

FINAL
ENVIRONMENTAL ASSESSMENT FOR THE
AFIT MASTER PLAN
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

88th AIR BASE WING



May 2011



Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 20 MAY 2011		2. REPORT TYPE Final		3. DATES COVERED -	
4. TITLE AND SUBTITLE Final Environmental Assessment for the AFIT Master Plan, Wright-Patterson Air Force Base, Ohio				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Air Force 88th Air Base Wing Wright-Patterson Air Force Base, Ohio				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 183	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

**FINDING OF NO SIGNIFICANT IMPACT
FOR IMPLEMENTATION OF THE
AIR FORCE INSTITUTE OF TECHNOLOGY
MASTER PLAN
WRIGHT-PATTERSON AIR FORCE BASE, OHIO
19 May 11**

Pursuant to the Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA), 40 Code of Federal Regulations (CFR) 1500 - 1508, Department of Defense Directive (DoD) 6050.1, and Air Force Regulation (AFR) 32 CFR Part 989, the 88th Air Base Wing (ABW) Civil Engineer Directorate, Asset Management Division prepared an Environmental Assessment (EA) for the Air Force Institute of Technology (AFIT) based at Wright-Patterson Air Force Base (WPAFB), Ohio. This EA is incorporated by reference into this finding.

Purpose and Need

The AFIT mission is to provide defense-focused graduate and professional continuing education and research to sustain the technological supremacy of America's air and space forces by offering graduate and post-graduate engineering degrees through its Graduate School of Engineering & Management in departments of Math & Statistics, Electrical & Computer Engineering, Engineering Physics, Operational Sciences, Systems & Engineering Management, and Aeronautics & Astronautics. AFIT provides a diverse curriculum of continuing education through its Civil Engineer and Services School and School of Systems & Logistics.

In order to continue AFIT's mission and sustain the increasing number of student and personnel needs, AFIT has analyzed existing facilities and infrastructure and has forecasted future needs and objectives to enable it to meet its stated mission. The purpose is to affirm AFIT's mission at WPAFB and provide a physical framework for implementing this mission over the next 20 years. AFIT is proposing the development of a comprehensive planning strategy, which would extend through 2030 through the implementation of a Master Plan.

Description of Proposed Action

The AFIT is proposing to implement its Master Plan by redeveloping and expanding on-campus facilities to meet the needs of growth of students and personnel. The Master Plan has a forecasted outlook of proposed campus construction and development to calendar year (CY) 30. The Master Plan identified total building area required for priority one and two needs: priority one needs included projected requirements for staff and enrollment growth and priority two needs included desirable facilities not essential to meeting growth objectives. Priority two facilities include additional post-graduate student offices, research laboratories, and a conference center.

To accommodate priority one space, the Master Plan proposes construction of a new 57,199-square foot (sf) AFIT Research Laboratory and a 39,267-sf addition to the existing AFIT Library. To accommodate priority two requirements, the Master Plan proposes expanding the Academic Facility (Building 20642) by 35,607 sf. The activities associated with implementing the Proposed Action to expand on-campus facilities and replace off-campus facilities would include demolition, construction, and renovation/rehabilitation on the AFIT campus. This would include demolition of approximately 18,293 gross square feet (gsf) of existing building space, and construction or renovation of 132,073 gsf of new or rehabilitated building space, for a net increase of approximately 113,780 gsf of on-campus construction. AFIT currently has approximately 423,000 gsf on campus and the equivalent of 61,000 gsf off campus, or 484,000 gsf.

No-Action Alternative

Under the no-action alternative, current programs and projects would continue to develop as planned and the action proposed would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped.

Environmental Consequences

Land Use (EA Section 4.1): The Proposed Action would result in no short or long-term adverse impacts because no changes to land use would occur at or surrounding WPAFB.

Air Quality (EA Section 4.2): Under the Proposed Action, there would be minor short-term adverse impacts to air quality during construction. Impacts from construction activities include the generation of fugitive dust and particulates from the removal and grading of soil, excavation operations, and other associated construction activities. In addition, there would be minor, short-term emissions from vehicles that would travel in the construction area. During construction, dust suppression measures will be used to minimize fugitive dust emissions.

Noise (EA Section 4.3): Under the Proposed Action, there would be minor adverse impacts on ambient noise from site preparation, excavation, and construction activities. Impacts would be short-term and minor because these activities would be carried out during normal working hours.

Geology and Soils (EA Section 4.4): As a result of the Proposed Action, short-term negligible adverse impacts would occur because construction activities would occur in developed areas. Negligible adverse impacts to soils, topography, and physiographic features would also occur. Erosion control measures in accordance with base specifications for construction projects would be implemented.

Water Resources (EA Section 4.5): Under the Proposed Action, there would be minor adverse impact to surface water during construction as the proposed activities would primarily be conducted in areas of existing facilities. The Proposed Action would not pose new risks; however, minor adverse effects on groundwater would occur as a result of construction activities. Erosion and sedimentation controls will be implemented as a Best Management Practice (BMP). A NPDES construction general permit will be obtained for soil disturbances greater than one-acre and a Storm Water Pollution Prevention Plan (SWPPP) will be prepared to ensure low impact disturbances from proposed construction activities.

Biological Resources (EA Section 4.6): Consultation with the United States Fish and Wildlife Service (USFWS) was conducted to address potential impacts to Federally-listed threatened or endangered plants or animals within the project area. A response from the USFWS indicated the agency has no objection to the proposed project.

Cultural Resources (EA Section 4.7): Consultation with the Ohio Historic Preservation Office (OHPO) of the Ohio Historical Society was conducted to address potential eligible structures for listing in the National Register of Historic Places (NRHP). There are no structures considered eligible for listing in the NRHP within the AFIT. A response from the OHPO indicated that preparation of a Master Plan does not constitute an undertaking subject to Section 106 review; however, construction-related activity associated with carrying out the recommendations of such a plan does constitute an undertaking that would need to be coordinated with the OHPO at such time.

Socioeconomics (EA Section 4.8): Under the Proposed Action, there would be short-term negligible adverse impacts on the local workforce that would result in a minor beneficial impact to the local economy in the form of revenue generated by construction activities.

Environmental Justice (EA Section 4.9): Under the Proposed Action, there would be no short- or long-term adverse impacts to low-income or minority populations due to land use not changing.

Infrastructure (EA Section 4.10): Under the Proposed Action, there would be negligible short-term adverse impact from traffic interruption in the project area during construction activities. No long-term adverse impacts would result from the Proposed Action because the number of students and personnel supporting the AFIT mission would increase only slightly. No adverse impacts on infrastructure are expected from the Proposed Action.

Health and Safety (EA Section 4.11): Under the Proposed Action, there would be potential minor adverse impacts to workers during construction activities. Impacts associated with construction activities would be minimized by adherence to applicable safety standards.

Hazardous Materials and Wastes (EA Section 4.12): With proper housekeeping and maintenance, the Proposed Action would have a negligible adverse impact on hazardous materials used during construction. Hazardous materials used would not be expected to increase. Therefore, it is anticipated that the volume, type, classifications, and sources of hazardous wastes would be similar in nature with the baseline condition waste streams.

Agency Consultation


In accordance with NEPA, 42 U.S.C. §4321 et seq. (1969), informal consultation was solicited with applicable agencies to seek input on the likelihood of environmental or other impacts resulting from development activities under the Proposed Action. A summary of the outcome of consultation efforts with pertinent agencies is included as Appendix A of the EA.

Public Notice

A public notice was posted in the *Dayton Daily News* and the Base paper, *The Skywrighter*, on March 22, 2011, initiating the public review period. The comment period was held from March 22, 2011 until April 20, 2011. The Draft EA and Draft FONSI were made available in the Fairborn Public Library. During this time period, one public comment was received, dated March 26, 2011. The USAF responded to the commenter on May 4, 2011. Copies of the comment and response are included in the Final EA.

Finding of No Significant Impact (FONSI)

The Proposed Action is to implement the AFIT Master Plan by redeveloping and expanding on-campus facilities to meet the needs of growth of students and personnel. Under the no-action alternative, current programs and projects would continue to develop as planned and the action proposed would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped. Based upon my review of the facts and analysis contained in the EA, which is hereby incorporated by reference, I conclude that the Proposed Action and the no-action alternative will not have a significant impact on the natural or human environment. An environmental impact statement is not required for this action. This analysis fulfills the requirements of the NEPA, the President's Council on Environmental Quality regulations, and 32 CFR 989.


NAME

Date: 20 May 11

DAVID A. PERKINS, P.E.
Director
Civil Engineer Directorate

**Final
Environmental Assessment for the
Air Force Institute of Technology Master Plan
Wright-Patterson Air Force Base, Ohio**

**Contract No. GSA GS-10F-0048J
Delivery Order W912QR-10F-0268**

Submitted to:

**U.S. Army Corps of Engineers
Louisville District
Environmental Engineering Branch**

Prepared by:

**Shaw Environmental & Infrastructure, Inc.
5050 Section Avenue
Cincinnati, OH 45212**

May 2011

COVER SHEET

ENVIRONMENTAL ASSESSMENT OF THE AIR FORCE INSTITUTE OF TECHNOLOGY MASTER PLAN AT WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Responsible Agencies: U.S. Air Force (USAF); Wright-Patterson Air Force Base (WPAFB), Ohio

Affected Location: Wright-Patterson AFB, Ohio

Proposed Action: Implement AFIT Master Plan

Report Designation: Environmental Assessment

Written comments and inquiries regarding this document were directed to Ms. Karen Beason, EIAP Program Manager, 88 ABW/CEAOR, 1450 Littrell Road, WPAFB, Ohio, 45433-5209, (937)257-5899, Karen.Beason@wpafb.af.mil.

Abstract: The Air Force Institute of Technology (AFIT) has analyzed existing facilities and infrastructure, while simultaneously forecasting future needs and objectives to enable it meet its stated mission. AFIT is proposing the development of a comprehensive planning strategy, which would extend through 2030 through the implementation of a Master Plan. The proposed expansion and renovations addressed in the Master Plan need to be completed expeditiously, without interrupting AFIT's mission, while maximizing available resources. The purpose of campus expansion and existing building renovations is to ensure that the AFIT campus facilities are sizable to facilitate both short-term and long-term growth of students and personnel.

This environmental assessment (EA) evaluated the Proposed Action and the No Action Alternative. Resources considered in the impact analysis were land use, air quality, noise, geological resources, water resources, biological resources, cultural resources, socioeconomics and environmental justice, infrastructure, health and safety, and hazardous materials and wastes. Analyses in this document identified minor short-term adverse impacts on air quality and noise resulting from the proposed construction activities related to AFIT campus redevelopment. The EA was made available to the public on March 21, 2011, for a 30-day review period.

TABLE OF CONTENTS

List of Tables	vii
List of Figures	vii
List of Appendices	viii
List of Acronyms	ix
 1.0 Purpose and Need For Action.....	1-1
1.1 Introduction.....	1-1
1.2 Facility Description.....	1-2
1.3 Purpose and Need	1-9
1.4 Scope of Environmental Analysis.....	1-11
1.5 Regulatory Framework	1-12
1.5.1 National Environmental Policy Act.....	1-12
1.5.2 Integration of Other Environmental Statutes and Regulations	1-12
1.5.3 Interagency and Intergovernmental Coordination for Environmental Planning and Community Involvement.....	1-14
 2.0 Alternatives Including the Proposed Action.....	2-1
2.1 Introduction.....	2-1
2.2 Process for Alternatives Development.....	2-1
2.3 Description of the Proposed Action.....	2-3
2.3.1 New AFIT Research Laboratory.....	2-3
2.3.2 Addition to AFIT Library and Alterations to Academic Building 20642.....	2-5
2.3.3 North Entry Court Redesign	2-5
2.3.4 Green Space Quadrangle Redesign and Construction	2-6
2.3.5 Parking Lot	2-6
2.3.6 New Steam Pipe Lines at Building 20640	2-6
2.3.7 Site Utilities Update / Upgrade.....	2-6
2.3.8 Kettering School Relocation to Building 20641	2-6
2.4 No Action Alternative.....	2-6
2.5 Alternatives Eliminated from Further Study.....	2-7
2.6 Comparison of Environmental Consequences	2-7

TABLE OF CONTENTS (continued)

3.0	Affected Environment	3-1
3.1	Land Use	3-1
3.1.1	Definition of the Resource	3-1
3.1.2	Existing Conditions.....	3-2
3.2	Air Quality	3-5
3.2.1	Definition of the Resource	3-5
3.2.2	Existing Conditions.....	3-8
3.3	Noise	3-10
3.3.1	Definition of the Resource	3-10
3.3.2	Existing Conditions.....	3-13
3.4	Geology and Soils.....	3-14
3.4.1	Definition of the Resource	3-14
3.4.2	Existing Conditions.....	3-15
3.5	Water Resources	3-16
3.5.1	Definition of the Resource	3-16
3.5.2	Existing Conditions.....	3-17
3.6	Biological Resources	3-21
3.6.1	Definition of the Resource	3-21
3.6.2	Existing Conditions.....	3-21
3.7	Cultural Resources	3-26
3.7.1	Definition of the Resource	3-26
3.7.2	Existing Conditions.....	3-27
3.8	Socioeconomics	3-28
3.8.1	Definition of the Resource	3-28
3.8.2	Existing Conditions.....	3-29
3.9	Environmental Justice.....	3-30
3.9.1	Definition of the Resource	3-30
3.9.2	Existing Conditions.....	3-32
3.10	Infrastructure.....	3-33
3.10.1	Definition of the Resource	3-33
3.10.2	Existing Conditions.....	3-33
3.11	Health and Safety.....	3-36
3.11.1	Definition of the Resource	3-36
3.11.2	Existing Conditions.....	3-37
3.12	Hazardous Materials and Wastes	3-38
3.12.1	Definition of the Resource	3-38
3.12.2	Existing Conditions.....	3-39

TABLE OF CONTENTS (continued)

4.0	Environmental Consequences.....	4-1
4.1	Land Use	4-1
4.1.1	Evaluation Criteria.....	4-1
4.1.2	Proposed Action	4-2
4.1.3	No Action	4-2
4.2	Air Quality	4-2
4.2.1	Evaluation Criteria.....	4-2
4.2.2	Proposed Action	4-4
4.2.3	No Action	4-8
4.3	Noise	4-8
4.3.1	Evaluation Criteria.....	4-8
4.3.2	Proposed Action	4-8
4.3.3	No Action	4-9
4.4	Geology and Soils.....	4-9
4.4.1	Evaluation Criteria.....	4-9
4.4.2	Proposed Action	4-9
4.4.3	No Action	4-11
4.5	Water Resources	4-11
4.5.1	Evaluation Criteria.....	4-11
4.5.2	Proposed Action	4-11
4.5.3	No Action	4-12
4.6	Biological Resources	4-12
4.6.1	Evaluation Criteria.....	4-13
4.6.2	Proposed Action	4-13
4.6.3	No Action	4-14
4.7	Cultural Resources	4-14
4.7.1	Evaluation Criteria.....	4-14
4.7.2	Proposed Action	4-15
4.7.3	No Action	4-15
4.8	Socioeconomics	4-15
4.8.1	Evaluation Criteria.....	4-15
4.8.2	Proposed Action	4-16
4.8.3	No Action	4-16
4.9	Environmental Justice.....	4-17
4.9.1	Evaluation Criteria.....	4-17
4.9.2	Proposed Action	4-17
4.9.3	No Action	4-17

TABLE OF CONTENTS (continued)

4.10	Infrastructure.....	4-17
4.10.1	Evaluation Criteria.....	4-17
4.10.2	Proposed Action	4-18
4.10.3	No Action	4-20
4.11	Health and Safety.....	4-20
4.11.1	Evaluation Criteria.....	4-20
4.11.2	Proposed Action	4-20
4.11.3	No Action	4-21
4.12	Hazardous Materials and Wastes	4-21
4.12.1	Evaluation Criteria.....	4-21
4.12.2	Proposed Action	4-21
4.12.3	No Action	4-23
4.13	Cumulative Impacts	4-23
4.14	Unavoidable Adverse Effects	4-25
4.15	Relationship of Short-Term Uses and Long-Term Productivity	4-25
4.16	Irreversible and Irretrievable Commitments of Resources	4-26
5.0	List of Preparers	5-1
6.0	List of Persons Contacted	6-1
7.0	References.....	7-1

LIST OF TABLES

- 1-1 Description of Existing AFIT Buildings
- 1-2 Summary of Applicable Regulatory Requirements
- 2-1 Comparison of Environmental Consequences
- 3-1 National Ambient Air Quality Standards
- 3-2 SEL dB Values for Aircraft Operating in the Vicinity of WPAFB
- 3-3 Percentage of Population Highly Annoyed by Noise Zones
- 3-4 Drainage Areas at Area B Monitored Under NPDES Permit
- 3-5 Employment of Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio
- 4-1 Conformity *de minimis* Emission Thresholds
- 4-2 Net Change in Emissions at WPAFB Associated with Proposed Action

LIST OF FIGURES

- 1-1 Location of WPAFB and Surrounding Area
- 1-2 Location of AFIT Campus and Surrounding Area
- 1-3 Existing Campus Site Plan
- 1-4 Building 20640
- 1-5 Building 20641
- 1-6 Building 20642
- 1-7 Building 20643
- 1-8 Building 20644
- 1-9 Building 20646
- 2-1 Proposed Building Site Plan Detail
- 3-1 Existing Land Use and Maximum Mission Noise Contours
- 3-2 Surface Water, NPDES Monitoring Points, and Areas of Potential Effect at AFIT
- 3-3 Threatened and Endangered Species and Wetlands Locations in Area B
- 3-4 Income and Poverty Level of Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)
- 3-5 Educational Attainment of the Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)
- 3-6 Race of Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)
- 3-7 ERP and Related Sites near AFIT Campus
- 4-1 Street Map of AFIT Area

APPENDICES

- Appendix A Interagency and Intergovernmental Coordination for Environmental Planning
Correspondence, Public Comment, and USAF Response
- Appendix B Clean Air Act – General Conformity Analysis
- Appendix C Noise Terminology and Analysis Methodology

LIST OF ACRONYMS

ABW	Air Base Wing
ACM	asbestos-containing materials
AFB	Air Force Base
AFI	Air Force Instruction
AFIT	Air Force Institute of Technology
AFPD	Air Force Policy Directive
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
APE	Area of Potential Effect
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
AST	above-ground storage tank
AW	Air Wing
BASH	Bird/Wildlife Aircraft Strike Hazard
BMP	Best Management Practice
BMP/LTM	Basewide Monitoring Program/Long Term Monitoring
CAA	Clean Air Act
CEANP	Pollution Prevention and Sustainment Section of the Environmental Branch in the Asset Management Division, Civil Engineering Directorate
CEANQ	Environmental Quality Section of the Environmental Branch in the Asset Management Division, Civil Engineering Directorate
CEAOR	Planning and Real Estate Section of the Optimization Branch in the Asset Management Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
CY	calendar year
CZ	clear zone
dB	decibel
dBA	A-weighted sound level measurement
DNL	day-night average A-weighted sound level
DoD	U.S. Department of Defense
DLSME	Defense Land Systems and Miscellaneous Equipment
DRMO	Defense Reutilization Marketing Office
EA	environmental assessment
EFDZ	earthfill disposal site
EIAP	Environmental Impact Analysis Process
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EISA	Energy Independence and Security Act
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
ESZ	Explosive Safety Zone
°F	degrees Fahrenheit

LIST OF ACRONYMS (continued)

FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot/feet
FY	fiscal year
gpd	gallons per day
gpm	gallons per minute
gsf	gross square feet
HAZMART	hazardous material pharmacy
HP	heating plant
HUD	U.S. Department of Health and Urban Development
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IRP	Installation Restoration Program
IT	International Technology Corporation
JP-8	Jet Fuel-8
LBP	lead-based paint
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
MCD	Miami Conservancy District
MCL	maximum contaminant level
MSA	Metropolitan Statistical Area
MSL	mean sea level
MSW	mixed solid waste
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NRHP	National Register of Historic Places
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resource Conservation Service
NSR	New Source Review
NWI	National Wetlands Inventory
O_3	ozone
OAC	Ohio Administrative Code
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
OSHA	Occupational Safety and Health Administration
OU	operable unit
PAH	polyaromatic hydrocarbon

LIST OF ACRONYMS (continued)

Pb	lead
PCB	polychlorinated biphenyl
PM _{2.5}	particulate matter with an aerodynamic particle size less than 2.5 micrometers
PM ₁₀	particulate matter with an aerodynamic particle size less than 10 micrometers
POL	petroleum, oils, and lubricants
POV	privately-owned vehicle
ppm	parts per million
PSD	Prevention of Significant Deterioration
RAPCA	Regional Air Pollution Control Agency
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SEL	sound exposure level
sf	square foot or feet
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SOP	standard operating procedure
SPC	Spill Prevention Coordinator
SPCC	spill prevention and control and countermeasures
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
TMDL	total maximum daily load
tpy	tons per year
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal Facility
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish & Wildlife Service
UST	underground storage tank
VOC	volatile organic compound
WPAFB	Wright-Patterson Air Force Base

1.0 PURPOSE AND NEED FOR ACTION

This section provides a brief introduction and facility description, a statement of the purpose of and need for the Proposed Action, an overview of the organization of the Environmental Assessment (EA), and a summary of the key environmental compliance requirements.

1.1 Introduction

The Air Force Institute of Technology (AFIT), located at Wright-Patterson Air Force Base (WPAFB), Ohio, reports to Air University, located at Maxwell Air Force Base. AFIT provides an alternative to the Air Command and Staff College and focuses on engineering expertise through master degree curriculum and leadership training. AFIT's focus has shifted over the past few years, from undergraduate to graduate degrees. Students represent all branches of the U.S. Armed Services as well as international allies.

AFIT's mission is to provide defense-focused graduate and professional continuing education and research to sustain the technological supremacy of America's air and space forces. AFIT offers graduate and post-graduate engineering degrees through its Graduate School of Engineering & Management. The School has departments of Math & Statistics, Electrical & Computer Engineering, Engineering Physics, Operational Sciences, Systems & Engineering Management, and Aeronautics & Astronautics. Students are actively involved in research in addition to classroom instruction. AFIT also provides a diverse curriculum of continuing education through its Civil Engineer and Services School and School of Systems & Logistics. Students participate as onsite residents, through distance asynchronous technology, and synchronous technology (several days).

AFIT has analyzed existing facilities and infrastructure, while simultaneously forecasting future needs and objectives to enable it to meet its stated mission. AFIT is proposing the development of a comprehensive planning strategy, which would extend through 2030, through the implementation of a Master Plan (Proposed Action).

The U.S. Air Force (USAF) is preparing an EA to analyze the potential impacts from implementing the Master Plan. This EA describes the plan elements of the proposed development alternatives under consideration for the Master Plan. If the analyses presented in the 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 the human environment and why an Environmental Impact Statement (EIS) is unnecessary. If significant environmental issues result that cannot be mitigated to insignificance, an EIS would be required, or the Proposed Action would be abandoned and no action would be taken.

The USAF has prepared this EA in accordance with the National Environmental Policy Act (NEPA) of 1969; 40 Code of Federal Regulations (CFR), Parts 1500-1508, the Council on Environmental Quality (CEQ) regulations implementing NEPA; and the USAF *Environmental Impact Analysis Process* (EIAP) [32 CFR Part 989].

1.2 Facility Description

WPAFB is located in the southwest portion of the state of Ohio in Greene and Montgomery counties, approximately 10 miles east of the city of Dayton. The Base encompasses 8,145 acres and is classified as non-industrial with mixed development. WPAFB is subdivided into two areas: Areas A and B. Area A is primarily administrative offices and an active airfield. Area B is primarily research and development with educational functions and is located across State Route (SR) 444 to the southwest. **Figure 1-1** shows the location of WPAFB and the surrounding area.

The AFIT campus is located in Area B, southeast of Hobson Way and Tenth Street. It is situated approximately 750 feet (ft) from the east perimeter of the Base, along National Road between Gates 19B and 22B. The AFIT has occupied its current campus since 1963. **Figure 1-2** shows the location of the AFIT campus at WPAFB and the surrounding area.

The campus is currently comprised of six buildings consisting of approximately 423,000 gross square feet (gsf) of space. All six buildings are physically connected for pedestrian movement, and the relative locations of the campus buildings are depicted in an existing campus site plan (**Figure 1-3**). They are organized on a modified “U” configuration and sit on a 34-ft-high local hillside. Building 20642 is the middle leg of the “U” and is a two-story building located at the high side of the site. Buildings on the other legs of the “U” sit lower and increase in height to three stories.

An informal axis runs east-west through the campus in approximate alignment with abandoned Eleventh Street. This axis helps to organize visitor drop-off, front door to the building complex, the “U” shape of the buildings, East Lawn, and parking to the east. This axis runs through the middle of Building 20642, which is the campus hub of support and event activities. The campus also has 793 parking spaces.

Figure 1-1. Location of WPAFB and Surrounding Area

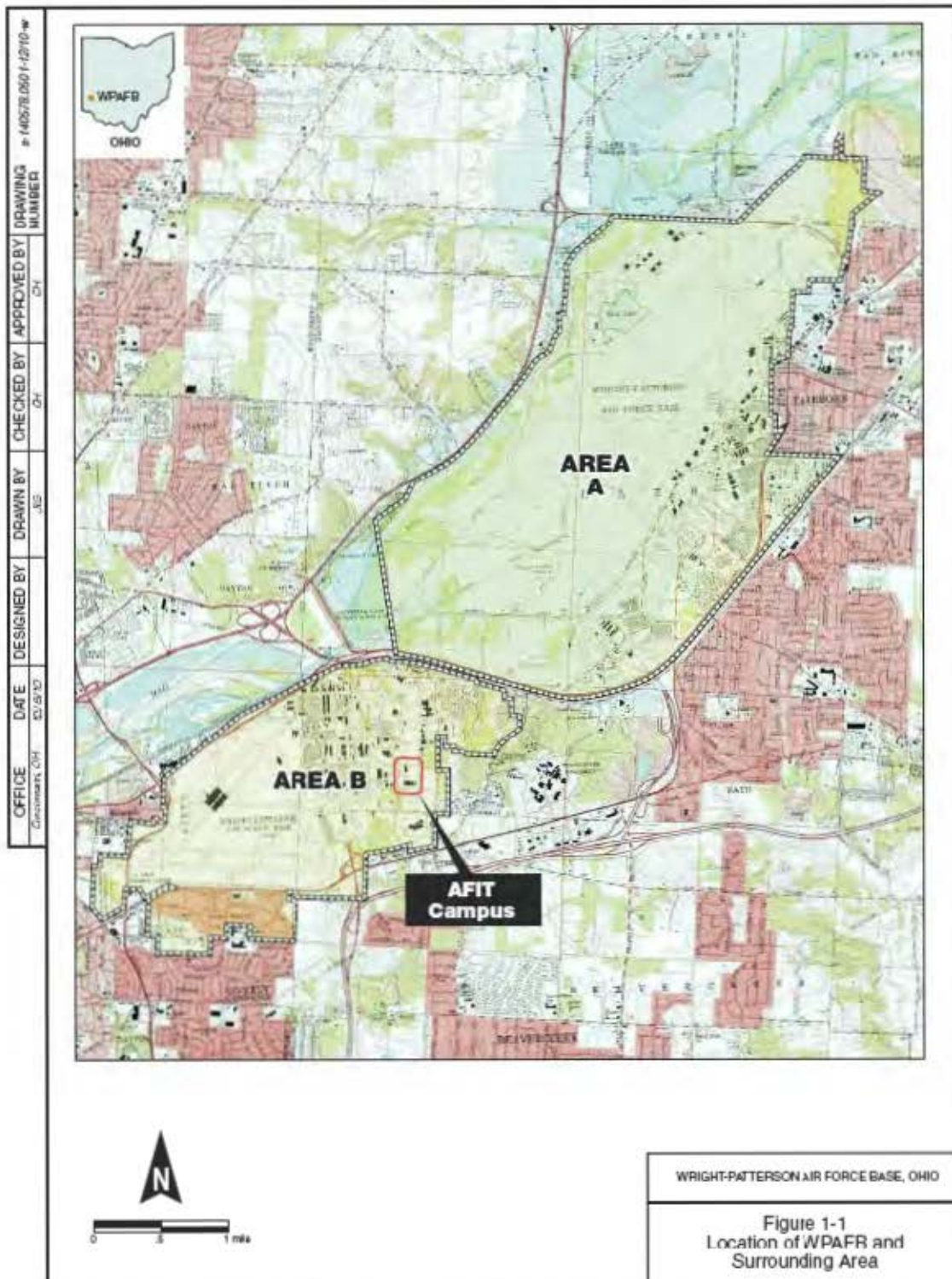


Figure 1-2. Location of AFIT Campus and Surrounding Area

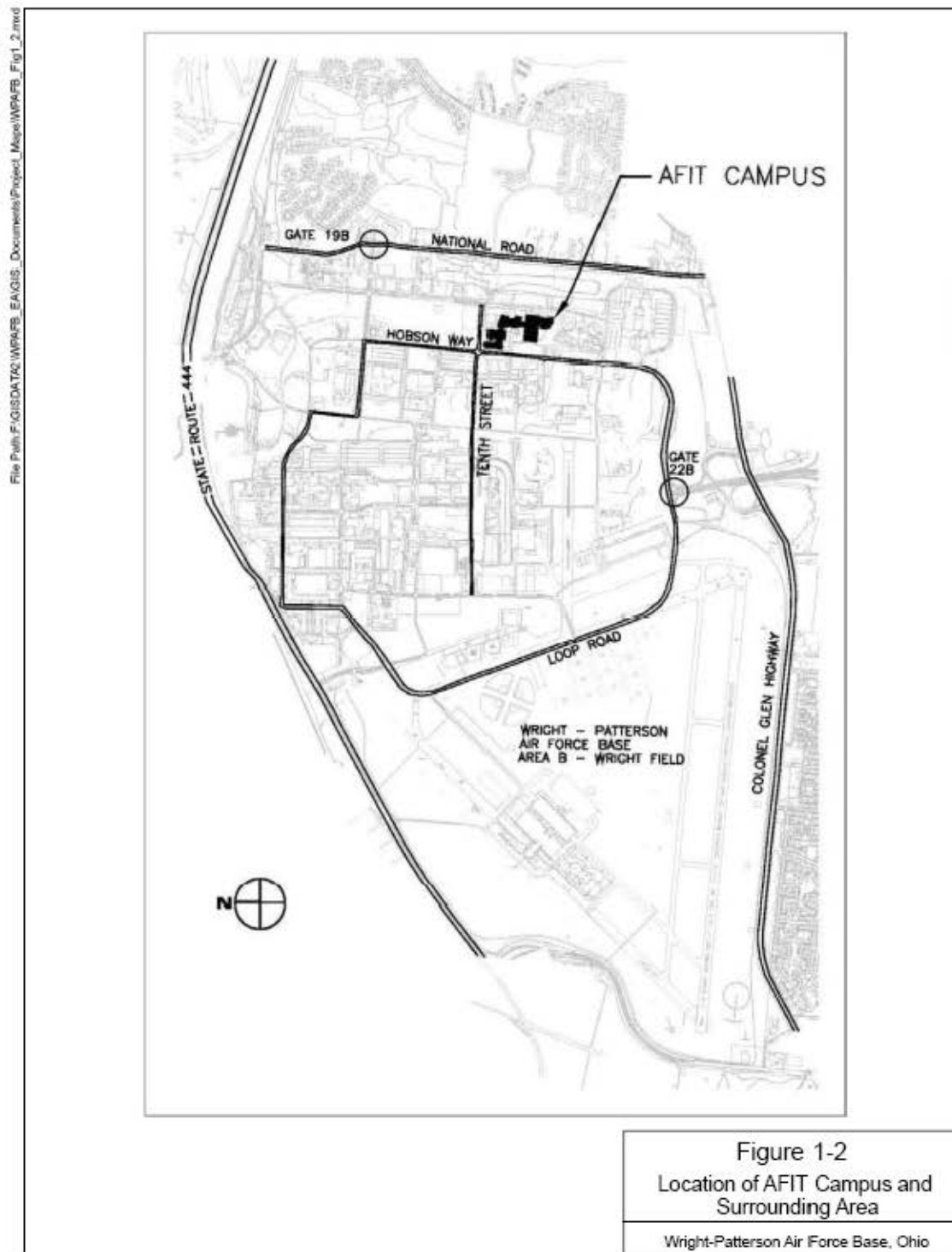


Figure 1-3. Existing Campus Site Plan

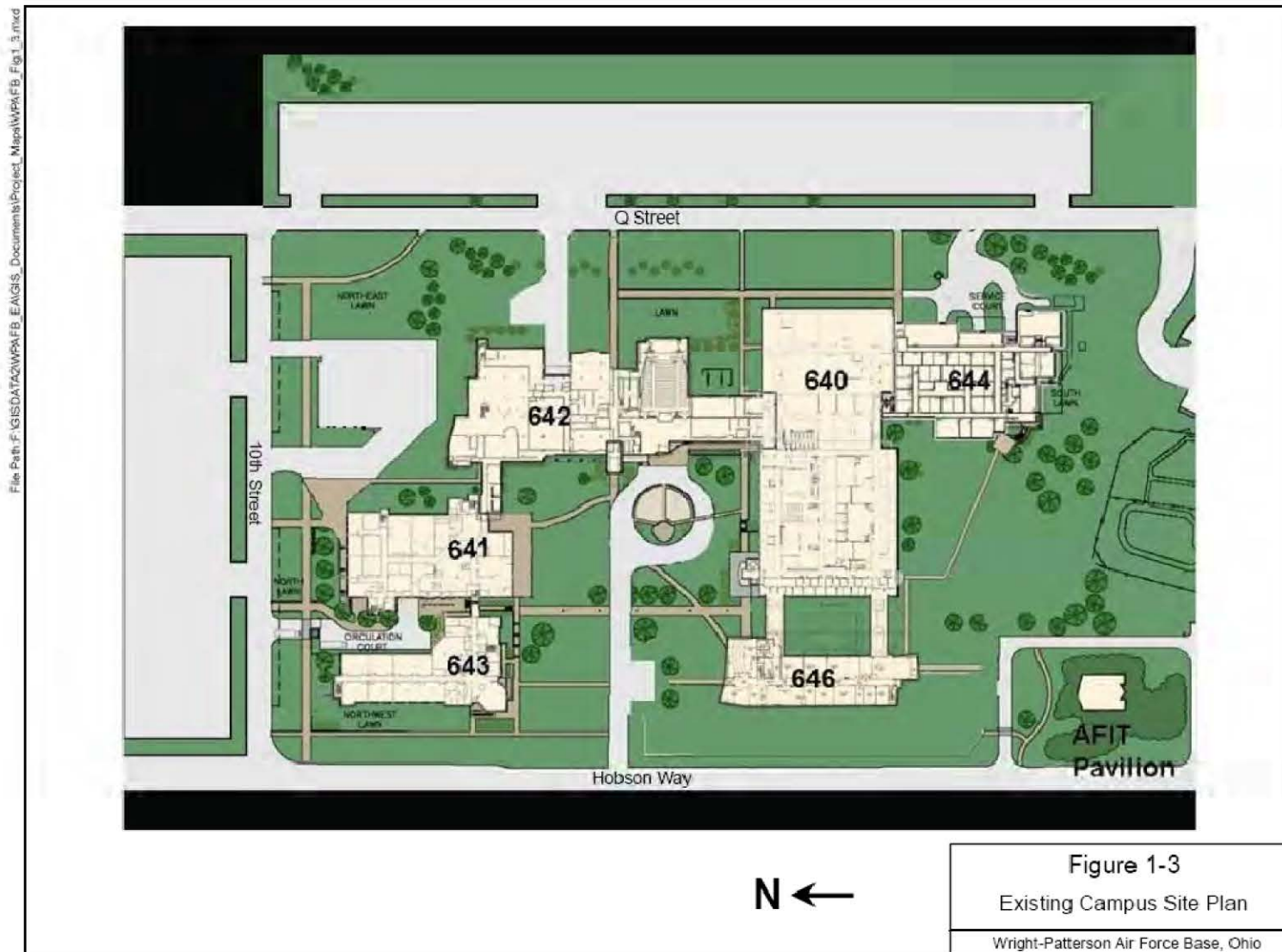


Table 1-1 contains a brief description of these buildings, and photographs for each of the six on-campus buildings are provided in **Figures 1-4 through 1-9**.

Table 1-1. Description of Existing AFIT Buildings

Bldg No./Name		Year Constructed	Size (gsf)	Activities
20640		1963 (renovated 2004)	134,000	Three-story building contains classrooms, laboratories, lecture hall, and offices
20641		1975	82,700	Three-story building contains classrooms, laboratories, and offices
20642		1982	102,900	Three-story building contains 700-seat auditorium, library, food service, bookstore, miscellaneous support services, and Commandant's Office
20643		1991	26,800	Three-story building contains classrooms, lecture hall, and offices
20644		2001	26,600	One-story building contains research laboratories
20646	Academic Building 1	2008	50,000	Three-story building contains classrooms, lecture hall, and offices

Source: Daniel Rohrbach, Personal Communication, Dec 2010

Notes: gsf = gross square feet

AFIT's School of Systems & Logistics is located off-Base in a corporate office park at 3100 Research Boulevard, Kettering, Ohio 45420. It occupies approximately 21,000 square feet (sf). AFIT also occupies approximately 40,000 sf in five off-campus buildings at WPAFB:

- No. 20194: This 8,500-sf facility is on WPAFB's demolition plan. It currently houses a laser laboratory. Located at 2675 K Street between 8th and 10th Streets.
- No. 20016: This facility currently houses part of Civilian Institution Programs and provides approximately 6,200 sf. Located at 2275 D Street between 3rd and 5th Streets.
- No. 20168: This 2,000-sf facility currently houses an anechoic chamber that AFIT uses. Located at 2644 G Street between 8th and 10th Streets.
- No. 20056: The AFIT library uses approximately 5,500 sf for archive storage. Located at 2100 Monahan Way between Monahan and 5th Streets.
- No. 20470: AFIT uses a portion of this decommissioned nuclear reactor facility for nuclear engineering laboratories. Located at 2064 13th Street near the intersection of M and 13th Streets.

Figure 1-4. Building 20640

Building 20640



Figure 1-5. Building 20641

Building 20641



Figure 1-6. Building 20642

Building 20642



Figure 1-7. Building 20643

Building 20643



Figure 1-8. Building 20644

Building 20644



Figure 1-9. Building 20646



1.3 Purpose and Need

AFIT has been directed by the Secretary of the Air Force to facilitate a new mission: initiate the Center for Systems Engineering and expand the Graduate School of Engineering & Management by 250 percent. The Center for Systems Engineering would use Graduate School faculty. The **purpose** of the Master Plan initiative is to affirm AFIT's mission at WPAFB and provide a physical framework for implementing this mission over the next 20 years.

The oldest campus building, Building 20640, is 47 years old and underwent renovation in 2004, which is a common life cycle for educational/research buildings. Other campus buildings will require renovation as they approach the same age. These renovations are needed to update building systems, resolve security deficiencies, and establish learning / research environments commensurate with current curricula.

AFIT provides a full range of administrative functions, including Commandant & Command Section, Academic Affairs, Public Affairs, Admissions / Registrar, Mission Support, and Communications & Information. AFIT also facilitates off-campus air education through civilian institutions, which requires administrative staff on campus.

In focusing on AFIT campus redevelopment, AFIT faces a two-pronged challenge – expand existing facilities to accommodate growth while renovating existing buildings. The proposed redevelopment addressed in the Master Plan need to be completed expeditiously, without interrupting AFIT’s mission, while maximizing available resources. The purpose of campus expansion and building renovations is to ensure that AFIT campus facilities are sizable to facilitate short- and long-term growth of students and personnel. The short-range vision of the campus is to be divided into two schools: 1) Graduate School of Engineering & Management Research and Development, and 2) Continuing Education.

The Master Plan is **needed** to address the following core goals for AFIT, which in turn will enable AFIT to fulfill its mission:

- Expand facilities to facilitate short-term growth.
- Consolidate all AFIT activities to the campus.
- Develop a campus infrastructure and organization that facilitates orderly construction as well as long-range growth that can’t be projected at this time.
- Establish optimal working relationships that can be achieved without multiple personnel moves.
- Diversify and improve the learning and research environments.
- Create a handsome and user-friendly environment.
- Facilitate building renovation on a logical timeline.
- Provide a flexible plan that can adapt to changing priorities.
- Establish internal space use flexibility and allow capital improvement projects to develop independently.
- Comply with WPAFB’s *General (Master) Plan* (2001).

It is important to note that a master plan is a document of broad and general scope. It must be flexible, and it is not a fixed blueprint. Variances within the constraints established in the Master Plan are expected to occur. Small projects needed for immediate ad hoc operations, routine maintenance and repair, and other projects that produce no significant permanent impact are not necessarily delineated.

All the growth and projects depicted in the Master Plan may not occur. AFIT must respond to future Presidential and Congressional decisions regarding its mandated mission. These policy decisions, in turn, reflect demands and pressures applied by U.S. citizens. Agency history has shown that changes in policy

can be expected over the next decade, and, within its mission, directives to AFIT could change as a result. Although the Master Plan extends to a planning horizon of 20 years, it is the intent of AFIT to review and update the Master Plan at approximately 10-year intervals.

1.4 Scope of Environmental Analysis

Consistent with the CEQ regulations, the EA is organized into the following sections:

- Section 1, Purpose and Need for Action, includes a background description, purpose and need statement, EA organization and scope of environmental analysis, and regulatory framework;
- Section 2, Description of Proposed Action and Alternatives, includes a process for alternatives development, alternatives considered but eliminated, and a comparison of impacts;
- Section 3, Affected Environment, includes a description of the natural and man-made environments within and surrounding AFIT that may be affected by the Proposed Action or the No Action Alternative;
- Section 4, Environmental Impacts, includes definitions and discussions of direct and indirect impacts, and mitigation and monitoring. The section also includes an analysis of the potential cumulative impacts on AFIT and WPAFB; unavoidable adverse impacts; the relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitments of resources;
- Section 5, List of Preparers;
- Section 6, Consultation and Coordination, contains a list of agencies consulted during EA preparation;
- Section 7, References, contains references for studies, data, and other resources used in the preparation of the EA; and
- Appendices, as required.

NEPA, which is implemented through the CEQ regulations, requires Federal agencies to consider alternatives to proposed actions and to analyze impacts of those alternatives. Potential impacts of the alternatives described in this document will be assessed in accordance with the USAF EIAP process, which requires that resource impacts be analyzed in terms of their context, duration, and intensity. In order to help the public and decision-makers understand the implications of impacts, they will be described in the short- and long-term, cumulatively, and within context. Environmental issues analyzed in the EA include:

- Land Use;
- Air Quality;
- Noise;
- Geology and Soils;
- Water Resources;
- Biological Resources, including vegetation, wetlands, wildlife, and threatened and endangered species;
- Cultural Resources;

- Socioeconomics;
- Environmental Justice;
- Infrastructure;
- Health and Safety; and
- Hazardous Materials and Waste.

Although all resources are evaluated, the EA will be “issue-driven” emphasizing the resources of most concern to the project. These issues will include airspace management, land use, air quality, and noise and will be particularly emphasized as part of the EA.

1.5 Regulatory Framework

This section describes statutes, regulations, and executive orders that govern and/or influence the scope of this EA. Several statutes were considered but found to have no influence on this project. Although this list is not all-inclusive, the proposed alternatives must comply with all applicable regulatory requirements.

1.5.1 National Environmental Policy Act

NEPA is a Federal statute requiring the identification and analysis of potential environmental impacts of proposed Federal actions before those actions are taken. NEPA mandates a structured approach to environmental impact analysis that requires Federal agencies to use an interdisciplinary and systematic approach in their decision-making process. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions.

The CEQ was established under NEPA to implement and oversee Federal policy in this process. CEQ regulations specify the reasons to prepare an EA:

- Briefly provide evidence and analysis for determining whether to prepare an EIS or a FONSI.
- Aid in an agency’s compliance with NEPA when an EIS is unnecessary.
- Facilitate preparation of an EIS when one is necessary.

Air Force Policy Directive (AFPD) 32-70, Environmental Quality, states that the USAF will comply with applicable Federal, State of Ohio, and local environmental laws and regulations, including NEPA. The USAF’s implementing regulation for NEPA is EIAP.

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 other relevant environmental statutes and regulations. The NEPA process 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 the Proposed

Action. According to CEQ regulations, NEPA requirements must be integrated “with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively.”

Potentially relevant statutes and regulations to which the USAF must comply are summarized in **Table 1-2**. Regulatory requirements are presented under appropriate categories in Section 3 of the EA.

Table 1-2. Summary of Applicable Regulatory Requirements

Compliance Area	Regulatory Requirements
Air Quality	Clean Air Act as amended, 42 U.S. Code (USC) § 7401 et seq.
	Air Force Instruction (AFI) 7040 Air Quality Compliance and Resources Management
	National Ambient Air Quality Standards – 40 Code of Federal Regulations (CFR) 81.34 Metropolitan Dayton Intrastate Air Quality Control Region and 40 CFR 81.336 Ohio Attainment Standards
	Ohio Administration Code (OAC) 3745-17 Particulate Matter Standards
	OAC 3745-31 Permit to Install New Source of Pollution
	OAC 3745-25 Emergency Episode Standards
	OAC 3745-15-05 <i>de minimis</i> air contaminant source exemption
	National Historic Preservation Act as amended, 16 U.S.C. § 470 et seq.
Cultural/Historic Resources	36 CFR Part 800 – Protection of Historic and Cultural Properties
	AFI 32-7065, Cultural Resources Management
	Occupational Safety and Health Act as amended, Subpart Z Toxic and Hazardous Substances
Health and Safety	29 CFR Part 1910 Occupational Safety and Health Standards
	29 CFR Part 1926 Safety and Health Regulations for Construction
	National Fire Protection Association, National Fire Codes
	AFI 32-7063, Air Installation Compatible Use Zone Program
Land Use	Endangered Species Act (ESA), 16 U.S.C. §1531 et seq.
Biological Resources	50 CFR Part 402 Interagency Cooperation--ESA of 1973, as amended
	Ohio Revised Code 1531.25, Protection of Species Threatened with State-Wide Extinction
	National Environmental Policy Act as amended, 42 U.S.C. § 4321 et seq.
	AFI 32-7064, Integrated Natural Resource Management Plan
	29 CFR 1910.95 Occupational Noise Exposure
Noise	Federal Water Pollution Control Act (Clean Water Act) as amended, 33 U.S.C. § 1251 et seq.
Wastewater & Storm water	AFR 32-1021 Planning and Programming Military Construction Projects
	40 CFR Part 122.26 Storm Water Discharges
	OAC 3745-33 Ohio National Pollution Discharge Elimination System (NPDES) Individual Permits
	2.0 OAC 3745-38 Ohio NPDES General Permits
	OAC 3745-42 Permits to Install and Plan Approvals for Water Pollution Control
	City of Dayton Sewer Use Ordinance (September 21, 1994).

Notes: CFR = Code of Federal Regulations; AFI = Air Force Instruction; OAC = Ohio Administrative Code; USC = U.S. Code; NPDES = National Pollutant Discharge Elimination System

1.5.3 Interagency and Intergovernmental Coordination for Environmental Planning and Community Involvement

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 Executive Order (EO) 12372, Intergovernmental Review of Federal Programs, require Federal agencies to cooperate with and consider state and local views in implementing a Federal proposal. Air Force Instruction (AFI) 32-7060 requires the USAF 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, the USAF notified relevant Federal, state, and local agencies of the action proposed and provided them the opportunity to make known their environmental concerns specific to the action. The IICEP process provided the USAF the opportunity to cooperate with and consider state and local views in implementing the Federal proposal. IICEP letters were sent to the U.S. Environmental Protection Agency (USEPA); U.S. Fish and Wildlife Service (USFWS); Ohio State Historic Preservation Office (SHPO); and other Federal, state, and local agencies.

The comment period lasted for 30 days. Agency responses were provided to the USAF and were incorporated into the analysis of potential environmental impacts performed as part of the EA. IICEP correspondences are included in **Appendix A**.

A Notice of Availability (NOA) for the EA and Draft FONSI was published in the *Dayton Daily News* and the Base paper, *The Skywrighter*, on March 22, 2011, initiating the public review period. The EA and Draft FONSI were made available in the Fairborn Public Library. During this time period, one public comment was received, dated March 26, 2011. The commenter requested that storm sewer grates be installed as part of the proposed redevelopment activities on the AFIT campus to minimize safety mishaps to bicycles and wheelchairs. The USAF responded to the commenter in a letter dated May 4, 2011, indicating that WPAFB acknowledges this request and that storm sewer grates are installed at all newly constructed storm sewer inlets in accordance with the WPAFB Facility Standards, requiring grates that are American with Disabilities Act (ADA) compliant and bicycle safe. WPAFB explained that the openings of the ADA grates are small and sometimes not able to handle the volume of storm water runoff; therefore, grates were selected to accommodate more runoff. The NOA, comment received, and USAF response to the comment are included in the Appendix A.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This section provides an introduction to the Proposed Action, criteria used in selecting the Proposed Action, a detailed description of the Proposed Action, a description of the No Action Alternative, identification of alternatives eliminated from further consideration, and a comparison of environmental consequences between the alternatives.

This EA is based on the approved *Master Plan Air Force Institute of Technology* (dated January 10, 2005) and best available information to date. The implementation of all features of the Master Plan would be dependent on the plan (1) being reasonable and coinciding with anticipated funding levels, and (2) being consistent with the *Wright-Patterson Air Force Base General Plan* (dated 2001).

The overall planning schedule for the proposed project is not absolute. Modification may be made to priorities and specific implementation dates of future facility requirements. Funding availability would be the primary driver of schedule compliance. Additionally, specific facility requirements could change over the life of the plan, especially during the last 10 years of implementation. Even with these changes, the overall concept of development is anticipated to remain intact and be implemented when AFIT completes compliance with NEPA, Federal, state, and local regulations and approval of state and local permits.

Master planning is an ongoing process. It is possible that the Master Plan might be modified over the next 20 years. AFIT would review the Final EA every 5 years to determine if the plan has changed significantly or if there is new environmental information that would warrant additional environmental review. If appropriate, AFIT would consider additional environmental documentation at that time.

The Master Plan alternatives analyzed in this document in accordance with NEPA are the result of agency and scoping input. The process for developing alternatives is described below in Section 2.2. All alternatives considered must meet the purpose and need for the Proposed Action. Conceptual alternatives that were considered but eliminated from further analysis are discussed in Section 2.5. Two alternatives are analyzed for potential impacts in this EA – the Proposed Action and the No Action Alternative.

Table 2-1 at the end of this section summarizes the impacts of the alternatives for this project.

2.2 Process for Alternatives Development

The Master Plan was developed using a thorough and analytical process. Consultants first met with Core Committee members to establish the planning process, goals, and objectives. The following goals were established:

- Expand facilities to facilitate short-term growth.
- Consolidate all AFIT activities to the campus.

- Develop a campus infrastructure and organization that facilitates orderly construction as well as long-range growth that can't be projected at this time.
- Establish optimal working relationships that can be achieved without multiple personnel moves.
- Diversify and improve the learning and research environments.
- Create a handsome and user-friendly environment.
- Facilitate building renovation on a logical timeline.
- Provide a flexible plan that can adapt to changing priorities.
- Establish internal space use flexibility and allow each capital improvement project to develop independently.
- Comply with WPAFB's *General (Master) Plan*.

The AFIT Master Plan was conceived as a contiguous collection of buildings surrounded by parking on two sides. The buildings would interconnect through the central services of Building 20642. Buildings and site are connected by major pedestrian spines, two of which run east-west and two run north-south. These spines act as highways to expedite circulation while clarifying exterior entry and interior way finding. Site development would be compact and buildings are to be less than three stories. This concept achieves the following objectives:

- Reinforce the collaborative learning and research environment while providing necessary secured zones around research laboratories;
- Maintain central services in Building 20642, at the campus core;
- Maximize utilization of available land;
- Minimize walk distances between parking and destinations;
- Reinforce the central open space as primary campus organizing element; and
- Improve the quality of the exterior environment by concentrating development capital.

A team of architects and engineers then assessed existing facilities to determine existing conditions, and planners met with AFIT representatives to identify projected activities and assess space requirements. Planners developed multiple plan alternatives and critiqued them with the Core Committee. Seven initial concepts were developed into three options, from which the preferred solution was chosen and finalized for more detailed consideration. The preferred solution is the Proposed Action in the EA, and it is described below in Section 2.3.

Concept floor plans were then developed that unified existing conditions with projected space requirements and the site Master Plan. Implementation schedules and capital budgets were developed for the projects identified in the Master Plan.

Along with the planning goals and objectives listed above, several requirements were identified in order to fulfill the purpose of the Proposed Action at WPAFB. The Proposed Action and other alternatives were screened against the following criteria:

- Because of manpower constraints base-wide, no alternative can have substantive impacts on mission operations.
- Any alternative evaluated must fully comply with all Federal, state, and local laws and regulations, as well as Department of Defense (DoD) and USAF policies, directives, and regulations.
- The action must be economically feasible and protect the environment.

2.3 Description of the Proposed Action

The AFIT is proposing to implement its Master Plan by redeveloping and expanding on-campus facilities to meet the needs of growth of students and personnel. The Master Plan has a forecasted outlook of proposed campus construction and development to calendar year (CY) 30. The Master Plan identified total building area required for priority one and two needs, which are defined as follows:

- Priority One: Projected requirements for staff and enrollment growth.
- Priority Two: Desirable facilities not essential to meeting growth objectives. Such facilities include additional post-graduate student offices, research laboratories, and a conference center.

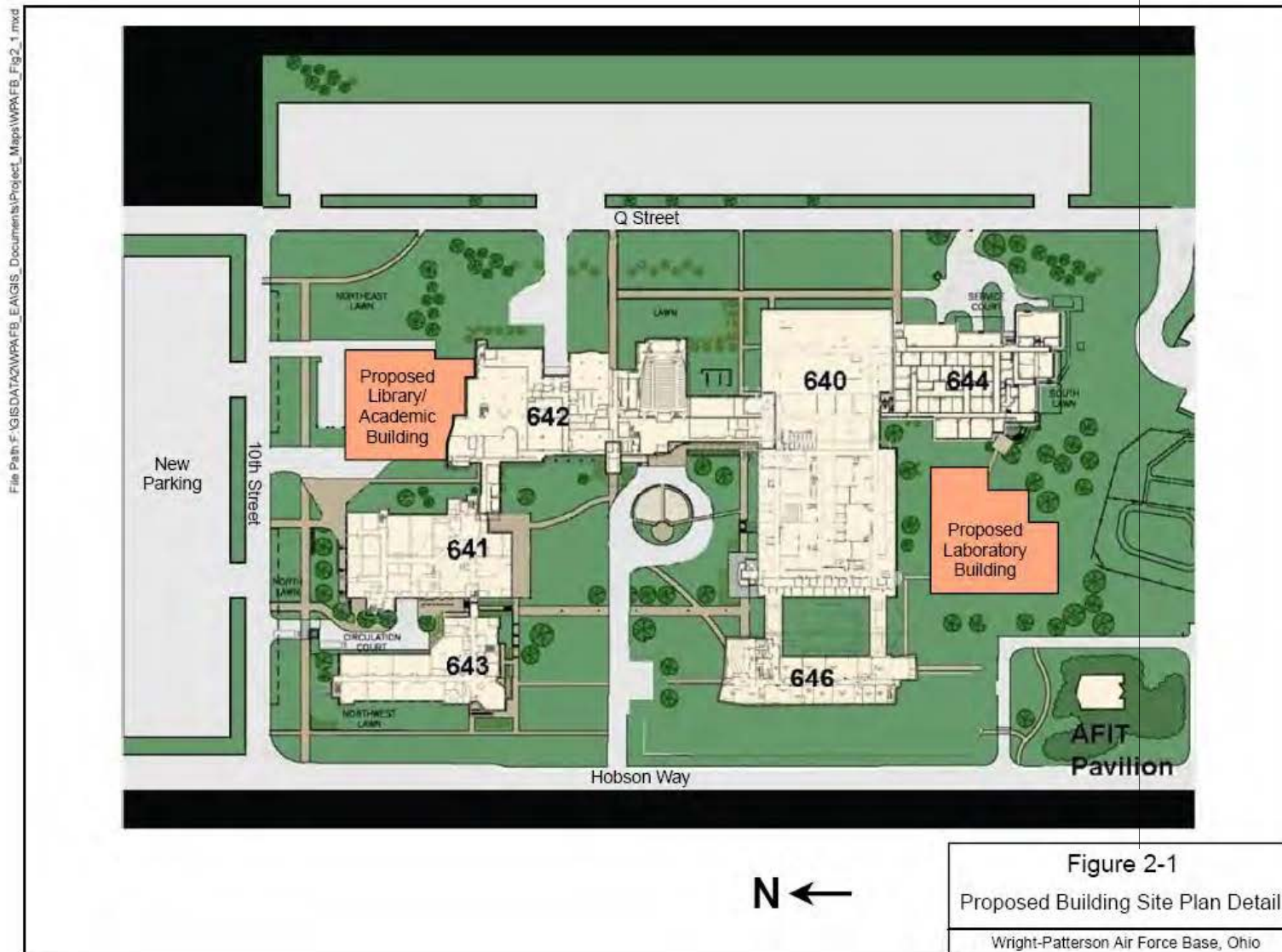
To accommodate priority one space, the Master Plan proposes construction of a new 57,199-sf AFIT Research Laboratory and a 39,267-sf addition to the existing AFIT Library. To accommodate priority two requirements, the Master Plan proposes expanding the Academic Facility (Building 20642) by 35,607 sf. The activities associated with implementing the Proposed Action to expand on-campus facilities and replace off-campus facilities would include demolition, construction, and renovation/rehabilitation on the AFIT campus. This would include demolition of approximately 18,293 gsf of existing building space, and construction or renovation of 132,073 gsf of new or rehabilitated building space, for a net increase of approximately 113,780 gsf of on-campus construction. AFIT currently has approximately 423,000 gsf on campus and the equivalent of 61,000 gsf off campus, or 484,000 gsf. The proposed construction projects under the Proposed Action are discussed below and identified in **Figure 2-1**.

2.3.1 New AFIT Research Laboratory

As part of the required consolidation of the Graduate School of Engineering & Management at AFIT, a new 57,199-sf research laboratory (Building 20647) would be constructed on the south end of the AFIT campus, adjacent and west of existing Building 20644 (**Figure 2-1**). Laboratory activities are currently conducted in three inadequate facilities located approximately 0.5 mile from the AFIT campus. The separation of these facilities from the campus creates access limitations to critical research material for the development of academic programs.

The facility would provide vital military education and training associated with various systems within the USAF, and would include research laboratory areas, classrooms, office and administrative areas,

Figure 2-1. Proposed Building Site Plan Detail



conference rooms, video studios, and mechanical equipment storage space. This modern and flexible facility would meet mission requirements and provide world-class research facilities to the DoD, built to comply with DoD Minimum Anti-Terrorism Standards for buildings per Unified Facilities Criteria.

Sustainable principles would be integrated into the design, development, and construction of the AFIT Research Laboratory facility in accordance with EO 13423, “Strengthening Federal Environmental, Energy, and Transportation Management in Acquisition” and in accordance with EO 13514, “Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings”. Other activities associated with construction of the facility would include providing the necessary utilities; providing for 300 parking spaces adjacent to the facility; and performing the required demolition of existing Buildings 20194 and 20168 (a total of 18,293 sf). These two facilities have outlived their life expectancy and are no longer feasible for any use.

2.3.2 Addition to AFIT Library and Alterations to Academic Facility 20642

As part of the required consolidation of the Graduate School of Engineering & Management at AFIT, a new 39,267-sf addition to the existing library would be constructed. AFIT would also alter the co-located Academic Facility (Building 20642) by providing 35,607 sf of improvements (**Figure 2-1**). The research library is currently split into two areas, with the primary facility located on campus and an annex housing additional materials, thesis evaluations, and data collections located approximately one mile from the AFIT campus. The separation of these facilities from the campus creates access limitations to critical research material for the development of academic programs.

The facility would provide vital military education and training associated with various systems within the USAF, and would include lecture and seminar classrooms, additional learning resources, faculty and staff offices and administrative areas, computer laboratories, conference rooms, video studios, a student lounge, and mechanical equipment storage space. This modern and flexible facility would meet mission requirements, house and consolidate the Civilian Institute, and expand the critical assets of the primary research library at AFIT. Construction activities would comply with DoD Minimum Anti-Terrorism Standards for buildings per Unified Facilities Criteria.

Sustainable principles would be integrated into the design, development, and construction of improvements to the AFIT Library and Academic Facility in accordance with EO 13423. Other activities associated with construction activities at the facility would include providing for the necessary utilities.

2.3.3 North Entry Court Redesign

AFIT would construct an updated entry court located on the north side of the campus between the existing library and Building 20641.

2.3.4 Green Space Quadrangle Redesign and Construction

AFIT would update the existing green space quadrangle located on the west side of the campus, adjacent and west of Building 20642.

2.3.5 Parking Lot

With parking needs to accommodate existing deficiencies as well as projected enrollment growth, AFIT proposes to construct a new 300-space parking lot on the north side of the campus immediate east of Hobson Way. Additional parking would be provided close to campus buildings to minimize walk distances. Walks are also proposed to connect parking and buildings.

2.3.6 New Steam Pipe Lines at Building 20640

AFIT would construct new steam pipe line into Building 20640.

2.3.7 Site Utilities Update / Upgrade

AFIT would update and upgrade existing AFIT site utilities to accommodate campus facilities.

2.3.8 Kettering School Relocation to Building 20641

The Kettering School located off-site would be relocated to occupy the third floor and half of the first floor of existing Building 20641.

2.4 No Action Alternative

Under the No-Action Alternative, current programs and projects would continue to develop as planned and the action proposed in this EA would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped.

Although this alternative does not satisfy the purpose and need for long-range expansion, it is included in the environmental analysis to provide a baseline for comparison with the proposed action and is analyzed in accordance with CEQ regulations for implementing NEPA. Although this alternative would eliminate unavoidable adverse, short-term impacts associated with the Proposed Action, the No Action Alternative would not satisfy selection criteria established under the purpose and need for this project, resulting in:

- On-going costly maintenance for outdated facilities,
- Failure to meet the goals outlined in AFIT's overall mission,
- Failure to prepare AFIT and its facilities for the future, and
- Failure to strategically position AFIT for implementation of its long-range plan.

The No-Action Alternative does not provide a framework for renewing AFIT infrastructure that would help meet future planning goals. Circulation throughout the campus would not be clarified through the consolidation of entry points, and vehicular and pedestrian circulation would not be separated. AFIT

facilities would be planned on a site-by-site basis, and research, operational, and administrative space would continue to be inadequate. AFIT would not have a plan to reach sustainability goals, and conservation efforts would continue to be unconsolidated. The No-Action Alternative would not fulfill the master planning objectives.

2.5 Alternatives Eliminated from Further Study

As part of the NEPA process, potential alternatives to the Proposed Action must be evaluated. For alternatives to be considered reasonable and warrant further detailed analysis they must be affordable, implementable, and meet the purpose and need for the action based on the project requirements stated in Section 2.2. Conceptual alternatives to the Proposed Action were considered to determine their feasibility as viable alternatives to expanding the existing AFIT campus at WPAFB.

One such conceptual alternative expanded proposed redevelopment as described under the Proposed Action to also include additional development activities as part of the USAF “Vector Blue” initiative. Proposed activities under the Vector Blue initiative were to be concentrated on the east lawn side of the AFIT campus and would include the phased construction of a Conference Center and an Academic Building/Laboratory as part of a graduate school program. This initiative would also include the realignment of Q Street to accommodate this proposed development.

While this conceptual alternative was consistent with the purpose and need for action, it was ultimately eliminated from further consideration due to budget considerations and will not be explored further in this EA.

2.6 Comparison of Environmental Consequences

The impacts associated with the Proposed Action and the No Action Alternative are summarized in **Table 2-1**. The information includes a concise definition of the issues addressed and the environmental impacts associated with each alternative. The analysis is based on information discussed in detail in Section 4.0, Environmental Impacts, of the EA.

Table 2-1. Comparison of Environmental Consequences

Affected Environment	Proposed Action	No Action Alternative
Land Use	<p>Short-Term: No adverse impact because no changes to land use would occur at or surrounding WPAFB.</p> <p>Long-Term: No adverse impact because no changes to land use would occur at or surrounding WPAFB.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Air Quality	<p>Short-Term: Minor, adverse impact from fugitive dust and vehicle exhaust emissions increases generated during construction. Net increases are below General Conformity <i>de minimis</i> thresholds.</p> <p>Long-Term: Negligible impacts in air quality over current conditions.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Noise	<p>Short-Term: Minor adverse impacts on ambient noise from construction activities. Impacts would be minor because these activities would be carried out during normal working hours.</p> <p>Long-Term: No adverse impact.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Geology and Soils	<p>Short-Term: Negligible adverse impacts. Erosion control measures in accordance with base specifications for construction projects would be implemented.</p> <p>Long-Term: No adverse impact to soils, topography, or physiographic features</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Water Resources		
Groundwater	<p>Short-Term: Minor adverse impacts during construction. Erosion and sedimentation controls would be implemented as a Best Management Practice (BMP).</p> <p>Long-Term: No adverse impacts.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Surface Water	<p>Short-Term: Minor adverse impact during construction. Erosion and sedimentation controls would be implemented as a BMP and a NPDES construction general permit would be obtained for soil disturbances greater than one-acre.</p> <p>Long-Term: No adverse impact.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>
Floodplains	<p>Short-Term: Minor adverse impacts from construction activities on storm water sewer outfall location at the Mad River. AFIT is not located in a floodplain.</p> <p>Long-Term: Negligible adverse impact.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>

Affected Environment	Proposed Action	No Action Alternative
Biological Resources Vegetation Wildlife	Short-Term: No adverse impact as the proposed activities would take place on previously disturbed areas with no naturally occurring vegetation. Long-Term: No adverse impact. Short-Term: No adverse impact on wildlife as the proposed project area does not provide suitable habitat and the current land use would not change. Long-Term: No adverse impact.	Short-Term: No impact. Long-Term: No impact. Short-Term: No impact. Long-Term: No impact.
Threatened and Endangered Species Wetlands	Short-Term: No adverse impact on threatened and endangered species as the proposed project area does not provide suitable habitat and the current land use would not change. Long-Term: No adverse impact. The proposed project area does not provide suitable habitat and the current land use would not change Short-Term: No adverse impact. No wetlands in the area. Long-Term: No adverse impact.	Short-Term: No impact. Long-Term: No impact. Short-Term: No impact. Long-Term: No impact.
Cultural Resources	Short-Term: No adverse impact. Long-Term: No adverse impact.	Short-Term: No impact. Long-Term: No impact.
Socioeconomics	Short-Term: Minor beneficial impact on local economy from revenue generated by construction activities. Long-Term: Minor beneficial impact as a result of supporting AFIT's expanded mission.	Short-Term: No impact. Long-Term: No impact.
Environmental Justice	Short-Term: No adverse impact. Long-Term: No adverse impact as there is no change in land use.	Short-Term: No impact. Long-Term: No impact.
Infrastructure	Short-Term: Negligible adverse impact from construction traffic. Negligible adverse impacts from utilities as there would be minor increase in personnel or facility operations. Long-Term: Minor beneficial impact due to utility upgrades.	Short-Term: No impact. Long-Term: No impact.
Health and Safety	Short-Term: Potential minor adverse impacts to workers during construction activities. Impacts would be minimized by adherence to safety standards. Long-Term: No adverse impact.	Short-Term: No impact. Long-Term: No impact.

Affected Environment	Proposed Action	No Action Alternative
<p>Hazardous Materials/Waste</p> <p>Hazardous Materials</p> <p>Hazardous Waste</p>	<p>Short-Term: Negligible adverse impact. Hazardous materials used during construction would not be expected to increase.</p> <p>Long-Term: Negligible adverse impact. Hazardous materials used, would not be expected to increase. Procurement of products containing hazardous materials would be comparable to those used at present.</p> <p>Short-Term: Negligible adverse impact. Hazardous wastes generated during construction would not be expected to increase and would be handled, stored, transported, disposed of, or recycled in accordance with WPAFB's Hazardous Waste Management Plan.</p> <p>Long-Term: Negligible adverse impact. It is anticipated that the volume, type, classifications, and sources of hazardous wastes would be similar in nature with the baseline condition waste streams.</p>	<p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p> <p>Short-Term: No impact.</p> <p>Long-Term: No impact.</p>

3.0 AFFECTED ENVIRONMENT

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

In compliance with NEPA, CEQ guidelines, and 32 CFR 989, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. These resources and conditions include land use, air quality, noise, geology and soils, water resources, biological resources, cultural resources, socioeconomics, environmental justice, infrastructure, health and safety, and hazardous materials and wastes. Analysis of potential environmental effects focuses on those resource areas that are appropriate for consideration in light of a proposed action. All resource areas are initially considered, but some may be eliminated from detailed examination because they do not directly apply to a particular proposal.

3.1 Land Use

3.1.1 Definition of the Resource

The term land use refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. In many cases, land use descriptions are codified in local zoning laws. There is, however, no nationally recognized convention or uniform terminology for describing land use categories. As a result, the meanings of various land use descriptions, labels, and definitions vary among jurisdictions.

Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational.

Two main objectives of land use planning are to ensure both orderly growth and compatible uses among adjacent property parcels or areas. Tools supporting land use planning include written master plans/management plans and zoning regulations. In appropriate cases, the locations and extent of proposed actions need to be evaluated for their potential effects on project sites and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its “permanence.”

To address land use with respect to noise and safety associated with aircraft operations, DoD required military departments to establish an Air Installation Compatible Use Zone (AICUZ) program. The goal of AICUZ is to promote compatible land use around air bases by providing information concerning aircraft operations, noise exposure, and accident potential to local governments (WPAFB 1995a, 2001).

One component of the AICUZ study was the development of noise contours. These contours are produced by the computerized Day-Night Average A-Weighted Sound Level (DNL) metric and the NOISEMAP methodology. In the context of aircraft operations, land use compatibility is also described in the context of noise levels. The AICUZ study included both the conditions that existed at the time the study was prepared as well as a Maximum Mission Scenario that was based on the noise effects of various potentially feasible mission changes.

The Maximum Mission (also known as Mission Capacity) Scenario was established for WPAFB to provide consistency when zoning and land use policies in the community are established. Because the noise contours were based on conservative assumptions regarding future missions, local zoning does not need to be adjusted with changes in missions. Therefore, the noise contours for the Maximum Mission Scenario remain in effect for local community planning purposes. Noise contour analysis is addressed in Section 3.3 of this EA.

The AICUZ program is also intended to reduce the potential for aircraft mishaps in populated areas. As a result of this program, WPAFB has altered basic flight patterns to avoid heavily populated areas. In addition, airfield safety zones were established under AICUZ to minimize the number of people who would be injured or killed if an aircraft crashed. Three safety zones are designated at the end of all active runways: Clear Zone (CZ), Accident Potential Zone (APZ) I, and APZ II.

The CZ represents the most hazardous area. APZs are outside of the CZs. APZ I is located immediately beyond the CZ and has a high potential for accidents. APZ II is immediately beyond APZ I and has measurable potential for accidents. While aircraft accident potential in APZs I and II does not necessarily warrant acquisition by USAF, land use planning and controls are strongly encouraged for the protection of the public. Compatible land uses are specified for these zones. According to AFI 32-7063, all new construction is required to comply with the AICUZ. The AFIT campus is not located in any of the APZs.

3.1.2 Existing Conditions

On-Base Land Use

WPAFB comprises 8,145 acres near Dayton, Ohio, and is divided into two areas: A and B. Area A contains administrative activities, airfield operation, maintenance, and civil engineering activities; and Area B focuses on acquisition, education, research, and development. The Base is expected to fulfill numerous roles within the USAF, incorporating both natural and man-made development constraints

within the Base boundaries. Over 2,500 acres of WPAFB remain undeveloped due to various development constraints.

There is a wide variety of land use classifications on WPAFB. Open Space and Outdoor Recreation represent some of the land constrained from development. Over 2,000 acres of this undeveloped land lies within the natural constraints area, which is composed of areas such as floodplains, lakes, wetlands, or areas with unsuitable soil for building. Also located within the natural constraint area is the 109-acre Huffman Prairie Flying Field containing remnant prairie habitat, which includes several rare plant and animal species.

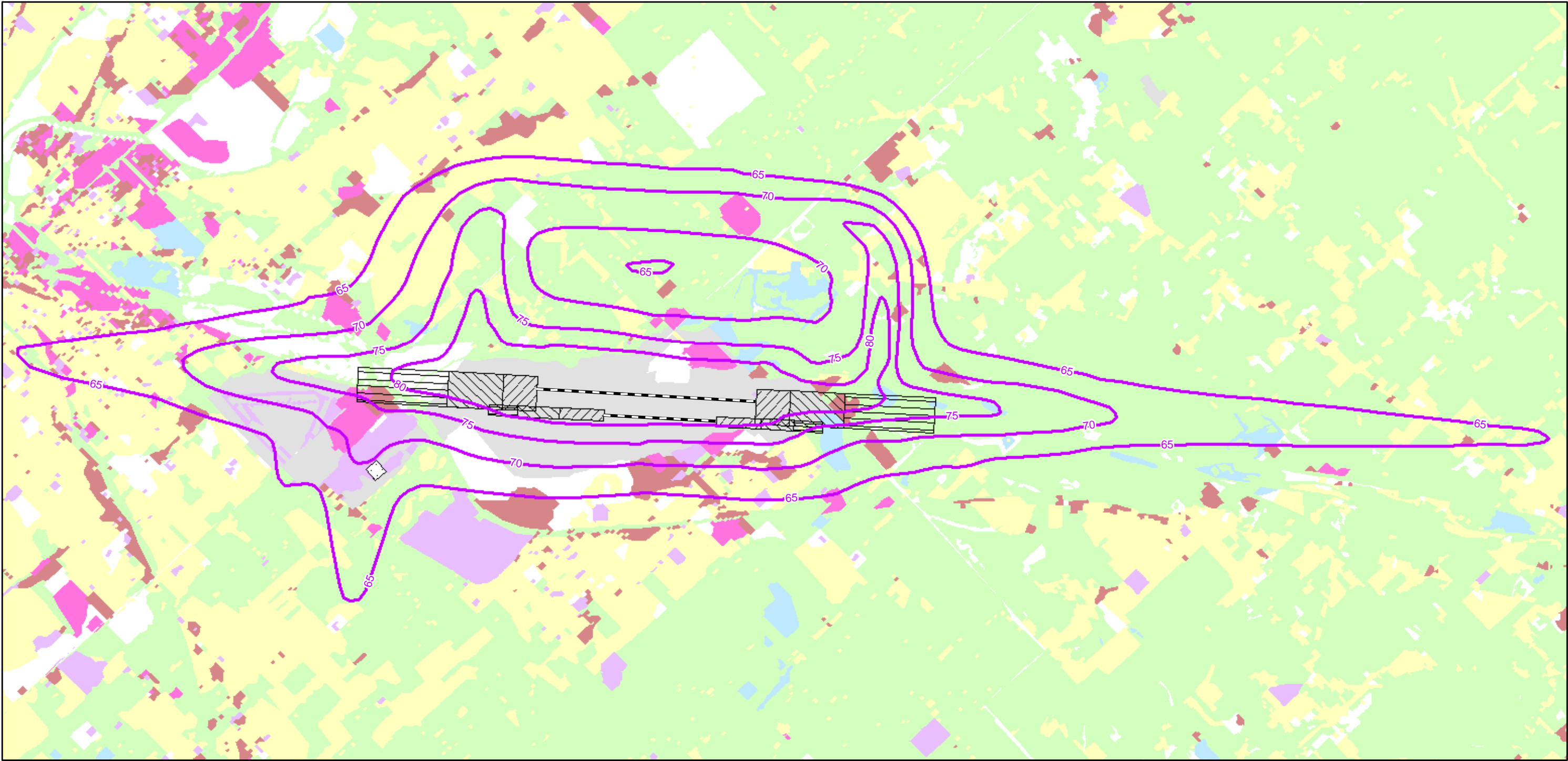
Human-made constraints also restrict development within the WPAFB boundaries. Included in these types of constraints are archaeological sites and historic buildings, which can be identified sites or those that remain undiscovered. Operational restrictions can also impede development. Noise contours from aircraft operations and explosive safety zones must be considered when looking at developing areas on the Base. Airfield and airspace control surfaces, such as runway approach CZs, are to remain clear of building obstructions. The presence of past waste disposal sites and fire training areas must be considered when siting facilities (WPAFB 1995a).

Surrounding Land Use

Land uses around WPAFB vary from heavily urbanized to rural agricultural (**Figure 3-1**). Most of the urbanized areas are west of the Base, with the low-density or agricultural area located east of the Base.

To the west and south of WPAFB is the Dayton metropolitan area. This area is comprised of higher population density cities such as Dayton, Huber Heights, Riverside, Fairborn, and Beavercreek. These cities, along with WPAFB, are within Greene and Montgomery counties. The 2010 census data had not been finalized when this EA was prepared; therefore, the most recent census data from 2000 were used. According to the most recent census data, Greene County has a population of 147,886 persons while Montgomery County has 559,062 persons (Bureau of Census 2000a). To the east and north of WPAFB is largely open area with agricultural lands interspersed with low-density development located within Miami and Clark counties. According to the most recent census data, Miami County has a population of 98,868 persons while Clark County has 144,741 persons (Bureau of Census 2000a).

Most of the land surrounding WPAFB that is impacted from Base activities is compatible with Base operations. Many factors contribute to the compatibility of land uses that are within Base activity areas. Development patterns and services available encourage or restrict development in many areas outside incorporated cities, and many areas immediately surrounding the Base are development-restricted due to floodplains or well water protection restrictions. Progressive land use controls have been the most important factor concerning compatible development within noise and APZs at WPAFB (WPAFB 1995a).



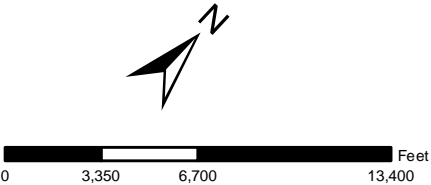
Legend:

- AFIT Campus
- Maximum Mission DNL Noise Contours
- Residential
- Commercial
- Industrial
- Institutional
- Open Space
- Vacant and Agricultural
- Extractive
- Airports
- Runway
- Clear Zones
- APZ I
- APZ II

Note:
DNL Noise Levels in Decibels
65, 70, 75, 80, 85

Source: 1995 AICUZ Study Maximum Mission

Source: Land Use - Ohio Department of Natural Resources
Montgomery County Land Use data; Miami County Land Use Data;
Clark County Land Use data; Greene County Land Use data.



WRIGHT-PATTERSON
AIR FORCE BASE,
OHIO

Figure 3-1
Existing Land Use and
Maximum Mission Noise Contours

3.2 Air Quality

3.2.1 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” in ambient air are expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The 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 surface topography, the size of the “air basin,” and the prevailing meteorological conditions.

The CAA directed the USEPA to develop, implement, and enforce strong environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, the 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. USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}] and particulates equal to or less than 2.5 microns in diameter [$\text{PM}_{2.5}$]), and lead (Pb).

The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources along with maintaining visibility standards. **Table 3-1** presents the primary and secondary NAAQS.

The criteria pollutant O_3 is not usually emitted directly into the air, but is formed in the atmosphere by photochemical reactions involving sunlight and previously emitted pollutants or “ O_3 precursors.” These O_3 precursors consist primarily of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) that are directly emitted from a wide range of emissions sources. For this reason, regulatory agencies attempt to limit atmospheric O_3 concentrations by controlling VOC pollutants (also identified as reactive organic gases) and NO_x .

The USEPA has recognized that particulate matter emissions can have different health affects depending on particle size and, therefore, developed separate NAAQS for coarse particulate matter PM_{10} and fine particulate matter $\text{PM}_{2.5}$. The pollutant $\text{PM}_{2.5}$ can be emitted from emission sources directly as very fine dust and/or liquid mist or formed secondarily in the atmosphere as condensable particulate matter typically forming nitrate and sulfate compounds. Precursors of condensable $\text{PM}_{2.5}$ can include SO_2 , NO_x , VOC, and ammonia. Secondary (indirect) emissions vary by region depending upon the predominant emission sources located there and thus which precursors are considered significant for $\text{PM}_{2.5}$ formation and identified for ultimate control.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Standard Value ⁶		Standard Type
CARBON MONOXIDE (CO)			
8-hour average	9 ppm	(10 mg/m³)	Primary
1-hour average	35 ppm	(40 mg/m³)	Primary
NITROGEN DIOXIDE (NO ₂)			
Annual arithmetic mean	0.053 ppm	(100 µg/m³)	Primary and Secondary
1-hour average ¹	0.100 ppm	(188 µg/m³)	Primary and Secondary
OZONE (O ₃)			
1-hour average ²	0.12 ppm	(235 µg/m³)	Primary and Secondary
8-hour average ²	0.075 ppm	(147 µg/m³)	Primary and Secondary
LEAD (Pb)			
3-month average ³		0.15 µg/m³	Primary and Secondary
PARTICULATE < 10 MICROMETERS (PM ₁₀)			
24-hour average ⁴		150 µg/m³	Primary and Secondary
PARTICULATE < 2.5 MICROMETERS (PM _{2.5})			
Annual arithmetic mean ⁴		15 µg/m³	Primary and Secondary
24-hour average ⁴		35 µg/m³	Primary and Secondary
SULFUR DIOXIDE (SO ₂)			
1-hour average ⁵	0.075 ppm	(196 µg/m³)	Primary
Annual arithmetic mean ⁵	0.03 ppm	(80 µg/m³)	Primary
24-hour average ⁵	0.14 ppm	(365 µg/m³)	Primary

Notes:

- 1 In February 2010, USEPA established a new 1-hr standard at a level of 0.100 ppm, based on the 3-year average of the 98th percentile of the yearly distribution concentration, to supplement the existing annual standard.
- 2 In March 2008, the USEPA revised the level of the 8-hour standard to 0.075 ppm. With regards to the secondary standard for O₃, USEPA revised the current 8-hour standard by making it identical to the revised primary standard.
- 3 In November 2008, USEPA revised the primary lead standard to 0.15 µg/m³. USEPA revised the averaging time to a rolling 3-month average.
- 4 In October 2006, USEPA revised the level of the 24-hour PM_{2.5} standards to 35 µg/m³ and retaining the level of the annual PM_{2.5} standard at 15 µg/m³ and retaining the level of the annual PM_{2.5}. With regard to primary standards for particle generally less than or equal to 10 µm in diameter (PM₁₀), USEPA is retaining the 24-hour standard and revoking the annual PM₁₀ standard.
- 5 In June 2010, USEPA established a new 1-hr SO₂ standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The USEPA is also revoking both the existing 24-hour and annual primary SO₂ standards.
- 6 Parenthetical value is an approximately equivalent concentration for NO₂, O₃ and SO₂.

ppb: parts per billion

ppm: parts per million

mg/m³: milligrams per cubic meterµg/m³: micrograms per cubic meter

The USEPA delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPs) that must be developed by each state or local regulatory agency and approved by the USEPA. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets, controls) must be incorporated into the SIP and approved by the USEPA.

The CAA required that the USEPA draft general conformity regulations. These regulations are designed to ensure that Federal actions do not impede local efforts to achieve or maintain attainment with the NAAQS. The General Conformity Rule and the promulgated regulations found in 40 CFR 93 exempt certain Federal actions from conformity determinations (e.g., contaminated site cleanup and natural disaster response activities). Other Federal actions are assumed to conform if total indirect and direct project emissions are below *de minimis* levels presented in 40 CFR 93.153. The threshold levels (in tons of pollutant per year) depend upon the nonattainment status that USEPA has assigned to a region. Once the net change in nonattainment pollutants is calculated, the Federal agency must compare them to the *de minimis* thresholds.

In 1997, the USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour O₃, PM_{2.5}, and regional haze standards that were promulgated in that year. Because of the litigation and resulting delay in implementing the new O₃ and PM_{2.5} ambient air quality standards, however, these new conformity requirements were not completed by the USEPA until 2006 when the PM_{2.5} *de minimis* levels were added. The last revision of the General Conformity rules occurred in April 2010. The USEPA rule in this latest revision sought to clear up identified issues, reduce specific regulatory burdens, and modify the rules to be helpful to states revising their SIP for implementing the revised NAAQS while assuring Federal agency actions continue to conform. Several of the burden reduction measure changes made to the General Conformity applicability in 40 CFR 93.153 include:

1. Deleting the provision that requires Federal agencies to conduct a conformity determination for regionally significant actions where the direct and indirect emission of any pollutant represent 10 percent or more of a nonattainment or maintenance area's emission inventory even though the total direct and indirect emissions are below *de minimis* levels.
2. Adding new types of actions that Federal Agencies can include in their "presumed to conform" lists and permitting States to establish in their General Conformity SIPs "presumed to conform" lists for actions within their State.
3. Finalizing an exemption for the emissions from stationary sources permitted under the minor source New Source Review (NSR) programs similar to the USEPA's existing General Conformity regulation which already provides for exemptions for emissions from major NSR sources.
4. Establishing procedures to follow in extending the 6-month conformity exemption for actions taken in response to an emergency.

Title V of the CAA Amendments of 1990 requires states and local agencies to implement permitting programs for major stationary sources. A major stationary source is a facility (e.g., plant, base, or activity) that has the potential to emit more than 100 tons annually of any one criteria air pollutant, 10 tons per year (tpy) of a hazardous air pollutant, or 25 tpy of any combination of hazardous air pollutants. However, lower pollutant-specific “major source” permitting thresholds apply in nonattainment areas. For example, the Title V permitting threshold for an “extreme” O₃ nonattainment area is 10 tpy of potential VOC or NO_x emissions. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their impact on air quality.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be “significant” if a proposed project’s net emission increase meets or exceeds the rate of emissions listed in 40 CFR 52.21(b)(23)(i); or (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 any regulated pollutant in the Class I area of 1 µg/m³ or more [40 CFR 52.21(b)(23)(iii)]. PSD regulations also define ambient air increments, limiting the allowable increases to any area’s baseline air contaminant concentrations, based on the area’s designation as Class I, II, or III [40 CFR 52.21(c)].

3.2.2 Existing Conditions

Regional Climate

The climate of this region of Ohio is humid and temperate with warm summers and cold winters. Average minimum and maximum temperatures are between 21 and 36 degrees Fahrenheit (°F) in January and 45 and 85 °F in July. The average annual precipitation is 38.43 inches, with June typically being the wettest month and October the driest month. The prevailing winds are from the southwest, with average monthly wind speeds between 3 and 7 knots.

Regional Air Quality

Under the authority of the CAA and subsequent regulations, the USEPA has divided the country into geographical regions known as Air Quality Control Regions (AQCRs) to evaluate compliance with the NAAQS. Through the CAA, Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus the USEPA has delegated enforcement of the PSD and Title V programs to the Ohio Environmental Protection Agency (OEPA). The OEPA has adopted the NAAQS by reference, thereby requiring the use of the standards within the state of Ohio.

Wright-Patterson AFB

WPAFB is located in Greene and Montgomery counties, which are located in the Metropolitan Dayton Intrastate AQCR (40 CFR 81.34). Each AQCR is classified as an attainment area or nonattainment area for each of the criteria pollutants depending on whether it meets or fails to meet the NAAQS for the pollutant. Ambient air quality for the Metropolitan Dayton Intrastate AQCR, which was formerly

classified as a maintenance area for the 1-hour and 8-hour O₃, is not yet designated for the new 8-hour O₃ NAAQS established in 2008.

Ambient air quality, which was classified as attainment for the NO₂ annual standard, is not yet designated for the new 1-hour standard established in 2010. Ambient air quality for SO₂ is not yet designated for the new 1-hour standard established in 2010. Ambient air quality for Pb, which was in attainment for the previous quarterly standard, is not yet designated for the new rolling 3-month standard established in 2008. The ambient air quality for PM_{2.5} is classified as attainment for the 24-hour standard and nonattainment for the annual standard. The region is designated as an unclassifiable/attainment area for all other criteria pollutants. Unclassifiable areas are those areas that have not had ambient air monitoring and are assumed to be in attainment with NAAQS. Any of the pending attainment designations have no regulatory effect on the current analysis.

Air quality is typically good in the vicinity of WPAFB, and is generally affected only locally by military and civilian vehicle emissions, particulate pollution from vehicle traffic, emissions from wastewater treatment plants, industrial sources, and construction activities. Mobile sources, such as vehicle and aircraft emissions, are generally not regulated and are not covered under existing stationary source permitting requirements. Stationary emissions sources at WPAFB include natural gas and coal-fired boilers; research and development sources, such as laboratory fume hoods and test cells; paint spray booths; refueling operations; and emergency power generators.

WPAFB is under the jurisdiction of USEPA Region 5 and the OEPA. The Regional Air Pollution Control Agency (RAPCA), under the jurisdiction of the OEPA, conducts annual compliance inspections at WPAFB. The base has long had an aggressive program of internal audits and inspections to ensure continual compliance with all applicable air permit terms and conditions. Detailed records are maintained to demonstrate compliance with emission limits, and reports are submitted in a timely manner to the local regulatory agency.

The WPAFB air emissions inventory includes over 1,400 emissions sources. Of these, approximately 1,050 are included in the Base's Title V permit application, which was originally submitted to the OEPA in February 1996 in accordance with CAA requirements. Many of the Title V sources are insignificant, including emergency generators and laboratory fume hoods. There were 29 permitted non-insignificant emissions units identified in the original application, most of which were boilers and paint spray booths. The OEPA finalized the Title V Operating Permit for WPAFB in January 2004 with an effective date of February 17, 2004 (OEPA 2004). A Title V renewal permit application was submitted to the OEPA in May 2008 and is currently under review. The Title V renewal application notified OEPA that the number of permitted non-insignificant emission units was reduced from 29 to 26.

AFIT Campus

The existing facilities that are part of the AFIT campus include Buildings 20640, 20641, 20642, 20643, 20644, and 20646. Several insignificant air emissions sources are included in the WPAFB Title V Operating Permit (OEPA 2004), identified on the Title V renewal application, or listed in the OEPA Air Services profile. These include:

- 1 Emergency Backup Generator
- 22 Laboratory Fume Hoods
- 2 Vented Bench-Scale Laboratory Equipment

Insignificant sources listed in the Title V permit may or may not have permit conditions or reporting requirements depending on the regulatory qualifications that categorizes a source as insignificant. Insignificant sources that were specifically issued a Permit-to-Install must be evaluated individually prior to commencing work to assure that the terms and conditions of the issued Permit-to-Install are maintained. Insignificant sources that were permitted-by-rule may be modified or relocated without notification provided the terms and conditions of the permitted-by-rule are maintained. Insignificant sources that are *de minimis* or to which only generally applicable requirements apply may undergo additions, removals, and relocations and do not require a modification of the Title V permit provided the changes do not exceed insignificant emission levels.

Insignificant emission levels are defined in Ohio Administrative Code (OAC) rule 3745-77-01(V)(3) to be less than or equal to 5 tpy of any regulated air pollutant other than a Hazardous Air Pollutant and not more than 20 percent of an applicable major source threshold. Changes to insignificant sources are handled as routine administrative changes through air profile updates submitted through Air Services to the OEPA, Division of Air Pollution Control.

An Air Conformity Applicability Analysis was prepared for the Proposed Action. This analysis is discussed in Section 4 and provided in **Appendix B**.

3.3 Noise

3.3.1 Definition of the Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Human response to noise varies according to the source type, characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day. Sound is measured with instruments that record instantaneous sound levels in decibels (dB). Decibels are used to characterize sound levels that can be sensed by the human ear. “A-weighted” decibels (dBA) incorporate an adjustment of the frequency content of a noise event to represent the way in which the average human ear responds to the noise event. All sound levels analyzed in this EA are A-weighted.

Single-event noise, such as an overflight, is described by the sound exposure level (SEL). Cumulative noise levels, resulting from multiple single-events, are used to characterize community noise effects from aircraft or airfield environment, and are measured in the DNL metric, as described in Section 3.2.1. A general discussion of these metrics is provided below and a detailed explanation is provided in **Appendix C**.

Sound Exposure Level

The SEL measurement describes a noise event, such as an aircraft overflight, comprising a period of time when an aircraft is approaching a receptor and noise levels are increasing, the instant when the aircraft is closest to the receptor and the maximum noise level is experienced, and the period of time when the aircraft moves away from the receptor resulting in decreased noise levels. SEL is a measure that accounts for both loudness and duration of a noise event.

The SEL metric relates to a single event, which is useful when calculating the noise effects of aircraft flyovers. Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft and engines at different power settings at various phases of flight. These values form the basis for the individual-event noise descriptors at any location, and are adjusted to the location by applying appropriate corrections for temperature, humidity, altitude, and variations from standard aircraft operating profiles and power settings. **Table 3-2** provides SEL values at various altitudes for aircraft operating directly over head at various speeds and power settings depending on aircraft type (values in the table represent averages).

Table 3-2. SEL dB Values for Aircraft Operating in the Vicinity of WPAFB

Altitude (feet AGL)	C-5 ¹	C-17 ¹	KC-135R ¹	F-16C ¹
200	118.5	107.6	102.3	100.9
500	111.7	100.2	95.9	94.4
1,000	105.8	93.4	90.8	89.0
2,000	98.9	85.1	85.1	82.9
3,150	93.4	79.1	80.8	78.4
5,000	86.5	73.0	76.0	73.3

Day based on steady, level flight and using Omega 10.9 aircraft profile data from actual overflight noise measurements. Omega 10.9 is a standalone DoD noise-modeling program that allows the user to retrieve data from the NOISEMAP database.
AGL = above ground level.

Day-Night Average A-Weighted Sound Level

The DNL noise metric incorporates a “penalty” for nighttime noise events to account for increased annoyance. DNL is the energy-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. The DNL values are obtained by averaging aircraft single event SEL values for a given 24-hour period. DNL is the preferred noise metric of U.S. Department of Housing and Urban Development (HUD), Federal Aviation Administration (FAA), USEPA, and DoD for modeling aircraft noise in airport environs.

Most people are exposed to sound levels of DNL 50 to 55 dBA or higher on a daily basis. Studies specifically conducted to determine noise impacts on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below DNL of 65 dBA (U.S. Department of Transportation [USDOT] 1980).

Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments and that there is a consistent relationship between DNL and the level of annoyance. The “Schultz Curve” (discussed in **Appendix C**) shows the relationship between DNL noise levels and the percentage of the population predicted to be highly annoyed.

Noise Criteria and Regulations

Federal and local governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. Guidelines and regulations that are relevant to the project are described below.

According to USAF, FAA, and HUD criteria, residential units and other noise-sensitive land uses are “clearly unacceptable” in areas where the noise exposure exceeds DNL of 75 dBA, “normally unacceptable” in regions exposed to noise between the DNL of 65 to 75 dBA, and “normally acceptable” in areas exposed to noise where the DNL is 65 dBA or less. The Federal Interagency Committee on Noise developed land-use compatibility guidelines for noise in terms of DNL (USDOT 1980). DNL is the metric used by the USAF in determining noise impacts of military airfield operations for land use planning.

USAF land use compatibility guidelines (relative to DNL values) are documented in the *AICUZ Program Handbook* (USAF 1999). Four noise zones are used in AICUZ studies to identify noise impacts from aircraft operations. These noise zones range from DNL of 65 to 80 dBA and above. For example, it is recommended that no residential uses, such as homes, multifamily dwellings, dormitories, hotels, and mobile home parks, be located where the noise is expected to exceed a DNL of 65 dBA.

If sensitive structures are located in areas within a DNL of 65 to 75 dBA, noise-sensitive structures should be designed to achieve a DNL of 25 to 30 dBA interior noise reduction. Noise-sensitive structures might include schools, concert halls, hospitals, and nursing homes. Elevated noise levels in these structures can interfere with speech, causing annoyance or communication difficulties. Some commercial and industrial uses are considered acceptable where the noise level exceeds DNL of 65 dBA. For outdoor activities, USEPA recommends DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population will be at risk from any of the effects of noise (USEPA 1974).

Response to Noise Events

Noise can cause a person to be irritated or annoyed. Noise annoyance is defined by USEPA as any negative subjective reaction to noise by an individual or group. DNL is an accepted unit for quantifying annoyance to humans by general environmental noise, including aircraft noise. **Table 3-3** describes the percentage of people who were “highly annoyed” when exposed to various levels of noise measured in DNL. The data shown provides a perspective on the level of annoyance that might be anticipated. For example, 15 to 25% of persons exposed on a long-term basis to DNL of 65 to 69 dBA are expected to be highly annoyed by noise events.

Table 3-3. Percentage of Population Highly Annoyed by Noise Zones

DNL	Percentage of Persons Highly Annoyed	
	Low	High
65–69 dBA	15	25
70–74 dBA	25	37
75–79 dBA	37	52
80 + dBA	61	61

Source: USAF 2000

Notes: dBA = A-weighted decibel; DNL = Day-Night Average A-Weighted Sound Level

The effects of noise on sleep are of concern, primarily in ensuring suitable residential environments. DNL incorporates consideration of sleep disturbance by assigning a 10 dBA penalty to nighttime noise events (10:00 p.m. to 7:00 a.m.). More typically, single noise events, not average sound levels, correlate with sleep disturbance. A discussion of the relationships between the occurrence of awakening and SEL is presented in **Appendix C**. Most of these relationships do not reflect habituation and, as such, do not address long-term sleep disturbance effects. Nevertheless, the studies can be used to demonstrate relative differences in interference among different noise-event exposure scenarios.

3.3.2 Existing Conditions

Construction Program

Building construction, modification, and demolition work can cause considerable noise emissions. A variety of sounds come from cranes, cement mixers, welding, hammering, boring, and other work processes. Construction equipment and building operations are often poorly silenced, but quickly become a part of the ambient noise levels heard every day.

The six proposed construction, modification, and removal projects detailed in Section 2.2.2 would potentially generate the types of sounds listed above. These activities would occur intermittently in fiscal year (FY) 11 and FY12.

Aircraft Operations

Existing noise contours were analyzed using results from DoD-approved noise models in the vicinity of WPAFB. The noise contour analysis for WPAFB is presented in the *1995 AICUZ Study for Wright-*

Patterson AFB, Ohio (WPAFB 1995a). Based on reasonable assumptions at the time of the 1995 AICUZ Study, a Maximum Mission/Maximum Capacity Scenario was analyzed and incorporated a potential increase in F-16, F-15, C-141, and C-5 aircraft operations. The Maximum Mission Model was intended to capture the maximum feasible operational capacity of the airfield and support activities. Within the limits of accuracy of the model itself, it was meant to provide a good-faith “worst-case” baseline for the surrounding communities’ zoning and land-use decisions, thus limiting encroachment and preserving the capacity of the Base to host additional flying missions.

To confirm that C-5 noise levels were within the Maximum Mission/Maximum Capacity Scenario, data were collected and analyzed in 2008 to produce noise contours that reflected C-5 operations. This analysis confirmed that noise levels were within the Maximum Mission/Maximum Capacity contours established in 1995. Because the Maximum Mission Scenario noise contours have been, and are currently, used for noise compatibility planning around the Base, these contours are used as the baseline for the noise analysis in this EA. **Figure 3-1** depicts the baseline noise contours presented in the 1995 AICUZ Study (WPAFB, 1995a).

The number of C-5 airfield operations will be reduced to zero and will be replaced by C-17 aircraft. A recent EA analyzed aircraft noise and concluded that the conversion from C-5 to C-17 aircraft would not increase the footprint of WPAFB’s Maximum Mission Scenario Noise Contours. And, in general, there would be a notable decrease in the amount of noise generated by the C-17 aircraft when compared to the C-5 since the C-17 is a quieter aircraft (WPAFB 2011).

No noise-sensitive receptors were identified in the AICUZ. There have been no recent complaints regarding aircraft noise. Aircrews limit their routes to the south and east as much as possible.

3.4 Geology and Soils

3.4.1 Definition of the Resource

Geological resources consist of the earth’s surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography, soils, geology, minerals, and, where applicable, paleontology.

Topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Geology is the study of the earth’s composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition. Hydrogeology extends the study of the subsurface to water-bearing structures. Hydrogeological information helps in the assessment of groundwater quality and quantity and its movement.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soils properties must be examined for their compatibility with particular construction activities or types of land use.

3.4.2 Existing Conditions

Topography and Geology

The topography of Area A is flat with some portions located within the 100-year flood- plain of the Mad River. The highest elevations on the Base are in Area B and occur along a bedrock ridge that extends from the southeast corner of Area B to the Wright Memorial. The majority of the base is on the broad alluvial plain of the Mad River Valley, which overlies Ordovician-age Richmond shale and limestone bedrock (WPAFB 2001). The land surface elevation on Base ranges from approximately 760 to 980 feet above mean sea level (MSL) (WPAFB 2001).

WPAFB is within the glaciated till plain region of southwestern Ohio, an area within the Central Lowlands Physiographic Province. The Central Lowlands province is characterized by low rolling hills, level plains, and flat alluvial valleys (WPAFB 2007a).

Natural Hazards

The state of Ohio is characterized by a low level of seismic activity (USGS 2008). The Dayton, Ohio, area does not typically experience earthquakes because of its location in relation to fault zones (Hansen 2002). Northwest Ohio had a series of historic earthquakes in the late 1800s to mid 1900s. The majority of these earthquakes were located in Auglaize and Shelby counties, which are approximately 45 miles from Greene County, Ohio (Hansen 2002), with the greatest instrumented magnitude recorded between 5.0 and 5.4 (USGS 2010). On July 23, 2010, a 5.0 magnitude earthquake originating along the Quebec-Ontario border was felt in Dayton and surrounding areas.

Soils

Surface soil at WPAFB formed on unconsolidated deposits, primarily alluvium, glacial outwash, glacial till, and loess (WPAFB 2007a). Development and substantial earthmoving activities have altered the natural soil characteristics at WPAFB, making precise classifications difficult. The U.S. Department of Agriculture-Natural Resource Conservation Service (NRCS) mapped most of WPAFB as urban land complexes.

According to the NRCS, the soil survey for Greene County, Ohio indicated that the soils in the project area (0 to 5 feet below the ground surface) are of the Sloan-Fill land complex (USDA-SCS 1978). The Sloan-Fill complex is made up of nearly level soil on floodplains where as much as 50 percent of the original soil has been covered by fill. The main area of the complex is on WPAFB. It is specifically in

runways, taxiways, and land adjacent to these uses. The fill areas have 3 to 5 feet of fill material, mostly Sloan soil and some Westland and Linwood soils. The fill material is generally mineral soil, organic material, and other organic or inorganic debris from various sources. The parts of the mapping unit that are not covered by fill are mostly Sloan silty clay loam.

3.5 Water Resources

3.5.1 Definition of the Resource

Water resources include groundwater, surface water, and floodplains. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

Groundwater

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

Surface Water

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. Storm water is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade lakes, rivers, and streams. Storm water flows, which may be exacerbated by high proportions of impervious surfaces associated with buildings, roads, parking lots, and airfields are important to the management of surface water. Storm water systems convey precipitation away from developed sites to appropriate receiving surface waters. Higher densities of development, such as those found in Area B, require greater degrees of storm water management because of the higher proportions of impervious surfaces that occur in urban centers.

Floodplains

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters. Such lands might be subject to periodic or infrequent inundation due to rain or melting snow. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines the 100-year floodplain. The 100-year floodplain is the area that has a 1 percent chance of inundation by a flood event in a given year.

EO 11988, *Floodplain Management*, requires Federal agencies to determine whether a proposed action would occur within a floodplain. This determination typically involves consultation of appropriate FEMA Flood Insurance Rate Maps, which contain enough general information to determine the relationship of the project area to nearby floodplains. EO 11988 directs Federal agencies to avoid floodplains unless the agency determines that there is no practicable alternative. Where the only

practicable alternative is to site in a floodplain, a specific step-by-step process must be followed to comply with EO 11988 outlined in the FEMA document *Further Advice on EO 11988 Floodplain Management*. As a planning tool, the NEPA process incorporates floodplain management through analysis and public coordination of the EA.

In addition, all floodplain related construction activities must be coordinated with the Miami Conservancy District (MCD) for approval. The MCD through the *Land Use Agreement* (dated January 7, 2000) and the *MCD Policy and Procedure for Permits in Retarding Basins*, regulates all construction on land within the Huffman Dam Retardation Basin and more than 5 feet below the spillway elevation of 835 feet, above MSL.

3.5.2 Existing Conditions

Groundwater

WPAFB is regionally located in the Great Miami River Valley, which is filled with glacial deposits of sand and gravel. The glacial outwash deposits are very permeable and exhibit high transmissivity and hydraulic conductivity. The resulting aquifer system, collectively called the Miami Valley Buried Aquifer, is a highly productive source of water for the millions of people in southwest Ohio. The USEPA designated the Miami Valley Buried Aquifer system as a sole-source aquifer in 1988, meaning that all new projects must be approved by USEPA Region 5 to ensure its continued use as a drinking water supply (53 Federal Register 15876). The buried aquifer system provides drinking water for more than 1.6 million people in southwest Ohio (Debrewer et al. 2000).

Groundwater can also be found in large volumes in the Silurian-age (415 to 465 million years ago) limestone and dolomite bedrock underneath the buried valley aquifer system. Private wells and smaller public systems typically use this bedrock aquifer because, though not as productive as the buried aquifer, it is adequate for such uses (MCD 2002). Underneath the limestone and dolomite bedrock is Ordovician-age (465 to 510 million year ago) bedrock shales and limestones of the Richmond Group. The lower bedrock aquifer system generally produces less than 5 gallons per minute (gpm) and is only productive enough for livestock use.

The buried valley aquifers coincide with the present Great Miami River and its tributaries. Water underground generally follows the same flows as surface waters with upland areas serving as recharge areas and groundwater divides (MCD 2002). At WPAFB, the Mad River follows the course of the Mad River Buried Aquifer, part of the Miami Valley Buried Aquifer system. South of Huffman Dam (a flood control dam that is managed by the MCD), a till zone divides the Mad River Buried Aquifer into an upper water table unit and a lower confined unit.

However, north of the dam and in other parts of the buried valley aquifer, till zones occur less frequently as discontinuous, less-permeable zones within the more permeable outwash deposits (WPAFB 1995b).

Vertical hydraulic gradients vary throughout the area, and both upward and downward gradients have been recorded in nested monitoring wells at WPAFB. Most of the wells in the outwash deposits yield between 750 and 1,500 gallons gpm, but can vary from less than 200 to more than 4,000 gpm (WPAFB 1995b). The City of Dayton groundwater production wells at Huffman Dam are screened at depths of over 100 ft below ground surface. Groundwater at WPAFB is typically hard due to the limestone and dolomite bedrock (Debrewer et al. 2000).

Surface Water

WPAFB is in the Mad River Valley. The Mad River originates approximately 40 miles north of Springfield, Ohio, and flows south and southwest past WPAFB to its confluence with the Great Miami River in Dayton, Ohio. The Great Miami River flows into the Ohio River, which flows into the Mississippi River. Sustained flow of the Mad River originates from groundwater discharge of glacial deposits upstream of Huffman Dam.

The Mad River approaches WPAFB from the north and flows along the northern border of Area B in the vicinity of Gate 1B. OEPA has divided the Mad River watershed into five areas: the headwaters; Mad River between Kings and Chapman Creeks; Buck Creek; Mad River from Chapman to Mud Creeks; and the lower Mad River (Mud Creek to the Great Miami River). Mud Creek enters the Mad River 2,000 ft due north of the SR 235 bridge, near the southern portion of Area A. WPAFB lies adjacent to the northernmost portion of the lower Mad River segment.

OEPA has determined that segments of the Mad River watershed do not support designated aquatic life uses for Warmwater Habitat, Modified Warmwater Habitat, Coldwater Habitat, or the Primary Contact Recreational use (OEPA 2009). Specifically, OEPA has identified the lower segment of the Mad River, adjacent to WPAFB, as an impaired water under Section 303(d) of the Clean Water Act (CWA) for not meeting aquatic life and recreation use standards (OEPA 2010).

The USEPA has established the total maximum daily load of effluent (TMDL) for the Mad River in the *Mad River Total Maximum Daily Loads for Sediment and Turbidity* (USEPA 2007). A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources. The TMDL for the Mad River watershed has been set at 120 percent of natural sediment loading. According to the report, the natural sediment loading in the basin is approximately 894 tons/mi²/yr based on an annual average.

There are several recreational lakes in Area A of WPAFB. The largest is Bass Lake located in the northeastern corner of Area A. The Twin Lakes Recreational Area, comprised of East Twin Lake, West Twin Lake, and Gravel Lake, is located in the southwest corner of Area A (WPAFB 1999). Trout and Hebble creeks are minor surface water features located in Area A. They flow in a general westward direction into the Mad River. Mud Run is another small surface water feature joining the Mad River

along the Base's northern border. Of these, the Mad River is the nearest body of water, which is located approximately 1-mile northwest of the AFIT campus.

The WPAFB Storm Water Pollution Prevention Plan (SWPPP) (prepared to comply with the CWA and the Ohio Water Pollution Control Act) provides detailed descriptions of storm drainage areas and their associated outfalls, potential storm water pollution sources, and material management approaches to reduce potential storm water contamination (WPAFB 2007b). The SWPPP is under revision by the base. An industrial permit with OEPA (NPDES IIO00001*DD) covers the WPAFB storm water program. The SWPPP provides specific Best Management Practices (BMPs) to prevent surface water contamination from activities such as storing and transferring of fuels, storage of coal piles, storage and use of deicing fluids, storage and use of lubrication oils and maintenance fluids, solid and hazardous waste storage, and salt and scale inhibitor storage. Some storm water also enters the Base from surrounding communities and areas (WPAFB 2001).

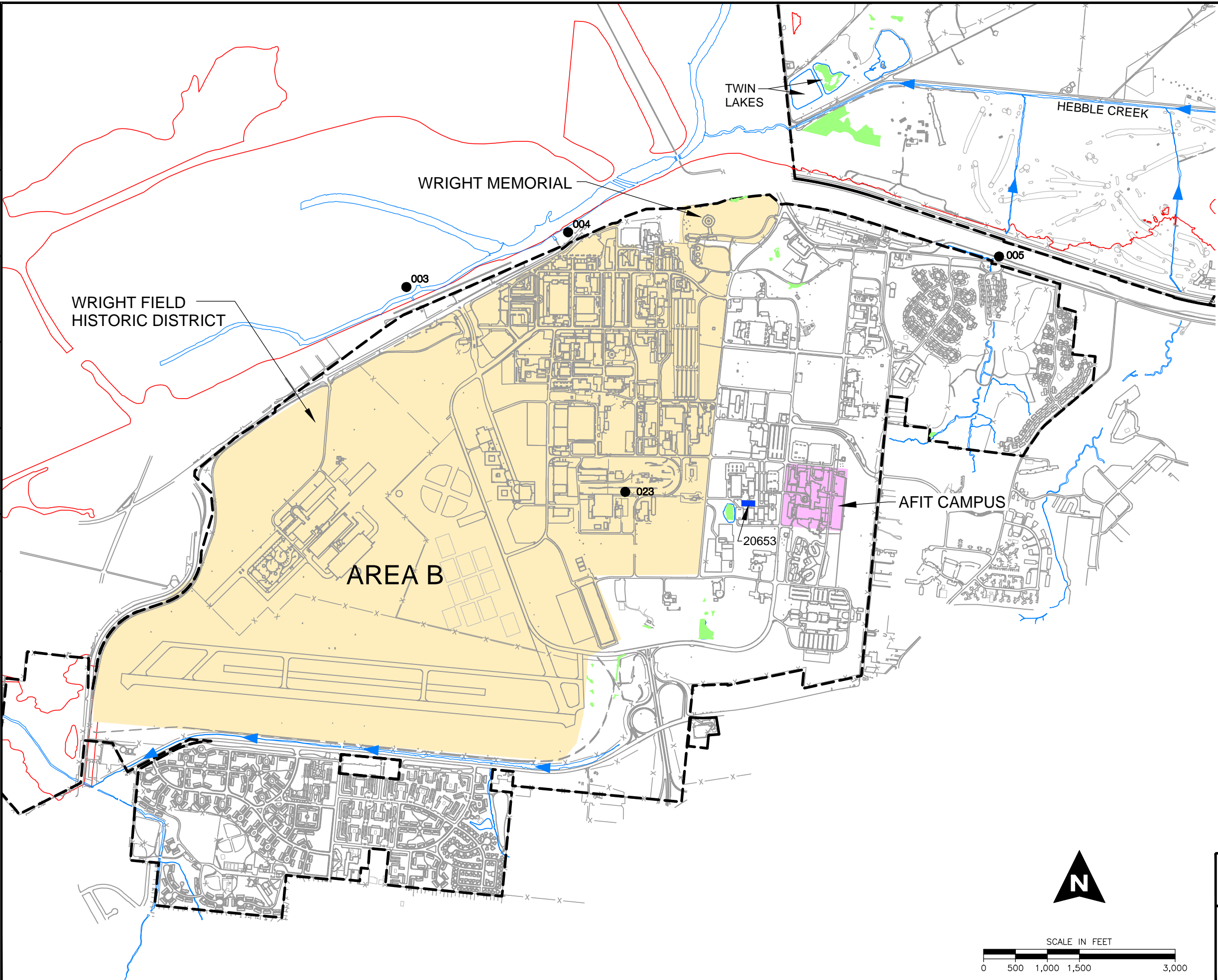
WPAFB's NPDES permit became effective in October 2010. Twenty defined drainage or "Outfall Areas" occur on Base (WPAFB 2007b). Outfalls in Area B drain west and north toward the Mad River, just north of Springfield Pike (WPAFB 2007b). Much of the base research laboratories are situated within the Area B outfall limits. There are 23 NPDES monitoring points on Base. **Table 3-4** provides specific information about Points 3, 4, 5, and 23, which primarily drain Area B and are currently monitored under the NPDES permit. Under the revised NPDES permit, these outfalls are monitored for general activities and aircraft component testing of oil and grease, odor severity, turbidity severity, benzene, toluene, ethylbenzene, xylene, and 1,2,4-trimethylbenzene. The outfalls currently monitored that drain Area B are shown in **Figure 3-2**.

Table 3-4. Drainage Areas at Area B Monitored Under NPDES Permit

Drainage Basin Number ¹	Description
3	Storm sewer utility located approximately 750 ft northwest of Building 20086. Drains street networks in Area B directly into the Mad River.
4	Storm sewer utility located approximately 250 ft north of Building 20087. Drains street networks in Area B directly into the Mad River.
5	Storm sewer utility located in drainage ditch along Old State Route 4 at Longstreet Lane. Drains street networks and drainage ditch west and north toward the Mad River.
23	Storm sewer utility located in the vicinity of Eleventh Street and G Street. Miscellaneous discharges (groundwater infiltration, building sump pumps, condensate from cooling equipment, and discharges from oil/water separators) to the storm sewer drainage system. Discharges toward the west and north toward the Mad River.

Source: WPAFB 2007b

¹ Drainage basin number corresponds to NPDES monitoring points indicated on Figure 3-2.



LEGEND:

- 100-YEAR FLOODPLAIN
- HISTORIC BUILDINGS
- HISTORIC LANDSCAPES
- NPDES MONITORING POINTS
- STREAM FLOW DIRECTION
- WETLANDS
- WPAFB BOUNDARY

WRIGHT-PATTERSON
AIR FORCE BASE,
OHIO

FIGURE 3-2

Surface Water, NPDES Monitoring Points,
and Areas of Potential Effect at AFIT

Floodplains

A large portion of WPAFB lies within the Mad River floodplain. The 10-year floodplain is at 804.7 ft above MSL, and the 100-year floodplain is at 814.3 ft above MSL. The project area is at an elevation range between 935 and 950 ft, MSL, which is above the Mad River 100-year floodplain elevation.

3.6 Biological Resources

3.6.1 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.

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 detention, and erosion protection. Wetlands are protected as a subset of the “the waters of the United States” under Section 404 of the CWA. The term “waters of the United States” has a broad meaning under the CWA and incorporates deepwater 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 Part 328).

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 large 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 might warrant protection under the Act.

3.6.2 Existing Conditions

Vegetation

Natural vegetative communities on WPAFB can be divided into five general categories: forest/woodlands (709 acres), prairie (109 acres), old fields (388 acres), wetlands (23 acres), and maintained areas that are routinely mowed (e.g., airfields, parks, roadsides, and golf courses) and other developed areas such as parking lots, residential lawns, and other green space between buildings.

The project area is located in an area designated by WPAFB as “Improved Grounds”. Improved grounds consist of turfgrass areas and plant material that requires intensive maintenance. Improved grounds include areas within the developed section of the base containing lawns, landscaped areas, parade grounds, road shoulders along main thoroughfares, most Military Family Housing common areas, and unoccupied Military Family Housing units. Establishment of turf on improved grounds is typically accomplished by seeding or sodding. Existing turf areas are comprised of various cultivars of primarily Kentucky bluegrass, perennial ryegrass, red fescue, and tall fescue (WPAFB 2007a).

WPAFB has been awarded the Arbor Day Foundation’s Tree City USA designation for twelve years. The Tree City USA award originates from the National Arbor Day Foundation, an organization founded in 1976 dedicated to tree plantings, conservation, and promotion of community forestry (WPAFB 2009a). Benefits of being a Tree City designee include creating a framework for action, education, a positive public image, and citizen pride (Arbor Day 2010).

Prairie habitat is present within WPAFB’s Huffman Prairie, which is an open (relatively treeless) community typically dominated by characteristic grasses. Huffman Prairie, covering approximately 109 acres in Area A, is one of the largest tall grass prairie remnants in Ohio. The majority of the vegetation at Huffman Prairie reflects recent land use history. Introduced forage grasses and nonnative forbs are well established. While there are about 125 native plant species in Huffman Prairie, there are also at least half that many nonnative species (WPAFB 2007a). The aggressive nonnative plants contribute to the degraded condition of the prairie. Degraded prairie, evidenced by a higher proportion of nonnative than native plant species, covers approximately 72 acres and high-quality prairie covers roughly 25 acres (WPAFB 2007a).

Wetlands

EO 11990, *Protection of Wetlands*, May 24, 1977, directs Federal agencies to consider alternatives to avoid adverse effects on and incompatible development in wetlands. Federal agencies are directed to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.

The CWA sets the basic structure for regulating discharges of pollutants to U.S. waters. Section 404 of the CWA establishes a Federal program to regulate the discharge of dredge and fill material into waters of the United States, including wetlands. The National Wetlands Inventory (NWI), a department within USFWS; USEPA; and the NRCS help in identifying wetlands.

A thorough base-wide wetland survey was conducted in June and July of 2004 and documented in the 2005 Wetland Management Plan (BHE 2005). Seventeen wetlands are located in Area B at WPAFB. All wetlands in Area B are located in developed areas. The wetlands exist in proximity to a high level of

human activity, and several are components of storm water management. Four of the wetlands, located approximately 1.5 miles southwest of the AFIT campus, formed on a slope east of Area B's inactive airfield. Underground drainage features or seeps may have led to the formation of these four small wetlands. The wetlands within the project area are of generally low quality due to their proximity to human activities. The nearest wetland consists of a 0.5-acre isolated wetland located approximately 750 ft west of the project area (referred to as wetland B5). A connected stream consisting of approximately 0.10 acre is also located approximately 500 ft northeast of the AFIT parking lot accessed from Q Street (WPAFB 2007a). Wetlands located in Area B are shown in **Figure 3-3**.

Wildlife

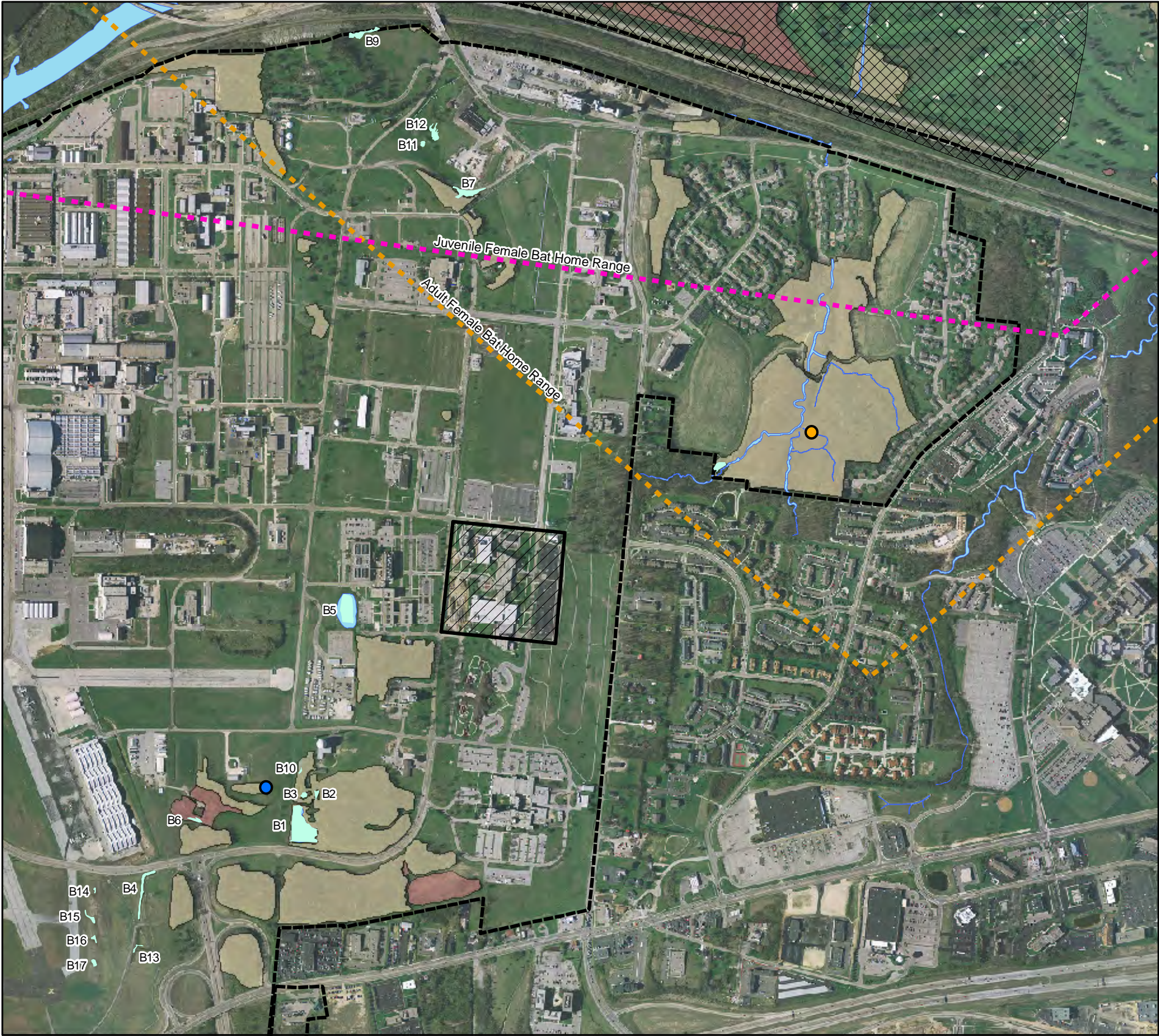
WPAFB is home to a diverse assemblage of animals. Many animals are only present at WPAFB for a short period while migrating between winter and summer habitats, while others are year-round residents. Common mammals on WPAFB include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), groundhog (*Marmota monax*), eastern fox squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), and deer mouse (*Peromyscus maniculatus*).

Common birds on Base include European starling (*Sturnus vulgaris*), eastern meadowlark (*Sturnella magna*), barn swallow (*Hirundo rustica*), savannah sparrow (*Passerculus sandwichensis*), red-winged blackbird (*Agelaius phoeniceus*), Canada goose (*Branta canadensis*), red-tailed hawk (*Buteo jamaicensis*), horned lark (*Eremophila alpestris*), American robin (*Turdus migratorius*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaidura macroura*), killdeer (*Charadrius vociferous*), American crow (*Corvus brachyrhynchos*), and mallard (*Anas platyrhynchos*).

Because birds as well as mammals pose a hazard to airfield and aircraft operations, the Air Force has established bird air strike hazard and wildlife management plans. WPAFB implements a comprehensive Bird/Wildlife Aircraft Strike Hazard (BASH) plan that involves prevention, monitoring, and reduction of bird/wildlife hazards (WPAFB 2007a).

Threatened and Endangered Species

Compliance with AFD 32-70 and AFI 32-7064 requires all Air Force properties to protect species classified as endangered or threatened under the ESA and to comply with Ohio Revised Code (ORC) 1531.25 and its implementing regulations for species listed by the state as threatened and endangered. To comply with these requirements, WPAFB developed an Endangered Species Management Plan (BHE 2001). The WPAFB Integrated Natural Resources Management Plan (WPAFB 2007a) contains a recent summary of threatened and endangered species on Base. Locations of habitat for threatened and endangered species are shown in **Figure 3-3**.



Legend

- AFITCampus
- WPAFB Boundary
- SURFACE WATER
- Wetlands
- Primary Habitat for the Eastern Massasauga Rattlesnake
- Habitat Potentially Suitable for Roosting Indiana Bats
- Home Range of Adult Female Indiana Bat
- Home Range of Juvenile Female Indiana Bat
- Potentially Suitable Habitat for the Blazing Star Stem Border Habitat
- Pigeon Grape
- Radiate Sedge



0 500 1,000 2,000 Feet

WRIGHT-PATTERSON
AIR FORCE BASE,
OHIO

Figure 3-3
Threatened and Endangered Species and
Wetlands Location in Area B

Federal- and state-listed species at WPAFB considered imperiled or vulnerable include the Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*), and the clubshell (*Pleurobema clava*, a mussel). The eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is a candidate for federal listing, and the blazing star stem borer, a moth (*Papaopema beeriana*) is a vulnerable state listed species. There are no federally listed plants on Base, and naturally occurring state-listed vegetation include whorled water-milfoil (*Myriophyllum verticillatum*) and pigeon grape (*Vitis cinerea*) (WPAFB 2007a).

The Indiana bat habitat follows the lower reaches of Hebble Creek, Trout Creek, and the riparian corridor of Mad River from its northern reach in Area A to its confluence with Hebble Creek (WPAFB 1995b, BHE/IT 1999) where this species roosts during the summer and forages in the floodplain/riparian forests. In July 2000, two Indiana bats (a juvenile female and an adult post-lactating female) were captured along Trout Creek during a base-wide mist net survey (BHE 2001). Radio tracking of these two bats confirmed the presence of a maternity colony in a dead slippery elm (*Ulmus rubra*) in a woodlot on the campus of Wright State University. No sightings of Indiana bats have been reported within the area of the Proposed Action.

The bald eagle is found throughout much of the contiguous 48 states along waterways and impoundments. Since the INRMP was published (WPAFB 2007a), the bald eagle has been removed from the Federal List of Endangered and Threatened Wildlife and Plants (FR Volume 72, Number 130, July 9, 2007). The bald eagle will be monitored for a five-year period and will continue to be protected under the provisions of the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. In the state of Ohio, bald eagles are listed as threatened species (ODNR 2010).

Although bald eagles may be found year round in Ohio, they only occur near WPAFB as rare winter visitors with most recent WPAFB sightings occurring along the Mad River corridor in 1984. During the winter of 2004/2005, one bald eagle was recorded in Greene County, and two in Montgomery County. In the winter of 2005/2006, one bald eagle was observed in Greene County, and no eagles were observed in either Greene or Montgomery Counties during the winter of 2006/2007. Recently, however, a pair of eagles has nested north of Eastwood Metro park/Lake in the vicinity of Rohr's Island well-field, which is west of Gate 1B in Area B, at least two miles west of the AFIT project area.

The eastern massasauga rattlesnake is usually found in wet areas including wet prairies, marshes, and low lying areas. Neither the historic nor current population size and status of massasauga snakes at WPAFB have been determined. Reports of massasauga sightings have been limited to the Prime Base Engineer Emergency Force Training Area and Twin Base Golf Course in Area C, which are not in the vicinity of the proposed action (WPAFB 2007a). There is no requirement to survey construction areas for potential snake habitat because the massasauga rattlesnake is a Federal candidate species. No sightings of the massasauga rattlesnake have been reported within the project area.

The clubshell is a Federal- and state-listed endangered species occurring in 12 streams in Kentucky, Pennsylvania, Indiana, Ohio, Michigan, and West Virginia. Surveys by 3D/International, Inc. (1998) and BHE Environmental (1999) documented clubshell subfossil remains at the confluence of Trout Creek and the Mad River and near the confluence of Mud Run and the Mad River (WPAFB 2007a). No sightings of the clubshell have been reported within the project area.

The blazing star stem borer moth is a state-listed endangered species occurring only in disjunct populations throughout the U. S. It is highly dependent upon remnants of mesic tall grass prairies. In 1992, three stem borers were captured at WPAFB's Huffman Prairie. Huffman Prairie is one of three locations where this species has been found in Ohio (WPAFB 2007a). No sightings of the blazing star stem borer have been reported within the project area.

The Ohio Department of Natural Resources (ODNR), Division of Wildlife was also contacted to request a search of their Biodiversity Database. The only species identified as occurring within a 1-mile radius of the project site was the state and federally endangered Indiana bat. This species was identified as occurring near the Huffman Metro Park (Five Rivers Metro Parks). None of the identified species were found to be located within the immediate project area. Correspondence from ODNR and the results of the search are provided in **Appendix A**.

3.7 Cultural Resources

3.7.1 Definition of the Resource

As defined by 36 CFR 800.16, historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act (NHPA) (1966), the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990).

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no structures remain standing) or architectural resources (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance). Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., arrowheads and bottles).

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

for the NRHP. More recent structures might warrant protection if they have potential as Cold War-era resources. Structures less than 50 years in age, and particularly DoD structures in the category of Cold War-era, are evaluated under explicit guidance of the National Park Service Bulletin 22.

The EA process and the consultation process prescribed in Section 106 of the NHPA requires an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's Area of Potential Effect (APE), which is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." In accordance with Section 106 of the NHPA, determinations regarding the potential effects of an undertaking on historic properties are presented to the SHPO.

3.7.2 Existing Conditions

The APE for the Proposed Action includes archaeological resources and buildings located in the area of the AFIT campus (**Figure 3-2**). The AFIT campus is located in the east-central portion of Area B. According to the ICRMP, there are no known archaeological sites, historic structures, or other significant cultural resources located in the immediate project area (WPAFB 2006). Two prehistoric archaeological resources are located in proximity to the project area and include the following:

- Site 33 GR 31 (located 800 ft northwest of the project area), identified as a single mound, is located within a gated hilltop area on USAF land acquired in the 1940s during expansion associated with World War II mobilization, has been listed on the NRHP since the 1970s;
- Site 33 GR 1171 (located 400 ft northeast of the project area), identified in a par course area located between Q and R streets in Area B, lacked research potential and was considered to be an ineligible historical archaeological resource because of the light density of cultural remains.

All the structures associated with the AFIT campus were built between 1963 and 2008. There are no buildings eligible for NRHP within the project area. However, one Cold War-era significant building exists approximately 400 feet east of the project area. Building 20653, "Material Lab", is not included in any of the historic districts on Base, however, is considered individually eligible for listing in the NRHP. The APE also includes historic landscapes located in Area B. There are no historic districts located within the project area; however, one historic district and one historic building are in proximity to the project area and include the following:

- Wright Field Historic District, consists of numerous significant sites, structures, and objects, and is located approximately 1,700 ft west of the project area; and
- Wright Memorial Building 40001, is located approximately one-mile northwest of the project area.

No known historic buildings or prehistoric or historic archaeological resources would be modified under the Proposed Action.

3.8 Socioeconomics

3.8.1 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 might 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 permit characterization of baseline conditions in the context of regional, state, and national trends.

Data in three areas provide key insights into socioeconomic conditions that might be affected by a proposed action. Data on employment could identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region could be used to compare the “before” and “after” effects of any jobs created or lost as a result of a proposed action. Data on industrial or commercial growth or growth in other sectors provides baseline and trend line information about the economic health of a region.

In appropriate cases, data on an installation’s expenditures in the regional economy help to identify the relative importance of an installation in terms of its purchasing power and jobs base. Demographics identify the population levels and changes to population levels of a region. Demographics data might 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 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).

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires Federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. The EO further requires Federal agencies to ensure that their policies, programs, activities, and standards address these disproportionate risks. The order defines environmental health and safety risks as “risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink and use for recreation, the soil we live on, and the products we use or are exposed to).” Such information aids in evaluating whether a proposed action would render vulnerable children targeted for protection in the EO.

3.8.2 Existing Conditions

Social and Economic Conditions

Population – WPAFB is located 10 miles outside of Dayton, Ohio. The city of Dayton has a population of 166,179; the Dayton-Springfield, Ohio Metropolitan Statistical Area (MSA) has a population of 950,558 (Bureau of Census 2000a). The MSA is defined by the U.S. Census Bureau as a core area with a large population nucleus (at least 50,000) and the adjoining communities that have a high degree of economic and social integration within that core (Bureau of Census 2000b).

The Dayton-Springfield MSA includes the counties of Greene, Montgomery, Miami, and Clark. For the purposes of this EA, the MSA is considered the region of influence (ROI) around WPAFB (Bureau of Census 2000a).

Employment – Some of the key industries in the Dayton, Ohio, economy include services, trade (wholesale and retail), government, and manufacturing. In FY06, the finance and insurance industries employed 14,595 employees and jobs provided by the government totaled 37,298 (DACC 2010).

Table 3-5 lists the industry of employment for residents around WPAFB, the Dayton-Springfield MSA, and the state of Ohio in 2000. A large portion of residents in the Dayton-Springfield MSA are employed in education, health and social services, and public education or manufacturing; a lower percentage are employed in agriculture, forestry, fishing and hunting, and mining.

Table 3-5. Employment of Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)

Employment by Industry	Dayton-Springfield MSA	Greene County	State of Ohio
Percent of Employed Persons in Armed Forces	0.7%	2.2%	0.1%
Industry of Civilian Labor Force			
Agriculture, forestry, fishing and hunting, and mining	0.5%	0.7%	1.1%
Construction	5.4%	5.4%	6.0%
Manufacturing	19.1%	13.8%	20.0%
Wholesale trade	3.2%	2.6%	3.6%
Retail trade	12.0%	12.3%	11.9%
Transportation and warehousing, and utilities	4.8%	3.9%	4.9%
Information	2.3%	2.3%	2.4%
Finance, insurance, real estate, and rental and leasing	5.0%	4.5%	6.3%
Professional, scientific, management, administrative, and waste management services	9.0%	9.6%	8.0%
Education, health and social services	20.8%	23.8%	19.7%
Arts, entertainment, recreation, accommodation, and food services	7.5%	7.9%	7.5%
Other services (except public administration)	4.4%	4.2%	4.5%
Public administration	5.9%	8.9%	4.1%

Source: Bureau of Census 2000a
MSA = Metropolitan Statistical Area

WPAFB provides a major source of employment in the five-county area. In addition, WPAFB awards numerous contracts every year to local businesses. For FY09, the total number of jobs provided by WPAFB was 27,406 (WPAFB 2009b). This number includes military active duty, trainees and reservists, DoD civilians, and other civilians, such as contractors. The number of indirect jobs supported by the base, such as restaurants, dry cleaners, and others is estimated at 33,090. The total economic impact to the local Dayton community was \$5.1 billion.

The unemployment rate for the Dayton-Springfield MSA in July 2010 was 11.2 percent, slightly higher than the statewide average of 10.3 percent (DACC 2010). The 2010 unemployment rate in the MSA around WPAFB and within Greene County was 9.6 percent, slightly lower than the state average of 10.2 percent. Residents living in Greene County have a lower per capita income and median household income in comparison to the MSA and the state of Ohio (Bureau of Census 2000a). The residents of Greene County also have a higher percent of persons living below the poverty level (**Figure 3-4**). The difference between the income and poverty levels are not considered to be substantially different from the MSA, countywide, or statewide averages.

Education – The percent of residents who have obtained a high school diploma is substantially the same around WPAFB, countywide, and statewide (**Figure 3-5**). However, a smaller percentage of residents in the MSA achieved a college education (22.4 percent) in comparison to Greene County (22.7 percent) and statewide (23.2 percent) percentages.

3.9 Environmental Justice

3.9.1 Definition of the Resource

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that all federal agencies address the effects of policies on minorities and low-income populations and communities, and to ensure that there would be no disproportionately high and adverse human health or environmental effects to minority or low-income populations or communities in the area. A “minority” is defined as a person who is Black, Hispanic (regardless of race), Asian American, American Indian, and/or Alaskan Native. “Low-income” is defined as a household income at or below the U.S. Census Bureau Poverty Threshold (Federal Highway Administration [FHWA] 1998).

A minority population is defined as any readily identifiable group of minority persons who live in geographic proximity, or are geographically dispersed or transient persons (such as migrant workers) who will be similarly affected by a proposed program, policy, or action (FHWA 1998). Minority populations residing in the study area were compared to the population characteristics of the city and state. The CEQ guidance states that “minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis.”

Figure 3-4. Income and Poverty Level of Residents in Dayton–Springfield MSA, Greene County, and the State of Ohio (2000)

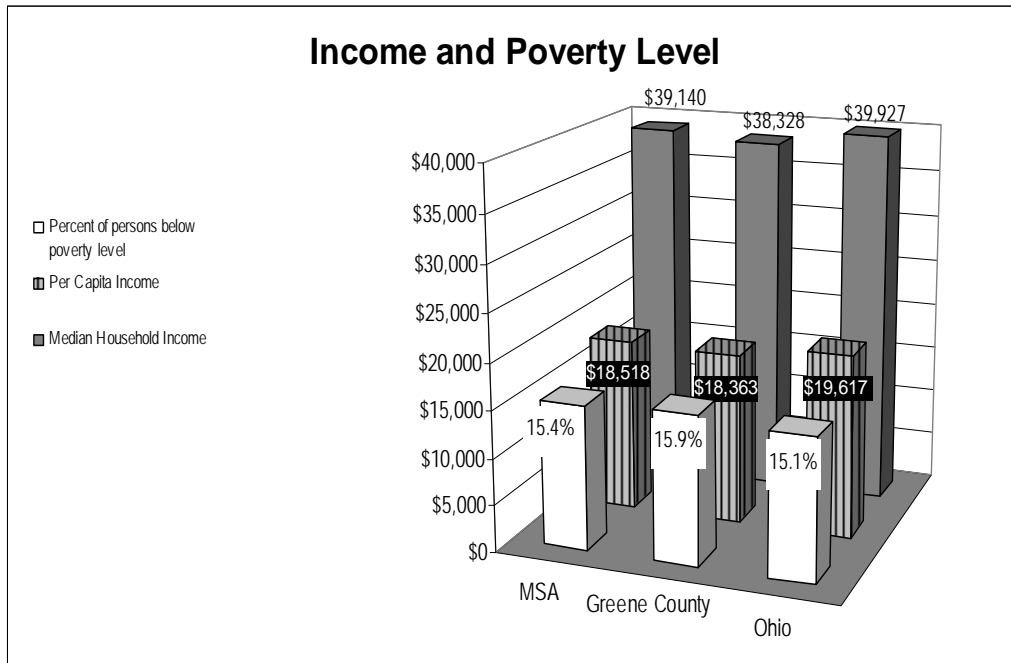
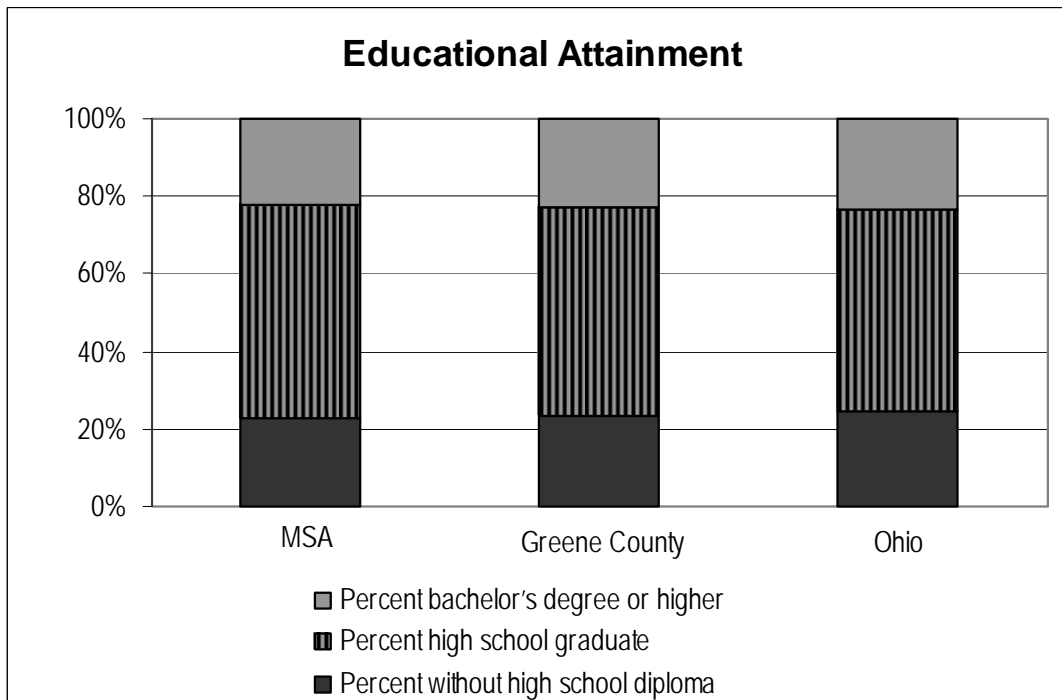


Figure 3-5. Educational Attainment of the Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)



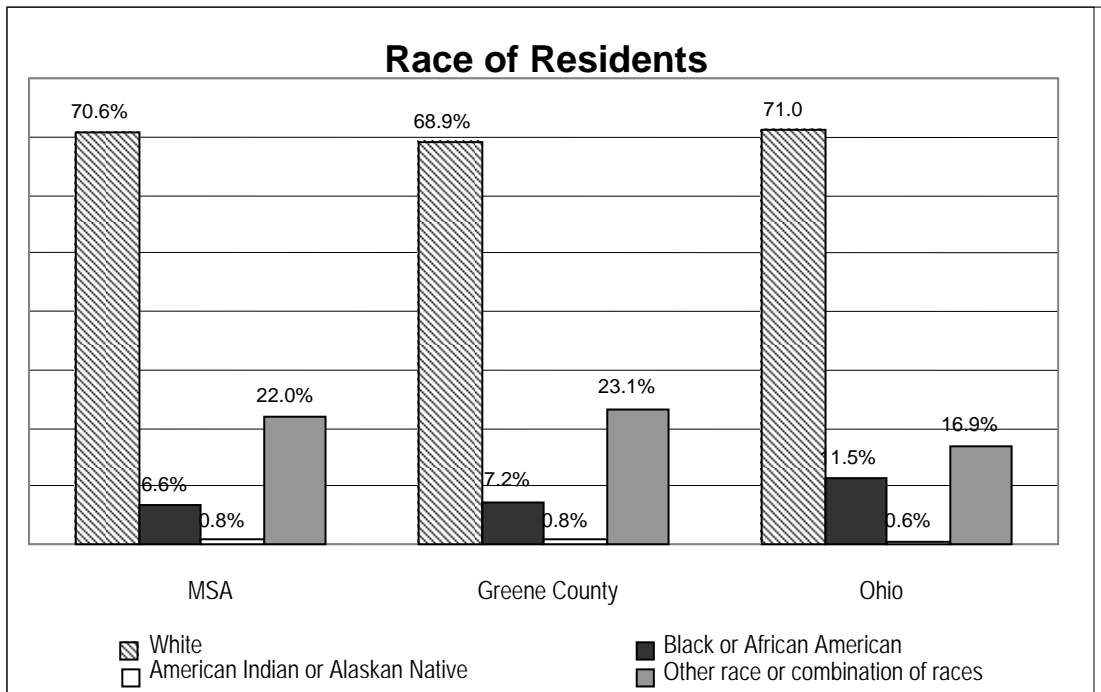
Low-income status was based upon comparing the income of the proposed project site and larger study area residential population to the U.S. Census Bureau Poverty Threshold (U.S. Census Bureau, Housing and Household Economic Statistics Division 2000a). The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low-income populations. The definition of “low income populations” is defined by HUD as populations where “50 percent or greater are low-income individuals”.

3.9.2 Existing Conditions

A screening analysis using U.S. Census Bureau racial and economic information catalogued by Census Tract and Block Group for 2000 was used to identify low income and minority populations living within the MSA around WPAFB. For the purpose of this analysis, residents living within Census Bureau Tract 2001.02 and 2007 are further evaluated to determine if a disproportionate level of impact could occur.

Census Bureau Tract 2001.02, which is northwest of WPAFB, was found to have a somewhat higher portion of minority populations (25 percent) than adjoining areas (average of 15 percent) (**Figure 3-6**). Census Bureau Tract 2007, which is located southeast of the Base, has a minority population that is relatively equal to surrounding areas (Bureau of Census 2000a).

Figure 3-6. Race of Residents in Dayton-Springfield MSA, Greene County, and the State of Ohio (2000)



Residents of Census Bureau Tract 2001.02 were also found to have a lower per capita income (\$13,339), a higher unemployment rate (9.4 percent), a higher portion of residents living below the poverty level (38.5 percent), and a higher population growth rate between 1990 and 2000 (31 percent) in comparison

with residents in adjoining areas (Bureau of Census 1990 2000a). Residents of Census Bureau Tract 2007 were also found to have a lower per capita income (\$13,295), a slightly higher unemployment rate (3.6 percent), a higher portion of residents living below the poverty level (23.3 percent), and a higher population growth rate between 1990 and 2000 (24 percent) in comparison to residents in adjoining areas (Bureau of Census 1990 2000a).

3.10 Infrastructure

3.10.1 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.

The infrastructure components to be discussed in this section include transportation systems, utilities (electrical power, natural gas, liquid fuel, and water supply), pollution prevention, solid waste, sanitary and wastewater systems, heating and cooling, communications, and airfield pavement.

Solid waste management primarily concerns itself with the availability of landfills to support a population’s residential, commercial, and industrial needs. Alternative means of waste disposal might involve waste-to-energy programs or incineration. In some localities, landfills are designed specifically for, and are limited to, disposal of construction and demolition debris. Recycling programs for various waste categories (e.g., glass, metals, and papers) reduce reliance on landfills for disposal.

3.10.2 Existing Conditions

The infrastructure information contained in this section was obtained from the WPAFB General Plan (WPAFB 2001) and provides a brief overview of each infrastructure component and comments on its existing general condition.

Transportation System

State highways provide direct access to WPAFB. SR-444 bisects the Base creating a barrier between Wright Field and Patterson Field (WPAFB 2001). SR-844 provides a route from Gate 15A to I-675, which is located east of the Base. I-675 provides direct access to I-70, which is approximately 9 miles to the north; U.S. 35, which is approximately 5 miles to the south; and I-75, which is approximately 15 miles to the southwest (WPAFB 2001). SR-235 provides access from Gate 26C to SR-4 and I-70 (WPAFB 2001). Traffic enters Area B through Gates 1B from Springfield Street, 19B from National Road, and 22B off of Interstate 675. The primary arterial road passes the west side of the AFIT campus via Hobson Way (P Street). The north and east sides of the campus are accessible by Tenth Street and Q Street, which are connector roads. These three roads provide good access to campus parking, docks, and delivery and building service points.

Electrical Power

Dayton Power & Light provides WPAFB with electrical power (WPAFB 2001). The Base receives power via two substations, which is delivered by over 500 miles of primary electrical lines on Base. These aboveground and underground transmission lines are owned by WPAFB (WPAFB 2001).

The electrical distribution system on Base is designed to meet the needs of a much larger base population so the demands of service are within the system's capacity (WPAFB 2001). The overall condition of the system is adequate in providing the power to the current Base population.

Natural Gas. The natural gas at WPAFB is supplied by Vectren. The on-Base natural gas system, which is owned by WPAFB, contains over 130,000 linear ft of underground piping and 11 distribution subsystems (WPAFB 2001). Vectren owns a distribution line that goes past the Wright Memorial area. The natural gas system is the principal heating option for housing areas and outlying areas of the Base. It feeds some individual buildings and the three satellite heating plants: Buildings 20581, 10849, and 4019 (WPAFB 2001).

Liquid Fuel. The liquid fuel system at WPAFB is delivered primarily by tank trucks with an alternate capability for pipeline delivery. Defense Logistics Agency-Energy is responsible for determining mode of delivery. WPAFB operates approximately 85 underground storage tanks (USTs) and 175 above-ground storage tanks (ASTs).

Eighty percent of the storage capacity on Base is for Jet Fuel-8 (JP-8), which is supplied directly to the Base via tank truck from Defense Fuel Support Point – Lebanon. The Bulk Fuels Storage tank farm is comprised of ten 420,000-gallon JP-8 ASTs and one 840,000-gallon JP-8 AST, one 15,000-gallon motor gas AST, and one 220,000-gallon diesel AST. There is one 100-gallon AST located in Building 20642 on the AFIT campus. The single-walled steel AST was installed in 1987 to support an emergency power generator located inside this building. The current status of the AST is listed as not-in-service.

Water Supply. The water supply and distribution system at WPAFB consists of two Base-owned and operated water collection, treatment, storage, and distribution systems (WPAFB 2001). One system services Wright Field (Area B) and The Woods (formerly referred to as Woodland Hills) and a second system services Area A and Patterson Field. The only portion of the Base that does not use the WPAFB water distribution system is the Page Manor housing area. Page Manor receives water from the Montgomery County Sanitary Sewer District (WPAFB 2001). WPAFB utilizes approximately 3.2 million gallons of drinking water per day.

Pollution Prevention. AFI 32-7080, *Pollution Prevention Program*, implements the regulatory mandates in the Emergency Planning and Community Right-to-Know Act, Pollution Prevention Act of 1990; EO 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*; EO

12873, *Federal Acquisition, Recycling, and Waste Prevention*; and EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. AFI 32-7080 prescribes the establishment of Pollution Prevention Management Plans. The 88 ABW fulfills this requirement with the following plans (WPAFB 2001):

- Integrated Solid Waste Management Plan
- Storm Water Pollution Prevention Plan
- Hazardous Waste Management Plan
- Hazardous Material Emergency Planning and Response Plan
- The Spill Prevention Control and Countermeasure Plan

These plans ensure that WPAFB maintains a waste reduction program and meets the requirements of the CWA; NPDES permit program; and Federal, state, and local requirements for spill prevention control and countermeasures.

Solid Waste. Municipal solid waste at WPAFB is managed in accordance with the guidelines specified in AFI 32-7042, *Solid and Hazardous Waste Compliance*. This AFI incorporates by reference the requirements of Subtitle D, 40 CFR 240 through 244, 257, and 258, and other applicable Federal regulations, AFIs, and DoD Directives. In general, AFI 32-7042 establishes the requirement for installations to have a solid waste management program that incorporates the following: a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; record-keeping and reporting; and pollution prevention.

WPAFB operates a Qualified Recycling Program that is run by the Pollution Prevention and Sustainment Section of the Environmental Branch in the Asset Management Division in the Civil Engineering Directorate (88 ABW/CEANP). The recycling center is located in Building 10293 on Patterson Field. The recycling program includes aluminum, glass, paper, plastics, oil, and ferrous and nonferrous materials (WPAFB 2001).

WPAFB has a contract for solid waste pick-up and disposal of all refuse on the base (WPAFB 2001). The contractor removes refuse from military family housing and industrial areas on the Base.

Sanitary Sewer and Wastewater Systems. The sanitary sewer collection system at WPAFB is owned by the Base and consists of 43 miles of pipelines. The wastewater produced on the north side of Patterson Field is discharged to the Fairborn treatment plant, northwest of the Base. The wastewater produced on the remainder of Patterson Field, Wright Field, and Page Manor is served by the Dayton treatment system.

WPAFB produces an average of 3.5 million gallons per day (gpd) of sewage. The overall condition of the system is adequate in the collection of wastewater. The current system is designed to accommodate a Base population that is approximately 50 percent larger (WPAFB 2001).

Heating and Cooling. WPAFB is heated with six coal- and gas-fired central heating plants. These plants are located Basewide and provide approximately 80 percent of the annual heating requirements for WPAFB (WPAFB 2001). The two largest central heating plants are in Building 31240, which serves Patterson Field and Kittyhawk Community Center; and Building 20770, which serves Wright Field (WPAFB 2001). There are also four satellite heating plants that serve smaller areas on the Base. These plants operate on natural gas and provide 4 percent of the Base's overall heating needs. The remaining 16 percent of the Base's heating is met by natural gas furnaces in individual buildings (WPAFB 2001).

Communications. The communications system at WPAFB provides support to the 445 Air Wing (AW) and its associate units. The communications system consists of telephone, local computer systems, long-haul communications, and land mobile radio systems (WPAFB 2001). There are over 100 miles of communication cable ducts on Base (WPAFB 2001).

WPAFB's communications and information utility infrastructure is in good condition (WPAFB 2001). There are improvements planned for the Base that would enable it to meet any known future communication requirements (WPAFB 2001).

3.11 Health and Safety

3.11.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The public has little access to the construction activities associated with the Proposed Action.

Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure depends primarily on the proximity of the hazard to the population. Activities that can be hazardous include transportation, maintenance and repair activities, and the creation of highly noisy environs. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation processes creates unsafe environments for nearby populations. Extremely noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

Munitions and Explosive Safety

Explosive safety zones (ESZs) are required for areas where ordinance are stored or handled. ESZs are typically determined based upon the net explosive weight of the ordinance to be stored or handled and the blast resistance properties of the magazine. Explosive Safety Quantity Distance (ESQD) arcs that delineate the extents of each ESZ are constructed. ESZ and ESQD requirements are specified in Air Force Manual 91-201, *Explosive Safety Standards*.

Construction and Demolition Safety

Construction site safety is largely 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 DoD and USAF regulations designed to comply with standards issued by 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.

3.11.2 Existing Conditions

Fire Hazards and Public Safety

The Fire Department at WPAFB provides fire, crash, rescue, and structural fire protection at the Base. The 445 AW abides by a general safety policy relating to the performance of all activities at the Base. Individuals, supervisors, managers, and commanders are expected to give full support to safety efforts and safety awareness and strict compliance with established safety standards are expected.

Munitions and Explosives Safety

There are two areas that are constrained by ESQD CZs in Area B (WPAFB 2010). Clear zones exist at Wright Field and at Building 20100 (Aerospace Survivability Facility). Explosives are classified based on their reactions to specific influences. The explosives hazard class is further subdivided into “division”, based on the character and predominance of the associated hazards and their potential for causing personnel casualties or property damage.

Construction and Demolition Safety

All contractors performing construction activities are responsible for following ground safety regulations and worker compensation programs, 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 availability of Material Safety Data Sheets. Industrial hygiene is the responsibility of contractors, as applicable.

Contractor responsibilities are to review potentially hazardous workplace operations; to monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous materials), 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.

3.12 Hazardous Materials and Wastes

3.12.1 Definition of the Resource

AFPD 32-70, *Environmental Quality*, establishes the policy that the USAF is committed to

- Cleaning up environmental damage resulting from its past activities
- Meeting all environmental standards applicable to its present operations
- Planning its future activities to minimize environmental impacts
- Managing responsibly the irreplaceable natural and cultural resources it holds in public trust
- Eliminating pollution from its activities wherever possible

Hazardous material is defined as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious irreversible illness, and incapacitating reversible illness, or that might pose a substantial threat to human health or the environment. Hazardous waste is defined as any solid, liquid, contained gaseous, or semi-solid waste; or any combination of wastes that pose a substantial present or potential hazard to human health or the environment.

Evaluation of hazardous materials and wastes focuses on USTs and ASTs and the storage, transport, and use of pesticides and herbicides, fuels, and petroleum, oils, and lubricants (POL). Evaluation might also extend to generation, storage, transportation, and disposal of hazardous wastes when such activity occurs at or near the project site of a proposed action. In addition to being a threat to humans, the improper release of hazardous materials and wastes can threaten the health and well-being of wildlife species, botanical habitats, soil systems, and water resources. In the event of release of hazardous materials or wastes, the extent of contamination varies based on type of soil, topography, and water resources.

Special hazards are those substances that might pose a risk to human health, but are not regulated as contaminants under the hazardous waste statutes. Included in this category are asbestos-containing materials (ACM), radon, lead-based paint (LBP), polychlorinated biphenyls (PCBs), and unexploded ordnance. The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the Toxic Substances Control Act (TSCA), define hazardous materials. The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste Amendments, defines hazardous wastes. In general, both hazardous materials and wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, might present substantial danger to public health or welfare or the environment when released or otherwise improperly managed.

Through its Environmental Restoration Program (ERP), the DoD evaluates and cleans up sites where hazardous wastes have been spilled or released to the environment. The ERP provides a uniform, thorough methodology to evaluate past disposal sites, to control the migration of contaminants, to minimize potential hazards to human health and the environment, and to clean up contamination. Description of ERP activities provides a useful gauge of the condition of soils, water resources, and other resources that might be affected by contaminants. It also aids in identification of properties and their usefulness for given purposes (e.g., activities dependent on groundwater usage might be foreclosed where a groundwater contaminant plume remains to complete remediation).

3.12.2 Existing Conditions

Hazardous Materials

AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout the USAF. It applies to all USAF personnel who authorize, procure, issue, use, or dispose of hazardous materials, and to those who manage, monitor, or track any of those activities. A privately contracted hazardous material pharmacy (HAZMART) is located in Building 30089. The HAZMART ensures that only the smallest quantities of hazardous materials necessary to accomplish the mission are purchased and used (WPAFB 2001).

Hazardous and toxic material procurements at WPAFB are approved and tracked by the Bioenvironmental Engineering Office. The Asset Management Division supports and monitors environmental permits, hazardous material and hazardous waste storage, spill prevention and response, and participation on the Base Environmental Protection Committee. The Hazardous Substance Steering Committee is a network safety, environmental and logistics experts who work with hazardous material Issue Point Managers, Unit Environmental Coordinators (UECs), and other hazardous material users to ensure safe and compliant hazardous material management throughout the base (WPAFB 2008a).

Hazardous Waste

The 88 ABW maintains a Hazardous Waste Management Plan (WPAFB 2008b) as directed by AFI 32-7042, *Solid and Hazardous Waste Compliance*. This plan prescribes the roles and responsibilities of all members of WPAFB with respect to the waste stream inventory, waste analysis plan, hazardous waste management procedures, training, emergency response, and pollution prevention. The plan establishes the procedures to comply with applicable Federal, state, and local standards for solid waste and hazardous waste management.

Wastes generated at WPAFB include waste flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, waste paint-related materials, mixed-solid waste (MSW), and other miscellaneous wastes. Management of hazardous waste is the responsibility of each waste-generating organization and the Asset Management Division (88 ABW/CEA). WPAFB produces more

than 1,000 kilograms of hazardous waste per month and is considered a large quantity hazardous waste generator.

There are six initial accumulation points at AFIT where hazardous waste is accumulated, stored, and picked up for off-site disposal. A variety of hazardous waste is generated at AFIT and is dependent upon what the current military test is at the time of generation. Initial accumulation points are treated as satellite accumulation points with no real time restriction for accumulation until 55-gallons of hazardous waste or one quart of P-listed hazardous waste is accumulated. At this point, the waste is picked up within three days for proper disposal by Vertex, Inc., the current disposal contractor.

Stored Fuels

Stored fuels present a potential threat to the environment, which is mitigated at WPAFB through spill prevention and control and countermeasures (SPCC). The WPAFB SPCC Plan (WPAFB 2008c) describes practices used to minimize the potential for stored fuel spills, prevent spilled materials from migrating off the base, and ensure that the cause of any spill is corrected. The WPAFB Oil and Hazardous Substance Integrated Contingency Plan (WPAFB 2005) describes emergency planning, notification and spill response practices. Collectively, the SPCC Plan, with a focus on spill prevention, and the Integrated Contingency Plan (ICP), with a focus on spill response, provides a comprehensive strategy for preventing stored fuel releases to the environment.

The Spill Prevention Coordinator (SPC) is the primary point of contact for the SPCC Program. The SPC works closely with Tank Managers, UECs, and WPAFB emergency response personnel to implement the SPCC Plan. Required SPCC training, standard operating procedures (SOPs), inspections, and record keeping are coordinated by the SPC.

Asbestos-Containing Materials

AFI 32-1052, *Facilities Asbestos Management*, provides the direction for asbestos management at USAF installations. This instruction incorporates by reference applicable requirements of 29 CFR 669 et seq., 29 CFR 1910.1025, 29 CFR 1926.58, 40 CFR 61.3.80, Section 112 of the CAA, and other applicable AFIs and DoD Directives.

AFI 32-1052 requires bases to develop an Asbestos Management Plan to maintain a permanent record of the status and condition of ACM in installation facilities, as well as documenting asbestos-management efforts. In addition, the instruction requires installations to develop an asbestos operating plan detailing how the installation accomplishes asbestos-related projects. Asbestos is regulated by the USEPA with the authority promulgated under OSHA, 29 U.S.C. 669, et seq. Section 112 of the CAA regulates emissions of asbestos fibers to ambient air. USEPA policy is to leave asbestos in place if disturbance or removal could pose a health threat.

The 88 ABW/CEA has developed standard contract specifications for the removal and disposal of ACM. These specifications incorporate all applicable USEPA, OSHA, and USDOT requirements. The Ohio Department of Health (ODH) must license contractors, and all asbestos-abatement work must be done under the onsite supervision of an ODH-designated “competent person.” Work area monitoring for airborne asbestos fibers is accomplished by an industrial hygienist certified by the American Board of Industrial Hygiene. Industrial hygienists must also be certified by the ODH. Laboratory analyses of air samples and of bulk samples must be accomplished in a certified and accredited laboratory.

Non-friable ACM can be disposed of in a sanitary landfill. Friable asbestos must be disposed of in a USEPA-approved landfill. ACM-abatement contractors are responsible for obtaining all required permits from regulatory agencies and for OEPA and ODH notification requirements (WPAFB 2001). WPAFB has implemented an Asbestos Management Plan to minimize risk from friable ACM in buildings where the material remains. Additional sampling is usually required in buildings scheduled for renovation or demolition (WPAFB 2001).

A base-wide survey for asbestos was conducted in Buildings 20640, 20641, and 20644 on January 12, 1988, January 11, 1988, and March 22, 1988, respectively. Based on the results of these surveys, potential ACM was identified in the mechanical rooms and restrooms of Buildings 20640 and 20641 (ATC 1988). Based on the date of these surveys and not all AFIT Buildings being surveyed, complete asbestos surveys would be required for all AFIT Buildings prior to demolition and renovation activities.

Lead-Based Paint

The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X), passed by Congress on October 28, 1992, regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, state, and local laws relating to LBP activities and hazards.

USAF policy and guidance establishes LBP management at USAF facilities. The policy incorporates, by reference, the requirements of 29 CFR 1910.120, 29 CFR 1926, 40 CFR 50.12, 40 CFR 240 through 280, the CAA, and other applicable Federal regulations. Additionally, the policy requires each installation to develop and implement a facility management plan for identifying, evaluating, managing, and abating LBP hazards.

More than 95 percent of WPAFB facilities were constructed prior to 1980 and contain LBP. Lead concentrations are generally low with the exception of paints used on outdoor structures such as water towers. The HUD action level is 5,000 ppm. However, even when concentrations are below this, OSHA Lead Construction Standard (29 CFR 1926.62) must be followed. All workers performing lead abatement or removal or any other lead disturbance are required to have a lead workers license issued by the ODH. Licensing is not required if the contract involves mechanical demolition. Contractors containerize LBP

wastes which are disposed of under contract. Bioenvironmental engineering samples and monitors all in-house projects involving LBP (WPAFB 2001).

No LBP surveys have been conducted for any AFIT buildings. As such, it is assumed that lead exists in all buildings until sampled and tested.

Environmental Restoration Program

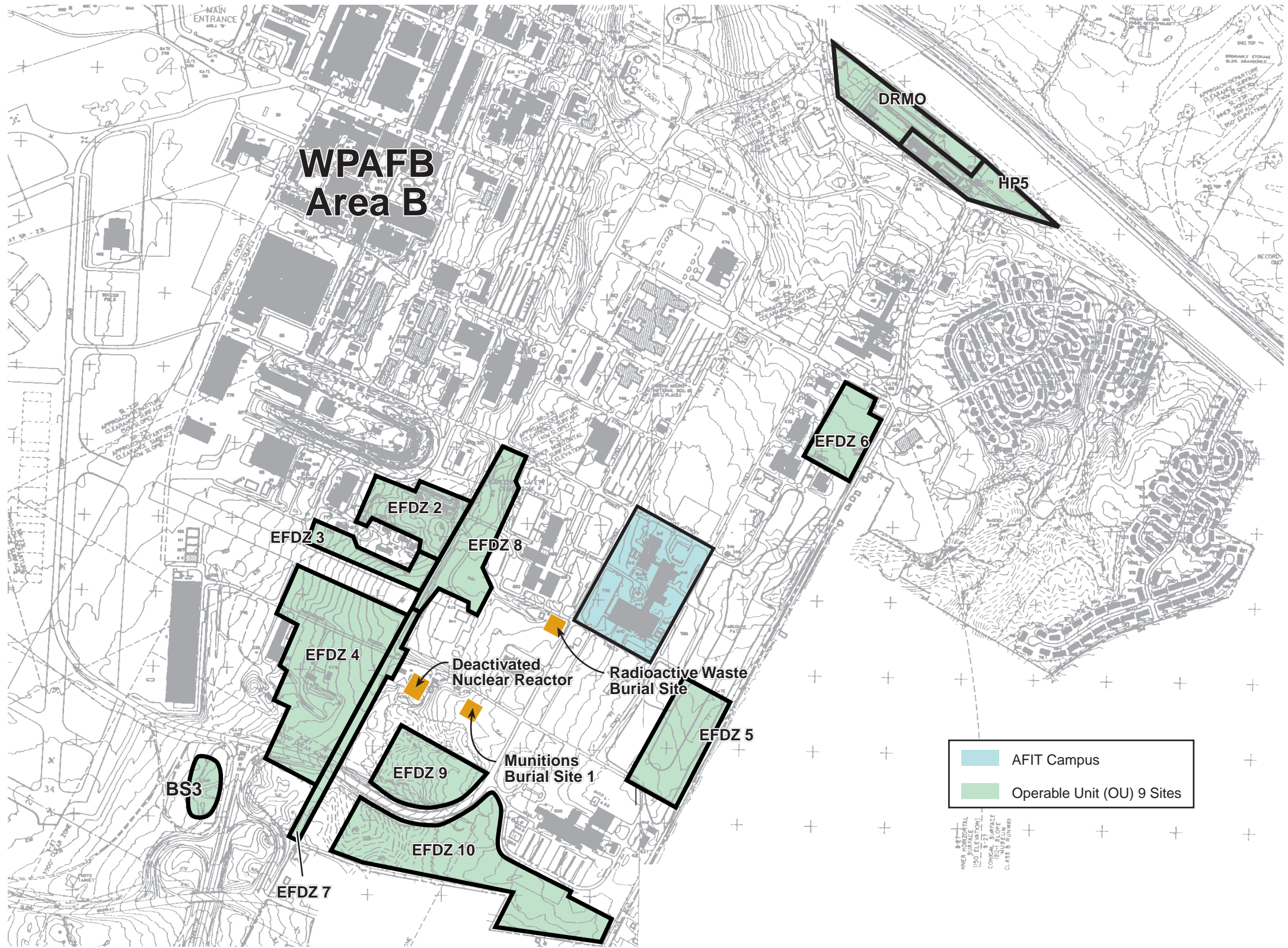
The ERP is a subcomponent of the Defense Environmental Restoration Program that became law under SARA (formerly the Installation Restoration Program [IRP]). The ERP requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. WPAFB began its IRP in 1981 with the investigation of possible locations of hazardous waste contamination. In 1988, WPAFB entered into an Ohio Consent Order with the OEPA. In October 1989, WPAFB was placed on the USEPA's National Priorities List, a list of sites that are considered to be of special interest and require immediate attention (WPAFB 2001).

WPAFB currently has identified 67 ERP sites, two regional groundwater sites, and several areas of concern per the Air Force Restoration Information Management System. WPAFB has grouped the majority of confirmed or suspected sites requiring investigation and characterization into 11 geographically-based operable units (OUs), designated as OUs 1 through 11 (IT 1999). In addition to the 11 OUs, WPAFB addressed base-wide issues of groundwater and surface water contamination under the Basewide Monitoring Program (BMP) and Long-Term Groundwater Monitoring (LTM) Program. Principal groundwater contaminants beneath WPAFB include benzene, toluene, ethylbenzene, xylene; trichloroethene; and tetrachloroethene (WPAFB 2007c).

The only ERP site in the area of the AFIT campus is OU9. OU9 is a collection of 11 discrete sites, nine of which have been used for disposal of earthfill materials, one burial site (BS3), and Heating Plant No. 5 (HP5). Earthfill Disposal Zones (EFDZs) 2 through 10 were included in OU9 because of the potential for disposal of hazardous chemical materials during or subsequent to fill placement. **Figure 3-7** indicates the locations of ERP and related sites within the vicinity of the AFIT campus.

The HP5 site was expanded from an investigation of the coal storage area only to include an evaluation of the adjacent Defense Reutilization Marketing Office (DRMO) storage yard. These sites were identified through the ERP as presented in the *“Installation Restoration Program Site Investigation Report for Eight Earthfill Disposal Zones, Wright-Patterson Air Force Base, Ohio”* (Engineering Science 1992), *“U.S. Air Force Site Investigation at Wright-Patterson Air Force Base, Ohio, Final Site Investigation Report for 16 IRP Sites”* (Science Applications International Corporation 1993), and *“Draft-Final Site Specific Work Plan for Remedial Investigation and Feasibility Study Wright-Patterson Air Force Base, Ohio, Operable Unit 9”* (IT 1994).

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	12/8/10	--	JJS	CH	CH	s-140578.0601-1/11-W



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 3-7
ERP and Related Sites
Near AFIT Campus

Basemap: Woolpert Consultants 1987

EFDZs 2 through 8 were identified as ERP sites during the Phase I records search from engineering drawings dated from the 1940s indicating these areas for placement of earth fill from projects elsewhere on the base. Direct evidence of past disposal of hazardous chemical materials has not been found for EFDZs 2 through 8; however, the sites were programmed for the ERP due to the potential for uncontrolled disposal of hazardous materials when earth filling occurred. EFDZs 9 and 10 have a similar history, and were identified during review of aerial photographs of Areas B as areas in which the ground was disturbed (SAIC 1993).

Previous investigations at OU9 include the WPAFB ERP Phase I Preliminary Assessment (ES 1982), the IRP Phase II, Stage I and Stage II Investigations (Weston 1985 and 1989), geophysical investigations of selected sites (ES 1989), various site reconnaissance walkovers, and the Site Investigations (ES 1982, SAIC 1993).

A Remedial Investigation (RI) of OU9 began in 1994 and was completed in 1997. The RI was undertaken to characterize the extent of environmental contamination to assess risks to human health and the environment and to develop, evaluate, and select appropriate remedial actions to mitigate adverse health effects, if required. Results of the RI are presented in “*Final Remedial Investigation Report, Wright-Patterson Air Force Base, Operable Unit 9, Ohio*” (IT 1997a). Little soil contamination was detected during the site investigation phase at OU9. Therefore, EFDZs 2, 3, 4, 5, 6, 7, 8 and 10 and BS3 were designated for long-term groundwater monitoring only. In addition, groundwater, surface water and sediment were designated for evaluation under the Basewide Monitoring Program.

Surface soil sampling was conducted at EFDZ4, EFDZ9, HP5 and in the DRMO. A baseline risk assessment was conducted to evaluate the soils at these four sites. The results of the human health risk assessment indicated that risk from exposures to OU9 soils at EFDZ4 and EFDZ9 was minimal. However, these conclusions were based on industrial land use assumptions and did not include potential exposures to soils by children.

Polyaromatic hydrocarbons (PAHs) were found to exceed both Reasonable Maximum Exposure and Average Exposure Preliminary Remediation Goals at HP5 and the DRMO. The areas in HP5 and the DRMO with significant PAHs are those where coal and coal ash has been unloaded and stored. Risk from surface soil exposures to PAHs is also associated with DRMO. This risk is most likely associated with former ash and inorganics were evaluated in the risk assessment, the focus of the risk characterization was the organic components.

The cumulative risk (for carcinogens) and the cumulative hazard index (for non-carcinogens) for total organics associated within the OU9 area exceeded the upper limit of the target risk range (IT 1998). Chemicals that individually exceeded their maximum contaminant level (MCL) as well as contributing to the total risk included: bis (2-ethyl hexyl) phthalate, benzene, 1,2-dichlorethane, tetrachloroethene,

trichloroethene, and vinyl chloride. Dioxin (OCDD) and 4,4,-DDT also contributed to the cumulative risk; these compounds do not have MCLs for comparison.

Surface water samples contained low concentrations of VOCs at all OU9 surface water sampling locations, and SVOCs were detected in low concentrations in surface water from EFDZ8 and EFDZ9 only. Sediment samples contained low concentrations of VOCs and SVOCs, primarily PAHs, with the majority of detections located in the vicinity of HP5/DRMO. The pesticide, MCP, and herbicide dichloroprop were also detected in sediments from the Reactor Wetland vicinity. Surface water and sediments were evaluated for ecological risk only (IT 1997a; IT 1997b).

Radioactive Waste Burial Site

The Radioactive Waste Burial Site was located in the south central section of Area B at the intersection of P and 12th Streets, approximately 2,250 ft north of the WPAFB boundary along Colonel Glenn Highway. The site consisted of a 7ft by 4ft concrete slab surrounded by an 8ft barbed wire fence labeled “Radioactive Waste Burial Site”. The site was first identified as a source of potential contamination during the ERP Phase I Records Search (ES 1982). Although the records search did not conclude that radioactive waste was buried at WPAFB, and no indications of elevated radiation were found at the Radioactive Waste Burial Site during the Phase I Investigation, the burial site was included as an ERP site because the area appeared to be a disposal site and was fenced and labeled.

The Radioactive Waste Burial Site was investigated in 1990 (WPAFB 1992). Soil sample data from excavations at the site as well as the site history indicated that the Radioactive Waste Burial Site was not used as a burial site for radioactive materials. Reports of personnel present during the placement of the concrete slab indicated that the site was used as a staging area for drums of radioactive waste in the 1950s. However, there is no indication that environmental contamination resulted. Soil samples from the site showed only naturally occurring radioactivity at background levels. Because the environment was not impacted by activities at the site, it was concluded that this site does not pose health risks and that no further action was necessary.

Deactivated Nuclear Reactor

The Deactivated Nuclear Reactor is an entombed reactor located in OU9, north of EFDZ9, shown on **Figure 3-7**. The reactor was a 10-megawatt reactor cooled and moderated with demineralized water. The reactor was completed in 1965 and operated for five years supporting various projects of defense agencies, civilian institutions, and USAF engineering students until shut down in June 1970. The Nuclear Regulatory Commission exempted the facility under Section 91B of the Atomic Energy Act of 1954. The AF internally regulates activities at the reactor. The 88 ABW, Aeronautical Systems Center, Air Force Materiel Command is the custodian of the facility and performs applicable inspection, maintenance, and monitoring activities to ensure compliance with the Air Force Nuclear Reactor Program (AFI 91-109), the

USAF Special Nuclear Reactor Study 97-1, and the protection of personnel and environment from unnecessary exposure to radiation.

Radiological monitoring, including soil, vegetation, surface water, and groundwater monitoring, is conducted semi-annually outside the facility. Monitoring is also conducted inside the facility, including ambient air surveys, swipe surveys, and air monitoring. In addition, groundwater monitoring was conducted in the vicinity of the reactor as part of the OU9 RI. Results of the groundwater monitoring indicated detectable levels of gross alpha and beta; however, all detectable levels of radiological activity were below their respective MCLs.

WPAFB has concluded that no action at the Deactivated Nuclear Reactor is necessary under CERCLA and the ERP to ensure protection of human health and the environment. Inspection, maintenance, and monitoring activities to ensure compliance with applicable regulations and ensures protection of personnel and the environment from unnecessary exposure to radiation. Actions taken to date include shutdown of the reactor in July 1970 and subsequent decommissioning.

Munitions Burial Site

Munitions Burial Site (MBS-1) is not technically part of the ERP because it was discovered in November 1995 when a construction contractor unexpectedly encountered buried objects while excavating a trench for installation of a sanitary sewer line for a new fire station in Area B (WPAFB 1997c; **Figure 3-7**). This area is located approximately 1,300 ft southwest of the AFIT campus. The buried objects, located at a depth of 13 to 15 ft, were steel tubes approximately 22 inches long and 1.5 inches in diameter. The objects were identified as M-114 submunitions by members of the 71st Ordnance Detachment Explosive Ordnance Disposal Team. The condition of the M-114 submunitions varied from good to highly deteriorated, and nine of the submunitions contained liquid audibly sloshing within the submunitions.

Extensive research was carried out by Armstrong Laboratories and it was determined that the bomblets were from a 1950s experiment conducted at the Base. The bomblets contained the bacteria *Brucella suis* (the first standardized biological agent selected by the U.S. Army Chemical Corps), which had been heat-sterilized and rendered inert prior to disposal. Because no other biological agents were ever placed in M-114s, there was no possibility of encountering other biological agents. Furthermore, all of the bursters were inert and there were no live fuses on the M-114s. WPAFB concluded that the bomblets posed no biological or explosive hazard and that the bomblets could be removed by conventional excavation procedures. A work plan for the excavation was prepared in August 1996 and 2,306 bomblets were removed mid-September 1996.

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents an evaluation of the environmental impacts that might result from implementing the Proposed Action or the No Action Alternative. The section also includes an analysis of the potential cumulative impacts on WPAFB; unavoidable adverse impacts; the relationship between short-term use of the human environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitments of resources.

The specific criteria for evaluating impacts and assumptions 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 requirement; and/or legislative criteria. Proposed mitigation measures are included for each environmental issue, as appropriate, to reduce potential impacts.

Impacts may be direct or indirect and are described in terms of type, context, duration, and intensity, which is consistent with the CEQ regulations. “Direct effects” are caused by an action and occur at the same time and place as the action. “Indirect effects” are caused by the action and occur later in time or are farther removed from the place of impact, but are reasonably foreseeable.

Impacts are defined in general terms and are qualified as adverse or beneficial, and as short-term or long-term. For the purposes of this EA, short-term impacts are generally considered those impacts that would have temporary effects. For example, air quality impacts from fugitive dust associated with construction would be considered short-term as they would only last for the duration of the construction activities. Long-term impacts are generally considered those impacts that would result in permanent effects. For example, the loss of vegetation, or the increase in traffic, associated with new development would be considered long-term.

The thresholds of change for the intensity of impacts are defined as follows:

Negligible, the impact is localized and not measureable or at the lowest level of detection;

Minor, the impact is localized and slight but detectable;

Moderate, the impact is readily apparent and appreciable; or

Major, the impact is severely adverse or highly noticeable and considered to be significant.

4.1 Land Use

4.1.1 Evaluation Criteria

Potential impacts on land use are based on the level of land use sensitivity in areas affected by a proposed action and compatibility of proposed actions with existing conditions. In general, a land use impact would be adverse if it met the following criteria:

- Inconsistency or noncompliance with existing land use plans or policies
- Precluded the viability of existing land use
- Precluded continued use or occupation of an area

- Incompatibility with adjacent land use to the extent that public health or safety is threatened
- Conflict with planning criteria established to ensure the safety and protection of human life and property

4.1.2 Proposed Action

There would be no adverse effects on the land use surrounding WPAFB. All redevelopment activities would be limited to areas located on the Base. Construction and renovation projects would upgrade capabilities necessary to perform required activities. Construction and renovation projects would occur on land classified as improved (**Figure 3-1**).

Proposed redevelopment activities would not result in any adverse or incompatible land use changes on or off the Base nor would they alter the relationships of the general land use areas that have been designated in the base-planning guidance documents. The land use categories incorporate developed and undeveloped lands. These land use designations were established to segregate aircraft facilities from other military base support areas. Proposed redevelopment of the AFIT campus would not be in conflict with base land use policies or objectives. The Proposed Action would not conflict with any applicable off-Base land use ordinances or designated CZs.

Effects associated with removal of construction materials and debris would include short-term minor disruption of land uses due to elevated noise levels and potential interference with roadway access due to construction vehicles. No changes to land use would occur at WPAFB as a result of the Proposed Action. The noise contour analysis is presented in Section 4.3.

4.1.3 No Action

The No Action alternative would have no impact on land use over current conditions.

4.2 Air Quality

4.2.1 Evaluation Criteria

The environmental consequences 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 conditions and ambient air quality. For the purposes of this EA, the impact in NAAQS “attainment” areas would be considered significant if the net increases in pollutant emissions from the Federal action would result in any one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Exceed any Evaluation Criteria established by a SIP

As mentioned in Section 3.3, the area including WPAFB is classified as a moderate maintenance area for O₃, designated as moderate nonattainment for PM_{2.5}, and is designated as an unclassified/attainment area for all other criteria pollutants.

Impacts on air quality in NAAQS “nonattainment” areas are considered significant if the net changes in project-related pollutant emissions result in any of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Increase the frequency or severity of a violation of any ambient air quality standard
- Delay the attainment of any standard or other milestone contained in the SIP

Because WPAFB is located in an area designated as maintenance for O₃ and non-attainment for PM_{2.5}, a conformity applicability analysis is required to determine whether the Proposed Action is subject to the Conformity Rule. With respect to the General Conformity Rule, effects on air quality would be considered significant and, therefore, subject to an evaluation to determine compliance with the General Conformity Rule, if:

- The proposed Federal action does not relate to transportation plans, programs, and projects developed, funded, or approved under Title 23 U.S.C. or the Federal Transit Act, and
- The Proposed Action-related direct and indirect emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been re-designated as a maintenance area.

The *de minimis* threshold emission rates were established by the USEPA in the General Conformity Rule to focus analysis requirements on those Federal actions with the potential to have “significant” air quality impacts. **Table 4-1** presents these thresholds, by regulated pollutant. These *de minimis* thresholds are similar, in most cases, to the definitions for major stationary sources of criteria and precursors to criteria pollutants under the CAA’s NSR Program (CAA Title I). As shown in **Table 4-1**, *de minimis* thresholds vary depending on the severity of the nonattainment area classification.

In addition to the *de minimis* emission thresholds, Federal PSD regulations define air pollutant emissions to be significant if the source is within 10 kilometers of any Federal Class I area (e.g., wilderness area greater than 5,000 acres or national park greater than 6,000 acres) and emissions would cause an increase in the concentration of any regulated pollutant in the Class I area of 1 µg/m³ or more [40 CFR 52.21(b) (23) (iii)]. Although PSD rules apply only to stationary sources of emissions, for the purposes of this EA, such an impact to a Class I area would be considered adverse.

Table 4-1. Conformity *de minimis* Emission Thresholds

Pollutant	Status	Classification	<i>de minimis</i> Limit (tpy)
Ozone (measured as NO _x or VOCs)	Nonattainment	Extreme	10
		Severe	25
		Serious	50
		Moderate/marginal (inside ozone transport region)	50 (VOCs)/100 (NO _x)
		All others	100
	Maintenance	Inside ozone transport region	50 (VOCs)/100 (NO _x)
		Outside ozone transport region	100
Carbon Monoxide (CO)	Nonattainment/maintenance	All	100
Particulate Matter (PM ₁₀)	Nonattainment/maintenance	Serious	70
		Moderate	100
		Not applicable	100
Particulate Matter (PM _{2.5})	Nonattainment/maintenance	Direct Emissions	100
		SO ₂ precursors	100
		NO _x precursors	100
Sulfur Dioxide (SO ₂)	Nonattainment/maintenance	Not applicable	100
Nitrogen Oxides (NO _x)	Nonattainment/maintenance	Not applicable	100

Source: 40 CFR 93.153 (b)

tpy: tons per year

4.2.2 Proposed Action

Air Quality Regulations Applicable to the Proposed Action

Stationary Sources and New Source Review. Local and regional pollutant impacts resulting from direct and indirect emissions from stationary emission sources under the Proposed Action are addressed through Federal and state permitting program requirements under NSR regulations (40 CFR 51 and 52). Local stationary source permits are issued and enforced by RAPCA. As noted previously, WPAFB has appropriate permits in place and has met all applicable permitting requirements and conditions for existing stationary devices. No new or modified stationary sources are anticipated as part of the Proposed Action.

National Emissions Standards for Hazardous Air Pollutants. Because WPAFB has the potential to emit more than 25 tpy of hazardous air pollutants, certain hazardous air pollutant-emitting activities on Base are subject to regulation under National Emissions Standards for Hazardous Air Pollutants (NESHAP), are promulgated in 40 CFR Parts 61 and 63. These NESHAP require emissions control measures and detailed recordkeeping to show compliance with NESHAP restrictions on the types of materials, such as paints, adhesives, and solvents, which can be used in specific operations. Specific NESHAP to which activities at WPAFB are subject include:

- 40 CFR 63 Subpart GG, Aerospace NESHAP
- 40 CFR 63 Subpart ZZZZ, Reciprocating Internal Combustion Engines Maximum Achievable Control Technology
- 40 CFR 61 Subpart M, Asbestos Remediation

In addition, WPAFB would also be subject to the Defense Land Systems and Miscellaneous Equipment (DLSME) NESHAP when that rule is promulgated. This rule would cover military surface coating operations other than those subject to the Aerospace and Shipbuilding NESHAP. The intent is to simplify compliance for DoD facilities that are currently forced to comply with multiple overlapping, and sometimes conflicting, NESHAP, including the Miscellaneous Metal Parts and Products Coating NESHAP, Plastic Parts and Products Coating NESHAP, Metal Furniture Coating NESHAP, Large Appliance Coating NESHAP, and Fabric and Other Textiles Coating NESHAP. USEPA currently has no date set for publication of a draft DLSME NESHAP.

Conformity. Because both a maintenance area and a nonattainment area are affected by this Proposed Action, the USAF must comply with the Federal General Conformity Rule. To do so, an analysis has been completed to ensure that, given the changes in direct and indirect emissions of the O₃ precursors (NO_x and VOCs), direct PM_{2.5}, and PM_{2.5} precursors (SO₂ and NO_x), the Proposed Action would be in conformity with CAA requirements. The Conformity Determination requirements specified in this rule can be avoided if the project nonattainment pollutant rate increase resulting from the Proposed Action is below *de minimis* threshold levels for each nonattainment pollutant. For purposes of determining conformity in these nonattainment areas, projected regulated pollutant emissions associated with the Proposed Action were estimated.

Based on a review of current AFIT campus activities and proposed activities, it has been determined that the potential sources of PM_{2.5}, SO₂, NO_x and VOC pollutant emissions associated with the Proposed Action would be from (1) construction/renovation activities associated with the Proposed Action and (2) motor vehicle emissions from construction worker commuting. Under the Proposed Action, no specific timeline for implementation of the proposed activities has been established. To develop a worst case annual emission scenario, it was conservatively assumed that all construction activities would be completed within one calendar year. The scope of the analysis was limited to those operations or activities that result in emissions that would be directly or indirectly attributable to the implementation of the Proposed Action.

The potential air quality impacts have been assessed based on the characteristics of the Proposed Action (i.e., construction, demolition, renovations) and are presented below.

Proposed Action Direct and Indirect Emissions

Construction Activities. The Proposed Action consists of nine construction projects at various AFIT facilities that are required by the Master Plan. Each of these projects were evaluated from an engineering

perspective to estimate the types of activities involved and the number of people and equipment required to execute the project.

The construction projects would generate particulate (PM₁₀ and PM_{2.5}) emissions as fugitive dust from movement of construction equipment (e.g., earth movers and waste hauling) and demolition. Fugitive dust emissions would occur during the duration of a specific project and most projects will not occur simultaneously. Because the Master Plan does not specify a specific time frame to execute each construction project, the emissions are conservatively estimated to occur within one calendar year. Also, each construction project is assumed to last for three months, which is a conservatively high estimate given that some activities will last no longer than a few weeks. Fugitive dust emissions for various construction activities were calculated using emissions factors and assumptions published in USEPA's AP-42 Section 13.2 dated October 2006 (USEPA 1998, 2006).

Construction operations would also result in emissions of criteria pollutants as combustion products from construction equipment as well as evaporative emissions from architectural coatings. These emissions would be of a temporary nature. The coating emissions were estimated using paint specifications and material balance calculations. For the construction equipment combustion products, the emissions factors and estimates were generated based on guidance provided in Air Emission Factor Guide for Air Force Mobile Sources (AFCEE 2009).

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. The construction emissions are presented in **Table 4-2** and include the estimated annual emissions from off-road construction equipment exhaust associated with the Proposed Action construction activities.

Vehicle Operations. Calculations of air pollutant emissions from privately owned vehicles (POVs) used for construction workers commuting were based on the vehicle miles traveled, vehicle category or classification (e.g., light-duty gasoline vehicle), average vehicle speed measured in mph, average vehicle occupancy rate, and USEPA-approved pollutant emission factors. Emissions factors from the USEPA's mobile source emission model, MOBILE6, were used to estimate emissions from motor vehicles commuter emissions in the Dayton Metropolitan area. The vehicle emissions are presented in **Table 4-2**.

Analysis. The information presented in **Table 4-2** shows that NO_x, VOC, CO, SO₂, PM₁₀ and PM_{2.5} emissions are projected to increase under the Proposed Action at WPAFB, but would be short-term negative impacts lasting only as long as the construction phase of each activity. As shown in **Table 4-2**, the Proposed Action would not result in a net emission increase above conformity *de minimis* limits listed

Table 4-2. Net Change in Emissions at WPAFB Associated with the Proposed Action

Air Pollutant Emissions Source	NO _x Emissions (tpy)	VOC Emissions (tpy)	CO Emissions (tpy)	SO ₂ Emissions (tpy)	PM Emissions (tpy)	PM ₁₀ Emissions (tpy)	PM _{2.5} Emissions (tpy)
CONSTRUCTION EMISSIONS							
New Construction of AFIT Research Lab	9.29	0.91	3.04	0.67	1.44	1.44	0.47
Expansion of Library	9.29	0.85	3.04	0.67	1.14	1.14	0.47
Addition of 151 Parking Space near Library	7.87	0.47	2.65	0.57	5.15	5.15	0.41
Expansion of Academic Building 20642	9.29	0.83	3.04	0.67	1.06	1.06	0.67
Demolition of Buildings 20194 & 20168	9.29	0.55	3.04	0.67	0.79	0.79	0.47
Redesign of North Entry Court between Library and Building 20641	9.29	0.79	3.04	0.67	0.73	0.73	0.47
Redesign of Green Space Quad West of Building 20642	9.29	0.55	3.04	0.67	1.91	1.91	0.47
Addition of 300 Parking Spaces East of Hobson Way	7.87	0.48	2.65	0.57	7.99	7.99	0.41
Realignment of Q Street	7.87	0.49	2.65	0.57	4.20	4.20	0.41
Laying New Steam Pipe Line into Building 20640	8.43	0.52	2.69	0.61	0.72	0.72	0.42
Upgrade / Update Site Utilities	-	0.15	-	-	-	-	-
Relocation of Kettering School	-	0.01	-	-	-	-	-
VEHICLE COMMUTER EMISSIONS							
New Construction of AFIT Research Lab	0.37	0.54	4.13	0.01	0.02	0.02	0.01
Expansion of Library	0.18	0.27	2.07	0.00	0.01	0.01	0.01
Addition of 151 Parking Space near Library	0.07	0.11	0.83	0.00	0.00	0.00	0.00
Expansion of Academic Building 20642	0.18	0.27	2.07	0.00	0.01	0.01	0.01
Demolition of Buildings 20194 & 20168	0.18	0.27	2.07	0.00	0.01	0.01	0.01
Redesign of North Entry Court between Library and Building 20641	0.10	0.09	1.26	0.00	0.01	0.01	0.00
Redesign of Green Space Quad West of Building 20642	0.18	0.27	2.07	0.00	0.01	0.01	0.01
Addition of 300 Parking Spaces East of Hobson Way	0.07	0.11	0.83	0.00	0.00	0.00	0.00
Realignment of Q Street	0.07	0.11	0.83	0.00	0.00	0.00	0.00
Laying New Steam Pipe Line into Building 20640	0.07	0.11	0.83	0.0	0.00	0.00	0.00
Upgrade / Update Site Utilities	0.18	0.27	2.07	0.00	0.01	0.01	0.01
Relocation of Kettering School	0.18	0.27	2.07	0.00	0.01	0.01	0.01
TOTAL EMISSIONS INCREASE	89.65	9.30	49.99	6.40	25.23	25.23	4.74
DE MINIMIS EMISSION LIMIT	100	100	100	100	100	100	100
BELOW DE MINIMIS LIMIT	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

Construction emissions include demolition, construction, surface coating, and off-road and mobile motorized construction equipment.

Vehicle emissions include privately-owned commute vehicles for construction workers.

tpy: tons per year

in 40 CFR 93.153 (b). Because the emissions expected from the Proposed Action would not exceed *de minimis* levels, the General Conformity Rule does not apply and the Proposed Action can be deemed to be in conformity with the Ohio SIP. **Appendix B** details the emissions factors, calculations, and estimates of construction, airfield, and motor vehicle emissions for the Proposed Action.

According to 40 CFR 81 Subpart D, no Class I visibility areas are located within 10 kilometers of WPAFB. The closest Federal Class I area is Mammoth Cave National Park in Kentucky, 320 kilometers to the south. Therefore, air emissions from the Proposed Action would not affect any Class I area.

The Proposed Action is projected to result in short-term emissions increased for all pollutants. The maximum Proposed Action-related net emissions increases are below all General Conformity *de minimis* thresholds. As a result of the Proposed Action, there would be negligible long-term impacts in air quality over current conditions.

4.2.3 No Action

The No Action alternative would have no adverse impact on air quality.

4.3 Noise

4.3.1 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 they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased noise exposure to unacceptable noise levels). Projected noise impacts were evaluated quantitatively for both the No Action and the Proposed Action for the conditions expected when AFIT campus redevelopment is complete and fully operational.

4.3.2 Proposed Action

Construction Program

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 for renovation/modification. The nearby facilities would experience muffled construction noise during the workday. However, noise generation would last only for the duration of renovation/modification activities, and could be reduced through the use of equipment exhaust mufflers and restriction of renovation/modification and demolition activities to normal working hours (between 7:00 a.m. and 5:00 p.m.).

Because the noise environment on Base and in the vicinity of WPAFB is dominated by military aircraft overflights, noise produced by redevelopment activities would not affect sensitive receptors on or off the Base. Noise associated with proposed construction activities would be comparatively minor, and would

occur in a relatively high traffic area on Base (education building with students arriving and leaving the AFIT campus throughout the day).

A street map of the area is provided in **Figure 4-1**. Under the proposed action, construction traffic would increase around AFIT streets. Increased traffic noise would occur in and around AFIT as a result of the proposed action from increases in construction vehicles and workers entering the AFIT area. The proposed action would have minor impacts on ambient noise from construction activities. Impacts would be minor because these activities are primarily new construction and renovations and would be carried out during normal working hours.

4.3.3 No Action

The No Action alternative assumes that AFIT campus operations would be similar to the current conditions. Thus, the No Action alternative would have no adverse impact on noise quality over the planned redevelopment.

4.4 Geology and Soils

4.4.1 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 the following steps:

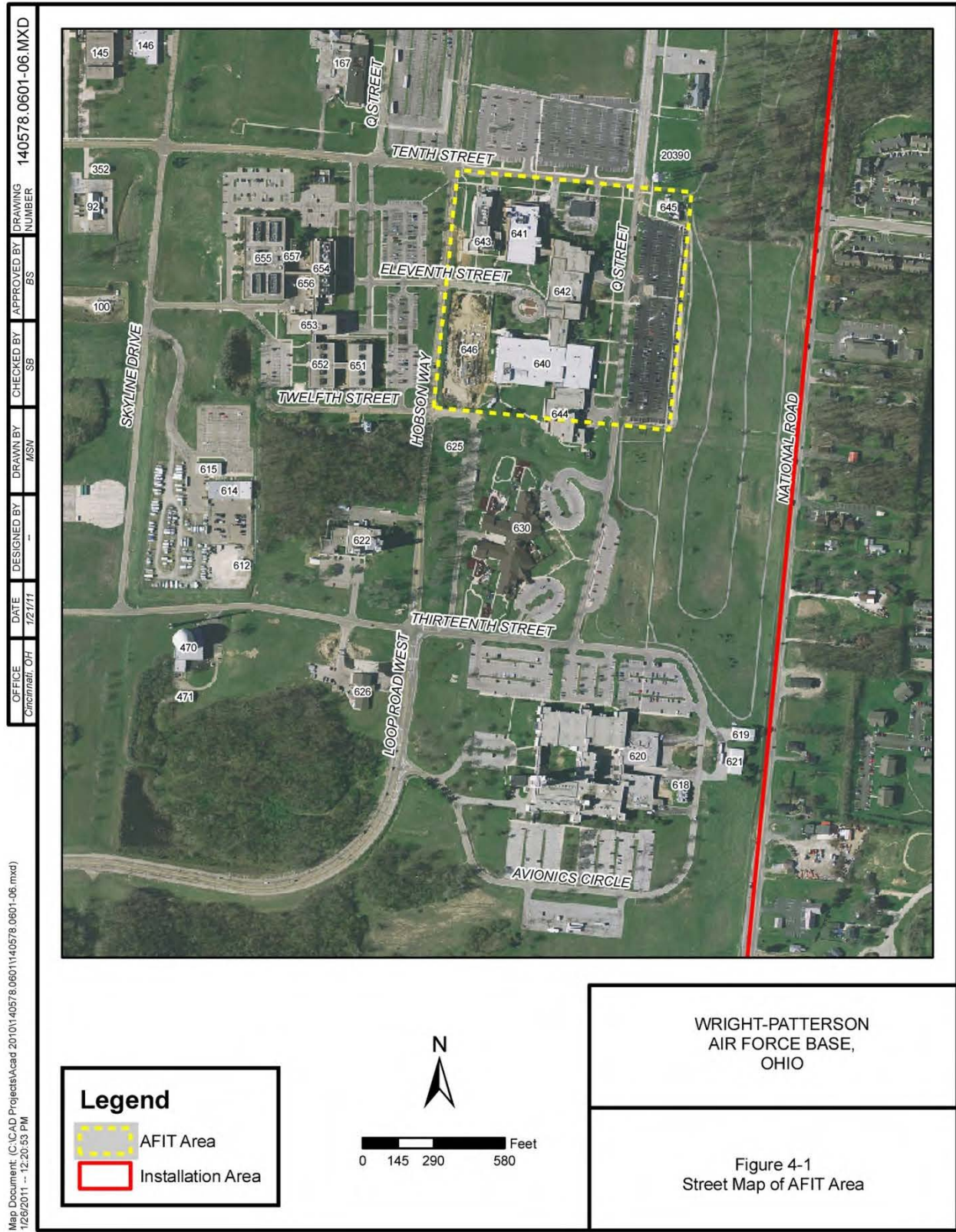
- Identification and description of resources that could potentially be affected
- Examination of a proposed action and the potential impacts this action may have on the resource
- Assessment of the level of potential impacts
- Provision of mitigation measures in the event that potentially adverse impacts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

Effects on geology and soils would be adverse if they would alter the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure or function within the environment.

4.4.2 Proposed Action

Short- and long-term impacts on geological resources are anticipated to be negligible as a result of the Proposed Action. Preparing the site prior to construction would require minimal leveling. If it is determined through the exploratory soil borings that any basements must be completed into bedrock, blasting would not be allowed. New utility lines, including the relocating of existing steam, water and sewer, are not expected to be as deep into the soil as basements. Excavation for basements and utility lines would not be expected to impact subsurface soils.

Figure 4-1. Street Map of AFIT Area



Erosion control measures in accordance with Base specifications for construction projects would be implemented. Soil erosion and siltation control measures would include the use of silt fencing, straw bales, and/or hydro-mulching in and adjacent to construction areas. In accordance with OSHA requirements, any open trenches where workers may be entering would need to be shored for side support to prevent collapse. Base contractors for the proposed action would also be responsible for complying with standard operating procedures and applicable health and safety regulations.

4.4.3 No Action

The No Action alternative would have no adverse impact on geology and soils over current conditions.

4.5 Water Resources

4.5.1 Evaluation Criteria

Evaluation criteria for impacts on water resources are based on water availability, quality, and use; existence of floodplains; and associated regulations. The Proposed Action would be adverse if it does one or more of the following:

- Reduces water availability or supply to existing users
- Overdrafts groundwater basins
- Exceeds safe annual yield of water supply sources
- Affects water quality adversely
- Endangers public health by creating or worsening health hazard conditions
- Threatens or damages unique hydrologic characteristics
- Violates established laws or regulations adopted to protect water resources

4.5.2 Proposed Action

Groundwater and Surface Water

The groundwater and surface water systems that surround WPAFB are closely interconnected. Runoff contaminants that might result from construction and facility operations that would impact surface water quality could also impact groundwater quality. Therefore, they are analyzed together.

Since the Proposed Action would involve the disturbance of greater than one-acre of soil, contractors would be required to obtain a construction general permit NOI and prepare a SWPPP outlining pollution prevention measures to be used during construction. In addition, Section 438 of the Energy Independence and Security Act of 2007 (EISA) requires federal agencies developing or redeveloping facilities with footprints exceeding 5,000 sf must do so in a manner that maintains or restores the pre-development site hydrology to the maximum extent technically feasible with regard to temperature, rate, volume, and duration of storm water flow. As such, all DoD installations are to use low impact development techniques to implement EISA Section 438.

Proposed facility operations would involve the same types of hazardous materials that are already used on the AFIT campus. Refer to Section 4.13 for more detailed information regarding quantities of hazardous

materials associated with the Proposed Action. Although the Proposed Action would not pose any new risks, minor adverse effects on groundwater and surface water would still be possible in the event of a spill. Management plans are in place for hazardous or harmful materials should a spill occur.

The AFIT campus is outside wellhead protection areas and is not located within any travel time recharge areas (Tetra Tech 2007). The construction activities at AFIT are not anticipated to impact groundwater quality.

Floodplains

According to EO 11988, *Floodplain Management*, any new construction in the regulatory floodplain must apply accepted flood protection to reduce the risk of flood-associated damages; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. The elevation of the proposed construction site within Area B (935 to 950 ft, MSL) is well above the Mad River 100-year floodplain elevation (814.3 ft, MSL) and reduction of floodplain management capacity would not be impacted by construction at AFIT.

Construction of new AFIT buildings would create approximately 16-acres of parking lot and street area. However, the additional storm water runoff from the paved areas of the new construction would not be expected to impact floodplain management at the storm sewer outfall location in the Mad River. Therefore, any potential short-term or long-term impacts from the new construction on floodplain management would be minor. Impacts would be minimized by monitoring runoff as phases of the AFIT are built.

As part of the IICEP process for this EA, WPAFB requested input from MCD on the Proposed Action. MCD reviewed the Proposed Action for implementation of the AFIT Master Plan. The MCD concluded that the Proposed Action would have no impact on the retarding basin. Copies of correspondence with MCD are provided in **Appendix A**.

The project area is at an elevation range between 935 ft and 950 ft MSL, which is above the Mad River 100-year floodplain elevation of 814.3 ft MSL.

4.5.3 No Action

The No Action alternative would have no adverse impact on water resources.

4.6 Biological Resources

Biological resources that could be impacted by the Proposed Action include vegetation, wildlife, threatened and endangered species, and wetlands.

4.6.1 Evaluation Criteria

This section evaluates the potential impacts on the biological resources under the Proposed Action and the No Action Alternative. The level of impact on biological resources is based on:

- Importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource
- Proportion of the resource that would be affected relative to its occurrence in the region
- Sensitivity of the resource to the proposed activities
- Duration of ecological ramifications

The impacts on biological resources are adverse if species or habitats of high concern are negatively affected over relatively large areas. Impacts are also considered adverse if disturbances cause reductions in population size or distribution of a species of high concern.

As a requirement under the ESA, Federal agencies must provide documentation that ensures that agency actions do not adversely affect the existence of any threatened or endangered species. The ESA requires that all Federal agencies avoid “taking” threatened or endangered species (which includes jeopardizing threatened or endangered species habitat). Section 7 of the ESA establishes a consultation process with USFWS that ends with USFWS concurrence or a determination of the risk of jeopardy from a Federal agency project.

4.6.2 Proposed Action

WPAFB has been extensively altered over time and the project area is permanently disturbed with existing facilities and paved roads. Therefore, there would be no adverse effects on the biological resources resulting from implementation of the Proposed Action.

Vegetation

The project area is located in an area designated as “Improved Grounds”, which includes existing turf in developed areas containing lawns, landscaped areas, and road shoulders along main thoroughfares.

Proposed construction activities would occur solely within improved areas of the Base. There are no naturally occurring vegetation communities within the ROI of the proposed activities. Land disturbing activities associated with construction are limited to lawn and landscaped areas. Affected areas would be mulched and revegetated with native plants following the construction period to prevent non-native, invasive plant growth. Short-term, localized effects on vegetation could be expected in proximity to the construction sites. Therefore, negligible adverse effects on vegetation would be expected as a result of the implementation of the Proposed Action at WPAFB.

Wildlife

Wildlife habitat within the improved areas of the Base is limited due to fragmentation by the existing facilities, roads, and impervious surfaces at WPAFB. Furthermore, most of the area associated with the Proposed Action consists of disturbed, landscaped, paved, or mowed lands. Redevelopment activities

would not impact habitat available to the mammals, birds, or herptiles that occur at WPAFB. This assessment is based on the limited extent of areas that would be affected by the Proposed Action. Therefore, no adverse effects on wildlife would be expected to result from the Proposed Action.

Threatened and Endangered Species

As previously mentioned, there are several Federal- and state-listed threatened or endangered species as well as species of concern, candidate species, and potentially threatened species that have the potential to occur in proximity to the proposed project area. Short-term noise created during construction activities is not likely to affect threatened or endangered species due to the proximity of construction activities to these species.

No construction activities would occur within areas where threatened or endangered species have been documented or within their potential habitat. Therefore, there would be no effect on threatened or endangered species or species of concern, candidate species, and potentially threatened species as a result of the redevelopment associated with the Proposed Action on WPAFB.

The Proposed Action is not likely to jeopardize the continued existence of Federal- or state-listed threatened and endangered species on or in proximity to WPAFB. No adverse effects on threatened and endangered species would be expected as a result of the Proposed Action at WPAFB.

As part of the IICEP process for this EA, WPAFB requested input from USFWS on the Proposed Action. The USFWS responded in a letter dated March 28, 2011, stating the agency has no objection to the proposed project. Copies of correspondence with USFWS are provided in **Appendix A**.

Wetlands

Construction activities at WPAFB would not occur within the vicinity of the jurisdictional wetlands identified on the Base. Therefore, no effects on wetlands are expected at WPAFB as a result of the Proposed Action.

4.6.3 No Action

The No Action alternative would have no adverse impact on biological resources.

4.7 Cultural Resources

4.7.1 Evaluation Criteria

Adverse impacts on cultural resources might include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sell, transfer, or

lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

4.7.2 Proposed Action

There are no structures that would be affected by construction activities associated with the Proposed Action that are considered eligible for the NRHP. WPAFB notified the SHPO of a finding of no adverse effect to the Proposed Action. The SHPO response indicated that preparation of a Master Plan does not constitute an undertaking subject to Section 106 review. However, construction-related activity associated with carrying out the recommendation of such a plan does constitute an undertaking and WPAFB would need to coordinate with the SHPO at such time. Correspondence with the SHPO is included in **Appendix A**.

No NRHP-eligible or potentially eligible districts or landscapes are within the APE for the Proposed Action. Therefore, historic districts or landscapes would not be affected by the Proposed Action.

4.7.3 No Action

The No Action alternative would have no adverse impact on cultural resources.

4.8 Socioeconomics

4.8.1 Evaluation Criteria

Elements of the Proposed Action include nine construction/renovation projects and changes in the number of AFIT students and personnel. The level 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 might be unnoticed in an urban area, but might have adverse impacts in a rural region. If potential socioeconomic changes were to result in substantial shifts in population trends or in adverse effects on regional spending and earning patterns, they would be considered adverse.

This section identifies potential economic and social impacts that might result from the Proposed Action. The methodology for the economic impact assessment is based on the Economic Impact Forecast System (EIFS) developed by the DOD in the 1970s to efficiently identify and address the regional economic effects of proposed military actions (EIFS 2001). EIFS provides a standardized system to quantify the impact of military actions, and to compare various options or alternatives in a standard, non-arbitrary approach.

The EIFS assesses potential impacts on four principal indicators of regional economic impact: business volume, employment, personal income, and population. As a "first tier" approximation of effects and their significance, these four indicators have proven very effective. The methodology for social impacts

is based on the Guidelines and Principles for Social Impact Assessment, developed by an inter-organizational committee of experts in their field (National Oceanic and Atmospheric Administration (NOAA) 1994).

The Proposed Action at WPAFB would have an adverse impact with respect to the socioeconomic conditions in the surrounding MSA if it would:

- Change the local business volume, employment, personal income, or population that exceeds the MSA's historical annual change; and/or
- Negatively affect social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates.

4.8.2 Proposed Action

As part of the Proposed Action, a gain of 135 faculty are expected to be counted as AFIT personnel in addition to 100 students enrolled at AFIT, a net gain of 235 personnel. The proposed increase in personnel is minor in comparison to the approximately 27,406 personnel currently working at WPAFB and is expected to have a negligible effect on the local workforce.

Construction costs associated with the Proposed Action are estimated to be \$18.5 million through CY12, which would have a beneficial impact on the local economy. Construction workers would primarily be drawn from the local workforce, resulting in a short-term, beneficial direct impact on the local economy. Census data for the MSA found 24,578 employees working in the construction industry in 2000 (Bureau of Census 2000a). The number of construction workers required for the proposed construction projects is very small compared to the available work force in the MSA, and would not impact local employment.

Indirect effects are expected to be long-term and beneficial to local employment and the local economy. The Proposed Action would have no long-term effects on employment, population, personal income, poverty levels, or other demographic or employment indicators in the Dayton–Springfield MSA. The Proposed Action does not involve changes in off-Base land use or new development; therefore, no impacts on social conditions are anticipated.

In addition, EO 13045 requires that Federal agencies identify and assess environmental health and safety risks that might disproportionately affect children. The Proposed Action would not likely pose any adverse or disproportionate environmental health or safety risks to children living in the vicinity of the Base. The likelihood of the presence of children at the site where the Proposed Action would occur on Base is considered minimal, which further limits the potential for effects. Therefore, no adverse effects would be expected.

4.8.3 No Action

The No Action Alternative would have no adverse impact upon socioeconomics over current conditions.

4.9 Environmental Justice

4.9.1 Evaluation Criteria

This section evaluates environmental justice concerns to include disproportionate impacts on low-income or minority populations. The Proposed Action at WPAFB would have an adverse impact with respect to environmental justice in the surrounding MSA if it would disproportionately impact minority populations or low-income populations.

4.9.2 Proposed Action

As discussed in Section 3.9.1, the USAF has issued guidance on Environmental Justice analysis. To comply with EO 12898, ethnicity and poverty status 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. The review indicates that residents living within Census Bureau Tracts 2001, 2002, and 2007 have a lower per capita income, a higher unemployment rate, and a higher percentage of residents living below the poverty level than county or state averages (Bureau of Census 2000a). The review also indicates that the percentage of minority residents is somewhat higher than county or state averages.

Potential adverse effects from the new renovation/modification activities would occur on the Base, with no adverse effects anticipated off-Base. The environment around WPAFB is influenced by USAF operations, land management practices, vehicle traffic, and emissions sources outside the Base. Increased traffic from temporary renovation/modification activities would affect local air quality, but these short-term effects would be dispersed and affect area residents and Base employees equally. The proposed redevelopment of the AFIT campus would be performed by outside contractors with employees living within Greene County and the ROI. Long-term economic benefits would be minimal since the Proposed Action would require 235 more personnel at WPAFB.

No disproportionate short- or long-term effects on minority or low-income populations from the Proposed Action are anticipated.

4.9.3 No Action

The No Action Alternative would have no adverse impact over current conditions with respect to environmental justice.

4.10 Infrastructure

4.10.1 Evaluation Criteria

Impacts on infrastructure are evaluated for their potential to disrupt or improve existing levels of service and additional needs for energy and water consumption, sanitary sewer systems, and transportation patterns and circulation. Impacts might arise from physical changes to circulation, construction activities, 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.

4.10.2 Proposed Action

Transportation Systems

Temporary demolition, and construction-related activities associated with implementation of the Proposed Action are anticipated to produce short-term negligible adverse impacts on traffic generation, traffic volume, street use, and parking availability on-Base. It is estimated that the total personnel working on-site on demolition, construction, and infrastructure redevelopment activities would be approximately 25 workers at any one time. Although these contractors would complete predominantly short-term projects, the overall redevelopment of the AFIT campus is comprised of sequential phases that would overlap and are expected to continue through 2030.

The Proposed Action would affect traffic generation and street system usage on-Base over the short- and long-term. Increases in traffic volumes and adverse impacts to traffic flow on-site are likely due to additional traffic entering, leaving, and cycling throughout the AFIT campus as a result of contractors performing construction-related activities. In particular, there would be an overall increase in the volume of truck and (heavy) equipment traffic as a result of removal of debris during demolition, and delivery of building materials during redevelopment. Truck traffic for equipment would be episodic and dispersed over time.

On-Base operations would face short-term minor impacts as a result of increased traffic generation and elevated traffic volumes. Construction equipment would be driven to the project locations and would be kept on site during the duration of the project. All damaged Base transportation infrastructure from construction activities on the Base would be repaired.

In the long-term, the Proposed Action would result in minor beneficial impacts as current campus-wide parking issues would be addressed with increases in available parking spaces from the construction and operation of the proposed 300 additional parking spaces adjacent to the proposed AFIT Research Laboratory. Increases in parking spaces would result in minor reductions in traffic generation, with less AFIT employees cycling through the campus looking for available spaces. Another long-term, minor beneficial impact is expected from the realignment of Q Street to increase the campus area.

No long-term adverse impacts are anticipated. Therefore, negligible effects on transportation systems would be expected under the Proposed Action.

Electrical Power

The Proposed Action would result in a negligible, if any, net change in the electrical power system. Therefore, negligible adverse effects on the electrical power would be expected under the Proposed Action.

Natural Gas

The Proposed Action would result in a negligible, if any, net change in the natural gas system. Therefore, negligible adverse effects on natural gas demand would occur as a result of the Proposed Action.

Water Supply

The Proposed Action would result in a negligible increase of personnel and use of the water supply system resulting in a negligible increase in the demand for water. Therefore, there would be no negligible adverse effects on the water supply system as a result of the Proposed Action.

Pollution Prevention

It is anticipated that the Proposed Action would not affect the Pollution Prevention Program at WPAFB. Quantities of hazardous material and chemical purchases, off-Base transport of hazardous waste, disposal of MSW, and energy consumption would continue at levels similar to current levels.

Solid Waste

In considering the basis for evaluating the level of impacts on solid waste, several items are considered. These items include evaluating the degree to which the proposed construction/renovation projects would affect the existing solid waste management program and capacity of the area landfill.

Solid waste generated from the proposed construction activities would consist of building materials such as solid pieces of concrete, metals (conduit, piping, and wiring), and lumber. Contractors are required to recycle construction and demolition waste to the greatest extent possible as part of Base policy, and any recycled construction and demolition waste would be diverted from landfills.

Long-term changes in solid waste generation due to the operation of the renovated facilities and the decrease in personnel would be minor. Therefore, the Proposed Action would have a minor, adverse impact on the solid waste management program at WPAFB.

Sanitary Sewer and Wastewater Systems

The Proposed Action would result in a net change in the use of the sanitary sewer system due to the increase in personnel. However, this would have a minor affect on future use of the sanitary sewer system. Therefore, no adverse impacts on the sanitary sewer system would result because of the Proposed Action.

Heating and Cooling

The Proposed Action would not result in a net change in heating and cooling systems usage. Therefore, no adverse impacts on heating and cooling systems would result from the Proposed Action. However, any newly installed refrigerant-containing equipment must utilize only hydrofluorocarbon refrigerants.

Communications

The Proposed Action would not result in a net change in communications systems. Therefore, no adverse impacts on the communications system would result from the Proposed Action.

4.10.3 No Action

Under the No Action Alternative, there would be no change in baseline conditions and none of the proposed construction projects would occur. Therefore, there would be no impact on WPAFB's infrastructure.

4.11 Health and Safety

4.11.1 Evaluation Criteria

Impacts on health and safety are evaluated for their potential to jeopardize the health and safety of Base personnel as well as the surrounding public. Impacts might arise from physical changes in the work environment, construction activities, introduction of construction-related risks, and risks created by either direct or indirect workforce and population changes related to proposed Base activities.

USAF regulations and procedures promote a safe work environment and guard against hazards to the public. WPAFB programs and day-to-day operations are accomplished according to applicable USAF Federal and state health and safety standards. Most of the activities conducted on the AFIT campus are in classroom or office settings, consisting of primarily research and development with educational functions. These types of activities have minimal risk to the health and safety of personnel directly involved in these activities.

4.11.2 Proposed Action

Fire Hazards and Public Safety

No adverse effects regarding fire hazards or public safety would be expected to occur on Base from renovation/modification projects planned as part of the Proposed Action.

Construction Safety

Short-term minor adverse effects would be expected from proposed construction activities. Implementation of the Proposed Action would slightly increase the short-term risk associated with construction contractors performing work at WPAFB during the normal work day because of the increase in construction activities.

Contractors would be required to establish and maintain safety programs, and adhere to SOPs. Projects associated with the Proposed Action would not pose a safety risk to Base personnel or to activities at the Base. In addition, “digging clearances” would be obtained from Base Civil Engineering and Base Utilities prior to excavating soils and installing utility lines. Proposed redevelopment projects would enable AFIT to meet future mission objectives, and conduct or meet mission requirements in a safe operating environment.

Any potential adverse impacts to the health and safety of nearby personnel will be minimized by clearly identifying the construction zone and prohibiting access to unauthorized individuals. Use of cranes and other high-profile equipment will require a “spotter” when operating near any overhead hazards. To minimize vehicle accidents, construction personnel will direct heavy vehicles entering and exiting the site. WPAFB has also incorporated stringent safety standards and procedures into day-to-day operations. Therefore, no adverse effects are anticipated as a result of the Proposed Action due to safeguards existing to protect personnel.

4.11.3 No Action

The No Action alternative would have no adverse impact on safety at WPAFB.

4.12 Hazardous Materials and Wastes

4.12.1 Evaluation Criteria

Impacts to hazardous material management would be considered adverse if the Federal action resulted in noncompliance with applicable Federal and state regulations, or increased the amounts generated or procured beyond current WPAFB waste management procedures and capacities.

Impacts on pollution prevention would be considered adverse if the Federal action resulted in worker, resident, or visitor exposure to these materials, or if the action generated quantities of these materials beyond the capability of current management procedures. Impacts on the ERP would be considered adverse if the Federal action disturbed (or created) contaminated sites resulting in negative effects on human health or the environment. Impacts on fuels management would be adverse if the established management policies, procedures, and handling capacities could not accommodate the activities associated with the Proposed Action.

4.12.2 Proposed Action

Hazardous Materials

Products containing hazardous materials would be procured and used during the proposed redevelopment projects and subsequent operation of the facilities. It is anticipated that the quantity of products containing hazardous materials used during the construction of new facilities and modification of existing facilities would be minimal and their use would be of short duration. Contractors would be responsible for the management of hazardous materials, which would be handled in accordance with Federal and state

regulations. Therefore, hazardous materials management at WPAFB would not be impacted by the proposed construction activities.

Hazardous Wastes

It is anticipated that the quantity of hazardous wastes generated from proposed redevelopment activities would be negligible. Contractors would be responsible for the disposal of hazardous wastes in accordance with Federal and state laws and regulations. Construction of the proposed facilities would not impact the Base's hazardous waste management program.

It is anticipated that the volume, type, classifications, and sources of hazardous wastes associated with the Proposed Action would be similar in nature with the baseline condition waste streams. Hazardous waste would be handled, stored, transported, disposed of, or recycled in accordance with the WPAFB Hazardous Waste Management Plan. Therefore, it is anticipated that the Proposed Action would result in negligible adverse impacts to hazardous materials at WPAFB.

Asbestos-Containing Material and Lead-Based Paint

Specifications for the proposed renovation/modification activities and USAF regulations prohibit the use of ACM and LBP for new construction. Some of the facilities to be renovated/modified as part of the proposed project area of the AFIT may contain ACM and/or LBP. An environmental survey would need to be accomplished to identify any ACM that may be disturbed during construction. Interior demolition and modification activities would be handled in accordance with the Asbestos Management Plan, LBP Management Plan, and USAF policy. The potential for adverse impacts would be minor.

Environmental Restoration Program

No proposed building construction or renovation projects would be located within OU9 (**Figure 3-7**). In 1997, an RI was undertaken in OU9 to characterize the extent of environmental contamination to assess risks to human health and the environment and to develop, evaluate, and select appropriate remedial actions to mitigate adverse health effect, if required. Little soil contamination was detected during the site investigation phase at OU9 and EFDZ 5, 6, and 8 (nearest to AFIT) were designated for long-term groundwater monitoring only.

Groundwater, surface water, and sediment were also designated for evaluation under the Basewide Monitoring Program (BMP) at that time. The radioactive waste burial site located southwest of the AFIT campus was investigated in 1990 with results indicating the burial site was not used as a burial site for radioactive materials. It was used as a radioactive waste drum staging area in the 1950s. Soil samples from this area indicated naturally occurring radioactivity at background levels. It was concluded that this site did not pose health risks and that no further action was necessary.

Because the renovation and construction projects would not be conducted beyond AFIT, there would be no effects on OU9. There are no ERP or burial sites with located within the AFIT campus. The closest ERP sites to AFIT are a radioactive waste burial site and EFDZ 5 (**Figure 3-7**). No indications of elevated radiation were found at the Radioactive Waste Burial Site during a 1990 investigation (WPAFB 1992) whereby soil sample data from excavations indicated that the site was not used as a burial site for radioactive materials and no indication of environmental contamination resulted. Soil samples from the site showed only naturally occurring radioactivity at background levels. Because the environment was not impacted by activities at the site, it was concluded that this site does not pose health risks and that no further action was necessary.

An RI of EFDZ 5 was completed in 1997 that characterized the extent of environmental contamination and assessed risk to human health and the environment (IT 1997a). Little soil contamination was detected during the site investigation and EFDZ 5 was designated for long-term groundwater monitoring. There has been no comprehensive groundwater monitoring program for the OU9 area since the 1997 characterization. The construction and renovation projects at AFIT would not occur within EFDZ 5.

Under the Proposed Action, construction and renovation projects would be limited to AFIT and there would be no adverse impacts to ERP sites.

4.12.3 No Action

The No Action alternative would have no adverse impact on hazardous materials storage and waste generation.

4.13 Cumulative Impacts

The CEQ regulations (40 CFR 1508.7) require assessment of cumulative impacts in the decision-making process for federal projects. 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 foreseeable future.

Projects proposed for the reasonably foreseeable future that are relevant to the project area include the following ancillary projects for 445 AW facilities in Areas A and B at WPAFB.

Overlay Hangar Parking Area – Proposed plans include removing damaged concrete, providing asphalt overlay, and restriping the parking area in Area A.

Convert Sprinklers to Wet Pipe in Buildings F/34007, F/34016, and F/34015 – Proposed activities consist of converting existing sprinkler system from pre-action to wet pipe in Area A.

Construct Composites Workroom in Building F/34026 – Proposed project in Area A consists of modifying the interior of existing shop facility (F34026) by (1) installing a prefabricated clean room with a self-contained heating, ventilation, and air conditioning system; (2) providing lighting, power and oil-free dry nitrogen; and (3) providing a 12-ft by 12-ft roll-up door.

Renovate Building F/34066 – This project proposes to renovate existing Facility 34066 in Area A, a former munitions shop, for assembly of replaceable countermeasure flare kits. Proposed activities include replacing doors and install low slope curbs at rolling doors; installing and replacing various lights and lighting fixtures; replacing explosion-proof receptacles; cleaning and painting restrooms and office area; and replacing a rain gutter.

Maintain Finishes at Wing HQ in Building F/34010 – Proposed project in Area A includes replacing carpet and repainting walls.

Maintain Finishes at Wing HQ in Building F/34012 – Proposed project in Area A includes replacing carpet.

Repair Roof in Building F/34024 – Proposed project in Area A includes replacing the roof with standing seam metal roof including cross supports onto existing rafters; and installing underground drains for downspouts, including surface drains to divert rainwater.

Human Systems Wing – Currently an active construction project in Area B located north of the AFIT campus.

Information Technology Center – Proposed new construction project in Area B located west of the AFIT campus.

These projects, should they be constructed as anticipated, are not expected to result in any cumulative impacts associated with the Proposed Action.

In addition, two other proposed projects could occur in Area A. First, the proposed replacement of the primary runway in Area A would not occur in the project area. The expansion of easements associated with the glide-slope corridor would also be evaluated in Area A. Second, an EIS is being prepared to evaluate impacts associated with the proposed reconfiguration of Entry Control Facilities at Gates 15A, 1A, and 26A, and changes to traffic flow in SR 444. This project would not be expected to impact the construction or renovation projects at AFIT.

4.14 Unavoidable Adverse Effects

Unavoidable adverse impacts would result from implementation of the Proposed Action.

Noise. The noise resulting from construction activities and construction equipment is an unavoidable condition. Although construction noise would occur under the Proposed Action, the noise would be temporary and would cease upon completion of the construction and renovation project. Noise is not considered an adverse impact.

Safety. The potential for worker safety mishaps is an unavoidable condition associated with the Proposed Action. However, the potential for this unavoidable situation would not increase over baseline conditions.

Energy. The use of nonrenewable resources is an unavoidable occurrence, although this use is negligible compared with total use of energy. The Proposed Action would require the use of fossil fuels, a nonrenewable natural resource. Energy supplies, although relatively small, would be committed to the Proposed Action or No Action alternative.

Geology and Soils. Under each Proposed Action, construction activities such as grading, excavating, and re-contouring of the soil, would result in soil disturbance. Implementation of BMPs during construction would limit potential impacts resulting from construction activities. Standard erosion control means would also reduce potential impacts related to these characteristics.

Biological Resources. Site grading associated with construction projects would remove minimal vegetation and associated small animal life now occupying and utilizing the affected areas. The affected sites are already heavily disturbed and do not presently provide suitable habitat for many species.

4.15 Relationship of Short-Term Uses and Long-Term Productivity

Short-term uses of the biophysical components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occur over a period of less than five years. Long-term uses of human environment include those impacts occurring over a period of more than five years, including permanent resource loss.

The Proposed Action would not result in intensification of land use at WPAFB or the surrounding area. Development of the Proposed Action would not represent a loss of open space. Therefore, it is anticipated that the Proposed Action would not result in any cumulative land use or aesthetic impacts. Long-term productivity of this site would be increased by the implementation of the Proposed Action.

In the short-term, the implementation of the Master Plan would affirm AFIT's mission at WPAFB and provide a physical framework for implementing this mission over the next 20 years. The Proposed

Action would result in long-term productivity because the implementation of the Master Plan would sustain the AFIT mission.

4.16 Irreversible and Irretrievable Commitments of Resources

The irreversible environmental changes that would result from implementation of the Proposed Action involve the consumption of material resources, energy resources, land, biological habitat, and human resources. The use of these resources is considered to be permanent.

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame (e.g., energy and minerals).

Material Resources. Material resources used for the Proposed Action include building materials (for construction of facilities), concrete and asphalt (for roads), and various material supplies (for infrastructure). Most of the materials that would be consumed are not in short supply and would not limit other unrelated construction activities.

Energy Resources. Energy resources used for the Proposed Action would be irretrievably lost. These include petroleum-based products, such as gasoline, jet fuel, diesel, natural gas, and electricity. During construction, gasoline and diesel would be used for the operation of construction vehicles. During operation, gasoline would be used for the operation of private and government-owned vehicles. Natural gas and electricity would be used by operational activities. Consumption of these energy resources would not place an overburdening demand on their availability in the region.

Biological Habitat. The Proposed Action would not result in the loss of vegetation or wildlife habitat on proposed construction sites. Proposed construction is occurring on already disturbed land that is classified as industrial use. Furthermore, the Proposed Action would not remove open space or undeveloped land currently functioning as biological habitat.

Human Resources. The use of human resources for construction and operation 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.

THIS PAGE INTENTIONALLY LEFT BLANK

5.0 LIST OF PREPARERS

This EA has been prepared under the direction of the Planning and Real Estate Section of the Optimization Branch in the Asset Management Division (88 ABW/CEAOR). The individuals who contributed to the preparation of this document are listed below.

Stephanie Burns

Shaw Environmental & Infrastructure, Inc
NEPA Specialist
M.P.A. Environmental Management
B.S. Natural Resources and Environmental Science
Years of Experience: 15

Rachel Crum

Shaw Environmental & Infrastructure, Inc.
Air Quality
Bachelor of Chemical Engineering
Years of Experience: 1

James Denier

Shaw Environmental & Infrastructure, Inc
Project Manager, Sr. NEPA Specialist
M.B.A. Business Management
B.A. Biological Sciences
Years of Experience: 30

Cynthia Hassan

Shaw Environmental & Infrastructure, Inc
Sr. NEPA Specialist
M.P.H. Epidemiology
B.S. Medical Technology
Years of Experience: 28

Randy Patrick

Shaw Environmental & Infrastructure, Inc
Air Quality
B.S. Chemical Engineering
M.S. Chemical Engineering
Years of Experience: 33

Gregory Plamondon

Shaw Environmental & Infrastructure, Inc
Geology, Soils, Water Resources,
Installation Restoration Program
Bachelor of Engineering, Hydrology
Years of Experience: 21

Timothy Rust

Shaw Environmental & Infrastructure, Inc.
Air Quality
B.S. Electrical Engineering
Years of Experience: 17

William Scoville

Shaw Environmental & Infrastructure, Inc.
Senior Review
M.S. Civil Engineering
B.S. Earth and Engineering Sciences
Years of Experience: 25

THIS PAGE INTENTIONALLY LEFT BLANK

6.0 LIST OF PERSONS CONTACTED

Several persons were contacted or consulted during the preparation of the EA. The persons contacted are listed below:

<u>Name</u>	<u>Role</u>	<u>Affiliation</u>
Karen Beason	EIAP Manager	88 ABW/CEAOR
Elizabeth (Libby) Domingue	Storage Tank Compliance/Spill Prevention Manager	88 ABW/CEANQ
Gary P. Downen	Toxics Program Manager	88 ABW/CEANP
Justin Cook	Resource Protection and Review	Ohio Historic Preservation Office
Roxanne Farrier	Floodplain Issues	Miami Conservancy District
Mary Knapp	Threatened and Endangered Species	U.S. Fish and Wildlife Services
Kurt Rinehart	Floodplain Issues	Miami Conservancy District
Daniel Rohrbach	Chief, Facility Management	AFIT
Darryn Warner	Natural Resources Program Manager	88 ABW/CEANQ
Debbie Woischke	Natural Resources	Ohio Department of Natural Resources; Division of Natural Areas & Reserves; Columbus, Ohio
Paul Woodruff	Cultural Resources Program Manager	88 ABW/CEANQ

THIS PAGE INTENTIONALLY LEFT BLANK

7.0 REFERENCES

- AFCEE 2009 U.S. Air Force Center for Engineering and the Environment (AFCEE). 2009. *Air Emissions Factor Guide to Air Force Mobile Sources*. December 2009.
- Arbor Day 2010 Arbor Day Foundation. 2010. Tree City USA. <<http://www.arborday.org/programs/treecityusa/>>. Accessed November 19, 2010.
- ATC 1988 ATC Associates, Inc. (ATC). 1988. Base Wide Asbestos Survey – Buildings 20640 and 20641. January 11 and January 12, 1988.
- BHE 1999 Wetland Inventory of Wright-Patterson Air Force Base.
- BHE 2001 BHE. 2001. Endangered Species Management Plan for Wright-Patterson Air Force Base, Ohio.
- BHE 2005 Wetland Management Plan for Wright-Patterson Air Force Base, Ohio.
- Bureau of Census 1990 U.S. Bureau of Census. 1990. American Fact Finder. <<http://www.factfinder.census.gov>>. Accessed October 26, 2010.
- Bureau of Census 2000a U.S. Bureau of Census. 2000. American Fact Finder. <<http://www.factfinder.census.gov>>. Accessed October 26, 2010.
- Bureau of Census 2000b U.S. Bureau of Census. 2000. American Fact Finder Glossary. <http://www.factfinder.census.gov/home/en/epss/glossary_m.html>. Accessed October 26, 2010.
- DACC 2010 Dayton Area Chamber of Commerce. 2010. Dayton Area Economic Indicators. <http://www.daytonchamber.org/files/economic_indicators_September_2010.pdf>. Accessed October 13, 2010.
- Debrewer et al. 2000 Debrewer, L.M., G.L. Rowe, D.C. Reutter, R.C. Moore, J.A. Hambrook, and N.T. Baker. 2000. "Environmental setting and effects on water quality in the Great and Little Miami River basins, Ohio and Indiana." U.S. Geological Survey Water-Resources Investigations Report 99-4201. <<http://in.water.usgs.gov/newreports/miami/miami.pdf>>. Accessed February 2, 2004.
- EIFS 2001 Economic Impact Forecast System (EIFS). 2001. Draft EIS Version 6 User Manual prepared by Katherine Bragdon and Ron Webster. August 15, 2001.
- ES 1982 Engineering Science (ES), 1982. *Installation Restoration Program, Phase I Records Search*, Wright-Patterson Air Force Base, Ohio.
- ES 1989 ES, 1989. *Installation Restoration Program, Final Site Investigation Part 1 Report on Eight Earthfill Disposal Zones*, Wright-Patterson Air Force Base, Ohio.
- Hansen 2002 Hansen, Michael C. 2002. *Earthquakes in Ohio*. Education Leaflet No. 9. State of Ohio, Department of Natural Resources, Division of Geological Survey. Revised Edition 2002. <<http://www.dnr.state.oh.us/geosurvey/pdf/el09.pdf>>. Accessed March 1, 2004.
- IT 1994 IT Corporation (IT), 1994. *Draft-Final Site Specific Work Plan for Remedial Investigation and Feasibility Study* Wright-Patterson Air Force Base, Ohio, Operable Unit 9.
- IT 1997a IT, 1997. *Final Remediation Investigation Report*, Wright-Patterson Air Force Base, Operable Unit 9, September 1997.
- IT 1997b IT, 1997. *Draft Ecological Risk Assessment Technical Memorandum*, Wright-Patterson Air Force Base, Ohio, 18 December.

IT 1998	IT, 1998. <i>Draft-Final Engineering Evaluation/Cost Analysis, Groundwater Basewide Monitoring Program, Evaluation of Remedies for Groundwater Operable Unit</i> , Wright-Patterson Air Force Base, Ohio. 29 May.
IT 1999	IT Corporation (IT), 1999. <i>Final Engineering Evaluation /Cost Analysis, Groundwater Basewide Monitoring Program</i> , Wright-Patterson Air Force Base, Ohio. March 31.
MCD 2002	Miami Conservancy District (MCD). 2002. <i>State of the Upper Great Miami Subwatershed</i> .
NOAA 1994	National Oceanic and Atmospheric Administration (NOAA). 1994. "Guidelines and Principles for Social Impact Assessment." <i>The Interorganizational Committee on Guidelines and Principles for Social Impact Assessment</i> . U.S. Department of Commerce, Technical Memorandum NMFS-F/SPO-16.
OEPA 2004	OEPA. 2004. <i>Final Title V Chapter 3745-77 Permit for Facility ID: 08-29-70-0441, Wright-Patterson Air Force Base</i> . January 2004.
OEPA 2009	OEPA. 2009. <i>Total Maximum Daily Loads for the Mad River Watershed. Final Report</i> . December 18, 2009.
OEPA 2010	OEPA. 2010. <i>Integrated Water Quality Monitoring and Assessment Report</i> . Draft for Public Comment. March 8, 2010.
SAIC 1993	Science Applications International Corporation (SAIC), 1993. <i>U.S. Air Force Site Investigation at Wright-Patterson Air Force Base, Ohio, Final Site Investigation Report for 16 IRP Sites, Dayton, Ohio</i> .
Tetra Tech 2007	Tetra Tech, Inc. 2007. <i>Drinking Water Source Protection Plan, Wright-Patterson Air Force Base</i> . 2007.
3D Environmental 1998	3D Environmental. 1998. Surveys for rare plant and wildlife species within the Mad River corridor at Wright-Patterson Air Force Base, Ohio. Unpublished technical report prepared for Wright-Patterson Air Force Base, 88 th Air Base Wing, Office of Environmental Management, WPAFB, Ohio.
USAF 1999	USAF. 1999. "Air Installation Compatible Use Zone (AICUZ) Handbook." Air Force Handbook 32-7084, Base Comprehensive Planning. Head-quarters, U.S. Air Force Directorate of Logistics and Engineering: U.S. Air Force Center for Environmental Excellence, Brooks Air Force Base, Texas. March 1999.
USDA-SCS 1978	U.S. Department of Agriculture (USDA) – Soil Conservation Service (SCS). 1978. <i>Soil Survey of Greene County, Ohio</i> , in cooperation with Ohio Department of Natural Resources and Ohio Agricultural Research and Development Center.
USDOT 1980	U.S. Department of Transportation (USDOT). 1984. "Airport Noise Compatibility Planning; Development of Submission Aircraft Operator's Noise Exposure Map and Noise Compatibility Program; Final Rule and Request for Comments." 14 CFR Parts 11 and 150. <i>Federal Register</i> 49(244). December 18, 1980.
USEPA 1974	USEPA. 1974. <i>Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety</i> . EPA 550/9-74-004. March 1974.
USEPA 1998	USEPA. 1998. <i>Emissions Factors & AP 42 for Mineral Products Industry</i> . AP 42, Fifth Edition, Volume 1, Chapter 11, Section 9 and 19. October 1998.

USEPA 2006 U.S. Environmental Protection Agency (USEPA). 2006. *Emissions Factors & AP 42 Miscellaneous Sources*. AP 42, Fifth Edition, Volume 1, Chapter 13, Section 2. November 2006.

USEPA 2007 USEPA. 2007. Mad River Total Maximum Daily Loads for Sediment and Turbidity. <http://oaspub.epa.gov/tmd/waters_list.tmdl_report?p_tmdl_id=33884>. Accessed November 2010.

USGS 2008 U.S. Geological Survey (USGS). 2008. "Seismic Hazard Map of Conterminous U.S." <<http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps>>. Accessed October 2008.

USGS 2010 USGS. 2010. Historic Earthquakes in Western Ohio. <http://earthquakes.usgs.gov/earthquakes/states/events/1937_03_09.php>. Accessed November 2010.

Weston 1985 Weston, Roy F. 1985. *Installation Restoration Program, Final Report, Phase II Stage 1 Study*, Wright-Patterson Air Force Base. 1985

Weston 1989 Weston, Roy F. 1989. *Installation Restoration Program Stage 2 Report*, Wright-Patterson Air Force Base. 1989.

WPAFB 1992 WPAFB, 2750 ABW/EMR. 1992. *Decision Document – Radioactive Waste Burial Site*, Wright-Patterson Air Force Base, Ohio. 24 February.

WPAFB 1995a WPAFB, 88 ABW. 1995. *Air Installation Compatible Use Zone (AICUZ) Study of Wright-Patterson Air Force Base*.

WPAFB 1995b WPAFB, 88 ABW/EME. 1995. *Final Site-Wide Characterization Report at Wright-Patterson Air Force Base*. Prepared by ICI and SAIC. March 3, 1995.

WPAFB 1998 WPAFB. 1998. *Environmental Assessment, Construction of Child Development Center, WPAFB, Ohio*. June 29, 1998.

WPAFB 1999 WPAFB. 1999. *Final Environmental Assessment of the Development of the Bass Lake Recreational Area*. Wright-Patterson Air Force Base, Ohio. October 29.

WPAFB 2001 WPAFB, Aeronautical Systems Center. 2001. *General Plan for Wright-Patterson Air Force Base*. May 2001.

WPAFB 2005 WPAFB, 2005. *Oil and Hazardous Substance Integrated Contingency Plan*, Change 2, July 2005.

WPAFB 2006 WPAFB, 88 ABW/CEVO. 2006. *Final Cultural Resources Management Plan at Wright-Patterson Air Force Base*. Prepared by IT Corporation. May 2006.

WPAFB 2007a WPAFB, 2007a. *Integrated Natural Resource Management Plan 2007-2011*, February 2007.

WPAFB 2007b WPAFB, 2007b. *Stormwater Pollution Prevention Plan*. July 2007.

WPAFB 2007c WPAFB, 2007c. *Installation Restoration Management Plan*. March 2007.

WPAFB 2008a WPAFB, 2008c. *Installation HAZMAT Management Program Plan*, July 2008.

WPAFB 2008b WPAFB, 2008d. *Hazardous Waste Management Plan*, April 2008.

WPAFB 2008c WPAFB, 2008e. *Spill Prevention Control and Countermeasure Plan*, February 2008.

WPAFB 2009a WPAFB. 2009. "Awarded Tree City USA for the 12th Year". April 2009. <<http://www.wpafb.af.mil/news/story.asp?id=123145907>>. Accessed November 19, 2010.

- WPAFB 2009b WPAFB, 2009. *Economic Impact Analysis*, 2009.
- WPAFB 2010 Personal communication between Mr. William (Marty) Curtis (88 ABW/SEW) and Ms. Stephanie Burns (Shaw Environmental & Infrastructure, Inc.) concerning explosives safety zones. January 2011.
- WPAFB 2011 WPAFB, 2011. *Final Environmental Assessment for the C-17 Aircraft Conversion* at Wright-Patterson Air Force Base. January 2011.

Appendix A

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) Correspondence



Shaw Environmental, Inc.

Shaw Environmental, Inc.

5050 Section Avenue
Cincinnati, OH 45212-2025
513.782.4700
Fax: 513.782.4807

January 20, 2011

Ms. Debbie Woischke
Ohio Department of Natural Resources
Division of Wildlife
Ohio Biodiversity Database Program
2045 Morse Road, Building G-3
Columbus, Ohio 43229-6693

Subject: Rare Species Data Request and Informal Consultation
Environmental Assessment of AFIT Master Plan
Wright-Patterson Air Force Base, Ohio

Dear Ms. Woischke:

The purpose of this letter is to request information from the National Heritage Program for State and Federally-listed threatened or endangered plants and animals in the vicinity of Area B at Wright-Patterson Air Force Base (WPAFB). The Air Force Institute of Technology (AFIT) is proposing to implement a Master Plan that would affirm AFIT's mission at WPAFB over the next 20 years.

We are currently preparing an Environmental Assessment (EA) under contract to WPAFB, which will address potential impacts associated with implementation of the Master Plan. The intent of the EA is to satisfy requirements under the National Environmental Policy Act (NEPA) of 1969. We are requesting the locations of known populations of rare, threatened and endangered species within a one mile radius of this project site as part of this assessment. For the Indiana bat, we are requesting information within a five-mile radius. We would also like to request informal consultation regarding possible impacts of this proposed project on species listed as threatened or endangered.

The proposed location for this project is shown on the enclosed maps. Construction activities under the Proposed Action would include new construction, demolition of existing facilities, and renovation/modification of existing education and research facilities at WPAFB to support AFIT's mission.

The EA prepared for the AFIT Master Plan is anticipated to result in a Finding of No Significant Impact (FONSI).

Proposed activities would include:

- Construction of a new 57,199 square foot (sf) research laboratory and 151 parking spaces adjacent to this facility,

- Addition to the existing AFIT library totaling 39,267 sf,
- Improvements to the existing Academic Facility (Building 20642) totaling 35,607 sf,
- Redesign of the north entry court,
- Redesign/construction of the green space quadrangle,
- Construction of a new 300-space parking lot on the north side of campus east of Hobson Way,
- Road realignment of Q Street,
- New steam pipe lines in Building 20640, and
- Update/upgrade site utilities.

Under the No-Action Alternative, current programs and projects would continue to develop as planned and the action proposed in this EA would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped. The No-Action Alternative does not provide a framework for renewing AFIT infrastructure that would help meet future planning goals. AFIT facilities would be planned on a site-by-site basis, and research, operational, and administrative space would continue to be inadequate. AFIT would not have a plan to reach sustainability goals, and conservation efforts would continue to be unconsolidated. The No-Action Alternative would not fulfill the master planning objectives.

The geographic location of the proposed project area is Greene County, Bath Township, Section 12, Township 2E, Range 7N (Figure 1). The area of the proposed construction, demolition, and renovation activities in and around the AFIT campus is located in the east-central portion of Area B, approximately, 750 feet from the east perimeter of the base, along National Road between Gates 19B and 22B. The AFIT campus is located southeast of Hobson Way and Tenth Street. The elevation of the AFIT campus is approximately 970 ft MSL. While the proposed area would undergo construction, demolition, and renovation, the current configuration of this area would not change dramatically (Figure 2).

Natural resources in the vicinity of the project area include a 0.5 acre isolated wetland (approximately 750 feet west of the AFIT campus), Hebble Creek (north of the area), and a small wooded area to the northeast. The proximity of the project area with respect to habitat for threatened and endangered species as well as wetlands in Area B is shown in Figure 3. Given that the construction, demolition, and renovation work would be confined to existing buildings and previously disturbed areas, no impacts to natural resources would be anticipated.

The form for our Data Request has been attached. We would appreciate any information from your database that applies to our project area. Please let us know if you concur with the no effect determination. Due to our schedule for this project, we would appreciate your response in two weeks. Please contact me at 720/554-8274 or by e-mail at Jim.Denier@shawgrp.com if you have any questions. Thank you for your consideration.

Sincerely,

SHAW ENVIRONMENTAL & INFRASTRUCTURE, INC.

A handwritten signature in black ink, appearing to read "J. Denier", with a long horizontal flourish extending to the right.

James A. Denier
Project Manager

cc: K. Beason (88 ABW/CEAOR, WPAFB)

Enclosures: USGS Quadrangle Map
 GIS Figure
 Threatened & Endangered Species/Wetlands Map
 Ohio Biodiversity Database Program Data Request Form

DATA REQUEST FORM

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
OHIO BIODIVERSITY DATABASE PROGRAM
2045 MORSE RD., BLDG. G-3
COLUMBUS, OHIO 43229-6693
PHONE: 614-265-6452; FAX: 614-267-3096

INSTRUCTIONS:

Please complete both sides of this form, sign and return it to the address or fax number given above along with: (1) a brief letter describing your project, and (2) a map detailing the boundaries of your project site. A copy of the pertinent portion of a USGS 7.5 minute topographic map is preferred but other maps are acceptable. Our turnaround time is two weeks, although we can often respond more quickly. If you fax in your request you do not need to mail the original unless otherwise requested.

FEES:

As of June 2010, we have temporarily suspended charging a fee until a review of the data request process has been completed.

WHAT WE PROVIDE: The Biodiversity Database is the most comprehensive source of information on the location of Ohio's rare species and significant natural features. Records for the following will be provided: plants and animals (state and federal listed species), high quality plant communities, geologic features, breeding animal concentrations and unprotected significant natural areas. We also provide locations for managed areas including federal, state, county, local and non-profit sites, as well as state and national scenic rivers. A minimum one mile radius around the project site will automatically be searched. Because the data is sensitive information, it is our policy to provide only the data needed to complete your project.

Date: January 20, 2011

Company name: Shaw Environmental & Infrastructure, Inc.

Name of person response letter should be addressed to: Mr. X Ms.

James A. Denier, Sr. Environmental Planner / Project Manager

Address: 7604 Technology Way, Suite 300

City/State/Zip: Denver, Colorado 80237

Phone: 720/554-8274 Fax: 720/554-8299

E-mail address: jim.denier@shawgrp.com

Project Name: Environmental Assessment, Air Force Institute of Technology (AFIT) Master Plan, Wright-Patterson AFB, Ohio

Project Number: _____

Project Site Address: AFIT Campus, Area B, Wright-Patterson Air Force Base

Project County: Greene

Project City/Township: Fairborn / Bath Township

Project site is located on the following USGS 7.5 minute topographic quad(s): _____

Fairborn Quad, Section 12, Range 7N, Township 7N

Description of work to be performed at the project site: New construction, demolition of existing facilities, and renovation/rehabilitation of existing education and research facilities at WPAFB to meet the needs of growth of students and personnel.

How do you want your data reported? (Both formats provide exactly the same data. The only difference is in the format of our response. The manual search is most appropriate for small scale projects or for those who do not have GIS capabilities. Please choose only one option.)

Printed list and map (manual search) X OR GIS shapefile (computer search) _____

Additional information you require: For the Indiana bat, include information with a five-mile radius.

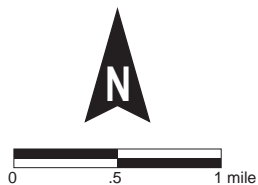
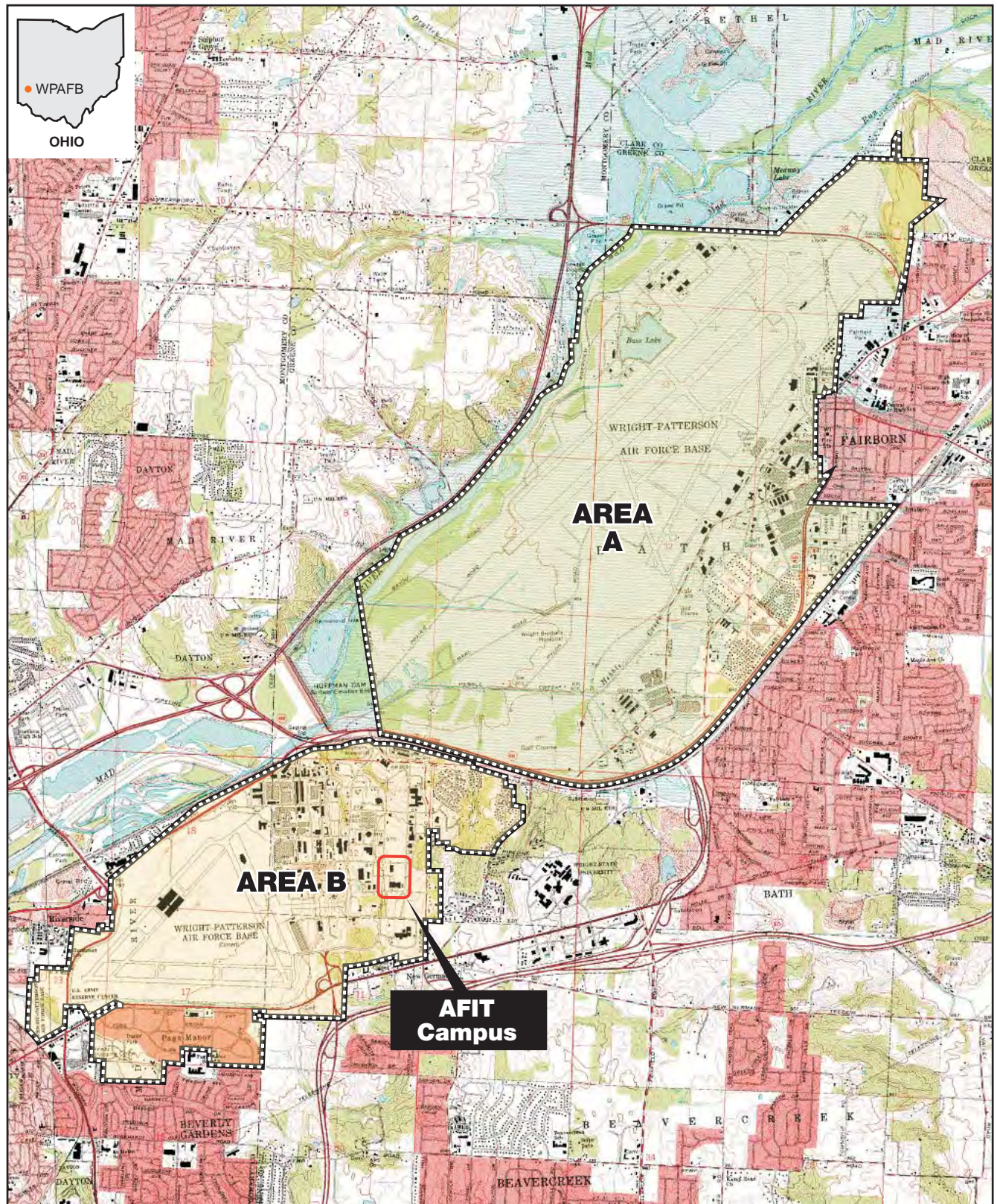
How will the information be used? The name, status and location of each species will be published in an environmental assessment that is being performed to satisfy requirements under the National Environmental Policy Act (NEPA).

I certify that data supplied by the Ohio Biodiversity Database Program will not be published without crediting the ODNR Division of Wildlife as the source of the material. In addition, I certify that electronic datasets will not be distributed to others without the consent of the Division of Wildlife, Ohio Biodiversity Program.

Signature: 

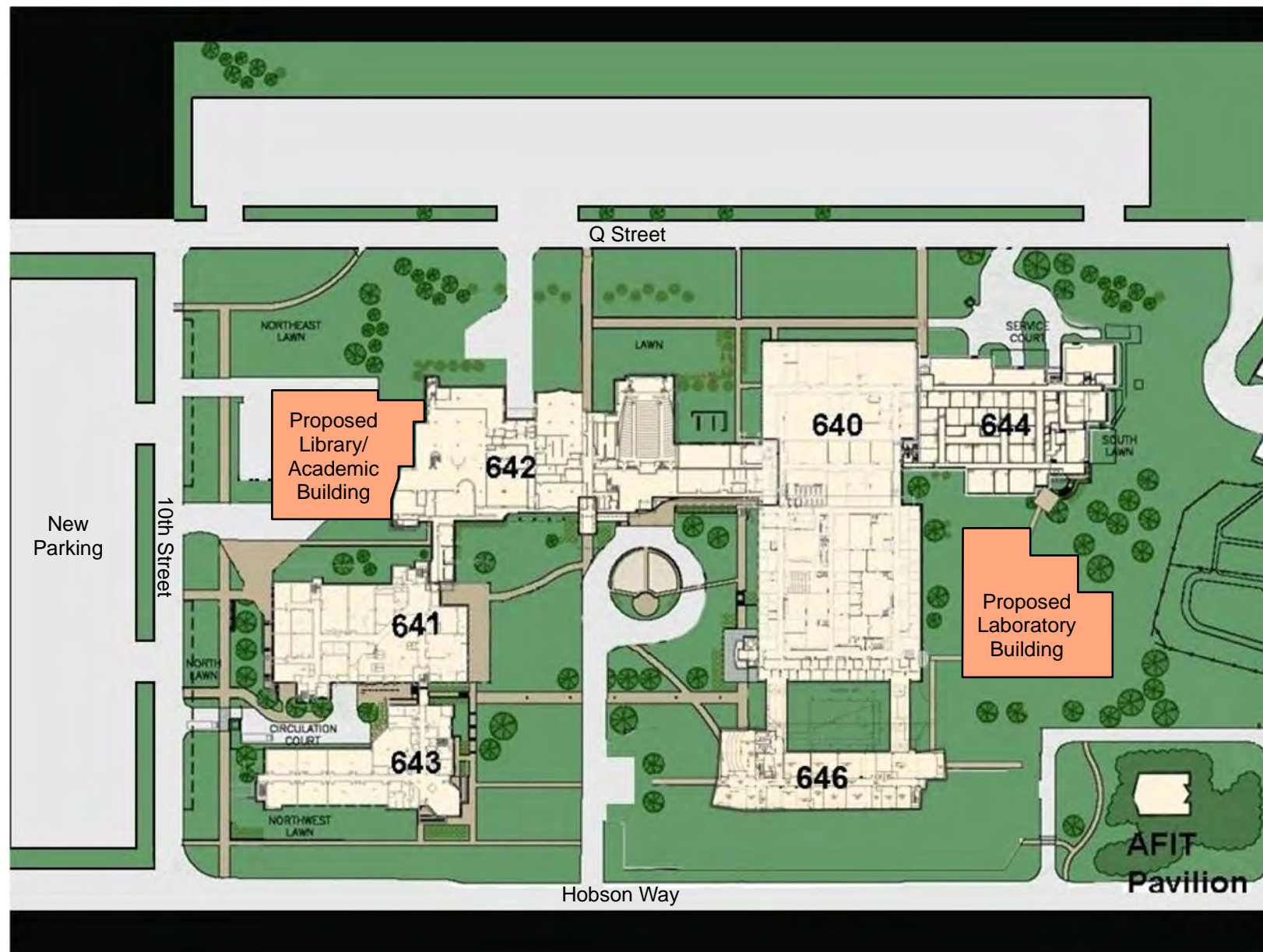
Date: 20 January 2011

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	12/8/10	--	JIS	CH	CH	s-140578.0501-12/10-W



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

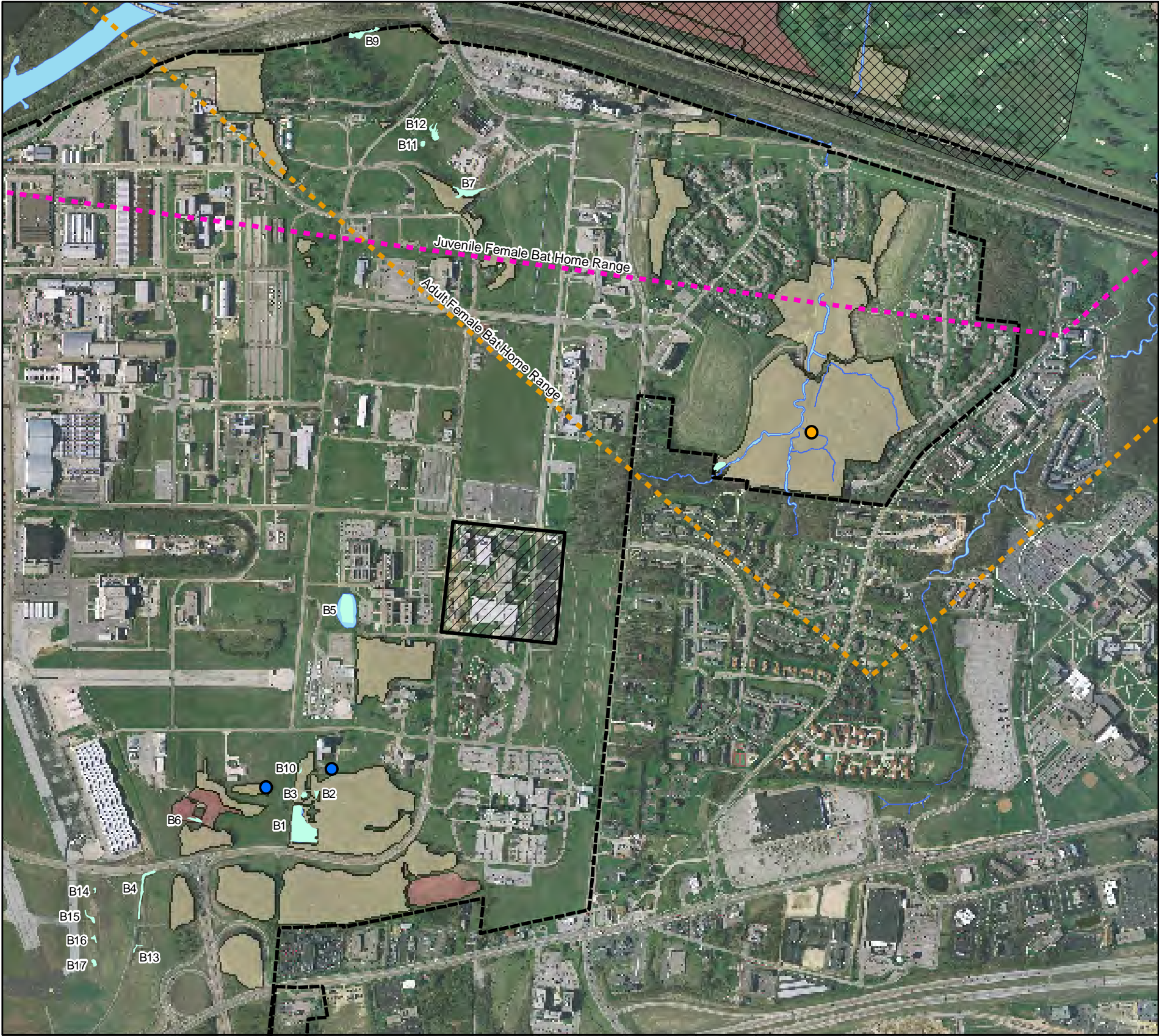
Figure 1
Location of WPAFB and
Surrounding Area







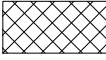
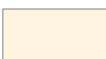





Wright-Patterson Air Force Base, Ohio

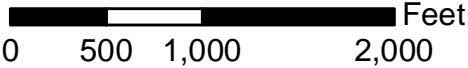
Figure 2

Proposed Building Site Plan Detail



Legend

-  AFITCampus
-  WPAFB Boundary
-  SURFACE WATER
-  Wetlands
-  Primary Habitat for the Eastern Massasauga Rattlesnake
-  Habitat Potentially Suitable for Roosting Indiana Bats
-  Home Range of Adult Female Indiana Bat
-  Home Range of Juvenile Female Indiana Bat
-  Potentially Suitable Habitat for the Blazing Star Stem Border Habitat
-  Pigeon Grape
-  Radiate Sedge



WRIGHT-PATTERSON
AIR FORCE BASE,
OHIO

Figure 3
Threatened and Endangered Species and
Wetlands Location in Area B



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

DAVID MUSTINE, DIRECTOR

Ohio Division of Wildlife

Office of the Chief
2045 Morse Rd., Bldg. G
Columbus, OH 43229-6693
Phone: (614) 265-6300

January 28, 2011

James Denier
Shaw Environmental & Infrastructure, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

Dear Mr. Denier:

I have reviewed our Biodiversity Database for the Air Force Institute of Technology Master Plan project area, including a one mile radius, at Wright Patterson Air Force Base in Fairborn, Greene County, Ohio, and on the Fairborn Quad. The search also included a five mile radius for the Indiana Bat (*Myotis sodalis*), state endangered and federal endangered. The numbers/letters on the list below correspond to the areas marked on the accompanying map. Common name, scientific name and status are given for each species.

Fairborn Quad

1. Huffman Metro Park – Five Rivers Metro Parks
2. *Myotis sodalis* – Indiana Bat, state endangered, federal endangered (5 sites)

In addition to the species given in the list above, there is a record for the Eastern Massasauga (*Sistrurus catenatus*), endangered, within your project study area. Please be aware that we do not give out specific location data for this sensitive species so it is not included in the list above. If the appropriate habitat exists directly within your project area, we request that you consult a professional herpetologist (approved by the Division of Wildlife) to determine whether a survey for this species needs to be performed. If the herpetologist determines that the presence of the Eastern Massasauga is highly unlikely, the project is not likely to have a negative impact to the species.

We are unaware of any geologic features, animal assemblages, scenic rivers, state wildlife areas, nature preserves, parks or forests or national wildlife refuges, parks or forests within a one mile radius of the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Please note that although we inventory all types of plant communities, we only maintain records on the highest quality areas.

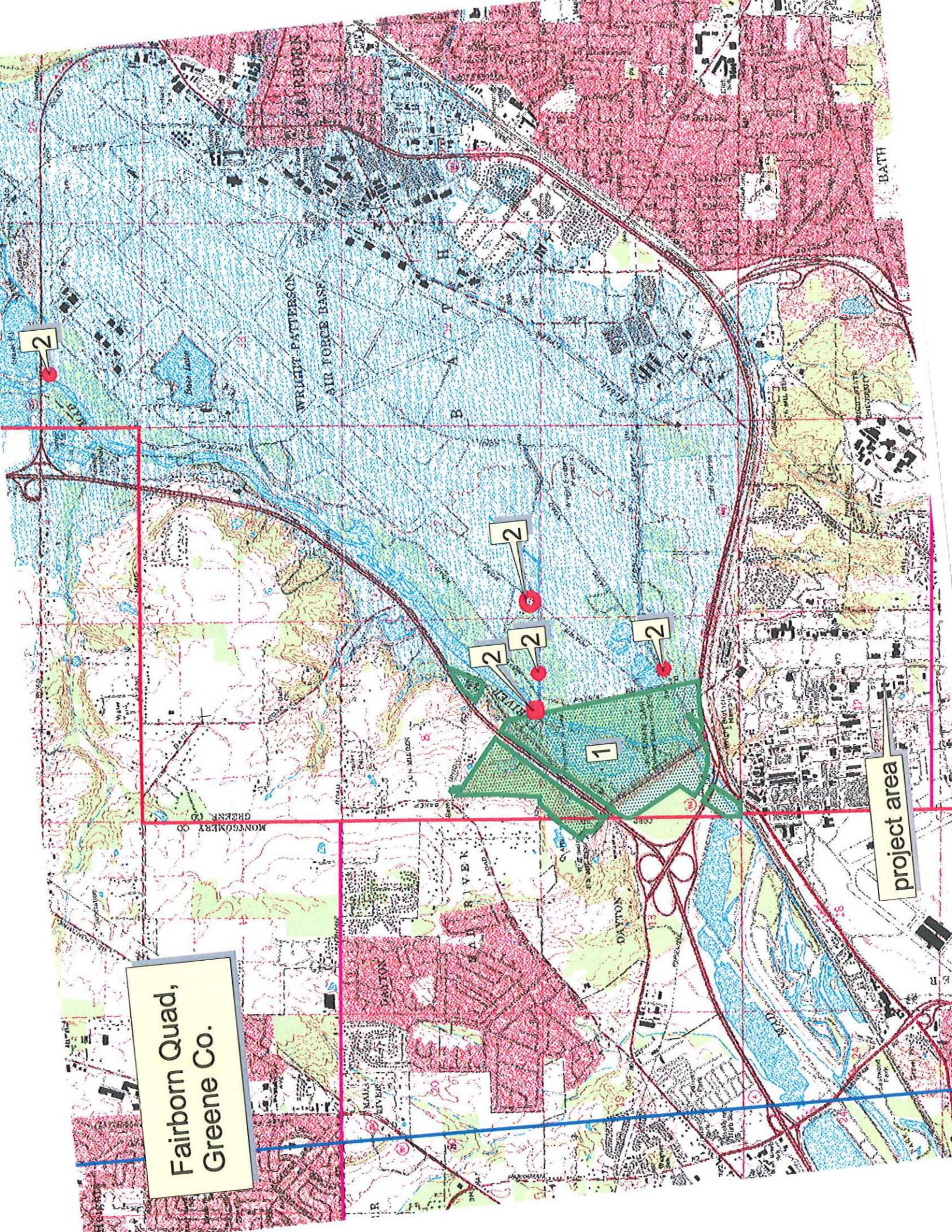
Please contact me at 614-265-6818 if I can be of further assistance.

Sincerely,

Debbie Woischke, Ecological Analyst
Ohio Biodiversity Database Program

Fairborn Quad,
Greene Co.

project area





DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

13 January 2011

88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB OH 45433-5209

Dr. Mary Knapp
U.S. Fish and Wildlife Service
6950 Americana Parkway, Suite H
Reynoldsburg, OH 43068-4127

Dear Dr. Knapp:

The U.S. Air Force is seeking informal consultation with the U.S. Fish and Wildlife Service in compliance with Section 7 of the Endangered Species Act regarding the proposed implementation of a Master Plan for the Air Force Institute of Technology (AFIT). The Master Plan specifies proposed construction and renovation projects that would affirm AFIT's mission at Wright-Patterson Air Force Base (WPAFB) by providing a physical framework for implementing the mission over the next 20 years.

WPAFB has initiated an Environmental Assessment (EA) for this project in accordance with the requirements of the National Environmental Policy Act of 1969. The proposed location for this project is shown on the enclosed maps. Construction activities under the Proposed Action would include new construction, demolition of existing facilities, and renovation/modification of existing education and research facilities at WPAFB to support AFIT's mission.

Proposed activities would include:

- Construction of a new 57,199 square foot (sf) research laboratory and 151 parking spaces adjacent to this facility,
- Addition to the existing AFIT library totaling 39,267 sf,
- Improvements to the existing Academic Facility (Building 20642) totaling 35,607 sf,
- Redesign of the north entry court,
- Redesign/construction of the green space quadrangle,
- Construction of a new 300-space parking lot on the north side of campus east of Hobson Way,
- Road realignment of Q Street,
- New steam pipe lines in Building 20640, and
- Update/upgrade site utilities.

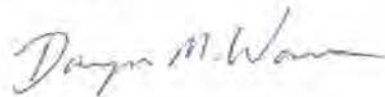
Under the No-Action Alternative, current programs and projects would continue to develop as planned and the action proposed in this EA would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped. The No-Action Alternative does not provide a framework for renewing AFIT infrastructure that would help meet future planning goals. AFIT facilities would be planned on a site-by-site basis, and research, operational, and administrative space would continue to be inadequate. AFIT would not have a plan to reach sustainability goals, and conservation efforts would continue to be unconsolidated. The No-Action Alternative would not fulfill the master planning objectives.

The geographic location of the proposed project area is Greene County, Bath Township, Section 12, Township 2E, Range 7N (Figure 1). The area of the proposed construction, demolition, and renovation activities in and around the AFIT campus is located in the east-central portion of Area B, approximately, 750 feet from the east perimeter of the base, along National Road between Gates 19B and 22B. The AFIT campus is located southeast of Hobson Way and Tenth Street. The elevation of the AFIT campus is approximately 970 ft MSL. While the proposed area would undergo construction, demolition, and renovation, the current configuration of this area would not change dramatically (Figure 2).

Natural resources in the vicinity of the project area include a half-acre isolated wetland (approximately 750 feet west of the AFIT campus), Hebble Creek (north of the area), and a small wooded area to the northeast. The proximity of the project area with respect to habitat for threatened and endangered species as well as wetlands in Area B is shown in Figure 3. Given that the construction, demolition, and renovation work would be confined to existing buildings and previously disturbed areas, no impacts to natural resources would be anticipated.

Thank you for your consideration. Please return your comments to me at the above address. If you have any questions, please contact me at (937) 257-4857 or by email at Darryn.Warner@wpaafb.af.mil.

Sincerely

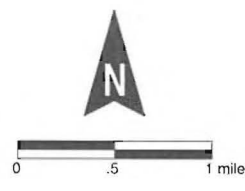
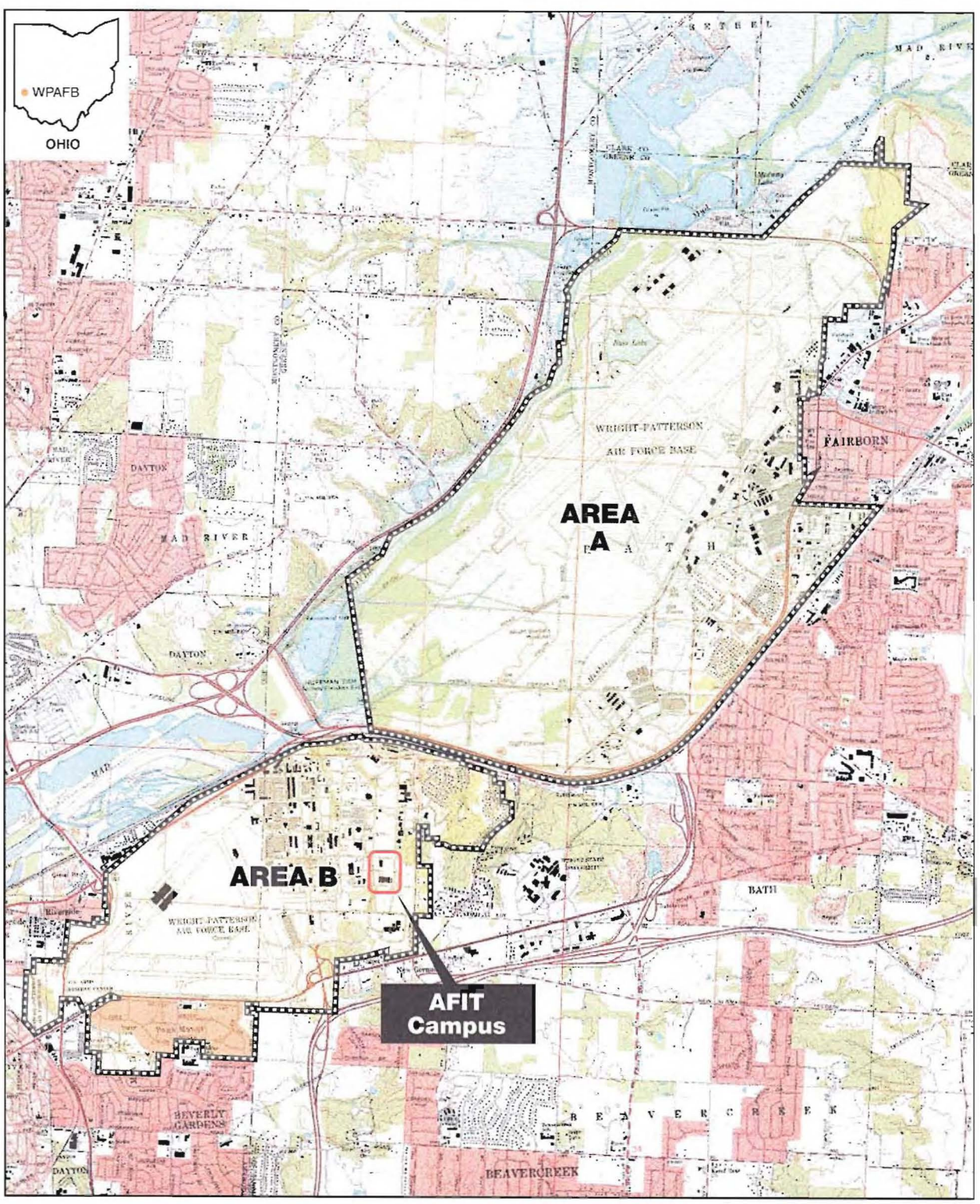


Darryn Warner
Environmental Quality Section
Asset Management Division

cc: Karen Beason (88 ABW/CEAOR, WPAFB)
James A. Denier (Shaw Environmental & Infrastructure, Inc.)

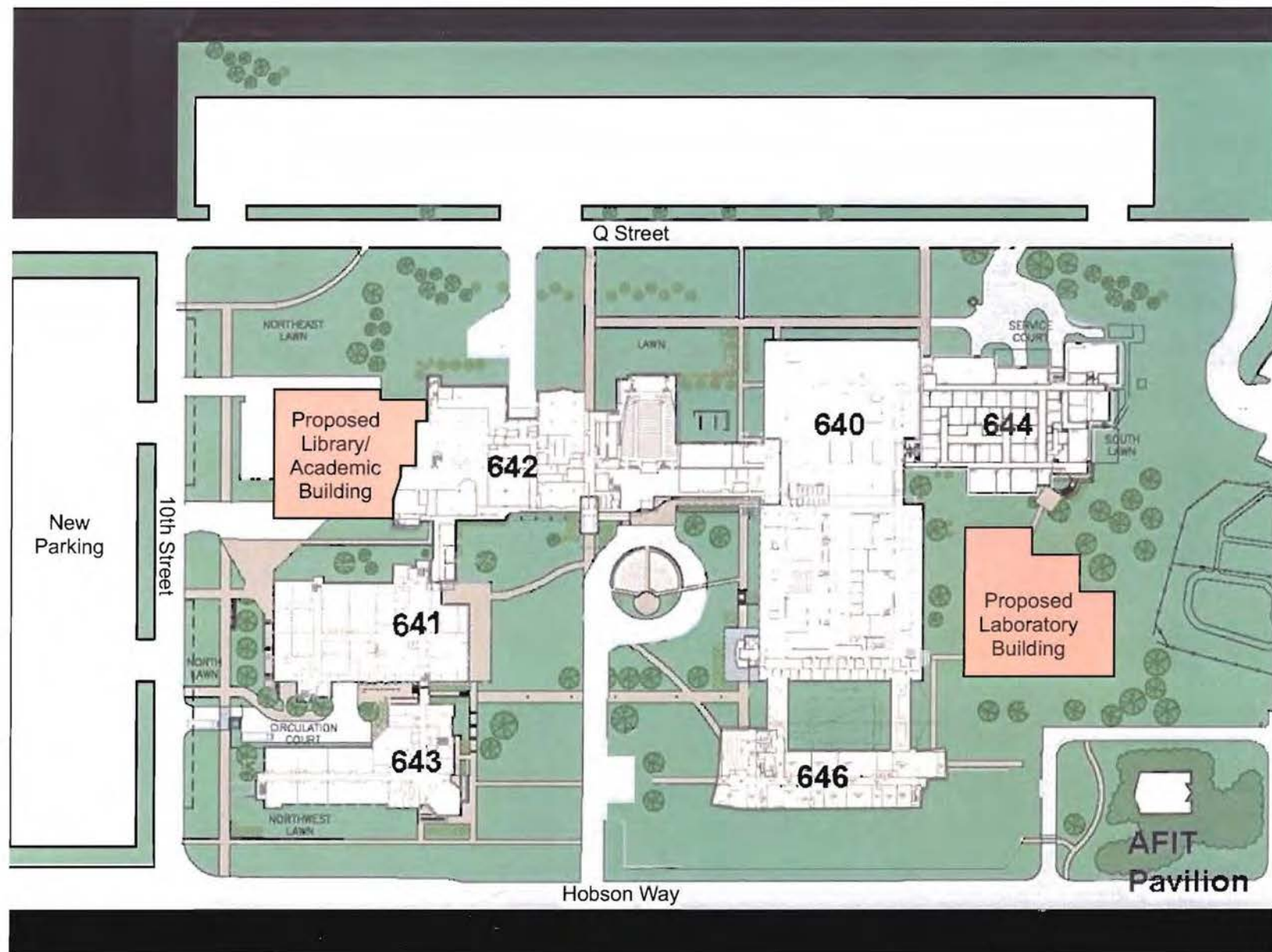
Enclosures: USGS Quadrangle Map
GIS Figure

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	12/8/10	--	JIS	CH	CH	S-140578.0501-12/10-W



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1
Location of WPAFB and
Surrounding Area



Wright-Patterson Air Force Base, Ohio

Figure 2
Proposed Building Site Plan Detail



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

March 28, 2011

Darryn Warner
88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB OH 45433-5209

TAILS #: 31420-2011-I-0406

Re: Master Plan for the Air Force Institute of Technology (AFIT)

Dear Mr. Warner:

We have received your recent correspondence dated January 13, 2011 requesting information about the subject proposal. There are no Federal wilderness areas, wildlife refuges or designated critical habitat within the vicinity of the project area. Based on the information you have provided, at this time we have no objection to the proposed project.

ENDANGERED SPECIES COMMENTS: Due to the project type, size, and location, we do not anticipate any impact on federally listed endangered, threatened, or candidate species, or their habitats. Should the project design change, or during the term of this action, additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, consultation with the Service should be initiated to assess any potential impacts.

If you have additional questions or require further assistance with your project proposal, please contact me at the following number (614) 416-8993 x12. I would be happy to discuss the project in further detail with you and provide additional assistance if necessary. In addition, you can find more information on natural resources in Ohio by visiting our homepage at: <http://www.fws.gov/midwest/ohio>.

Sincerely,

Mary Knapp, Ph.D.
Field Supervisor



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

13 January 2011

88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB OH 45433-5209

Mr. Kurt Rinehart
Miami Conservancy District
38 E. Monument Avenue
Dayton, OH 45402

Dear Mr. Rinehart:

Wright-Patterson AFB (WPAFB) is preparing an Environmental Assessment (EA) to analyze potential environmental impacts from implementing the Air Force Institute of Technology's (AFIT) Master Plan. The Master Plan specifies proposed construction and renovation projects that would affirm AFIT's mission at WPAFB by providing a physical framework for implementing the mission over the next 20 years.

WPAFB has initiated an EA for this project in accordance with the requirements of the National Environmental Policy Act of 1969. The purpose of this letter is to notify you of this proposed project and request your evaluation of potential impacts of this project on the Miami Conservancy District.

Construction activities under the Proposed Action would include new construction, demolition of existing facilities, and renovation/modification of existing education and research facilities at WPAFB to support AFIT's mission.

Proposed activities would include:

- Construction of a new 57,199 square foot (sf) research laboratory and 151 parking spaces adjacent to this facility,
- Addition to the existing AFIT library totaling 39,267 sf,
- Improvements to the existing Academic Facility (Building 20642) totaling 35,607 sf,
- Redesign of the north entry court,
- Redesign/construction of the green space quadrangle,
- Construction of a new 300-space parking lot on the north side of campus east of Hobson Way,
- Road realignment of Q Street,
- New steam pipe lines in Building 20640, and
- Update/upgrade site utilities.



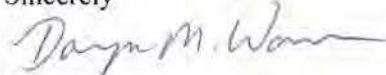
Recycled Paper

Under the No-Action Alternative, current programs and projects would continue to develop as planned and the action proposed in this EA would not be taken. No new construction would occur at AFIT under this alternative. The campus would continue to be underdeveloped. The No-Action Alternative does not provide a framework for renewing AFIT infrastructure that would help meet future planning goals. AFIT facilities would be planned on a site-by-site basis, and research, operational, and administrative space would continue to be inadequate. AFIT would not have a plan to reach sustainability goals, and conservation efforts would continue to be unconsolidated. The No-Action Alternative would not fulfill the master planning objectives.

The geographic location of the proposed project area is Greene County, Bath Township, Section 12, Township 2E, Range 7N (Figure 1). The area of the proposed construction, demolition, and renovation activities in and around the AFIT campus is located in the east-central portion of Area B, approximately, 750 feet from the east perimeter of the base, along National Road between Gates 19B and 22B. The AFIT campus is located southeast of Hobson Way and Tenth Street. The elevation of the AFIT campus is approximately 970 ft MSL. While the proposed area would undergo construction, demolition, and renovation, the current configuration of this area would not change dramatically (Figure 2).

Thank you for your consideration. Please return your comments to me at the above address. If you have any questions, please contact me at (937) 257-4857 or by email at Darryn.Warner@wpafb.af.mil.

Sincerely

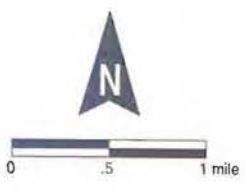
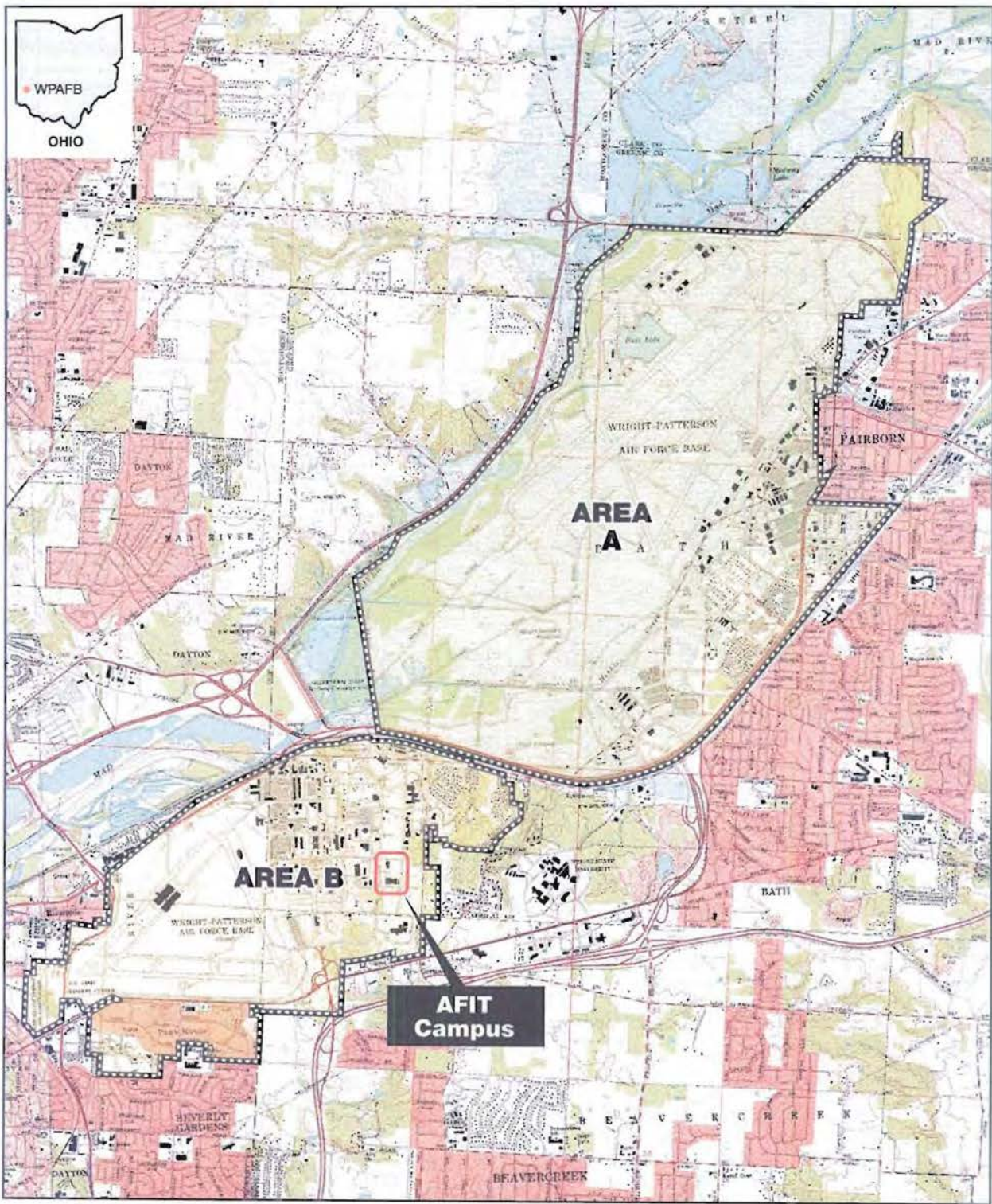


Darryn Warner
Environmental Quality Section
Asset Management Division

cc: Karen Beason (88 ABW/CEAOR, WPAFB)
James A. Denier (Shaw Environmental & Infrastructure, Inc.)

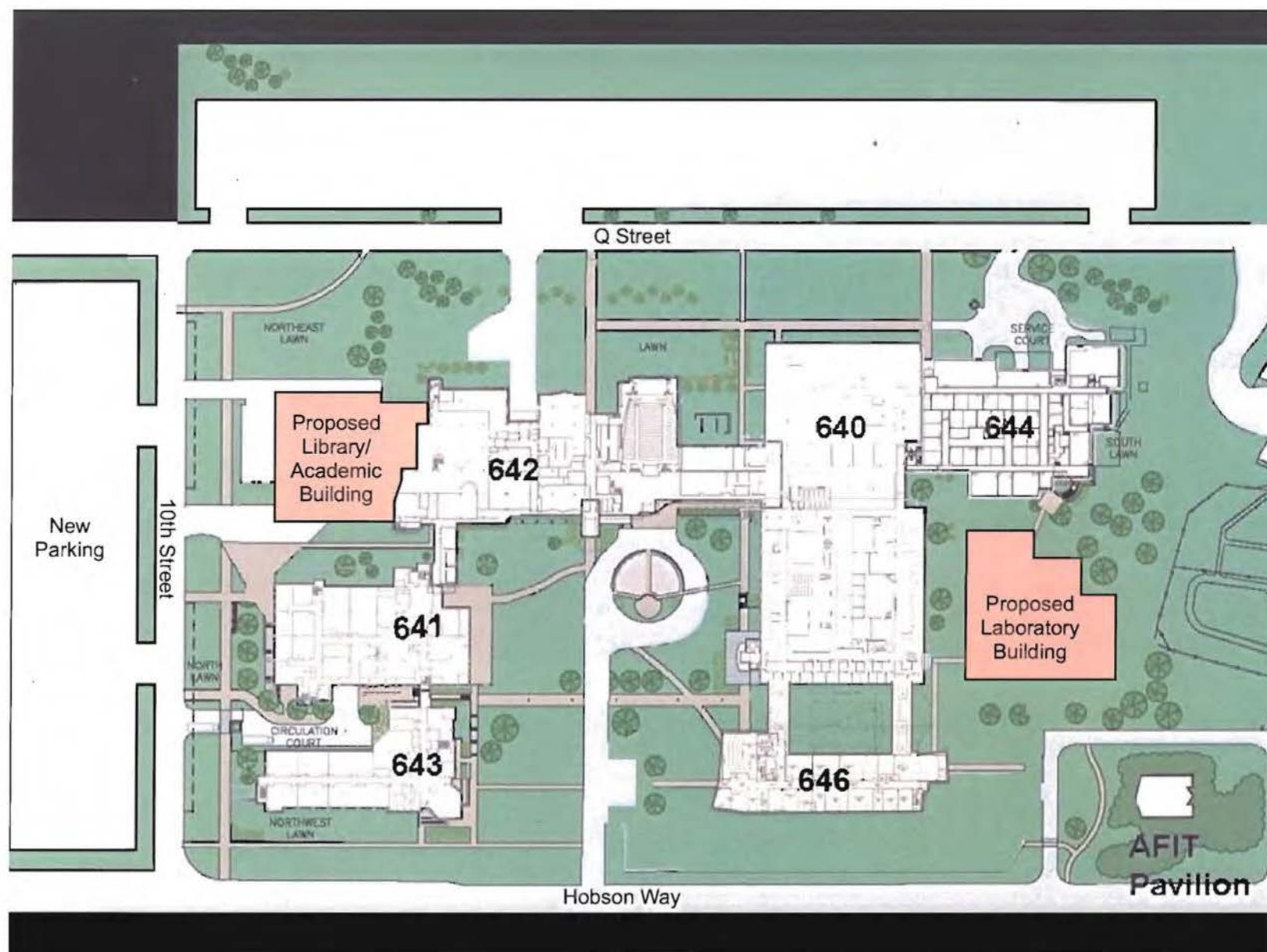
Enclosures: USGS Quadrangle Map
GIS Figure

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Cincinnati, OH	12/8/10	--	JIS	CH	CH	S-140578.0501-12/10-W



WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Figure 1
Location of WPAFB and
Surrounding Area



Wright-Patterson Air Force Base, Ohio

Figure 2
Proposed Building Site Plan Detail



BOARD OF DIRECTORS
William E. Lukens
Gayle B. Price, Jr.
Thomas B. Rentschler
GENERAL MANAGER
Janet M. Bly

January 28, 2011

Mr. Darryn Warner
88 ABW/CEANQ
1450 Littrell Road, Building 22
Wright-Patterson AFB, OH 45433-5209

Re: Huffman Retarding Basin, WPAFB, Proposed AFIT Master Plan

Dear Mr. Warner:

We have reviewed the proposed construction and renovation projects for the Air Force Institute of Technology's (AFIT) Master Plan at WPAFB.

Based on our review it appears the proposed project will have no impact on the retarding basin so authorization from MCD is not required.

Thank you for the opportunity to review the project and if you have any further questions please contact me at (937) 223-1278, ext. 3230.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Roxanne H. Farrier".

Roxanne H. Farrier
Property Administrator

RHF:rmc

cc: Kurt Rinehart

File: WPAFB



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

11 February 2011

88 ABW/CEANQ
1450 Littrell Road
Wright-Patterson AFB OH 45433-5209

Mr. Mark Epstein
Department Head, Resource Protection & Review
Ohio Historic Preservation Office
1982 Velma Ave
Columbus OH 43211-2497

Dear Mr. Epstein

Wright-Patterson Air Force Base (WPAFB) is preparing an Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA) to analyze the potential impacts from implementing a Master Plan. The Air Force Institute of Technology (AFIT) is proposing the development of a comprehensive planning strategy, which would extend through 2030, through the implementation of a Master Plan (Proposed Action). This EA describes and addresses the plan elements of the proposed development alternatives under consideration for the Master Plan. WPAFB is located in Greene County, Ohio (see attachment 1). The AFIT campus is located in Area B, southeast of Hobson Way and Tenth Street. AFIT has occupied its current campus since 1963. It is our opinion that the proposed project will have No Effect on properties listed on, or eligible for listing on, the National Register of Historic Places. In accordance with 36 CFR 800.11(e), we are submitting the following documentation.

Description of the undertaking. AFIT is proposing to implement its Master Plan by redeveloping and expanding on-campus facilities to meet the needs of growth of students and personnel. The Master Plan has a forecasted outlook of proposed campus construction and development through calendar year (CY) 30. The Master Plan proposes construction of a new 57,199-square foot (sf) AFIT Research Laboratory and a 39,267-sf addition to the existing AFIT Library (see Attachment 1). The Master Plan also proposes expanding the Academic Facility (Building 642) by 35,607 sf. The activities associated with implementing the Proposed Action to expand on-campus facilities and replace off-campus facilities would include demolition, construction, and renovation/rehabilitation on the AFIT campus. This would include demolition of approximately 18,293 gross sf of existing building space, and construction or renovation of 132,073 gross sf of new or rehabilitated building space, for a net increase of approximately 113,780 gross sf of on-campus construction.

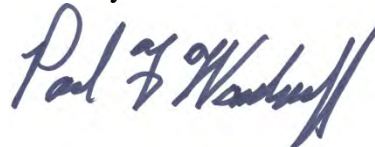
Description of steps taken to identify historic properties. As part of the Integrated Cultural Resources Management Plan for Wright-Patterson Air Force Base surveys have been conducted

encompassing the entire base to locate historic and prehistoric archaeological sites (see ICRMP May 2006). The surveys conducted did not yield any properties eligible for or potentially eligible for, listing on the National Register of Historic Places, in the area of potential effect for this project. Wright-Patterson Air Force Base produced the Wright Field Cultural Landscape Report (October 1, 1998) which focused on analyzing character defining features of the district. The area of potential effects for this project falls well outside of areas identified in this report. Wright-Patterson Air Force Base produced the Army Air Forces Cultural Landscape Report (January 2002) (AAFCLR) which focused on analyzing character defining features of Area B. The area of potential effects for this project falls within Army Air Forces Management Zone IVB as identified in this report, and is outside the boundaries of the Wright Field Historic District (see Attachment 2). The AAFCLR notes that in Zone IVB, "Few historic resources remain in this zone". Also the report notes that there are no recommendations for this area which would require Section 106 consultation. There are a number of suggested recommendations which do not require consultation. These suggestions deal with maintaining the general alignments of roads in this zone. All other suggested recommendations have no bearing on the AFIT site.

Description of the undertaking's effects on historic properties. There are no historic facilities located within the proposed project's area of potential effects. There are no known historic or prehistoric archaeological sites within or adjacent to the area encompassing the project area. The addition and new construction listed as being part of the project are not in or adjacent to any previously identified historic property or district, although the APE falls within Zone IVB of the AAFCLR there would be no impacts to the zone. The proposed project will not change the circulation pattern within Zone IVB. Therefore, it is our opinion that the proposed project will have no effect on historic properties.

Please review the information we have provided and let us know whether you concur with the no effect determination. Should you have questions, I can be reached at 937-257-1374, or via email at paul.woodruff@wpafb.af.mil.

Sincerely

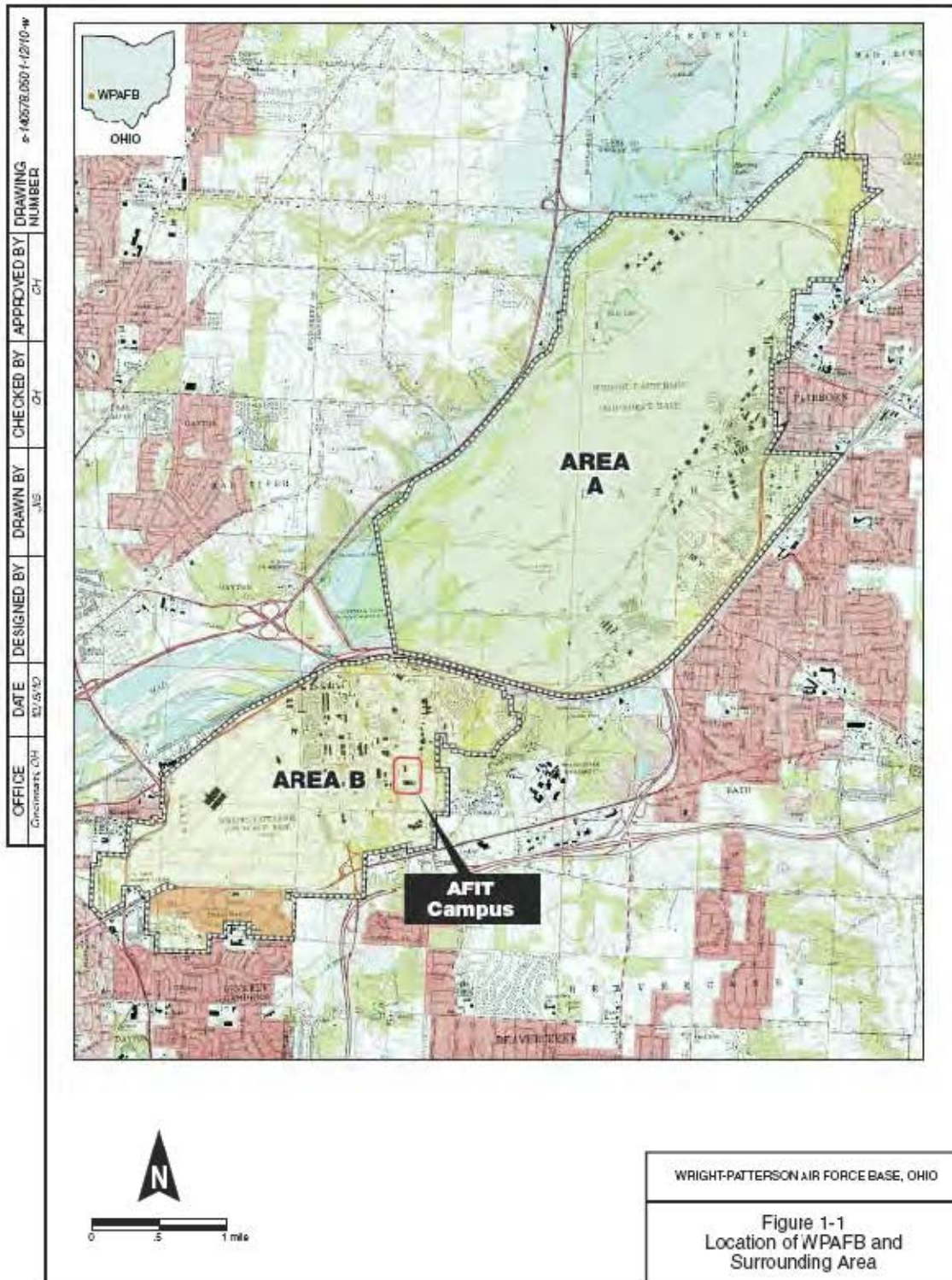
A handwritten signature in blue ink that reads "Paul Woodruff". The signature is stylized with a large, looped "P" and a cursive "Woodruff".

Paul Woodruff
Cultural Resources Manager
Environmental Quality Section
Environmental Branch

Attachments

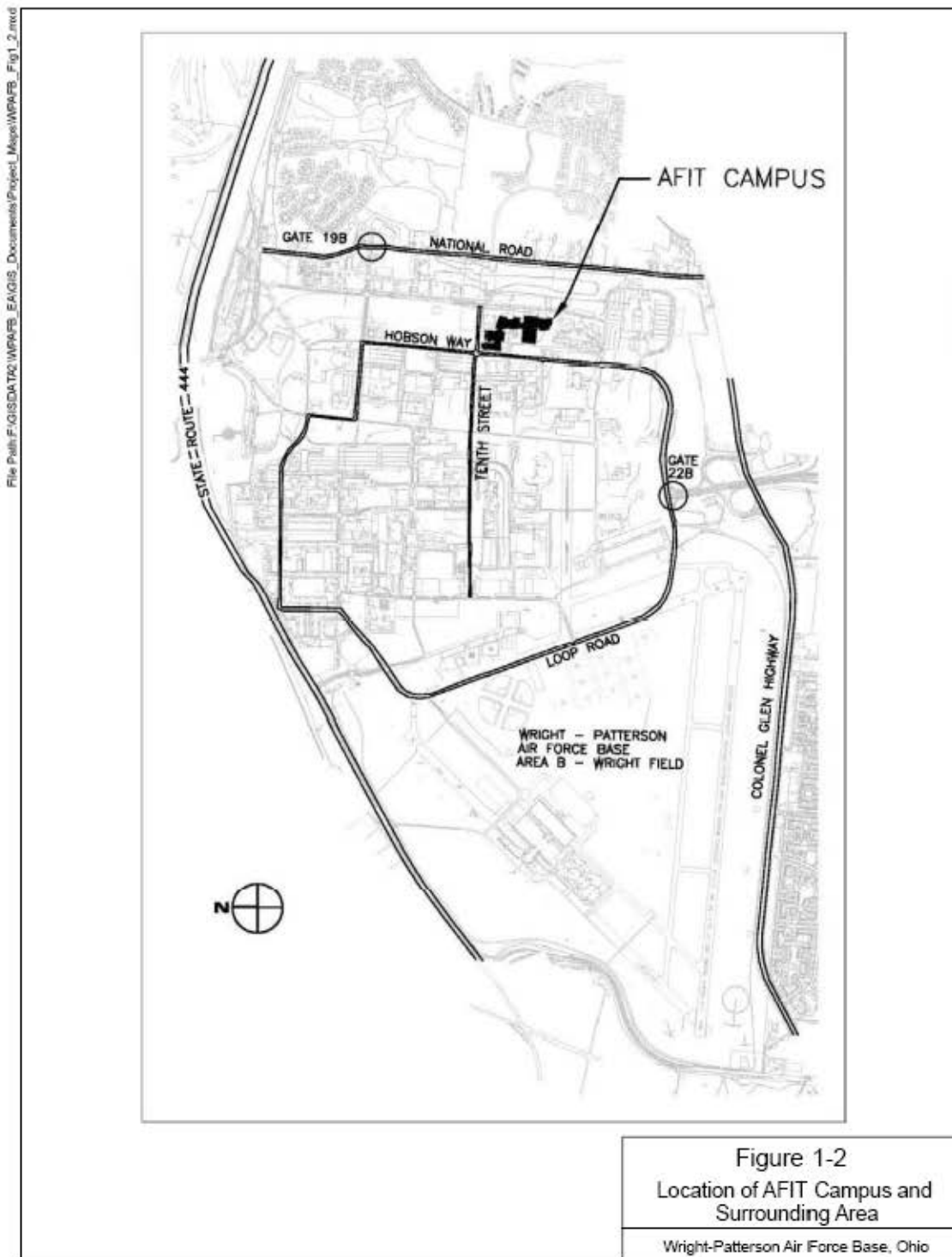
1. Project Mapping and proposed activities
2. Excerpt from Army Air Forces Cultural Landscape Plan

1 **Figure 1-1. Location of WPAFB and Surrounding Area**



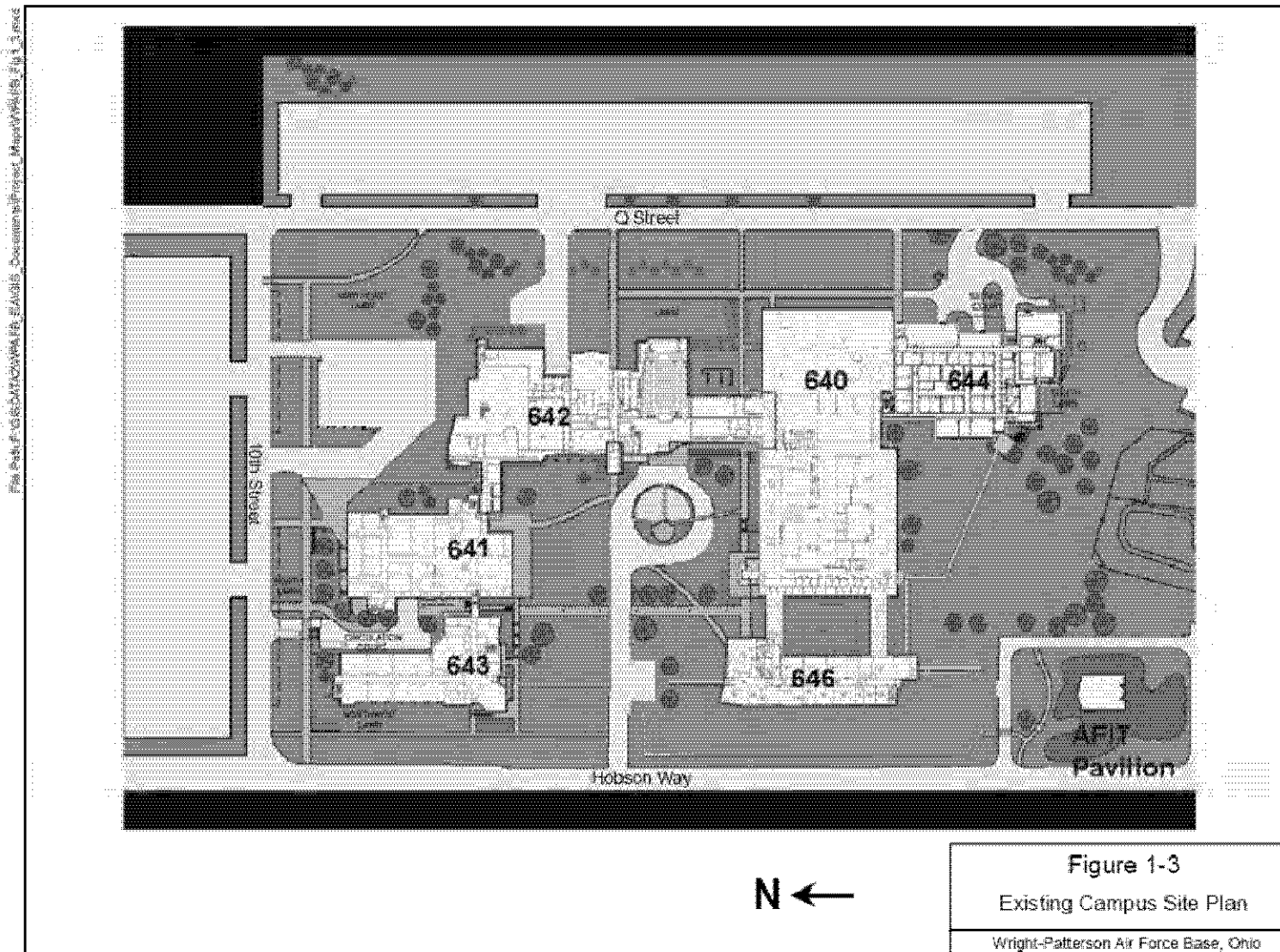
2

1 **Figure 1-2. Location of AFIT Campus and Surrounding Area**



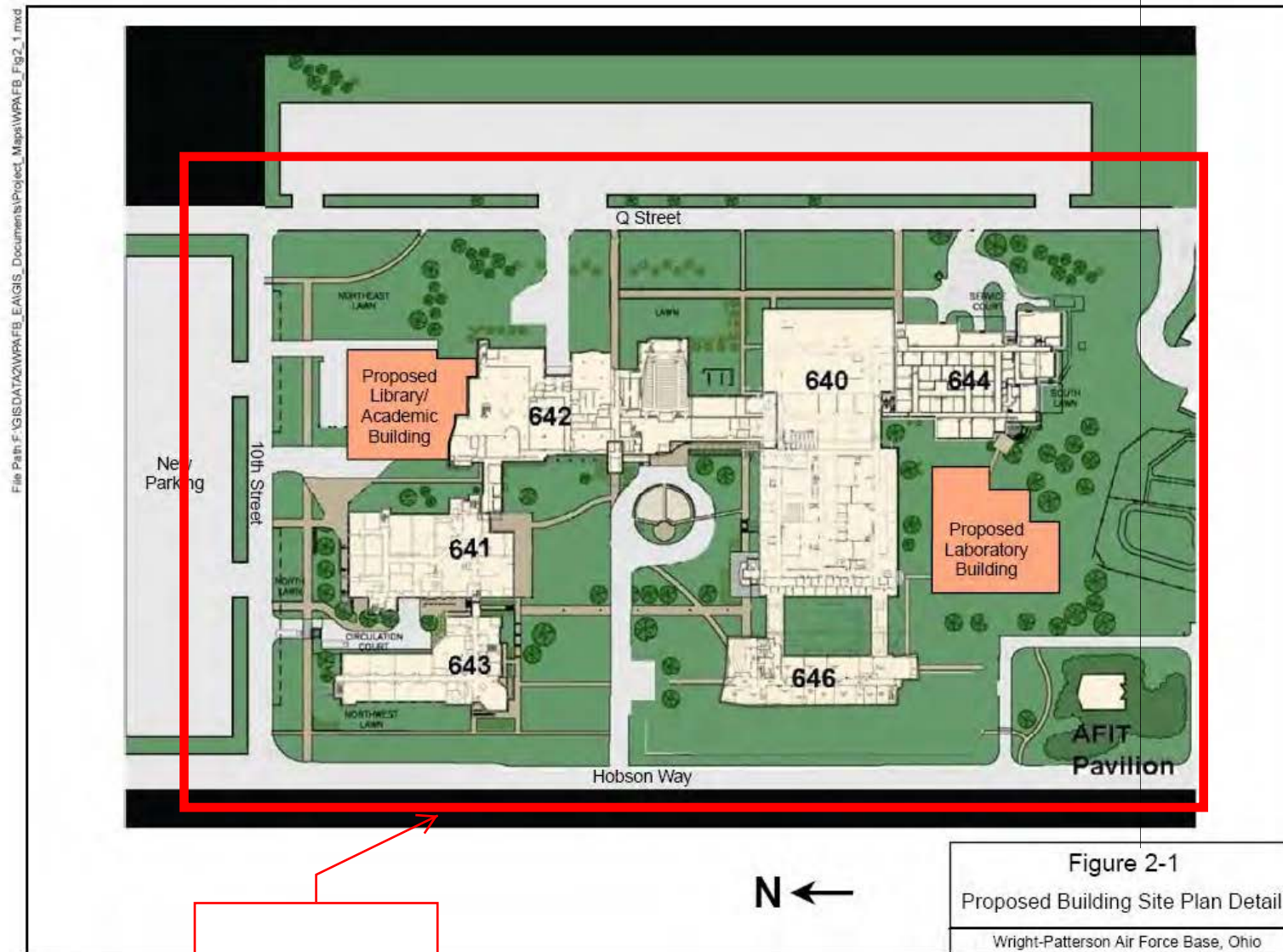
2

1 **Figure 1-3. Existing Campus Site Plan**



2

1 **Figure 2-1. Proposed Building Site Plan Detail**



2

Table 1-1. Description of Existing AFIT Buildings

Bldg No./Name		Year Constructed	Size (gsf)	Activities
20640		1963 (renovated 2004)	134,000	Three-story building contains classrooms, laboratories, lecture hall, and offices
20641		1975	82,700	Three -story building contains classrooms, laboratories, and offices
20642		1982	102,900	Three -story building contains 700-seat auditorium, library, food service, bookstore, miscellaneous support services, and Commandant's Office
20643		1991	26,800	Three -story building contains classrooms, lecture hall, and offices
20644		2001	26,600	One-story building contains research laboratories
20646	Academic Building 1	2008	50,000	Three -story building contains classrooms, lecture hall, and offices



Zone IVB:

Location: With the exception of Zone IVA, the area located east of Skyline Drive and west of National Road, and between the northern and southern boundaries of Area B. Few historic resources remain in this zone. Existing historic resources with integrity include two individually significant buildings, the AAF road system and wooded areas. 'Suggested recommendations' do not require consultation with the Cultural Resource Manager for compliance under the National Historic Preservation Act of 1966 as amended.

Spatial organization and Land Use

No recommendations.

Response to Natural Features

No recommendations.

Circulation

1. Suggested recommendation: Preserve and maintain (alignment) major roads in the AAF road system of this zone including: Third Street, Fifth Street, Tenth Street, "Q" Street, and "P" Street (see Figure B-9).
2. Suggested recommendation: Based on a confirmation of their ownership, preserve and maintain (alignment) Kauffman Avenue and National Road (previously Huffman Dam Road); they pre-date the installation and retain integrity related to the pre-installation and AAF eras.
3. Suggested recommendation: Preserve and maintain the following minor roads with historic integrity: a portion of First Street, a small piece of Eleventh Street, Twelfth Street, the east portion of Thirteenth Street, and "R" Street.

Buildings

1. Only two remaining historic buildings in this zone shall be preserved and maintained, Hunter's Lodge (No. 329) and Hoopole School (No. 631). Both buildings pre-date the installation. Building No. 631 is proposed as individually contributing building on the National Register of Historic Places; No. 329 should be added as an AAF contributing building (non-contiguous). Use *The Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* (1995) to guide preservation and rehabilitation work. Use the *Ohio Historic Inventory Forms* for identifying significant historic character-defining building features. Several stone features (see below) including a stone chimney likely date from the WF/AAF eras as part of work conducted by the Works Progress Administration for the Officers' Recreational Center (see following).

Structures, Site Furnishings, and Objects

1. Preserve and maintain the stone features associated with Hunter's Lodge (No. 329). Conduct condition assessments and prepare maintenance/restoration plans for the stone features (stone wall, two outdoor fireplace grill, and others if identified during the assessment). If possible, original stones should be reused for restoration work and

re-laid in its original location (number stones before dismantling and reassemble in correct location). If new stone is required to replace missing material, it should match the color, texture, shape, and scale of historic material.

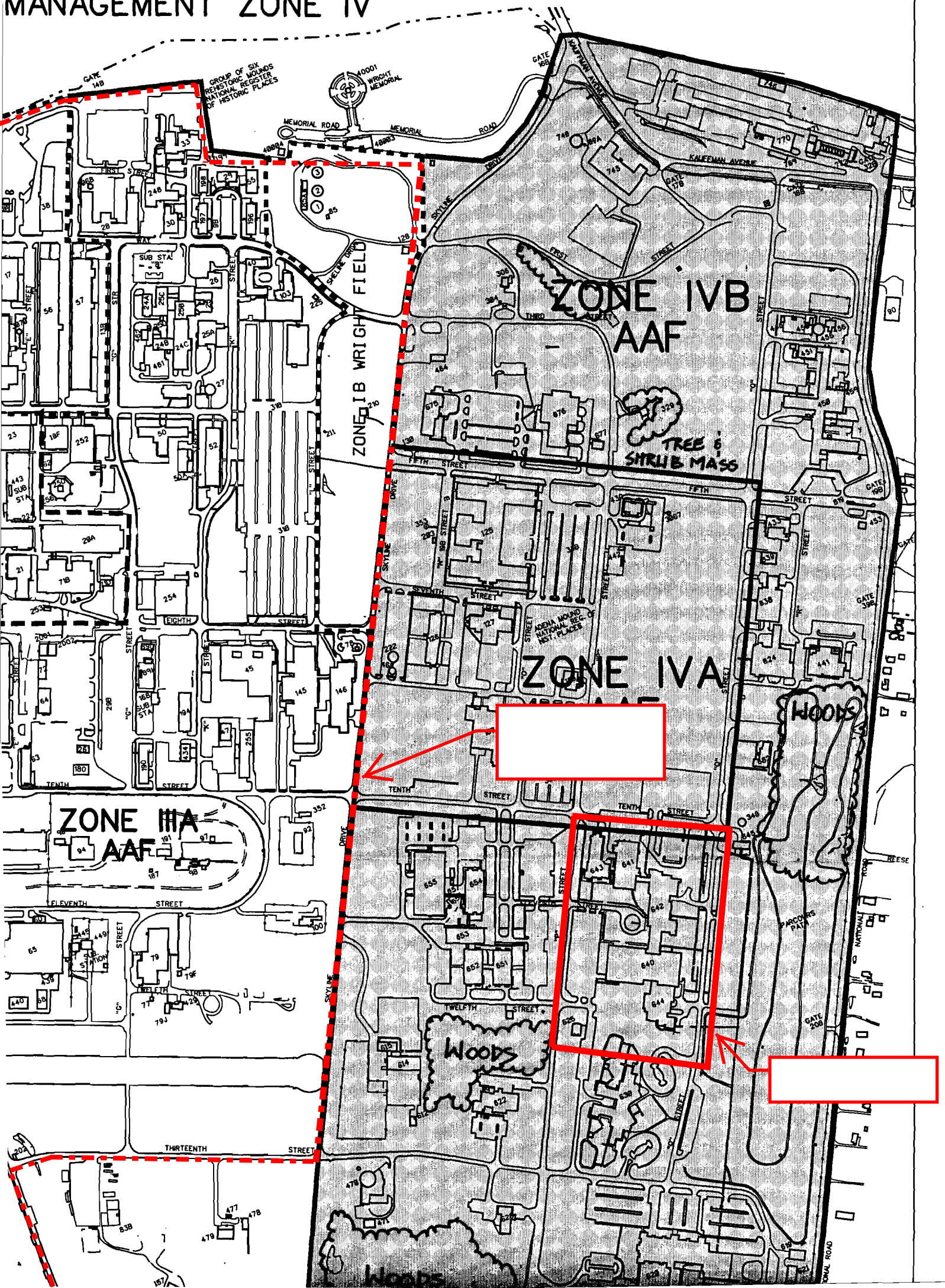
Vegetation

1. Preserve and maintain the deciduous tree and shrub mass surrounding Hunter's Lodge (No. 329). Conduct further research to inventory this vegetative mass and other vegetation at the building to assess its historic significance and integrity.
2. Suggested recommendation: Preserve and maintain the existing wooded areas that pre-dated the installation (see Figure C-4). Restore with native species as appropriate.

Views and Vistas

1. Suggested recommendation: Preserve and maintain a clear view along Skyline Drive from the "Hilltop" area to the west towards the airfield. Do not block the view down the Accelerated Runway.

MANAGEMENT ZONE IV



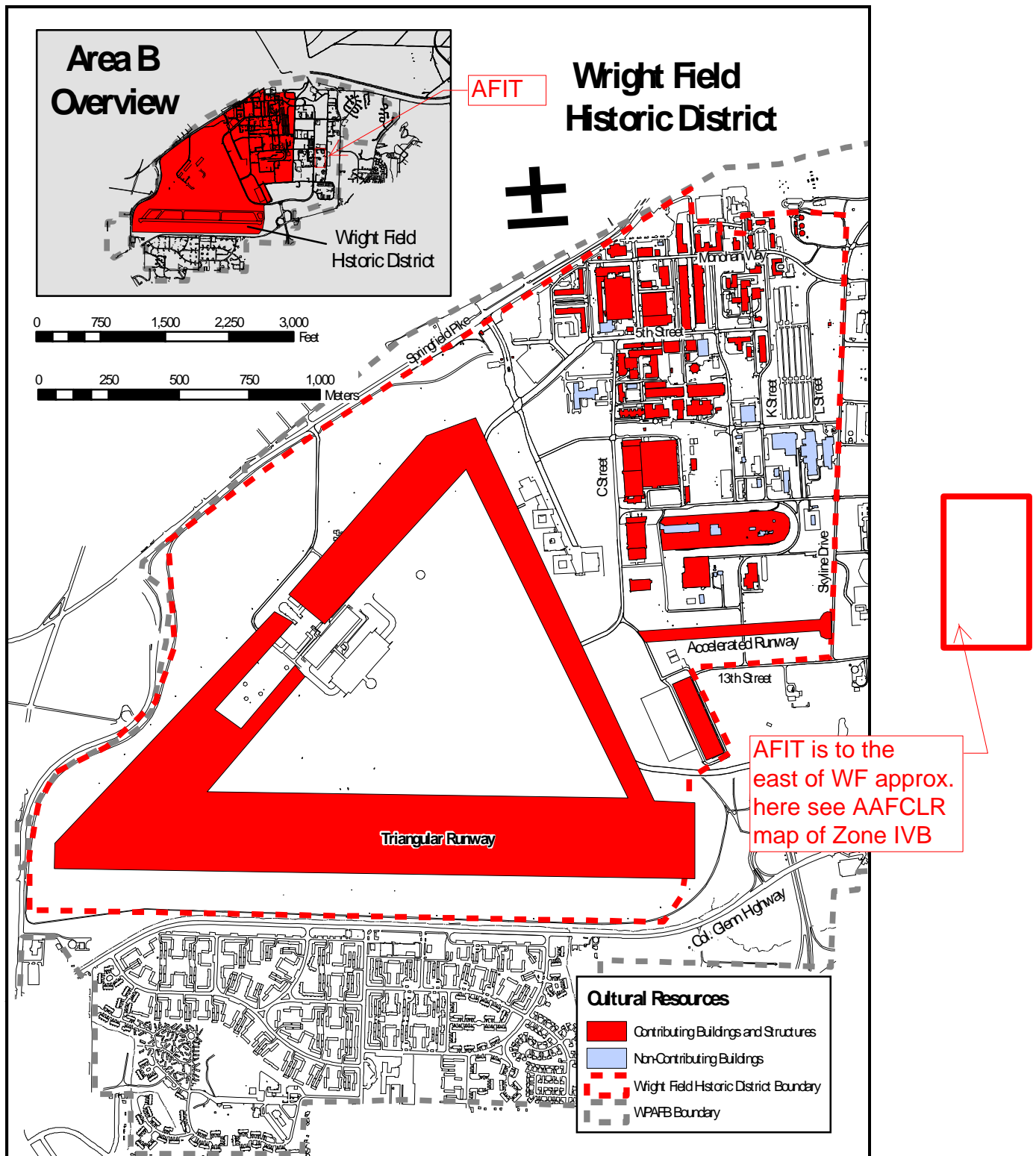


Figure 12 Wright Field Historic District map

From: Justin Cook [<mailto:jcook@ohiohistory.org>]
Sent: Wednesday, May 18, 2011 3:54 PM
To: Woodruff, Paul F Civ USAF AFMC 88 ABW/CEANQ
Subject: AFIT Master Plan EA

Paul,

I managed to track down your submission for the AFIT Master Plan EA. As we discussed during our phone conversation, it is OHPO's opinion that preparation of a Master Plan does not constitute an undertaking subject to Section 106 review [see 36 CFR Section 800.16(y)]. However, construction-related activity associated with carrying out the recommendations of such a plan does constitute an undertaking and WPAFB will need to submit the project documentation required by 36 CFR Section 800.11 to OHPO to facilitate review once construction documents are developed.

Your submission concludes that construction recommended in the plan will not affect historic properties. The primary basis of your finding seems to be that previous survey efforts did not identify any historic properties within the APE. However, it is important to note that 36 CFR Section 800.4(c(1) acknowledges that "the passage of time (and) changing perceptions of significance...may require the agency official to reevaluate properties". Because this is a thirty year plan, it is entirely possible that the eligibility of properties within the APE may have changed by the time construction activities proposed in this document are actually being developed. We can't issue blanket clearance for a geographic area for a thirty year period. Section 106 must be conducted on a project-specific basis and at this time WPAFB lacks specifics about how individual projects proposed in the plan will be carried out.

We look forward to consulting with WPAFB under 36 CFR Part 800 regarding individual projects proposed in the plan as they are developed.

Justin Cook
History Reviews Manager
Resource Protection and Review
Ohio Historic Preservation Office
1982 Velma Avenue
Columbus, Ohio 43211
Phone: 614-298-2000
Email: jcook@ohiohistory.org

1304 Horizon Drive
Fairborn, OH 45324-5816
March 26, 2011

Ms. Estella Holmes
88 ABW/PA
1801 Tenth Street, Suite 2
Wright-Patterson AFB, OH 45433-5543


Dear Ms. Holmes,

This letter is about the Environmental Assessment of AFIT Master Plan. More specifically it is about catch basin covers also known as storm sewer grates. Bad grates have openings that trap bicycle wheels and wheelchair wheels. I am asking that safe grates be installed.

For over 42 years I have tried to get WPAFB to install safe grates. Sometimes safe grates are installed and other times bad grates are installed. In the 1980's the Army Corps of Engineers insisted on installing grates that would trap bicycle wheels at AFIT. WPAFB bought safe grates and had contractor install these. I have triggered two congressional investigations about bad grates at WPAFB.

Please install safe grates at the new AFIT complex.

Sincerely,



Elwood J. Ensor



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

4 May 2011

88 ABW/PA
1801 Tenth Street, Suite 2,
Wright-Patterson AFB, OH 45433-5543

Mr. Elwood J. Ensor
1304 Horizon Drive
Fairborn, OH 45324-5816

Dear Mr. Ensor

Thank you for your letter, dated March 26, 2011, expressing concerns regarding the AFIT Master Plan Environmental Assessment (EA). We certainly appreciate your support and the consideration you have given the future condition and safety of the base. You expressed specific concern regarding the catch basin covers, also known as storm sewer grates.

Storm sewer grates are installed at all newly constructed storm sewer inlets in accordance with the Wright-Patterson Air Force Base Facility Standards. These standards require grates that are Americans with Disabilities Act (ADA) compliant and bicycle safe. However, the openings of the ADA grates are small and sometimes not able to handle the volume of storm water runoff. While varying from ADA standards is not the norm on Wright-Patterson, potential safety issues, such as ponding, can sometimes make it necessary to select grates which accommodate more runoff. There are no long term plans to retrofit existing structures, as this would require an exorbitant amount of money given the number of inlets throughout the installation.

Please be assured this issue is being considered in the AFIT Master Plan EA. Thanks again for expressing your thoughts. Should you have any additional concerns or questions, please don't hesitate to contact me at (937) 255-3395, or via e-mail at estella.holmes@wpafb.af.mil.

Sincerely

A handwritten signature in black ink that reads "Estella Holmes".

ESTELLA HOLMES
Public Affairs Specialist
Public Affairs Office

Appendix B

Clean Air Act
General Conformity Analysis

Engineering Construction Emissions

Area Description	Area		Project Duration	Emission Factor	Control Efficiency	Estimated Emissions	Estimated Emissions
	A		T	EM _{FAC}	CE	E _{lb}	E _{TON}
	A = L * W		†2	†3	†4	E _{TON} = A * T * EM _{FAC}	E _{TON} = A * T * EM _{FAC}
	(ft. ²)†1	(acre)	(months)	(ton/acre/month)	(%)	(lb)	(ton)
New Construction of AFIT Research Lab	57199	1.3	3	1.2	80%	1891	0.95
Expansion of Library	39267	0.9	3	1.2	80%	1298	0.65
Addition of 151 Parking Space near Library	285995	6.6	3	1.2	80%	9456	4.73
Expansion of Academic Buildings 20642	35607	0.8	3	1.2	80%	1177	0.59
Demolition of Buildings 20194 & 20168	18293	0.4	3	1.2	80%	605	0.30
Redesign of North Entry Court between library and building 20641	14300	0.3	3	1.2	80%	473	0.24
Redesign of Green Space Quad West of Building 20642	85799	2.0	3	1.2	80%	2837	1.42
Addition of 300 Parking Spaces East of Hobson Way	457592	10.5	3	1.2	80%	15129	7.56
Realignment of Q Street	228796	5.3	3	1.2	80%	7565	3.78
Laying New Steam Pipe Line into Building 20640	17937	0.4	3	1.2	80%	593	0.30
Upgrade / Update Site Utilities	-	-	-	-	-	-	-
Relocation of Kettering School	-	-	-	-	-	-	-
Total	-	-	-	-	-	41023	20.51

LEGEND

†1 Note: Based on estimated footprints for each construction project. Estimates were made from Figure 2-1 of the DOPAA

†2 Note: Conservative estimate for excavation work = 3 months.

†3 Note: Emission factor Section 13.2.3 "Heavy Construction Operations" (dated 1/95), of AP-42, "Compilation of Air Pollutant Emission Factors", 5th Edition, U.S. EPA, Research Triangle Park, NC, 1998.

†4 Note: Table 2.1.1-3 - "Summary of Techniques, Efficiencies, and Costs for Controlling Fugitive Dust from Paved and Unpaved Surfaces," Fugitive Dust Control Technology, Orlemann (1993).

Control efficiency for watering of paved surfaces.

Diesel Equipment Engine Emissions

Equipment	Load Factor (%)	Operating Hours hours	Duration days	HP hp	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr
Diesel Dozer	0.59	8	90	500	0.35	2.04	5.03	0.33	0.32	0.38
Diesel Truck	0.59	16	90	1500	0.29	1.66	5.11	0.26	0.25	0.37
Diesel Crane	0.43	8	90	500	0.38	1.37	5.47	0.29	0.28	0.37
Diesel Excavator	0.59	8	90	150	0.34	1.7	4.55	0.32	0.31	0.38
Diesel Paving Equipment	0.59	8	90	150	0.52	2.84	5.3	0.48	0.47	0.39

Notes:

Emission factors from Table 3-1 of Air Emissions Factor Guide for Air Force Mobile Sources, December 2009.

Assumed Values for Operating Hours and specific HP of equipment based on engineering judgment.

Assumed each project construction phase would have a duration of a three month period based on engineering judgment.

New Construction of AFIT Research Lab

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Expansion of Library

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Diesel Equipment Engine Emissions

Addition of 151 Parking Space near Library

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Excavator		47.76	238.81	639.17	44.95	43.55	53.38
Diesel Paving Equipment		73.05	398.95	744.52	67.43	66.02	54.79
Total Emissions (lb)		935.57	5301.57	15740.36	842.86	811.95	1147.69
Total Emissions (ton)		0.47	2.65	7.87	0.42	0.41	0.57

Expansion of Academic Buildings 20642

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Demolition of Buildings 20194 & 20168

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Diesel Equipment Engine Emissions

Redesign of North Entry Court between Library and Building 20641

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Redesign of Green Space Quad West of Building 20642

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Dozer		163.89	955.24	2355.32	154.52	149.84	177.94
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		1108.33	6086.59	18578.73	983.97	947.78	1343.73
Total Emissions (ton)		0.55	3.04	9.29	0.49	0.47	0.67

Addition of 300 Parking Spaces East of Hobson Way

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Excavator		47.76	238.81	639.17	44.95	43.55	53.38
Diesel Paving Equipment		73.05	398.95	744.52	67.43	66.02	54.79
Total Emissions (lb)		935.57	5301.57	15740.36	842.86	811.95	1147.69
Total Emissions (ton)		0.47	2.65	7.87	0.42	0.41	0.57

Diesel Equipment Engine Emissions

Realignment of Q Street

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Excavator		47.76	238.81	639.17	44.95	43.55	53.38
Diesel Paving Equipment		73.05	398.95	744.52	67.43	66.02	54.79
Total Emissions (lb)		935.57	5301.57	15740.36	842.86	811.95	1147.69
Total Emissions (ton)		0.47	2.65	7.87	0.42	0.41	0.57

Laying New Steam Pipe Line into Building 20640

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
Diesel Truck		814.76	4663.81	14356.67	730.48	702.38	1039.52
Diesel Excavator		47.76	238.81	639.17	44.95	43.55	53.38
Diesel Crane		129.68	467.54	1866.75	98.97	95.56	126.27
Total Emissions (lb)		992.21	5370.16	16862.58	874.40	841.48	1219.17
Total Emissions (ton)		0.50	2.69	8.43	0.44	0.42	0.61

Upgrade / Update Site Utilities - N/A

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
N/A							
Total Emissions (lb)		-	-	-	-	-	-
Total Emissions (ton)		-	-	-	-	-	-

Diesel Equipment Engine Emissions

Relocation of Kettering School - N/A

Equipment		VOC	CO	NOx	PM-10	PM-2.5	SO2
N/A							
Total Emissions (lb)		-	-	-	-	-	-
Total Emissions (ton)		-	-	-	-	-	-

Diesel Equipment Emission Summary

		VOC	CO	NOx	PM-10	PM-2.5	SO2
Total Emissions (lb)		10449	57794	175556	9307	8964	12725
Total Emissions (ton)		5.22	28.90	87.78	4.65	4.48	6.36

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Step 1 Estimate the Vehicle Miles Traveled (VMT) by Vehicle Class

For this analysis, we have assumed that the commuter fleet corresponding to the construction workers will reflect the passenger vehicle fleet on the roads in the vicinity of Wright-Patterson AFB. The passenger car VMT data for Greene County and Montgomery County Ohio,

The following average construction worker counts have been assumed for this analysis:

Area Description	Number of Workers
New Construction of AFIT Research Lab	50
Expansion of Library	25
Addition of 151 Parking Space near Library	10
Expansion of Academic Buildings 20642	25
Demolition of Buildings 20194 & 20168	25
Redesign of North Entry Court between Library and Building 20641	25
Redesign of Green Space Quad West of Building 20642	25
Addition of 300 Parking Spaces East of Hobson Way	10
Realignment of Q Street	10
Laying New Steam Pipe Lines in Building 20640	10
Upgrade / Update Site Utilities	25
Relocation of Kettering School	25
Total	265

Greene and Montgomery County Passenger Vehicle VMT Mix

VClassId	VMT	Vehicle Class	Mix
1	4,168.815	LDGV	67.72%
2	367.869	LDGT1	5.98%
3	1,224.654	LDGT2	19.89%
4	372.532	LDGT3	6.05%
24	22.185	MC	0.36%
Total (mi/day)	6,156.054		100.00%

Assumptions Used To Estimate Mileage

1.2	Riders per vehicle
30	Miles avg. commute round trip
50%	Vehicles do daytime errands/lunch
10	Miles avg. errand/lunch round trip
90	Working Days

Source for VMT Mix: National Mobile Inventory Model (NMIM) county-level database of NONROAD and MOBILE6 National Emission Inventory (NEI) 2002. ftp://ftp.epa.gov/EmissionInventory/prelim2002nei/mobile/nmim_related/

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Step 2 Select the Appropriate Air Pollutant Emission Factors (grams per mile) for the POV Fleet

Emission Factors

Emission factors are taken from the U.S. EPA MOBIL6 emissions model, as compiled and published in "Air Emissions Factor Guide to Air Force Mobile Sources" Air Force Institute for Environmental Safety and Occupational Health Risk Analysis (AFIERA), December 2009.

All vehicle emissions are calculated assuming that the average commute vehicle is five years old.

Note that PM10 and PM 2.5 emission factors include both exhaust and "fugitive" emissions (paved road, brake & tire dust, etc.).

Emission Factors in g/mi from MOBILE6 Tables for 2005 Model Year Vehicles in CY2010.

	POV Low Altitude g/mi - 2010					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.27	0.25	3.77	0.01	0.024	0.014
LDGT1	0.32	0.27	4.24	0.01	0.024	0.014
LDGT2	0.32	0.27	4.24	0.01	0.024	0.014
LDGT3	0.52	0.41	5.14	0.01	0.024	0.014
MC	1.12	2.56	11.17	0.003	0.040	0.020

Reference: Tables 4-2 through 4-53, (AF IERA, December 2009)

Notes:

LDGT1 and LDGT2 emission factors shown above were taken from AF IERA LDGT1 (3,000 average lbs) emission factors

LDGT3 emission factors shown above were taken from AF IERA LDGT3 (7,250 average lbs) emission factors

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Step 3 Multiply the Emission Factors Times the Annual Vehicle Miles Traveled for Each Vehicle Class

New Construction of AFIT Research Lab						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.039	0.036	0.545	0.001	0.003	0.002
LDGT1	0.046	0.039	0.613	0.001	0.003	0.002
LDGT2	0.046	0.039	0.613	0.001	0.003	0.002
LDGT3	0.075	0.059	0.744	0.001	0.003	0.002
MC	0.162	0.370	1.616	0.000	0.006	0.003
Total	0.369	0.544	4.132	0.006	0.020	0.011

Expansion of Library						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Addition of 151 Parking Space near Library						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.008	0.007	0.109	0.000	0.001	0.000
LDGT1	0.009	0.008	0.123	0.000	0.001	0.000
LDGT2	0.009	0.008	0.123	0.000	0.001	0.000
LDGT3	0.015	0.012	0.149	0.000	0.001	0.000
MC	0.032	0.074	0.323	0.000	0.001	0.001
Total	0.074	0.109	0.826	0.001	0.004	0.002

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Expansion of Academic Buildings 20642						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Demolition of Buildings 20194 & 20168						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Redesign of North Entry Court between Library and Building 20641						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.103	0.087	1.258	0.003	0.007	0.004

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Redesign of Green Space Quad West of Building 20642						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Addition of 300 Parking Spaces East of Hobson Way						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.008	0.007	0.109	0.000	0.001	0.000
LDGT1	0.009	0.008	0.123	0.000	0.001	0.000
LDGT2	0.009	0.008	0.123	0.000	0.001	0.000
LDGT3	0.015	0.012	0.149	0.000	0.001	0.000
MC	0.032	0.074	0.323	0.000	0.001	0.001
Total	0.074	0.109	0.826	0.001	0.004	0.002

Realignment of Q Street						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.008	0.007	0.109	0.000	0.001	0.000
LDGT1	0.009	0.008	0.123	0.000	0.001	0.000
LDGT2	0.009	0.008	0.123	0.000	0.001	0.000
LDGT3	0.015	0.012	0.149	0.000	0.001	0.000
MC	0.032	0.074	0.323	0.000	0.001	0.001
Total	0.074	0.109	0.826	0.001	0.004	0.002

Privately-Owned Vehicle Emissions From Construction Worker Commutes Associated with AFIT Project

Laying New Steam Pipe Lines in Building 20640						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.008	0.007	0.109	0.000	0.001	0.000
LDGT1	0.009	0.008	0.123	0.000	0.001	0.000
LDGT2	0.009	0.008	0.123	0.000	0.001	0.000
LDGT3	0.015	0.012	0.149	0.000	0.001	0.000
MC	0.032	0.074	0.323	0.000	0.001	0.001
Total	0.074	0.109	0.826	0.001	0.004	0.002

Upgrade / Update Site Utilities						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Relocation of Kettering School						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
LDGV	0.020	0.018	0.273	0.001	0.002	0.001
LDGT1	0.023	0.020	0.307	0.001	0.002	0.001
LDGT2	0.023	0.020	0.307	0.001	0.002	0.001
LDGT3	0.038	0.030	0.372	0.001	0.002	0.001
MC	0.081	0.185	0.808	0.000	0.003	0.001
Total	0.184	0.272	2.066	0.003	0.010	0.005

Total Emissions						
	Construction Commute Emissions by Vehicle Class					
	NOx	VOC	CO	SO2	PM10	PM2.5
Total	1.874	2.698	21.091	0.033	0.101	0.057

Construction Surface Coating Emissions

Calculation of VOC Emissions Due to Site Surface Coating Activities (Uncontrolled).

Input Parameters and Assumptions

All paint is restricted to maximum VOC

150	g/L of VOC
0.33	lb/L of VOC
1.25	lb/gal of VOC

New Construction of AFIT Research Lab						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	57199	3	25830	3	350	277.16
Primer Interior Walls	57199	3	25830	2	150	431.14
Total (lb)						708.31
Total (tons)						0.354

Expansion of Library						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	39267	3	21401	3	350	229.64
Primer Interior Walls	39267	3	21401	2	150	357.23
Total (lb)						586.87
Total (tons)						0.293

Construction Surface Coating Emissions

Addition of 151 Parking Space near Library						
Operation	No. of Spaces	Area/space scf/space	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Lining Parking Lot	151	5	755	3	350	8.10
Total (lb)						8.10
Total (tons)						0.004

Expansion of Academic Buildings 20642						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	35607	3	20379	3	350	218.68
Primer Interior Walls	35607	3	20379	2	150	340.17
Total (lb)						558.85
Total (tons)						0.279

Demolition of Buildings 20194 & 20168 - N/A						
Operation	Length (ft)	Height (ft)	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
No Painting						
Total (lb)						-
Total (tons)						-

Redesign of North Entry Court between Library and Building 20641						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	14300	3	12915	3	350	138.58
Primer Interior Walls	14300	3	12915	3	150	323.36
Total (lb)						461.94
Total (tons)						0.231

Construction Surface Coating Emissions

Redesign of Green Space Quad West of Building 20642 - N/A						
Operation	Length (ft)	Height (ft)	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
No Painting						-
Total (lb)						-
Total (tons)						-

Addition of 300 Parking Spaces East of Hobson Way						
Operation	No. of Spaces	Area/space scf/space	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Lining Parking Lot	300	5	1500	3	350	16.10
Total (lb)						16.10
Total (tons)						0.008

Realignment of Q Street						
Operation	Length (ft)	Width (ft)	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Lining Road	2033	0.5	4066	3	350	43.63
Total (lb)						43.63
Total (tons)						0.022

Construction Surface Coating Emissions

Laying New Steam Pipe Lines in Building 20640						
Operation	Length (ft)	Height (ft)	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	17937	1	1224	3	350	13.13
Primer Interior Walls	17937	1	1224	3	150	30.64
					75	0.00
Total (lb)						43.77
Total (tons)						0.022

Upgrade / Update Site Utilities						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	629189	3	8567	3	350	91.92
Primer Interior Walls	629189	3	8567	3	150	214.49
Total (lb)						306.42
Total (tons)						0.153

Relocation of Kettering School						
Operation	Foot Print scf	Stories floors	Total Area (ft ²)	Coats	Paint Coverage (ft ² /gal)	Max. VOC (lb)
Paint Interior Walls	85799	2	586	3	350	6.29
Primer Interior Walls	85799	2	586	2	150	9.78
Total (lb)						16.06
Total (tons)						0.008

Total VOC Emissions from Surface Coating		
	VOC (lb)	VOC (ton)
Total	2750.04	1.38

Resources:

Dimensions: Based on estimated footprints for each construction project. Estimates were made from Figure 2-1 of the DOPAA.

Paint Coverage Rate is from Sherwin Williams Product Data Sheet for Surface Coating for interior/exterior latex paint, surface coating of all surface enamel.

Emission Summary

Area Description	Total Emissions by Construction Activity						
	VOC	CO	NOx	PM	PM-10	PM-2.5	SO2
CONSTRUCTION EMISSIONS							
New Construction of AFIT Research Lab	0.91	3.04	9.29	1.44	1.44	0.47	0.67
Expansion of Library	0.85	3.04	9.29	1.14	1.14	0.47	0.67
Addition of 151 Parking Space near Library	0.47	2.65	7.87	5.15	5.15	0.41	0.57
Expansion of Academic Buildings 20642	0.83	3.04	9.29	1.06	1.06	0.67	0.67
Demolition of Buildings 20194 & 20168	0.55	3.04	9.29	0.79	0.79	0.47	0.67
Redesign of North Entry Court between Library and Building 20641	0.79	3.04	9.29	0.73	0.73	0.47	0.67
Redesign of Green Space Quad West of Building 20642	0.55	3.04	9.29	1.91	1.91	0.47	0.67
Addition of 300 Parking Spaces East of Hobson Way	0.48	2.65	7.87	7.99	7.99	0.41	0.57
Realignment of Q Street	0.49	2.65	7.87	4.20	4.20	0.41	0.57
Laying New Steam Pipe Lines in Building 20640	0.52	2.69	8.43	0.72	0.72	0.42	0.61
Upgrade / Update Site Utilities	0.15	-	-	-	-	-	-
Relocation of Kettering School	0.01	-	-	-	-	-	-
VEHICLE COMMUTER EMISSIONS							
New Construction of AFIT Research Lab	0.54	4.13	0.37	0.02	0.02	0.01	0.01
Expansion of Library	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Addition of 151 Parking Space near Library	0.11	0.83	0.07	0.00	0.00	0.00	0.00
Expansion of Academic Buildings 20642	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Demolition of Buildings 20194 & 20168	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Redesign of North Entry Court between Library and Building 20641	0.09	1.26	0.10	0.01	0.01	0.00	0.00
Redesign of Green Space Quad West of Building 20642	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Addition of 300 Parking Spaces East of Hobson Way	0.11	0.83	0.07	0.00	0.00	0.00	0.00
Realignment of Q Street	0.11	0.83	0.07	0.00	0.00	0.00	0.00
Laying New Steam Pipe Lines in Building 20640	0.11	0.83	0.07	0.00	0.00	0.00	0.00
Upgrade / Update Site Utilities	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Relocation of Kettering School	0.27	2.07	0.18	0.01	0.01	0.01	0.00
Total	9.30	49.99	89.65	25.23	25.23	4.74	6.40

Appendix C

Noise Terminology and Analysis Methodology

This Appendix presents a detailed discussion of noise and its effects on people and the environment. An assessment of aircraft noise requires a general understanding of how sound is measured and how it affects people in the natural environment. The purpose of this appendix is to address public concerns regarding aircraft noise impacts.

Section C.1 is a general discussion on the properties of noise. Section C.2 summarizes the noise metrics discussed throughout this Environmental Assessment (EA). Section C.3 provides Federal land use compatibility guidelines that are used in applying aircraft noise impacts to land use planning in the airport environment.

C.1 GENERAL

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only source of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise, and typically are singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

Sound is a physical phenomenon, and consists of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant or unpleasant depends largely on the listener's current activity, past experience, and attitude toward the source of that sound. It is often true that one person's music is another person's noise.

The measurement and human perception of sound involves two basic physical characteristics, intensity and frequency. The intensity is a measure of the strength or amplitude of the sound vibrations and is expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder is the perception of that sound. The second important physical characteristic is sound frequency which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

The loudest sounds which can be detected comfortably by the human ear have intensities which are 1,000,000,000,000 times larger than those of sounds which can just be detected. Because of this vast range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB, and}$$

$$80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB}$$

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB}$$

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as “decibel addition” or “energy addition.” The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

An important facet of decibel addition arises later when the concept of time-average sound levels is introduced to explain Day-Night Average Sound Level (DNL). Because of the logarithmic units, the time-average sound level is dominated by the louder levels that occur during the averaging period. As a simple example, consider a sound level which is 100 dB and lasts for 30 seconds, followed by a sound level of 50 dB which also lasts for 30 seconds. The time-average sound level over the total 60-second period is 97 dB, not 75 dB.

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels.

The minimum change in the time-average sound level of individual events which an average human ear can detect is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound’s loudness, and this relation holds true for loud sounds and for quieter sounds.

Sound frequency is pitch measured in terms of hertz (Hz). The normal human ear can detect sounds which range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally well by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for the varied frequency sensitivity of people, we use the A-weighted scale that approximates the average, healthy human ear. The A-weighting de-emphasizes the low and high frequency portion of the noise signal and emphasizes the mid-frequency portion. Sound levels measured using A-weighting are most properly called A-weighted sound levels while sound levels measured without any frequency weighting are most properly called sound levels. However, since most environmental impact analysis documents deal only with A-weighted sound levels, the adjective “A-weighted” is often omitted, and A-weighted sound levels are referred to simply as sound levels. In some instances, the author will indicate that the levels have been A-weighted by using the abbreviation dBA or dB(A), rather than the abbreviation dB, for decibel. As long as the use of A-weighting is understood to be used, there is no difference implied by the terms “sound level” and “A-weighted sound level” or by the units dB, dBA, and dB(A). The A-weighting function de-emphasizes higher and especially lower frequencies to which humans are less sensitive. Because the A-weighting is closely related to human hearing characteristics, it is appropriate to use A-weighted sound levels when assessing potential noise effects on humans and many terrestrial wildlife species. In this document, all sound levels are A-weighted and are reported in dB.

Sound levels do not represent instantaneous measurements but rather averages over short periods of time. Two measurement time periods are most common: 1 second and 1/8 of a second. A measured

sound level averaged over 1 second is called a slow response sound level; one averaged over 1/8 of a second is called a fast response sound level. Most environmental noise studies use slow response measurements, and the adjective “slow response” is usually omitted. It is easy to understand why the proper descriptor “slow response A-weighted sound level” is usually shortened to “sound level” in environmental impact analysis documents.

C.2 NOISE METRICS

A “metric” is defined as something “of, involving, or used in measurement.” As used in environmental noise analyses, a metric refers to the unit or quantity that measures or represents the effect of noise on people. Noise measurements typically have involved a confusing proliferation of noise metrics as individual researchers have attempted to understand and represent the effects of noise. As a result, past literature describing environmental noise or environmental noise abatement has included many different metrics. Recently, however, various Federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analyses documents, and both the Department of Defense (DOD) and the Federal Aviation Administration (FAA) have specified those which should be used for Federal aviation noise assessments. These metrics are as follows.

C.2.1 Maximum Sound Level

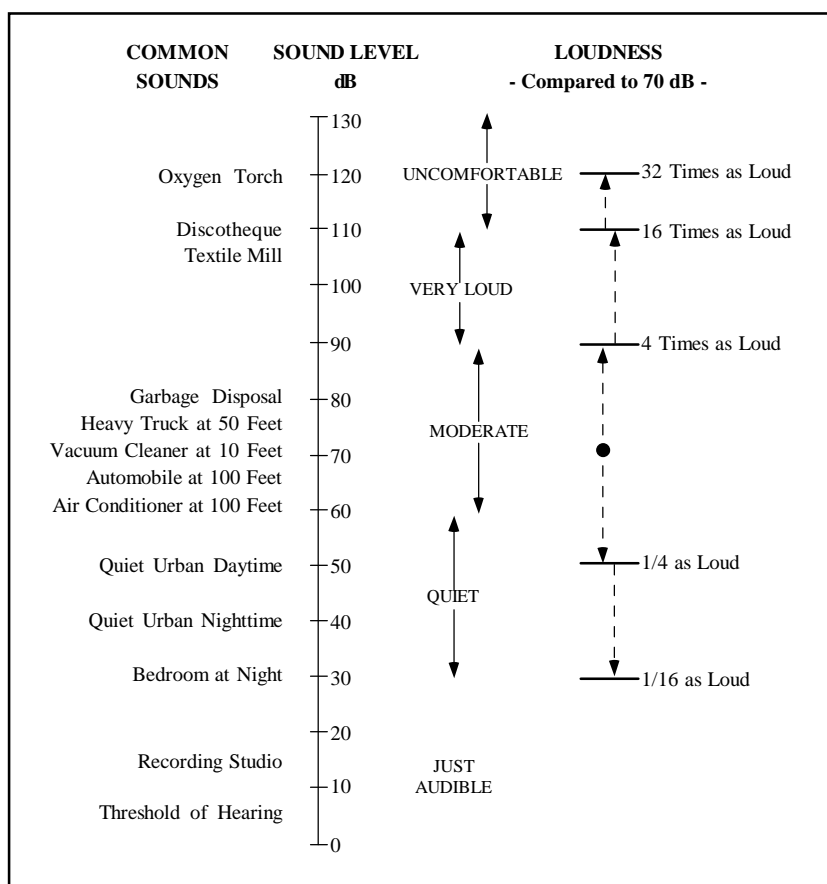
The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{\max} , or $L_{A\max}$. The typical A-weighted levels of common sounds are shown in Figure C-1. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.

C.2.2 Sound Exposure Level

Individual time-varying noise events have two main characteristics: (1) a sound level which changes throughout the event, and (2) a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The sound exposure level (abbreviated SEL or LAE) combines both of these characteristics into a single metric.

Sound exposure level is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise event. Since aircraft overflights usually last longer than one second, the SEL of an overflight is usually greater than the maximum sound level of the overflight.

Sound exposure level is a composite metric which represents both the intensity of a sound and its duration. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Because the SEL and the maximum sound level are both A-weighted sound levels expressed in dBs, there is sometimes confusion between the two, so the specific metric used should be clearly stated.



Source: Harris 1979

Figure C-1. Typical A-Weighted Sound Levels of Common Sounds

Day-Night Average Sound Level

Time-average sound levels are the measurements of sound levels which are averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period.

For the evaluation of community noise effects, and particularly aircraft noise effects, the day-night average sound level (abbreviated DNL or L_{dn}) is used. Day-night average sound level averages aircraft sound levels at a location over a complete 24-hour period, with a 10-dB adjustment added to those noise events which take place between 10:00 p.m. and 7:00 a.m. (local time) the following morning. This 10 dB “penalty” represents the added intrusiveness of sounds which occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

Ignoring the 10 dB nighttime adjustment for the moment, DNL may be thought of as the continuous A-weighted sound level which would be present if all of the variations in sound level which occur over a 24-hour period were smoothed out so as to contain the same total sound energy.

DNL provides a single measure of overall noise impact, but does not provide specific information on the number of noise events or the individual sound levels which occur during the day. For example, a DNL of 65 dB could result from a very few noisy events, or a large number of quieter events.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. Scientific studies and social surveys which have been conducted to appraise community annoyance to all types of environmental noise have found the DNL to be the best measure of that annoyance. Its use is endorsed by the scientific community (American National Standards Institute [ANSI] 1980, 1988; U.S. Environmental Protection Agency [USEPA] 1974; Federal Interagency Committee on Urban Noise [FICUN] 1980; Federal Interagency Committee on Noise [FICON] 1992).

There is, in fact, a remarkable consistency in the results of attitudinal surveys about aircraft noise conducted in different countries to find the percentages of groups of people who express various degrees of annoyance when exposed to different levels of DNL. This is illustrated in Figure C-2, which summarizes the results of a large number of social surveys relating community responses to various types of noises, measured in DNL.

Figure C-2 is taken from Schultz (1978) and shows the original curve fit. A more recent study has reaffirmed this relationship (Fidell et al. 1991). Figure C-3 shows an updated form of the curve fit in comparison with the original (Finegold et al. 1992). The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors which influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

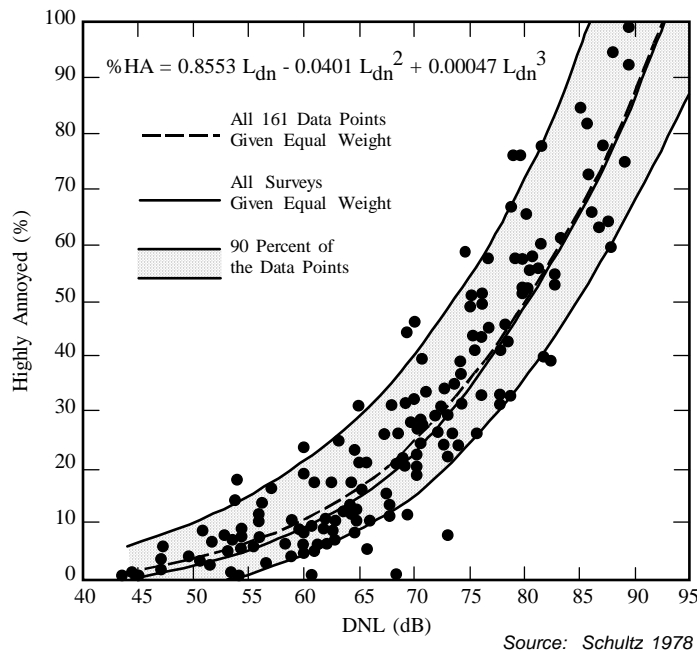
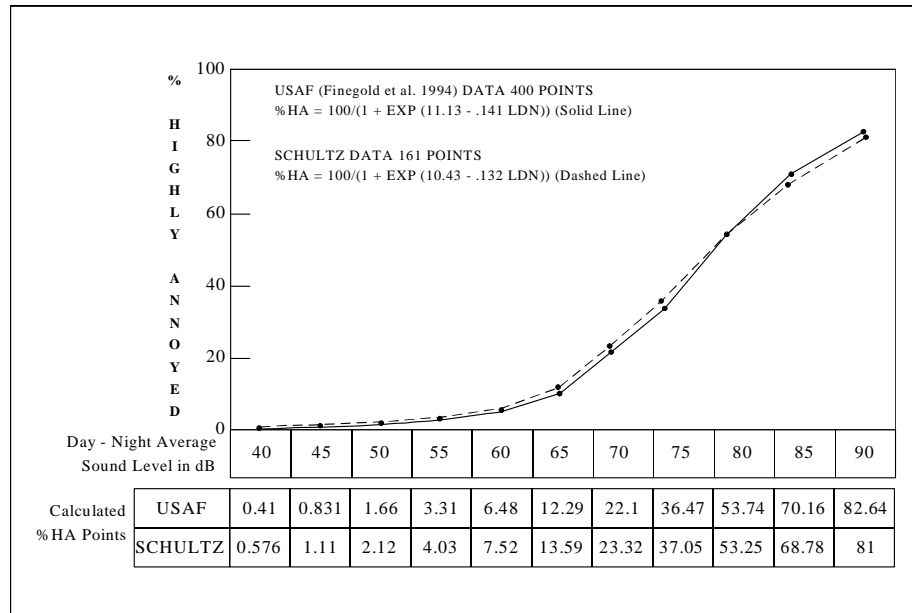


Figure C-2. Community Surveys of Noise Annoyance



Sources: Schultz 1978 and Finegold et al. 1994

Figure C-3. Response of Communities to Noise and Comparison of Original Schultz 1978 and Current USAF Curve Fits

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events. A National Aeronautics and Space Administration (NASA) study reported the reactions of individuals in a community to daily helicopter overflights, ranging from 1 to 32 per day (Fields and Powell 1985). The stated reactions to infrequent helicopter overflights correlated quite well with the daily time-average sound levels over this range of numbers of daily noise events.

The use of DNL has been criticized recently as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based on the inherent feeling that people react more to single noise events and not as much to “meaningless” time-average sound levels.

Time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.5 dB. Assume, as a second example that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of events. This is the basic concept of a time-average sound metric, and specifically the DNL.

C.3 LAND-USE COMPATIBILITY

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL. In June 1980, an ad hoc FICUN published guidelines for considering noise in land use planning (FICUN 1980). These guidelines related DNL to compatible land uses in urban areas. The committee was composed of representatives from the DOD, Department of Transportation, Department of Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, Federal agencies have generally adopted these guidelines to make recommendations to the local communities on land use compatibilities.

The FAA included the committee's guidelines in the Federal Aviation Regulations (USDOT 1984). These guidelines are reprinted in Table C-1, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (see Notes in Table C-1), they provide the best means for evaluating noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL (L_{dn} values) above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions.

In 1990, the FICON was formed to review the manner in which aviation noise effects are assessed and presented. This group released its report in 1992 and reaffirmed the use of DNL as the best metric for this purpose (FICON 1992).

Analyses of aircraft noise impacts and compatible land uses around DOD facilities are normally made using NOISEMAP (Moulton 1992). This computer-based program calculates DNL at many points on the ground around an airfield and draws contours of equal levels for overlay onto land-use maps of the same scale. The program mathematically calculates the DNL of all aircraft operations for a 24-hour period, taking into consideration the number and types of aircraft, their flight paths and engine thrust settings, and the time of day (daytime or nighttime) that each operation occurs.

Day-night average sound levels may also be measured directly around an airfield, rather than calculated with NOISEMAP; however, the direct measurement of annualized DNL is difficult and costly since it requires year-round monitoring or careful seasonal sampling. NOISEMAP provides an accurate projection of aircraft noise around airfields.

NOISEMAP also has the flexibility of calculating sound levels at any specified ground location so that noise levels at representative points under flight paths can be ascertained. NOISEMAP is most accurate for comparing "before and after" noise impacts which would result from proposed airfield changes or alternative noise control actions, so long as the various impacts are calculated in a consistent manner.

Table C-1. Land Use Compatibility Guidelines with Yearly

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVELS IN DECIBELS					
	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals & nursing homes	Y	25	30	N	N	N
Churches, auditoria, & concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business, & professional	Y	Y	25	30	N	N
Wholesale & retail-building materials, hardware, and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic & optical	Y	Y	25	30	N	N
Agriculture (except livestock) & forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming & breeding	Y	Y(6)	Y(7)	N	N	N
Mining & fishing, resource production & extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas & spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits & zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, & camps	Y	Y	Y	N	N	N
Golf courses, riding stables, & water recreation	Y	Y	25	30	N	N
<p>Key: Y (Yes) = Land use and related structures compatible without restrictions. N (No) = Land use and related structures are not compatible and should be prohibited. NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure. 25 or 30 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.</p> <p>Notes: (1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements often are stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems. (2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low. (3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low. (4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low. (5) Land-use compatible, provided special sound reinforcement systems are installed. (6) Residential buildings require an NLR of 25 dB. (7) Residential buildings require an NLR of 30 dB. (8) Residential buildings not permitted.</p>						

Source: FAA 1985 and USDOT 1984

REFERENCES

- ANSI 1980 American National Standards Institute (ANSI). 1980. *Sound Level Descriptions for Determination of Compatible Land Use*. ANSI S3.23-1980.
- ANSI 1988 ANSI. 1988. *Quantities and Procedures for Description and Measurement of Environmental Sound, Part 1*. ANSI S12.9.
- FAA 1985 Federal Aviation Administration (FAA). 1985. *Aviation Noise Effects*. March 1985.
- FICON 1992 Federal Interagency Committee on Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. August 1992.
- FICUN 1980 Federal Interagency Committee on Urban Noise (FICUN). 1980. *Guidelines for Considering Noise in Land Use Planning and Control*.
- Fidell et al. 1991 Fidell, S., D.S. Barger, and T.J. Schultz. 1991. "Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise." *Journal of the Acoustical Society of America* 89:221-233. January 1991.
- Fields and Powell 1985 Fields, James M. and C.A. Powell. 1985. *Community Survey of Helicopter Noise Annoyance Conducted under Controlled Helicopter Noise Exposure Conditions*. National Aeronautics and Research Administration, NASA TM-86400.
- Finegold et al. 1992 Finegold, L.S., C.S. Harris, and H.E. VonGierke. 1992. "Applied Acoustical Report: Criteria for Assessment of Noise Impacts on People." *Journal of Acoustical Society of America*. June 1992.
- Finegold et al. 1994 Finegold, L.S., C.S. Harris, and H.E. vonGierke. 1994. "Community Annoyance and Sleep Disturbance: Updated Criteria for Assessing the Impacts of General Transportation Noise on People." *Noise Control Engineering Journal* 42(1):25-30. January-February 1994.
- Harris 1979 Harris, C.M. 1979. *Handbook of Noise Control*. McGraw-Hill Book Company.
- Moulton 1992 Moulton, C.M. 1992. *Air Force Procedure for Predicting Noise Around Airbases: Noise Exposure Model (NOISEMAP) Technical Report*. Report AL-TR-1992-0059.
- Schultz 1978 Schultz, T.J. 1978. "Synthesis of Social Surveys on Noise Annoyance." *Journal of the Acoustical Society of America* 64(2):377-405. August 1978.
- USDOT 1984 U.S. Department of Transportation (USDOT). 1984. *Airport Noise Compatibility Planning; Development of Submission of Aircraft Operator's Noise Exposure Map and Noise Compatibility Program; Final Rule and Request for Comments*. 14 CFR Parts 11 and 150. *Federal Register* 49(244): 18 December.
- USEPA 1974 U.S. Environmental Protection Agency, Office of Noise Abatement and Control (USEPA). 1971. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. EPA 550/9-74-004. March 1974.