

ENVIRONMENTAL ASSESSMENT OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I



VANCE AIR FORCE BASE, OKLAHOMA

MARCH 2003

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ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit	CZ	clear zone
71 FTW	71st Flying Training Wing	dB	decibel
ACHP	American Council on Historic Preservation	dBA	A-weighted decibel
AETC	Air Education and Training Command	DNL	Day-Night Average Sound Level
AF	U.S. Air Force	DoD	U.S. Department of Defense
AFB	Air Force Base	EA	Environmental Assessment
AFI	Air Force Instruction	EIAP	Environmental Impact Analysis Process
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection, and Health	EIS	Environmental Impact Statement
AFPD	Air Force Policy Directive	EO	Executive Order
AGE	aerospace ground equipment	ESA	Endangered Species Act
AICUZ	Air Installation Compatible Use Zone	FAA	Federal Aviation Administration
AMP	Asbestos Management Plan	FHMP	Family Housing Master Plan
AOP	Asbestos Operating Plan	FICON	Federal Interagency Committee on Noise
APZ	accident potential zone	FONSI	Finding of No Significant Impact
AQCR	Air Quality Control Region	ft ²	square feet
ASR	Asbestos Survey Report	ft ³ /sec	cubic feet per second
AST	aboveground storage tank	FY	Fiscal Year
BAH	Basic Allowance for Housing	GOV	government-owned vehicle
BR	bedroom	GRADE	Guidance for Rating and Assessing Damage and Exposure
CAA	Clean Air Act	HABS	Historic American Building Survey
CEQ	Council on Environmental Quality	HAZMAT	Hazardous Material
CFR	Code of Federal Regulations	HDPE	High-density polyethylene
CO	Carbon Monoxide	HQ	Headquarters
CRMP	Cultural Resources Management Plan	HQ AFCEE	Headquarters Air Force Center for Environmental Excellence
CWA	Clean Water Act	HUD	U.S. Department of Housing and Urban Development
CY	Calendar Year		

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FINDING OF NO SIGNIFICANT IMPACT ENVIRONMENTAL ASSESSMENT OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I AT VANCE AIR FORCE BASE, OKLAHOMA

AGENCY: 71st Flying Training Wing (71 FTW) Vance Air Force Base (AFB), Oklahoma (OK)

BACKGROUND: Demolish and replace 59 military family housing (MFH) units at Vance AFB, OK with modern and efficient housing for military personnel. Pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing the Act (40 Code of Federal Regulations [CFR] Parts 1500-1508), Department of Defense (DoD) Directive 6050.1, DoD Regulation 5000.2-R, 32 CFR 989, as amended, *U.S. Air Force Environmental Impact Analysis Process*, and other applicable Federal regulations, the U.S. Air Force (AF) conducted an assessment of the potential environmental consequences of the Proposed Action and the No Action Alternative.

PROPOSED ACTION: The purpose of the action is to provide MFH at Vance AFB that meets AF housing standards by demolishing existing units and constructing new units. The need for the action is to provide modern and efficient housing for non-commissioned officers and their dependents stationed at Vance AFB. Under Phase I, Vance AFB has identified the need to demolish and replace 59 MFH units at Vance AFB as part of the installation's Fiscal Year (FY) 2003 Capital Improvement Program.

OTHER ACTIONS: There are two actions at Vance AFB that could contribute to cumulative impacts. The first is the proposed beddown of T-6A aircraft. An *Environmental Assessment of T-6A Beddown and Changes to the T-37 Program at Vance AFB* was completed, and a Finding of No Significant Impact (FONSI) was signed in September 2002. This action could occur concurrently with the Proposed Action. The second action that could contribute to cumulative impacts is the Vance AFB plan to upgrade the remaining 121 MFH units during Phase 2 and Phase 3 of this program. Currently, no timeline has been developed for the implementation of Phase 2 and Phase 3.

SUMMARY OF FINDINGS: The following paragraphs summarize the findings of the attached EA for the Proposed Action. Beneficial impacts would be expected as a result of inhabiting the new MFH units. The new units would meet or exceed all of the current standards for energy efficiency. In addition, all units will meet modern housing standards.

Noise. The primary source of noise at Vance AFB would continue to be from aircraft operations; however, there could be periods of time in which construction noise could be discerned and provide minor annoyance to on-base personnel. After completion of proposed construction activities, none of the projects would result in changes to existing noise levels. Overall, noise impacts associated with the Proposed Action would be negligible.

Land Use. No adverse impacts would be expected within the existing MFH area and slight beneficial impacts would be expected within the MFH expansion area as a result of the Proposed Action.

Air Quality. The effects of the increase in any criteria pollutants within the air quality control region due to the Proposed Action would be temporary, would fall off rapidly with distance from the proposed construction sites, and would not result in any long-term impacts.

Safety. The short-term risk associated with construction contractors performing work at Vance AFB during the normal workday would be anticipated to slightly increase. Contractors would be required to establish and maintain safety programs. Projects associated with the Proposed Action would not pose a risk to installation personnel.

Geological Resources. Soils have been previously disturbed and modified by agricultural uses and prior construction; therefore, soil impacts are not expected.

Water Resources. Surface water and groundwater features would not be impacted due to the minimal increase in runoff from the additional impervious cover. No activity would occur in a floodplain.

Biological Resources. Although short-term, localized minor effects could be expected on vegetation in proximity to the construction and demolition sites, no adverse effects would be expected as a result of the implementation of the Proposed Action at Vance AFB.

Cultural Resources. There are no known archaeological resources located on Vance AFB, and the area is not considered to have a high potential for cultural resources. In addition, the areas within the base that would be subject to ground disturbing activities associated with the Proposed Action have been subjected to heavy disturbance in the past.

Socioeconomics. Short-term beneficial impacts on regional socioeconomics would occur during construction activities at Vance AFB. However, no long-term benefits would occur, and there would be no changes in socioeconomic patterns or trends.

Environmental Justice. No disproportionately high or adverse impact on minority and low-income populations would occur.

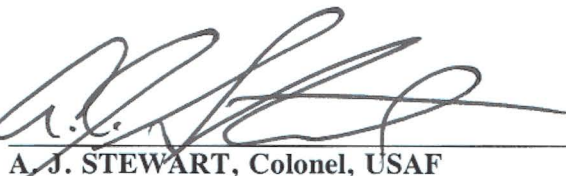
Infrastructure and Utilities. No adverse impacts would be expected.

Hazardous Materials and Wastes. Hazardous waste generation and hazardous materials purchases would minimally affect hazardous materials or hazardous waste management and would not prevent the base from achieving its pollution prevention reduction goals. No facilities would be constructed on an Installation Restoration Program site. Asbestos containing material and lead-based paint is expected to be encountered during building demolition. It is the responsibility of the demolition contractors to comply with relevant health and safety and disposal regulations.

NO ACTION ALTERNATIVE: Under the No Action Alternative, Vance AFB would continue to use existing MFH units, and not renovate its current stock of MFH units. These units fail to meet current AF living standards. There would be no change from the existing conditions at the installation, and the inadequacy and degradation of the existing MFH units would continue. The existing units were constructed in 1960 and show the effects of age and heavy use. Houses are approaching the end of their useful life expectancy. Implementation of the No Action Alternative would require AF members and their families to continue living in outdated, sub-standard housing. Selection of this alternative would negate Vance AFB's ability to meet AF requirements of replacing substandard MFH units by FY 2010.

PUBLIC REVIEW AND INTERAGENCY COORDINATION: This Finding of No Significant Impact and the Draft EA were made available to the public for 21 days. Based on the provisions set forth in the Proposed Action, all activities were found to comply with the criteria or standards of environmental quality and coordinated with the appropriate Federal and state agencies.

DECISION: Based on the requirements of NEPA, CEQ, and 32 CFR 989, as amended, I conclude the environmental effects of the Proposed Action are not significant, and therefore, an environmental impact statement will not be prepared.



A. J. STEWART, Colonel, USAF

19 Mar 03
Date

**ENVIRONMENTAL ASSESSMENT OF
PROPOSED UPGRADES TO
MILITARY FAMILY HOUSING, PHASE I**



Vance Air Force Base, Oklahoma

MARCH 2003

COVER SHEET

ENVIRONMENTAL ASSESSMENT OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I AT VANCE AIR FORCE BASE, OKLAHOMA

Responsible Agencies: 71st Flying Training Wing (71 FTW) Vance Air Force Base (AFB), Oklahoma (OK)

Affected Location: Vance AFB, Garfield County, OK

Proposed Action: Demolish and replace 59 military family housing (MFH) units at Vance AFB, OK with modern and efficient housing for military personnel.

Written comments and inquiries regarding this document should be directed to: Mr. Mark Buthman, Dyn CEV, 140 Channel Street, Suite 231, Vance AFB, OK 73705-5623, (580) 213-7344.

Report Designation: Environmental Assessment (EA).

Abstract: The purpose of the action is to provide MFH at Vance AFB that meets U.S. Air Force (AF) housing standards by demolishing existing units and constructing new units. The need for the action is to provide modern and efficient housing for non-commissioned officers and their dependents stationed at Vance AFB. Under Phase I, Vance AFB has identified the need to demolish and replace 59 MFH units at Vance AFB as part of the installation's Fiscal Year 2003 Capital Improvement Program. Under the No Action Alternative, Vance AFB personnel would continue to use existing MFH units. There would be no change from the existing conditions at the installation. This alternative would not address the 71 FTW's current requirement to upgrade these MFH units to meet AF quality of life standards. This EA has been prepared to evaluate the Proposed Action and the No Action Alternative. Resources considered in the impact analysis are: noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomic resources, environmental justice, infrastructure and utilities, and hazardous materials and wastes.

**ENVIRONMENTAL ASSESSMENT
OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I
VANCE AIR FORCE BASE, OKLAHOMA**

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1. Purpose of and Need for the Proposed Action

This chapter includes six sections: an introduction to military family housing (MFH) at Vance Air Force Base (AFB), a statement of the purpose of and need for the Proposed Action, the location of the Proposed Action, a statement of the decision to be made, a summary of the scope of the environmental review including a list of the applicable regulatory requirements, and an overview of how this Environmental Assessment (EA) is organized.

1.1 Introduction

The U.S. Air Force (AF) currently operates and maintains approximately 110,000 housing units at installations in the contiguous United States (U.S.), Alaska, Hawaii, and overseas. Office of the Secretary of Defense (OSD) policy is to rely on local communities to provide housing for military families. However, following World War II and the Korean conflict, suitable and affordable housing near many of the installations was insufficient to meet MFH requirements. As a consequence, the AF began an extensive housing construction program. Approximately 60 percent of the existing housing inventory was built in the 1950s and 60s.

Since most of the AF's MFH units are over 40 years old, OSD guidance now requires the Services to upgrade all inadequate housing to modern standards by or before Fiscal Year (FY) 2007. The 2002 AF Family Housing Master Plan (FHMP) summarizes the requirements remaining for the AF Family Housing program upon the completion of the FY03 MFH program as submitted in the FY03 - FY07 AF Amended Program Objective Memorandum. Once execution of the FY03 MFH investment program is completed, approximately 53 percent of AF MFH will not meet modern standards and will require either major improvement or replacement. Therefore, the AF will not achieve the OSD guidance by FY07. However, the AF will endeavor to attain its goal to revitalize all inadequate housing by FY10 in order to maintain the quality of life for AF families.

Vance AFB is located in Enid, Oklahoma. The installation is assigned to Headquarters (HQ) Air Education and Training Command (AETC) and is operated by the 71st Flying Training Wing (71 FTW). Vance AFB currently owns 230 MFH units, all of which are inadequate and require revitalization per Air Force Instruction (AFI) 32-6002, *Family Housing Planning, Programing, Design, and Construction*.

In 1995, the city of Enid offered three parcels of land to Vance AFB (see Figure 1-1) with the idea that the land could be used in the following ways. The 154-acre parcel located north of the

base could be used for parasail training and/or agricultural out-leasing; the 6.75-acre parcel south of the base could be used for agricultural out-leasing; and the 10.6-acre parcel located east of the base could be used for extension of MFH or agricultural out-leasing. Vance AFB accepted the three parcels of land, and is now proposing to construct new MFH units on the newly acquired 10.6-acre parcel.

This EA analyzes Vance AFB's Proposed Action and the No Action Alternative. If the analyses presented in this EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FONSI) would be prepared. A FONSI briefly presents reasons why a Proposed Action would not have a significant effect on resource areas, that include the human and natural environment, and why an Environmental Impact Statement (EIS) is unnecessary. If significant environmental issues arise that cannot be mitigated to insignificance, an EIS would be required, or the Proposed Action would be abandoned and no action would be taken.

1.2 Purpose of and Need for the Proposed Action

The purpose of the action is to provide MFH at Vance AFB that meets AF housing standards by demolishing existing units and constructing new units. Vance AFB is proposing to demolish 59 existing MFH units and replace them with 59 new MFH units. These new units would be distributed across the demolition area and vacant parcel of land to the north of the existing MFH area.

The need for the action is to provide modern and efficient housing for non-commissioned officers and their dependents stationed at Vance AFB. The current Capeheart housing units were constructed in 1960, do not meet the current standards, and are below current AF square footage allowances. Vance AFB is allocated 230 MFH units and has maintained an average occupancy rate of 98 percent in these units over the last three years. All 230 MFH units are inadequate and in need of revitalization. Housing interiors are outdated and generally inadequate by modern criteria. Vance AFB is implementing the AF guidance requirement to upgrade all inadequate housing to modern standards by or before FY10. Vance AFB plans to replace all 230 MFH units in multiple phases. Phase I focuses on the removal and replacement of 59 MFH units. Construction of new MFH units on the 10.6-acre parcel would begin in May 2003, and Phase I demolition of the old Capeheart MFH units would begin in December 2003. Under the current proposed timeline, Phase I of the MFH replacement program would be complete in May 2004.

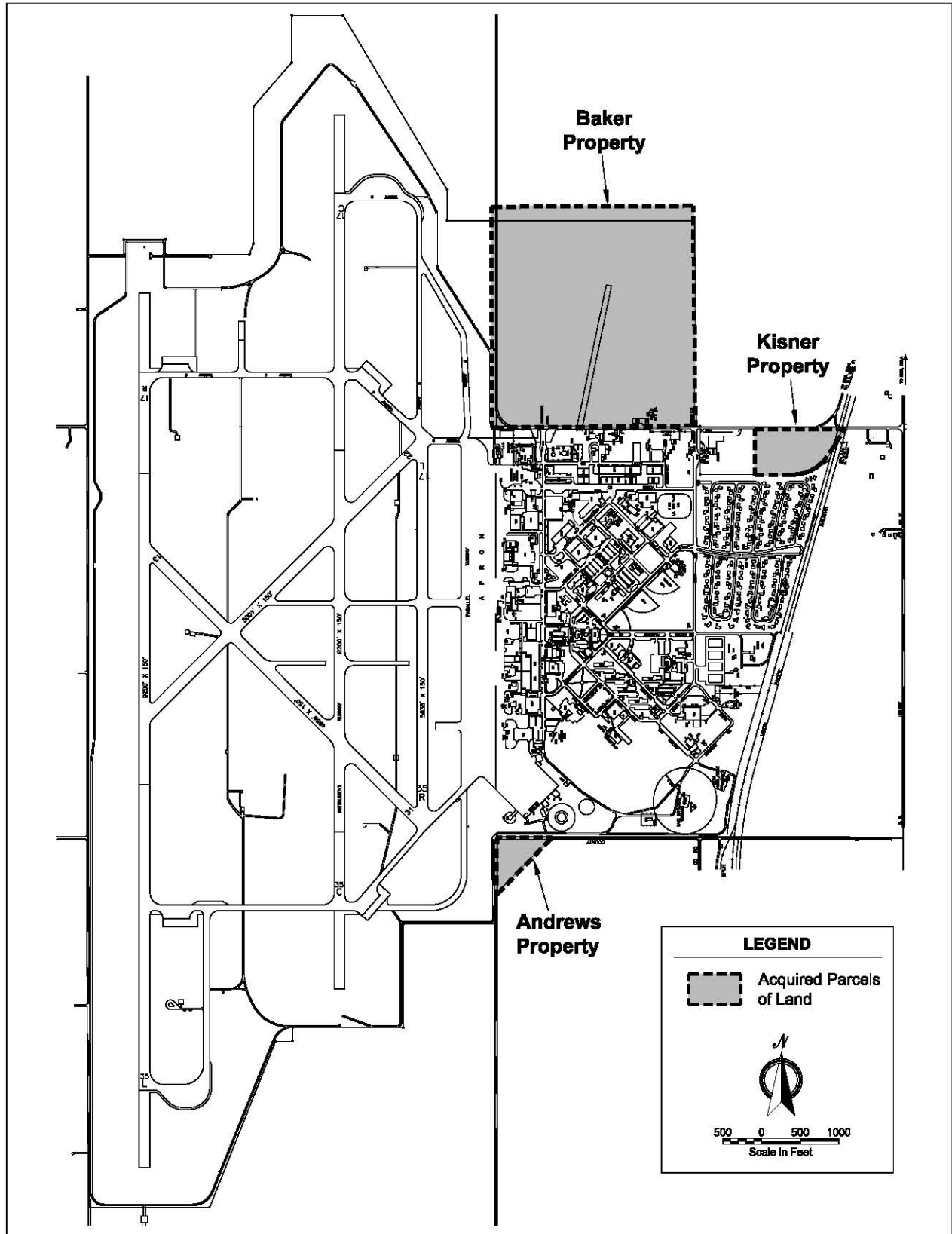


Figure 1-1. Parcels of Land Offered to Vance AFB

1.3 Location of the Proposed Action

Vance AFB is located in the northern central portion of the state of Oklahoma and in the west central half of Garfield County. Vance AFB lies at the southwest corner of the city of Enid, and a portion of the installation is within the corporate limits of the city. Figure 1-2 shows the location of Vance AFB.

1.4 Decision to be Made

The AF would make one of the following decisions:

- Implement the proposed construction and demolition of 59 MFH units at Vance AFB (Proposed Action), or
- Not implement the proposed construction and demolition of 59 MFH units at Vance AFB (No Action Alternative).

Based on the review of the analysis, the decision-maker would either sign a FONSI or recommend the analysis proceed to an EIS.

1.5 Scope of the Environmental Review

1.5.1 National Environmental Policy Act

Under the National Environmental Policy Act (NEPA) of 1969, federal agencies are required to systematically assess the environmental consequences of their proposed actions during the decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process. In 1978, CEQ issued regulations implementing the process (40 Code of Federal Regulations [CFR] 1500-1508). CEQ regulations require that an EA:

- Briefly provide evidence and analysis to determine whether the Proposed Action might have significant effects that would require preparation of an EIS. If the analysis determines that the environmental effects would not be significant, a FONSI would be prepared.
- Facilitate the preparation of an EIS, when required.

The EA assesses the demolition and construction of 59 MFH units proposed at Vance AFB as part of the installation's FY03 Capital Improvement Program. Additionally, the EA complies

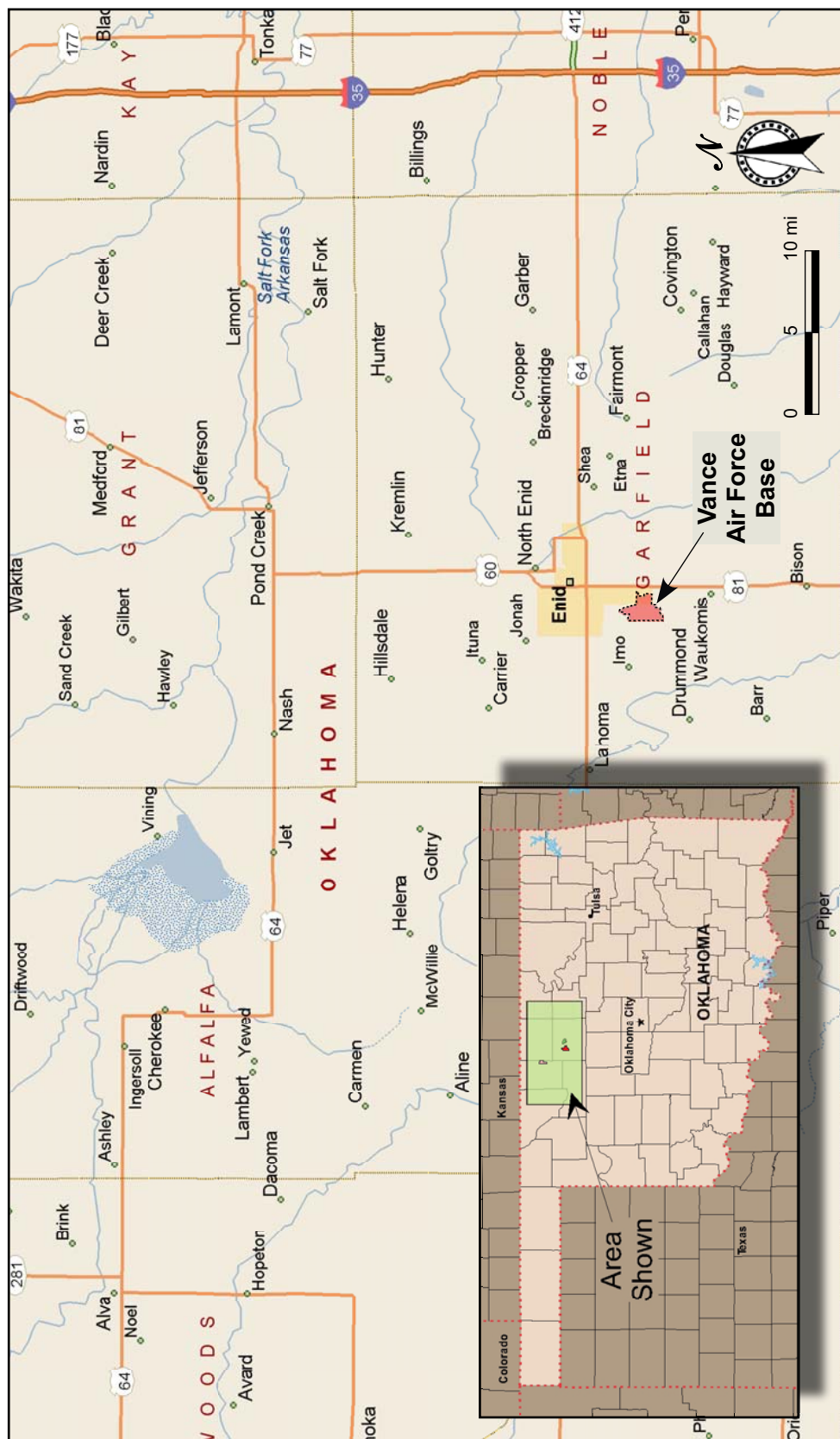


Figure 1-2. Vance AFB Vicinity Map

with the AF Environmental Impact Analysis Process (EIAP) for the Proposed Action as set forth in 32 CFR Part 989, as amended, *The Environmental Impact Analysis Process*, which implements NEPA, CEQ regulations, and Department of Defense (DoD) Instruction 4715.9, *Environmental Planning and Analysis*.

This EA identifies, describes, and evaluates the potential environmental impacts that may result from the proposed construction and demolition projects. As appropriate, the affected environment and environmental consequences of the Proposed Action may be described in terms of site-specific descriptions or regional overview. Finally, this EA identifies mitigation measures or best management practices to prevent or minimize environmental impacts, if required.

1.5.2 Integration of Other Environmental Statutes and Regulations

To comply with NEPA, the planning and decision making process for actions proposed by federal agencies involves a study of relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with a proposed action. According to CEQ regulations, the requirements of NEPA must be integrated “with other planning and environmental review procedures required by law or by an agency so that all such procedures run concurrently rather than consecutively.”

This EA examines potential effects of the Proposed Action and alternatives on 12 resource areas: noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomic resources, environmental justice, infrastructure and utilities, and hazardous materials and wastes. The following list presents examples of relevant laws, regulations, and other requirements that are often considered as part of the analysis.

Safety

- AFI 91-202, *The U.S. Air Force Mishap Prevention Program*, implements Air Force Policy Directive (AFPD) 91-2, *Safety Programs*
- AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*, implements AFPD 91-3, *Occupational Safety and Health*

Air Quality

- *Clean Air Act (CAA)* (42 United States Code [U.S.C.] 7401-7671g), as amended

Noise

- Land use guidelines established by the U.S. Department of Housing and Urban Development (HUD) and based on findings of the Federal Interagency Committee on Noise (FICON) recommend acceptable levels of noise exposure corresponding to land use.

Land Use

- AFI 32-7063, *Air Installation Compatible Use Zone (AICUZ) Program*

Water Resources

- *Clean Water Act* (CWA) 1977 (33 U.S.C. 1251 et seq., as amended)
- *Water Quality Act* of 1987 (Public Law [P.L.] 95-217)
- Executive Order (EO) 11988, *Floodplain Management*

Biological Resources

- *Endangered Species Act* (ESA) of 1973 (16 U.S.C. 1531 et seq.)
- EO 11990, *Protection of Wetlands*
- CWA, under Section 404

Cultural Resources

- *National Historic Preservation Act* (NHPA) of 1966 (16 U.S.C. 470 et seq.)
- Protection of Historic and Cultural Properties (36 CFR 800 [1986])
- *Archeological Resources Protection Act* of 1979
- EO 13007, *Indian Sacred Sites*
- EO 13084, *Consultation and Coordination with Indian Tribal Governments*

Socioeconomics and Environmental Justice

- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*

1.5.3 Statement of the Baseline Condition and the Analysis Period

FY02 activities will be used to establish the baseline conditions. However, if FY02 data are not available, the most recent information will be used. For analysis purposes, FY03 (beginning December 2002) through FY04 (beginning October 2003) will be assessed for the potential impacts that may result from the proposed construction and demolition projects. These two years would represent the proposed period for the construction and demolition activities at Vance AFB.

1.5.4 Interagency and Intergovernmental Coordination for Environmental Planning

NEPA requirements help ensure that environmental information is made available to the public during the decision-making process and prior to actions being taken. The premise of NEPA is that the quality of federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process. CEQ regulations implementing NEPA specifically state, "There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping." The Intergovernmental Coordination Act and EO 12372, *Intergovernmental Review of Federal Programs*, require federal agencies to cooperate with and consider state and local views in implementing a federal proposal. AFI 32-7060 requires the AF to implement a process known as Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), which is used for the purpose of agency coordination and implements scoping requirements.

Through the IICEP process, Vance AFB notified relevant federal, state, and local agencies of the Proposed Action and provided them time to make known their human or natural environmental concerns specific to the action. The IICEP process provides Vance AFB the opportunity to cooperate with and consider state and local views in implementing the federal proposal. Upon receipt, agency responses were incorporated into the analysis of potential environmental impacts performed as part of this EA. Vance AFB coordinated with agencies such as the U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), State Historic Preservation Office (SHPO), and other federal, state, and local agencies. Appendix C of this EA includes a copy of an IICEP letter mailed to the agencies for this action, the IICEP distribution list, and agency comments.

A Notice of Availability for this EA and FONSI was published in the *Enid News and Eagle* on February 12, 2003. This was done to solicit comments on the Proposed Action and involve the

local community in the decision-making process. A copy of the Notice of Availability, associated affidavit, and privacy advisory is included in Appendix C. No public comments were received.

1.5.5 Cumulative Actions

There are two actions at Vance AFB that could contribute to cumulative impacts. The first is the proposed beddown of T-6A aircraft. An *Environmental Assessment of T-6A Beddown and Changes to the T-37 Program at Vance AFB* was completed, and a FONSI was signed in September 2002. This action could occur concurrently with the Proposed Action. Any cumulative impacts associated with the T-6A beddown are assessed in this EA. The second action that could contribute to cumulative impacts is the Vance AFB plan to upgrade the remaining 121 MFH units during Phase II and Phase III of this program. Currently, no timeline has been developed for the implementation of Phase II and Phase III. Cumulative impacts, if any, associated with these actions are assessed as part of this EA.

1.6 Introduction to the Organization of the Document

- | | |
|-------------------|--|
| <i>Chapter 1</i> | Chapter 1 contains background information on Vance AFB, a statement of the purpose of and need for the Proposed Action, the location of the Proposed Action, the decision to be made, the scope of the environmental review, including a listing of applicable regulatory requirements, and an introduction to the organization of the document. |
| <i>Chapter 2</i> | Chapter 2 provides a history of the formulation of alternatives, a detailed description of the Proposed Action, a detailed description of the No Action Alternative, a description of alternatives eliminated from further consideration, other actions at Vance AFB, a comparison of environmental effects of all alternatives, an identification of the preferred alternative, and a summary of mitigation measures/best management practices. |
| <i>Chapter 3</i> | Chapter 3 contains a general description of the biophysical resources and baseline conditions that potentially could be affected by the Proposed Action or No Action Alternative. |
| <i>Chapter 4</i> | Discusses environmental consequences. |
| <i>Chapter 5</i> | Lists the preparers of the document. |
| <i>Chapter 6</i> | Lists the references used in preparation of the EA. |
| <i>Appendix A</i> | Includes a copy of the Department of Defense Form 813. |
| <i>Appendix B</i> | Includes a copy of the Department of Defense Form 1391. |

Appendix C Includes a copy of the IICEP letter mailed to the agencies for this action, the IICEP distribution list, responses from agencies, and a copy the Notice of Availability.

Appendix D Includes a copy of the air emissions calculations spreadsheets.

2. Description of Proposed Action and Alternatives

This chapter has eight sections: a history of the formulation of alternatives, a detailed description of the Proposed Action, a description of the No Action Alternative, identification of alternatives eliminated from further consideration, identification of other actions announced for the base unrelated to the Proposed Action, a comparison of the anticipated environmental effects of all alternatives, identification of the preferred alternative, and a discussion of mitigation measures and best management practices that could reduce the potential for impacts.

2.1 History of the Formulation of Alternatives

Other potential alternatives were considered early in the conceptual phase of this program. However, they did not meet the project's goals due to cost considerations and housing standards requirements. An Economic Analysis performed by Vance AFB Facilities Management Office in January 2002 compared four alternatives: the Proposed Action (demolition and new construction), No Action Alternative (status quo), and two Alternatives Eliminated from Further Consideration (renovation and direct compensation). The following sections briefly explain each alternative.

2.2 Proposed Action

The Proposed Action is to construct 59 housing units on an area comprised of a 10.6-acre parcel donated to Vance AFB by the city of Enid and an adjacent land parcel currently containing 59 housing units. Figure 2-1 shows the base map. Figure 2-2 illustrates the location of the proposed demolition and clearing. Figure 2-3 shows the proposed construction. The existing 59 housing units would be demolished. The new construction would have a slight change in the number of bedrooms allocated to military personnel based upon the individual's military rank compared with the existing MFH units. The new units would include three and four bedroom housing units. Table 2-1 displays the current and proposed unit allocations. The units would be single- and two-story units with an attached garage. The new units would meet or exceed all of the current standards for energy and water efficiency and would meet modern housing standards. In addition, the existing infrastructure would be used to the maximum extent practicable. Thus, the Proposed Action would provide modern housing units for AF personnel, allow for increased outdoor space, and is the most cost-effective alternative.

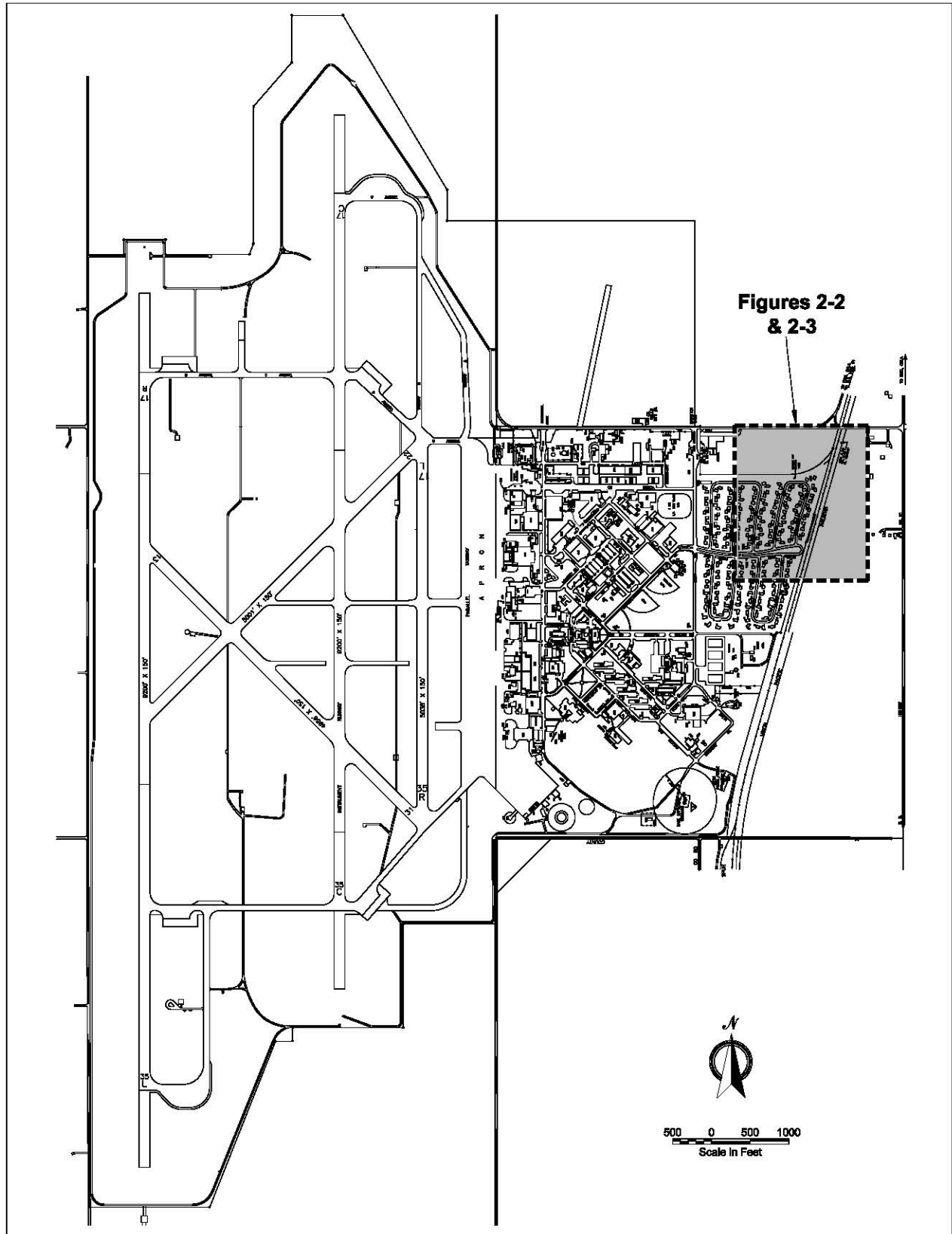


Figure 2-1. Vance AFB Site Map



Figure 2-2. Location of Proposed Demolition Projects and Clearing at Vance AFB

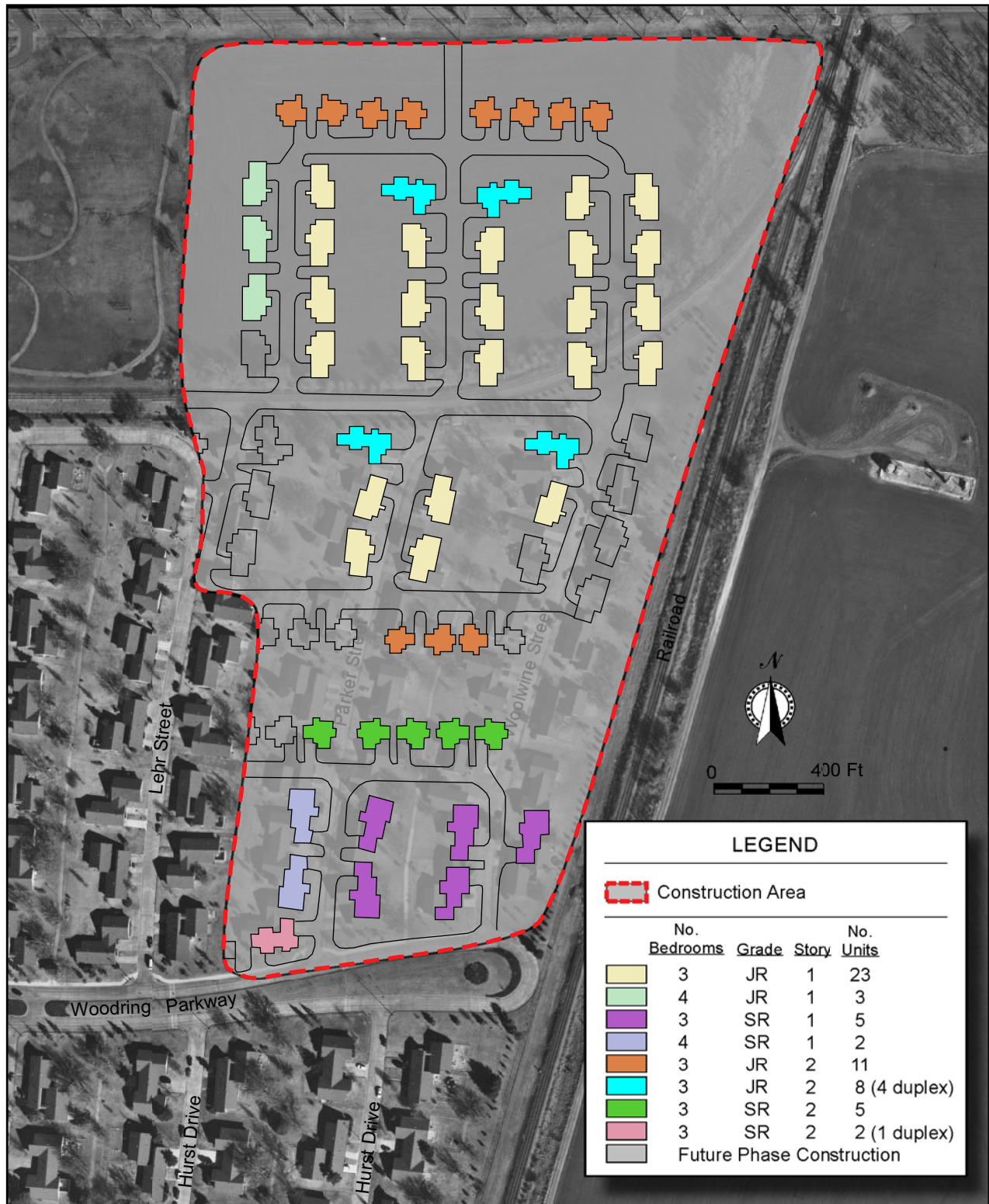


Figure 2-3. Location of Proposed Construction Projects at Vance AFB

Table 2-1. Current and Proposed MFH Unit Allocation

Rank and Number of Bedrooms	Current Number of MFH Units	Proposed Number of MFH Units		
		Single-story	Two-story	Total
JNCO 2 BR	10	0	0	0
JNCO 3 BR	31	23	11	34
JNCO 4 BR	4	3	8 ^a	11
SNCO 3 BR	12	5	5	10
SNCO 4 BR	2	2	2 ^b	4
Total				59

Note: JNCO – Junior Non-commissioned Officer
 SCNO – Senior Non-commissioned Officer
 BR – bedroom
^a – 4 duplexes
^b – 1 duplex

The 10.6-acre parcel is currently a wheat field. An environmental baseline survey entitled *Environmental Baseline Survey Conducted on Kisner Property Part of NE/4, Section 36, T22N, R7W, Enid, Garfield County, Oklahoma* dated December 1995 and an EA entitled *Environmental Assessment for city of Enid Land Proffer* dated February 15, 1996, found no environmental concerns. The aforementioned documents are incorporated by reference. There would be no increase or decrease in personnel numbers at the installation as a result of the Proposed Action.

2.3 No Action Alternative

Under the No Action Alternative, Vance AFB would continue to use existing MFH units, and not renovate its current stock of MFH units. These units fail to meet current AF living standards. There would be no change from the existing conditions at the installation, and the inadequacy and degradation of the existing MFH units would continue. The existing units were constructed in 1960 and show the effects of age and heavy use. Houses are approaching the end of their useful life expectancy. Implementation of the No Action Alternative would require AF members and their families to continue living in outdated, sub-standard housing. Selection of this alternative would negate Vance AFB's ability to meet AF requirements of replacing substandard MFH units by FY10.

2.4 Alternatives Eliminated from Further Consideration

Modification of existing facilities was considered in the early conceptual phase of this program; however, such modifications would not meet the program's goals or fulfill mission requirements as discussed below. Thus, these alternatives were eliminated from further consideration.

2.4.1 Renovation of Existing Buildings

This alternative would include the renovation of all 59 MFH units, maintaining the current rank/bedroom composition. The existing one-story duplexes would be updated to current standards. The renovated MFH units would provide a safe, comfortable, and appealing living environment comparable to off-base housing. However, this alternative is not acceptable because it would not adequately address the size deficiencies of the current houses. Constructing additions onto the existing houses would negatively impact the neighborhood by reducing the space between housing units. Furthermore, the scope of improvements necessary to bring the MFH units to standard is not economically feasible. The cost would be more than 70 percent of the replacement costs. AF guidelines do not allow renovations if the cost is more than 70 percent of the cost for replacement. Therefore, this alternative is not viable and has been eliminated from further consideration.

2.4.2 Direct Compensation

This alternative would involve demolishing the existing housing, moving all 59 families off-base, and paying basic allowance for housing (BAH) for military members assigned to Vance AFB. This is not a feasible alternative because an October 2001 Housing Market Analysis concluded there is a deficit of adequate housing in the community to meet AF needs. Therefore, this alternative was eliminated from further consideration.

2.5 Other Actions Announced for Vance AFB

A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." As stated in Section 1.5.5, there is one known action anticipated at Vance AFB during the same period as the Proposed Action. The beddown of the T-6A aircraft when combined with the MFH Proposed Action could potentially result in cumulative impacts. An EA entitled *Environmental Assessment of T-6A*

Beddown and Changes to the T-37 Program at Vance Air Force Base was completed, and the FONSI was signed in September 2002. The aforementioned EA, therefore, is incorporated by reference. In addition, Phase II and Phase III of the military family housing project could potentially result in cumulative impacts. Any potential impacts will be addressed in this EA. No other future or foreseeable actions have been identified for Vance AFB.

2.6 Comparison of Environmental Effects of All Alternatives

Table 2-2 summarizes the impacts of the Proposed Action and No Action Alternative, as presented in Chapter 4, *Environmental Consequences*.

2.7 Identification of Preferred Alternative

The Preferred Alternative is anticipated to be the implementation of the Proposed Action as selected by the AF.

2.8 Mitigation Measures/Best Management Practices

Mitigation measures may not be necessary for implementation of the Proposed Action. However, best management practices for specific resources would be implemented as part of the Proposed Action to further minimize environmental impacts. These best management practices are presented in Table 2-3 and are further detailed in Chapter 4, *Environmental Consequences*.

Table 2-2. Environmental Consequences

Resource (Applicable EA Section) ¹	Proposed Action	No Action Alternative
Noise (Section 4.1)	The primary source of noise at Vance AFB would continue to be from aircraft operations; however, there could be periods of time in which construction noise could be discerned and provide minor annoyance to on-base personnel. This condition would occur when construction activity is underway and flying activity is low. After completion of proposed construction activities, none of the projects would result in changes to existing noise levels. Overall, noise impacts associated with the Proposed Action would be negligible. Therefore, the Proposed Action would not produce any long-term impacts to the existing noise environment.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.1.
Land Use (Section 4.2)	No adverse impacts would be anticipated. Construction projects would be performed in land use areas with facilities of the same or similar function.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.2.
Air Quality (Section 4.3)	Construction emissions would produce slightly elevated short-term criteria pollutant ambient air concentrations. The Proposed Action would result in short-term minor impacts to regional air quality. However, the increases would be minimal (less than 0.001 percent increase for any criteria pollutant) when compared to the air emissions baseline for Air Quality Control Region No. 185. Furthermore, the effects would be temporary, would fall off rapidly with distance from the proposed construction sites, and would not result in any long-term impacts.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.3.

Table 2-2. Environmental Consequences (continued)

Resource (Applicable EA Section)	Proposed Action	No Action Alternative
<i>Safety</i> (Section 4.4)	Implementation of the Proposed Action would be anticipated to slightly increase the short-term risk associated with construction contractors performing work at Vance AFB during the normal workday. Contractors would be required to establish and maintain safety programs. Projects associated with the Proposed Action would not pose a risk to installation personnel.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.4.
<i>Geological Resources</i> (Section 4.5)	Minimal short-term impacts would be anticipated. However, construction activities at Vance AFB would occur within areas where the physiography, geology, and soils have been previously disturbed and modified by prior building construction. Implementation of best management practices during construction would reduce the potential for erosion.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.5.
<i>Water Resources</i> (Section 4.6)	Additional water usage would be required during construction as a fugitive dust control measure. The quantity necessary would be minimal and no adverse impact is anticipated. Furthermore, the Proposed Action would result in no net increase in personnel; therefore no additional water consumption is expected. The storm water runoff from the additional acreage of impervious cover would not be expected to noticeably change the total volume or quality of storm water runoff. No construction at Vance AFB would occur in a floodplain. Use of best management practices during construction phase would reduce the potential for sedimentation entering receiving bodies of water.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.6.

Table 2-2. Environmental Consequences (continued)

Resource (Applicable EA Section)	Proposed Action	No Action Alternative
<i>Biological Resources</i> (Section 4.7)	The proposed construction activities would occur on previously disturbed areas within the developed regions of the base. No federally or state-listed endangered, threatened, or special status species are known to occur on Vance AFB. No Vance AFB construction projects would occur in or near wetlands.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.7.
<i>Cultural Resources</i> (Section 4.8)	Sites for planned facilities have been previously disturbed. No archaeological resources have been identified at Vance AFB and no historic architectural resources are located in the construction area. No adverse impacts would be anticipated.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.8.
<i>Socioeconomics</i> (Section 4.9)	Short-term beneficial impacts would be anticipated. Short-term beneficial impacts on regional socioeconomics would occur during construction activities at Vance AFB. However, no long-term benefits would occur, and there would be no changes in socioeconomic patterns or trends.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.9.
<i>Environmental Justice</i> (Section 4.10)	There would be no adverse environmental impacts associated with the Proposed Action. Therefore, no minority or low-income populations would be adversely or disproportionately impacted.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.10.

Table 2-2. Environmental Consequences (continued)

Resource (Applicable EA Section)	Proposed Action	No Action Alternative
<i>Infrastructure and Utilities</i> (Section 4.11)	Electricity and natural gas usage would likely decrease because of the higher heating and air conditioning unit efficiencies of new equipment. The number of vehicles entering and exiting the base each day, as well as the on-base volume of traffic, would be expected to temporarily increase as a result of construction traffic. The debris deposited in the construction and demolition debris landfill would be a one time deposit of approximately 5,425.5 tons. Water consumption would be expected to remain the same. Wastewater production also would be expected to remain the same.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.11.
<i>Hazardous Materials and Wastes</i> (Section 4.12)	The amount of hazardous materials used and the amount of hazardous waste generated would be expected to remain the same. Contractors would be responsible for hazardous materials during construction activities. Any hazardous waste generated as a result of proposed construction activities would be handled by the contractor in accordance with applicable federal, state, and AF regulations. No facilities would be constructed on an Installation Restoration Program site. Asbestos containing materials and lead-based paint are expected to be encountered during building demolition. It is the responsibility of the demolition contractors to comply with relevant health and safety and disposal regulations. The soil under and immediately surrounding the housing units may contain contaminants. The potential exists for the presence of chlordane and creosote. The construction contractor would take care during demolition and construction to disturb as little of this soil as possible. Prior to occupancy of the housing, the contractor would be responsible for having a competent risk assessor carry out representative sampling of soils to determine the level of contamination.	The No Action Alternative would result in no change from the baseline condition as described in Section 3.12.

Table 2-3. Summary of Best Management Practices

Resource (Applicable EA Section)	Proposed Action Best Management Practices
<i>Noise</i> (Section 4.1)	New facilities would be designed and constructed to comply with AF Noise Level Reduction policy to reduce interior noise levels in residential and public use buildings to a Day-Night Average Sound Level (DNL) of about 45 A-weighted decibels (dBA).
<i>Air Quality</i> (Section 4.3)	Construction contractors would apply water at the construction site to control fugitive dust emissions.
<i>Geological Resources and Water Resources</i> (Sections 4.5 and 4.6)	Construction contractors would use erosion and sedimentation control techniques such as silt fencing and temporary diversions to minimize erosion and sedimentation during construction.
<i>Cultural Resources</i> (Section 4.8)	If any archeological artifacts were to be exposed during construction, the construction activities would cease, as required by federal and AF regulations. Work would not resume until an archeological investigation is completed.

3. Affected Environment

This section describes the environmental conditions most likely to be affected by the Proposed Action and provides information to serve as a baseline from which to identify and evaluate environmental impacts from implementation of the Proposed Action. Baseline conditions represent current conditions.

In compliance with NEPA, CEQ guidelines, and 32 CFR Part 989, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. These resources and conditions include noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomic resources, environmental justice, infrastructure and utilities, and hazardous materials and wastes.

The term “resource areas” refers to those aspects of the human environment that may be affected by a proposed action. Resource areas are organized into broad groupings of environmental assets, such as water resources or biological resources. Some aspects of the environment reflect conditions imposed by humans. These include resource areas such as land use and hazardous waste sites.

3.1 Noise

3.1.1 Definition of the Resource

Noise is generally defined as unwanted sound and can be any sound that is undesirable. It may interfere with communications, sleeping patterns, have enough intensity to damage hearing, or be annoying. Human response to noise varies depending on the type and characteristics of the noise, duration and frequency, distance between the noise source and receptor, receptor sensitivity, and time of day.

Due to wide variations in sound levels, sound is measured in decibels (dB), which are based on a logarithmic scale (e.g., a 10-dB increase corresponds to a 100-percent increase in perceived sound). Under most conditions, a 5-dB change is necessary for noise increases to be noticeable to humans (USEPA 1972). Sound measurement is further refined by using an A-weighted decibel scale (dBA) that emphasizes the range of sound frequencies that are most audible to the human ear (between 1,000 and 8,000 cycles per second).

The day-night average sound level (DNL) is the average of sound exposure level (SEL) values during a 24-hour period. A penalty of 10 dB is assigned to noise events (including aircraft operations) occurring between 10:00 p.m. and 7:00 a.m., which is considered nighttime for the purposes of noise assessment and modeling. The 10 dB penalty is intended to compensate for generally lower background noise levels and increased annoyance associated with events occurring at night, during sleeping hours. DNL is the preferred noise descriptor of HUD, Federal Aviation Administration (FAA), USEPA, and DoD (FICON 1992).

3.1.2 Existing Conditions

Vance AFB is located in Garfield County, approximately 55 miles south of the Kansas state border and approximately five miles south of the city of Enid business district. The base is bordered to the east by State Highway 81 and to the west by agricultural land. The town of Waukomis lies approximately four miles south. Northern portions of the base, including the cantonment area, are located within Enid city limits. Although the areas north of the base are within the city limits, the land is used primarily for agricultural purposes with only a few scattered residences.

The noise associated with activities at Vance AFB is characteristic of the noise associated with flying operations at most AF installations and commercial flying facilities. During periods of no aircraft activity at Vance AFB, noise associated with base activities results primarily from maintenance and shop operations, ground traffic movement, occasional construction, and similar sources. This noise is almost entirely restricted to the base itself and is comparable to sounds that occur in adjacent communities. It is during periods of aircraft ground or flight activity that the noise environment changes.

Vance AFB has recently updated its noise zones as a result of the *Environmental Assessment of T-6A Beddown and Changes to the T-37 Program at Vance Air Force Base*. These noise zones have been overlaid on the Vance AFB base map to show their location relative to the existing MFH units and the acquired Kisner property. As shown in Figure 3-1, none of the proposed MFH expansion area lies within the 65 dB DNL. The majority of the existing MFH units lie within the 65 to 69 dB DNL noise zone and the units at the southern portion of the MFH area lie within the 70 to 74 dB DNL noise zone.

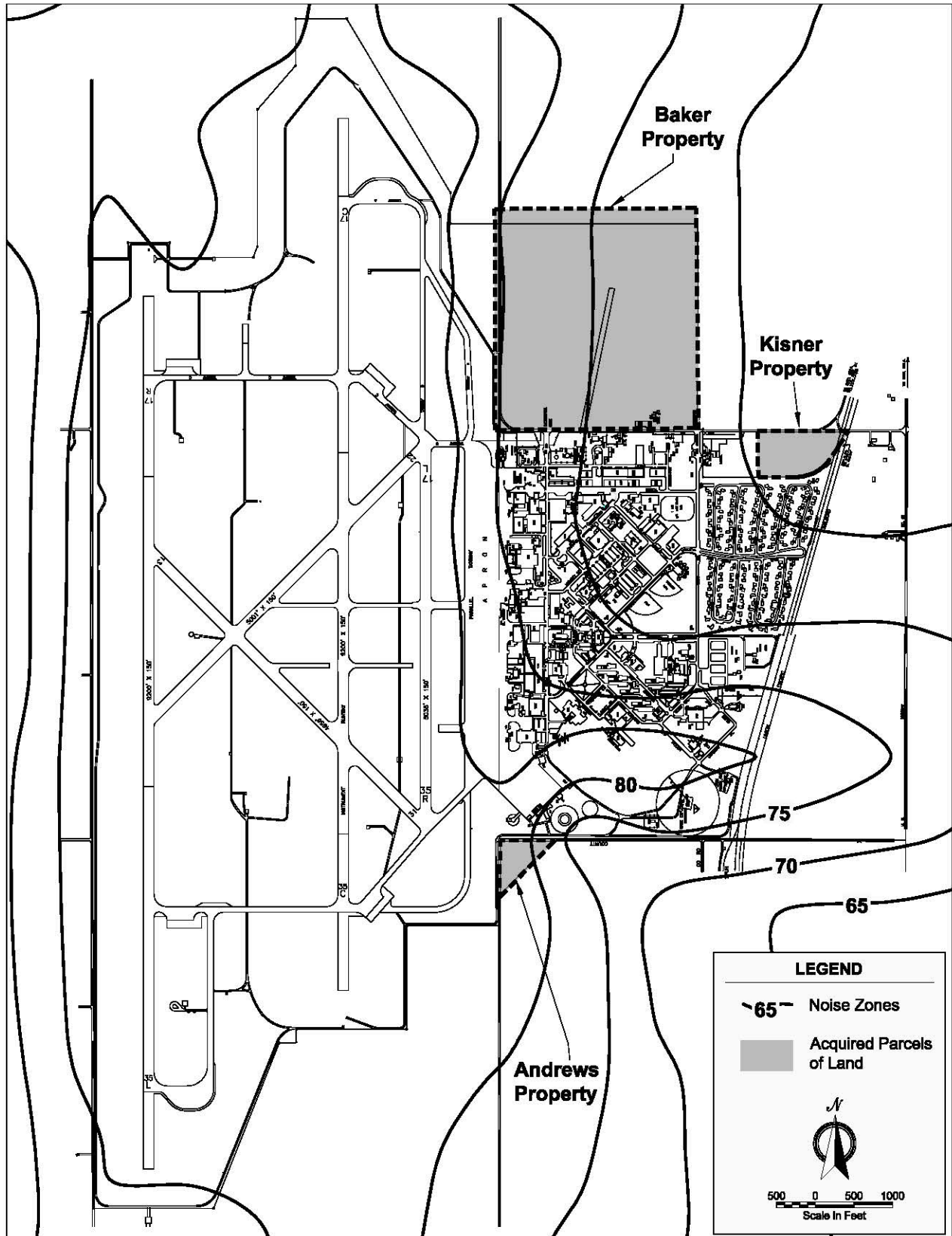


Figure 3-1. Vance AFB MFH Noise Zones

3.2 Land Use

3.2.1 Definition of the Resource

Land use comprises natural conditions or human-modified activities occurring at a particular location. Human-modified land use categories include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and other developed use areas. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

3.2.2 Existing Conditions

Vance AFB is located in Garfield County. The population of Garfield County is approximately 57,813 with a population density of 54.6 persons per square mile (U.S. Bureau of Census 2000). The majority of the land adjacent to Vance AFB falls within the jurisdiction of unincorporated Garfield County. Existing land use surrounding the base within unincorporated Garfield County is almost entirely agricultural. Little development exists outside the municipal boundaries. Existing on-base land uses are shown in Figure 3-2.

The city of Enid lies to the northeast and the smaller town of Waukomis lies to the south. The city of Enid is an established urban area containing a mixture of land uses. According to the 2000 census data, Enid had a population of 45,196, a slight decline over the 1990 census population of 45,309. Northern portions of Vance AFB, including the cantonment area, the clear zones (CZs), and all of the accident potential zones (APZs) are located within Enid city limits (USAF 1993). For each runway at Vance AFB, CZs encompass an area 2,000 feet wide by 3,000 feet long. APZ I is 3,000 feet wide by 5,000 feet long and APZ II is 3,000 feet wide by 7,000 feet long. The existing MFH units and the expansion area do not lie within the CZs and APZs for Vance AFB.

The proposed MFH expansion area has historically been used for agricultural purposes. Currently, the expansion area is being used for the cultivation of wheat. The existing MFH area and the MFH expansion area property is bounded by railroad tracks to the east and the roadway to the north.

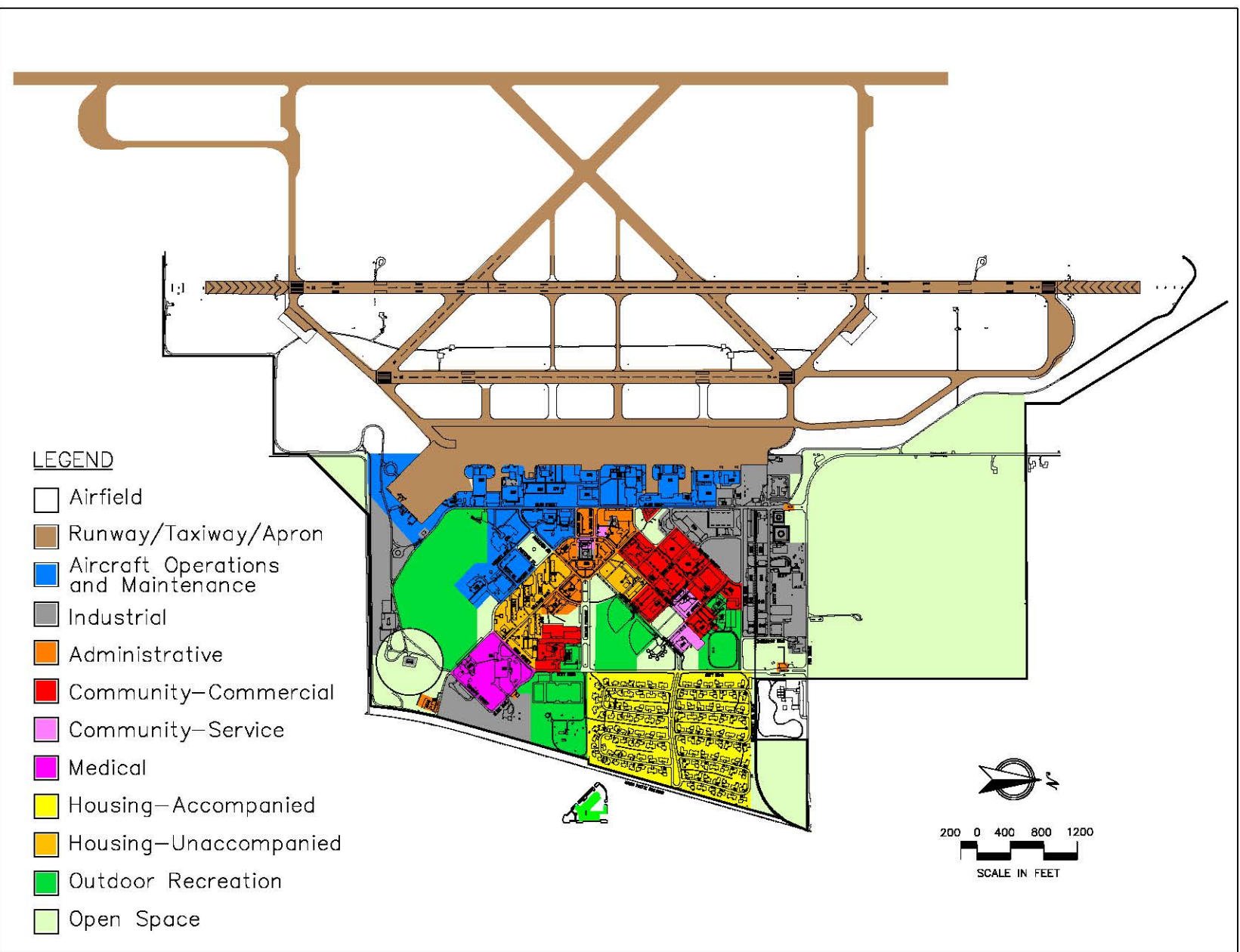


Figure 3-2. Vance AFB On-Base Land Use

The local governments around Vance AFB are interested in protecting the base mission and in preventing any future encroachments into the area surrounding the base. In 1988, the city of Enid, the town of Waukomis, and Garfield County passed ordinances establishing land use and noise attenuation standards and height restrictions for the areas around the base. These standards are compatible with and include the recommendations of the Vance AFB AICUZ study, which is currently being amended.

3.3 Air Quality

3.3.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these “criteria pollutants” are expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also of surface topography, the size of the air basin, and the prevailing meteorological conditions.

The CAA directed USEPA to develop, implement, and enforce strong environmental regulations that would ensure cleaner and healthier ambient air quality. In order to protect public health and welfare, USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS) for pollutants that have been determined to impact human health and the environment. The USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for seven criteria air pollutants including: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 microns (or micrometers) in diameter (PM_{10}), particulate matter equal to or less than 2.5 microns in diameter ($\text{PM}_{2.5}$), and lead (Pb). NAAQS represent maximum levels of pollution that are considered safe, with an adequate margin of safety to protect public health and welfare. O_3 is not emitted directly from stationary, mobile, or area pollution sources; rather, it is a product of photochemically reactive compounds such as NO_2 and volatile organic compounds (VOC). These compounds are inventoried and quantified as precursors of O_3 .

The Oklahoma Department of Environmental Quality (ODEQ) is responsible for implementation of the CAA and has adopted the federal primary and secondary NAAQS as presented in Table 3-1.

Table 3-1. National and State Ambient Air Quality Standards

Pollutant	Standard Value		Standard Type
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m ³) ^b	Primary & Secondary
1-hour Average	35 ppm	(40 mg/m ³) ^b	Primary
Nitrogen Dioxide (NO ₂)			
Annual Arithmetic Mean	0.053 ppm	(100 µg/m ³) ^b	Primary & Secondary
Ozone (O ₃)			
1-hour Average ^a	0.12 ppm	(235 µg/m ³) ^b	Primary & Secondary
8-hour Average ^a	0.08 ppm	(157 µg/m ³) ^b	Primary & Secondary
Lead (Pb) ^c			
Quarterly Average		1.5 µg/m ³	Primary & Secondary
Particulate ≤ 10 micrometers (PM ₁₀)			
Annual Arithmetic Mean		50 µg/m ³	Primary & Secondary
24-hour Average		150 µg/m ³	Primary & Secondary
Particulate ≤ 2.5 micrometers (PM _{2.5})			
Annual Arithmetic Mean		15 µg/m ³	Primary & Secondary
24-hour Average		65 µg/m ³	Primary & Secondary
Sulfur Dioxide (SO ₂)			
Annual Arithmetic Mean	0.03 ppm	(80 µg/m ³) ^b	Primary
24-hour Average	0.14 ppm	(365 µg/m ³) ^b	Primary
3-hour Average	0.50 ppm	(1300 µg/m ³) ^b	Secondary

Notes:

^a In July of 1997, the 8-hour ozone standard was promulgated and the 1-hour ozone standard was remanded for all areas, excepting areas that were designated non-attainment with the 1-hour standard when the ozone 8-hour standard was adopted. In July of 2000, the ozone 1-hour standard was re-instated as a result of the federal lawsuits that were preventing the implementation of the new 8-hour ozone standard. As of December 2001, USEPA estimated that the revised 8-hour ozone standard rules will be promulgated in 2003-2004. In the interim, no areas can be deemed to be definitively non-attainment with the new 8-hour standard.

^b Parenthetical value is an approximately equivalent concentration.

^c Lead was originally established as a criteria pollutant due to the use of leaded gasoline. The increased and predominate use of unleaded gasoline has led to a significant decrease in the measurable levels of lead in the air. As a result, in a majority of the country, emissions of lead are no longer significant.

ppm – parts per million

mg/m³ – milligrams per cubic meter

µg/m³ – micrograms per cubic meter

The CAA §176(c)(1) prohibits federal agencies from undertaking projects that do not conform to a USEPA-approved State Implementation Plan (SIP) in non-attainment areas. In 1993, USEPA developed the General Conformity Rule, which specifies how federal agencies must determine CAA conformity for sources of non-attainment pollutants in designated non-attainment and maintenance areas. This rule and all subsequent amendments may be found in 40 CFR 51 Subpart W and 40 CFR 93 Subpart B. Through the Conformity Determination process specified

in the final rule, any federal agency must analyze increases in pollutant emissions directly or indirectly attributable to the Proposed Action, and may need to complete a formal evaluation that may include modeling for NAAQS impacts, obtaining a commitment from the state regulatory agency to modify the SIP to account for emissions from the Proposed Action, and/or provision for mitigation for any significant increases in non-attainment pollutants. Since the Proposed Action at Vance AFB occurs in an attainment area, the General Conformity Rule does not apply. No further conformity analysis is required.

3.3.2 Existing Conditions

Vance AFB is located in Garfield County, within the North Central Oklahoma Intrastate Air Quality Control Region (AQCR) No. 185. This AQCR, which includes the counties of Garfield, Grant, Kay, Noble, and Payne, is classified as in attainment or better than national standards for all criteria pollutants (Federal Register Vol. 65, No. 140). Vance AFB is within the interior plain region of Oklahoma; this section is a transitional area between the humid east and the semi-arid west. Annual precipitation for the city of Enid and Vance AFB is approximately 27.88 inches with most of the precipitation occurring from March through October. The annual average temperature is 59.7 degrees Fahrenheit (°F). Table 3-2 shows normal monthly temperature and precipitation data for the city of Enid. Winds are typically from the south, averaging 12.3 knots (one knot equals 1.151 miles per hour) with occasional strong gusts of 17 to 21 knots.

Table 3-2. Climate Summary

Month	Normal Daily Mean Temperature (°F)	Normal Monthly Precipitation (Inches)
January	35	0.89
February	40	1.22
March	48	2.04
April	59	2.82
May	68	4.47
June	78	3.38
July	83	2.60
August	82	2.59
September	73	2.94
October	62	2.50
November	49	1.50
December	39	0.93

Note: Available data obtained from nearest reporting station in the city of Enid, OK, from the National Climatic Data Center (<http://www.srh.noaa.gov/ftpoot/ama/climate/cliend.htm>).

Persistent climatic conditions may greatly influence local and regional air quality. Ozone production from photochemically reactive compounds (e.g., VOC and oxides of nitrogen [NO_x]) is greatly dependent on available sunshine and high temperatures. Persistent winds may serve to dilute and disperse concentrated pollutants while precipitation may trap compounds and remove them from the air.

As required by the ODEQ stationary source permitting regulations, Vance AFB routinely calculates annual criteria pollutant emissions from stationary sources and provides this information to the state. However, there is no state or federal routine requirement to calculate pollutant emissions for aircraft operations, government-owned and privately-owned vehicles (i.e., GOVs and POVs), aerospace ground equipment (AGE), and other sources not included in the state's stationary source permitting program. However, AFI 32-7040 requires AF facilities to prepare a periodic comprehensive air emissions inventory to include mobile source emissions. At the time this analysis was prepared, no mobile source air emissions inventory had been performed.

Vance AFB is not a major source of pollutant emissions and, therefore, does not require a Federal Title V Operating Permit. However, Vance AFB has a facility-wide operating permit (#98-235-O) for engine test cells and general solvent use.

In order to regulate pollutant emissions, the ODEQ has promulgated state-wide regulations that require minor and major stationary emissions sources to obtain construction permits and operating permits. In accordance with ODEQ Regulations (Title 252 Chapter 100, Subchapter 7), Vance AFB has obtained an operating permit as a "natural minor" source. The installation's permit (ODEQ Permit No. 98-235-O) specifies operational and emission limits for two regulated source types: the Jet Engine Test Cell at Building 47; and General Solvent Use – basewide. All other source types at Vance AFB are considered *de minimis* and are not addressed by this permit. Any changes to the sources covered by this permit or ODEQ permitting requirements must be addressed in a modification to the permit.

3.4 Safety

3.4.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for property damage, serious bodily injury or illness, or death. Human health and safety addresses: (1) workers' health and safety during demolition activities and facilities construction, and (2) public

safety during demolition and construction activities and during subsequent operations of those facilities.

Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees and implementation of operational practices that reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DoD and AF regulations designed to comply with standards issued by the Occupational Safety and Health Administration (OSHA) and USEPA. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

3.4.2 Existing Conditions

All contractors performing construction activities are responsible for following ground safety regulations and OSHA regulations and are required to conduct construction activities in a manner that does not pose any risk to workers or personnel. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and use and availability of Material Safety Data Sheets. Industrial hygiene is the responsibility of contractors, as applicable. Contractor responsibilities are to review potentially hazardous workplaces; to monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous material), physical (e.g., noise propagation), and biological (e.g. infectious waste) agents; to recommend and evaluate controls (e.g., ventilation, respirators) to ensure personnel are properly protected or unexposed; and to ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures or engaged in hazardous waste work.

3.5 Geological Resources

3.5.1 Definition of the Resource

An area's geological resources typically consist of surface and subsurface materials and their inherent properties. Principal factors influencing the ability of geological resources to support structural development are seismic properties (i.e., potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography.

The term soil generally refers to unconsolidated materials overlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil depth,

structure, elasticity, strength, shrink-swell potential, and erodibility determine a soil's ability to support man-made structures and facilities. Soils typically are described in terms of their series or association, slope, physical characteristics, and relative compatibility or constraints in regard to particular construction activities and types of land use.

Topography is defined as the relative position and elevations of the natural and/or man-made features of an area that describe the configuration of its surface. An area's topography is influenced by many factors, including human activity, seismic activity of the underlying geological material, climatic conditions, and erosion. Information about an area's topography typically encompasses surface elevations, slope, and physiographic features (i.e., mountains, ravines, or depressions).

3.5.2 Existing Conditions

Physiography and Topography. Vance AFB is located in the north central portion of the Red Bed Plains in the Osage section of the Central Lowlands physiographic province. The Red Bed Plains is a large area of moderately rolling plains developed on thick masses of Permian Age (286 to 245 million years ago) sedimentary bedrock. The plains are dissected at intervals by shallow stream valleys, which typically have a relief of less than 50 feet. The greatest relief of approximately 150 feet is found along the larger streams (Vance AFB 2001d).

The airfield and operating areas of Vance AFB are located on a regional topographic high with the crest running approximately east-west near the southern boundary of the base. From the crest, the land surface slopes gently to the north (averaging about 20 feet per mile), and more steeply to the south (averaging 50 to 100 feet per mile). Total relief over the base from south to north is approximately 40 feet, with an average elevation of 1,285 feet above mean sea level (MSL) (Vance AFB 2001a, Vance AFB 2001d).

Geology. The bedrocks underlying Vance AFB consist of Permian Age (286 to 245 million years ago) continental red bed deposits. The top geologic formation beneath the soil mantle is the Cedar Hills Unit. The Permian rocks form long, parallel belts of outcrops that extend without interruption from southwestern Nebraska across Kansas into south central Oklahoma, and dip westward at a low angle (about 20 to 30 feet per mile). This structure has been termed the Prairie Plains homocline. The Permian beds underlying the base consist of nonmarine deposits of the Hennessey shale formation. Hennessey shales consist of interbeds of clay sands, weakly cemented sandstone, and shale, all red to reddish-brown in color. Overburden soils are red to reddish-brown in color with occasional open fractures and an occasional clay seam. The

underlying base is a red shale or sandstone, known as siltstone, which is basically a soft rock. The sandstone is of Permian origin and is found at depths ranging from 10 to 20 feet. The underlying sandstone is reddish-brown in color with occasional open fractures and an occasional clay seam (Vance AFB 2001a).

Soils. Generally, the soils at Vance AFB are a fine sandy loam of medium fertility, gently rolling, and well drained. The soils are principally residual (weathered-in-place) derivatives of the parent formation as modified by decayed vegetation, leaching, and sometimes (locally) by wind and/or erosion or deposition. The gently rolling terrain is also of medium to high susceptibility to wind and water erosion. The soils here, other than the topsoil, are characteristic of those derived from shales and are moderately to fairly active. As such, they can be expected to exhibit considerable volume change with periodic changes in moisture content. Below a certain level the soils grade less plastic (less active) with depth until they become characteristic of the parent siltstone beneath (Vance AFB 2001a).

The north end of the base and the family housing area are within the Kirkland-Bethany-Tabler soil association. These soils tend to have a deep loam surface layer with clayey subsoils. This association is typically found in broad, nearly level upland areas containing some hard-to-drain depressions. Soils are moderately well to well-drained. Surface drainage is slow, and very little moisture is lost through runoff, except during intense rains (Vance AFB 2000). The series are described below (Vance AFB 2001a):

- **Bethany Series.** The Bethany series consists of deep, medium textured, nearly level soils of the uplands. This surface layer is a dark-brown or dark grayish brown, slightly acid, moderately permeable, friable silt loam of granular structure. The subsoil is a brown or dark-brown, mildly alkaline clay ranging from 24 to 36 inches in thickness. The layer immediately below this is a massive silty clay loam or clay loam at depths ranging from 42 to 54 inches. It is somewhat more permeable and calcareous than the subsoil. Bethany soils are associated with the Kirkland and Tabler soils, but are better drained and have a thicker surface layer.
- **Kirkland Series.** The Kirkland series consists of deep, dark-colored, nearly level to very gently sloping soils that formed in alkaline reddish clays or shales. These soils are on uplands in the eastern part of the county. The surface layer is a dark brown, slightly acid, friable, granular silt loam. This layer is generally about 12 inches thick, but ranges from 8 to 14 inches. The surface layer rests abruptly on the subsoil, which is dark-brown, very slowly permeable, blocky clay about 32 inches thick. The subsoil is moderately alkaline and extremely hard when dry. The substratum is a yellowish-red, massive clay that is slightly more permeable than the subsoil. Kirkland soils are moderately well drained, but tend to be somewhat droughty in dry periods.

- **Tabler Series.** The soils in this series are found in nearly level areas or slight depressions on the uplands. They are deep, medium textured, and moderately well drained. The surface layer is gray silt loam about 8 inches. It is a moderate or weak, fine granular structure. This layer is permeable and easily penetrated by plant roots. It is medium to slightly acid. Immediately beneath the surface layer is a transitional zone, which is a layer of gray, heavy silt loam about 2 to 4 inches thick. The subsoil, a gray clayey layer 36 inches thick, begins abruptly at a depth of 12 inches. The layer is mottled indicating poor internal drainage. The substratum is similar to the subsoil but is structureless, less mottled, and moderately alkaline to calcareous. This layer is at a depth of about 48 inches.

The soils at the proposed MFH expansion area are of the Bethany series, which consist of deep, medium-textured, nearly level soils. This series is described above.

3.6 Water Resources

3.6.1 Definition of the Resource

Water resources include surface water, groundwater, and floodplains. Evaluation identifies the quantity and quality of the resource and its demand for potable, irrigation, and industrial purposes.

Surface water resources consist of lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Stormwater flows, which are increased by high proportions of impervious surfaces associated with buildings, roads, and parking lots, are important to the management of surface water. Stormwater also is important to surface water quality because of its potential to introduce sediments and other contaminants into lakes, rivers, and streams.

Groundwater consists of subsurface hydrologic resources. It is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically may be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

Floodplains are areas of low-level ground present along a river or stream channel. Such lands may be subject to periodic or infrequent inundation due to rain or melting snow. Risk of flooding is influenced by local topography, the frequency of precipitation events, and the size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency, which evaluates floodplains for 100- and 500-year flood events. Federal,

state, and local regulations often limit floodplain development to passive uses such as recreational and preservation activities in order to reduce the risks to human health and safety and minimize cost to replace or repair repetitively damaged infrastructure.

3.6.2 Existing Conditions

Surface Water. Vance AFB lies within the Arkansas River basin and the Cimarron River subbasin. No naturally occurring lakes are located in the region. The most significant surface water features within the region are Canton Lake and the Great Salt Plains Reservoir, as well as the Canadian, Cimarron, Chikaskia, and Salt Fork Rivers. The area is drained by several small intermittent streams. The northern and central sections drain into Boggy Creek, while Hackberry Creek, which tends to be dry during periods of low rainfall, drains the southern portions. Both creeks join Skeleton Creek, a tributary of the Cimarron River. The proposed MFH expansion area contains no surface water (Vance AFB 1996).

Groundwater. Groundwater resources under Vance AFB are limited, generally yielding less than 50 gallons per minute. Of two unconfined aquifers, the uppermost consists of Permian Age (286 to 245 million years ago) sandstone, siltstone, and shale and flows in an east-northeast direction with the water table approximately 8 to 25 feet below ground. A second, underlying aquifer is separated by 10 feet of shale. Direction of flow is to the north-northeast (USAF 1997a).

Public water supply, including the city of Enid, is associated with the Quaternary Age (1.6 million years ago to today) alluvium and terrace deposits from the Arkansas River tributaries. A large terrace deposit underlies the city of Enid and extends north, providing a plentiful supply of low sulfate, low chloride quality water. According to Enid water production plant personnel, approximately 160 water wells over the area are capable of producing 25 million gallons per day (mgd). Local consumption averages 9 to 10 mgd (USAF 1992). Vance AFB receives its entire water supply from the city of Enid (Vance AFB 2001d).

Stormwater. Stormwater at Vance AFB is managed by a series of ditches and a network of underground drains and pipes. A 2-year storm generates approximately 1,280 cubic feet per second (ft³/sec) of runoff from all areas. Stormwater drains into the Skeleton and Hackberry Creeks (Vance AFB 1997a).

Floodplains. Vance AFB is not located within a 100- or 500-year floodplain (Vance AFB 2000). The proposed MFH expansion area does not lie in a floodplain (Vance AFB 1996). As a result, the analysis of floodplains will not be carried forward.

3.7 Biological Resources

3.7.1 Definition of the Resource

Biological resources include native or naturalized plants and animals, and the habitats, such as wetlands, forests, and grasslands, in which they exist. Sensitive and protected biological resources include plant and animal species listed as threatened or endangered by the USFWS or a state. Determining which species occur in an area affected by a proposed action may be accomplished through literature reviews and coordination with appropriate federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

Under the Endangered Species Act (ESA) (16 U.S.C. 1536), an “endangered species” is defined as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined as any species likely to become an endangered species in the foreseeable future. The USFWS also maintains a list of species considered to be candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS has attempted to advise government agencies, industry, and the public that these species are at risk and may warrant protection under the Act.

Although Oklahoma does not have an endangered species act, the state has several provisions under which threatened and endangered wildlife can be classified based on scientific criteria. The Oklahoma Permanent Statutes define endangered wildlife species as “any wildlife species or subspecies in the wild or in captivity whose prospects of survival and reproduction are in immediate jeopardy and includes those species listed as endangered by the federal government, as well as any species or subspecies identified as threatened by Oklahoma statute or Commission resolution” (Oklahoma Permanent Statutes §29-2-109). The Oklahoma Permanent Statutes define threatened wildlife species as “any wildlife species or subspecies in the wild or in captivity that, although not presently threatened with extinction, are in such small numbers throughout their range that they may become an endangered species within the foreseeable future or that they may be endangered if their environment deteriorates. Threatened species and subspecies include those species and subspecies listed as ‘threatened’ by the federal government as well as any species or subspecies identified as threatened by Oklahoma statutes or Commission resolution” (Oklahoma Permanent Statutes §29-2-135).

Biological resources also include wetlands. Wetlands are an important natural system and habitat because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient

cycling, wildlife habitat provision, unique flora and fauna niche provision, stormwater attenuation and storage, sediment detention, and erosion protection. Wetlands are protected as a subset of the “waters of the U.S.” under Section 404 of the Clean Water Act. The term “waters of the U.S.” has a broad meaning under the Clean Water Act and incorporates deep-water aquatic habitats and special aquatic habitats (including wetlands). The U.S. Army Corps of Engineers (USACE) defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (33 CFR 328).

3.7.2 Existing Conditions

Vegetation. Vance AFB is located in the Middle Rocky Mountain Steppe-Coniferous Forest-Alpine Meadow Province (Bailey 1995). Located along the eastern edge of the Great Plains in the Red Bed Plains, this biotic province is also known as the Enid Prairies Subdivision, characterized by flat to gently rolling prairies that are typically only broken by drainageways (Vance AFB 2000). A variety of plant species common to the area are present on Vance AFB. Vegetation communities include large areas of native short and tall grasses and forbs. Species of grasses and forbs found on Vance AFB include buffalo grass (*Buchloe dactyloides*), sideoats grama (*Bouteloua curtipendula*), and sand dropseed (*Sporobolus cryptandrus*) (Vance AFB 2001a). Agricultural areas present within Vance AFB are planted with wheat, alfalfa, sorghum, and other small grains (Vance AFB 2001a).

The majority of land at Vance AFB is improved and/or semi-improved. In 1993, an urban forest study was conducted to inventory and evaluate the condition of trees on Vance AFB to establish a long-range management plan for this resource. The study revealed that approximately 4,000 trees consisting of over 75 different species existed on Vance AFB. This information has been included in the Vance AFB Integrated Resources Management Plan (IRMP) and specific management activities have been prescribed. Vance AFB has been designated as a Tree City USA installation (Vance AFB 2000).

Wildlife. Although extensive wildlife surveys have not been performed on Vance AFB, a limited number of mammals have been observed on the base. Mammal species with the potential to occur on the base include white-tailed deer (*Odocoileus virginianus*), fox squirrel (*Sciurus niger*), gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), badger (*Taxidea*

taxus), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*) (Vance AFB 2001a, USAF 1992).

Observations made on Vance AFB indicate several reptile and amphibian species common to the local area are present on the installation. Reptiles with the potential to occur on the base include the ornate box turtle (*Terrapene ornata*), fence lizard (*Sceloporus undulatus*), common garter snake (*Thamnophis sirtalis*), and the black rat snake (*Elaphe obsoleta*). Amphibian species with the potential to occur on the base include the American toad (*Bufo americanus*) and grey treefrog (*Hyla versicolor*).

The open grassland areas on Vance AFB provide seeds for a diverse population of game and non-game birds. Species such as wild turkey (*Meleagris gallopavo*), northern bobwhite (*Colinus virginianus*), scaled quail (*Callipepla squamata*), mourning dove (*Zenaida macroura*), ring-necked pheasant (*Phasianus colchicus*), American crow (*Corvus brachyrhynchos*), and numerous song birds have the potential to occur on the base (Vance AFB 2001a, USAF 1992). The border resulting from the boundary between grassland and forested ecosystems provides excellent habitat for a variety of avian species. Bird species that migrate and/or winter in these areas may be numerous, whereas summer breeding birds may include several species of hummingbirds, flycatchers, and vireos. The most common breeding birds in these areas include meadowlark (*Sturnella sp.*), sparrows (*Spizella sp.*), the brown-headed cowbird (*Molothrus ater*), and the tufted titmouse (*Parus bicolor*) (I-Bird 2000). In the marshy and stream areas on base, birds such as cattle egrets (*Bubulcus ibis*) and several species of heron may locally breed.

Raptors (i.e., birds of prey) observed at Vance AFB include the red-tailed hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), northern Goshawk (*Accipiter gentilis*), and turkey vulture (*Cathartes aura*). All of these raptors are known to breed and winter in Oklahoma.

Threatened and Endangered Species. A biological survey for threatened or endangered species was conducted in 1996. This survey revealed that no state- or federally listed threatened or endangered species occur on base property nor are likely to inhabit the immediate area (Vance AFB 1997a). In addition, the Oklahoma Department of Wildlife Conservation (ODWC) has stated that no state-listed species would be affected in the area of Vance AFB (ODWC 2002). As a result, analysis of threatened and endangered species on or in the vicinity of Vance AFB will not be carried forward.

Wetlands. No wetlands have been identified on Vance AFB (Vance AFB 2001a) or on the proposed MFH expansion area (Vance AFB 1996). As a result, analysis of wetlands will not be carried forward.

3.8 Cultural Resources

3.8.1 Definition of the Resource

Cultural resources may include prehistoric and historical archaeological sites, buildings, structures, districts, artifacts, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, or religious purposes. Under 36 CFR 800, federal agencies must take into consideration the potential effect of an undertaking on “historic properties,” which refers to cultural resources listed in, or eligible for inclusion in, the National Register of Historic Places (NRHP). In order to be determined a “historic property,” the resource must meet one or more of the criteria established by the National Park Service, and outlined in 36 CFR 60.4, that make the resource eligible for inclusion in the NRHP.

Cultural resources are defined in the NHPA as prehistoric and historic sites, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on their condition and historic use, such resources may provide insight into living conditions of previous existing civilizations, and/or may retain cultural and religious significance to modern groups.

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no above-ground structures remain standing) or architectural resources (buildings or other structures or groups of structures that are of historic or aesthetic significance). Archaeological resources comprise areas where human activity has measurably altered the earth or intact deposits of physical remains are found (i.e., prehistoric or historic habitation remains).

Architectural resources include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to be considered potentially eligible for nomination to the NRHP, as stated in National Register Bulletin 15. More recent structures, such as Cold War-era resources, may warrant protection if they are associated with exceptionally significant events or persons, represent remains that are so fragile that examples of any kind are extremely rare, or they have the potential to gain significance in the future, as stated in National Register Bulletin 22.

Traditional Cultural Properties (TCPs) or sacred sites can include archaeological resources, structures, neighborhoods, prominent topographic features, habitats, or areas where particular plants, animals, or minerals exist that Native Americans or other cultural groups consider to be

essential for the preservation of traditional cultural practices, as stated in National Register Bulletin 38.

Cultural resources management at AF installations is established in AFI 32-7065, *Cultural Resources Management*. The AFI details the compliance requirements for protecting cultural resources including the preparation of a Cultural Resources Management Plan (CRMP). The CRMP must include: an inventory and evaluation of all known cultural resources; identification of the likely presence of other significant cultural resources; description of installation strategies for maintaining cultural resources and complying with related resource statutes, regulations, policies, and procedures; standard operating procedures and action plans that include budget, staffing and scheduling activities; clear identification and resolution of the mission impact on cultural resources; and conformance with local, state, and federal preservation programs. Cultural resources on Vance AFB are managed through the implementation of the IRMP.

3.8.2 Existing Conditions

Cultural resources at Vance AFB are managed in accordance with applicable environmental laws including AF Regulation 126-7, *Historic Preservation*; 32 CFR Part 989; the NHPA of 1966, as amended, and its implementing regulations 36 CFR Part 800; EO 11593, *Protection and Enhancement of the Cultural Environment*, of 1971; NEPA of 1969, as amended, and its implementing regulation 42 U.S.C.; the Archaeological and Historic Preservation Act of 1974 (Public Law [P.L.] 93-291); the American Indian Religious Freedom Act of 1978 (P.L. 95-341); the Archaeological Resources Protection Act of 1979 (P.L. 96-95); and the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601).

Archaeological Resources. Archaeological research and investigations in Oklahoma and the plains region have resulted in the chronological division of human habitation into five general periods: Paleo-Indian (15,000 – 7,000 BC), Archaic (7,000 BC – AD 1), Woodland (AD 1 – AD 1000), Village (AD 1000 – AD 1550), and Historic (AD 1550 and after) (Wyckoff and Brooks 1983). The majority of the state of Oklahoma has not been extensively surveyed for archaeological sites. In the vicinity of Vance AFB, only Osage and Kay Counties have been subjected to extensive archaeological study. Over 8,000 archaeological sites have been recorded in Oklahoma, and it has been estimated that as many as 80,000 archaeological sites potentially exist within the state. The potential for archaeological sites in the Oklahoma region is highest along the rivers and tributaries that exist in the plains areas, and on terraces associated with the mountainous regions in the southeastern portion of the state. Approximately seven percent (546)

of the approximately 8,000 identified archaeological sites in Oklahoma are located in Garfield County and the counties surrounding it. These sites are located primarily in proximity to the Cimarron and North Canadian Rivers (USAF 1992).

All of the 1,829 acres on Vance AFB have been developed or disturbed by past and present military operations. No unimproved grounds exist within the base boundaries (Vance AFB 2001a). A cultural resource assessment was conducted at Vance AFB by a representative of the National Park Service in 1983 as part of an Archaeological Baseline Survey requested by HQ AETC (71 FTW 1983a, 71 FTW 1983b). The assessment included an archaeological reconnaissance survey, and the identification of buildings and structures built between 1942 and 1950 that could be potentially eligible for nomination to the NRHP. No archaeological resources were identified at the installation. No further work was recommended at Vance AFB due to extensive land disturbance and a low potential for archaeological resources.

In 1988, the city of Enid enlisted the services of Stanley D. Bussey, PhD., to conduct an archaeological survey on the portion of the Baker property that contains the sewer line from Vance AFB to the city. No evidence of historic or prehistoric cultural resources was found on the ground surface, in stream banks, or in backdirt from animal burrows. Furthermore, in 1993, an archaeological survey was conducted on Vance AFB by Steven L. DeVore. DeVore found no evidence of any archeological resources and recommended that no further archaeological work be conducted on Vance AFB. The proposed expansion area has been utilized for agricultural purposes since the 1920s. The above-mentioned studies, combined with the extensive amount of disturbance associated with almost 50-plus years of farming activity deem it unlikely that any archeological sites, if present, remain identifiable.

Historical Resources. Europeans first entered the Oklahoma area in the 1550s, but no permanent settlements existed until the U.S. Government established the “Indian Territory” in northeastern Oklahoma and began relocating Native Americans from areas to the south and east to that area. The Choctaw were the first of The Five Civilized Tribes (Choctaw, Cherokee, Chickasaw, Creek, and Seminole) that were forcibly relocated to the Indian Territory established in the 1830s and 1840s under the Indian Removal Act (Thompson 1986). The forced relocation of the Cherokee, Chickasaw, Creek, and Seminole followed soon thereafter, and the effect of this forced relocation on these groups resulted in thousands of deaths, devastated their political and economic systems, raised tensions among indigenous Native American groups, and resulted in conflicts between Native Americans and Euro-American settlers that lasted throughout the nineteenth century. The Choctaw, Cherokee, and Osage (another tribe located in Oklahoma) were frequently involved in

territorial conflicts with each other, and these conflicts increased following the Act of Union, which officially established the boundaries of the Cherokee Nation in 1840 (Agnew 1980 and Wright 1951).

The U.S. Government opened up portions of the Indian Territory for homesteading in 1889, and government sponsored “land runs” were used to allow homesteaders to stake their claim on land parcels in the area. The completion of the nationwide railroad system spurred the exploitation of minerals such as coal and oil that had been discovered in the area, and by the early 1900s Oklahoma was the largest producer of crude oil in the southwest (Morgan and Morgan 1984).

Historical structures in the vicinity of Vance AFB are primarily commercial buildings, as well as a few private homes and ranches that date from the 1890s and early 1900s. The largest concentrations of historical structures in Oklahoma are located in Cherokee, Alfalfa, Okeene, Blaine, Taloga, Dewey, Arnett, Shattuck, and Ellis counties (USAF 1992).

A total of 156 industrial buildings and 230 housing units are located on Vance AFB, which encompasses 1,829 acres. Recordation and evaluation of historic buildings and structures at Vance AFB resulted in the identification of two buildings, Building 129 and Building 170, that meet any of the criteria necessary to be considered potentially eligible for nomination to the NRHP, as stated in National Register Bulletin 15 (Vance AFB 2001a, Vance AFB 1997a). Level 2 Historic American Building Survey (HABS) documentation was prepared for Building 129 prior to modification, according to the stipulations contained in a Memorandum of Agreement approved by the Oklahoma SHPO and the Advisory Council on Historic Preservation (ACHP) in 1993 (Vance AFB 2001a). Building 129 is no longer eligible due to modification. At present, Building 170 is the only potentially eligible building at Vance AFB. Neither of these buildings is within the MFH area.

The MFH units were constructed in the 1960s. They are approximately 43 years old. Multiple building modifications have been made to these structures since they were constructed, such as the replacement of flat roofs with pitched roofs, new siding, and the addition of carports. Since these structures are not 50 years old and have undergone major modifications, they are not eligible for nomination to the NHRP. The Oklahoma Historical Society conducted a site visit to Vance AFB on January 27, 2003 to confirm eligibility of the MFH units. As a result of the site visit, the Oklahoma Historical Society concluded that “none of the facilities, family housing, or the adjacent park and open land to be impacted by Phase I, retain enough historical integrity to be considered for inclusion in the national Register.” The entire letter from the Oklahoma Historical Society can be found in Appendix C.

The proposed MFH expansion area contains no structures. It is currently used for the cultivation of wheat.

3.9 Socioeconomics

3.9.1 Definition of the Resource

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Regional birth and death rates and immigration and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators may be accompanied by changes in other components such as housing availability and the provision of public services. Socioeconomic data at county, state, and national levels permits characterization of baseline conditions in the context of regional, state, and national trends.

Demographics. Demographics identify the population levels and changes to population levels of a region. Demographics data may also be obtained to identify, as appropriate to evaluation of a proposed action, its characteristics in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators.

Socioeconomic data shown in this section are presented at county, state, and U.S. levels to characterize baseline socioeconomic conditions in the context of regional, state, and national trends. Data have been collected from previously published documents issued by federal, state, and local agencies and from state and national databases (e.g., U.S. Bureau of Economic Analysis' Regional Economic Information System).

3.9.2 Existing Conditions

The primary concern regarding socioeconomic resources pertains to changes in population, housing, and economic conditions. Population, race, and poverty characteristics for the U.S., the state of Oklahoma, and Garfield County are presented in Table 3-3.

3.10 Environmental Justice

3.10.1 Definition of the Resource

On February 11, 1994, President Clinton issued EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO requires that federal agencies' actions substantially affecting human health or the environment do not

Table 3-3. Population, Race, and Poverty Characteristics

	United States	Oklahoma	Garfield Co., OK
Total Population	281,421,906	3,450,654	57,813
Percent White	75.1	76.2	88.7
Percent Black	12.3	7.6	3.3
Percent American Indian, Eskimo, or Aleut	0.9	7.9	2.1
Percent Asian or Pacific Islander	3.7	1.5	1.3
Percent Other	5.5	2.4	2.0
Percent reporting two or more races	2.4	4.5	2.6
Percent Living in Poverty	13.1	16.7	14.1

Sources: U.S. Bureau of Census 2000, U.S. Bureau of Census 1990

Note: Poverty data reflects U.S. Bureau of Census 1990 data

exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The essential purpose of the EO is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of where a proposed action would occur. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EO.

3.10.2 Existing Conditions

To comply with EO 12898, ethnicity and poverty status in Garfield County were examined and compared to state and national levels. The Census Bureau bases the poverty status of families and individuals on threshold variables, including income, family size, number of family members under 18 and over 65 years of age, and amount spent on food. In 1990, the U.S. poverty threshold was \$11,821 for a family of three and 13.12 percent of the U.S. population were below the poverty level. Based on the 1990 U.S. Bureau of Census data (see Table 3-3), residents in Garfield County have a higher poverty level than the national level and a lower poverty level than the state of Oklahoma. However, the percentage of minority residents in Garfield County is generally lower than state and national levels.

3.11 Infrastructure and Utilities

3.11.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as “urban” or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to economic growth of an area.

3.11.2 Existing Conditions

The information contained in this section was obtained from the Vance AFB General Plan and provides a brief overview of each infrastructure component and comments on its existing general condition. AETC conducts regular evaluations to rate the overall condition of infrastructure and base facility groups for its installations.

Drinking Water Supply. All potable water used at Vance AFB is purchased from the city of Enid. The city’s water comes from wells located in the Ames area, about 20 miles southwest of Enid. The water is treated at the municipal water plant and enters the base on the north side, near the Industrial Gate through a 10-inch supply main. Potable water is stored on base in a 500,000-gallon elevated tank and a 300,000-gallon aboveground tank. Drinking water is sampled monthly and water quality reports are prepared annually. Water quality is currently considered to be in compliance with all drinking water standards.

Wastewater. Wastewater generated at the base is discharged into the city's sanitary sewer system and treated at the city of Enid Publicly Owned Treatment Works (POTW) sewage treatment facility.

Storm Drainage. The base is subdivided into 10 stormwater drainage areas. Stormwater generated in these areas is channeled through a series of open ditches and underground stormwater lines to one of seven outfalls from the base. The storm drainage system is made up of about 23 miles of underground collection pipes and manholes. A majority of the system, approximately 80 percent, consists of the original vitrified clay pipe. Other sections of this system have recently been enlarged to handle runoff from a 100-year storm and are constructed of concrete. The overall condition of the storm drainage system is considered to be good. To ensure the quality of stormwater runoff being discharged off base, monitoring and sampling of stormwater from outfall discharge points are conducted on a regular basis under the supervision of Bioenvironmental Engineering. Several measures such as prescribed storage and materials handling, containment dikes around storage areas, a spill retention sluice gate with back-up inflatable bladder, appropriate pesticide applications, oil/grease/sediment interceptors, and paved surface sweeping have been implemented as part of the 2000 Stormwater Pollution Prevention Plan used to minimize runoff contamination.

Natural Gas. Natural gas is supplied to the base from the Oklahoma Natural Gas Company. The four-inch high pressure, 200 pounds per square inch (psi), supply line enters a master metering station on the north side of the base near Hairston Gate. The base distribution system contains approximately 13 miles of mains and is arranged in a dual looped configuration. The main cantonment area is in its own loop configuration as is the housing area. However, both systems are interconnected allowing the capability to isolate either area. The housing area is metered separately from the main base. Basewide gas pressure is normally maintained at 16 psi. Most of the original distribution system is still in use today. The main distribution lines are all steel pipe with a coated and wrapped covering. All lines within the distribution system are cathodically protected. About 20 percent of the service lines have been replaced with polyethylene line.

Electrical. Electrical service is purchased and delivered to a main distribution switching station, located along the north end of the installation directly west of Hairston Gate. This station was upgraded in 1990 to include underground feed and five new switches with a bypass switch. With primary power of 12,500 volts, electrical service is distributed through five circuits to various parts of the base. The family housing area consists of all underground electric lines served by Circuit 5. The electrical distribution system consists of approximately 51 miles of overhead and

underground electrical lines. About 65 percent of the system is underground. The base plans to convert to a complete underground distribution system. Underground systems improve reliability by lessening vulnerability to wind, ice, and lightning damage, and increase base beautification by eliminating overhead utility lines. The present condition of the system is considered to be satisfactory.

Base Pavements. The base road network consists of over 21 miles of roads and approximately 218,000 square yards of paved parking lots. Most of the streets within the cantonment area have an asphalt surface. The two main thoroughfares carrying industrial traffic, Elam Road and Young Road, are constructed of concrete, as are the streets within the family housing area. Of the total road surfaces on base, approximately 62 percent are asphalt, 8 percent are concrete, and the perimeter recycled milled asphalt and gravel road makes up the remaining 30 percent. Over 80 percent of the base pavement is in good condition. However, Elam Road is in very poor condition as it is used as a construction route, and Brown Parkway, Young Road, and other bituminous roads have significant surface deterioration.

Solid Waste Disposal and Recycling. All non-hazardous solid waste generated within the main base and the family housing area is collected by base contractor civil engineer personnel and transported to the city of Enid Municipal Landfill. The landfill accepts approximately 6,000 to 8,000 tons of solid waste and recyclables a month. Coordination and operation of recycling efforts are the responsibility of the Civil Engineer Environmental Branch, which provides weekly pickup of on-base materials and yard waste. Weekly curbside collection of recyclable materials in the MFH area is provided through a cooperative arrangement with the city of Enid Curbside Recycling Project and the Enid State School Educational Network of Community Enterprises Recycling Program of the Northern Oklahoma Resource Center of Enid. The success of Vance AFB's recycling program is achieved through the collaborative efforts of the local community, tenants, contractors, and military organizations across the base (Vance AFB 1997b).

3.12 Hazardous Materials and Wastes

Hazardous material is defined as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that because of its quantity, concentration, physical, chemical, or infectious characteristics may cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose a substantial threat to human health or the environment. Hazardous waste is defined as any solid, liquid, contained gaseous, or semisolid waste, or any

combination of wastes that poses a substantial present or potential hazard to human health or the environment.

Issues associated with hazardous material and waste typically center around underground storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, and use of pesticides, fuels, and petroleum, oils, and lubricants. When such resources are improperly used in any way, they can threaten the health and well being of wildlife species, botanical habitats, soil systems, water resources, and humans.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, the DoD has dictated that all facilities develop and implement Hazardous Material (HAZMAT) Emergency Planning and Response Plans or Spill Prevention, Control, and Countermeasure Plans. In addition, DoD has developed the Installation Restoration Program (IRP), intended to facilitate thorough investigation and cleanup of contaminated sites located on military installations. These plans and programs, in addition to established legislation (e.g., the Comprehensive Environmental Response, Compensation, and Liability Act and Resource Conservation and Recovery Act), effectively protect the ecosystems on which most living organisms depend.

3.12.1 Existing Conditions

Hazardous Materials. Vance AFB uses the AF Environmental Management Information System, a HAZMAT pharmacy system to monitor each individual supply source, providing the command with the location and quantity of hazardous materials. The purchase of products containing Class I ozone-depleting substance (ODS) has been eliminated and the use of Class II ODS has been minimized. In 1996, Vance AFB achieved a 47 percent reduction in non-fuel purchases of products containing EPA-17 chemicals and chemical compounds compared to the Calendar Year 1992 (CY92) baseline inventory. This continued reduction in the industrial toxics inventory is realized through product substitution and process modifications (Vance AFB 1997b).

Fuels are utilized at Vance AFB for the operation of aircraft, aircraft support equipment, fleet vehicles, electricity generation, and heating. Various fuels, including JP-8 turbine aviation fuel, diesel, and motor gasoline, are stored and dispensed from USTs or ASTs or dispensed from delivery trucks. In CY01, Vance AFB consumed 537,439 gallons of motor gasoline, 71,899 gallons of diesel, and 17,945,045 gallons of JP-8.

Hazardous Wastes. Vance AFB is registered as an industrial large quantity generator and has a Resource Conservation and Recovery Act (RCRA) Part B Post Closure Permit from ODEQ.

According to the Vance AFB Hazardous Waste Management Plan, a total of 53 hazardous waste streams have been identified on the base. Once generated, hazardous wastes are stored temporarily in one of the 52 satellite accumulation points (SAPs) until a maximum amount of 55 gallons is accumulated. Once accumulated, the waste is then removed from the SAPs to the designated hazardous waste management accumulation storage area in Building 250 where it is stored for less than 90 days. The Defense Reutilization and Marketing Office contractor transports the waste to an off-base disposal site.

Vance AFB has reduced off-base transfers of hazardous waste by implementing recycling initiatives, product substitutions, process modifications and equipment purchases. Cleaning vat solvents, used engine oils, hydraulic fluids, off-spec fuel oils, and lead-acid batteries are transported to off-base recycling facilities. Waste anti-freeze is recycled in a batch distillation unit located in the Vehicle Maintenance Shop. For CY00, approximately 13,682 pounds of hazardous waste from Vance AFB were transported off base for disposal. This is a 91 percent reduction from the CY92 baseline of 151,173 pounds. In addition, since 1992 Vance AFB has been considered free of all materials containing polychlorinated biphenyls (Vance AFB 2000, Vance AFB 1997b).

Asbestos. The Vance AFB Asbestos Management Program is comprised of the Asbestos Management Plan (AMP), the Asbestos Operating Plan (AOP), and the Asbestos Survey Report (ASR) and Database System. The AMP, updated in March 2001, is a comprehensive policy document that specifies work to be accomplished and assigns various base offices responsibility for the work. Other components of the AMP include a record retention system and a regulatory review covering applicable federal, state and AF regulations. The AOP, updated in September 2001, sets forth specific procedures for accomplishing asbestos abatement and related tasks such as work control procedures, operations and maintenance work practices, worker protection, training, and record keeping. The ASR is based on a base-wide asbestos survey that was completed in August 1991. The ASR contains the location, condition assessment, AF's Guidance for Rating and Assessing Damage and Exposure (GRADE) priority, recommended response, and estimated cost of response for all cells of ACM or suspect material identified during the survey (Vance AFB 2001b).

The MFH units were randomly tested for ACM or suspect material. The results concluded that ACM was present in pipe insulation located in the utility closets and some floor tiles throughout the housing units.

Lead-Based Paint. The lead-based paint (LBP) Management Program at Vance AFB is managed in accordance with the AF Policy. The LBP Management Plan, updated in March 2001, provides guidance in preventing health and environmental hazards as a result of LBP exposure. This plan outlines the policy and procedures to be followed in conducting the surveying, sampling, analysis, and abatement of LBP-contaminated materials. The results of the 1994 and 1995 LBP survey of family housing and non-housing priority facilities indicated that nearly all of the family housing units tested contained some LBP. Traces of LBP were found in the tested non-housing facilities (Vance AFB 2000 and Vance AFB 2001c).

X-ray fluorescence (XRF) surveys were conducted for multifamily housing, both NCO and Officer Housing. In the NCO Housing reporting group, 98 percent of the surveyed MFH units contain at least some LBP. This was mostly limited to exterior painted surfaces. Painted components that tested positive at least once include the following:

- Metal beams or columns (87 percent positive results)
- Wood beams or columns (24 percent)
- Wood cabinet doors (4 percent)
- Wood ceiling (<1 percent)
- Varnished wood closet door (<1 percent)
- Wood door frames (<1 percent)
- Interior metal door jambs (100 percent – only one sample)
- Interior wood door jambs (5 percent)
- Exterior wood façade (1 percent)
- Exterior wood soffits (1 percent)
- Exterior metal trim (63 percent)
- Exterior wood trim (10 percent)
- Exterior wood window frames (67 percent)
- Wood shelves (1 percent)
- Wood shelf supports (1 percent)
- Wood window jambs (3 percent)

- Metal walls (1 percent)
- Sheetrock walls (1 percent)
- Panelled or wood walls (4 percent)
- Wood window sill (2 percent)

Just because a component is included in the above list, does not necessarily mean that extensive abatement is required. For example, out of 713 sheetrock wall samples, five tested positive, one was inconclusive, and 674 tested negative. In this case, HUD would require confirmational lab testing of the five positive and one inconclusive to determine abatement needs. Varnished wood doors had one inconclusive reading. There were no positive or inconclusive results found on the other 15 components sampled in the NCO Housing. There were some components whose size or accessibility prevented complete testing with XRF.

In Officer Housing, 100 percent of the MFH units surveyed contained some LBP. Components that tested positive at least once include the following:

- Wood beams or columns (5 percent positive results)
- Wood fencing (20 percent)
- Exterior metal trim (69 percent)
- Wood shelves (1 percent)

Just because a component is included in the above list, does not necessarily mean that extensive abatement is required. Wood walls and ceilings had one inconclusive reading each. There were no positive or inconclusive results noted on 26 other components. As with the NCO Housing, there were some components whose size or accessibility prevented complete testing with XRF.

Installation Restoration Program. According to the Vance AFB General Plan, updated in March 2000, 25 IRP sites have been identified on base since the implementation of the program. Of these 25 sites, seven are considered closed, nine are active and nine have completed response actions awaiting closure (Vance AFB 2000). Sampling is currently being conducted in the MFH area to determine if contamination from past practices (i.e., railroad bed and pesticide application) occurs. In the event contamination is found in the MFH area, Vance AFB will follow the current plans and procedures to remediate the contaminated soil. Because current plan and procedures

are in effect to properly handle potential contaminants and there are no IRP sites located in or near the MFH area, analysis of IRP sites will not be carried forward.

Pesticides. It is likely that pesticides were applied via sub-slab injection according to manufacturers' guidelines in the MFH area prior to the mid-1980s.

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4. Environmental Consequences

Section 4 presents an evaluation of the environmental impacts that may result from implementing the Proposed Action or the No Action Alternative.

The evaluation criteria for the analyses are presented under each resource area. Evaluation criteria for most potential impacts were obtained from standard criteria; federal, state, or local agency guidelines and requirements; and/or legislative criteria. Long-term implications of the Proposed Action are also presented in this Section.

Housing activities associated with the Proposed Action would be consistent with those of the baseline condition. However, beneficial impacts would be expected from use of the new MFH units. The new MFH structures and appliances would meet or exceed all of the current standards for energy efficiency. The new MFH units would be outfitted with thermopane windows and insulated metal doors. Furthermore, the electrical and mechanical equipment would be selected and sized based on energy efficiency. In addition, all MFH units would meet modern housing standards. These improvements would result in beneficial impacts as a result of the new construction.

4.1 Noise

4.1.1 Evaluation Criteria

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of a proposed action. Potential changes in the noise environment can be beneficial (i.e., if the number of sensitive receptors exposed to unacceptable noise levels is reduced), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if there is an increase in exposure to unacceptable noise levels). Sound produced by construction activities as they relate to the ambient sound produced by aircraft operating at Vance AFB is examined below. Also, in performing this noise assessment, other ongoing projects on base were considered for cumulative noise impacts.

4.1.2 Proposed Action

Implementation of the Proposed Action would have minor, temporary effects on the noise environment near the project sites resulting from the use of heavy equipment during construction activities. The nearby facilities would experience muffled construction noise during the workday.

However, noise generation would last only for the duration of construction activities, and could be reduced through the use of equipment exhaust mufflers and restriction of construction activity to normal working hours (i.e., between 7:00 a.m. and 5:00 p.m.). Noise produced by construction at the sites would not affect sensitive receptors on or off the base. In addition, the noise environment on base is dominated by military aircraft overflights. Noise associated with construction activities would be comparatively minor and would occur in relatively remote areas of the base. Therefore, short-term, minor adverse effects would be expected as a result of the Proposed Action.

4.1.3 No Action Alternative

Under the No Action Alternative, the baseline condition would continue at Vance AFB. Therefore, there would be no change to the baseline noise conditions and no adverse impacts would be anticipated.

4.1.4 Mitigative Actions

No long-term impacts to noise would be anticipated under the Proposed Action. Therefore, no mitigative actions would be required. However, the goal of the AF Noise Level Reduction (NLR) policy is to reduce interior noise levels in residential and public use buildings to a DNL of approximately 45 dBA. For example, those buildings with outdoor sound levels ranging from a DNL of 65 to 70 dBA, would require a 25 dBA ambient noise level reduction for interior noise levels. For those buildings with outdoor sound levels ranging from a DNL of 70 to 75 dBA, a 30 dBA ambient noise level reduction would be required for interior noise levels. New facilities are designed and constructed to comply with AF NLR policy.

4.2 Land Use

4.2.1 Evaluation Criteria

In considering the basis for evaluating impacts on land use, several items were examined, including: 1) the degree to which the location of facilities would impact existing sensitive land use; 2) the degree to which construction and/or operation of facilities would interfere with the activities or functions of adjacent existing or proposed land uses; and 3) the degree of any physical changes in land use that would impact surrounding uses and compatibility with land uses.

4.2.2 Proposed Action

Construction projects under the Proposed Action would be performed in land use areas with facilities of the same or similar function. However, the proposed MFH expansion area would convert from open space to residential land use. This would be consistent with present and foreseeable land use patterns on the base. Under the Proposed Action, the MFH units would be demolished and constructed across a larger land area allowing some of the MFH units to move outside the 65 dB DNL noise zone, resulting in a beneficial impact on residential land use. Therefore, no adverse impacts would be expected within the existing MFH area and slight beneficial impacts would be expected within the MFH expansion area as a result of the Proposed Action.

4.2.3 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. There would be no change in land use at Vance AFB. No adverse impacts would be expected.

4.2.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation.

4.3 Air Quality

4.3.1 Evaluation Criteria

The potential impacts to local and regional air quality conditions near a proposed federal action are determined based upon the increases in regulated pollutant emissions relative to existing ambient air quality conditions. This assessment considers whether the net increases of direct (occurring at the same place and time as the source operation) and indirect (occurring at a different location or in the foreseeable future) pollutant emissions from the federal action would cause or contribute to a violation of any national or state ambient air quality standard, or expose sensitive receptors to substantially increased pollutant concentrations, or represent an increase of ten percent or more in an affected AQCR emissions inventory.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions to be “significant” if: 1) a proposed project is within 10 kilometers of any Class I area; and 2) regulated pollutant emissions would cause an increase in the 24-hour average

concentration of 1 $\mu\text{g}/\text{m}^3$ or more of any regulated pollutant in the Class I area (40 CFR Part 52.21(b)(23)(iii)). PSD regulations also define ambient air increments and limit the allowable increases to any area's baseline air contaminant concentrations in relation to an area's designation as a Class I, II, or III area (40 CFR Part 52.21(c)). A Class I area is an area of special national or regional natural, scenic, recreational or historic value including: all international parks, National Wilderness Areas, and National Parks exceeding 5,000 acres. All other attainment or unclassifiable areas are designated Class II. Class III areas have allowable pollution levels approaching but not to exceed NAAQS thresholds. Vance AFB is not within ten kilometers of any Class I designated area. The closest Class I area is the Wichita Mountains Wildlife Refuge in Oklahoma, which is 322 kilometers (approximately 200 miles) from Vance AFB.

4.3.2 Proposed Action

Implementation of the Proposed Action at Vance AFB would generate regulated pollutant emissions from construction activities. Regulated pollutant emissions would include fugitive dust from ground-disturbing activities; fuel combustion emissions from construction equipment; and evaporative emissions from architectural coatings used during construction. The potential air quality impacts to Vance AFB are based on the characteristics of the Proposed Action and are described below.

Construction Activities. The Proposed Action consists of the demolition of 59 MFH units and the construction of 59 MFH units. The construction projects would generate fugitive dust emissions from ground disturbing activities (e.g., grading, demolition, soil piles, unpaved roads, etc.) as well as combustion emissions from the combustion of fuel used by the construction equipment. Fugitive dust emissions would be greatest during the initial site preparation activities and would vary from day-to-day depending on the construction phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of construction activity. A portion of fugitive dust particulate emissions from construction activities is fine particulate or PM_{10} , which, as discussed previously, is a criteria pollutant.

Fugitive dust emissions for various construction activities were calculated using emission factors and assumptions published in USEPA's Compilation of Air Pollutant Emission factors AP-42 Section 11.9 dated July 1998 and Section 13.2 dated September 1998, as well as common engineering principals and assumptions. The estimates assume that 230 working days are available per year for construction (accounting for weekends, weather, and holidays). Based on

temperature, precipitation and wind speed, soil percent moisture was estimated to be an average of 40 percent for this analysis. A wind speed of greater than 12 mph is recorded 51 percent of the time in this region and this value was used in construction emission calculation factor development (USEPA 2001).

In addition to fugitive dust, construction activities would result in emissions of criteria pollutants as combustion products from fuel-burning equipment as well as evaporative emissions from architectural coatings and asphalt paving operations. Emission factors were generated based on USEPA guidance and common engineering assumptions provided in *Air Quality Thresholds of Significance* from the Sacramento Metropolitan Air Quality Management District (SMAQMD 1994), the most comprehensive guidance available in the U.S. Construction emissions for CY04, the planned construction year, are shown in Table 4-1 and presented in Appendix D.

For purposes of this analysis, the project duration, affected project site area disturbed, and parking area were used to estimate fugitive dust and PM₁₀ emissions. These emissions would produce slightly elevated short-term PM₁₀ ambient air concentrations at the base. However, the effects would be temporary and would fall off rapidly with distance from the proposed construction sites.

Table 4-1. Construction Emissions Associated with the Proposed Action at Vance AFB

	Criteria Air Pollutant Emissions				
	NO ₂ (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)
Proposed Action Construction Emissions ¹	62.38	16.90	56.88	3.03	4.76
AQCR No. 185 Inventory (tpy) ²	43,595	28,645	156,153	37,279	62,823
Construction Emission % of AQCR No. 185 Regional Inventory	0.14%	0.06%	0.04%	<0.01%	<0.01%

Note: tpy – tons per year

¹ Construction emissions would occur during CY04 in AQCR No. 185.

² Source: USEPA 2002

Specific information describing the types of construction equipment required for a specific task, the hours the equipment is operated, and the operating conditions vary widely from project to project. For purposes of analysis, these parameters were estimated using established methodologies for construction and experience with similar types of construction projects. Combustion by-product emissions from construction equipment exhausts were estimated using USEPA's AP-42 emissions factors for heavy-duty diesel-powered construction equipment.

The construction emissions presented in Table 4-1 include the estimated annual emissions from construction equipment exhaust associated with the Proposed Action at Vance AFB. As with fugitive dust emissions, combustion emissions from the fuel used by the construction equipment would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts.

4.3.3 No Action Alternative

Under the No Action Alternative, baseline conditions would remain the same and no construction activities would occur. There would be no impact on the ambient air quality within AQCR No. 185 as a result of the No Action Alternative.

4.3.4 Mitigative Actions

Potential criteria pollutant emissions associated with the Proposed Action do not exceed significance criteria requirements. Therefore, no mitigative actions for improving the ambient air quality would be required. Construction contractors would apply water at the construction site to control fugitive dust emissions.

4.4 Safety

4.4.1 Evaluation Criteria

If implementation of the Proposed Action were to substantially increase risks associated with the safety of Vance AFB personnel, contractors, or the local community, or substantially hinder the ability to respond to an emergency, it would represent an adverse impact. Furthermore, if implementation of the Proposed Action would result in incompatible land use with regard to safety criteria (e.g., height restrictions or aircraft run-up areas), impacts to safety would be adverse.

4.4.2 Proposed Action

Short-term, minor adverse effects would be expected. Implementation of the Proposed Action would slightly increase the short-term risk associated with construction contractors performing work at Vance AFB during the normal workday because the level of such activity would increase. Contractors would be required to establish and maintain safety programs. Projects associated with the Proposed Action would not pose a safety risk to base personnel or to activities at the

base. In addition, the MFH units would not exceed airfield height restrictions or impact the safety of flying operations in any manner.

4.4.3 No Action Alternative

Under the No Action Alternative, there would be no change in baseline conditions and none of the proposed construction projects would occur. As a result, construction-related safety risks to Vance AFB and contractor personnel would not be present.

4.4.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation.

4.5 Geological Resources

4.5.1 Evaluation Criteria

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of a proposed action on geological resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering design are incorporated into project development.

Analysis of potential impacts on geological resources typically includes:

- Identification and description of resources that could potentially be affected
- Examination of a proposed action and the potential effects this action may have on the resource
- Provision of mitigation measures in the event that potentially significant impacts are identified.

4.5.2 Proposed Action

Under the Proposed Action, construction activities, such as grading, excavating, and recontouring of the soil, would result in soil disturbance. Implementation of best management practices during construction would limit potential impacts resulting from construction activities. Fugitive dust from construction activities would be minimized by watering and soil stockpiling, thereby reducing to negligible levels the total amount of soil exposed. Standard erosion control means (e.g., silt fencing, sediment traps, application of water sprays, and revegetation at disturbed areas)

would also reduce potential impacts related to these characteristics. Therefore, there would be no adverse impacts on soils at the base.

The Proposed Action would not cause or create any changes to the topography of the Vance AFB area. Therefore, no impact on regional or local topography or physiographic features would result from implementation of the Proposed Action.

4.5.3 No Action Alternative

The baseline condition, which generates no impacts, would continue at Vance AFB. There would be no impacts to geological resources as a consequence of the No Action Alternative.

4.5.4 Mitigative Actions

No impacts to geological resources would be anticipated under the Proposed Action. Therefore, no mitigative actions would be required. Implementation of best management practices such as rock berms, silt fences, and single point construction entries would minimize soil erosion on Vance AFB.

4.6 Water Resources

4.6.1 Evaluation Criteria

Evaluation criteria for water resources include consideration of water availability, quality, and use. The following factors were considered:

- The degree to which water availability to existing users would be reduced
- The degree to which groundwater levels or other water supply sources would be reduced
- The effect on water quality and public health
- The effect on unique hydrologic characteristics
- Whether laws or regulations would be violated

4.6.2 Proposed Action

The base currently has 612 acres of improved property. Due to construction and demolition activities, the Proposed Action would increase impervious surface area an additional 4.5 acres. This 0.74-percent increase in impervious surface area is negligible when compared to the total

surface area of improved property at Vance AFB. It is not anticipated that the Proposed Action would have any adverse impact on surface water in and around Vance AFB. During the construction, renovation, and demolition aspect of this action, adherence to proper engineering practices and applicable codes and ordinances would help to reduce stormwater runoff. Erosion and sedimentation controls would be in place during construction to reduce and control siltation as a result of erosion to areas outside of the construction site. Implementation of the Proposed Action is expected to have no adverse effects on water quality.

4.6.3 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. There would be no change in water resources at Vance AFB or in the surrounding area. No adverse impacts would be anticipated.

4.6.4 Mitigative Actions

No impact to water resources would be anticipated under the Proposed Action. Therefore, no mitigative actions would be required. Implementation of best management practices such as erosion and sedimentation controls would be in place during construction to reduce and control siltation and erosion impacts to areas outside of the construction sites.

4.7 Biological Resources

4.7.1 Evaluation Criteria

This section evaluates the potential impacts to the biological resources under the Proposed Action. The evaluation of impacts to biological resources is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration of ecological ramifications. A habitat perspective will provide a framework for analysis of general classes of effects (e.g., removal of critical habitat, noise associated with training, human disturbance) for the area under consideration for a proposed action. The evaluation considers whether species or habitats of high concern are adversely affected over relatively large areas and whether disturbances cause reductions in population size or distribution of a species of high concern.

Ground disturbance associated with construction may directly or indirectly cause potential impacts to biological resources. Direct impacts from ground disturbance were evaluated by

identifying the types and locations of potential ground-disturbing activities in correlation to important biological resources. Habitat removal and damage or degradation of habitats may be effects associated with ground disturbing activities.

4.7.2 Proposed Action

Vegetation. Land disturbing activities associated with construction and demolition activities would be limited to lawn, landscaped areas, and agricultural areas. Affected areas would be reseeded or replanted following the construction and/or demolition period. Although short-term, localized minor effects could be expected on vegetation in proximity to the construction and demolition sites, no adverse effects would be expected as a result of the implementation of the Proposed Action at Vance AFB.

Wildlife. Wildlife habitat on the installation within the area of the proposed construction activities is limited due to fragmentation by the existing facilities, roads, and impervious surfaces. Furthermore, most of the area associated with this portion of the Proposed Action consists of disturbed, landscaped, paved, or mowed lands. Approximately 10.6 acres of open space associated with the proposed MFH expansion area would be affected. However, the habitat value of this acreage is low due to fragmentation. Construction activities would not impact habitat available to the wildlife species that occur at Vance AFB or within the proposed MFH expansion area. This assessment is based on the limited extent of areas that would be affected by the Proposed Action.

4.7.3 No Action Alternative

Under the No Action Alternative, there would be no change from the baseline condition. There would be no adverse effects on biological resources as a result of the No Action Alternative.

4.7.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation.

4.8 Cultural Resources

4.8.1 Evaluation Criteria

Potential impacts of the Proposed Action were assessed by: (1) identifying the nature and potential significance of cultural resources in potentially affected areas, and (2) identifying

activities that could directly or indirectly affect cultural resources classified as historic properties. Historic properties, under 36 CFR 800, are defined as cultural resources included in, or eligible for inclusion in the NRHP. The term “eligible for inclusion” includes both listed and eligible properties, which meet NRHP listing criteria as outlined by 36 CFR 60.4. Therefore, cultural resources not yet evaluated are considered potentially eligible for the NRHP and are afforded the same regulatory consideration as nominated historic properties.

4.8.2 Proposed Action

The primary potential impacts to cultural resources at Vance AFB would be related to direct and indirect impacts from building alteration, demolition, and ground disturbing activities associated with the proposed demolition of MFH units. Impacts of the Proposed Action on cultural resources would be considered significant if activities or undertakings would directly or indirectly impact historic properties.

Archaeological Resources. There are no known archaeological resources located on Vance AFB or within the proposed MFH expansion area, and the area is not considered to have a high potential for cultural resources. In addition, the areas within the base that would be subject to ground disturbing activities associated with the Proposed Action have been subjected to heavy disturbance in the past, and are currently the location of relatively intense military activity (Vance AFB 1997a).

Historical Resources. Structures that would be modified in association with the Proposed Action include the existing MFH units. The existing MFH units are not eligible for nomination to the NRHP (71 FTW 2001). Therefore, the demolition of these buildings associated with the Proposed Action would have no effect on historic properties.

Based on these findings, the Proposed Action represents no effect to cultural resources at Vance AFB.

4.8.3 No Action Alternative

Under the No Action Alternative, there would be no change from the baseline condition. Therefore, the No Action Alternative would have no adverse effect on any known historic or archeological resources.

4.8.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation. However, if any archeological artifacts were to be exposed during construction, the construction activities would cease, as required by federal and AF regulations. Work would not resume until an archeological investigation is completed.

4.9 Socioeconomics

4.9.1 Evaluation Criteria

The evaluation of construction expenditure impacts is assessed in terms of direct effects on the local economy and related effects on other socioeconomic resources (e.g., housing). The magnitude of potential impacts can vary greatly, depending on the location of a proposed action. For example, implementation of an action that creates ten employment positions may be unnoticed in an urban area but may have beneficial impacts in a rural region.

4.9.2 Proposed Action

Implementation of the Proposed Action at Vance AFB would not alter or change the number of personnel or aircraft operations on site. Short-term beneficial impacts on regional socioeconomics would occur during construction activities at Vance AFB due to the purchase of materials and use of labor from the regional work force. However, no long-term benefits would occur, and there would be no changes in socioeconomic patterns or trends. Therefore, socioeconomic impacts would be negligible under the Proposed Action.

4.9.3 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. There would be no change in socioeconomic resources at Vance AFB. The short-term beneficial impacts on regional socioeconomics that would be realized under the Proposed Action would not occur.

4.9.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation.

4.10 Environmental Justice

4.10.1 Evaluation Criteria

Environmental justice analysis is applied only to proposed actions resulting in adverse environmental impacts. Based on the *AF Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process*, dated November 1997, if there would be no adverse impact, then there would not be any disproportionately high and adverse impact to minority or low-income populations. Adverse human health effects include bodily impairment, infirmity, illness, or death. Adverse environmental effects may include ecological, cultural, human health, or socioeconomic impacts when interrelated to impacts to the natural or physical environment.

4.10.2 Proposed Action

To comply with EO 12898, minority and low-income populations in the study area have been examined and compared to state and national statistics to determine if minority or low-income groups could be disproportionately affected by the Proposed Action. This review indicates that the number of low-income and minority residents in Garfield County is higher than national averages but lower than state averages. Furthermore, only minor adverse environmental impacts would be associated with the Proposed Action. Therefore, no minority or low-income populations would be adversely or disproportionately impacted.

4.10.3 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. There would be no disproportionately high and/or adverse effects on low-income populations or minorities.

4.10.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation.

4.11 Infrastructure and Utilities

4.11.1 Evaluation Criteria

Impacts to infrastructure are evaluated on their potential for disruption or improvement of existing levels of service and additional need for energy and water consumption, wastewater

systems, and transportation patterns and circulation. Impacts may arise from physical changes to circulation, construction activity, introduction of construction-related traffic on local roads, or changes in daily or peak-hour traffic volumes and energy needs created by either direct or indirect workforce and population changes related to base activities.

4.11.2 Proposed Action

To the extent possible, existing infrastructure will be utilized. Utilities and the associated appurtenances shall be designed based on standard engineering practice for the materials used; the Oklahoma Department of Environmental Quality Standards for the Construction of Sanitary Sewer and Water Lines; and applicable AF Manuals and Pamphlets.

Drinking Water Supply. Existing water lines are transite pipe and would be replaced by AWWA C900 DR 18 PVC pipe with PVC fittings. Color-coded tracer tape with wire would be installed approximately 1-foot above all water lines. New water lines would be located approximately 3-feet from the back of the curbs and would be looped to provide good circulation of the water within the housing development. Service lines of $\frac{3}{4}$ -inch copper or polyethylene using service saddles at the water main line would serve each residence. No meter would be required.

All water lines would be a minimum of six inches for fire protection purposes and fire hydrants would be spaced approximately 500-feet on center to place hydrants within 250-feet of any structure.

Wastewater. Existing sewer lines are verified clay pipe with a plastic lining that was installed to reduce inflow and infiltration. The existing sewer lines serving the MFH area flow to an existing lift station located at the north end of the subdivision. The lift station has sufficient capacity to serve the housing area and the pumps were recently replaced with submersible grinder pumps. The existing lift station and 6-inch force main would remain. Existing manholes in the area of the new housing units are approximately six to seven feet deep. The new units to the north of the old railroad spur along Fox Drive may require elevating above natural grade one to two feet to allow gravity-feed sewer flows to the existing lift station.

Storm Drainage. Existing storm sewers would be maintained and utilized. Reinforced concrete pipe would be used for storm sewers under paving and in structural areas. High-density polyethylene (HDPE) corrugated pipe with a smooth interior would be used outside of structural areas. Combination cast iron grates with curb inlets would be used to remove storm water from streets. Storm sewers would be based on a 10-year storm and would provide emergency overflow paths to direct excess stormwater away in the event of storms of greater magnitude or storm

sewer blockages. Open channels designed to carry the 50-year and the 100-year storm would be maintained at a minimum of one foot below the finished floor of any structure. Lots within the proposed MFH expansion area would drain from the back to the front and into the streets.

Natural Gas. New main gas lines would be two-inch diameter polyethylene. Service lines would be polyethylene with regulators and shut-off valves at each residence. Isolation valves would be provided at gas main branches to limit the number of residences without service due to maintenance or repair on gas lines. New gas line mains would be located on the street side of the new housing units on the same side as the water main. A minimum separation of 5 feet would be maintained between the gas main and water main. No meters would be required. Color-coded tracer tape with wire would be installed approximately 1-foot above all gas piping with accessibility at valve locations.

Electrical. The existing electrical service has been recently renovated. The service is 7200 volts primary with 240 volts secondary in a loop configuration that is primarily below grade service. The loop configuration serves the needs of the housing area in a dependable manner. The loop configuration would be expanded into the proposed MFH expansion area. A survey of the existing pad mount transformers indicate that the units are in good shape and suitable for re-use in the Proposed Action. The existing base electrical substation is adequately sized to provide service to additional residences and residences with larger square footages.

Base Pavements. Existing streets within the housing area are Portland Cement Concrete (PCC). Base personnel prefer the streets within the proposed MFH area to be constructed of PCC as well. However, if asphaltic concrete is used, the intersection should be paved with PCC. Standard street widths on the base are 29-feet from back of the curb to back of the opposite curb. Curbs would be six-inch high barrier curbs. Streets would be designed to carry the 10-year storm with cresting at the top of the curb.

Solid Waste Disposal and Recycling. Trash and garbage are collected by the base at the residence. Trash enclosures approximately 40-inches high would be required at each residence. Solid waste generated from the proposed demolition and construction activities would consist of building materials such as solid pieces of concrete, metal (conduit, piping, and wiring), and lumber. Analysis of the impacts associated with implementation of the Proposed Action is based on the following assumptions:

$$\text{Solid Waste (tons)} = \frac{(\text{Project Area}) \times (\text{Pounds of Debris})}{2,000 \text{ pounds per ton}}$$

- Approximately 4 pounds of construction debris is generated for each square foot (ft²) of floor area for new structures.
- Approximately 1 pound of construction debris is generated for each ft² of new asphalt paving.
- Approximately 92 pounds of demolition debris is generated for each ft² of floor areas of demolished structures.

Table 4-2 presents an estimated amount in tons of solid waste generated from the proposed construction and demolition activities using the assumptions detailed above (Vance AFB 2001c).

Table 4-2. Projected Construction Solid Waste Generation at Vance AFB

Project	Project Area (ft ²)	Solid Waste (pounds)	Solid Waste (tons)
Total Construction	100,930	403,720	201.86
Total Asphalt	144,000	144,000	72.00
Total Demolition	125,625	11,557,500	5,778.75
Total Solid Waste (pounds)		12,105,220	
Total Solid Waste (tons)		6,052.61	

It is estimated that 6,052.61 tons of solid waste would be generated from the proposed new construction. The city of Enid Municipal Landfill would be used for construction debris. It has the capacity to handle all of the waste generated from the proposed demolition and construction within the open landfill cell. The landfill is also constructing a new landfill cell in calendar year 2004. It would likely go to the city of Enid landfill, which has a capacity of 1.6 million tons. Assuming all of the debris would be landfilled, this would result in a one-time increase in the total annual landfill disposal for Vance AFB. This amount would have a negligible effect on the remaining capacity and the life expectancy of the landfill. Impacts could further be reduced with some of the waste being diverted for recycling or reuse.

4.11.3 No Action Alternative

Under the No Action Alternative, there would be no change in baseline conditions and none of the proposed construction projects would occur. There would be no impact on the installation's infrastructure and utilities as a result of the No Action Alternative.

4.11.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation under the Proposed Action.

4.12 Hazardous Materials and Wastes

4.12.1 Evaluation Criteria

Analysis of hazardous materials and waste management considered whether the federal action resulted in noncompliance with applicable federal and ODEQ regulations, or increased the amounts generated or procured beyond current Vance AFB management procedures and capacities. Analysis of fuels management considered whether established management policies, procedures, and handling capacities could accommodate the proposed activities. Analysis of pollution prevention considered the degree to which the action would result in worker, resident, or visitor exposure to these materials, or if the action would generate quantities of these materials beyond the capability of current management procedures.

4.12.2 Proposed Action

Hazardous Materials. Products containing hazardous materials that would be used during the proposed demolition and construction of the new facilities would be minimal and temporary. Construction contractors would be responsible for the hazardous materials used during the project. Therefore, Vance AFB hazardous materials management would not be impacted by the proposed demolition and construction activities.

Hazardous Wastes. It is anticipated that the quantity of hazardous wastes generated from the proposed construction and operation of the new base facilities would be negligible, and these activities would not have any effect on the base hazardous waste management program. The construction contractor would be responsible for handling any hazardous waste generated as a result of the proposed construction in accordance with applicable ODEQ regulations and the Vance AFB Hazardous Waste Management Plan.

Asbestos. Under the Proposed Action, all ACM will be contained and removed if encountered during demolition activities in accordance with ACM removal procedures. Therefore, no negative impacts to the management of ACM would be associated with the Proposed Action.

Lead-Based Paint. Under the Proposed Action, all LBP will be managed in accordance with LBP procedures during demolition activities. Therefore, no negative impacts to the management of LBP would be anticipated with implementation of the Proposed Action.

Pesticides. The soil under and immediately surrounding the housing units may contain chlordane (a termiticide). The construction contractor would take care during demolition and construction

to disturb as little of this soil as possible. Of particular concern would be earthmoving activities such as grading or leveling. The contractor would not remove any soils from the site without appropriate environmental testing and without written consent from the Vance AFB Wing Commander. Prior to occupancy of housing where soils were disturbed, the contractor would be responsible for having a competent risk assessor carry out a representative sampling of soil immediately surrounding the housing, gardens, and likely children's play areas. If the results exceed 1.6 milligrams/kilogram, the contractor would conduct a complete risk assessment. The results of screening sampling or a risk assessment would be provided to the AF for approval prior to occupancy.

4.12.3 No Action Alternative

Under the No Action Alternative, existing conditions would remain as is and none of the proposed projects would occur. Consequently, personnel would continue to occupy buildings that contain ACM and LBP materials. The ACM and LBP materials are not friable, and personnel are not currently exposed to the materials; thus, any potential impact from material remaining in a facility would be negligible.

4.12.4 Mitigative Actions

No adverse impacts have been identified requiring mitigation. However, if any contaminated soil were to be encountered during demolition, implementation of best management practices would remediate any contaminated soil encountered during the demolition phase of the proposed project. Therefore, no impacts to hazardous wastes and materials are anticipated.

4.13 Cumulative Impacts

Cumulative impacts on environmental resources result from incremental effects of proposed actions, when combined with other past, present, and reasonably foreseeable future projects in the area. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (federal, state, and local) or individuals. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

As presented in Section 1.5.5, there are two actions at Vance AFB that could contribute to cumulative impacts. The first is the proposed beddown of T-6A aircraft. An Environmental

Assessment of *T-6A Beddown and Changes to the T-37 Program at Vance AFB* was completed, and a FONSI was signed in September 2002. The Proposed Action includes five construction and demolition projects at various locations and facilities throughout the installation to support T-6A aircraft and the Joint Primary Aircraft Training System program at Vance AFB. This portion of the action could occur concurrently with the Proposed Action. Consideration for cumulative impacts to noise, air quality, water resources, socioeconomics, environmental justice, infrastructure and utilities, hazardous materials and wastes, land use, safety, biological resources, geological resources, and cultural resources, are discussed in the following subsections. For all resource areas listed above, there would be no impacts and, therefore, no cumulative impacts.

The second action that could contribute to cumulative impacts is the Vance AFB plan to upgrade the remaining 121 MFH units during Phase II and Phase III of the MFH program. Currently, no timeline or final designs have been developed for the implementation of Phase II and Phase III to adequately quantify potential impacts. However, the potential impacts associated with the replacement of 59 MFH units under Phase I are expected to be similar to the potential impacts of Phase II and Phase III. Although Phase II and III are anticipated to have the same potential impacts as Phase I, the potential impacts associated with Phase I would not affect Phase II and III because each phase would occur sequentially and independently of the others.

4.13.1 Noise

The sound environment surrounding Vance AFB is dominated by aircraft related noise. All of the MFH area falls within the DNL 65 to 70 dBA noise contour. The closest sensitive noise receptor to the MFH Area is the Eisenhower School, located just northwest of the proposed MFH area. The area in the vicinity of the MFH area will be impacted by intermittent construction noise throughout all three phases of the MFH program, but will be overshadowed by aircraft related noise. Both the MFH EA and T-6A Beddown EA proposed actions produce construction related noise. These noise events do not cause a cumulative impact because they occur in two different locations (i.e., flight line and MFH area). Therefore, no cumulative noise impacts result from these two actions.

4.13.2 Air Quality

The fugitive dust and PM₁₀ emissions that would be produced at the base as part of the MFH and T-6A Beddown construction programs would result in slightly elevated short-term PM₁₀ ambient air concentrations. However, the effects would be temporary and would fall off rapidly with distance from the proposed construction sites. Construction emissions for CY04, the planned

construction year under both proposals, are shown in Table 4-3. As shown in Table 4-3 MFH construction emissions are greater than T-6A construction emissions. As a result of implementation of both the MFH EA and the T-6A Beddown EA, the cumulative net change remains below the Proposed Action T-37 and T-6A Maximum Fleet Overlap (CY05) presented in the T-6A Beddown EA.

The construction emissions presented in Table 4-3 include the cumulative estimated annual emissions from construction equipment exhaust associated with the actions proposed at Vance AFB. These construction emission levels are anticipated to continue until Phase III is completed. As with fugitive dust emissions, combustion emissions from the fuel used by the construction equipment would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. Furthermore, as shown by Table 4-3, there would be a negligible increase in the emissions of any pollutant in AQCR No. 185 when compared to AQCR No. 185's current emissions inventory. Therefore, no adverse cumulative effects on air quality would be anticipated.

Table 4-3. Emissions Associated with the Cumulative Actions at Vance AFB

	Criteria Air Pollutant Emissions				
	NO ₂ (tpy)	VOC (tpy)	CO (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)
AQCR No. 185 Inventory (tpy) ¹	43,595	28,645	156,153	37,279	62,823
Construction Emissions					
T-6A Beddown Proposed Action Construction Emissions ^{2,3}	1.88	1.25	1.73	0.09	0.42
MFH Proposed Action Construction Emissions ²	62.38	16.90	56.88	3.03	4.76
Cumulative Construction Emissions	64.26	18.15	58.61	3.12	5.18
Total Emissions					
T-6A Beddown Proposed Action Total Emissions (in AQCR 185 – includes construction) ^{2,3,4,5}	-11.77	-23.05	-961.07	-20.23	-1.99
MFH Proposed Action Total Emissions ²	62.38	16.90	56.88	3.03	4.76
Cumulative Total Emissions	50.61	-6.15	-904.19	-17.20	2.77
% of AQCR No. 185 Regional Inventory	0.12%	-0.02%	-0.58%	-0.05%	< 0.01%

Note: tpy – tons per year

¹ Source: USEPA 2002

² Construction emissions would occur during CY04 in AQCR No. 185.

³ Source: *T-6A Beddown and Changes to the T-37 Program at Vance AFB*, September 2002

⁴ Sortie-Operations Emissions within the Vance 1B Military Operating Area emissions would begin in CY04 in AQCR No. 185.

⁵ Total emissions for each AQCR were calculated by determining what percent of the Slow Routes or the Vance 1B Military Operating Area is in each AQCR.

4.13.3 Water Resources

The base currently has 612 acres of improved property. Due to construction and demolition activities, the actions proposed would increase impervious surface area an additional 4.6 acres (4.5 MFH EA + 0.11 T-6A Beddown EA). This 0.75-percent increase in impervious surface area is negligible when compared to the total surface area of improved property at Vance AFB. Drainage patterns at Vance AFB would remain the same under both actions. It is not anticipated that there would be any adverse cumulative impacts on surface water in and around Vance AFB. During the construction, renovation, and demolition aspects of both actions, adherence to proper engineering practices and applicable codes and ordinances would help to reduce stormwater runoff. Erosion and sedimentation controls would be in place during construction to reduce and

control siltation as a result of erosion to areas outside of the construction sites. No adverse cumulative effects on water quality would be expected.

4.13.4 Socioeconomics

Slight increased beneficial effects to socioeconomics continue through Phase III due to the increase of jobs and equipment and supplies purchased to complete the proposed construction and demolition of the new MFH units.

4.13.5 Environmental Justice

There are no impacts to environmental justice as result from implementation of both actions, thus no cumulative impacts are expected to occur.

4.13.6 Infrastructure and Utilities and Hazardous Materials and Wastes

No cumulative impacts are expected with respect to drinking water supply, wastewater, storm drainage, electrical supply, natural gas supply, base pavements, hazardous materials, and hazardous wastes associated with both actions.

Solid Waste Disposal and Recycling. Analysis of the cumulative impacts associated with implementation of both actions is based on the following assumptions:

$$\text{Solid Waste (tons)} = \frac{(\text{Project Area}) \times (\text{Pounds of Debris})}{2,000 \text{ pounds per ton}}$$

- Approximately 4 pounds of construction debris is generated for each square foot (ft²) of floor area for new structures.
- Approximately 1 pound of construction debris is generated for each ft² of new asphalt paving.
- Approximately 92 pounds of demolition debris is generated for each ft² of floor areas of demolished structures.

Table 4-4 presents an estimate amount in tons of solid waste generated from the cumulative construction and demolition activities using the assumptions detailed above.

Table 4-4. Projected Cumulative Construction Solid Waste Generation at Vance AFB

Project	Project Area (ft²)	Solid Waste (pounds)	Solid Waste (tons)
MFH Total Construction	100,930	403,720	201.86
MFH Total Asphalt	144,000	144,000	72.00
MFH Total Demolition	125,625	11,557,500	5,778.75
T-6A Beddown Total Construction	5,680	22,720	11.36
T-6A Beddown Total Demolition	907	83,444	41.72
Total Solid Waste (pounds)		12,211,384	
Cumulative Solid Waste (tons)		6,105.69	

It is estimated that 6,105.69 tons of solid waste would cumulatively be generated from the proposed new construction. This equates to the amount of solid waste the city of Enid Municipal Landfill normally receives in one month. As presented in Section 4.11.2, the city of Enid Municipal Landfill has the capacity to handle all of the solid waste generated from the proposed demolition and construction within the open landfill cell. The city of Enid landfill has a capacity of 1.6 million tons and will increase its capacity with the construction of a new landfill cell in calendar year 2004. Assuming all of the debris would be landfilled, this would result in a one-time increase in the total annual landfill disposal for Vance AFB. This amount would have a negligible effect on the remaining capacity and the life expectancy of the landfill. Impacts could further be reduced with some of the solid waste being diverted for recycling or reuse by Vance AFB or city of Enid Municipal Landfill. No adverse cumulative effects would be expected.

4.13.7 Land Use, Safety, Biological, Geological, and Cultural Resources

As previously discussed, the MFH EA and the T-6A Beddown EA would occur in different locations on the base. Thus, any impacts to land use, safety, geological resources, biological resources, and cultural resources would be localized, resulting in little to no area-wide impacts, therefore, no cumulative impacts.

4.14 Unavoidable Adverse Environmental Impacts

Unavoidable impacts would result from the implementation of the Proposed Action; however, none of the impacts would be adverse. Noise from the facility construction activities would occur; however, the activities would take place during daytime hours and would be at levels that would not cause hearing impairment. The emission of air pollutants associated with heavy

equipment operation during construction and demolition activities would be an unavoidable condition, but is not considered adverse. Site grading during construction would remove minimal vegetation. The use of nonrenewable energy resources is unavoidable, but the amount used would be minor.

4.15 Irreversible and Irretrievable Commitment of Resources

NEPA also requires that environmental analysis include identification of "... any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects the use of these resources would have on consumption or destruction of a resource that could not be replaced in a reasonable period of time.

The irreversible environmental changes that could result from implementation of the Proposed Action include the consumption of material resources, energy resources, and human resources.

Material resources used for the Proposed Action include materials for facility construction. The materials that would be consumed are not in short supply and are readily available from suppliers in the region. Use of these materials would not limit other unrelated construction activities.

Energy resources would be irretrievably lost. These include petroleum-based products such as gasoline and diesel fuel. During facility construction, gasoline and diesel fuel would be used for operation of equipment and other vehicles. Consumption of these energy resources would not place an unreasonable demand on their availability in the region. Therefore, no adverse impacts would be expected.

The use of human resources for facility construction is considered an irretrievable loss, only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action represents employment opportunities and is considered beneficial.

5. List of Preparers

This EA has been prepared under the direction of Vance AFB, Headquarters Air Force Center for Environmental Excellence, and Headquarters Air Education and Training Command. Individuals who contributed to the preparation of this document are listed below.

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Cheryl Myers

engineering-environmental Management, Inc. (e²M)

A.A.S. Nursing

Years of Experience: 25

Dan Niosi

engineering-environmental Management, Inc. (e²M)

B.A. Environmental Studies/Natural Science

Years of Experience: 3

Allan Priest

engineering-environmental Management, Inc. (e²M)

B.S. Natural Resources Management

Years of Experience: 12

6. List of References

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Vance AFB 1997a	Vance Air Force Base (AFB). 1997. Environmental Assessment for Construction of Civil Engineering Complex and Physical Fitness Center. Vance Air Force Base, Oklahoma. 16 September 1997.
Vance AFB 1997b	Vance Air Force Base (AFB). 1997. Pollution Prevention Management Plan. 1997.
Vance AFB 2000	Vance Air Force Base (AFB). 2000. General Plan. Vance Air Force Base, Oklahoma. Prepared by Black & Veatch. July 1997. Updated March 2000.
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Vance AFB 2001d	Vance Air Force Base (AFB). 2001. Installation Restoration Program Management Action Plan. Vance AFB. January 2001.
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APPENDIX A

AF FORM 813

REQUEST FOR ENVIRONMENTAL IMPACT ANALYSIS

Report Control Symbol
RCS:

INSTRUCTIONS: Section I to be completed by Proponent; Sections II and III to be completed by Environmental Planning Function. Guidelines on separate sheets as necessary. References appropriate item numbers.

SECTION I - PROPONENT INFORMATION

1. TO (Environmental Planning Function)

DYN CEV
Environmental Manager

2. FROM (Proponent organization and functional address symbol)

DYN CS
Director, Community Services

3a. TELEPHONE NO.

X-7330

3. TITLE OF PROPOSED ACTION

REPLACE BASE HOUSING - PHASE I, Project Number XTLF044003

4. PURPOSE AND NEED FOR ACTION (Identify decision to be made and need date)

Demolish and replace 59 housing units with housing that is commensurate with local standards. Each housing unit will include a safe room and all other amenities identified in the Housing Community Plan (HCP).

5. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES (NOPAA) (Provide sufficient details for evaluation of the total action.)

Project to include site development and preparation, force protection, energy conservation, landscaping, and supporting infrastructure to include all of the requirements identified in the HCP.

6. PROponent APPROVAL (Name and Grade)

Jay Merz, CIV
Director, Community Services

6a. SIGNATURE

7b. DATE

20020722

SECTION II - PRELIMINARY ENVIRONMENTAL SURVEY. (Check appropriate box and describe possible environmental effects including cumulative effects.) (+ = positive effect; 0 = no effect; - = adverse effect; U = unknown effects)

7. AIR INSTALLATION COMPATIBLE (USE ZONING/LAND USE plans, accident potential, encroachment, etc.)

X

8. AIR QUALITY (Emissions, attainment status, state implementation plan, etc.)

X

9. WATER RESOURCES (Quality, quantity, source, etc.)

X

10. SAFETY AND OCCUPATIONAL HEALTH (Asbestos/radiation/chemical exposure, explosives safety, quantity-distance, etc.)

X

11. HAZARDOUS MATERIALS/WASTE (Drugs/toxins/poisonous, solid waste, etc.)

X

12. BIOLOGICAL RESOURCES (Wetlands/Woodlands, threatened or endangered species, etc.)

X

13. CULTURAL RESOURCES (Native American burial sites, archaeological, historical, etc.)

X

14. PHYSIOGRAPHY AND SOILS (Topography, minerals, geothermal, Reclamation Restoration Program, seismicity, etc.)

X

15. SOCIOECONOMIC (Employment/population projections, school and local fiscal impacts, etc.)

X

16. OTHER (Potential impacts not addressed above.)

X

SECTION III - ENVIRONMENTAL ANALYSIS DETERMINATION

17. ☐ PROPOSED ACTION QUALIFIED FOR CATEGORICAL EXCLUSION (CATEX) # _____; OR☒

PROPOSED ACTION DOES NOT QUALIFY FOR A CATEX, FURTHER ENVIRONMENTAL ANALYSIS IS REQUIRED.

18. REMARKS

The proposed action occurs in an Air Quality Control Region designated as in attainment. The proposed actions will have de minimus air emissions, therefore, a conformity determination is not required.

The proposed action will have a potential temporary air quality impact.

19. ENVIRONMENTAL PLANNING FUNCTION CERTIFICATION (Name and Grade)

J. Hank Ellis, Civ.

19a. SIGNATURE

19b. DATE

7-26-02

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APPENDIX B

AF FORM 1391

1. COMPONENT AIR FORCE		FY 1003 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE																																					
3. INSTALLATION AND LOCATION VANCE AIR FORCE BASE, OKLAHOMA			4. PROJECT TITLE REPLACE FAMILY HOUSING, PH 1																																						
5. PROGRAM ELEMENT 88741	5. CATEGORY CODE 711-142	7. PROJECT NUMBER XTLFG44003	8. PROJECT COST (\$000) 11,423																																						
9. COST ESTIMATES																																									
ITEM		U/M	QUANTITY	UNIT	COST																																				
REPLACE FAMILY HOUSING		UN	59	92,158	5,437																																				
SUPPORTING FACILITIES					4,855																																				
UTILITIES		LS			(1,791)																																				
PAVEMENTS		LS			(530)																																				
SITE IMPROVEMENTS		LS			(1,101)																																				
FORCE PROTECTION		LS			(434)																																				
NEIGHBORHOOD IMPROVEMENTS		LS			(899)																																				
SUBTOTAL					10,292																																				
CONTINGENCY (5%)					515																																				
TOTAL CONTRACT COST					10,807																																				
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)					616																																				
TOTAL REQUEST					11,423																																				
AREA COST FACTOR			.87																																						
<p>10. Description of Proposed Construction: Demolish and replace 59 housing units with housing that is commensurate with local standards. Each housing unit will include a safe room and all other amenities identified in the Housing Community Plan (HCP). Project to include site development and preparation, force protection, energy conservation, landscaping, supporting infrastructure to include all of the requirements identified in the HCP.</p> <table border="1"> <thead> <tr> <th>Unit Type</th> <th>Net Area</th> <th>Project Factor</th> <th>\$/NSM</th> <th>No. Units</th> <th>Total Cost</th> </tr> </thead> <tbody> <tr> <td>NCO 3BR</td> <td>121</td> <td>0.85</td> <td>852</td> <td>42</td> <td>3,680,384</td> </tr> <tr> <td>NCO 4BR</td> <td>146</td> <td>0.85</td> <td>852</td> <td>3</td> <td>317,200</td> </tr> <tr> <td>SNCO 3BR</td> <td>135</td> <td>0.85</td> <td>852</td> <td>12</td> <td>1,367,966</td> </tr> <tr> <td>SNCO 4BR</td> <td>160</td> <td>0.85</td> <td>852</td> <td>3</td> <td>231,744</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>59</td> <td>5,437,294</td> </tr> </tbody> </table>						Unit Type	Net Area	Project Factor	\$/NSM	No. Units	Total Cost	NCO 3BR	121	0.85	852	42	3,680,384	NCO 4BR	146	0.85	852	3	317,200	SNCO 3BR	135	0.85	852	12	1,367,966	SNCO 4BR	160	0.85	852	3	231,744					59	5,437,294
Unit Type	Net Area	Project Factor	\$/NSM	No. Units	Total Cost																																				
NCO 3BR	121	0.85	852	42	3,680,384																																				
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SNCO 3BR	135	0.85	852	12	1,367,966																																				
SNCO 4BR	160	0.85	852	3	231,744																																				
				59	5,437,294																																				
<p>11. REQUIREMENT: 110 UN ADEQUATE: 0 UN SUBSTANDARD: 230 UN</p> <p>PROJECT: Replace Military Family Housing, Phase 1 (Current Mission).</p> <p>REQUIREMENT: This project is required to provide modern and efficient housing for Non Commissioned Officers and their dependents stationed at Vance AFB. All units will meet modern housing standards and are programmed in accordance with the HCP. The housing will provide safe, comfortable, and appealing living environment comparable to the off-base civilian community. The design will provide a modern kitchen, living room, family room, safe room, bedroom and bath configuration, with ample interior and exterior storage. The number of bedrooms will range from three to four. Units will be provided with garages and additional parking will be provided for an additional vehicles and/or visitors. Adequate support infrastructure of roads and utilities will also be provided. The area is sited directly adjacent to the existing Family Housing Area. This is the first phase of an initiative to replace family housing units at Vance AFB.</p> <p>CURRENT SITUATION: These existing Capehart housing units were constructed in 1960 and</p>																																									

1. COMPONENT AIR FORCE		FY 2003 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE
3. INSTALLATION AND LOCATION VANCK AIR FORCE BASE, OKLAHOMA			4. PROJECT TITLE REPLACE FAMILY HOUSING, PH 1	
5. PROGRAM ELEMENT BE741	6. CATEGORY CODE 711-142	7. PROJECT NUMBER XTLFC44003	8. PROJECT COST (\$000) 11,423	
<p>do not meet the Whole House standards and are below current Air Force square footage allowances. Housing interiors are outdated and generally inadequate by modern criteria. The bedrooms are small and lack adequate closet space. While these units have been well maintained and do not have any health or safety deficiencies, the costs associated with adding on to each unit and reconfiguring the interior spaces to meet current standards exceed 76% of the replacement cost. Per Air Force Instruction (AFI) 31-6002, Family Housing Planning, Programming, Design, and Construction replacement should be pursued when the estimated cost exceeds 70% of the estimated replacement cost.</p> <p><u>IMPACT IF NOT PROVIDED:</u> Residents will continue to live in quarters which do not meet Air Force quality of life standards and the maintenance/utility costs will remain high. Affordable off base housing is not available for our Non-Commissioned Officers due to the large number of officers enrolled in pilot training. Most off base housing units are priced to match the BAM for these officers. For the Non-Commissioned Officer families, the only alternative to living in the existing substandard on-base housing is the expensive off-base housing. This is a major morale and/or financial problem for the affected families.</p> <p><u>ADDITIONAL:</u> This project meets the criteria/scope specified in Part II of Military Handbook 1190 "Facility Planning and Design Guide." An economic analysis will be prepared comparing the alternatives of new construction and status quo operation. The average cost to improve these housing units is greater than 70% of the replacement cost. Since this is replacement housing, there will be no increase in the student population or impact on the ability of local school districts to support base dependents. Base Civil Engineer: Mr. John Cole, (580) 283-7771.</p>				

Tri-Service Family Housing Cost Model

SERVICE: AIR FORCE

LOCATION: VANCE AIR FORCE BASE, OKLAHOMA

BASELINE:

(	59	)*(	127	)*(	852	) =	\$6,195,814
(	No. Units	)*(	ANSM	)*(	\$/NSM	) =	1.5 M Line Cost

PROJECT FACTORS:

(	0.87	)*(	1.02	)*(	0.96	) =	0.85
(	ACF	)*(	Project Size	)*(	Unit Size	) =	Project Factor

HOUSING COST:

(	6,396,814	)*(	0.85	) =	\$5,437,292
(	1.5 Meter Line Cost	)*(	Project Factor	) =	Housing Cost
(	5,437,292	)/(	59	) =	\$92,159
(	Housing Cost	)/(	No. Units	) =	Average Unit Cost

SUPPORTING COST:

UTILITIES	\$1,793,766
PAVEMENTS	\$630,335
SITE IMPROVEMENTS	\$1,100,682
FORCE PROTECTION	\$434,284
NEIGHBORHOOD IMPROVEMENTS	\$898,999
Support Cost	\$4,858,067

SUMMARY:

(	5,437,292	)+(	4,858,067	) =	\$10,295,359				
(	Housing Cost	)+(	Support Cost	) =	Subtotal				
(	10,295,359	)*(	1.05	)*(	1.057	) =	\$11,422,975	Sav: \$11,423,000	
(	Subtotal	)*(	Contingency	)*(	SIOM	) =	Project Cost	(Round)	
(	11,423,000	)/(	59	)*(	127	)*(	0.67	) =	\$1,749
(	Project Cost	)/(	No. Units	)*(	ANSM	)*(	ACF	) =	Total Project Cost/\$M

PROJECT SIZE FACTOR	(# OF UNITS)	UNIT SIZE	(AVG NET CM)
1-9 = 1.15	100-199 = 1.08	55-68 = 1.05	97-105 = 0.99
10-19 = 1.10	200-299 = 0.98	69-77 = 1.03	106-115 = 0.98
20-49 = 1.05	300-499 = 0.96	78-87 = 1.01	116-124 = 0.97

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APPENDIX C

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING CORRESPONDENCE



DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

DEC 09 2002

Colonel A. J. Stewart
Commander, 71st Flying Training Wing
246 Brown Parkway, Suite 224
Vance AFB OK 73705-5015

Tulsa District, Corps of Engineers
Department of the Army
P.O. Box 61
Tulsa OK 74121-0061


To Whom It May Concern

Vance Air Force Base is preparing an *Environmental Assessment (EA) of Proposed Upgrades to Military Family Housing, Phase I at Vance Air Force Base, Oklahoma*. A Summary of the Proposed Action and Alternatives is included with this correspondence as Attachment 1.

The environmental impact analysis process for this proposal is being conducted by the 71st Flying Training Wing of the Air Education and Training Command in accordance with the Council on Environmental Quality guidelines pursuant to the requirements of the National Environmental Policy Act of 1969. In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, we request your participation by reviewing the attached Summary Proposed Action and Alternatives and solicit your comments concerning the proposal and any potential environmental consequences. Please provide written comments or information regarding the action at your earliest convenience but no later than 30 days from the date of this letter. Also enclosed is a listing of those Federal, state, and local agencies that have been contacted (see Attachment 2).

Please address questions concerning the proposal to Mr. Mark Buthman. He can be reached at (580) 213-7344. Please forward your written comments to Mr. Buthman in care of Dyn CEV, 140 Channel Street, suite 231, Vance AFB, OK 73705-5623. Thank you for your assistance.

Sincerely



A. J. STEWART, Colonel, USAF

Attachments:

1. Summary of the Proposed Action and Alternatives
2. Interagency and Intergovernmental Coordination for Environmental Planning Distribution List

ATTACHMENT 1

ENVIRONMENTAL ASSESSMENT OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I VANCE AIR FORCE BASE, OKLAHOMA

Summary of the Proposed Action and Alternatives

Background Information

Vance Air Force Base (AFB) is located in Enid, Oklahoma. The installation is assigned to Headquarters Air Education and Training Command and is operated by the 71st Flying Training Wing (71 FTW). Vance AFB currently owns 230 Military Family Housing (MFH) units, of which 171 units are inadequate and require revitalization.

The purpose of the Proposed Action is to provide modern and efficient housing for non-commissioned officers and their dependents stationed at Vance AFB. Under Phase I, Vance AFB has identified the need to demolish and replace 59 MFH units at Vance AFB as part of the installation's Fiscal Year (FY) 2003 Capital Improvement Program. The current Capeheart housing units were constructed in 1960, do not meet the current standards, and are below current U.S. Air Force (AF) square footage allowances. Vance AFB is implementing the AF guidance requirement to upgrade all inadequate housing to modern standards by or before FY 2010.

An Economic Analysis performed by Vance AFB Facilities Management Office in January 2002 compared four alternatives: the Proposed Action (demolition and new construction), No Action Alternative (status quo), and two Alternatives Eliminated from Further Consideration (renovation and direct compensation). The following sections briefly explain each alternative.

Proposed Action

The Proposed Action is to construct 59 housing units on an area comprised of a 10.6-acre parcel donated to Vance AFB by the City of Enid and an adjacent land parcel currently containing 59 housing units. Figure 1 shows the location of Vance AFB. Figures 2 and 3 illustrate the locations for current Vance AFB MFH and the proposed new construction, respectively. The existing 59 housing units would be demolished. The new construction would have a slight change in the number of bedrooms allocated to military personnel based upon the individual's military rank compared with the existing MFH units. The new units would include three and four bedroom housing units. Table 1 displays the current and proposed unit allocations. The units would be one-story duplexes with a single car garage. The new units would meet or exceed all of



Figure 1. Vance AFB Vicinity Map

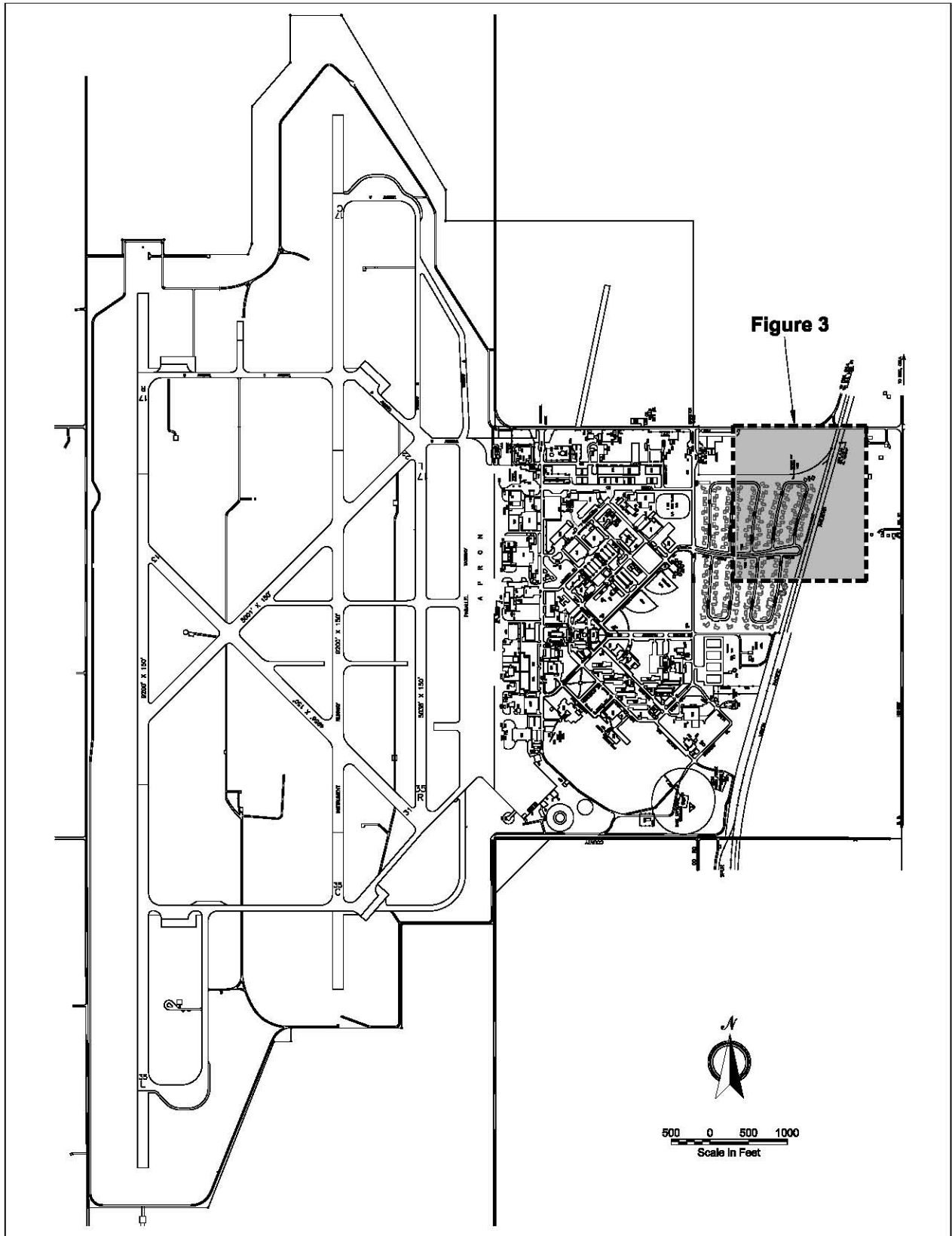


Figure 2. Vance AFB Site Map



Figure 3. Location of Proposed Construction and Demolition Projects at Vance AFB

the current standards for energy efficiency and would meet modern housing standards. Thus, the Proposed Action would provide modern housing units for AF personnel, allow for increased outdoor space, and is the most cost-effective alternative.

The 10.6-acre parcel is currently a wheat field. An environmental baseline survey entitled *Environmental Baseline Survey Conducted on Kisner Property Part of NE/4, Section 36, T22N, R7W, Enid, Garfield County, Oklahoma* dated December 1995 and an EA entitled *Environmental Assessment for City of Enid Land Proffer* dated February 15, 1996, found no environmental concerns. There would be no increase or decrease in personnel numbers at the installation as a result of the Proposed Action.

Table 1. Current and Proposed MFH Unit Allocation

Rank and Number of Bedrooms	Current Number of MFH Units	Proposed Number of MFH Units
JNCO 2 BR	10	0
JNCO 3 BR	31	42
JNCO 4 BR	4	3
SNCO 3 BR	12	12
SNCO 4 BR	2	2

Note: JNCO – Junior Non-commissioned Officer
SCNO – Senior Non-commissioned Officer
BR – bedroom

No Action Alternative

Under the No Action Alternative, Vance AFB would continue to use existing MFH units, and not renovate its current stock of MFH units. These units fail to meet current AF living standards. There would be no change from the existing conditions at the installation, and the inadequacy and degradation of the existing MFH units would continue. The existing units were constructed in 1960 and show the effects of age and heavy use. Houses are approaching the end of their useful life expectancy. Implementation of the No Action Alternative would require AF members and their families to continue living in outdated, sub-standard housing. Selection of this alternative would negate Vance AFB's ability to meet AF requirements of replacing substandard MFH units by FY 2010.

Alternatives Eliminated from Further Consideration

Modification of existing facilities was considered in the early conceptual phase of this program; however, such modifications would not meet the projects' goals or fulfill mission requirements as discussed below. Thus, these alternatives were eliminated from further consideration.

Renovation of Existing Buildings. This alternative would include the renovation of all 59 MFH units, maintaining the current rank/bedroom composition. The existing one-story duplexes would be updated to current standards. The renovated MFH units would provide a safe, comfortable, and appealing living environment comparable to off-base housing. However, this alternative is not acceptable because it would not adequately address the size deficiencies of the current houses. Constructing additions onto the existing houses would negatively impact the neighborhood by reducing the space between housing units. Furthermore, this alternative would be the most expensive, and the scope of improvements necessary to bring the MFH units to standard is not economically feasible. The cost would be more than 70 percent of the replacement costs. Therefore, this alternative is not viable and has been eliminated from further consideration.

Direct Compensation. This alternative would involve demolishing the existing housing, moving all 59 families off-base, and paying basic allowance for housing (BAH) for the entire period of the analysis. This is not a feasible alternative because an October 2001 Housing Market Analysis concluded there is a deficit of adequate housing in the community to meet AF needs. Therefore, this alternative was eliminated from further consideration.

ATTACHMENT 2

ENVIRONMENTAL ASSESSMENT OF PROPOSED UPGRADES TO MILITARY FAMILY HOUSING, PHASE I VANCE AIR FORCE BASE, OKLAHOMA

Interagency and Intergovernmental Coordination for Environmental Planning Distribution List

Department of the Army
Tulsa District, Corps of Engineers
P.O. Box 61
Tulsa, OK 74121-0061

U.S. Fish and Wildlife Service
Director, Ecological Services Office
222 Sam Houston Avenue Suite A
Tulsa, OK 74127

Mr. Michael Jansky
USEPA Region 6
Federal Assistance Section (6E-FF)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

U.S. Bureau of Indian Affairs
Mr. Merritt E. Youdeer
Muskogee Area Director
Federal Building and U.S. Courthouse
Muskogee Area Office
Muskogee, OK 74401

The Honorable Frank Keating
State Capitol, Rm. 212
Oklahoma City, OK 73105

Ms. Melvena Heisch
Deputy, State Historic Preservation Officer
Oklahoma Historical Society
2704 Villa Prom
Oklahoma City, OK 73107

Oklahoma Department of Environmental
Quality
Customer Assistance Program
1000 Northeast Tenth Street
Oklahoma City, OK 73152

Department of Wildlife Conservation
Natural Resources Section
1801 North Lincoln
P.O. Box 53465
Oklahoma City, OK 73107

Metropolitan Planning Commission
Mr. Jim Henderson, Chairman
706 W. Maine
Enid, OK 73701

Mr. Chris Bauer
Planning Administrator
City of Enid
P.O. Box 1768
Enid, OK 73702

The Honorable Olin Unruh
County Commissioner, Chairman
Garfield County Courthouse
Enid, OK 73701

Oklahoma National Heritage Inventory
Oklahoma Biological Survey
111 E. Chesapeake St.
Norman, OK 73109-0575



Oklahoma
Biological
Survey

Natural Heritage Inventory

OKLAHOMA BIOLOGICAL SURVEY
111 E. Chesapeake Street
Norman, Oklahoma 73019-0575, USA
(405) 325-1985
FAX: (405) 325-7702

A.J. Stewart

Wednesday, December 18, 2002

U.S. Department of Defense, Vance Air Force Base
246 Brown Parkway, Ste. 244
Vance AFB, OK 73705-5015

OBS Ref.: 2002-450-FED-DOD

Re: Environmental Assessment of Proposed Upgrades to Military Family Housing, Phase I

Dear Mr. Stewart,

This letter is in response to your request for information on the presence of endangered species or other elements of biological significance at the referenced site. We have reviewed the information currently in the Natural Heritage Inventory database and have found no records of elements at the location you describe.

Because the database is only as complete as the information that has been collected, we cannot say with certainty whether or not a given site harbors rare species or ecological communities. In addition, the Oklahoma Biological Survey has no regulatory authority for endangered species and cannot say whether a project is or is not compliant with state or federal laws. Endangered species regulatory authorities in Oklahoma are the U.S. Fish and Wildlife Service office in Tulsa (918-581-7458) and the Oklahoma Department of Wildlife Conservation in Oklahoma City (405-521-4619). These offices also may have site specific information of which we are unaware.

Sincerely,

Ian Butler
Biological Data Coordinator



DEPARTMENT OF THE ARMY
TULSA DISTRICT CORPS OF ENGINEERS
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

Real Estate
Acquisition &
Realty Services Branch

January 8, 2003

Mr. Mark Buthman
DYN-CEV, AETC
140 Channel Street, Suite 231
Vance AFB, OK 73705-5623

SUBJECT: Vance AFB Environmental Assessment of Proposed Upgrades
to Military Family Housing, Phase I at Vance AFB, Oklahoma

Dear Mr. Buthman:

In letter, dated 9 December 9, 2002, from Colonel A.J. Stewart, we were requested to provide comments on a "Summary of the Proposed Action," which was an enclosure to the letter. This letter was not received in this office until 7 January 2003, presumably as a result of the use of an old (and no longer valid) Post Office box mailing address.

Our Environmental and Regulatory Branch has reviewed the referenced Summary and offers the following comment: "USAF should coordinate the action with the SHPO (which they indicate they are doing) in order to adequately assess the potential historic significance and National Register eligibility of the 1960s era Capehart housing slated for demolition."

If you have any questions or comments regarding this comment, please contact Mr. Louis Vogel, CESWT-PE-E at (918) 669-4934.

Additionally, in late November 2002, we received the directive to finalize the title transfer of the 10.6 acres from the Vance Development Authority to Vance Air Force Base. Our attorney has been in contact with the Enid City Attorney, Ms. Carol Lahman. We expect the deed transfer to be complete in the very near future.

Sincerely,

Angela McPhee
Acting Chief
Real Estate Division

WILDLIFE CONSERVATION COMMISSION

Lewis Stiles	John S. "Jack" Zink
CHAIRMAN	MEMBER
Mac Maguire	Harland Stonecipher
VICE CHAIRMAN	MEMBER
Douglas Schones	Bruce Mabrey
SECRETARY	MEMBER
John D. Groendyke	Bill Phelps
MEMBER	MEMBER



FRANK KEATING, GOVERNOR
GREG D. DUFFY, DIRECTOR

DEPARTMENT OF WILDLIFE CONSERVATION

1801 N. Lincoln

P.O. Box 53465

Oklahoma City, OK 73152

PH. 521-3851

January 10, 2003

Mark Buthman
Dyn DEV
140 Channel Street, Ste 231
Vance AFB, OK 73705

Dear Mr. Buthman,

This responds to your letter of December 9, 2002 requesting information regarding the possible presence of state threatened or endangered species as well as any environmental impact for the following:

Project: Proposed Upgrades to Military Family Housing, Phase I

Location: Vance AFB, Oklahoma

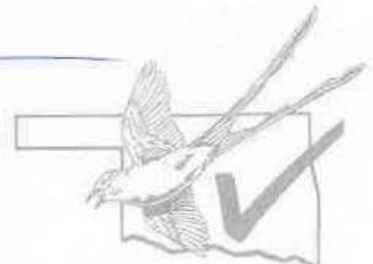
Please understand that due to time and personnel constraints this Department has not conducted an actual field survey of the proposed site. Therefore, we are unable to provide site-specific information. We have reviewed the information provided for this project against our current records of state endangered and threatened species. Our records are compatible with the Oklahoma Natural Heritage Inventory and it appears that no state listed species would be affected.

Please be sure to contact the US Fish and Wildlife Service's Tulsa office (918-581-7458) to determine if any federally-listed species will be affected. For additional information concerning sensitive species, we recommend that you contact the Oklahoma Natural Heritage Inventory, 111 East Chesapeake, Norman, Oklahoma 73019.

Thank you for the opportunity to comment. If we can be of further assistance, please contact our Natural Resources Section at 405-521-4616.

Sincerely,

Thomas Heuer
Natural Resources Biologist



Search for the Scissortail

**Oklahoma Historical Society**

Founded May 27, 1893

State Historic Preservation Office • 2704 Villa Prom • Shepherd Mall • Oklahoma City, OK 73107-2441
Telephone 405/521-6249 • Fax 405/947-2818

January 13, 2003

Mr. Mark Buthman
Department of the Air Force
Dyn CEV
140 Channel Street, Suite 231
Vance AFB, OK 73705-5623

RE: File #0509-03: Vance Military Housing Upgrade Project

Dear Mr. Buthman:

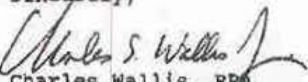
Per our conversation by telephone today, I have indicated that we need additional information to properly assess whether any of the proposed housing modifications will affect eligible properties for listing on the National Register of Historic Places. Current plans are to demolish 59 circa 1960 Capehart era housing units.

Although not documented in the submitted materials, you have stated that the roofs have been modified to pitched roofs and vinyl siding has been added to these units. This extent of modification is probably significant enough that the houses are not eligible properties. However, prior to making a decision on eligibility, I would like for Jim Gabbert (Architectural Historian with the State Historic Preservation Office) and myself to have the opportunity to visit the site and determine the extent of modification that has taken place.

As discussed, we will plan to arrive at Vance around 10:30 on the 27th of January, 2003, to review the project area. As mentioned, we will be bringing on base a camera to photograph representative examples if that does not pose a problem.

Until then, thank you for the update on extent of modifications. If you have any questions, please call me at 405/521-6381. Thank you.

Sincerely,


Charles Wallis, RPA
Historical Archaeologist



Oklahoma Historical Society

Founded May 27, 1893

State Historic Preservation Office • 2704 Villa Prom • Shepherd Mall • Oklahoma City, OK 73107-2441
Telephone 405/521-6249 • Fax 405/947-2918

January 30, 2003

Mr. Mark Buthman
Dept. of the Air Force, Dyn CEV
140 Channel Street, Suite 231
Vance AFB, OK 73705-5623

RE: File #0509-03; Vance AFB Proposed Upgrades to Family Housing

Dear Mr. Buthman:

We have received and reviewed the documentation concerning the referenced project in Grant County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no historic properties affected by the referenced project.

Based on a site visit by Charles Wallis and Jim Gabbert of my staff on 1/27/03, it is our opinion that none of the facilities, family housing or the adjacent park and open land to be impacted by Phase I, retain enough historic integrity to be considered for inclusion in the National Register. This assessment includes the entire Family Housing area.

Thank you for the opportunity to comment on this project. We look forward to working with you in the future.

Should further correspondence pertaining to this project be necessary, the above underlined file number must be referenced. If you have any questions, please contact Mr. Jim Gabbert, Architectural Historian, at 405/522-4478. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

The Draft Finding of No Significant Impact (FONSI) and Environmental Assessment (EA) were made available for public review from February 12 through March 5, 2003. The below Notice of Availability was published in the *Enid News and Eagle* on February 12, 2003.

PUBLIC NOTICE

**Notice of Availability
Draft Finding of No Significant Impact for the
Draft Environmental Assessment of Proposed Upgrades
to Military Family Housing, Phase I at
Vance Air Force Base, Oklahoma**

VANCE AIR FORCE BASE, OKLA. – A Draft Environmental Assessment (EA) of Proposed Upgrades to Military Family Housing at Vance Air Force Base, Oklahoma has been prepared. Vance Air Force Base is proposing to issue a Finding of No Significant Impact (FONSI) based on this Draft EA. The analysis considered potential effects of the proposed action on twelve resource areas: noise, land use, air quality, safety, geological resources, water resources, biological resources, cultural resources, socioeconomics, environmental justice, infrastructure and utilities, and hazardous materials and wastes. The results, as found in the Draft EA, show that the proposed action would not have an adverse impact on the environment – indicating that a FONSI would be appropriate. An Environmental Impact Statement should not be necessary to implement the proposed action.

Copies of the Draft FONSI and EA showing the analysis are available for review at the following locations: Public Library of Enid and Garfield County, 120 W. Maine, and Vance Air Force Base Library, 446 McAffrey Ave., Suite 24.

Public comments on the Draft FONSI and EA will be accepted through **March 5, 2003**.

Written comments and inquiries on the Draft FONSI and EA should be directed to Mark Buthman, 71 FTW/Dyn CEV, 140 Channel Street, Vance AFB, OK 73705, (580) 213-7344.

In addition, the following Privacy Advisory was published as part of the Cover Sheet to the Draft EA:

Privacy Advisory

Your comments on this Draft EA are requested. Letters or other written comments provided may be published in the Final EA. Comments will normally be addressed in the Final EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public comment period or to fulfill requests for copies of the Final EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and specific comments will be disclosed; personal home addresses and phone numbers will not be published in the Final EA.

AFFIDAVIT

Sandy McDaniel, of lawful age, being duly sworn, states: That she is the Business Manager of the Enid News & Eagle; that she has examined the bound files of said papers and finds that there was in the issue of the **ENID NEWS & EAGLE** of the date of February 13, 2003 on page A8 of the that edition a 10 inch advertisement for Engineering Environmental Management see below captioned as follows:

She further states that she is unable to furnish tear sheets of these issues and makes this affidavit in lieu thereof.

Subscribed and sworn to before me this 26th day of March, 2003

Colleen Miller

Sue

Sandy McDaniel



COLLEEN Miller, Notary Public
Garfield County
New Mexico

My Commission Expires: 6-4-2005
My commission expires on June 4, 2005.

My commission #01008165

APPENDIX D

AIR QUALITY EMISSIONS CALCULATIONS SPREADSHEETS

Acreage Calculations

Proposed Construction

MFH Units

Grade	BRs	sq. ft.	Units	total sq. ft.
Senior Enlisted	4	2150	2	4,300
Senior Enlisted	3	1860	12	22,320
Junior Enlisted	4	1950	3	5,850
Junior Enlisted	3	1630	42	68,460
			59	100,930 = total sq. ft.

(sq. ft. taken from *Replace Family Housing Phase I Charette Report* - Page 16)

Total Asphalt = 144,000

Total Concrete = 74,600

319,530 = total sq. ft.
7.34 = total acreage

Proposed Demolition

MFH Units

Grade	BRs	sq. ft.	Units	total sq. ft.
Senior Enlisted	4	1750	2	3,500
Senior Enlisted	3	1500	12	18,000
Junior Enlisted	4	1575	3	4,725
Junior Enlisted	3	1300	42	54,600
			59	80,825 = total sq. ft.

(sq. ft. taken from DD 1391 and *Economic Analysis* - Appendix C)

Total Paving = 44,800

125,625 = total sq. ft.
2.88 = total acreage

Total Disturbance = total construction + total demolition = 10.22 acres

Proposed Construction Projects at Vance Air Force Base

Includes:

100% of the demolition of 59 MFH units. 80,825 ft ²	80,825
100% of the demolition of pavement and curbs. 44,800 ft ²	44,800
100% of the construction of 59 MFH. 100,930 ft ²	100,930
100% of the new asphalt. 144,000 ft ²	144,000
100% of the new concrete. 74,600 ft ²	74,600

Construction Site Air Emissions

Combustive Emissions of ROG, NOx, SO2, CO and PM10 Due to Construction

User Inputs:

Total Building Area:	301,155 ft ²	(Includes construction and demolition of MFH units, demolition of pavements and curbs, and new concrete)	301,155
Total Paved Area:	144,000 ft ²	(Includes asphalt paving)	144,000
Total Disturbed Area:	10.2 acres	(sum of total building area and total paved area)	445,155
Construction Duration:	1.0 years	(assumed per information from base POC)	10.2
Annual Construction Activity:	230 days/yr	(assumed)	43,560 sf/acre

Results: [Average per Year Over the Construction Period]

	ROG	NOx	SO2	CO	PM10
Emissions, lbs/day	146.93	542.47	26.36	494.61	41.41
Emissions, tons/yr	16.90	62.38	3.03	56.88	4.76

Calculation of Unmitigated Emissions

Summary of Input Parameters

	ROG	NOx	SO2	CO	PM10
Total new acres disturbed:	10.22	10.22	10.22	10.22	10.22
Total new acres paved:	3.31	3.31	3.31	3.31	3.31
Total new building space, ft ² :	301,155	301,155	301,155	301,155	301,155
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	10.22	10.22	10.22	10.22	10.22
Area paved, acres in 1 yr:	3.31	3.31	3.31	3.31	3.31
Building space, ft ² in 1 yr:	301,155	301,155	301,155	301,155	301,155

Annual Emissions by Source (lbs/day)

	ROG	NOx	SO2	CO	PM10
Grading Equipment	2.6	16.4	1.1	3.5	2.9
Asphalt Paving	0.9	0.0	0.0	0.0	0.0
Stationary Equipment	50.6	41.3	2.7	8.9	2.4
Mobile Equipment	48.2	484.9	22.5	482.1	36.1
Architectural Coatings (Non-Res)	44.7	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	146.9	542.5	26.4	494.6	41.4

Emission Factors

Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

Source	SMAQMD Emission Factor				
	ROG	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft ²	1.37E-04 lbs/day/ft ²	9.11E-06 lbs/day/ft ²	2.97E-05 lbs/day/ft ²	8.00E-06 lbs/day/ft ²
Mobile Equipment	1.60E-04 lbs/day/ft ²	1.61E-03 lbs/day/ft ²	7.48E-05 lbs/day/ft ²	0.0016 lbs/day/ft ²	1.20E-04 lbs/day/ft ²
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
 Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Construction Fugitive Dust Emissions

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).
Worksheet Revised 16 June 1997.

User Input Parameters / Assumptions

Acres graded per year:	10.2	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	34	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	days/yr	graded area is exposed
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10		(Fraction of site area covered by soil piles)
Soil percent silt, s:	15	%	(expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	40	%	(assumed, conservatively high considering rainfall, windy conditions and regional sandy soils)
Annual rainfall days, p:	85	days/yr	rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)
Wind speed > 12 mph %, I:	51	%	(from wind rose http://www.epa.gov/ttnotag1/areas/windr/13967.gif)
Fraction of TSP, J:	0.5		(SCAQMD recommendation)
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	5	ft	
Qty construction vehicles:	1	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	26.6	hr/acre	
Bulldozer mileage per acre	1.7	VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	6	VMT/day	
Construction VMT per acre	20.4	VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^a (W/3)^b/(M/0.2)^c] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.25 lbs/hr	26.6 hr/acre	6.7 lbs/acre
Grading	0.77 lbs/VMT	1.7 VMT/acre	1.3 lbs/acre
Vehicle Traffic	1.37 lbs/VMT	20.4 VMT/acre	28 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Soil Piles EF = $1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941)$, p. A9-99.

Soil Piles EF = 34.4 lbs/day/acres covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)

Soil Piles EF = 3.44 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	6.7 lbs/acre	10.22	NA	68	0.03
Grading	1.3 lbs/acre	10.22	NA	13	0.01
Vehicle Traffic	28.0 lbs/acre	10.22	NA	286	0.14
Erosion of Soil Piles	3.4 lbs/acre/day	10.22	90	3,164	1.58
Erosion of Graded Surface	26.4 lbs/acre/day	10.22	90	24,283	12.14
TOTAL				27,815	13.91

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters

Construction area 10.22 acres/yr (from "Combustion" Worksheet)
Qty Equipment: 1 (calculated based on acres disturbed)

Assumptions.

Terrain is mostly flat.

Terrain is populated with grass; trees are negligible.

An average of 6" soil is removed during stripping.

An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.

200 hp bulldozers are used for site clearing.

300 hp bulldozers are used for stripping, excavation, and backfill.

Vibratory drum rollers are used for compacting.

Stripping, Excavation, Backfill and Compaction require an average of two passes each.

Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	10.22	17.03
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	10.22	5.00
022 242 5220	Excavation	Bulk, open site, common earth, 150' haul	800	cu. yd/day	0.99	1.01	5.11	5.15
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	5.11	2.11
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	10.22	4.23
TOTAL								33.52

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 33.52

Qty Equipment: 1

Grading days/yr: 33.52

Round to	34 grading days/yr
----------	--------------------

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IICEP	Interagency and Intergovernmental Coordination for Environmental Planning	PM _{2.5}	particulate matter equal to or less than 2.5 microns in diameter
IRMP	Integrated Resources Management Plan	POTW	Publicly Owned Treatment Works
IRP	Installation Restoration Program	POV	privately-owned vehicle
JNCO	Junior Non-Commissioned Officer	ppm	parts per million
LBP	lead-based paint	PSD	Prevention of Significant Deterioration
MFH	Military Family Housing	psi	pounds per square inch
mg/m ³	milligrams per cubic meter	RCRA	Resource Conservation and Recovery Act
mgd	million gallons per day	SAP	Satellite Accumulation Point
MSL	Mean Sea Level	SEL	Sound Exposure Level
NAAQS	National Ambient Air Quality Standards	SHPO	State Historic Preservation Office
NCO	Non-Commissioned Officer	SIP	State Implementation Plan
NEPA	National Environmental Policy Act	SNCO	Senior Non-Commissioned Officer
NHPA	National Historic Preservation Act	SO ₂	Sulfur Dioxide
NLR	Noise Level Reduction	TCP	Traditional Cultural Property
NO ₂	Nitrogen Dioxide	tpy	tons per year
NO _x	Nitrogen Oxides	U.S.	United States
NRHP	National Register of Historic Places	U.S.C.	United States Code
O ₃	Ozone	USACE	U.S. Army Corps of Engineers
ODEQ	Oklahoma Department of Environmental Quality	USEPA	U.S. Environmental Protection Agency
ODS	Ozone Depleting Substance	USFWS	U.S. Fish and Wildlife Service
ODWC	Oklahoma Department of Wildlife Conservation	UST	underground storage tank
OSD	Office of the Secretary of Defense	VOC	Volatile Organic Compound
OSHA	Occupational Safety and Health Administration	XRF	X-ray fluorescence
		μ/m ³	micrograms per cubic meter
P.L.	Public Law		
Pb	Lead		
PCC	Portland Cement Concrete		
PM ₁₀	particulate matter equal to or less than 10 microns in diameter		

