 to 2100 week days. The agency controlling the air traffic in the MOA is Albuquerque Center. This MOA is used primarily for T-38 training.

2.2.4.4 Williams 3A MOA

Williams 3A MOA is contained within Williams 3 MOA in the southeast corner. It encompasses approximately 800 square miles and extends from 100 AGL to but not including 11,000 MSL. It is active from 0600 to 2100 week days. The agency controlling the air traffic in the MOA is Albuquerque Center. This MOA is used primarily for T-38 training.

2.2.4.5 Williams 4 MOA

Williams 4 MOA joins Williams 2 & 3 MOA's along their northern boundaries and extends northward. It encompasses approximately 1,960 square miles and extends from 14,000 MSL to FL 180. It is active sunrise to sunset (SR-SS) Monday through Friday (M-F) and by Notices to Airman (NOTAM) weekends. The agency controlling the air traffic in the MOA is Albuquerque Center. This MOA is used primarily for T-38 training.

2.2.5 Williams Military Operating Areas

Williams Military Operating Areas (MOA's) are bounded by airspace designated under Federal Air Regulations (FAR's) Parts 71 and 77. Federal Airways identified as V (Victor) 528 bounds Williams 4 MOA on the north, V 16 on the west, and V 94 on the south. Airway V 190 traverses Williams 4 MOA northeast-southwest. The Williams MOA's are bounded on the east by the Reserve MOA and Morenci MOA.

2.2.6 Designated Airspace Contained Within Lateral Limits of the MOA's

The landing of aircraft is prohibited on lands or waters administered by the National Park Service, U.S. Fish and Wildlife Service or U.S. Forest Service without authorization from the respective agency. Exceptions include: 1) when forced to land due to an emergency beyond the control of the operator, 2) at officially designated landing sites, or 3) on approved official business of the Federal Government.

All aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of the following: National Parks, Monuments, Seashores, Lakeshores, Recreation Areas, and Scenic Riverways administered by the National Park Service; National Wildlife Refuges, Big Game Refuges, Game Ranges and Wildlife Ranges administered by the U.S. Fish and Wildlife Service; and Wilderness and Primitive areas administered by the U.S. Forest Service. FAA Advisory Circular (AC) 91-36C, "Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas," defines the surface as: the highest terrain within 2,000 feet laterally of the route of flight, or the upper-most rim of a canyon or valley. See Table 2.2.6.1.

The Casa Grande Ruins National Monument located on the north side of Coolidge is not designated in accordance with the above criteria on the Phoenix Sectional Aeronautical Chart. Personnel at the Monument have observed deterioration of the historic structure located there due to vibrations caused by low civil flying aircraft. No military aircraft have been observed flying in close proximity of the Casa Grande Ruins National Monument.

2.2.7 Auxiliary Airfield Airspace

The air traffic using the auxiliary airfield will be monitored by runway supervisory units (RSU's) operated by the Air Force. These facilities will be manned by Air Force pilots who are not certified air traffic controllers and will not be part of the FAA air traffic control facilities.

2.2.8 Other Volumes of Airspace

Controlled and uncontrolled airspace underlie the lateral limits of the MOA's. Controlled airspace is shown on the Phoenix Sectional with the boundaries of the control areas depicted by the blue shading along airways and edges of the MOA's. The clear sharp edge of the shading

indicates the limits of the control areas and the feathered portion is toward the interior of the space defined as control area. This airspace begins at 1,200 feet above ground level (AGL) and extends upward to the base of the Continental Control Area (14,500 feet above mean sea level, MSL) unless designated otherwise on the sectional chart. Within or adjacent to these control areas lie transition areas identified by magenta shading. The limits are depicted in the same manner as the control area and are designated to contain IFR operations in controlled airspace during portions of the terminal operations and while transitioning between the terminal and en route environment.

Transition Areas are controlled airspace extending upward from 700 feet or more above the surface when designated in conjunction with an airport for which an instrument approach procedure has been prescribed; or from 1,200 feet of more above the surface when designated in conjunction with airway route structures or segments.

Uncontrolled airspace is that airspace less than 1,200 above the surface under the control areas and less than 700 feet above the surface under the transition areas. The only airspace which is uncontrolled from the surface to the base of the Continental Control Area is a portion Williams 4 MOA near the northeast section. (See Sections 2.2.4.1 - 2.2.4.5 for elevations of the floors of the MOA's.)

Aircraft operating within the confines of this uncontrolled airspace in MOA 4 are subject to the rules and regulations stated in FAR Part 91 except those operating under IFR rules along V 190 which is controlled airspace.

2.2.9 Airports Within or Close Proximity to the MOA's

Several airports lying within or in close proximity to the MOA's identify landing facilities which represent probable origin/destination points for VFR traffic traversing the MOA's . The name of the airport, location relative to a MOA, the number of based aircraft, and the date of record can be found in Table 2.2.9.1.

3 MILITARY AVIATION ACTIVITY IN MILITARY OPERATIONS AREA (MOA) AIRSPACE

3.1 Summary

Williams AFB conducts T-37 flight training in the UPT areas and at Headpin Auxiliary Field Monday through Friday. Occasionally, instrument training is conducted in the T-37 on weekends and is performed on published IFR routes throughout the Southwest. The UPT areas and the Headpin Auxiliary Field are not used on weekends.

In addition to Williams AFB utilizing the MOA's for flight training, other military air traffic conducting training flights traverse the MOA's at low altitudes and at high speeds along various IR or VR routes.

3.2 T-37 Training in MOA's 1 & 2

A flight of 10 - 15 aircraft (T-37 sorties) are launched approximately 10 - 12 times each week day during the training year. This equates to 100 - 180 aircraft launched and recovered at 3 - 9 minute intervals between 0630 (6:30 AM) and 1700 (5:00 PM) for the purpose of undergraduate pilot training at Williams Air Force Base each day. Some of the aircraft are scheduled to go to Coolidge Municipal Airport initially while the remainder go to the UPT areas located in MOA's 1 & 2. These areas are designated blocks of airspace with horizontal and vertical limits and are shown in Figure 2. Some areas are designated as high and low meaning that within the horizontal limits there can be two aircraft training at the same time. One aircraft in the low section and the other aircraft a minimum of 3,000 feet above the lower one. During a typical flight, the T-37's will generally utilize the UPT areas and Coolidge Municipal Airport for training of maneuvers and then return to Williams Air Force Base. Approximately 10% of the sorties may be scheduled for instrument training of site, i.e. flights out side the limits of the designated MOA's.

The other assigned location for training is the auxiliary airfield known as Headpin and is located at the Coolidge Municipal Airport. The active runway for the T-37's is 05 or 23. At the auxiliary airfield students learn and practice landing and takeoff techniques for various flight conditions.

Aircraft landing and taking off at Williams AFB are controlled by the Runway Supervisory Unit (RSU) or Air Traffic Control Tower (ATCT) facilities located on the airfield. The launching and recovery of T-37 sorties normally takes place on runways 13R-31L and 13L-31R under the control of the RSU's. The center runway, 13C-31C, is used by the T-37's primarily for instrument training and is under the control of the ATCT. Air traffic at the fringes of the airport traffic area is coordinated with Phoenix Approach Control or Albuquerque Center. Routes of highly concentrated air traffic routes to and from Williams AFB, the UPT areas, and Headpin are shown in the Williams AFB T-37 In-Flight Guide.

There are 9 UPT areas located in MOA's 1 & 2. All UPT areas have vertical limits of 8,000 to 13,000 feet and 16,000 to 22,000 feet MSL except Globe which has one block 11,000 to 15,000 feet MSL. The aircraft

utilizing these training areas fly at speeds from 75 - 250 mph, 200 mph being the normal cruise speed. The departure and recovery procedures depicted in the Williams AFB T-37 In-Flight Guide describe the routes and altitudes the aircraft will adhere to during training operations. The Kilo Departure takes aircraft from Williams AFB to the UPT areas up to altitudes of 14,000 feet MSL. The Kilo Departure to Headpin has a maximum altitude of 5,000 feet MSL and the Kilo Departure to Boondock ILS has a maximum altitude of 6,000 feet MSL. The recovery procedures are depicted in the same guide and described the paths and altitudes for aircraft to follow on the return to Williams AFB. The different routes and altitudes depicted provide for the safe separation of traffic maneuvering in the MOA airspace.

3.3 Military Training Routes (MTR's)

IFR Military Training Routes (IR) are mutually developed by DOD and FAA and VFR Military Training Routes (VR) are developed by DOD to provide for military operational and training requirements that cannot be met under the terms of FAR 91.70 (Aircraft Speed). Accordingly, The FAA has issued a waiver to DOD to permit operation of an aircraft below 10,000 feet MSL in excess of 250 knots indicated airspeed along DOD/FAA mutually and DOD developed and published IFR and VFR routes. Routes with no segments above 1,500 feet above ground level (AGL) are assigned a four digit in place of a three digit identifier.

A detailed description of particular routes can be found in DOD Flight Information Publication (FLIP) AP/1B, Area Planning Military Training Routes for North and South America. The routes (VR 267 - 268 - 269) identified as having potential impact on the candidate areas are discussed later in this report. (See Figure 1)

Three U.S. Air Force installations are responsible for managing and scheduling the MTR's located within the Williams MOA's. These installations are: HQ 355th Tactical Training (TAC), Davis-Monthan AFB, Arizona; HQ 832nd Air Division (TAC), Luke AFB, Arizona; and HQ 82nd Flying Training Wing (ATC), Williams AFB, Arizona. The scheduling installation will coordinate all flights with the FAA facility having air space jurisdiction in accordance with FAA Handbook 7610.4 (Special Military Operations).

4 CIVILIAN AVIATION ACTIVITY IN MILITARY OPERATIONS AREA (MOA) AIRSPACE

4.1 Summary

The impact of civilian aviation activity primarily comes from the general aviation community and parachute operations in the area. Air carrier operations are not a factor impacting the evaluation of candidate areas due to the air traffic control environment in which they operate.

The Williams AFB T-37 Flight Guide, published 1 May 1988, prescribes procedures by which all T-37 s used for undergraduate pilot training will depart and recover to Williams Air Force Base. These procedures were developed for transitioning the MOA's to and from Coolidge Municipal Airport and the UPT areas. Nothing in the Guide or any other publication has been developed for the proposed candidate areas. A survey of the pilots in the study area, registered with the FAA Certification Branch, Oklahoma City, was conducted to determine the volume of air traffic flying between any two points that may impact the flight path prescribed in the Williams AFB T-37 Flight Guide. (See Appendix; Pilot Survey and Survey Questionnaire)

4.2 Types of Airspace Interactions

The sport of parachuting, or sky diving as it is commonly referred to, became active in 1972 at the Coolidge Airport and has been growing ever since. In 1986, Sky Dive Arizona became the tenant on the airport and has promoted training and competitive events in the sport of sky diving. The jump season begins normally in mid October and increases in activity to mid December. The activity remains fairly uniform until the end of May and then tapers off to generally the weekends. The first year saw 20,000 jump operations and activity has grown to 41,000 jump operations annually. During the period of January through April 1989, there were 28,656 jumps recorded. The peak operations to date were experienced in February 1989 and totaled 9,573 jumps. In the 3 years since Sky Dive Arizona started its operation, the activity has more than doubled and it is anticipated that over the next 5 years activity will increase 30% to nearly 53,300 jump operations annually.

Sky diving operations utilize the south landing zone on a full time basis during the jumping season. On weekends the north landing zone is utilized when training and/or competitive activities take place. At times five competitive events may need to be accommodated during the week. Jumping operations are conducted at altitudes as low as 3,500 feet MSL and as high as 15,000 feet MSL. During these jump operations there may be as many as 45 jumpers exiting an aircraft during one pass. An event is being planned that may include as many as 200 jumpers from several aircraft during one pass. The number of jumpers that stray away from the proper landing zone number less than 1 in 2,400.

When jump operations are in progress the T-37's continue to do touch and go's unless a canopy is observed over the north end of the field at which time the Air Force suspends flight operations. All jump operations are civilian except that the government may come use the facilities

approximately twice a year and provide all aircraft, equipment and personnel. Notification of jump activities is given through permanent NOTAM filed with the area Flight Service Station (FSS) and radio communication with ATC prior to each jump.

In January of 1988, Williams Air Force Base began recording data regarding the jumping activities at Coolidge Municipal Airport. The data items recorded were 1) day of the month, 2) number of jumps, 3) number of jumpers, 4) and impact comments. The impact comments include data on the number of jumpers missing the jump zone (i.e. land between the ramp and runway), T-37 operational impact due to missed radio calls, and the number of aircrews reporting impacts to T-37 training caused by jump activities. During the period of January 1988 through March 1989, nine months of random sampling were reviewed and the following data was obtained. The number of radio calls missed that were to be made to alert the Air Force of the jumping in progress amounted to 2.8% of the jumps made during this period. In addition, 0.8% of the jumpers landed off the drop zone as previously defined and 2.6% of the jumpers impacted T-37 training to some extent. (See Table 4.2.2)

Air carrier traffic operates on assigned airways at assigned altitudes. This movement of air traffic is coordinated with other military traffic operating at the higher altitudes and with an IFR clearance by ATC. Under these circumstances, air carrier traffic is separated from military traffic by radar and does not impact aircraft proposed to be in a traffic pattern at an auxiliary field in one of the candidate areas.

The number, location and type of air traffic generated by the general aviation airports in proximity to the candidate areas indicate a potential for conflicting flight paths between military and civilian aircraft.

Maps were prepared to indicate graphically the possible corridors that could be generated assuming direct origin/destination flights within the study area. (See Figure 2.) This assumption is supported by 81.6% of the pilots responding stating that they do fly direct routes. These pilots also responded with 91.9% of these flights were conducted during daylight hours which coincides with the time military training is occurring. The map showing the three (3) possible candidate areas depicts the flight paths as a result of the survey using dotted lines. This depiction can then be interpreted as --- the greater the density of dots in a given area the greater the volume of general aviation air traffic. The average altitude flown by general aviation pilots measured above ground level (AGL) is 4,386 feet. The responses indicated minimum altitudes ranging from 1,000 feet AGL in the desert to 2,000 feet over mountainous terrain. Therefore; some general aviation flights could be in conflict with military aircraft in the traffic pattern around the proposed auxiliary airfield candidate areas. (See Table 4.2.1)

In addition, while 96% of the pilots were aware of the Military Operating Areas (MOA's), 34% of the respondents indicated course deviation was required to avoid military aircraft flying in the training areas. It is interesting to note that while 69.8% of the pilots do not file flight plans; therefor, assumed to not inquire as to the anticipated activity in the MOA's or on the Military Training Route (MTR's), 37.8% do participate in visual flight rules (VFR) flight

following with air traffic control (ATC). This procedure is requested by the pilot and ATC assigns a transponder code (squawk) and radio frequency to each participating aircraft for the purpose of issuing traffic advisories.

Candidate area A has the additional impact of lying under a MTR (VR 267-268-269). This route, scheduled and managed by the 355 TTW at Davis-Monthan AFB, is used by approximately 100 military aircraft per month. These aircraft consist primarily of F-16 and A-7 and travel this segment of the route at 6,500 feet MSL and at speeds from 250 KIAS to 0.9 IMN (287 mph to 750 mph). It is estimated that 20% of these pilots are not from the local area which gives them a disadvantage of not being aware of traditional local air traffic.

5 POTENTIAL CANDIDATE AREAS FOR AUXILIARY AIRFIELD IN THE MILITARY OPERATIONS AREA (MOA)

5.1 Summary

It is evident, based upon over flight activity alone, that the candidate areas ranked in order of least general aviation traffic impact are:

Area C - estimate 696 flights per year

Area B - estimate 2,256 flights per year plus flight activity utilizing Boondock ILS practice approaches over the northern portion of Area B.

Area A - estimate 2,952 flights per year plus 1,200 military sorties per year for a total of 4,152 flights.

5.2 Area A

Candidate area A is located in Sections 1,12,13,24,25 of Township 4 South, Range 8 East and Sections 4,5,6,7,8,9,16,17,18,19,20,21,29, and 30 of Township 4 South, Range 9 East of the Gila and Salt Meridian. The candidate area is in Pinal County, Arizona and can be located on the Florence Quadrangle map. (See Figure 3)

It is estimated that there will be 2,952 general aviation aircraft over flying this area annually. The altitudes the aircraft will be fly vary but responses from the pilot survey indicate that they could conflict with the flight paths and altitudes of the T-37 aircraft climbing or descending from the UPT areas or in the traffic pattern should an auxiliary airfield be located here. In addition, VR 267 - 268 - 269 lies over this area and other military air traffic utilize this training route at 6,500 feet MSL and at high speeds will impact any T-37 traffic here.

5.3 Area B

Candidate area B is located in Sections 1,2,3,4,8,9,10,11,12,13,14, 15,16,17,20,21,22,23,24,25,26,27,28,29,32,33,34,35, and 36 of Township 5 South, Range 11 East; Sections 1 through 35 of Township 6 South, Range 11 East; Sections 3,4,5 of Township 7 South, Range 11 East; and Sections 1,2,10,11,12,13, 14,24,25 of Township 6 South, Range 10 East of the Gila and Salt Meridian. The candidate area is in Pinal County, Arizona and can be located on the Florence Southeast, North Butte, Cactus Forest, Ninetysix Hills NW, Picacho Reservoir SE and Ninietysix Hills SW Quadrangle maps. (See Figure 3)

It is estimated that there will be 2,256 general aviation aircraft over flying the northern portion of this area annually. The altitudes the aircraft will be flying vary but responses from the pilot survey indicate that they could conflict with the flight paths and altitudes of the T-37 aircraft climbing or descending from the UPT areas or in the traffic pattern should an auxiliary airfield be located here. In addition, military aircraft performing practice approaches to Boondock

ILS will be over flying the area at 5,500 feet MSL down to a decision height (DH) of 1,910 feet MSL. This training at high speeds will impact any T-37 traffic here.

The southern portion of Area B appears to have no general aviation air traffic over flying the area and no published military training routes except for the departure, recovery and traffic pattern routes now used by the T-37's. These routes will be changed as a result of the relocation of the auxiliary airfield.

5.4 Area C

Candidate area C is located in Sections 3,4,5,8,9,10,11,14,15,16, 17,20,21,22,23,24,25,26,27,28,33,34,35, and 36 of Township 6 South, Range 10 East; Sections 1,2,3,11,12 of Township 7 South, Range 10 East; Sections 30,31,32, of Township 6 South, Range 10 East; and Sections 5,6,7,8 of Township 7 South, Range 10 East of the Gila and Salt Meridian. The candidate area is in Pinal County, Arizona and can be located on the Cactus Forest, Picacho Reservoir SE and Ninietysix Hills SW Quadrangle maps. (See Figure 3)

It is estimated that there will be 696 general aviation aircraft over flying the northern portion of this area annually. The altitudes the aircraft will be fly vary but responses from the pilot survey indicate that they could conflict with the flight paths and altitudes of the T-37 aircraft climbing or descending from the UPT areas or in the traffic pattern should an auxiliary airfield be located here.

The southern portion of Area C appears to have no general aviation air traffic over flying the area and no published military training routes except for the departure, recovery and traffic pattern routes now used by the T-37's. These routes will be changed as a result of the relocation of the auxiliary airfield.

6 POTENTIAL MITIGATIVE MEASURES

Measures that could be used to mitigate the potential conflict between military and civilian air traffic are identified as follows:

- Request that the area Flight Service Station (FSS) brief pilots of the air traffic activity in the vicinity of the auxiliary air field during any weather briefing or flight plan recording conducted for general aviation flights in the area.

- Coordinate with the FAA to publish a flyer to distribute to all registered pilots in Arizona and New Mexico which describes the location of the auxiliary air field and states the procedures for evaluating existing activity and contacting the RSU's if flight is planned in near vicinity.

- Emphasize in local civilian pilot training, through normally scheduled seminars, and in appropriate publications the practice of filing flight plans and utilizing VFR flight following with ATC when traversing the MOA's

- Gain a better understanding of the new ASR 9 radar system to be installed at Luke AFB, Williams AFB and Tucson to be integrated with the ARTS III computer systems at Phoenix and Tucson TRACON to provide enhanced capabilities for the handling of air traffic.

APPENDIX

TABLE 2.2.6.1 - DESIGNATED AIRSPACE

Designated Airspace

Contained In

U.S. Fish and Wildlife Service,
U.S. Forest Service Wilderness and Primitive Areas,
and
Restricted Areas

Name	Airspace Designation MOA
Bald Eagle Breeding Area	
Salt River	4
Wilderness Areas	
Superstition	1
Salt River Canyon	2
Galiuro	3A
Sanita Teresa	3A
Four Peaks	4
Salome	4
Sierra Ancha	4
Primitive Area	
Aravaipa Canyon	2
Restricted Areas	
R 2301 A	1
R 2301 B	1
R 2301 C	1

TABLE 2.2.9.1 - AIRPORTS IN THE STUDY AREA

Probable Origin/Destination Airports In The Study Area

Airport Name	Location	No. of Based Aircraft	Date of Record
Casa Grande	Outside MOA	41	9/85
Chandler	Outside MOA	241	5/88
Coolidge	MOA 1	14	11/88
Eloy	Outside MOA	30	3/88
Falcon Field	Outside MOA	796	12/86
Flying J Ranch	NA		
Globe	MOA 2	31	9/85
Grapevine	MOA 4	0	5/84
Kearny	MOA 2	6	3/88
Mogollon	NA		
Payson	Outside MOA	33	12/83
Pinal Air Park	Outside MOA	24	3/88
San Carlos	MOA 2	5	5/84
San Manuel	Outside MOA	12	3/88
Sarita	MOA 1	3	5/84
Schnepf	MOA 1	2	5/84
Show Low	Outside MOA	81	12/88
Superior	MOA 1	2	9/88
Taylor	Outside MOA	23	9/85
Valley Farms	MOA 1	2	5/84
White River	MOA 3	9	9/85
Womack	MOA 1	1	5/84
Other	Outside MOA	52	3/88 & 12/83

PILOT SURVEY

The information gathered to predict the volume of VFR traffic impacting the T-37 training area is identified in the following questions used in the survey.

The survey consisted of 683 mailings and requested responses to the questions listed in Table 7.4. The responses received totaled 158 of which 9 were unusable due to incomplete information. This resulted in 23.1% of the pilots responding with usable information. The pilots listed as living in the Phoenix Metro area were screened to narrow the data base to those living in the East Valley, east and south of downtown Mesa, This includes:

Mesa - Apache Junction - Chandler - Gilbert

It is believed that these pilots would be the most likely to have origin/destination flights from Falcon Field (Mesa) and Chandler (Chandler Municipal). These pilots were further screened by random selection to 20% of the total data base for this area. The remainder, 610 pilots, represent all pilots living in and immediately surrounding the study area.

Historical studies of this kind were not found to have been performed locally; therefore, certain assumptions had to be made. These assumptions were based upon 20 years and over 3,000 hours of pilot and instructor pilot experience.

SURVEY QUESTIONNAIRE

A. The aircraft you normally fly is located at which airport ?

1. Casa Grande	2. Chandler	3. Coolidge	4. Eloy
5. Falcon Field	6. Flying J Ranch	7. Globe	8. Grap
9. Kearny	10. Mogollon	11. Pinal Air Park	12.Payso
13. San Carlos	14. San Manuel	15. Sarita	16. Schn
17. Show Low	18. Superior	19. Taylor	
20. Valley Farms	21. White River	22. Womack	23. Othe

B. Indicate the average number of times per month that you fly to any of following airports from the airport identified in question A.

1. Casa Grande	2. Chandler	3. Coolidge	4. Eloy
5. Falcon Field	6. Flying J Ranch	7. Globe	8. Grap
9. Kearny	10. Mogollon	11. Pinal Air Park	12.Payso
13. San Carlos	14. San Manuel	15. Sarita	16. Schn
17. Show Low	18. Superior	19. Taylor	
20. Valley Farms	21. White River	22. Womack	23. Othe

C. Do you normally fly a direct route to the airports in question B ?

1. Yes 2. No

D. What time of day do you normally fly to these airports ?

1. Daylight 2. Nighttime

E. Purpose of the flight is ?

1. Business 2. Pleasure

F. Do you file a flight plan ?

1. Yes 2. No

G. Do you flight follow with ARTCC or Approach Control ?

1. Yes 2. No

H. Are you aware of the Military Operating Areas for Williams AFB ?

1. Yes 2. No

I. At what altitude do you normally fly (AGL) ?

1. Enter altitude on the card.

J. Have you ever had to alter course to avoid military aircraft conducting flight training ?

1. Yes 2. No

TABLE 4.2.1 - RESPONSES TO PILOT SURVEY

RESPONSES TO PILOT POLL		
Pilot responses indicating a direct route flown between airports in study area.		
124 Direct	25 Indirect	3 Either
81.6%	16.4%	2.0%
Pilot responses indicating time of day routes are normally flown to airports in study area.		
136 Daylight	4 Nighttime	8 Either
91.9%	2.7%	5.4%
Pilots indicating purpose of the flight.		
47 Business	75 Pleasure	28 Either
31.3%	50.0%	18.7%
Pilots indicating the filing of a flight plan.		
35 Yes	104 No	10 Sometimes
23.5%	69.8%	6.7%
Pilots indicating requests for flight following with ARTCC or Approach Control.		
56 Yes	88 No	4 Sometimes
37.8%	59.5%	2.7%
Pilots indicating awareness of the Military Operating Areas for Williams AFB.		
144 Yes	6 No	
96.0%	4.0%	
Average altitude flown above ground level indicated by pilot responses.		
4386 feet AGL		
Pilots indicating necessity of altering course to avoid military aircraf conducting flight training.		
51 Yes	99 No	
34.0%	66.0%	

TABLE 4.2.2 - SUMMARY OF PARACHUTE OPERATIONS

SAMPLE JUMP STATISTICS FOR COOLIDGE MUNICIPAL AIRPORT
JAN 88 - MAR 1989

YR	MO	JUMPS	JUMPERS	RADIO	OUT OFF DZ	IMPACTS
1988	JAN	183	2,206	4	32	154
1988	FEB	198	1,648	2	4	55
1988	MAR	198	2,227	2	23	35
1988	APR	49	340	4	2	--
1988	OCT	16	65	--	1	1
1988	NOV	37	167	--	--	--
1988	DEC	59	461	3	--	--
1989	FEB	151	3,820	10	28	--
1989	MAR	152	2,780	4	19	106
	TOTALS	1,043	13,714	29	109	351

FIGURES

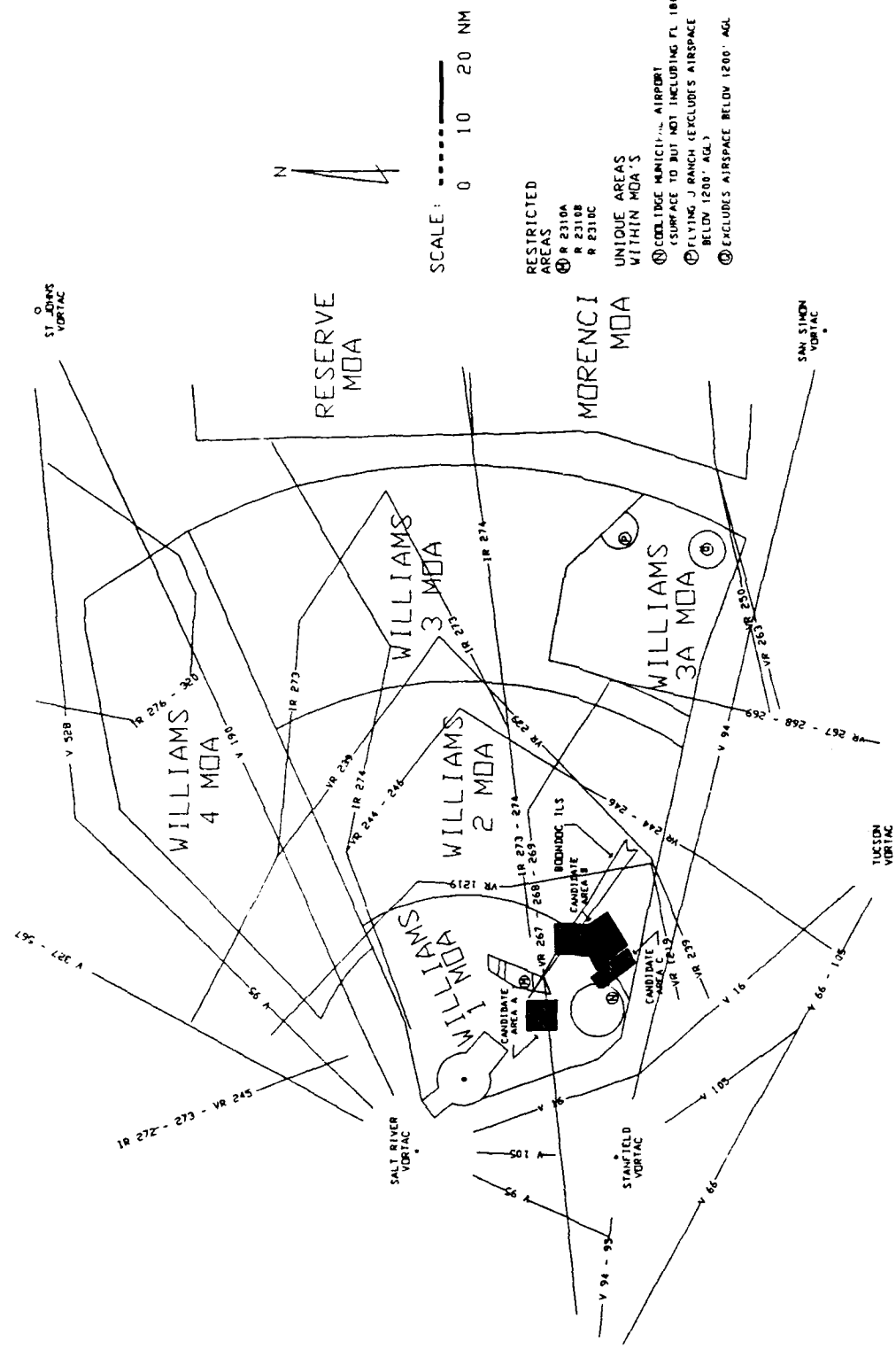

FIGURE 1. The Three Candidate Areas -- A, B, And C -- In Relationship To The Williams AFB Military Operations Area.

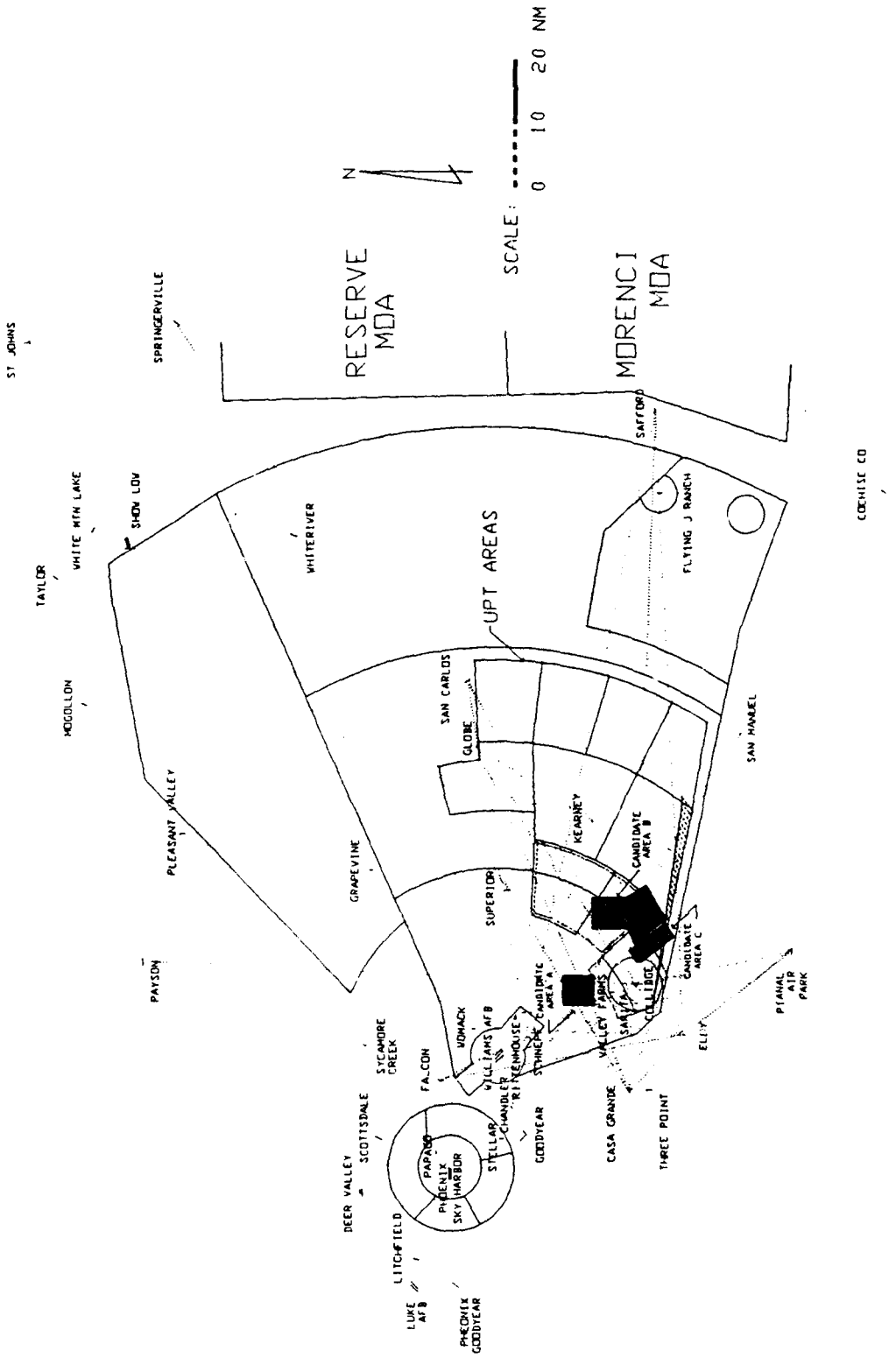

FIGURE 2. The Three Candidate Areas -- A, B, And C -- In Relationship To The Williams AFB Military Operations Areas. Local Airports, And Probable Aviation Flight Paths.

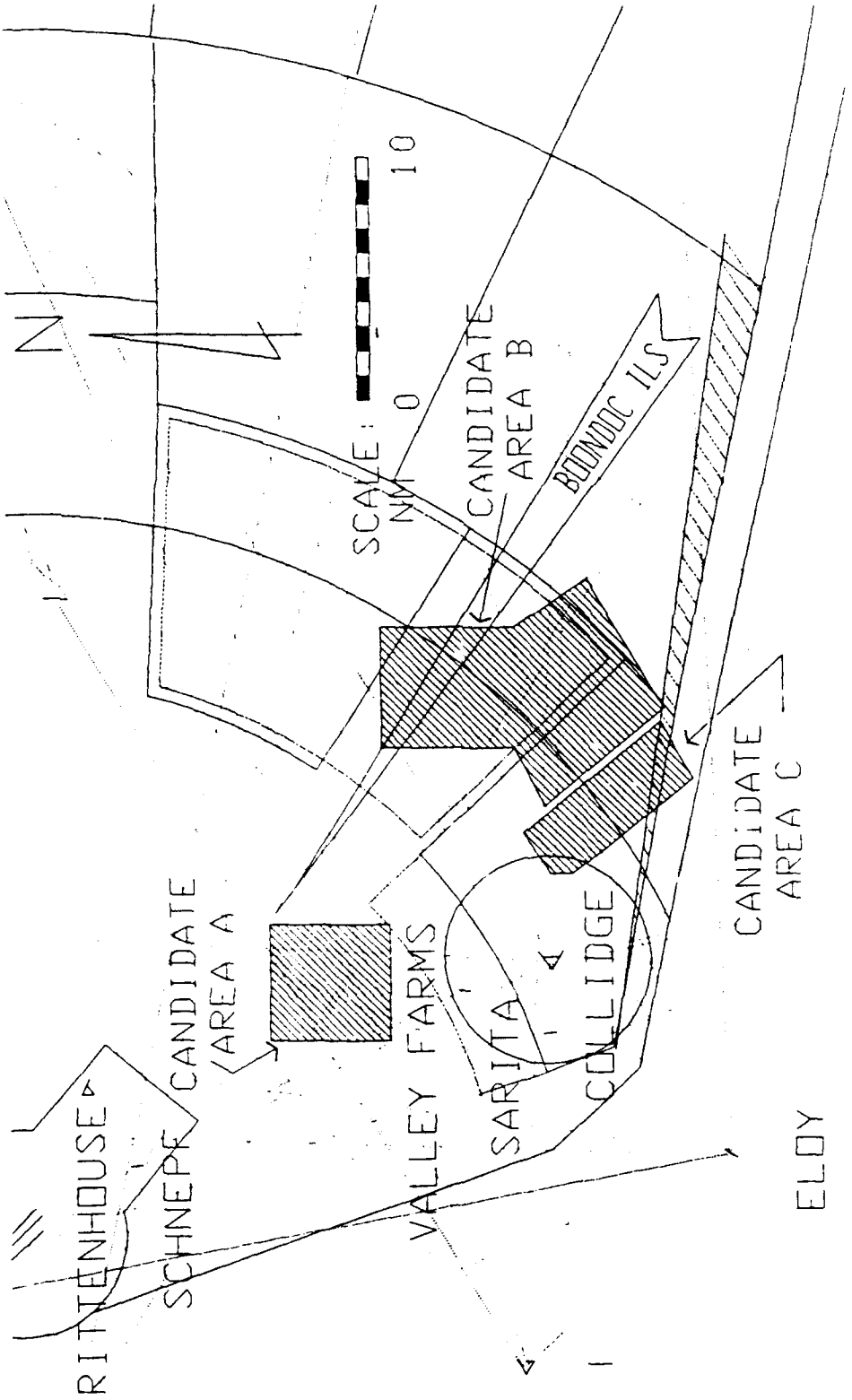

FIGURE 3. Probable General Aviation Flight Paths In Relationship To The Candidate Areas (A, B, And C).