DRAFT

ENVIRONMENTAL ASSESSMENT FOR WATER WELL DEVELOPMENT AT BUCKLEY AIR FORCE BASE

DEPARTMENT OF THE AIR FORCE
BUCKLEY AIR FORCE BASE, COLORADO

AIR FORCE CENTER FOR
ENGINEERING AND THE ENVIRONMENT

MAY 2010

ACRONYMS

°F	degrees Fahrenheit
460 CES	460th Civil Engineer Squadron
460 SW	460th Space Wing
AASF	Army Aviation Support Facility
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ADT	average daily traffic
AFB	Air Force Base
AFI	Air Force Instruction
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
ANG	Air National Guard
AOPC	Area of Potential Concern
APS	Aurora Public Schools
APZ	Accident Potential Zone
AQCC	Air Quality Control Commission
AQCR	Air Quality Control Region
AST	aboveground storage tank
AT/FP	Antiterrorism Force Protection
BASH	Bird-Aircraft Strike Hazard
BEA	U.S. Bureau of Economic Analysis
BLS	U.S. Bureau of Labor Statistics
BMP	Best Management Practice(s)
CAA	Clean Air Act
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES/CEV	Civil Engineer Squadron/ Environmental Flight
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
COANG	Colorado Air National Guard
CWA	Clean Water Act
CZ	Clear Zone
dB	decibel
dBA	A-weighted decibel
DIA	Denver International Airport
DMWRD	Denver Metro Wastewater Reclamation District
DNL	day-night average dBA
DoD	Department of Defense
E-470	Expressway 470
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GPD	gallon(s) per day
GPM	gallon(s) per minute
HAP	hazardous air pollutant
HAZMART	hazardous materials pharmacy
HAZWOPER	Hazardous Waste Operations and Emergency Response
HMMP	Hazardous Materials Management Plan
HWMP	Hazardous Waste Management Plan
I-	Interstate
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
in/yr	inch(es) per year
JFHQ-CO	Joint Force Headquarters – Colorado
JP-	jet fuel
LEED	Leadership in Energy and Environmental Design
LOS	level-of-service
MBTA	Migratory Bird Treaty Act
Mcf/Month	million cubic feet per month
MGD	million gallons per day
MGY	million gallons per year
mph	miles per hour
MS4	Municipal Separate Storm Sewer System
msl	mean sea level
MWh/Month	megawatt hour(s) per month
mya	million years ago
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOC	Naval Information Operations Command
NO_2	nitrogen dioxide
NOI	Notice of Intent
NOSC	Navy Operational Support Center
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
ODS	Ozone Depleting Substances
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
Pb	lead
PCE	tetrachloroethylene
PM	particulate matter
PM_{10}	particulate matter equal or less than ten microns in diameter
$PM_{2.5}$	particulate matter equal or less than 2.5 microns in diameter
PMSA	Primary Metropolitan Statistical Area
PSD	Prevention of Significant Deterioration
QD	quantity-distance
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
SDWA	Safe Drinking Water Act
sf	square foot/feet
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO2	sulfur dioxide
SO_x	sulfur oxide
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
sy	square yard
tpy	tons per year
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGBC	Green Building Council
VOC	volatile organic compound
WMC	Waste Management of Colorado, Inc.
WRCC	Western Regional Climate Center
WWII	World War II

EXECUTIVE SUMMARY

The U.S. Air Force (USAF) and the 460th Civil Engineer Squadron (460 CES) propose the activation of three (3) existing water wells in order to establish an independent and sustainable irrigation system on Buckley Air Force Base (AFB). The Proposed Action comprises the construction of a 250,000-gallon aboveground storage tank (AST) which would be used to store water pumped from Well #1, Well #2, and Well #3. To implement this action, Well #1 would require rehabilitation measures and Well #2 would require re-drilling and additional construction. Well #3 is fully functional and is currently in operation. Pipelines linking these three existing wells to the proposed AST would be installed. In addition, the Proposed Action also includes the the installation of a delivery/irrigation pipeline that would connect to and operate with the existing irrigation system on the base.

The purpose of the proposed water well development is to responsibly maintain and irrigate the current landscape and to increase self-sufficiency at Buckley AFB. The current irrigation system results in some unnecessary water waste, and development of an independent system would increase the efficiency of the base's water use patterns while increasing the responsible use of regional water resources. An independent irrigation system at Buckley AFB would also be more fiscally responsible since the base would no longer rely on the City of Aurora for its irrigation water, and funds previously dedicated to the purchase of water could be allocated to other base projects.

This Environmental Assessment (EA) considers the Proposed Action and evaluates potential environmental impacts to those resources that would likely be affected by implementation of the Proposed Action or its alternatives. The alternatives considered comprise two (2) alternative AST locations and pipeline alignments, as well as a No-Action alternative. This EA analyzes resource areas including: utilities, transportation and circulation, geological resources, water resources, land use, socioeconomics, environmental justice, cultural resources, visual resources, air quality, noise, hazardous materials and waste, biological resources, and safety.

ENVIRONMENTAL ASSESSMENT
FOR WATER WELL DEVELOPMENT AT
BUCKLEY AFB

CONTENTS

SECTION	TITLE	PAGE
ACRONYMS		inside front cover
EXECUTIVE SUMMARY		ES-1
1	**PURPOSE AND NEED FOR ACTION**	1-1
1.1	INTRODUCTION	1-1
1.2	LOCATION AND BACKGROUND	1-1
1.3	PURPOSE AND NEED	1-3
1.4	SUMMARY OF ENVIRONMENTAL STUDY REQUIREMENTS	1-5
1.4.1	National Environmental Policy Act	1-5
1.4.2	Endangered Species Act	1-6
1.4.3	Clean Air Act and Conformity Requirements	1-6
1.4.4	Water Resources Regulatory Requirements	1-7
1.4.5	Cultural Resources Regulatory Requirements	1-8
1.4.6	Antiterrorism Force Protection	1-9
1.4.7	Sustainability and Greening	1-9
1.4.8	Other Executive Orders	1-10
1.4.9	Interagency and Intergovernmental Coordination for Environmental Planning	1-10
2	**PROPOSED ACTION AND ALTERNATIVES**	**2-1**
2.1	INTRODUCTION	2-1
2.2	PROPOSED ACTION	2-1
2.2.1	Preferred AST Location	2-3
2.3	ALTERNATIVES	2-3
2.3.1	Alternative 1: Location of AST South of Camp Rattlesnake	2-5
2.3.2	Alternative 2: Location of AST along Highway 30/E. 6th Avenue	2-7
2.3.3	Alternative 3: No-Action Alternative	2-9
3	**AFFECTED ENVIRONMENT**	**3-1**
3.1	UTILITIES	3-1
3.1.1	Definition of Resource	3-1
3.1.2	Existing Conditions	3-1
3.1.2.1	Buckley AFB	3-2
3.2	TRANSPORTATION AND CIRCULATION	3-7

CONTENTS
(Continued)

NUMBER	TITLE	PAGE
3.2.1	Definition of Resource	3-7
3.2.2	Existing Conditions	3-7
3.2.2.1	Regional and Local Circulation	3-7
3.2.2.2	Buckley AFB	3-8
3.3	GEOLOGICAL RESOURCES	3-10
3.3.1	Definition of Resources	3-10
3.3.2	Existing Conditions	3-10
3.3.2.1	Regional Setting	3-10
3.3.2.2	Buckley AFB	3-11
3.4	WATER RESOURCES	3-14
3.4.1	Definition of Resource	3-14
3.4.2	Existing Conditions	3-14
3.4.2.1	Regional Setting	3-14
3.4.2.2	Buckley AFB	3-15
3.5	LAND USE	3-19
3.5.1	Definition of Resource	3-19
3.5.2	Existing Conditions	3-19
3.5.2.1	Regional Setting	3-19
3.5.2.2	Buckley AFB	3-20
3.6	SOCIOECONOMICS	3-22
3.6.1	Definition of Resource	3-22
3.6.2	Existing Conditions	3-22
3.6.2.1	Regional Setting	3-22
3.6.2.2	Buckley AFB	3-26
3.7	ENVIRONMENTAL JUSTICE	3-27
3.7.1	Definition of Resource	3-27
3.7.2	Existing Conditions	3-27
3.7.2.1	Minority and Low Income Populations	3-27
3.7.2.2	Protection of Children from Environmental Health Risks and Safety Risks	3-29
3.8	CULTURAL RESOURCES	3-31
3.8.1	Definition of Resource	3-31
3.8.2	Existing Conditions	3-31
3.8.2.1	Regional Setting	3-31
3.8.2.2	Buckley AFB	3-32
3.9	VISUAL RESOURCES	3-33
3.9.1	Definition of Resource	3-33
3.9.2	Existing Conditions	3-33
3.9.2.1	Regional Visual Character	3-33
3.9.2.2	Buckley AFB	3-33

CONTENTS
(Continued)

NUMBER	TITLE	PAGE
3.10	AIR QUALITY	3-35
3.10.1	Definition of Resource	3-35
3.10.1.1	Criteria Pollutants	3-35
3.10.2	Existing Conditions	3-35
3.10.2.1	Climate	3-35
3.10.2.2	Local Air Quality	3-36
3.10.2.3	Emissions at Buckley AFB	3-37
3.11	NOISE	3-39
3.11.1	Definition of Resource	3-39
3.11.2	Existing Conditions	3-39
3.11.2.1	Buckley AFB	3-39
3.12	HAZARDOUS MATERIALS AND WASTES	3-41
3.12.1	Definition of Resource	3-41
3.12.2	Existing Conditions	3-41
3.12.2.1	Hazardous Waste Generation and Storage	3-42
3.12.2.2	Universal Waste	3-43
3.12.2.3	Storage Tanks and Oil/Water Separators	3-43
3.12.2.4	Asbestos	3-44
3.12.2.5	Environmental Restoration Program	3-46
3.12.2.6	Areas of Potential Concern	3-48
3.13	BIOLOGICAL RESOURCES	3-50
3.13.1	Definition of Resource	3-50
3.13.2	Existing Conditions	3-51
3.13.2.1	Vegetation	3-51
3.13.2.2	Wildlife	3-51
3.13.2.3	Sensitive Species	3-52
3.13.2.4	Wetlands	3-56
3.14	SAFETY	3-56
3.14.1	Definition of Resource	3-56
3.14.2	Existing Conditions	3-57
3.14.2.1	Aircraft Mishaps and Bird-Aircraft Strike Hazard	3-57
3.14.2.2	Accident Potential Zones	3-58
3.14.2.3	Explosives Safety	3-58
4	**ENVIRONMENTAL CONSEQUENCES**	4-1
4.1	UTILITIES	4-2
4.1.1	Approach to Analysis	4-2
4.1.2	Impacts	4-2
4.1.2.1	Proposed Action	4-2
4.1.2.2	Alternatives 1: Location of AST South of Camp Rattlesnake	4-5

CONTENTS
(Continued)

NUMBER	TITLE	PAGE
4.1.2.3	Alternative 2: Location of AST along Highway 30/6th Avenue	4-5
4.1.2.4	Alternative 3: No-Action Alternative	4-6
4.2	TRANSPORTATION AND CIRCULATION	4-7
4.2.1	Approach to Analysis	4-7
4.2.2	Impacts	4-7
4.2.2.1	Proposed Action	4-7
4.2.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-8
4.2.2.3	Alternative 3: No-Action Alternative	4-8
4.3	GEOLOGICAL RESOURCES	4-9
4.3.1	Approach to Analysis	4-9
4.3.2	Impacts	4-9
4.3.2.1	Proposed Action	4-9
4.3.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-12
4.3.2.3	Alternative 3: No-Action Alternative	4-12
4.4	WATER RESOURCES	4-13
4.4.1	Approach to Analysis	4-13
4.4.2	Impacts	4-13
4.4.2.1	Proposed Action	4-13
4.4.2.2	Alternatives 1: Location of AST South of Camp Rattlesnake	4-16
4.4.2.3	Alternative 2: Location of AST along Highway 30/6th Avenue	4-17
4.4.2.4	Alternative 3: No-Action Alternative	4-17
4.5	LAND USE	4-18
4.5.1	Approach to Analysis	4-18
4.5.2	Impacts	4-18
4.5.2.1	Proposed Action	4-18
4.5.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-19
4.5.2.3	Alternative 3: No-Action Alternative	4-19
4.6	SOCIOECONOMICS	4-20
4.6.1	Approach to Analysis	4-20
4.6.2	Impacts	4-20
4.6.2.1	Proposed Action	4-20
4.6.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-20
4.6.2.3	Alternative 3: No-Action Alternative	4-21

CONTENTS
(Continued)

NUMBER	TITLE	PAGE
4.7	ENVIRONMENTAL JUSTICE	4-22
4.7.1	Approach to Analysis	4-22
4.7.2	Impacts	4-22
4.7.2.1	Proposed Action	4-22
4.7.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-23
4.7.2.3	Alternative 3: No-Action Alternative	4-23
4.8	CULTURAL RESOURCES	4-24
4.9	VISUAL RESOURCES	4-25
4.9.1	Approach to Analysis	4-25
4.9.2	Impacts	4-25
4.9.2.1	Proposed Action	4-25
4.9.2.2	Alternative 1: Location of AST South of Camp Rattlesnake	4-26
4.9.2.3	Alternative 2: Location of AST along Highway 30/ 6th Avenue	4-26
4.9.2.4	Alternative 3: No-Action Alternative	4-26
4.10	AIR QUALITY	4-27
4.10.1	Approach to Analysis	4-27
4.10.2	Impacts	4-28
4.10.2.1	Proposed Action	4-28
4.10.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-30
4.10.2.3	Alternative 3: No-Action Alternative	4-31
4.11	NOISE	4-32
4.11.1	Approach to Analysis	4-32
4.11.2	Impacts	4-32
4.11.2.1	Proposed Action	4-32
4.11.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-33
4.11.2.3	Alternative 3: No-Action Alternative	4-33
4.12	HAZARDOUS MATERIALS AND WASTES	4-34
4.12.1	Approach to Analysis	4-34
4.12.2	Impacts	4-34
4.12.2.1	Proposed Action	4-34
4.12.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-39
4.12.2.3	Alternative 3: No-Action Alternative	4-39
4.13	BIOLOGICAL RESOURCES	4-40
4.13.1	Approach to Analysis	4-40

CONTENTS
(Continued)

NUMBER	TITLE	PAGE
4.13.2	Impacts	4-40
4.13.2.1	Proposed Action	4-40
4.13.2.2	Alternative 1: Location of AST South of Camp Rattlesnake	4-43
4.13.2.3	Alternative 2: Location of AST along Highway 30/6th Avenue	4-43
4.13.2.4	Alternative 3: No-Action Alternative	4-44
4.14	SAFETY	4-45
4.14.1	Approach to Analysis	4-45
4.14.2	Impacts	4-45
4.14.2.1	Proposed Action	4-45
4.14.2.2	Alternatives 1 and 2: Alternative AST Locations at Buckley AFB	4-46
4.14.2.3	Alternative 3: No-Action Alternative	4-46
5	**CUMULATIVE IMPACTS**	**5-1**
5.1	OFF-BASE ACTIVITIES	5-1
5.2	ON-BASE ACTIVITIES	5-2
6	**SUMMARY OF FINDINGS**	**6-1**
7	**SPECIAL PROCEDURES**	**7-1**
8	**REFERENCES**	**8-1**
9	**LIST OF PREPARERS**	**9-1**

APPENDICES

A IICEP Correspondence
B Air Emission Factors and Assumptions

LIST OF FIGURES

NUMBER	TITLE	PAGE
1-1	Location of Buckley AFB	1-2
1-2	Buckley AFB	1-4
2-1	Preferred AST Location	2-4
2-2	Tank Location: Alternative #1	2-6
2-3	Tank Location: Alternative #2	2-8
3-1	Irrigation Areas at Buckley AFB	3-6
3-2	Soil Associations at Buckley AFB	3-12
3-3	Surface Water Resources, Floodplains, Groundwater Wells, and Wetlands at Buckley AFB	3-16
3-4	Current Land Use at Buckley AFB	3-21
3-5	Historic Location of Demolished Structures with Potential Asbestos-Containing Material (ACM), Buckley AFB	3-45
3-6	Environmental Restoration Program (ERP) Sites and Areas of Potential Concern (AOPCs) at Buckley AFB	3-47
4-1	Soils Associations and Proposed Project and Alternatives	4-10
4-2	Surface Water Resources, Floodplains, Groundwater Wells, and Wetlands and Proposed Project and Alternatives	4-14
4-3	Historical Location of Demolished Structures with Potential Asbestos-Containing Material (ACM) and Proposed Project and Alternatives	4-36
4-4	Environmental Restoration Program (ERP) Sites and Areas of Potential Concern (AOPCs) and Proposed Project and Alternatives	4-37

LIST OF TABLES

NUMBER	TITLE	PAGE
2-1	Components of Preferred AST Location	2-3
2-2	Components of Alternative 1	2-5
2-3	Components of Alternative 2	2-7
3-1	Information on Selected Groundwater Wells at Buckley AFB	3-18
3-2	Local and Regional Population Trends (1990, 2000 and 2008)	3-23
3-3	Annual Employment by Occupational Sector in the Denver PMSA (1990, 2000 and 2007)	3-24
3-4	Annual Employment by Occupational Sector in the Denver PMSA (1990, 2000 and 2007)	3-25
3-5	Economic Indicators, Denver PMSA, Colorado, and United States (1990, 2000, and 2007)	3-26
3 6	Environmental Justice Data	3-28
3-7	Denver AQCR Designation for Criteria Pollutants	3-36
3-8	Stationary and Mobile Source Emissions at Buckley AFB	3-38
3-9	Areas of Potential Concern (AOPCs) at Buckley AFB	3-49
3-10	Sensitive Species Potentially Occurring on Buckley AFB	3-53
4-1	Projected Combustion Emissions for Construction and Operational Activities (total tons)	4-29
5-1	Projects Planned at Buckley AFB	5-4

SECTION 1
OVERVIEW

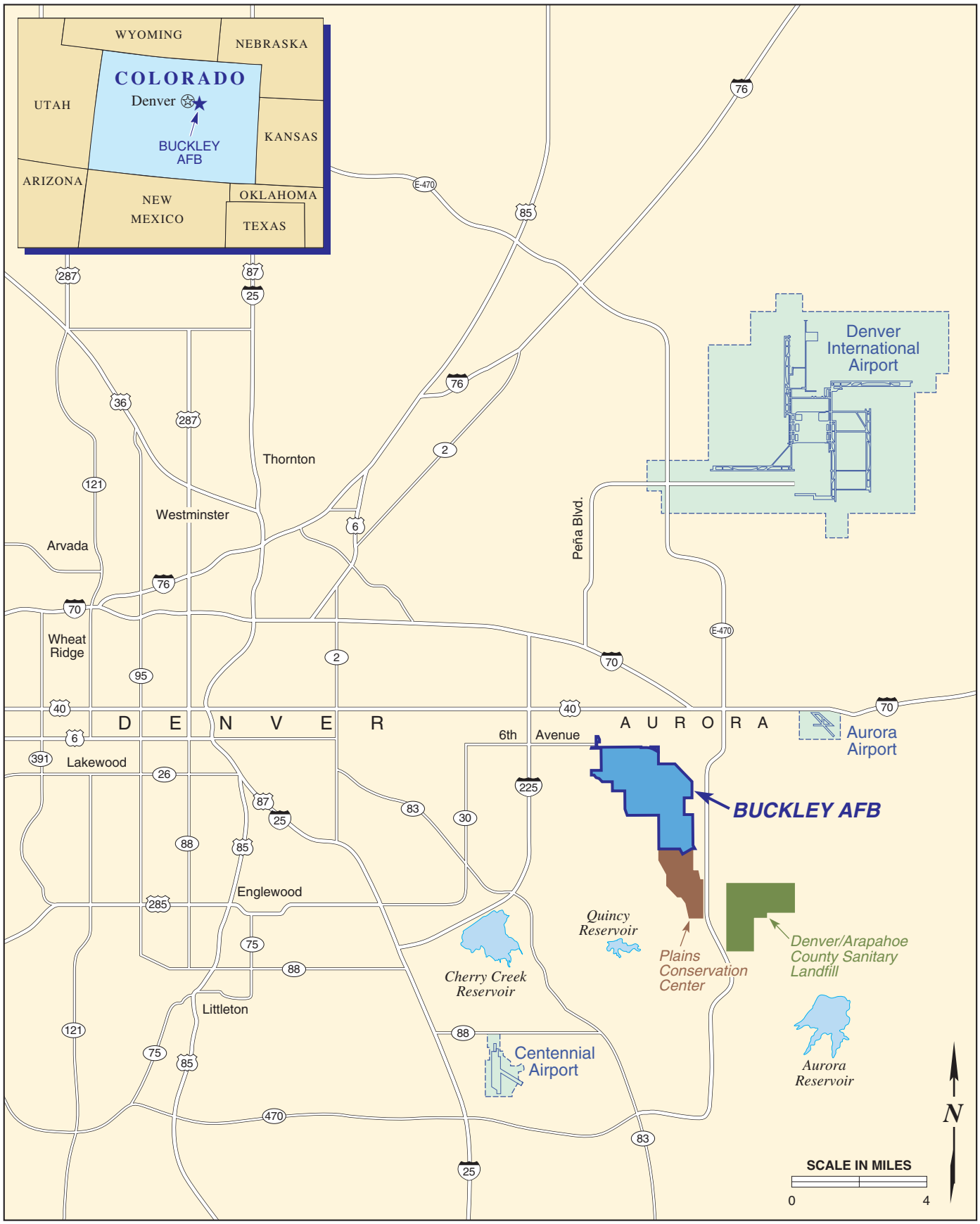
1.1 INTRODUCTION

The 460th Space Wing (460 SW) is a unit of the U.S. Air Force (USAF) Space Command located at Buckley Air Force Base (AFB). The 460th Civil Engineer Squadron (460 CES), which provides base operating support, has an interest in activating two existing water wells to in order to establish an independent and sustainable irrigation system on Buckley AFB, where they currently irrigate approximately 58 acres, primarily along major thoroughfares and near structure complexes.

At present, Buckley AFB has two unutilized water wells for which the Air Force retains water rights. Currently, the base obtains its irrigation water from the City of Aurora; there is no contractual arrangement with the City that would preclude the base from establishing an independent water system (Buckley AFB 2010). The Proposed Action to be addressed in this Environmental Assessment (EA) comprises the development of existing water wells located on both USAF and City of Aurora property, and the construction of a suitable facility to store water pumped from these wells in order to provide irrigation on the base, independent of outside water sources.

1.2 LOCATION AND BACKGROUND

Buckley AFB, abutting the eastern limits of the City of Aurora, is located in Arapahoe County, approximately 5 miles east of Denver and approximately 10 miles southwest of Denver International Airport (Figure 1-1). Regional access to the base is provided by toll highway Expressway 470 (E-470), from which the base can be reached by Jewell Avenue, as well as by Interstate 25 (I-25), I-225, I-70, and I-76. Access to the base can be gained from the City of Aurora through East Mississippi Avenue. Predominant land use activities in the area comprise high-density residential, commercial, and light industrial to the north and west



EA

Location of Buckley AFB
Aurora, Colorado

FIGURE 1-1

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

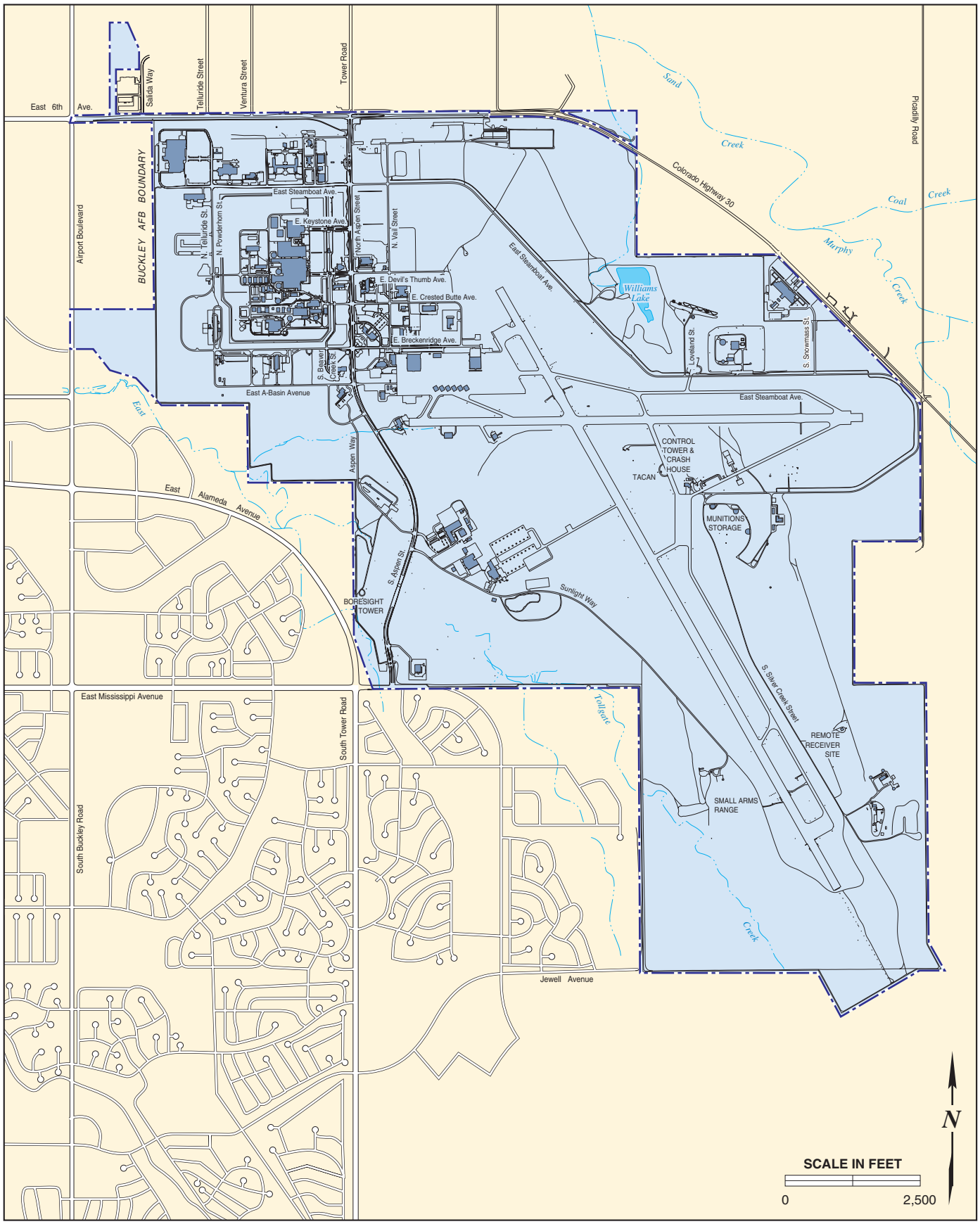
of the base. East of the base are several large undeveloped parcels, a small municipal airport (Aurora Airport), the Denver/Arapahoe County Sanitary Landfill, and smaller areas under various phases of residential expansion. The base comprises about 3,250 acres, virtually all of which have been disturbed or developed to support USAF missions.

The 460 SW is the current host unit at Buckley AFB and their mission is to deliver global infrared surveillance, tracking, and missile warning for theater and homeland defense and to provide combatant commanders with expeditionary warrior Airmen. In addition to the 460 SW, several major tenant organizations are located at Buckley AFB, including:

- 140th Wing Colorado, Air National Guard (COANG)
- Aerospace Data Facility – Colorado
- 566th Intelligence Squadron
- Joint Force Headquarters – Colorado (JFHQ-CO)
- 743rd Military Intelligence Battalion
- Army Aviation Support Facility (AASF)
- Marine Air Control Squadron 23, Marine Air Control Group 48, 4th Marine Aircraft Wing
- Quebec Battery, 5th Battalion, 14th Marines, 4th Marine Division
- Company A, Marine Cryptologic Support Battalion
- Bravo Company, Intelligence Support Battalion, Marine Forces Reserve
- Headquarters, 169th Field Artillery Brigade
- U.S. Coast Guard Cryptologic Unit – Colorado
- Navy Operational Support Center (NOSC)
- Naval Information Operations Command (NIOC)

1.3 PURPOSE AND NEED

In an effort to become increasingly self-sufficient, Buckley AFB has assessed the viability of well water sources on its property. If well development is pursued, a storage facility would be necessary to maintain sufficient water supply for irrigation on the base.



EA

Buckley AFB

FIGURE 1-2

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

To this end, the 460 CES is exploring how best to responsibly maintain and irrigate its current landscape. The current irrigation system results in some unnecessary water waste, and development of an independent system would increase the efficiency of the base's water use patterns while increasing the responsible use of regional water resources. An independent irrigation system at Buckley AFB would also be more fiscally responsible since the base would no longer rely on the City of Aurora for its irrigation water, and funds previously dedicated to the purchase of water could be allocated to other base projects.

1.4 SUMMARY OF ENVIRONMENTAL STUDY REQUIREMENTS

The Environmental Impact Analysis Process (EIAP) is the process by which Federal agencies facilitate compliance with environmental regulations. The primary legislation affecting these agencies' decision-making process is the National Environmental Policy Act (NEPA). This act and other facets of the EIAP are described below.

1.4.1 National Environmental Policy Act

NEPA requires that Federal agencies consider potential environmental consequences of proposed actions in their decision-making process. The law's intent is to protect, restore, or enhance the environment through well-informed Federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA for the purpose of implementing and overseeing Federal policies as they relate to this process. In 1978, the CEQ issued *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] §1500-1508 [CEQ 1978]). These regulations specify that an EA be prepared to:

- briefly provide sufficient analysis and evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
- aid in an agency's compliance with NEPA when an EIS is deemed unnecessary; and
- facilitate preparation of an EIS when one is necessary.

Further, to comply with other relevant environmental requirements (e.g., the Safe Drinking Water Act, Endangered Species Act [ESA], and National Historic Preservation Act [NHPA]) in addition to NEPA, and to assess potential environmental impacts, the EIAP and, subsequently, the decision-making process for the Proposed Action involves a thorough examination of all environmental issues pertinent to this action proposed at Buckley AFB. A summary of other relevant regulations is provided below.

1.4.2 Endangered Species Act

The ESA of 1973 (16 United States Code [USC] §§ 1531–1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require formal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Act.

1.4.3 Clean Air Act and Conformity Requirements

The Clean Air Act (CAA) (42 USC §§ 7401–7671, as amended) provided the authority for the U.S. Environmental Protection Agency (USEPA) to establish nationwide air quality standards to protect public health and welfare. The National Ambient Air Quality Standards (NAAQS) were developed for six criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter, and lead (Pb). The Act also requires that each state prepare a State Implementation Plan (SIP) for maintaining and improving air quality and eliminating violations of the NAAQS. Under the CAA Amendments of 1990, Federal agencies are required to determine whether their undertakings are in conformance with the applicable SIP and demonstrate that their actions will not cause or contribute to a new violation of the NAAQS; increase the frequency or severity of any existing violation; or delay timely attainment of any standard, emission reduction, or milestone contained in the SIP. The USEPA has set forth regulations in 40 CFR 51, Subpart W, which

require the proponent of a proposed action to perform an analysis to determine if its implementation would conform to the SIP.

1.4.4 Water Resources Regulatory Requirements

The Clean Water Act (CWA) of 1977 (33 USC §§ 1251 *et seq.*) regulates pollutant discharges that could affect aquatic life forms or human health and safety, such as those potentially released during temporary construction procedures or well development activities. Section 404 of the CWA, and Executive Order (EO) 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Section 404 also regulates development in streams and wetlands and requires a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management*, requires Federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains. Additionally, the National Pollutant Discharge Elimination System (NPDES) requires that regulated federal entities must implement stormwater pollution prevention plans (SWPPPs) or stormwater management programs (both using best management practices [BMPs]) that effectively reduce or prevent the discharge of pollutants into receiving waters.

The Safe Drinking Water Act (SDWA) of 1974 intends to protect public health by regulating the nation's public drinking water supply. Most recently amended in 1996, the act requires several actions to protect drinking water and its sources, which include rivers, lakes, reservoirs, springs, and ground-water wells. The SDWA applies to every public water system in the U.S. and recognizes source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water in addition to focusing on water treatment as the means of providing safe drinking water to the public.

1.4.5 Cultural Resources Regulatory Requirements

The NHPA of 1966 (16 USC § 470) established the National Register of Historic Places (NRHP) and the Advisory Council on Historic Preservation (ACHP) which outlined procedures for the management of cultural resources on Federal property. Cultural resources can include archaeological remains, architectural structures, and traditional cultural properties such as ancestral settlements, historic trails, and places where significant historic events occurred. The NHPA requires Federal agencies to consider potential impacts to cultural resources that are listed, nominated to, or eligible for listing on the NRHP; designated a National Historic Landmark; or valued by modern Native Americans for maintaining their traditional culture. Section 106 of NHPA requires Federal agencies to consult with the appropriate State Historic Preservation Office (SHPO) if their undertaking might affect such resources. *Protection of Historic and Cultural Properties* (36 CFR 800 [1986]) provides an explicit set of procedures for Federal agencies to meet their obligations under the NHPA, which includes inventorying of resources and consultation with SHPO.

EO 13007, *Indian Sacred Sites*, directs Federal land (any land or interests in land owned by the United States, including leasehold interests held by the United States, except Indian trust lands) managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites (any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe [an Indian or Alaska Native tribe, band, nation, Pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to Public Law No. 103-454, 108 Stat. 4791, an "Indian" refers to a member of such an Indian tribe] or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion) provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.

The American Indian Religious Freedom Act (AIRFA) (42 USC § 1996) established Federal policy to protect and preserve the rights of Native Americans to believe, express, and exercise their traditional religions, including providing access to sacred sites. The Native American Graves Protection and Repatriation

Act (NAGPRA) (25 USC §§ 3001–3013) requires consultation with Native American tribes prior to excavation or removal of human remains and certain objects of cultural importance.

1.4.6 Antiterrorism Force Protection

The DoD has developed Antiterrorism/Force Protection (AT/FP) standards that are designed to reduce the likelihood of physical damage and mass casualties from potential terrorist attacks. Unified Facilities Criteria (UFC) 4-010-01, *DoD Minimum Anti-terrorism Standards for Buildings,* outlines various planning, construction, and operational standards to address potential terrorism threats. A key element of AT/FP standards is the establishment of minimum setbacks and other security standoffs between mass gathering facilities and potentially non-secure adjacent uses (e.g., parking lots, off-installation property). AT/FP setbacks typically extend outward from the sides and corners of facilities for a prescribed distance (e.g., 45 meters); development is either limited or altogether prohibited in such setback areas. Additional AT/FP standards address other facility design and operational considerations, including internal building layout, facility access and security, site circulation, and emergency mass notification.

1.4.7 Sustainability and Greening

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* strives to improve efficiency and environmental performance in Federal agencies by setting goals in the areas of energy efficiency, greenhouse gas emission mitigation, water conservation, waste management and recycling, green procurement, pollution prevention, and livable communities, among others. The EO specifies that every Federal organization and agency must make the reduction of greenhouse gas emissions a priority and establishes specific goal-setting, inventorying, and reporting requirements for Federal agencies. This includes an order for each agency to develop, implement, and update a Strategic Sustainability Performance Plan, which should work toward continual improvement of sustainable practices associated with Federal actions.

Sustainable green building and development practices can be recognized through sustainable site development, water savings, energy efficiency, materials

selection and indoor environmental quality. The U.S. Green Building Council (USGBC)'s Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is a third-party certification program and the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings (USGBC 2008). LEED rating systems are based on a set number of prerequisites and credits in six major categories: (1) sustainable sites; (2) water efficiency; (3) energy and atmosphere; (4) materials and resources; (5) indoor environmental quality; and (6) innovation and design process (USGBC 2005). In the most recent LEED rating system (version 2.2), buildings can qualify for four levels of certification, in order from highest to lowest: platinum, gold, silver, and certified. Benefits of constructing LEED-certified facilities include lower operating costs and increased asset value, reduced waste sent to landfills, conservation of energy and water, healthier and safer facilities for occupants, reduction of harmful greenhouse gas emissions that incrementally contribute to global climate change, and the demonstration of an owner's commitment to environmental stewardship and social responsibility.

1.4.8 Other Executive Orders

Additional regulatory legislation that potentially applies to the implementation of this proposal includes guidelines promulgated by EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, to ensure that citizens in either of these categories are not disproportionately affected. Potential health and safety impacts that could disproportionately affect children are considered under the guidelines established by EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, acts as additional protection for migratory birds.

1.4.9 Interagency and Intergovernmental Coordination for Environmental Planning

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) is a Federally mandated process for informing and coordinating with other governmental agencies regarding proposed actions. As detailed in 40 CFR § 1501.4(b), CEQ regulations require intergovernmental notifications prior to

making any detailed statement of environmental impacts. Through the IICEP process, the USAF notifies relevant Federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a proposed action. Comments and concerns submitted by these agencies during the IICEP process are subsequently incorporated into the analysis of potential environmental impacts conducted as part of the EA.

SECTION 2
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

To provide a sufficient water supply for irrigation at Buckley Air Force Base (AFB), the 460th Civil Engineer Squadron (460 CES) and the U.S. Air Force (USAF) propose the rehabilitation and development of two existing water wells. The construction of a suitable facility to store water pumped from these wells would also be necessary to maintain water resources for year round irrigation. Since water for the base is currently obtained from the City of Aurora, revitalizing existing water wells and establishing a new pipeline system would contribute to more sustainable and self-sufficient water usage at Buckley AFB. This section describes details related to the Proposed Action and alternatives considered.

2.2 PROPOSED ACTION

The Proposed Action comprises the construction of a 250,000-gallon aboveground storage tank (AST) which would be used to store water pumped from Well #1, Well #2, and Well #3. To implement this action, Well #1 would require rehabilitation measures and Well #2 would require re-drilling and additional construction; pipelines linking these two existing wells to the proposed AST would need to be installed. Well #3 is fully functional and is already in operation to supply water to Williams Lake; however pipelines linking this well to the proposed AST would be required. Also proposed is the installation of a delivery/irrigation pipeline that would connect to and operate with the existing irrigation system on the base.

The rehabilitation of Well #1, located within the easement property of Buckley AFB, would be required for the Proposed Action to be feasible. The well is not currently equipped with pumping equipment and is heavily biofouled. The legal water production limitations of this well include a decreed volume limit of 80.6 acre-feet and a decreed flow limit of 166 gallons per minute. The well would be a minimum of 2,115 feet below ground surface upon completion of the proposed rehabilitation. If used, Well #1 would likely produce the full legal amount of

water. A water well study (Buckley AFB 2009) which addressed the viability of Well #1 recommends that the structural integrity of the well be verified and that the rehabilitation program include chemical and mechanical cleaning to remove biological clogging. Prior to the development of this well, it will be determined that Well #1 is fully within the easement property of Buckley AFB and the well site will be protected in accordance with all applicable Antiterrorism/Force Protection (AT/FP) standards. Ultimately the well site would require the installation of power and piping between the well, the proposed AST, and the Buckley AFB main cantonment area in order to be made operational.

For Well #2 to be properly outfitted for use as planned in the Proposed Action, the site would most likely require a complete re-drilling and rehabilitation. The well is currently sealed with no pumping equipment on the site. The legal water production limitations of this well include a decreed volume limit of 70.0 acre-feet and a decreed flow limit of 200 gallons per minute. This site would most likely become a new well capable of producing the full legal amount of water. Additionally, an investigation conducted in 2006 found the well to be blocked at a depth of 455 feet below ground surface. Historically, the well depth at this site has been recorded at 1,945 feet below ground surface, and could potentially be re-drilled to this depth depending on future permitting determination by the Colorado State Engineer's Office (Buckley AFB 2009). The Proposed Action includes construction and drilling activities associated with rehabilitating the well site, as well as the installation of pumping equipment, power, and piping to facilitate the conveyance of water from the well to the proposed AST and then to developed areas of the base currently under irrigation.

As previously indicated, Well #3 is an active well currently supplying water to maintain the artificial water body of Williams Lake to the east of runway 14/32. The well head, pump controls, a flow meter, and other equipment are located on a concrete pad enclosed in an unlocked, fenced area within the flight line fence. The well was originally installed in 1942, but an extensive rehabilitation of the well was performed in April 2005. Well #3 was relined with steel casing to a total depth of 2,134 feet below ground surface (Buckley AFB 2009). The Proposed Action includes the installation of additional piping to facilitate conveyance of this well to the proposed AST and then to irrigated areas of the base.

2.2.1 Preferred AST Location

Under the Proposed Action, the proposed 250,000-gallon AST would be located to the east of a current Recreational Vehicle parking area as depicted in Figure 2-1. This is the preferred AST location as it will require the least amount of ground disturbance to install the proposed pipeline and the AST location is well outside the airfield Accident Protection Zone (APZ). Table 2-1 provides a description of the project components that would be necessary to support construction of the proposed AST in the preferred location. The dimensions of the proposed tank would comply with all appropriate Airfield Planning and Design requirements in the Unified Facilities Criteria (UFC 3-260-01). Also in compliance with these requirements, the proposed tank would not obstruct any runway imaginary surfaces at the airfield.

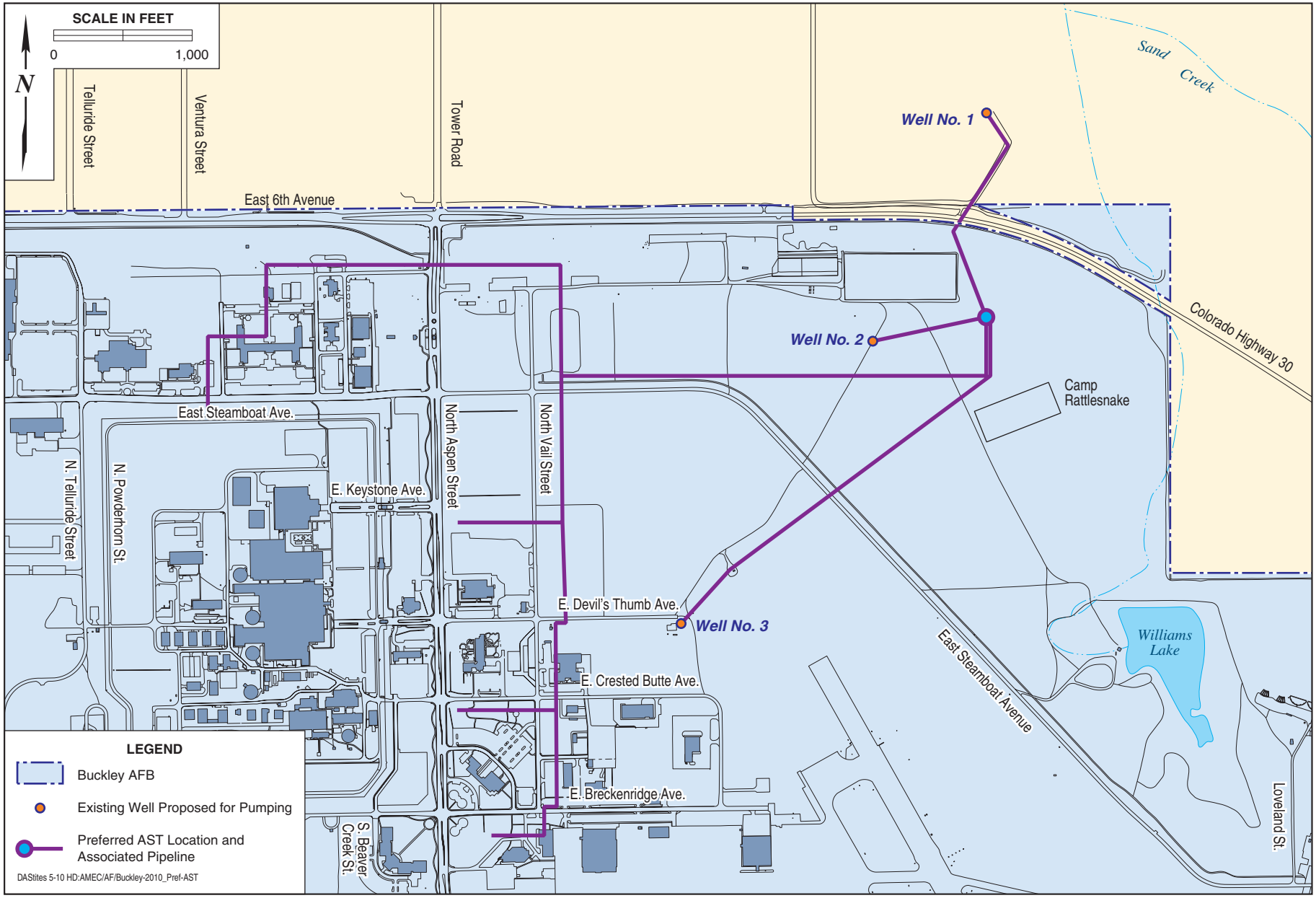
Table 2-1. Components of Preferred AST Location

Component	Dimensions/Capacity
Water Storage	
Aboveground Storage Tank (AST)	250,000-gallon capacity
Water Pipelines*	
Well #1 to AST	1,633 linear feet (LF)
Well #2 to AST intake pipeline	838 LF
Well #3 to AST intake pipeline	3,282 LF
AST to irrigation system	13,223 LF
Total pipeline	18,976LF

* All linear distances are estimated.

2.3 ALTERNATIVES

NEPA guidelines require that an assessment of potentially effective and reasonably feasible alternatives be provided. Alternatives that were dismissed early in the planning process as infeasible are not addressed in this EA. For instance, since the fate of Williams Lake at Buckley AFB is uncertain due to its potential contribution to bird-aircraft strike hazards and it is unclear whether this would be an alternative long-term water storage site, the use of Williams Lake as an alternative water supply and storage site is not further analyzed. Also, the creation of new wells to meet the need for irrigation water was deemed cost



EA

Preferred AST Location

FIGURE 2-1

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

prohibitive and inefficient in light of the existing wells to which Buckley AFB retains water rights; therefore, the drilling of new wells is not analyzed as an alternative in this EA.

In considering the proposed 250,000-gallon AST, two alternative locations for the tank are addressed in this EA in addition to the preferred AST location. In compliance with NEPA guidelines and to provide a baseline against which to compare the Proposed Action and alternatives, the "No-Action" alternative is also carried forward. The details of each alternative are summarized below.

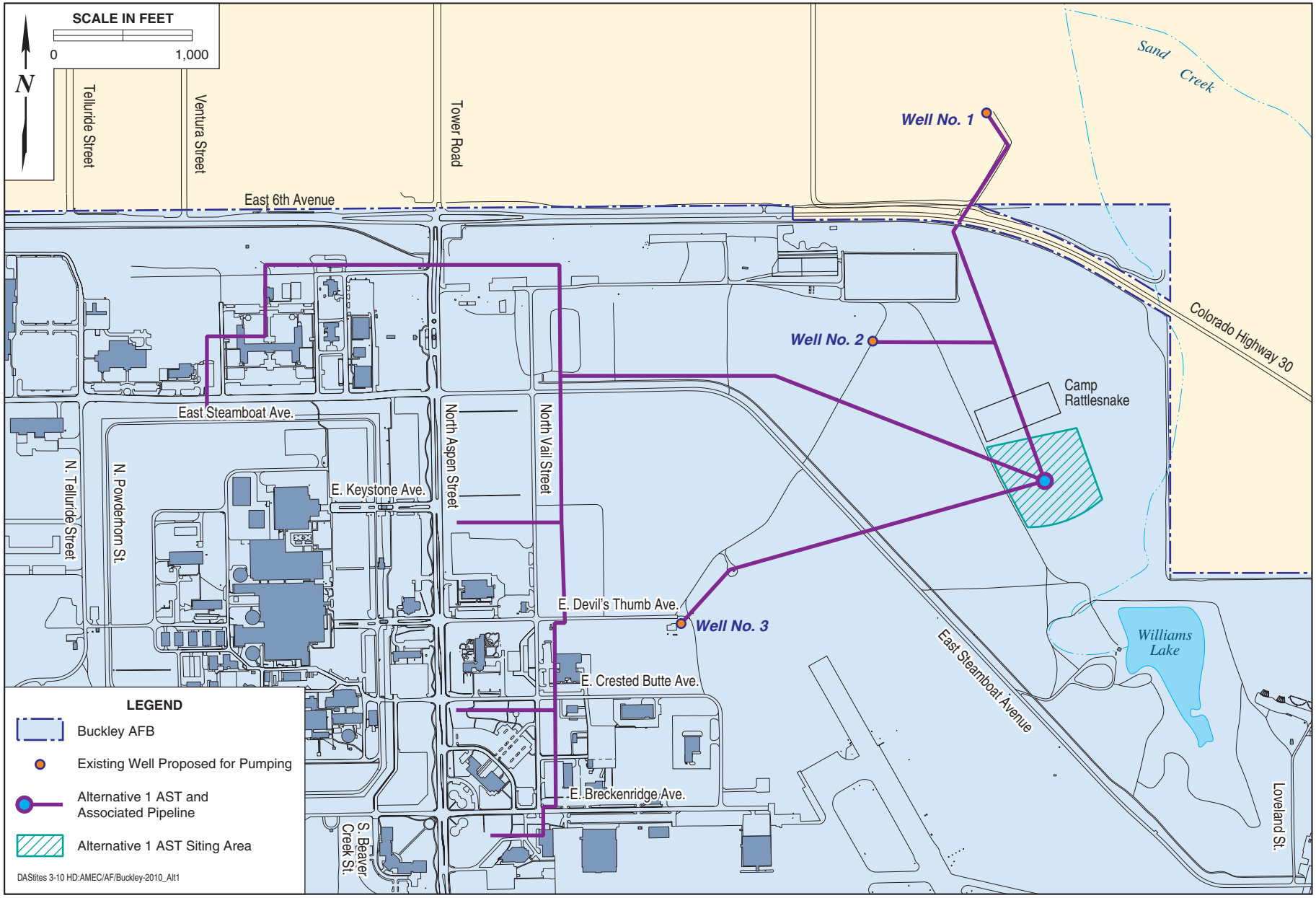
2.3.1 Alternative 1: Location of AST South of Camp Rattlesnake

Under this alternative, the proposed 250,000-gallon AST would be located south of Camp Rattlesnake as depicted in Figure 2-2. This location is outside both the APZ and the CZ. Implementation of this alternative would place an additional structure in the vicinity of Camp Rattlesnake, which is used by various tenant organizations and the USAF as a target area for the practice of field and air to ground drop operations. Table 2-2 provides a description of the project components that would be necessary to support construction of the proposed AST in the location described under this alternative. The dimensions of the proposed tank would comply with all appropriate Airfield Planning and Design requirements in the Unified Facilities Criteria (UFC 3-260-01) and the proposed tank would not obstruct the runway imaginary surfaces at the airfield.

Table 2-2. Components of Alternative 1

Component	Dimensions/Capacity
Water Storage	
Aboveground Storage Tank (AST)	250,000-gallon capacity
Water Pipelines*	
Well #1 to AST	2,940 LF
Well #2 to AST intake pipeline	1,911 LF
Well #3 to AST intake pipeline	2,888 LF
AST to irrigation system	13,365 LF
Total pipeline	21,104 LF

* All linear distances are estimated.



No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

EA

Tank Location: Alternative #1

FIGURE 2-2

This alternative would include all the attendant water well construction and rehabilitation activities required by the Proposed Action in addition to the proposed construction of the AST. All activities associated with pipeline installation outlined in the Proposed Action would proceed with implementation of this alternative.

2.3.2 Alternative 2: Location of AST along Highway 30/E. 6th Avenue

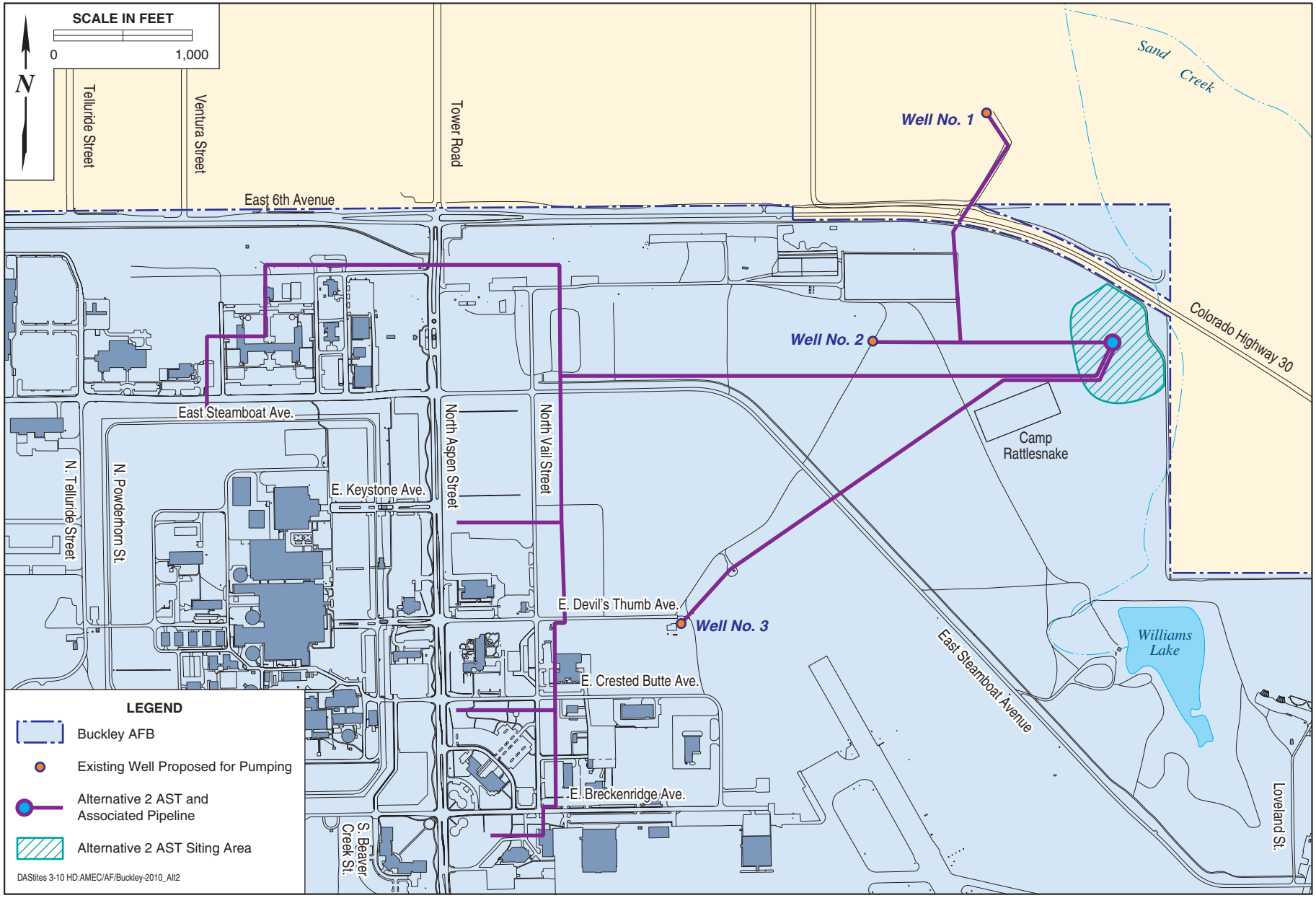
Implementation of this alternative would result in the placement of the proposed 250,000-gallon AST within the northeastern portion of the base, bound by Highway 30 and 6th Avenue as depicted in Figure 2-3. This area is located more than 3,000 feet outside the APZ and CZ. Table 2-3 provides a description of the project components that would be necessary to support construction of the proposed AST in the location described under this alternative. The dimensions of the proposed tank would comply with all appropriate Airfield Planning and Design requirements in the Unified Facilities Criteria (UFC 3-260-01) and would not obstruct the runway imaginary surfaces at the airfield.

In addition to the construction of an AST, this alternative would include all the attendant water well construction and rehabilitation activities. As the location furthest from both the well locations and the irrigated areas at Buckley AFB, the siting of the AST located here would require the most extensive pipeline construction of the three examined alternatives. Also, all the activities associated with pipeline installation outlined in the Proposed Action would proceed with the implementation of this alternative.

Table 2-3. Components of Alternative 2

Component	Dimensions/Capacity
Water Storage	
Aboveground Storage Tank (AST)	250,000-gallon capacity
Water Pipelines*	
Well #1 to AST	2,921 LF
Well #2 to AST intake pipeline	1,698 LF
Well #3 to AST intake pipeline	3,867 LF
AST to irrigation system	13,863 LF
Total pipeline	22,349 LF

* All linear distances are estimated.



No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

EA

Tank Location: Alternative #2

FIGURE 2-3

2.3.3 Alternative 3: No-Action Alternative

Selection of the No-Action Alternative would result in the continuing use of irrigation water purchased from the City of Aurora. The current inefficient water use (i.e., by the transfer of water from more remote wells owned by the City) would continue and USAF objectives to create a more sustainable and self-sufficient irrigation system at Buckley AFB would not be realized. Though this is the least desirable outcome, the No-Action Alternative will be carried forward for further analysis in the EA in accordance with NEPA guidelines and Council on Environmental Quality (CEQ) requirements.

SECTION 3
AFFECTED ENVIRONMENT

This section describes relevant existing environmental conditions for resources potentially affected by the Proposed Action and project alternatives. In compliance with guidelines contained in the National Environmental Policy Act, Council on Environmental Quality regulations, and 32 Code of Federal Regulations (CFR) § 989, the description of the affected environment focuses on only those resources potentially subject to impacts.

Resource descriptions focus on the following areas: utilities, transportation and circulation, geology and soils, water resources, land use, socioeconomics, environmental justice, cultural resources, visual resources, air quality, noise, hazardous materials and hazardous wastes, biological resources, and safety.

3.1 UTILITIES

3.1.1 Definition of Resource

In any given location, a variety of infrastructural services—known as *utilities*—are provided by public and private entities to support necessary functions and enhance the quality of life. Some utilities, such as irrigation water or electricity service, may be respectively provided by on-site water wells or power generation facilities.

3.1.2 Existing Conditions

This section describes existing utilities provided at Buckley Air Force Base (AFB), including electricity, natural gas, potable water, wastewater, irrigation water, and solid waste disposal. The region of influence (ROI) for utilities is limited to Buckley AFB.

3.1.2.1 Buckley AFB

Electricity

Electricity is provided to Buckley AFB by Xcel Energy of Colorado. The base has an off-base purchase contract with Xcel Energy for approximately 28,478 megawatt hours per month (MWh/Month) (Buckley AFB 2007a). On-base stationary generators can also generate up to approximately 1,060 MWh/Month of electricity for emergency supplies. In fiscal year (FY) 2007, average electricity usage at Buckley AFB was approximately 11,141 MWh/Month, while peak electricity usage was approximately 13,122 MWh/Month (Buckley AFB 2007a).

Natural Gas

Natural gas is also provided to Buckley AFB by Xcel Energy. The on-base natural gas system has a capacity of approximately 416 million cubic feet per month (Mcf/Month). In FY 2007, average natural gas usage at Buckley AFB was approximately 173 Mcf/Month, while peak natural gas usage was approximately 354 Mcf/Month (Buckley AFB 2007a).

Potable Water

Potable water is supplied to the base by the City of Aurora (Buckley AFB 2007a). Buckley AFB maintains and operates the on-base potable water system (Buckley AFB 2003). The potable water supply available to the base from the city is up to 7,000,000 gallons per day (GPD); however, Buckley AFB's paid tap fees limit the supply to approximately 959,000 GPD (Buckley AFB 2007a). During FY 2004 to 2006, average potable water demand at the base was approximately 360,000 GPD, while peak potable water demand was approximately 982,000 GPD.[1] In addition, fire demand at Buckley AFB was calculated at approximately 740,000 gallons (Buckley AFB 2007a).

[1] Peak water demand measured in August 2005 (Buckley AFB 2007a).

Wastewater

Buckley AFB has separate sanitary and industrial wastewater collection systems that join before they leave the base (Buckley AFB 2007a). Wastewater collected from the northwest and eastern parts of Buckley AFB enters the City of Aurora's sanitary sewer at the base's northern perimeter and is treated by the city's main treatment plant. Wastewater collected from the southwest part of Buckley AFB enters the city's south sanitary sewer at the base's south perimeter and is treated by the city's Sand Creek treatment plant (Buckley AFB 2007a). Plant capacity[2] for Buckley AFB wastewater discharges is approximately 8.1 million gallons per day (MGD). During FY 2004 to 2006, average daily discharge from the base was approximately 0.22 MGD, while peak daily discharge was approximately 0.53 MGD[3] (Buckley AFB 2007a).

Buckley AFB holds a *Pretreatment Permit* issued by the Denver Metro Wastewater Reclamation District that requires regular wastewater sampling at the base's northern perimeter outfall point. Samples collected from this point indicate that base wastewater discharge quality is well within permitted pretreatment limits (Buckley AFB 2003, 2007a).

Storm Water

Buckley AFB holds two *National Pollutant Discharge Elimination System* (NPDES) permits for on-base storm water management. The first permit—a NPDES *Municipal Separate Storm Sewer System* (MS4) permit—provides an overall management and compliance program for the owners and operators of storm water conveyance systems, in this case the 460th Space Wing. Requirements of the MS4 permit include the preparation and implementation of a *Storm Water Management Plan* (SWMP), intended to preserve, protect, and improve surface water resources from polluted storm water runoff (Buckley AFB 2009h). The second permit—a NPDES *Storm Water Multi-Sector General Permit for Industrial Activities*—applies to potential discharges associated with industrial activities relating to air transportation and landfills at Buckley AFB. The requirements of

[2] Represents the combined capacities of 1.9 MGD for the City of Aurora's main treatment plant and 6.2 MGD for the city's Sand Creak treatment plant (Buckley AFB 2007a).
[3] Peak wastewater discharge measured in December 2005 (Buckley AFB 2007a).

this permit include 1) the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for the applicable industrial discharges, 2) conducting a comprehensive site compliance evaluation, monitoring storm water discharges, and 3) providing semi-annual training for personnel involved with industrial-type activities and operations. Additionally, the discharge of storm water runoff from a construction project must be authorized by a separate construction water permit issued by the U.S. Environmental Protection Agency (USEPA) in accordance with the *General Permit for Storm Water Discharges from Construction Activities*. The permit requires the development and implementation of a construction-specific SWPPP for construction activities at the base totaling one acre or more and where storm water discharges from the site enter an MS4 system that leads to natural drainage channels or streams classified as surface waters of the United States (Buckley AFB 2009h).

Storm water and other surface runoff at Buckley AFB is collected and discharged via the base's storm sewer system, a network of surface ditches and channels that are separate from the base's sanitary sewer system. Portions of the base's storm sewer system are underground, and underground discharges are directed either to the City of Aurora's storm sewer system or East Toll Gate Creek (Buckley AFB 2007a). Surface storm water discharges generally flow southwest across the base toward East Toll Gate Creek; however, discharges from the northern part of the base flow toward the Sand Creek watershed (Buckley AFB 2009h). The Sand Creek watershed and East Toll Gate Creek are both listed on Colorado's Section 303(d)[4] list for impaired water quality (USEPA 2008a). The Sand Creek watershed has been listed as impaired for the metal *selenium* and the pathogen *E. coli*, while East Toll Gate Creek has been listed for selenium (USEPA 2008b, 2008c). However, Buckley AFB would not likely face more restrictive storm water discharge permit limits because impaired water quality in these receiving bodies has not been attributed to on-base discharges (Buckley AFB 2009h).

Irrigation Water

Irrigation water is presently supplied to Buckley AFB by the City of Aurora via the base's potable water system (Buckley AFB 2009a). Approximately 58 acres of

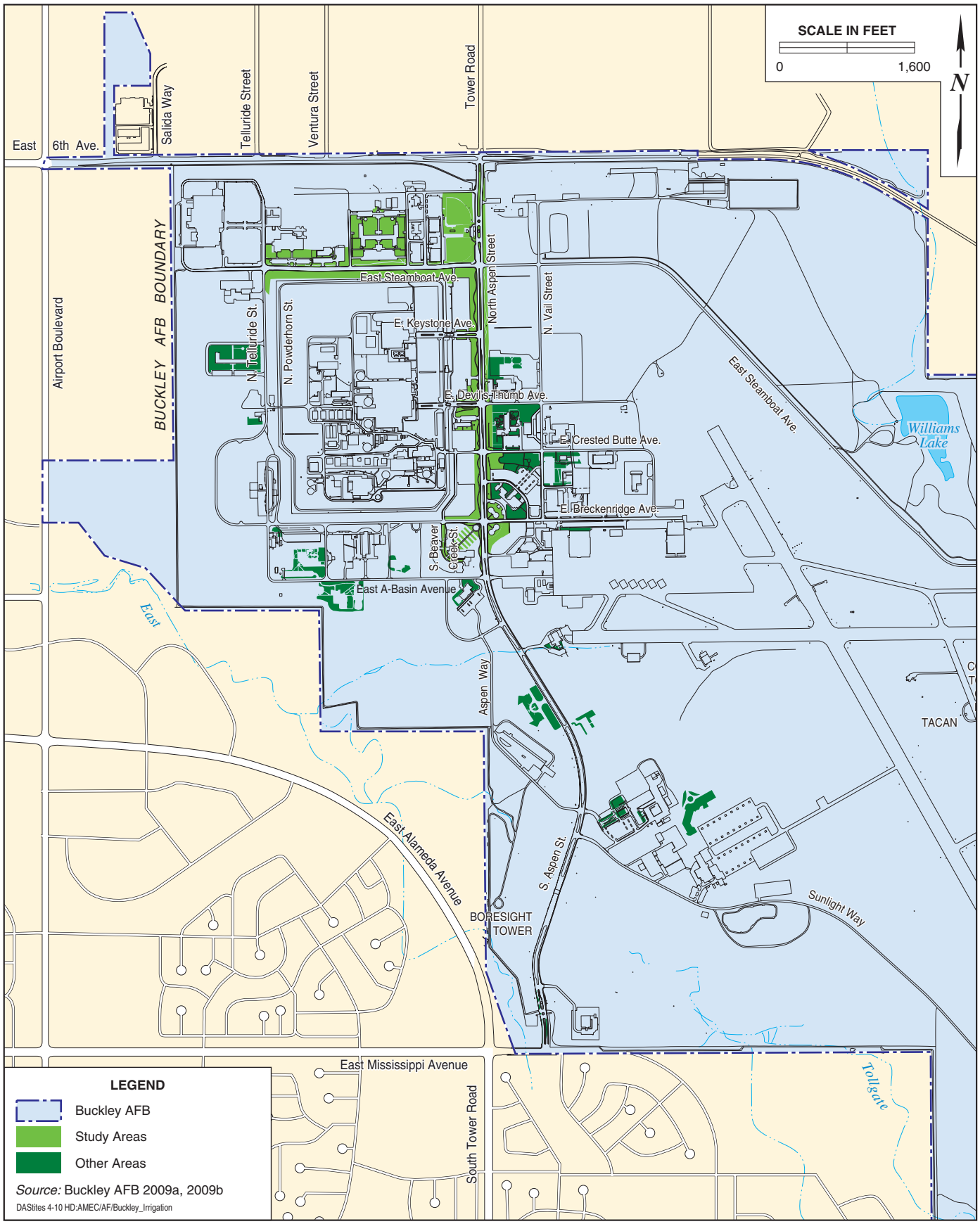
[4] *Section 303(d)* of the Clean Water Act (CWA) requires states to maintain lists of impaired waters.

ornamental lawn areas comprised of bluegrass sod are currently being irrigated at the base, and estimated irrigation water consumption totals approximately 70 million gallons per year (MGY). The average irrigation application rate at Buckley AFB is approximately 44 inches per year (in/yr), well above the 30 in/yr application rate recommended for bluegrass sod by Denver Water Department (Buckley AFB 2009a).

A 2009 study evaluated the feasibility of constructing an on-base irrigation system through incorporation of existing unutilized on-base groundwater wells, surface water resources (e.g., Williams Lake), and other available infrastructure (e.g., pipelines, etc.) (Buckley AFB 2009a). The study determined that a total of approximately 34.4 acres of irrigated areas located in the northwestern part of Buckley AFB could be served by construction of the on-base irrigation system (Figure 3-1) (Buckley AFB 2009b). Refer to Section 3.4, *Water Resources*, for additional information on surface water resources at Buckley AFB and existing groundwater wells and associated water rights.

Solid Waste Disposal

Solid waste collection and disposal services at Buckley AFB are contracted to Waste Management of Colorado, Inc. (WMC) (Buckley AFB 2007a). Waste is transported by WMC to the Denver Arapahoe Disposal Site located 3 miles southeast of the base. The landfill is permitted to operate until 2086. In FY 2006, Buckley AFB sent approximately 1,200 tons of municipal solid waste and 1,600 tons of construction and demolition debris to the landfill (Buckley AFB 2007a). Refer to Section 3.12, *Hazardous Materials and Hazardous Wastes*, for a discussion of hazardous waste disposal at Buckley AFB.



EA

Irrigation Areas at Buckley AFB

FIGURE 3-1

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.2 TRANSPORTATION AND CIRCULATION

3.2.1 Definition of Resource

Transportation and circulation refers to the movement of vehicles throughout a road and highway network. *Primary* roads include major interstates and other principal arterials designed to move traffic but not necessarily to provide access to all adjacent areas. *Secondary* roads include rural routes and major surface streets that provide access to residential and commercial areas, hospitals, and schools. The capacity of transportation networks and quality of circulation may be described in *average daily traffic* (ADT) volumes or *level of service* (LOS).

3.2.2 Existing Conditions

The ROI for transportation and circulation includes Buckley AFB's circulation network and roads surrounding the base, which could be affected by base traffic.

3.2.2.1 Regional and Local Circulation

Regional access to Buckley AFB is provided by Interstate (I-) 25, I-225, I-70, and the toll highway Expressway 470 (E-470). Located approximately 12 miles west of the base, I-25 facilitates travel north and south through the Denver Metropolitan Region. I-25 links to I-225, a major highway that runs north-south through the City of Aurora about 3 miles west of Buckley AFB. I-225 provides access to the base via exits at East 6th Avenue/Colorado State Route (SR-) 30, East Alameda Parkway, and East Mississippi Avenue. I-70 runs east-west through the Denver Metropolitan Region, and passes about 2 miles north of Buckley AFB. E-470 runs north-south near the eastern boundary of the base. Peña Boulevard, the primary access route to Denver International Airport (DIA), is located about 4 miles north of Buckley AFB and provides access to the base via the I-70/Airport Boulevard interchange (Buckley AFB 2003).

Local access to Buckley AFB is provided by East 6th Avenue/SR-30, a major surface street that runs east from I-225, past Airport Boulevard, past the base's two north entry gates (Main and Telluride Gates), and continues to the southeast to E-470. Additional local access to Buckley AFB is provided by East Alameda

Parkway and East Mississippi Avenue, both major surface streets that run east from I-225 and terminate near the base's south entry gate (Mississippi Gate) (Buckley AFB 2008a). East Iliff Avenue/East Jewell Avenue is a recently completed major surface street that travels west-east about 1 mile south of Buckley AFB from I-225 to E-470 (Buckley AFB 2003). Airport Boulevard is the primary surface street west of the base, traveling south from the I-70/Peña Boulevard interchange, past East 6th Avenue/SR-30, and south to East Iliff Avenue/East Jewell Avenue (Buckley AFB 2008a).

In 2008, annual ADT volumes on East 6th Avenue/SR-30 near the Buckley AFB North Gate entry were 5,637 eastbound and 5,745 westbound (Colorado Department of Transportation [CDOT] 2008). By comparison, annual ADT volumes on East 6th Avenue/SR-30 just east of the I-225 interchange were 19,827 eastbound and 19,850 westbound. Annual ADT volumes on East 6th Avenue/SR-30 at Piccadilly Road, located east of the base, were 3,885 eastbound and 3,824 westbound (CDOT 2008). No recent traffic capacity data (e.g., LOS) were available for the Buckley AFB vicinity (Buckley AFB 2003, 2008a).

3.2.2.2 Buckley AFB

Access to Buckley AFB is available via three primary gates. The *Main Gate*, located at the northern perimeter of the base at the intersection of East 6th Avenue/SR-30 and Aspen Street, processes about 39 percent of peak morning hour (i.e., 6:30 to 7:30 AM) inbound vehicles. The *Telluride Gate*, also located at the northern perimeter of the base at the intersection of East 6th Avenue/SR-30 and North Telluride Street, processes about 14 percent of peak morning hour inbound vehicles. The *Mississippi Gate*, at the southeast perimeter of the base at the intersection of East Mississippi Avenue and Aspen Street, processes 47 percent of peak morning hour inbound vehicles, and is the only entrance available for truck traffic (e.g., equipment and fuel deliveries). All three primary gates were upgraded in 2009 to improve security and traffic circulation. One additional entrance located at the eastern perimeter of the base, the *East Gate*, provides restricted access for munitions deliveries (Buckley AFB 2008a).

Aspen Street, a 4-lane divided street, is the primary north-south thoroughfare on Buckley AFB. Breckenridge Avenue is the primary east-west circulation route in

the developed northwest portion of the base. Steamboat Avenue provides access from the northwest portion of the base to the airfield, Williams Lake, and the undeveloped east portion of the base (Buckley AFB 2008a). Under the Proposed Action, a water pipeline would be routed across East Steamboat Avenue, connecting Well #3 to the proposed AST.

3.3 GEOLOGICAL RESOURCES

3.3.1 Definition of Resources

Geological resources analyzed in this study include *topography*, *geology*, and *soils*. Topography is the general shape and arrangement of a land surface, including its height and the position of its natural and human-created features. Geology describes the structure and configuration of the earth's surface and subsurface materials and their inherent properties. Soils are the unconsolidated surface materials overlying bedrock or other subsurface material, and they are typically described in terms of their composition materials, elasticity, slope, permeability, water-holding capacity, and erosion potential.

3.3.2 Existing Conditions

The ROI for geological resources is limited to Buckley AFB.

3.3.2.1 Regional Setting

Buckley AFB is located within the Denver Basin in the western portion of Colorado's central high plains, approximately 50 miles east of the Continental Divide. The Denver Basin is a structural depression that is 300 miles long and 200 miles wide and was formed about 67 million years ago (mya) during a mountain-building event called the Laramide Orogeny (Buckley AFB 2003). Geologic layers within the basin are comprised of zones of sandstone and siltstone in excess of 5,000 feet thick overlaying the 8,000-foot thick, relatively impermeable Pierre shale formation that forms the bottom of the basin (Buckley AFB 2003, 2008a). The Denver Basin is surrounded on three sides by higher terrain, including the Palmer Lake Divide to the south, the Rampart Range and Rocky Mountains to the west, and Cheyenne Ridge to the north. To the east lie the relatively level Great Plains. Most of the basin is characterized by broadly rolling topography with major streams in wide valleys (Buckley AFB 2008b).

3.3.2.2 Buckley AFB

Topography

The topography of Buckley AFB is comprised of relatively flat land and rolling upland. Elevations range from approximately 5,500 feet above mean sea level (msl) in the northwestern corner of the base to approximately 5,650 feet above msl in the southeastern corner of the base (Buckley AFB 2008b).

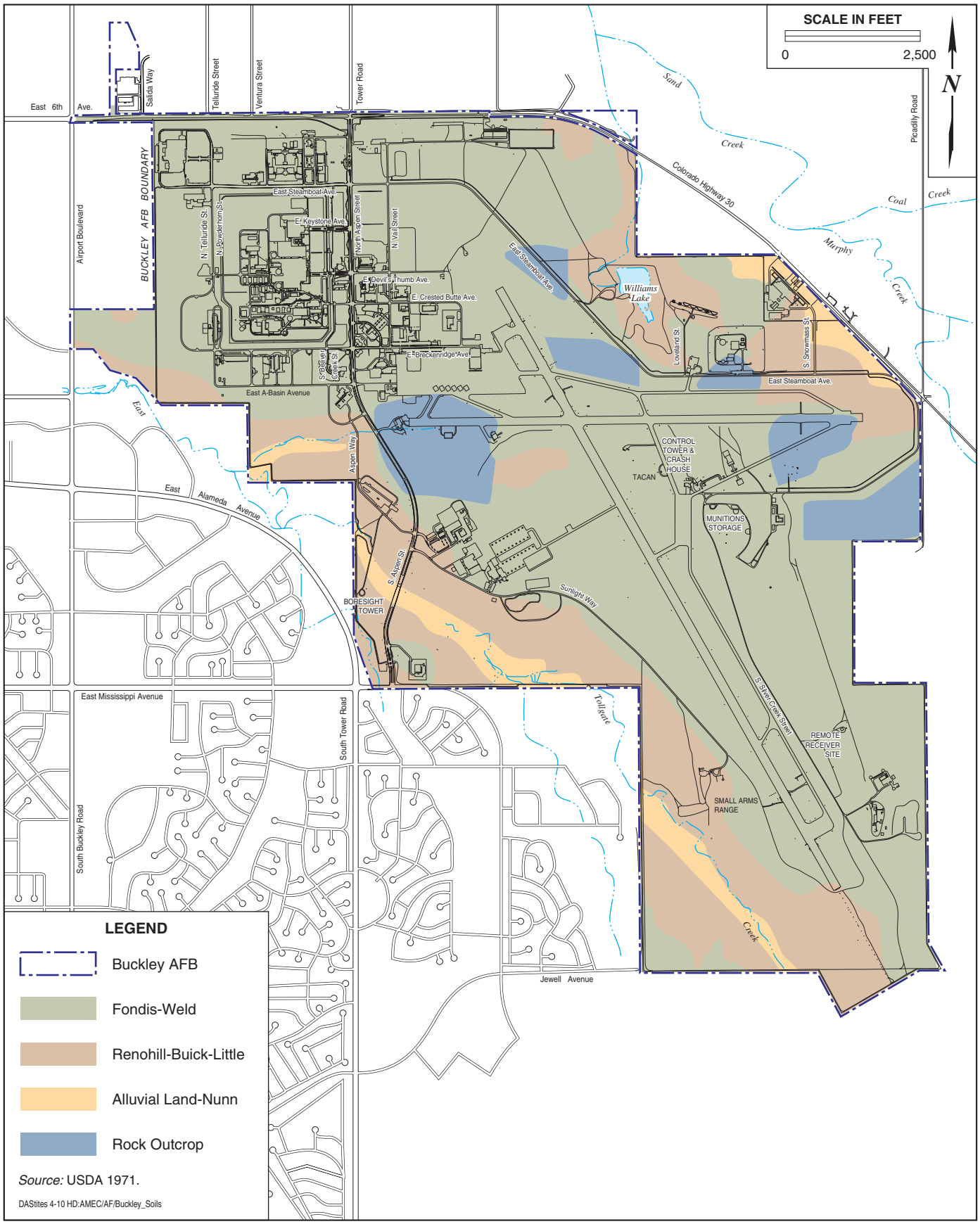
Geology

Buckley AFB is located in the lowlands of the South Platte River, in the western part of the Denver Basin. Surficial deposits in the base vicinity are comprised of unconsolidated, wind-blown (*eolian*) and/or water-deposited (*alluvial*) sediments that may reach a thickness of 30 feet. Deposition of these sediments began about 2.6 mya and continues today. These deposits overlay the layers of sandstone and siltstone and the shale floor that comprise the Denver Basin (Buckley AFB 2003).

Soils

U.S. Department of Agriculture (USDA) *Natural Resources Conservation Service* maps identify three primary soil associations on Buckley AFB: the *Alluvial Land-Nunn Association*, *Renohill-Buick-Little Association*, and *Fondis-Weld Association* (Figure 3-2). Other on-base areas have been mapped as containing *Rock Outcrop* complexes (USDA 1971).

Most of the surficial soils present on Buckley AFB have been classified as moderately to highly erodible; however, engineering modifications to surface construction (e.g., foundation design) and incorporation of site-specific drainage plans can compensate for expansive soil conditions (Buckley AFB 2003). Detailed information about soil associations present at Buckley AFB is presented below. Since the Alluvial Land-Nunn Association and Rock Outcrops would not be located in the footprint of the Proposed Action and project alternatives, they have been excluded from further discussion below.



EA

Soil Associations at Buckley AFB

FIGURE 3-2

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

Fondis-Weld Association. This soil association consists of deep, nearly level, loamy soils formed mainly in silty eolian material. Fondis soils are well-drained and gently sloping (1 to 5 percent), with moderately slow permeability and high water-holding capacity. They are also susceptible to wind and water erosion (USDA 1971). Soils from the Fondis-Weld Association have been mapped on a majority of the Buckley AFB surface area (refer to Figure 3-2).

Renohill-Buick-Little Association. This soil association consists of moderately deep, well-drained, loamy to clayey soils. Within this association, the dominant Renohill soils have moderate internal drainage, varying slopes (3 to 30 percent), moderately slow to slow permeability, and moderate available water-holding capacity. They are susceptible to soil blowing and water erosion (USDA 1971). The most common Renohill-Buick-Little Association soils found on Buckley AFB are the Renohill-Buick loam and the Renohill-Little complexes. These soils have been mostly mapped on the East Toll Gate Creek uplands and south of Coal and Sand Creeks (refer to Figure 3-2).

3.4 WATER RESOURCES

3.4.1 Definition of Resource

Water resources analyzed in this study include *surface water*, *groundwater*, and *water management*. Surface water resources include lakes, rivers, and streams that collect and distribute water from precipitation and natural or human-created water collection systems. Groundwater comprises subsurface water resources that are interlaid in layers of rock and soil and recharged by surface water seepage. Water management—including the management of storm water and other runoff—is pertinent to the quality and availability of surface water and groundwater resources. Other issues relevant to water resources include watershed areas affected by existing and potential hazards related to *floodplains*.

3.4.2 Existing Conditions

The ROI for water resources includes surface waters on Buckley AFB and associated drainage basins, as well as groundwater underlying the base and surrounding areas. Discussions of water management and floodplains are generally limited to Buckley AFB.

3.4.2.1 Regional Setting

The primary surface water drainage system comprising the Denver Metropolitan Region is the South Platte River, located approximately 15 miles northwest of Buckley AFB. Smaller drainages located in the vicinity of the base include the Sand, East Toll Gate, Coal, and Murphy Creeks, as well as two smaller, unnamed creeks. Regional surface drainages trend to the northwest.

The Denver Metropolitan Region is underlain by four principal bedrock aquifers that comprise the Denver Basin: the Laramie-Fox Hills, Arapahoe, Denver, and Dawson aquifers. These aquifers are separated by beds of shale with low permeability and are located within zones of sandstone and siltstone (Buckley AFB 2008b). The Denver Aquifer is the uppermost aquifer and is up to 1,000 feet thick. It is classified as a tributary in some locations because it comes in contact with surrounding surface water systems and their alluvium. The deepest of the

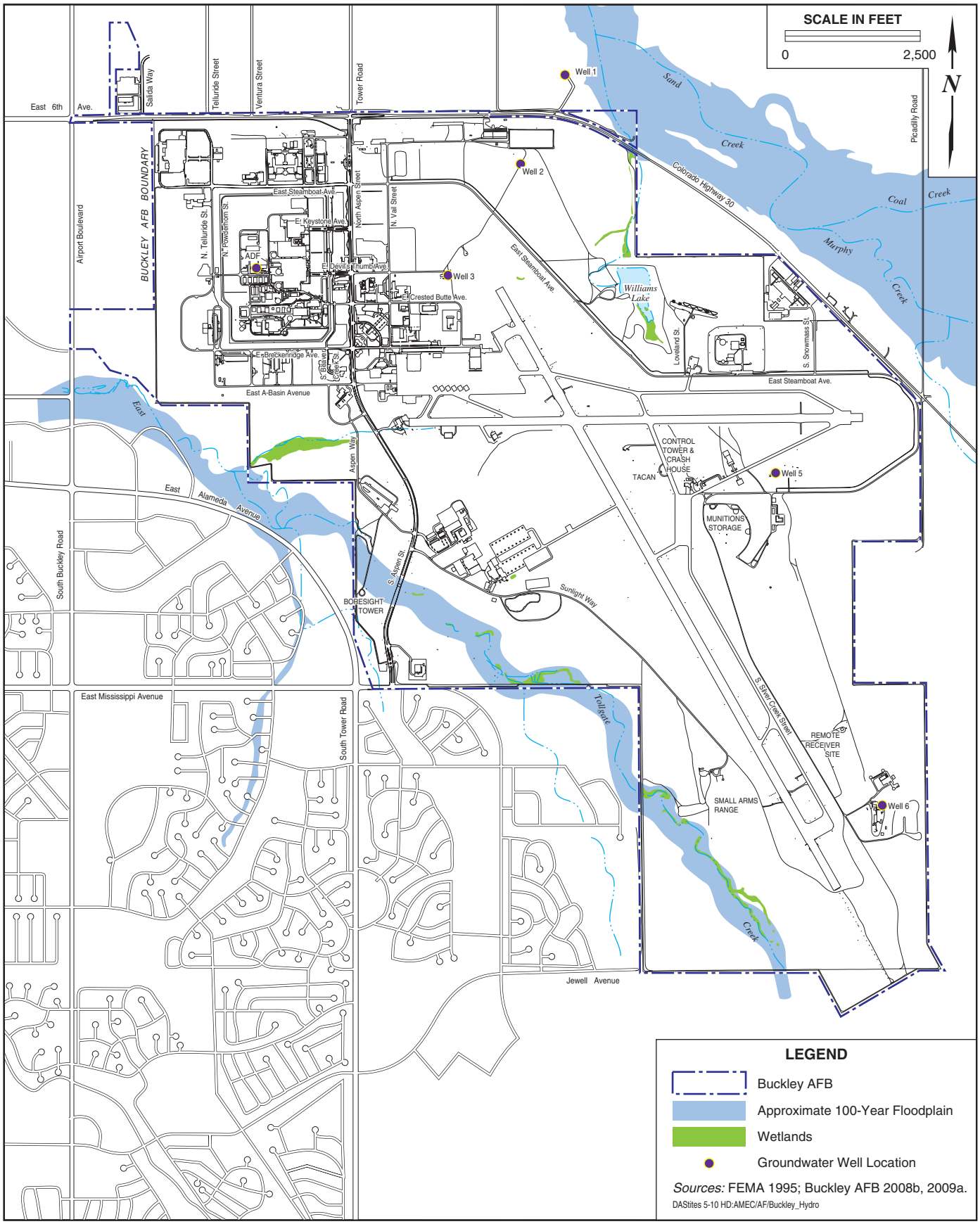
aquifers is the Laramie Fox-Hills and is underlain by the Pierre shale formation, a layer of great thickness and low water permeability (Buckley AFB 2003). The Arapahoe and Denver aquifers meet USEPA drinking water standards (Buckley AFB 2003, 2008a). The Denver Basin aquifer system is a source of drinking water for the Denver Metropolitan Region and nearby rural communities (Buckley AFB 2008b).

3.4.2.2 Buckley AFB

Surface Water

The principal surface water body at Buckley AFB is Williams Lake, located in the northeast part of the base (Figure 3-3). The lake was constructed in 1961 with a maximum surface area of approximately 30 acres and a storage capacity of up to 85 acre-feet; however, the present surface area of the lake is only about 8.7 acres (Buckley AFB 2003, 2009a, 2010a). The evaporative loss rate for Williams Lake has been estimated between 8.5 and 11.4 MGY, and about 15 MGY is pumped to the lake from Well #3 to maintain the lake's water level. Water supplies in the lake are also augmented by local runoff, but further diminished by seepage (Buckley AFB 2003, 2009a). Hydrological evaluations of Williams Lake have determined that the lake and associated drainage areas may not be hydrologically connected to nearby surface waters (Buckley AFB 2010a).

Williams Lake is presently used primarily for recreational purposes (e.g., fishing) (Buckley AFB 2003). Water quality in the lake has not been established, but testing has occurred to verify that fish in the lake are safe for consumption. Specifically, fish were sampled from the lake in 2004 for heavy metals, and the levels did not violate established state health standards (Buckley AFB 2010a). The lake is also being maintained as a backup source of water for firefighting on Buckley AFB in case supplies from the City of Aurora are unavailable (Buckley AFB 2010a). The lake has also been evaluated as a possible storage reservoir for irrigation and emergency potable water supplies (Buckley AFB 2009a).



EA

Surface Water Resources, Floodplains, Groundwater Wells, and Wetlands at Buckley AFB

FIGURE 3-3

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

The only other named surface water feature located on Buckley AFB is East Toll Gate Creek, which crosses the southern part of the installation. Sand Creek, the primary surface drainage feature in the vicinity, is located to the north-northeast of Buckley AFB (refer to Figure 3-3). All surface water resources on Buckley AFB drain either into the Sand Creek drainage basin (generally including the eastern portion of the installation) or into the Toll Gate Creek drainage basin (generally including the western portion). Surface water drainage at Buckley AFB is generally intermittent, resulting from the occurrence of precipitation events. This runoff is controlled and managed by a man-made storm water drainage system composed of ditches, curbs and gutters, culverts, pipelines, and detention ponds. Sand Creek, which is joined by Toll Gate Creek, eventually drains into the South Platte River approximately 12 miles northwest of Buckley AFB (Buckley AFB 2009h). The base contains a drainage area of approximately 3,283 acres, of which a total of 650 acres, or approximately 20 percent, are comprised of impervious surfaces (Buckley AFB 2007b).

Groundwater

Surficial aquifer systems are present at Buckley AFB, the result of alluvial deposition from erosion of upland bedrock areas (Buckley AFB 2008b). These alluvial aquifer systems are associated with East Toll Gate and Sand Creeks and augment water supplied to Williams Lake (Buckley AFB 2007c). Groundwater is recharged to these aquifers through direct infiltration of precipitation and irrigation water and by lateral and upward seepage of groundwater (Buckley AFB 2008b). Groundwater generally flows to the northwest beneath Buckley AFB, following the trend of stream drainages toward the South Platte River (Buckley AFB 2003). In the area surrounding Buckley AFB, the Denver Aquifer is classified as a tributary because it comes in contact with surrounding surface water systems and their alluvium; the aquifer is approximately 175 feet thick in the area under the base (Buckley AFB 2007c).

A total of six groundwater wells have been installed on Buckley AFB (refer to Figure 3-3) (Buckley AFB 2009a). One well—*Well #3*—is pumped for several months during the summer to augment the water level in Williams Lake. Several other on-base wells are not currently operational. All wells on Buckley AFB have

associated water rights to obtain groundwater from aquifers under the base (Buckley AFB 2009a).

Table 3-1 presents a summary of information the four groundwater wells at Buckley AFB that were evaluated for incorporation into the Proposed Action and project alternatives (Buckley AFB 2009a, 200b). The two additional on-base wells (*ADF* and *Well #6*) have been excluded from further description below.

Table 3-1. Information on Selected Groundwater Wells at Buckley AFB

Well	Reported/ Most Recent Measured Total Depth	Install/ Rehab Dates	Aquifer	Associated Water Rights	Additional Information
Well #1	2,186 ft/ 2,119 ft	1942/ 1977-78	Laramie-Fox Hills	Up to 60 MGY, in combination with Well #3	Disinfection would be required for potable use
Well #2	1,876 ft/ 455 ft	1942/ 1976	Laramie-Fox Hills	Rights retained if well is reinstalled within 200 ft of existing well	Closure/ abandonment recommended
Well #3	2,164 ft/ 2,134 ft	1942/ N/A	Lower Arapahoe, Laramie-Fox Hills	Up to 60 MGY, in combination with Well #1	Pipe connection pumps 15 MGY to Williams Lake
Well #5	2,100 ft/ 1,115 ft	1942/ N/A	Arapahoe/ Laramie-Fox Hills	Rights retained if well is reinstalled within 200 ft of existing well	Closure/ abandonment recommended

Notes: ft - foot/feet
N/A - not applicable
rehab - rehabilitation
Source: Buckley AFB 2009a.

Floodplains

Designated 100-year floodplains associated with East Toll Gate Creek and its smaller tributaries cross the southwest part of Buckley AFB, while small sections of 100-year floodplains associated with Sand Creek cross the northeast corner of the base (Buckley AFB 2008b) (refer to Figure 3-3).

3.5 LAND USE

3.5.1 Definition of Resource

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

3.5.2 Existing Conditions

The ROI for land use is limited to Buckley AFB and, where applicable, land use policies pertaining to the City of Aurora.

3.5.2.1 Regional Setting

Buckley AFB is located in the northeast part of the City of Aurora, along the eastern fringe of the city's developed core. Present land use in the vicinity of the base is comprised of light industrial, to the northwest; a mix of light industrial, undeveloped space, and park and sports facilities, to the north; newly-constructed residential neighborhoods to the southwest; and, agricultural and undeveloped space to the east and south (City of Aurora 2009a). The *Plains Conservation Center*—an approximately 1,100-acre state-designated preservation area—is located southeast of Buckley AFB (Plains Conservation Center 2010).

Noise and airfield safety contours have been delineated around Buckley AFB and adjacent areas to restrict building heights, as well as the establishment of noise-sensitive receptors (e.g., schools, hospitals, etc.) and otherwise incompatible uses (City of Aurora 2009b). Refer to Section 3.14, *Safety*, for a discussion of airfield safety contours around Buckley AFB and to Section 3.11, *Noise*, for a discussion of noise contours around the base.

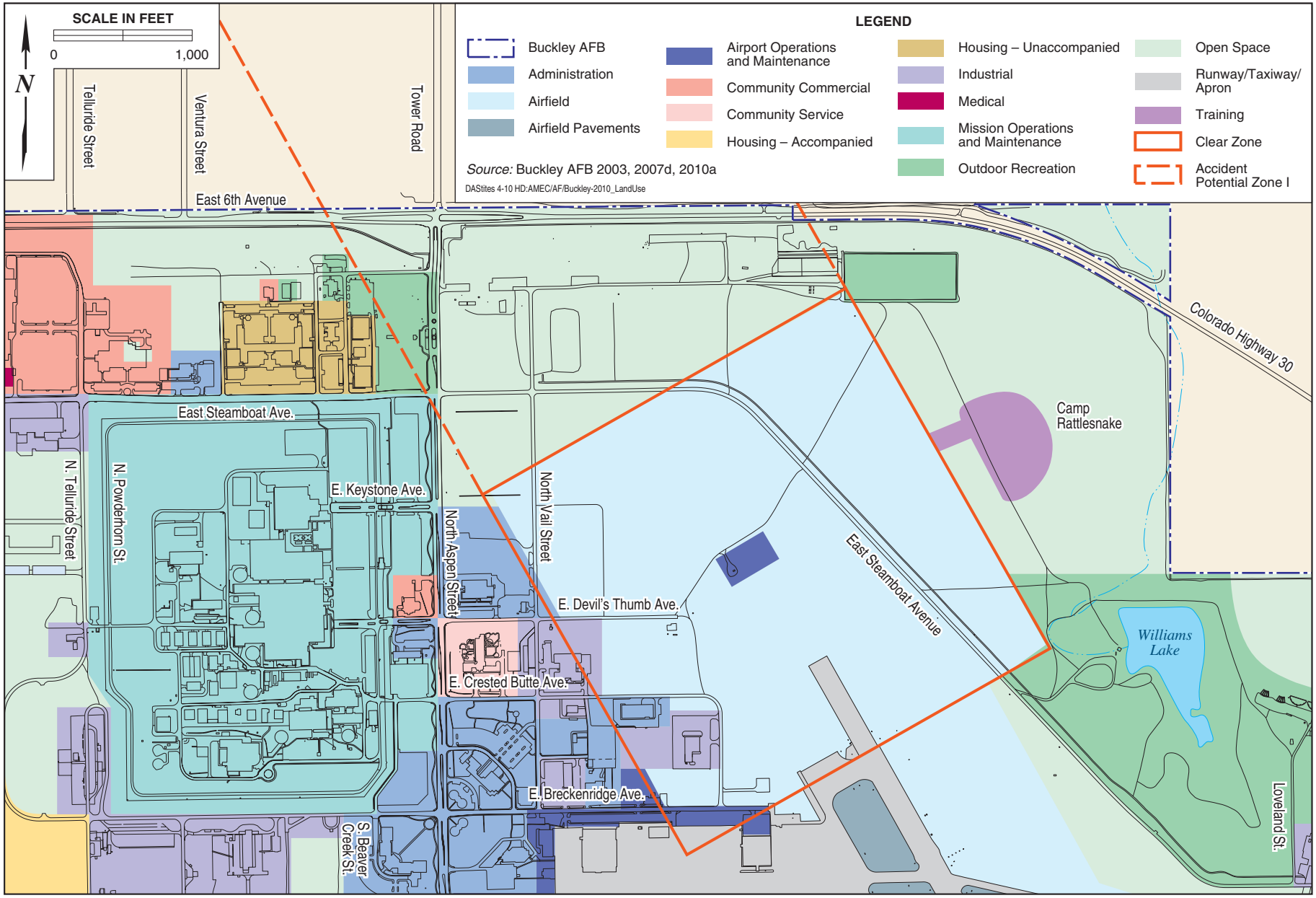
Areas to the east of the base are part of the *E-470 Corridor*, a 25-mile planned future growth corridor established along E-470 in the City of Aurora *2009 Comprehensive Plan* (City of Aurora 2009c). The E-470 Corridor is presently mostly undeveloped, but planned development includes large areas of regional and commercial activity, over 40,000 residential dwelling units, and park and open space areas (City of Aurora 2007, 2009d, 2009e). Corridor areas east of Buckley AFB would be developed as *Research and Development* facilities that would be constructed as a campus-oriented development intermixed with open space (Buckley AFB 2003). Corridor areas southeast of the base would remain as open space (City of Aurora 2009d, 2009e).

3.5.2.2 Buckley AFB

Land use within Buckley AFB has been classified into 14 categories based on the types of activities and associated uses that occur (Figure 3-4). The *Airfield* and associated *Airfield Pavements* and *Airfield Operations and Maintenance* are the predominant land use in the central part of the base. Two *Mission Operations and Maintenance* areas are located on-base—a large area in the northwest part of the base and an additional area in the east near Williams Lake (Buckley AFB 2007d).

Administrative and *Industrial* uses are mostly concentrated in the northwest part of Buckley AFB, with additional minor concentrations in the vicinity of the airfield (Buckley AFB 2007d, 2010a). Two *Training* areas are also located on-base: one southwest of the airfield and one immediately northwest of Williams Lake (Buckley AFB 2010a).

Various uses are located only in the northwest part of the base, including *Community Commercial*, *Community Service*, *Housing–Accompanied*, *Housing–Unaccompanied*, and *Medical* (Buckley AFB 2007d). Undeveloped areas along the perimeter of Buckley AFB have been classified as *Open Space*. *Outdoor Recreation* areas are located amongst the open space, including a large recreation area surrounding Williams Lake (Buckley AFB 2007d).



EA

Current Land Use at Buckley AFB

FIGURE 3-4

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.6 SOCIOECONOMICS

3.6.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Human population is affected by regional birth and death rates, as well as net in- or out-migration. Economic activity typically comprises employment, personal income, and industrial growth. Impacts on these fundamental socioeconomic indicators can also influence other components such as housing availability and public services provision.

3.6.2 Existing Conditions

The ROI for socioeconomics includes Buckley AFB and the City of Aurora. Socioeconomic data in this section are presented at the local, regional, state, and national level to analyze baseline socioeconomic conditions in the context of local, regional, state, and national trends. Local socioeconomic data are presented for the City of Aurora and, where available, Buckley AFB. Regional socioeconomic data are presented for the Denver Primary Metropolitan Statistical Area (PMSA), a five-county area with a single population center (the City of Denver) surrounded by numerous communities characterized by high degrees of economic and social interaction and interdependence. The Denver PMSA is comprised of Adams, Arapahoe, Denver, Douglas, and Jefferson Counties. Buckley AFB and the City of Aurora are located in Arapahoe County.

3.6.2.1 Regional Setting

Population

In 2008, the estimated population of the City of Aurora was 305,241, representing a 37.4 percent increase from the City's 1990 population level of 222,103 (Table 3-2). Regional and state populations grew at a faster pace during the same period, with the populations of the Denver PMSA and State of Colorado respectively increasing by 54.2 percent and 49.9 percent (U.S. Census Bureau

Table 3-2. Local and Regional Population Trends (1990, 2000 and 2008)

Geographical Area	1990	2000	2008	Percent Change (1990-2008)
City of Aurora	222,103	276,393	305,241	37.4%
Denver PMSA	1,622,980	2,109,282	2,502,881	54.2%
State of Colorado	3,294,394	4,301,261	4,939,456	49.9%
United States	248,709,873	281,421,906	304,059,728	22.3%

Sources: U.S. Census Bureau 1990, 2000, 2008.

1990, 2008). Approximately 12.2 percent of the Denver PMSA populace was located in the City of Aurora in 2008 (U.S. Census Bureau 2008).

Employment

In 2007, the three occupational sectors that provided the greatest number of private industry jobs in the Denver PMSA were *services*; *finance, insurance, and real estate;* and *retail trade* (Table 3-3). In combination, these three sectors provided jobs for an estimated 67.3 percent of the workforce, which totaled 1,663,133 people in 2007. By comparison, *government and government enterprises* provided jobs for 185,414 people or an estimated 11.1 percent of the regional workforce in 2007 (U.S. Bureau of Economic Analysis [BEA] 2007a).

Table 3-3 represents the distribution of jobs by occupational sector in the Denver PMSA for 1990, 2000, and 2007. Between 1990 and 2007, total employment in the region increased by 570,960 positions, or approximately 52.3 percent. The three occupational sectors that saw the biggest percentage increases in jobs between 1990 and 2007 were *construction* (149.7 percent increase), *services* (124.2 percent increase), and *finance, insurance, and real estate* (81.1 percent increase) (U.S. BEA 1990a, 2007a). By comparison, the sectors with the biggest decreases in jobs during the same period were *manufacturing* (22.9 percent decrease), *transportation and public utilities* (21.2 percent decrease), and *other occupational sectors* (20.3 percent decrease), a category that includes farming, mining, forestry, and other similar occupations. *Government and government enterprises* occupations gained a total of 36,425 positions, or approximately 24.3 percent, between 1990 and 2007; however, *military* occupations shed a total of 6,061 positions, or 40.7 percent, during the same period (U.S. BEA 1990a, 2007a).

Table 3-3. Annual Employment by Occupational Sector in the Denver PMSA (1990, 2000 and 2007)

Occupational Sector	1990	2000	2007	Percent Change (1990-2007)
Construction	48,362	113,724	120,742	149.7%
Manufacturing	99,535	96,307	76,789	-22.9%
Transportation & Public Utilities[1]	75,700	110,043	59,660	-21.2%
Wholesale Trade	65,578	82,898	76,100	16.0%
Retail Trade	174,795	244,880	163,666	-6.4%
Finance, Insurance & Real Estate	110,079	172,785	199,333	81.1%
Services[2]	337,170	515,013	756,088	124.2%
Govt. and Govt. Enterprises[3]	149,169	168,656	185,414	24.3%
Federal, Civilian	*34,306*	*30,192*	*28,315*	*-17.5%*
Military	*14,877*	*8,946*	*8,816*	*-40.7%*
State and Local	*99,986*	*129,518*	*148,283*	*48.3%*
Other Occupational Sectors[4]	31,785	34,615	25,341	-20.3%
Total Employment	**1,092,173**	**1,538,921**	**1,663,133**	**52.3%**

Notes: [1] *Transportation and Public Utilities* includes waste disposal services occupations for 1990 and 2000 only; for 2007, waste disposal services occupations are included in *Services*.
[2] *Services* includes information occupations, but excludes public administration occupations. Includes agricultural services occupations for 2007 only; for 1990 and 2000, agricultural services are included in *Other Occupational Sectors*.
[3] *Government and Government Enterprises* includes Federal civilian and military occupations, and state and local government occupations. Excludes employment in the education and health care occupations.
[4] *Other Occupational Sectors* includes farm employment, forestry, fishing, and other miscellaneous related occupations. Also includes agricultural services occupations for 1990 and 2000 only.
Sources: U.S. BEA 1990a, 2000a, 2007a.

Unemployment

U.S. Bureau of Labor of Labor Statistics (BLS) data for the city of Aurora show an increase in unemployment between December 2008 and December 2009, from 7.7 to 9.0 percent (Table 3-4). However, similar increases were experienced during the same period in the Denver PMSA (6.3 to 7.5 percent), Colorado (5.8 to 7.5 percent), and the nation (7.4 to 10.0 percent) (U.S. BLS 2008a, 2008b, 2009a, 2009b).

Table 3-4. Annual Employment by Occupational Sector in the Denver PMSA (1990, 2000 and 2007)

	Geographical Area			
	City of Aurora[1]	Denver PMSA[1]	Colorado[2]	United States[2,3]
December 2009				
Work Force	170,793	1,357,177	2,656,762	153,059.0
Unemployment	15,286	101,499	198,445	15,267.0
Unemployment Rate	9.0%	7.5%	7.5%	10.0%
December 2008				
Work Force	175,412	1,396,492	2,751,262	154,587.0
Unemployment	13,442	88,634	159,875	11,400.0
Unemployment Rate	7.7%	6.3%	5.8%	7.4%

Notes: [1] Data are *not seasonally adjusted*.
[2] Data are *seasonally adjusted*.
[3] Work force and unemployment in the United States expressed in *thousands*.
Sources: U.S. BLS 2008a, 2008b, 2009a, 2009b.

Earnings

In 2007, average earnings per job in the Denver PMSA were $53,324, representing an inflation-adjusted increase of approximately 28 percent since 1990 (Table 3-5) (U.S. BEA 1990b, 2007b; U.S. BLS 2010). Median household income in the Denver PMSA in 2007 was $61,819, representing an inflation-adjusted increase of about 12 percent since 1990 (U.S. Census Bureau 1990, 2007; U.S. BLS 2010).

2007 average earnings per job in the Denver PMSA ($53,324) were approximately 106 percent of average earnings in Colorado ($48,206) and over 114 percent of average earnings in the nation ($46,835) (U.S. BEA 2007b; U.S. BLS 2010). 2007 median household income in the Denver PMSA ($61,819) was approximately 107 percent of Colorado's median household income ($57,973) and about 116 percent of national median household income ($53,277) (U.S. Census Bureau 2007; U.S. BLS 2010).

In 1990, *military* jobs in the Denver PMSA totaled 14,877, or approximately 1.4 percent of total jobs (U.S. BEA 1990a). However, in 2000 and 2007, military jobs in the Denver PMSA totaled 8,946 and 8,816, respectively representing only about 0.6 and 0.5 percent of total jobs (U.S. BEA 2000a, 2007a).

Table 3-5. Economic Indicators, Denver PMSA, Colorado, and United States (1990, 2000, and 2007)

Geographical Area	1990	2000	2007
Denver PMSA			
Total Jobs	1,092,173	1,538,921	1,663,133
Civilian Jobs	1,077,296	1,529,975	1,654,317
Military Jobs	14,877	8,946	8,816
Percent Military	1.4%	0.6%	0.5%
Average Earnings Per Job[1]	$41,585	$52,019	$53,324
Median Household Income[1]	$55,135	$58,599	$61,819
Colorado			
Total Jobs	2,054,265	2,949,831	3,215,903
Average Earnings Per Job[1]	$37,569	$46,697	$48,206
Median Household Income[1]	$50,032	$59,476	$57,973
United States[2]			
Total Jobs	139,380.9	166,758.8	180,943.8
Average Earnings Per Job[1]	$38,882	$44,168	$46,835
Median Household Income[1]	$49,893	$52,912	$53,277

Notes: [1] Data are inflation-adjusted to 2010 dollars (U.S. BLS 2010).
[2] Total jobs in the United States expressed in *thousands*.
Sources: U.S. BEA 1990a, 1990b, 2000a, 2000b, 2007a, 2007b; U.S. Census Bureau 1990, 2000, 2007.

3.6.2.2 Buckley AFB

In 2008, employment at Buckley AFB totaled 12,735, including 3,156 active duty personnel, 3,843 civilian employees, 2,427 contractors, and 3,309 National Guard and reservists (City of Aurora 2009b). Total payroll expenditures by the base were estimated at approximately $632 million, and the base plans to make capital investments of nearly $40 million in the next five years. The economic impact of Buckley AFB within the region was estimated at about $1.11 billion in 2008 (City of Aurora 2009b).

3.7 ENVIRONMENTAL JUSTICE

3.7.1 Definition of Resource

In 1994, Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued to focus attention of Federal agencies on human health and environmental conditions in minority and low-income communities and to ensure that disproportionately high and adverse human health or environmental effects on such communities are identified and addressed. Because children may suffer disproportionately from environmental health risks and safety risks, EO 13045, *Protection of Children from Environmental Health and Safety Risks*, was introduced in 1997 to prioritize the identification and assessment of environmental health and safety risks that may affect children and to ensure that Federal agencies' policies, programs, activities, and standards address environmental health risks and safety risks to children.

3.7.2 Existing Conditions

The ROI for environmental justice includes Buckley AFB and immediately surrounding communities within the City of Aurora[5], as well as larger communities of comparison (e.g., the Denver PMSA). Table 3-6 presents a summary of environmental justice data for the geographical communities of comparison.

3.7.2.1 Minority and Low-Income Populations

In order to comply with EO 12898, ethnicity and poverty status in the vicinity of Buckley AFB were examined and compared to city, regional, state, and national data to determine if any minority or low-income communities could potentially be disproportionately affected by implementation of the Proposed Action or project alternatives.

[5] The vicinity of Buckley AFB has been defined as Arapahoe County Census Tracts 70.08, 70.35, 70.43, 70.64, 70.65, 70.66, 70.67, and 71.02, all of which are adjacent to and/or include Buckley AFB (U.S. Census Bureau 1999, 2000).

Table 3-6. Environmental Justice Data

Racial Data	Buckley AFB Vicinity[1]	City of Aurora	Denver PMSA	Colorado	United States
Total Population	37,645	305,241	2,502,881	4,939,456	304,059,728
Minority Population[2]	**13,511 (35.9%)**	**150,225 (49.2%)**	**840,243 (33.6%)**	**1,443,082 (29.2%)**	**105,116,842 (34.6%)**
Hispanic/Latino[3]	5,179 (13.8%)	82,562 (27.0%)	561,504 (22.4%)	997,060 (20.2%)	46,891,456 (15.4%)
Asian-American	1,669 (4.4%)	13,011 (4.3%)	83,934 (3.4%)	124,757 (2.5%)	13,239,894 (4.4%)
African-American	5,128 (13.6%)	43,516 (14.3%)	126,306 (5.0%)	177,573 (3.6%)	36,701,103 (12.1%)
Native American/ Alaska Native	217 (0.6%)	2,415 (0.8%)	13,919 (0.6%)	31,779 (0.6%)	1,993,622 (0.7%)
Native Hawaiian/ Pacific Islander	67 (0.2%)	1,245 (0.4%)	2,273 (0.1%)	4,761 (0.1%)	402,725 (0.1%)
Other/Multi-Racial[4]	1,251 (3.3%)	7,476 (2.4%)	52,307 (2.1%)	107,152 (2.2%)	5,888,042 (1.9%)
Non-Minority Population[5]	24,134 (64.1%)	155,016 (50.8%)	1,662,638 (66.4%)	3,496,374 (70.8%)	198,942,886 (65.4%)
Income Data	**Buckley AFB Vicinity[1]**	**City of Aurora**	**Denver PMSA**	**Colorado**	**United States**
Total Population	37,338	305,241	2,502,881	4,939,456	304,059,728
Percent Below Poverty Level	**2,382 (6.4%)**	**47,007 (15.4%)**	**282,826 (11.3%)**	**563,098 (11.4%)**	**40,135,884 (13.2%)**
Age Data	**Buckley AFB Vicinity[1]**	**City of Aurora**	**Denver PMSA**	**Colorado**	**United States**
Total Population	37,645	305,241	2,502,881	4,939,456	304,059,728
Population Under 18	**11,443 (30.4%)**	**79,880 (26.2%)**	**635,566 (25.4%)**	**1,206,766 (24.4%)**	**73,921,896 (24.3%)**

Notes: [1] *Buckley AFB Vicinity* has been defined as Arapahoe County Census Tracts 70.08, 70.35, 70.43, 70.64, 70.65, 70.66, 70.67, and 71.02, all of which are adjacent to and/or include Buckley AFB

[2] *Minorities* are persons classified by the U.S. Census Bureau as Hispanic/Latino, Asian-American, African-American, Native American, Alaska Native, Native Hawaiian, Pacific Islander, Other Race, or Multi-Racial.

[3] *Hispanic/Latinos* are persons of any racial background with a Hispanic/Latino cultural *heritage*.

[4] *Other/Multi-Racial* includes persons of two or more races and persons of races not categorized above.

[5] *Non-Minority Population* includes persons who are White, European-American, and/or Middle Eastern.

Sources: U.S. Census Bureau 1999, 2000, 2008.

Minority Populations

Based on U.S. Census data, minority residents comprise approximately 35.9 percent of the total population residing in communities near Buckley AFB. By comparison, minority residents comprise a larger percentage of the City of Aurora (49.2 percent), but slightly smaller percentages of the Denver PMSA (33.6 percent), Colorado (29.2 percent) and the nation (34.6 percent) (U.S. Census Bureau 2000, 2008).

Low-Income Populations

Based on U.S. Census data, the percentage of residents in communities near the base considered to be low-income is approximately 6.4 percent. By comparison, higher percentages of the population are living below the poverty level in the City of Aurora (15.4 percent), the Denver PMSA (11.3 percent), Colorado (11.4 percent), and the nation (13.2 percent) (U.S. Census Bureau 1999, 2008).

3.7.2.2 Protection of Children from Environmental Health Risks and Safety Risks

In order to comply with EO 13045, the number of children under age 18 in the vicinity of Buckley AFB was examined and compared to city, regional, state, and national levels. Additionally, locations where populations of children may be concentrated—such as schools and child care centers—were determined for the base vicinity. The purpose of this analysis is to address potential disproportionate health and safety risks to children that may result from implementation of the Proposed Action or project alternatives.

Age Distribution

According to U.S. Census data, communities near Buckley AFB have a total of 11,443 children under 18, which represents approximately 30.4 percent of the total population. By comparison, the percentage of the population represented by children under 18 is less in the City of Aurora (26.2 percent), the Denver PMSA (25.4 percent), Colorado (24.4 percent), and the nation (24.3 percent) (U.S. Census Bureau 2000, 2008).

Schools and Child Care Centers

Aurora Public Schools (APS) serves the City Aurora with a total of 55 schools. Current total enrollment in the district is approximately 35,500 students. Nearly 76 percent of APS students are from minority backgrounds, including 51 percent Hispanic/Latino and 20 percent African-American (APS 2010a). Three district schools are located adjacent to the western perimeter of Buckley AFB: Aurora Quest, a K-8 magnet school for gifted and talented students; William Smith High School; and, Pickens Technical College, a technical training and certification facility for high school- and adult-age students (APS 2010b, 2010c, 2010d, 2010e).

A total of 351 multi-family housing units are located on Buckley AFB in the northwest part of the base (refer to Figure 3-4 in Section 3.5, *Land Use*). The housing units were constructed in FY 2005 and are presently operated by a private contractor (Buckley AFB 2006). No information was available on the number of children currently residing in the housing units. A day care center is located in the central part of the base in Building 725 (Buckley AFB 2003).

3.8 CULTURAL RESOURCES

3.8.1 Definition of Resource

Several Federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (1966), the Archaeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resource Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). In addition, U.S. Department of Defense (DoD) Instruction (DODI) 4710.02, *Department of Defense Interactions with Federally-Recognized Tribes* (2006) governs DoD interactions with Federally-recognized tribes within which DODI 4710.02 is a component. In order for a cultural resource to be considered significant, it must meet one or more of the following criteria for inclusion on the National Register of Historic Places (NRHP):

> "The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and: 1) that are associated with events that have made a significant contribution to the broad patterns of our history; or 2) that are associated with the lives or persons significant in our past; or 3) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or 4) that have yielded, or may be likely to yield, information important in prehistory or history" (36 CFR § 60:4).

3.8.2 Existing Conditions

The ROI for cultural resources is limited to Buckley AFB.

3.8.2.1 Regional Setting

The earliest recorded European explorers in northeastern Colorado were the Spanish, whose expeditions reached the Great Plains in the 1540s. The early 1700s saw the influx of French fur traders, and in 1803, northeastern Colorado—

and the land now occupied by Buckley AFB—became part of the United States through purchase of the Louisiana Territory from France.

3.8.2.2 Buckley AFB

History of Buckley AFB

Buckley AFB was established in 1942 as a munitions training base. After World War II (WWII), control of the base was transferred to the Colorado Air National Guard (ANG) and later to the U.S. Navy. The USAF ceded control in 1959, and the base became Buckley ANG Base in 1960. During the Cold War era (1960s to 1991), the ANG mobilized Buckley-based tactical fighter squadrons for myriad historical events. The base was renamed *Buckley Air Force Base* in 2000 and has since received various capital investments to facilitate future growth as a USAF airfield facility (Buckley AFB 2010b).

Cultural Resources at Buckley AFB

Buckley AFB has undergone four separate cultural resources surveys since 1983 which cumulatively evaluated all areas of the installation within the footprints of the Proposed Action and project alternatives. Cultural resources identified in these combined surveys included a number of lithic scatters, foundations of historic properties, trash dumps, and a railroad spur line—none of which were considered eligible for the NRHP (Buckley AFB 2008b). Six buildings on base were deemed eligible for the NRHP; however, the Proposed Action and project alternatives would not include removal or alteration of any buildings and these buildings have not been described in this document. Further, the Colorado State Historic Preservation Office has previously concurred that no significant archaeological resources have been identified at Buckley AFB and that various past proposed actions would, therefore, unlikely impact any resources (Buckley AFB 2008b).

3.9 VISUAL RESOURCES

3.9.1 Definition of Resource

Visual resources are defined as the natural and manufactured features that comprise the aesthetic qualities of an area. These features form the overall impressions that an observer receives of an area or its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered characteristic of an area if they are inherent to the structure and function of a landscape.

3.9.2 Existing Conditions

The ROI for visual resources is limited to Buckley AFB facilities and open space.

3.9.2.1 Regional Visual Character

Topography surrounding Buckley AFB is generally level to gently rolling and is dominated by suburban development to the southwest and northwest. Some commercial, industrial, and recreational development exists to the north. Areas south and east of the base are mostly undeveloped (the Plains Conservation Center, located southeast of the base, comprises approximately 1,100 acres of undeveloped grassland); however, planned future development east of the base would change the region's visual character. There are no wild and scenic rivers, designated scenic roads or vistas, or other sensitive visual resources near Buckley AFB. State parks and federal wildlife refuges located near the base include: Cherry Creek State Park, 6 miles to the southwest; Barr Lake State Park, 18 miles to the north; Chatfield State Park, 20 miles to the southwest; Roxborough State Park, 24 miles to the southwest; Golden Gate Canyon State Park, 36 miles to the northwest; and Rocky Mountain Arsenal National Wildlife Refuge, 10 miles to the north.

3.9.2.2 Buckley AFB

Buckley AFB is located on the eastern side of the City of Aurora with a visual environment characteristic of a large military facility. Most structures are

one-story and have been constructed with a variety of materials and in a variety of styles. The East Toll Gate Creek drainage at the southwest border of the base serves as a physical and visual break between the base and surrounding residential areas. Seedlings were planted along the north, west, and southwest borders of the base to create a greenbelt buffer.

3.10 AIR QUALITY

This section describes air quality considerations and conditions in the area around Buckley AFB. The discussion addresses air quality standards and describes current air quality conditions in the region.

3.10.1 Definition of Resource

Air quality is affected by stationary sources (e.g., industrial development) and mobile sources (e.g., motor vehicles). Air quality at a given location is a function of several factors including the quantity and type of pollutants emitted locally and regionally, and the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography.

3.10.1.1 Criteria Pollutants

Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by USEPA for criteria pollutants, including: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than ten microns in diameter (PM_{10}) and 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). NAAQS represent maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect public health and welfare.

3.10.2 Existing Conditions

3.10.2.1 Climate

Average temperatures at Buckley AFB generally range from approximately 29 degrees Fahrenheit (^{o}F) in the winter months to approximately 70 ^{o}F in the summer months with an average annual temperature of 49 ^{o}F. Average annual rainfall at Buckley AFB is 14.34 inches. More rainfall occurs in the spring months, with a peak monthly average of 2.44 inches in May; the lowest monthly average rainfall of 0.38 inches occurs in February (HAMweather 2010). Snow

season begins in the fall and extends through spring; the average annual snowfall at the Denver Airport is 59.6 inches, with a peak monthly average of 12.6 inches in March (Western Regional Climate Center [WRCC] 2010a).

Buckley AFB is located in a fairly breezy area. For each month of the year, the average wind speed is at least 7.6 miles per hour (mph) and the annual average wind speed is 8.4 mph. Spring tends to bring stronger winds; the windiest months, March and April, exhibit an average speed of 9.7 mph. The prevailing wind direction is from the south throughout the year. However, local topography and the passage of storm fronts can greatly influence wind speed and direction on a short-term basis (WRCC 2010b, 2010c).

3.10.2.2 Local Air Quality

Buckley AFB is located in Arapahoe County, Colorado, within the Metropolitan Denver Air Quality Control Region (AQCR). The Region of Influence (ROI) for this resource is the entire Denver AQCR. A geographic area with air quality that is cleaner than the primary standard is called an "attainment" area; areas that do not meet the primary standard are called "nonattainment" areas. Table 3-7 summarizes the attainment status for the Denver AQCR.

Table 3-7. Denver AQCR Designation for Criteria Pollutants

National Ambient Air Quality Standard Criteria Pollutant	Designation
Carbon monoxide (CO)	Attainment/Maintenance
Nitrogen dioxide (NO_2)	Attainment
8-hour ozone (O_3) (as measured by precursors nitrogen oxides (NO_x) and volatile organic compounds (VOC)	Non-attainment
Particulate matter with aerodynamic diameter of 10 micrometers or less (PM_{10})	Attainment/Maintenance
Particulate matter with aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$)	Attainment
Sulfur (measured as sulfur dioxide, SO_2)	Attainment
Lead (Pb)	Attainment

Source: Colorado Air Quality Control Commission [CAQCC], 2005a, 2005b, 2005c, and 2007.

3.10.2.3 Emissions at Buckley AFB

Buckley AFB operates under Title V Operating Permit 95OPAR118 that regulates air emissions from stationary sources. Buckley AFB is a major source of criteria pollutants under the Title V program because it has the potential to emit more than 100 tons of the criteria pollutants CO and nitrogen oxides (NO_x). Buckley AFB is a minor source of CO, SO_2, volatile organic compounds (VOCs), and PM_{10} under the Prevention of Significant Deterioration (PSD) provisions, with a potential to emit of less than 250 tons per year (tpy) of these pollutants. Buckley AFB is a PSD synthetic minor source of NO_x because the base accepted permit limits that establish the potential to emit for this pollutant at less than 250 tons per year (Jensen 2002).

Mobile sources are not regulated under the Clean Air Act, Title V operating permit, or the Colorado operating permit program, but are considerable components of total base air emissions. These emissions, therefore, are periodically inventoried as part of Buckley AFB's air quality management program. Emissions from mobile sources include CO, NO_x, Pb, sulfur oxides (SO_x), PM_{10}, and VOCs. In addition, motorized Air Force vehicles and portable equipment are considered mobile sources, including equipment operated and refueled under vehicle inspection and maintenance provisions.

Buckley AFB currently emits hazardous air pollutants (HAP) during the course of base activities such as storing fuel, using paints, and running generators. However, Buckley AFB is not a major source of HAP. These emissions are estimated annually in the Buckley AFB Air Emission Inventory. The air emissions summary for mobile and stationary sources at Buckley AFB is presented in Table 3-8.

Buckley AFB also uses Class I and Class II Ozone-Depleting Substances (ODS). Class I ODS are currently used for fire suppression. Class II ODS are used as a refrigerant in air conditioners. The current policy at Buckley AFB is to prohibit the use of Class I or Class II ODS for new construction projects.

Table 3-8. Stationary and Mobile Source Emissions at Buckley AFB

Category	Annual Emissions (tons per year)				
	CO	NO_x	PM_{10}	SO_x	VOCs
2008 Stationary Source Emissions at Buckley AFB	19.13	39.82	5.71	0.68	22.07
2007 Mobile Source Emissions at Buckley AFB	290.20	7.58	2.1	56.87	8.02
Total Emissions at Buckley AFB	309.33	47.40	7.81	57.55	30.09

Notes: [1] VOCs and NO_X contribute to the formation of ground-level O_3. Pb and $PM_{2.5}$ were not included in this table because they were not included in the 2007 Denver Metropolitan AQCR emissions inventory, the 2007 stationary source emission inventory, or the 2003 mobile source emissions inventory.

[2] At the time of the 2007 emissions inventory, Buckley AFB was located in the Central Front Range AQCR. However, since then, Colorado's AQCR boundaries have been reestablished and Buckley AFB is now included in the Denver Metropolitan/North Front Range AQCR.

Sources: Buckley AFB 2009c, 2009d.

3.11 NOISE

3.11.1 Definition of Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or otherwise results in an adverse human response. Actual response to noise can vary according to the type and characteristics of the noise source, distance between the noise source and receptor, sensitivity of the receptor, and time of day. Sensitive noise receptors are identified facilities or land uses that would be most sensitive to the effects of noise, such as residences, schools, patient care facilities, and child care centers.

The unit used to measure the loudness of noise is the *decibel* (dB). Most community noise standards utilize *A-weighted decibels* (dBA) as the measure of noise, as it provides a high degree of correlation with human annoyance and health effects. A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to functioning of the human ear.

The *Air Installation Compatible Use Zone* (AICUZ) program was established by the DoD in response to the Noise Control Act of 1972 to promote an environment free from noise that jeopardizes public health or welfare. Noise zones and Accident Potential Zones (APZs), together, form the AICUZ program for an air installation. The AICUZ program also serves to protect USAF airfields from encroachment and incompatible land development.

3.11.2 Existing Conditions

The ROI for noise is limited to Buckley AFB and adjacent areas described within the base's designated AICUZ program.

3.11.2.1 Buckley AFB

The DoD uses *NOISEMAP*—a computerized day-night average dBA (DNL) modeling program—to produce contours showing noise levels generated by aircraft operations. Contours established at Buckley AFB extended outside of the

base boundary. Existing on-base noise conditions are predominantly influenced by aircraft operations and by the test run-ups of aircraft engines. Daily activities at Buckley AFB typically generate noise ranging from 65 to 80 DNL (Buckley AFB 2007d).

3.12 HAZARDOUS MATERIALS AND WASTES

3.12.1 Definition of Resource

Hazardous wastes are defined by the *Resource Conservation and Recovery Act* (RCRA), as amended, as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health or the environment. Hazardous materials are defined by the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as amended, as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious irreversible illness, or incapacitating reversible illness; or pose a substantial threat to human health or the environment. Issues associated with hazardous materials and wastes typically center around underground storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, and use of pesticides, fuels and other petroleum-based products, lubricants, antifreeze, and paint solvents. When such resources are improperly used in any way, they can threaten the health and well-being of wildlife species, botanical habitats, soil systems, water resources, and people.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, USAF, through AFI 32-4002 and 32-7086, has dictated that all facilities develop and implement *Hazardous Materials Management Plans* (HMMPs), *Hazardous Waste Management Plans* (HWMPs), and/or *Spill Prevention, Control, and Countermeasure* (SPCC) Plans. Also, the DoD has developed the *Environmental Restoration Program* (ERP) to facilitate the thorough investigation and cleanup of contaminated sites located at military installations. These plans and programs, in addition to established legislation (e.g., CERCLA, RCRA, etc.) effectively form the "safety net" intended to protect the ecosystems on which most living organisms depend.

3.12.2 Existing Conditions

The ROI for hazardous materials and wastes is limited to sources at Buckley AFB. The base's Civil Engineer Squadron/Environmental Flight (CES/CEV) is responsible for environmental management action plans at Buckley AFB and acts

as the USAF liaison on environmental compliance matters with regulatory agencies. In conformance with the policies established by Air Force Policy Directive 32-70, *Environmental Quality*, the CES/CEV has developed plans to manage hazardous materials and wastes, including the base's HWMP and SPCC Plan (Buckley AFB 2008b). The CES/CEV supports the tenants of the base concerning environmental permits, hazardous materials and waste storage, spill prevention and response, and participation on the *Base Environmental*, *Safety and Occupational Health Council* (Buckley AFB 2003).

3.12.2.1 Hazardous Waste Generation and Storage

Hazardous materials are used at Buckley AFB for aircraft and ground vehicle maintenance, as well as general base maintenance activities (Buckley AFB 2003). The receipt, storage, and issue of hazardous materials are conducted at the hazardous materials pharmacy (HAZMART) which utilizes an electronic tracking database, EESOH-MIS, to track hazardous material usage and storage. Response to potential hazardous materials spills would follow procedures in the base's *SPCC* Plan (Buckley AFB 2007b, 2008b).

Hazardous waste at Buckley AFB is primarily generated by aircraft, ground vehicle, and general base maintenance activities, and includes deicing fluids, antifreeze, flammable solvents, contaminated fuels and lubricants, used filters, stripping chemicals, waste oils, and aerosol paint waste (Buckley AFB 2008b). Hazardous waste is collected at *initial accumulation points* throughout the base and transferred to a *central accumulation point* once the accumulated quantity reaches 55 gallons, or one quart for acute hazardous waste. All hazardous waste accumulated on Buckley AFB is transported and disposed of at permitted off-site facilities by a contractor within 180 days of initial accumulation date (Buckley AFB 2007b, 2008b).

Management of hazardous waste is the responsibility of each waste-generating organization and the CES/CEV. The CES/CEV maintains the base's *HWMP*, which outlines hazardous waste management procedures such as waste stream inventorying and training procedures. Response to potential hazardous waste spills would follow procedures in Buckley AFB's *HWMP* (Buckley AFB 2008b).

The base has been classified as a *small-quantity generator*[6] of hazardous waste by the USEPA (Buckley AFB 2007b).

3.12.2.2 Universal Waste

Universal waste comprises batteries, electronics, fluorescent light bulbs, pesticides, and other commonly-used items that contain substances hazardous to human health and environmental conditions, such as mercury, lead, or copper. These wastes are subject to state regulations (6 Code of Colorado Regulations 1007-3, Section 273), but they are not managed as hazardous unless mixed with a hazardous waste. Buckley AFB has been classified as a *large-quantity handler*[7] of universal waste by the USEPA (Buckley AFB 2007b), and commonly-generated universal waste at the base includes aerosol cans and fluorescent light bulbs (Buckley AFB 2007a, 2007b). Universal waste is stored at *universal accumulation points* throughout the base. There are no limits to the quantity of universal waste that may be stored at a universal accumulation point; however, universal waste must be removed from the base within one year of accumulation (Buckley AFB 2007b).

3.12.2.3 Storage Tanks and Oil/Water Separators

Fuels and other petroleum-based products that are stored and used at Buckley AFB include JP-8 jet fuel, diesel fuel, gasoline, and various oils. Storage occurs in ASTs and USTs. Areas on base where significant volumes of such products are stored and used include the base's main petroleum product storage facility, the Army/Air Force Exchange Service fueling station, at various aviation support facilities, and at various buildings where diesel tanks are required for auxiliary generators (Buckley AFB 2003).

Buckley AFB has oil/water separators (OWSs) at all on-base maintenance areas for the accumulation of small discharges of waste oil and other petroleum-based

[6] A *small-quantity generator* produces between 100 and 1,000 kilograms (kg) (about 220 to 2,200 pounds, or 25 to 300 gallons) of hazardous waste annually; produces no more than 1 kg (about 2.2 pounds) of acutely hazardous waste in any month; and, never accumulates more than 6,000 kg (about 13,200 pounds) of non-acutely hazardous waste onsite at any one time.
[7] A *large-quantity handler* generates more than 5,000 kg (about 11,000 pounds) of universal waste annually.

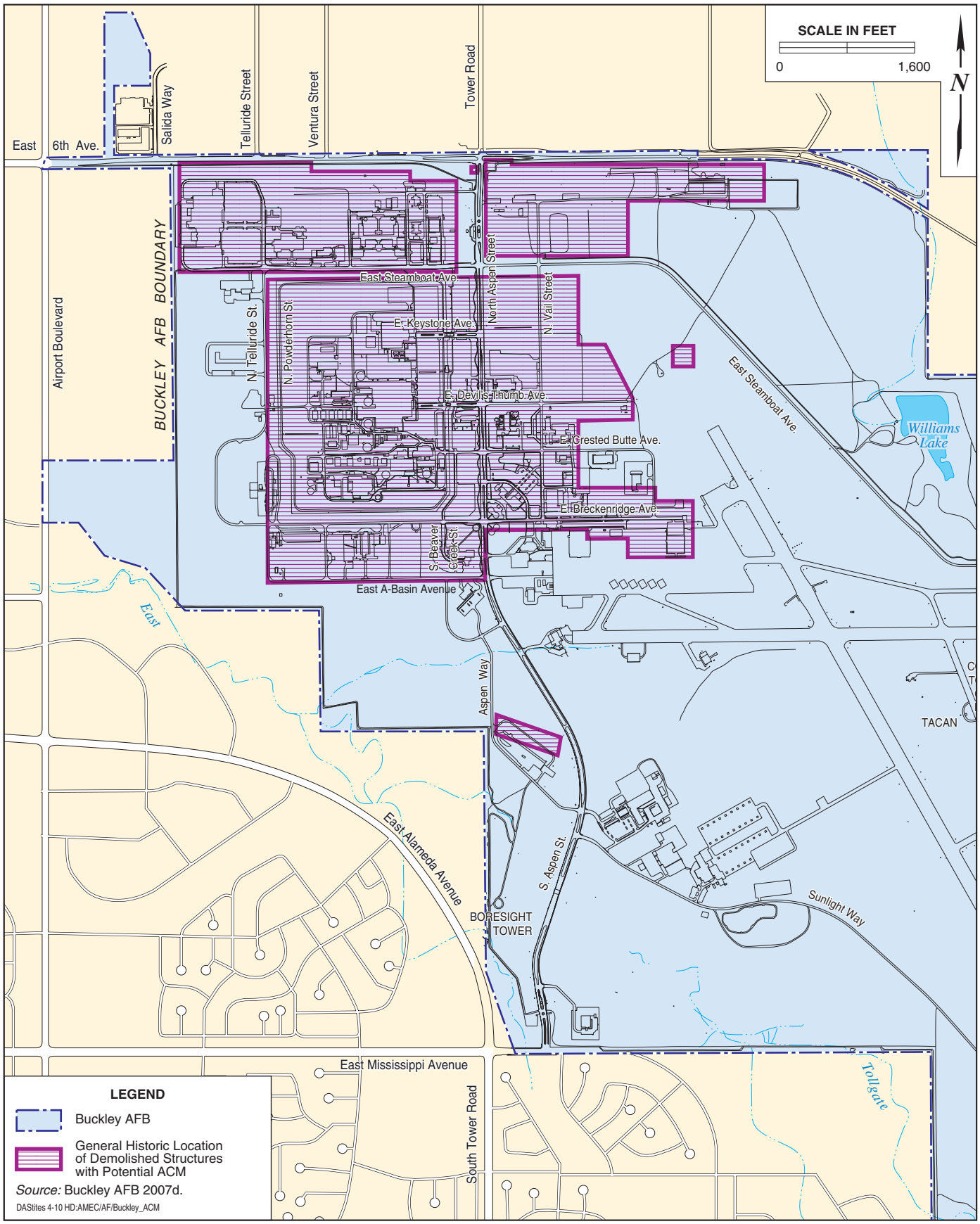
products. All OWSs at Buckley AFB are connected to the base's industrial wastewater collection system (Buckley AFB 2008b). Refer to Section 3.1, *Utilities*, for a discussion of Buckley AFB's wastewater collection systems and to Section 3.4, *Water Resources*, for a discussion of water management at the base.

3.12.2.4 Asbestos

Asbestos is a mineral fiber that was historically added to products to strengthen them and provide heat insulation and fire resistance. When asbestos-containing material (ACM) is damaged or disturbed by repair, remodeling, or demolition activities, microscopic fibers become airborne and can be inhaled into the lungs, where they can cause significant health problems (USEPA 2010b). Breathing high levels of asbestos has been associated with some types of cancer. Many building products contained asbestos prior to the 1970s.

Air Force Instruction (AFI) 32-1052, *Facility Asbestos Management*, provides direction for the management of ACM on USAF installations. AFI 32-1052 outlines requirements for establishing *asbestos management plans* and *asbestos operating plans* at USAF installations. The objective of the asbestos management plan is to document the status and condition of ACM within an installation. The asbestos operating plan provides direction for conducting asbestos-related work within the installation.

An "asbestos area" has been identified in the northwest portion of Buckley AFB (Figure 3-5). Within this area, ACM is present within the soil to a depth of approximately 2 feet. The ACM originated from demolition debris (i.e., concrete, flooring, tile, siding, roofing material, pipe insulation, and other building materials) that was left in place following the demolition of a WWII-era hospital and dormitory complex. The demolition date is unknown; however, based on review of aerial photographs, the complex was demolished prior to 1985. Prior to construction of the Base Exchange Facility and Fitness Center Complex in this area, multiple investigations beginning in 1999, were performed to determine the presence of ACM in surface and shallow subsurface demolition debris (Buckley AFB 2009e). In 2003, the Colorado Department of Public Health and Environment issued *Compliance Order #03-09-30-01* to Buckley AFB for previous



EA

Historic Location of Demolished Structures with Potential Asbestos-Containing Material (ACM) Buckley AFB

FIGURE 3-5

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

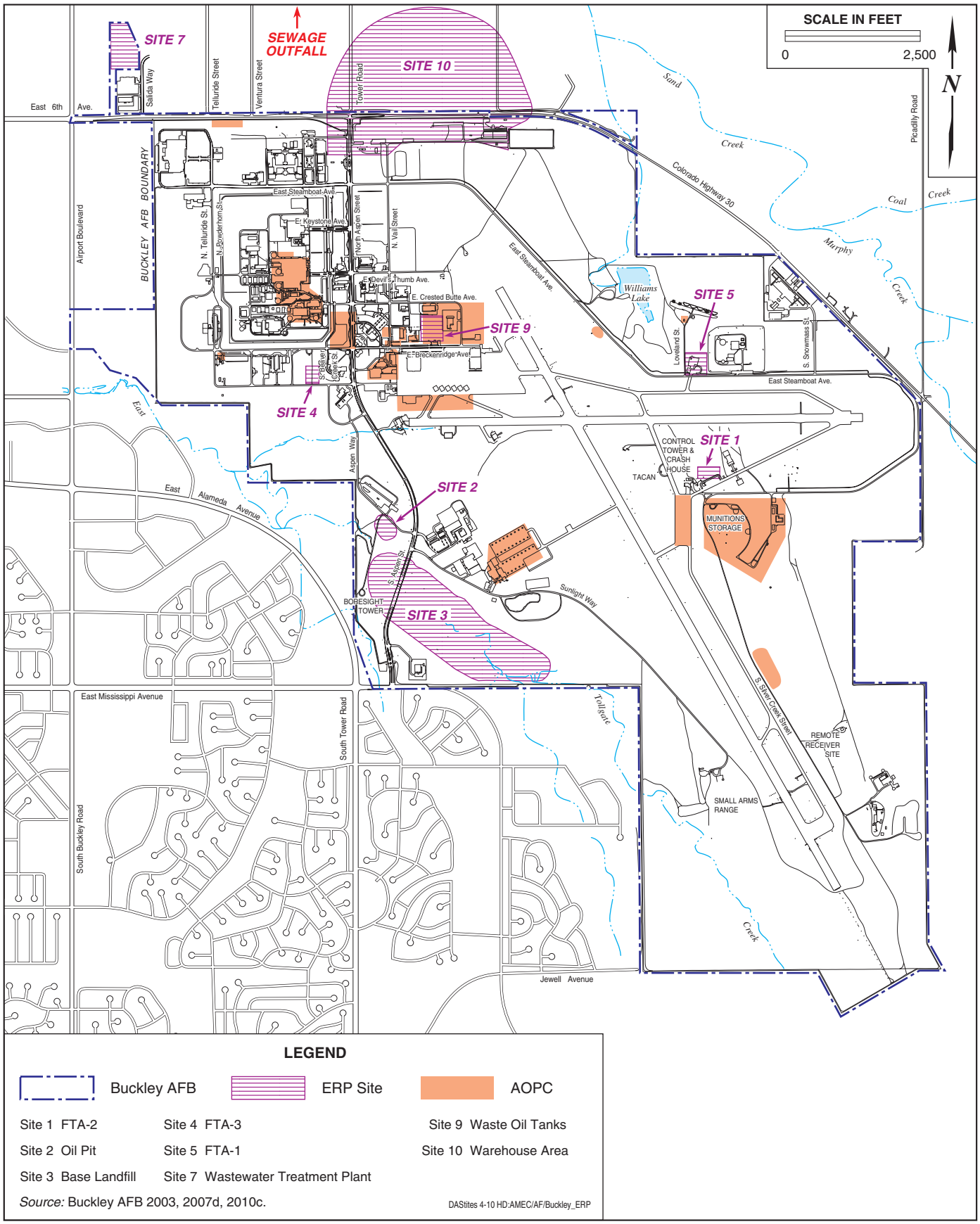
violations related to the handling and storage of ACM during construction activities in this area. As a requirement of the Compliance Order, Buckley AFB submitted an Asbestos Management Plan which identifies procedures to be implemented when any asbestos contamination is encountered at the base.

3.12.2.5 Environmental Restoration Program

The Buckley AFB ERP has identified a total of ten sites where historic activities at the base may have created contamination from toxic and hazardous substances, including petroleum-based products. Two identified ERP sites have been closed, and the locations of the eight remaining open ERP sites are shown on Figure 3-6 (Buckley AFB 2008b). Buckley AFB continues to investigate available records from the USAF and other military organizations to evaluate if historic activities resulted in additional contaminated areas for possible inclusion in the base's ERP (Buckley AFB 2007d).

Of the eight open ERP sites at Buckley AFB, only one site—*ERP Site 10*—would be located in the footprint of the Proposed Action and project alternatives. This site is described in detail below. No other ERP sites would be impacted by the Proposed Action or project alternatives; accordingly, these additional sites are not described below.

ERP Site 10. ERP Site 10 is located at the northern perimeter of Buckley AFB, and comprises both on-base and off-base areas (refer to Figure 3-6). A portion of the site was historically used in the 1940s and 1950s for vehicle maintenance, and another portion was historically used from 1955 to 1996 for the storage of pesticides and herbicides (Buckley AFB 2008b). A 1997 site investigation detected a variety of contaminants in soils and groundwater, including tetrachloroethylene (or perchloroethylene [PCE]) and metals. A plume contaminated primarily with PCE has also been shown to flow off-base to the north under property owned by the City of Aurora (Buckley AFB 2008b). In 2005, an interim remedial action was established to substantially reduce groundwater contaminant concentrations in the on-base source area, and it continues to be operated to preclude the flow of contaminated groundwater off



EA

Environmental Restoration Program (ERP) Sites and Areas of Potential Concern (AOPCs) at Buckley AFB

FIGURE 3-6

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

base. Treatability studies to evaluate remedial technologies for additional on- and off-base remediation are currently underway (Buckley AFB 2008b).

3.12.2.6 Areas of Potential Concern

In 2008 and 2009, a basewide investigation was conducted to identify sites at Buckley AFB not currently being evaluated under the ERP or other compliance programs where potential releases to soil or groundwater have occurred. The investigation identified 17 areas of potential concern (AOPCs) within the base boundary—as well as an additional AOPC associated with an outfall area of a former sewage treatment plant located north of the base—where additional investigation work would be needed (Buckley AFB 2010c). These AOPCs were identified because soil or groundwater sampling results exceeded screening criteria or other data indicated the potential for contamination. Table 3-9 presents a summary of the 18 AOPCs requiring additional investigation; additional identified AOPCs requiring no further investigation have been excluded from the table (Buckley AFB 2010c).

Table 3-9. Areas of Potential Concern (AOPCs) at Buckley AFB

Area of Potential Concern	Affected Media	Primary Contaminants
Truck Fueling	groundwater/soil	PAHs, PHCs (groundwater); PHCs, solvents (soil)
Aqua Gas System	groundwater	solvents
Armament & Automotive	groundwater	solvents, PAHs
Ordnance Storage	groundwater	solvents, PAHs, SVOCs, perchlorate
Boiler House	soil	PAHs, PHCs
Space Warning Squadron	groundwater	solvents, PAHs
Navy Motor Pool	groundwater	solvents, PAHs
Fire Protection Training	groundwater/soil	PAHs, SVOCs (groundwater); mercury, lead (soil)
Building 815	groundwater	solvents
Aerospace Ground Equipment	groundwater	solvents
Communication Facility	groundwater	solvents
Apron Runoff	soil	PHCs, cadmium, lead
Auxiliary Apron	groundwater	PAHs
Outfall Area	soil	PAHs, pesticides, cadmium, chromium, lead, mercury, silver, zinc
Army National Guard	groundwater	selenium
Runway Borrow	groundwater/soil	selenium (groundwater); mercury (soil)
Fuel Laboratory	soil	PAHs
Former Transformer Building	soil	PAHs, PHCs

Notes: PAHs - polycyclic aromatic hydrocarbons
PHCs - petroleum hydrocarbons
SVOCs - semi-volatile organic compounds
Source: Buckley AFB 2010c.

3.13 BIOLOGICAL RESOURCES

3.13.1 Definition of Resource

Biological resources include native or naturalized plants and animals and the habitats in which they occur. Sensitive biological resources are defined as those plant and animal species listed as threatened or endangered, or proposed as such, by the U.S. Fish and Wildlife Service (USFWS), Colorado Division of Wildlife (CDOW) or Colorado Natural Heritage Program (CNHP). The Federal Endangered Species Act (ESA) of 1973 and the Colorado ESA protect listed species against killing, harming, harassment, or any action that may damage their habitat. Species of concern are not protected by law, but could become listed and protected at any time.

Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the Endangered Species Act and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitats).

Migratory birds, as listed in 50 CFR § 10.13, are ecologically and economically important to the U.S., and recreational activities such as bird watching, studying, and feeding are practiced by many Americans. The *Migratory Bird Treaty Act* (MBTA), as amended, was enacted to protect migratory birds from capture, pursuit, hunting, or removal from natural habitat. Over 800 species are currently protected under the MBTA. In 2001, EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, was issued to ensure that Federal agencies consider environmental effects on migratory bird species and, where feasible, implement policies and programs which support the conservation and protection of migratory birds.

Jurisdictional wetlands are those subject to regulatory authority under Section 404 of the CWA and EO 11990, *Protection of Wetlands*. Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and the USEPA as, "those areas that are inundated or saturated by surface or groundwater at a frequency and

duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR § 328.3[b]). Wetlands are protected as a subset of the *Waters of the U.S.* under Section 404 of the CWA; the USACE requires a permit for any activities crossing wetlands or other Waters of the U.S.

3.13.2 Existing Conditions

The ROI for biological resources is limited to Buckley AFB.

3.13.2.1 Vegetation

Two types of grassland communities occur at Buckley AFB. The crested wheatgrass (*Agropyron cristatum*) complex is the most common while a native mid-grass prairie occurs in the southern portions of the base and is dominated by western wheatgrass (*Agropyron smithii*). Other vegetation types include landscaped areas within the cantonment area as well as riparian bottomlands (Buckley AFB 2008b).

Existing grassland conditions at Buckley AFB can be described as a mosaic of grassland prairie, exotic weed infestations, riparian, and bottomland meadow. Typical vegetation at the installation include blue grama (*Bouteloua gracilis*), crested wheatgrass, western wheatgrass, yucca (*Yucca glauca*), plains pricklypear cactus (*Opuntia polyacantha*), needlegrass (*Stipa* spp.), buffalograss (*Buchloe dactyloides*), Russian thistle (*Salsola iberica*), kochia (*Kochia scoparia*), various mustards, crested pricklypoppy (*Argemone polyanthemos*), and sunflowers (*Helianthus* spp.). The shrubby component includes rubber rabbitbrush (*Chrysothamnus nauseosus*), and broom snakeweed (*Gutierrezia sarothrae*) (Buckley AFB 2008b).

3.13.2.2 Wildlife

The open grasslands and riparian corridors at Buckley AFB provide habitat for a variety of wildlife species. Numerous reptiles and amphibians have the potential to occur at the base including the western hognose snake (*Heterodon nasicus*), bullsnake (*Pituophis catenifer*), prairie rattlesnake (*Crotalus viridis viridis*), many-

lined skink (*Eumeces multivirgatus*), plains spadefoot (*Spea bombifrons*), and tiger salamander (*Ambystoma tigrinum*) (Buckley AFB 2008b; 2010a).

Common songbirds found at Buckley AFB include the horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), house finch (*Carpodacus mexicanus*), black-billed magpie (*Pica pica*), American robin (*Turdus migratorius*), and lark bunting (*Calamospiza melanocorys*). Birds of prey present at the base include the burrowing owl (*Athene cunicularia*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), American kestrel (*Falco sparverius*), and prairie falcon (*Falco mexicanus*). The mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), northern shoveler (*Anas clypeata*), great blue heron (*Ardea herodias*), and killdeer (*Charadrius vociferus*) are bird species associated with the surface water resources of the base. These birds, their eggs, and nests are protected by the MBTA (Buckley AFB 2000).

The grassland complex at Buckley AFB supports a variety of small mammals. Rodents include the thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), black-tailed prairie dog (*Cynomys ludovicianus),* eastern fox squirrel (*Sciurus niger*), and western harvest mouse (*Reithrodontomys megalotis*). Black tailed jackrabbits (*Lepus californicus*) and desert cottontails (*Sylvilagus audubonii*) also utilize these grasslands. Large herbivores on base are generally absent due to conflicts with aircraft on the runways but an occasional mule deer (*Odocoileus hemionus*) or white-tailed deer (*Odocoileus virginianus*) may be found. Predators include the red fox (*Vulpes vulpes*), coyote (*Canis latrans*), American Badger (*Taxidea taxus*), and striped skunk (*Mephitis mephitis*) (Buckley AFB 2008b; 2010a).

3.13.2.3 Sensitive Species

According to information from the USFWS, CDOW, and Buckley AFB, a total of 13 special-status species potentially occur on base (Table 3-10).

Table 3-10. Sensitive Species Potentially Occurring on Buckley AFB

Common Name	Scientific Name	Status
Amphibians		
Northern leopard frog	*Rana pipiens*	SSC
Birds		
Bald eagle	*Haliaeetus leucocephalus*	ST
Ferruginous hawk	*Buteo regalis*	SSC
Mountain Plover	*Charadrius montanus*	SSC
Western burrowing owl	*Athene cunicularia*	ST
Whooping crane	*Grus americana*	FE, SE
Mammals		
Black-footed ferret	*Mustele nigripes*	FE, SE
Black-tailed prairie dog	*Cynomys ludovicianus*	SSC
Preble's Meadow jumping mouse	*Zapus hudsonius preblei*	FT, ST
Swift fox	*Vulpes velox*	SSC
Plants		
Colorado butterfly plant	*Gaura neomexicana* ssp. *coloradensis*	FT
Ute Ladies'-tresses orchid	*Spiranthes diluvialis*	FT
Reptiles		
Common garter snake	*Thamnophis sirtalis*	SSC

FC - Federal candidate
FT - Federally threatened
FE - Federally endangered
SSC - State special concern
ST - State threatened
SE - State endangered
Note: Table 3-10 includes only the state and federally listed species which either occur or potentially occur at Buckley AFB.
Sources: Buckley AFB 2008b, Buckley AFB 2010a, CDOW 2010a, 2010b; USFWS 2010.

Northern Leopard Frog. The northern leopard frog can be found along the riparian margins of ponds, marshes, streams, lakes, and reservoirs. It also occurs in wet meadows and along irrigation ditches. Surveys have not been conducted for this species at Buckley AFB, but suitable habitat may exist along the bottomlands and stream margins associated with Murphy Creek, East and West Toll Gate Creeks, and unnamed tributaries of Sand Creek.

Bald Eagle. The State threatened bald eagle is associated with large rivers, lakes, and reservoirs. They usually feed on fish but on the eastern plains of Colorado are known to feed on small mammals such as black-tailed prairie dogs, especially during the winter (Buckley AFB 2000). Bald eagles occur as winter transients at Buckley AFB, where they may occasionally forage in prairie dog towns.

Ferruginous Hawk. Ferruginous hawks were known to occur as a resident at the former Plains Conservation Center adjacent to Buckley AFB (Buckley AFB 2000). This species forages for small mammals including black-tailed prairie dogs in open vegetation areas. Due to the large numbers of prairie dogs on base and extensive habitat occupied by these and other prey species, these hawks can be found on base as a transient or while foraging.

Mountain Plover. The mountain plover is listed as a State special concern species. This species prefers shortgrass prairies dominated by buffalograss and blue grama with areas of bare ground. They also inhabit prairie dog towns. The breeding range of the mountain plover does not include the western portion of Arapahoe County. The mountain plover is only likely to be found on base as a rare migratory transient.

Western Burrowing Owl. The State threatened western burrowing owl is a migratory resident on base and occurs there from March through October. They inhabit the grassland community and use abandoned prairie dog burrows or other excavated sites as nesting locations. During the summer of 2002, at least 18 to 20 nesting pairs were observed on the base (Buckley AFB 2008b).

Whooping Crane. The whooping crane is a federally and State endangered species that has been recorded in mudflats around reservoirs and in agricultural areas. In Colorado it is uncommon in spring and fall and a rare migrant in the western valleys. Whooping cranes are mostly recorded in Mesa, Delta, and Gunnison counties and are casual migrants on the eastern plains. Habitat on Buckley AFB would include nesting areas in wetlands adjacent to Williams Lake.

Black-Footed Ferret. The black-footed ferret is a federally and State endangered species. It is closely associated with prairie dog habitat, as it depends upon prairie dogs for food and uses prairie dog burrows for nesting. While black-footed ferrets have historically occupied areas ranging from the shortgrass and midgrass prairie to semidesert shrublands, they are presently known to exist only in a remnant restored population in the Shirley Basin of Wyoming and in captive breeding populations across the country. Although no live ferrets have been found in Colorado, evidence suggests they inhabit Colorado.

Black-Tailed Prairie Dog. Another state special concern species, the black-tailed prairie dog, is a common and numerous resident at Buckley AFB. It inhabits short and mid-grass prairies where it forms colonies known as towns. Prairie dogs provide a food source and/or valuable habitat for many species including some of the sensitive species mentioned in this section. The base follows the *Supplement to the Environmental Assessment of Proposed Prairie Dog Management Practices at Buckley AFB*, dated June 2001 (Buckley AFB 2003).

Preble's Meadow Jumping Mouse. The Preble's Meadow jumping mouse is a state- and federally threatened species. Meadow jumping mice have very long tails and very large feet. Their habitat consists of grassy or weedy fields, where they use runways made by other rodents. Although Buckley AFB contains habitat suitable for the Preble's Meadow jumping mouse, the USFWS has determined that there are no longer any wild free-ranging Preble's Meadow jumping mice in the Denver metropolitan area and has designated it as a block clearance zone (Buckley AFB 2008b).

Swift Fox. The swift fox, a State special concern species, is found across the eastern plains of Colorado. Typical habitat includes short and mid-grass prairies with relatively flat or gently rolling topography. This species preys largely on rabbits and hares but also takes smaller rodents such as black-tailed prairie dogs. This species has not been observed at Buckley AFB (Buckley AFB 2008b); however, it may go unnoticed due to its nocturnal behavior.

Colorado Butterfly Plant. A federally threatened species, the Colorado butterfly plant also occurs in similar habitat. Potential habitat for the Colorado butterfly plant occurs along the bottomlands and stream margins associated with Murphy Creek, East and West Toll Gate Creeks, and unnamed tributaries of Sand Creek.

Ute Ladies'-tresses Orchid. The Ute ladies'-tresses orchid is a federally threatened species. It occurs in wet meadows, along streams, lakes, and associated floodplains. Although suitable habitat for the Ute ladies'-tresses orchid has been identified in low-lying areas near Toll Gate Creek and Williams Lake, a 2001survey did not find any specimens (Buckley AFB 2003).

Common Garter Snake. The common garter snake is a State special concern species that inhabits marshes, ponds, and the edges of streams. For the most part, it is restricted to aquatic, wetland, and riparian habitats along the floodplains of streams. Likely habitat at Buckley AFB includes wetlands and riparian areas along East Toll Gate Creek and the tributaries of Sand Creek, and in the wetlands adjacent to Williams Lake.

3.13.2.4 Wetlands

A base-wide jurisdictional wetlands determination by the USACE has not been completed for Buckley AFB (Buckley AFB 2010a). *National Wetland Inventory* (NWI) maps identify a total of six wetland areas on the base. Refer to Figure 3-3 in Section 3.4, *Water Resources*, for a map of wetlands occurring on Buckley AFB. Most of the wetlands occur in the vicinity of East Toll Gate Creek in the undeveloped southwestern part of the base. In the northeast part of Buckley AFB, there are two wetlands associated with an unnamed tributary of Sand Creek, as well as wetland areas adjacent to Williams Lake (Buckley AFB 2003, 2010a).

Williams Lake has been classified by the USACE as a *palustrine open water wetland* (Buckley AFB 2010a). However, the USACE determined that Williams Lake and associated drainage areas—including wetlands—are isolated waters and not hydrologically connected to nearby Murphy Creek (Buckley AFB 2010a). This finding is currently being validated by the USACE with an interim finding that the wetlands remain isolated with no nexus. Therefore, the possibility may exist that Williams Lake and associated drainage areas—including wetlands—are not *Waters of the U.S.* under Section 404 of the CWA (Buckley AFB 2010a).

3.14 SAFETY

3.14.1 Definition of Resource

The primary safety concern at facilities with aircraft operations is the potential for aircraft mishaps (i.e., crashes), which may be caused by mid-air collisions with other aircraft or objects, weather difficulties, or bird-aircraft strikes. The USAF has defined aircraft mishap classifications based upon personal injury and property damage. These mishap classifications range from Class A (i.e., total

cost in excess of $1 million for injury, occupational illness, and property damage; or destruction or damage beyond repair to military aircraft) to Class D (i.e., total damages between $1,000 and $10,000). Bird-Aircraft Strike Hazard (BASH) is defined as the threat of aircraft collision with birds and other wildlife during aircraft operations. Most birds fly close to ground level; correspondingly, more than 90 percent of all reported BASH incidents occur below 3,000 feet above ground level and/or in the immediate vicinity of the airfield (Federal Aviation Administration 2007).

APZs—rectangular zones extending outward from the ends of active runways at military bases—delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. Clear Zones (CZs) are the areas closest to the end of the runway, which is considered the most hazardous area. APZs and noise zones together form the AICUZ for an air installation. The AICUZ program serves to protect USAF airfields from encroachment and incompatible land development.

Air Force Manual 91-201, *Explosives Safety Standards*, requires that defined quantity distance (QD) arcs be maintained between explosive materials storage (e.g., munitions) and handling facilities and a variety of other types of facilities. QD arcs are determined by the type and quantity of explosive materials stored; within QD arcs, development is either restricted or altogether prohibited in order to maintain personnel safety and minimize the potential for damage in the event of an accident.

3.14.2 Existing Conditions

The ROI for safety is limited to Buckley AFB and adjacent areas located within the base's designated airfield safety zones.

3.14.2.1 Aircraft Mishaps and Bird-Aircraft Strike Hazard

There have been no recent notable aircraft mishaps reported at Buckley AFB. In 2005, an F-16C fighter aircraft assigned to Buckley AFB was destroyed upon making an emergency landing at Lamar Airport, located approximately 150

miles southeast of the base in Lamar, Colorado. There were no fatalities and only minor damage to private property (Buckley AFB 2005).

Bird-aircraft strikes present a potential threat to Buckley AFB aircraft and aircrew safety due to the base's proximity to resident and migratory bird species. The base developed a BASH plan in order to minimize the threat and occurrence of bird strike and wildlife hazards at Buckley AFB. There were 31 bird strikes reported between 1999 and 2008 (City-Data.com 2008). Additionally, two coyotes have been struck by F-16s at the base (Buckley AFB 2002).

3.14.2.2 Accident Potential Zones

At Buckley AFB, CZs and APZs extend 15,000 feet from both ends of the runway (refer to Figure 3-4 in Section 3.5, *Land Use*). Most of the CZs are within base boundaries, but the majority of the APZs fall outside of the base (Buckley AFB 2003). Under the Proposed Action, a pipeline would be constructed to transport water from Well #3 to the proposed AST. This pipeline would likely traverse the CZ and APZ located at the north end of Runway 14/32. Present land use to the north of the base is comprised by a mix of light industrial, undeveloped space, and recreational facilities, while agricultural and undeveloped uses predominate south of Buckley AFB (City of Aurora 2009a). Refer to Section 3.3.5, *Land Use*, for a detailed discussion of present and future land use around the base.

3.14.2.3 Explosives Safety

QD arcs have been established around various facilities adjacent to the airfield, including a munitions hold area, hot cargo pad, and the munitions storage area. The footprints of the Proposed Action and project alternatives would be located outside of all established QD arcs at Buckley AFB. Accordingly, explosives safety would not be impacted by the Proposed Action or project alternatives, and an analysis of potential impacts has been eliminated from Section 4, *Environmental Consequences*.

SECTION 4
ENVIRONMENTAL CONSEQUENCES

Environmental impacts which would result from implementation of the Proposed Action at Buckley Air Force Base (AFB) by the U.S. Air Force (USAF) are evaluated in this section. Analyses are presented by resource area, as described in Section 3, *Affected Environment*. Examination of potential environmental impacts is intended to reduce redundancy where similar impacts are expected for each alternative to the Proposed Action. In instances where the alternative actions carried forward in this document would have identical or substantially similar environmental consequences (e.g., transportation and circulation, socioeconomics, etc.), the alternatives are analyzed together. Further, with regard to cultural resources, an analysis of potential impacts is not provided because the Proposed Action and all project alternatives would not involve the removal or alteration of any buildings and the Colorado State Historic Preservation Office has previously concurred that no significant archaeological resources have been identified at Buckley AFB.

The definitions for impact intensity thresholds used in this document are as follows:

- ***Negligible***. Impacts on the resource, although anticipated, would be difficult to observe and are not measurable.
- ***Minor***. Impacts on the resources would be detectible upon close scrutiny or would result in small but measurable changes to the resource.
- ***Moderate***. Impacts on the resource would be easily observed and measurable, but would be localized or short-term (equal to or less than two years).
- ***Major***. Impacts on the resource would be easily observed and measurable, widespread, and long-term (more than two years).

4.1 UTILITIES

4.1.1 Approach to Analysis

Interruption or disruption of utility services could occur as a result of physical disturbance or displacement of public utility infrastructure during the construction portion of project implementation. In addition, an impact to utilities would occur if an increase in demand for utility service is beyond the capacity of the utility provider. In general, impacts to utilities would be significant if the Proposed Action had the potential to exceed existing or forecasted capacities of natural gas, wastewater, water, solid waste disposal, or electricity.

4.1.2 Impacts

4.1.2.1 Proposed Action

Under the Proposed Action, pipelines would be constructed to transport water from Wells #1, 2, and 3 to the proposed aboveground storage tank (AST). The projected pipeline alignments may traverse existing utility lines which could be potentially affected by the Proposed Action during construction phases. Because the potential exists for the installation of proposed pipelines to encounter existing utilities during construction, especially between Well #3 and the proposed AST site and in the vicinity of N. Vail Street, coordination with base engineering and advance site inspection to verify utility locations and avoid disturbance would be required prior to construction or pipeline maintenance activities. Coordination of this kind would prevent the disruption of existing base utilities, and impacts to existing utility lines would be negligible and short-term.

Electricity usage for the base would be slightly increased both in the short- and long-term due to the installation of additional water pumping and pump regulation facilities as well as general construction needs. However, the additional electricity would be negligible and use is not anticipated to exceed existing utility provider capacities. Therefore, impacts to electric utilities would be negligible in the short- and long-term under the Proposed Action.

Potable water will continue to be purchased from the City of Aurora in an amount that will be sufficient to meet the demand at Buckley AFB. However, the amount purchased from the City of Aurora would decrease overall as irrigation water demand—currently met by the purchase of potable water—would be partially supplemented by water conveyed from Wells #1, 2, and 3 to the proposed AST and subsequent use of the pumped water for on-base irrigation. Therefore, with regard to potable water supply, the Proposed Action would represent a minor beneficial impact over the long-term.

Construction activities under the Proposed Action would include excavation, trenching, and grading that would result in localized, temporary effects to surface hydrology. A construction-specific *Storm Water Pollution Prevention Plan* (SWPPP) would be developed and implemented for the Proposed Action to ensure that surface water runoff management during construction activities would comply with applicable regulatory and permit requirements, including Buckley AFB's existing National Pollutant Discharge Elimination System (NPDES) MS4 permit for on-base storm water management. The construction SWPPP would also contain measures to prevent potentially adverse discharges from entering Buckley AFB's surface and storm sewer discharge systems and their associated receiving bodies (the City of Aurora storm sewer system, and East Toll Gate and Sand Creeks). Compliance with these measures would also ensure that the Proposed Action would not adversely affect Section 303(d)-listed watersheds (i.e., East Toll Gate and Sand Creeks) that receive runoff from the base. Accordingly, construction-related impacts to storm water management would be minor and short-term.

Under the Proposed Action, the actual increase in impervious surfaces would be limited to the AST footprint and adjacent areas, and these project components would be designed so that potential changes to existing surface water runoff would be minimal. Operational activities under the Proposed Action would comply with all applicable regulatory and permit requirements, including Buckley AFB's existing NPDES MS4 permit for on-base storm water management. Where applicable, operations would also follow BMPs contained in Buckley AFB's Storm Water Management Plan (SWMP) to prevent potentially adverse discharges from entering on-base discharge systems and their associated receiving bodies, including especially Section 303(d)-listed watersheds.

Therefore, operation-related impacts to storm water management would be minor over the long term.

Plans to minimize impacts from well water discharge related to testing and maintenance as well as accidental spill-outs would be developed and would follow *Best-Management Practices* (BMPs) for the prevention of soil and storm water contamination (refer to sections 4.3 and 4.4). In addition, the proposed piping system for irrigation would be configured in a closed-loop system with the ability to keep the base water system charged for other facilities and allow for the discharge of water to clear the pipes of any sediment buildup which would further minimize the potential for accidental spill-outs. If it is deemed necessary to discharge pumped well water related to testing and maintenance of the irrigation system to the sanitary sewer system, consultation with the Denver Metro Wastewater Reclamation District (DMWRD) would be conducted. Though potential impacts to wastewater utilities exist, the Proposed Action would not exceed the current or foreseeable capabilities of utility providers and incorporation of BMPs and coordination with the DMWRD would minimize these potential impacts. Therefore, the Proposed Action would result in minor impacts to wastewater over the long-term.

With regard to irrigation water supplies, water produced from Wells #1, 2 and 3 would be subsequently conveyed and stored in the proposed AST for use primarily as an on-base irrigation water supply. As indicated in a 2009 study that evaluated the feasibility of constructing such an on-base irrigation system, a total of approximately 34.4 acres of irrigated areas located in the northwestern part of Buckley AFB could be served by construction of the proposed on-base irrigation system (Buckley AFB 2009a, 2009b). Therefore, the Proposed Action would also represent a moderate beneficial impact over the long-term to on-base irrigation water supplies.

Finally, the Proposed Action is not anticipated to have a measurable effect on solid waste disposal or natural gas utilities as a result of the implementation of the Proposed Action. Therefore, no foreseeable short- or long-term impacts would occur to solid waste disposal and natural gas utilities.

4.1.2.2 Alternatives 1: Location of AST South of Camp Rattlesnake

Implementation of this alternative would result in the construction of an AST at a site on Buckley AFB alternate to the preferred AST location (refer to Figures 2-1, 2-2, and 2-3). Under Alternative 1, all attendant water well construction and rehabilitation activities required by the Proposed Action would be implemented and all activities associated with pipeline installation would be implemented. Impacts to utilities would be similar to those described in the Proposed Action. Solid waste and natural gas utilities would not be impacted, and changes in electricity use would be the same as those discussed under implementation of the Proposed Action. Anticipated impacts to potable, storm water, irrigation, and waste water operations would also be similar to those associated with the Proposed Action. In addition, this alternative would also require the development and implementation of site-specific plans to minimize impacts from well water discharge related to testing and maintenance as well as accidental spill-outs. Plans would be developed based on terrain and proximity to existing drainage facilities and would follow all relevant BMPs. Therefore, impacts to utilities under this alternative would remain minor over the short and long term.

4.1.2.3 Alternative 2: Location of AST along Highway 30/6th Avenue

Under Alternative 2, potential short- and long-term impacts to utilities would be similar to those described under the Proposed Action. Under this alternative, however, the potential siting area for the location of the AST along Highway 30/E. 6th Avenue overlays mapped floodplain and wetland areas located on the northeast portion of the base (refer to Figure 4-2 and Section 4.4). However, the potential siting area under Alternative 2 is substantially large enough to accommodate an exact location of an AST such that it would avoid directly disturbing the mapped floodplain and wetland areas and any required setbacks. In addition, a construction SWPPP would be developed and implemented for this alternative to ensure that storm water runoff management during construction activities would comply with applicable regulatory and permit requirements, including Buckley AFB's existing National NPDES permits for on-base storm water management. The construction SWPPP would also contain measures to prevent potentially adverse discharges from entering Buckley AFB's surface and storm sewer discharge systems and their associated receiving bodies.

Therefore, impacts to utilities under this alternative would remain minor over the short and long term.

4.1.2.4 Alternative 3: No-Action Alternative

Under the No-Action Alternative, the proposed rehabilitation and production of Wells #1 and 2 and installation of an AST and associated pipelines would not occur. No impacts to utilities would be anticipated under the No-Action Alternative. No decrease in the amount of potable water purchased from the City of Aurora would occur and no changes in electric or waste water utility usage associated with the Proposed Action would be anticipated.

4.2 TRANSPORTATION AND CIRCULATION

4.2.1 Approach to Analysis

Potential impacts to transportation and circulation are assessed with respect to anticipated disruption or improvement of current transportation patterns and systems; deterioration or improvement of existing levels of service (LOS); and changes to existing levels of transportation safety. Impacts may arise from physical changes to circulation (e.g., closing, rerouting, or creating roads), construction activity, introduction of construction-related traffic on local roads, or changes in daily or peak-hour traffic volumes created by base workforce and population changes. Impacts on roadway capacities would be significant if roads with no history of exceeding capacity were forced to operate at or above their full design capacity or if already substandard conditions were worsened.

4.2.2 Impacts

4.2.2.1 Proposed Action

Implementation of the Proposed Action would require the delivery of materials to construction and installation sites; however, construction traffic would comprise only a small portion of total existing regional traffic. Further, the increase in traffic volumes associated with construction activity would be temporary and negligible and implementation of standard BMPs would also require that construction vehicles and equipment would remain on site during construction activities whenever feasible to further minimize impacts to traffic volumes on regional roadways. Upon completion of construction, no long-term impacts to off-base transportation volumes would result.

Although traffic volume impacts would be negligible over the short and long term, construction-related impacts associated with the installation of pipeline alignments beneath and adjacent to active roadways (e.g., circulation detours and periodic obstructions presented by construction activities) would result from implementation of the Proposed Action. Impacts would be most prevalent during phases of construction that involved pipeline installation or maintenance beneath E. 6th Street and E. Steamboat Avenue. Standard construction BMPs

related to transportation and circulation would also include the development of a Transportation Management Plan to address construction traffic hazards, delays, detours, and general safety precautions. Potential adverse impacts to transportation and circulation would be minimized to negligible levels upon implementation of a Transportation Management Plan and implementation of standard construction BMPs when trenching/installing pipeline and related construction and infrequent maintenance activities occur. Therefore, impacts to traffic and circulation would be considered minor over the short term and negligible over the long term as a result of the Proposed Action.

4.2.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Under either alternative, all attendant water well construction and rehabilitation activities and all activities associated with pipeline installation would be implemented as required by the Proposed Action, including installation of pipeline alignments beneath and adjacent to active roadways (e.g., E. 6th Avenue and E. Steamboat Avenue). Construction- and maintenance-related impacts to transportation and circulation would occur as described under the Proposed Action with implementation of either alternative. Inclusion of standard construction BMPs, including staging of construction vehicles on-site and development of a Transportation Management Plan, would minimize potential impacts to transportation and circulation. Therefore, impacts under either alternative would be considered minor over the short term and negligible over the long term.

4.2.2.3 Alternative 3: No-Action Alternative

Under the No-Action Alternative, transportation conditions and circulation patterns would remain as they currently exist on base without any short-term disruptions due to construction and pipeline installation activity. Implementation of this alternative would not affect regional transportation and circulation. Therefore, no impacts are anticipated under this alternative.

4.3 GEOLOGICAL RESOURCES

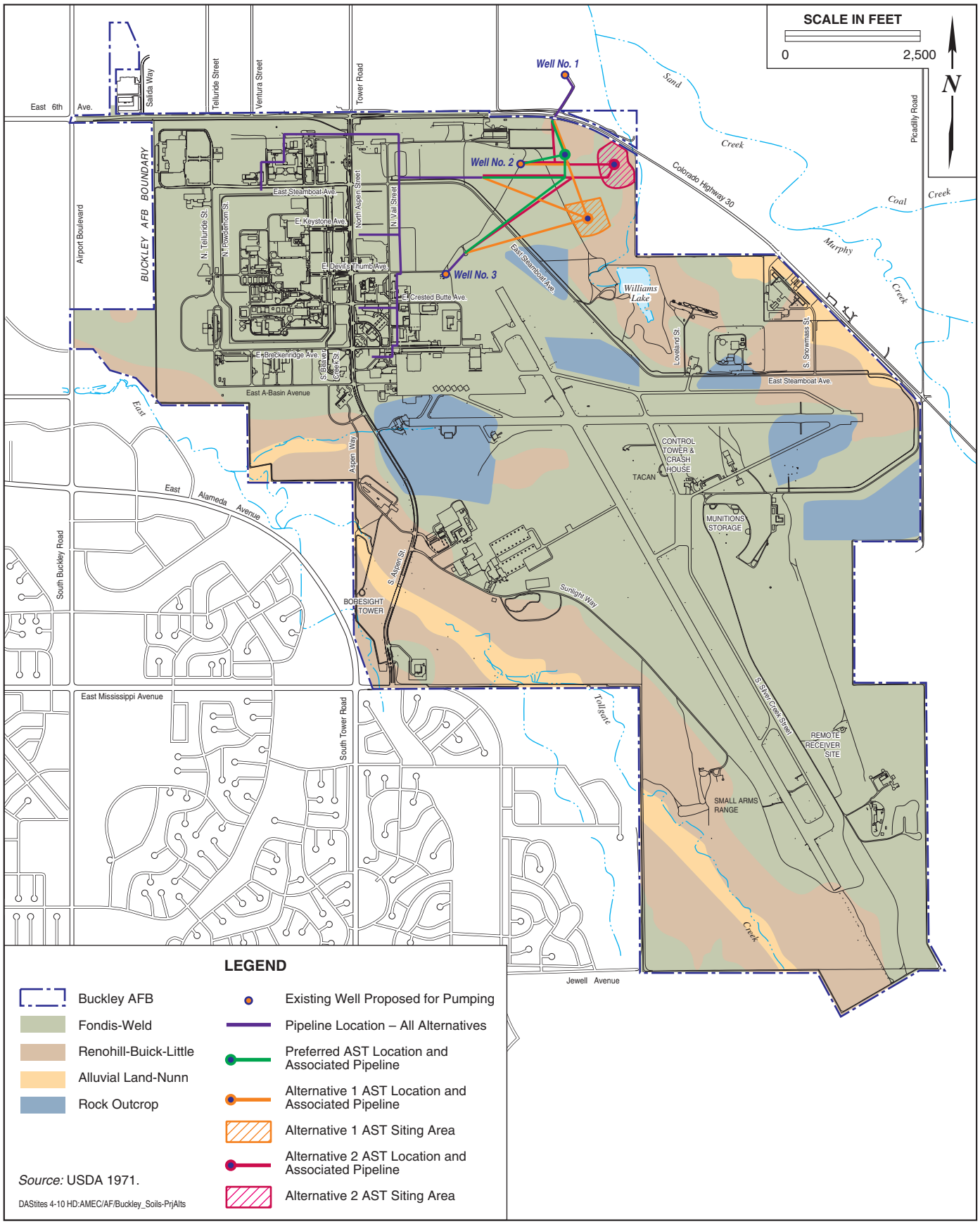
4.3.1 Approach to Analysis

An impact to geological resources would be significant if implementation of the Proposed Action or a project alternative would: 1) increase potential occurrences of erosion, siltation, or geological hazards (e.g., landslides, etc.); 2) incorporate engineering or construction techniques that do not adequately address potential geologic hazards; or, 3) expose people or structures to major geological hazards. Generally, impacts with regard to geological resources can be avoided or minimized if proper construction techniques, erosion and siltation control measures, and structural engineering designs are incorporated into project development. Since no unique geological resources would be located in the footprints of the Proposed Action and project alternatives (refer to Section 3.3, *Geological Resources*), further analysis of unique geological resources has been eliminated. In addition, since potential impacts to geological resources would be limited to the project vicinity on Buckley AFB, there would be no impacts to regional geology and further analysis has been eliminated.

4.3.2 Impacts

4.3.2.1 Proposed Action

Implementation of the Proposed Action would include excavation activities associated with the rehabilitation of Well #1 and Well #2, as well as trenching for the installation of piping and other equipment, and grading and site preparation activities at the proposed AST installation site. A majority of excavation and trenching activities would take place in areas identified as containing *Fondis-Weld* soils (Figure 4-1). These soils are comprised of loamy and silty *eolian* (i.e., wind-blown) material that can become compacted by heavy equipment during construction. Fondis-Weld soils are also susceptible to wind and water erosion (U.S. Department of Agriculture [USDA] 1971). Excavation and trenching activities located in the vicinity of Well #1 would take place in areas identified as containing *Renohill-Buick-Little* soils. These soils are comprised of loamy to clayey material with moderate internal drainage. Renohill-Buick-Little soils are also susceptible to wind and water erosion (USDA 1971).



EA

Soil Associations and Proposed Project and Alternatives

FIGURE 4-1

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

In order to minimize potential occurrences of erosion, siltation, and soil compaction during excavation, trenching, and other construction activities, BMPs would be incorporated as part of the Proposed Action, including:

- Covering stockpiled soils and excavated and trenched areas during rains;
- Incorporating erosion and siltation prevention measures (e.g., minimal watering for dust suppression, use of netting and silt fencing, etc.);
- Channeling surface water flow away from excavated and trenched areas;
- Backfilling all excavated soils to their original location where feasible;
- Re-contouring to previous surface hydrological conditions;
- Revegetating surface areas as soon as soils are backfilled into excavated and trenched areas; and,
- Limit the use of heavy equipment to the maximum extent practicable.

With implementation of the BMPs described above, construction-related impacts to soils would be minimal and localized to the project footprint. In addition, because cumulative soil disturbance associated with the Proposed Action would be greater than 1 acre, a *Notice of Intent* (NOI) for construction activities would be filed with the U.S. Environmental Protection Agency (USEPA), and a construction SWPPP containing further measures to prevent soil erosion and siltation would be developed and implemented (refer to Section 4.4, *Water Resources*, for additional information on the SWPPP). Therefore, implementation of the Proposed Action would result in minor, site-specific impacts to soils over the short term.

Once the Proposed Action is operational, potential impacts to soils would be minimal, and any potential excavation or other soil disturbance due to equipment upgrades or other maintenance activities would also incorporate applicable BMPs listed above. Further, all project components (wells, piping, the AST, and other related equipment) would be engineered so that potential impacts from erosion, siltation, and geological hazards (e.g., landslides, etc.) would be minimized. Therefore, implementation of the Proposed Action would result in negligible long-term impacts to geological resources.

All construction activities proposed within the installation would occur on previously disturbed land, which is capable of supporting such development.

Topography within the proposed construction areas is level and does not pose an erosion hazard under the Proposed Action. Therefore, impacts to topography resulting from implementation of the Proposed Action would be negligible.

4.3.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Under either alternative, all attendant water well construction and rehabilitation activities and all activities associated with pipeline and AST installation would be implemented as required by the Proposed Action. Potential short- and long-term impacts to soils and other geological resources would be similar to those described under the Proposed Action. Under either alternative, the location of an AST at a site alternate to the proposed location would require the trenching and installation of a greater amount of linear feet of piping, resulting in slightly increased amounts of *Fondis-Weld* soils that would be disturbed during construction activities (refer to Figure 4-1). Alternatives 1 and 2 would either require an additional 2,128 linear feet of piping or 3,373 linear feet of piping, respectively, than under the Proposed Action. However, both alternatives would incorporate the same BMPs to minimize potential occurrences of erosion, siltation, and soil compaction as the Proposed Action, and implementation of either alternative would result in minor, site-specific impacts to soils over the short term. In addition, all construction activities implemented under either alternative would occur on previously disturbed land, which is capable of supporting such development. Topography within the alternative construction areas is relatively level and does not pose an erosion hazard under the Proposed Action. Therefore, implementation of either alternative would result in negligible long-term impacts to geological resources.

4.3.2.3 Alternative 3: No-Action Alternative

Under the No-Action Alternative, the proposed rehabilitation and production of Wells #1 and 2 and installation of an AST and associated pipelines would not occur. Therefore, no impacts to geological resources or soils would be anticipated under the No-Action Alternative.

4.4 WATER RESOURCES

4.4.1 Approach to Analysis

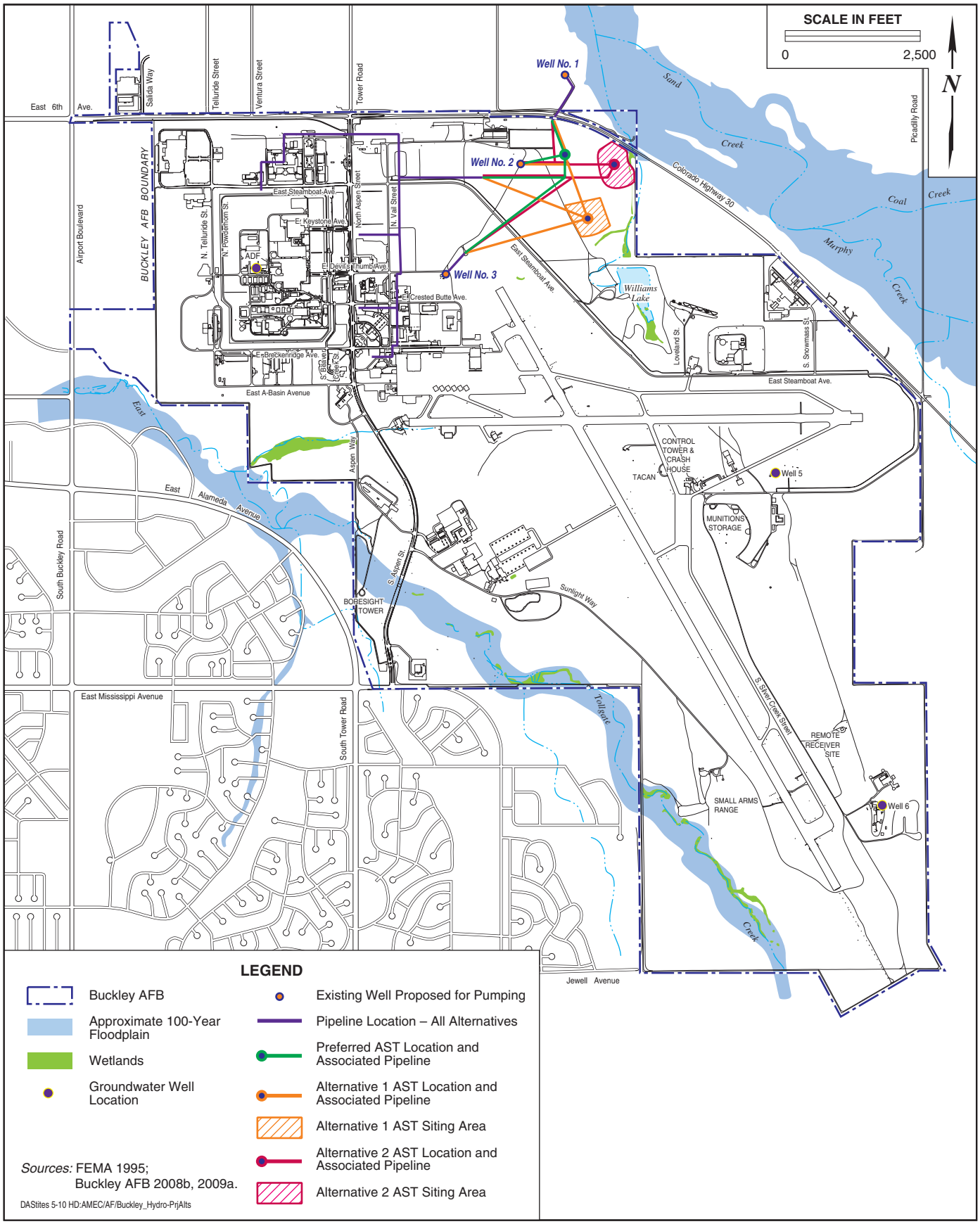
An impact to water resources would be significant if implementation of the Proposed Action or a project alternative would: 1) reduce water availability to or interfere with the supply of existing users; 2) create or contribute to the overdraft of groundwater basins or exceed decreed annual yields of water supply sources; 3) adversely affect surface or groundwater quality; 4) threaten or damage unique hydrologic characteristics; or, 5) violate established laws or regulations that have been adopted to protect or manage water resources, including management plans adopted by Buckley AFB. Since the footprints of the Proposed Action and project alternatives would be located outside of any designated floodplains (refer to Figure 3-3 in Section 3.4, *Water Resources*), further analysis of floodplains has been eliminated.

4.4.2 Impacts

4.4.2.1 Proposed Action

<u>Surface Water</u>

Implementation of the Proposed Action would result in localized, temporary effects to surface hydrology due to excavation activities associated with the rehabilitation of Well #1 and Well #2, trenching and installation of piping and other equipment, and grading and site preparation activities for the proposed AST (Figure 4-2). During construction, BMPs (e.g., channeling storm water flow into existing drainages, using netting to stabilize erosion, etc.) would be implemented to minimize erosion, runoff, and sedimentation. Further, because cumulative soil disturbance associated with the Proposed Action would be greater than 1 acre, a construction storm water permit, comprised of a SWPPP and an NOI, would be obtained. The BMPs and monitoring, reporting procedures would be developed and implemented for the Proposed Action. Following construction activities, all temporarily disturbed areas would be restored to pre-construction conditions to the maximum extent practicable, including re-contouring to previous surface hydrological conditions and



EA

Surface Water Resources, Floodplains, Groundwater Wells, and Wetlands and Proposed Action and Alternatives

FIGURE 4-2

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

revegetating to prevent potential increases in erosion. Therefore, construction-related impacts to surface water would be minor and short term.

Implementation of the Proposed Action would increase the total amount of impermeable surfaces at Buckley AFB by a negligible amount and long-term operations under the Proposed Action would not substantially increase surface water runoff. Accordingly, the quality of on-base and nearby surface water features (e.g., Williams Lake, East Toll Gate and Sand Creeks, etc.) would not be adversely affected. Further, although Well #3 currently serves as a water source to Williams Lake and the Proposed Action would divert a portion of Well #3 water to the proposed AST and ultimately the on-base irrigation system, engineering, environmental, and water management staff at Buckley AFB would ensure that water levels at Williams Lake would remain at current and/or future programmed levels. Therefore, operation-related impacts to surface water would be minor over the long term.

Groundwater

Construction activities associated with the Proposed Action would include rehabilitation and re-drilling of Wells #1 and 2 and trenching and surficial grading for the installation of piping, the AST, and other related equipment. Since surficial aquifer systems are present at Buckley AFB, the potential exists to encounter groundwater during construction. However, trenching and grading would be limited to less than 10 feet below ground surface and would generally not take place immediately adjacent to areas identified as containing surficial aquifer systems (i.e., areas near East Toll Gate and Sand Creeks, etc.). Should groundwater be encountered, discharges would be managed in compliance with applicable regulatory and permit requirements in a manner that would not adversely impact groundwater water quality at Buckley AFB.

Under the Proposed Action, excavation into bedrock aquifers would be required for the rehabilitation of Well #1 and Well #2. During excavation activities, BMPs (e.g., routine inspections of drilling and other excavation equipment, refraining from refueling or lubricating equipment immediately adjacent to the wells, etc.) would be implemented to ensure that no adverse impacts to groundwater would occur. In addition, well-specific rehabilitation activities (i.e., chemical and mechanical cleaning to remove biological clogging in Well #1, re-drilling to

remove mid-level blockages in Well #2, etc.) would occur in compliance with applicable regulatory and permit requirements in a manner that would not adversely impact groundwater water quality. Since the Proposed Action would not involve the modification of Well #3 or Well #5, no impacts to these wells would occur. Consequently, construction-related impacts to groundwater would be minor and short term.

Operation of the Proposed Action would include the re-commissioning and production of Well #1 and Well #2 and the use and operation of Well #3 for on-base irrigation. The legal water production limitations of Well #1 include a decreed volume limit of 80.6 acre-feet and a decreed flow limit of 166 gallons per minute (GPM), while the legal production limitations of Well #2 include a decreed volume limit of 70.0 acre-feet and a decreed flow limit of 200 GPM (Buckley AFB 2009a). Under the Proposed Action, Well #1 and Well #2 are anticipated to produce the full legal amount of water decreed to these wells. However, Buckley AFB is underlain with an extensive bedrock aquifer system with no identified overdrafts or other existing supply shortages. As a result, the re-commissioning and use of Well #1 and Well #2 at legal water production limits would not create or contribute to the overdraft of groundwater basins in the vicinity of Buckley AFB. Further, since Well #3 is currently in production and serves as a water source to Williams Lake, the Proposed Action would not substantially increase production of Well #3 over current levels. Finally, the use of Well #1 and Well #2 would not adversely affect existing water rights or ongoing pumping associated with Well #3, or existing water rights associated with the presently inactive Well #5. As a result, operation-related impacts to groundwater would be minor over the long term.

4.4.2.2 Alternatives 1: Location of AST South of Camp Rattlesnake

Under Alternative 1, potential short- and long-term impacts to surface water and groundwater would be similar to those described under the Proposed Action. Under this alternative, location of the AST south of Camp Rattlesnake would not result in substantially different impacts to water resources than those described for the AST location under the Proposed Action. Therefore, impacts to water resources under Alternative 1 would be minor over the short and long term.

4.4.2.3 Alternative 2: Location of AST along Highway 30/6th Avenue

Under Alternative 2, potential short- and long-term impacts to surface water and groundwater would be similar to those described under the Proposed Action. Under this alternative, however, the potential siting area for the location of the AST along Highway 30/E. 6th Avenue overlays mapped floodplain and wetland areas located on the northeast portion of the base (refer to Figure 4-2). However, the potential siting area under Alternative 2 is substantially large enough to accommodate an exact location of an AST such that it would avoid directly disturbing the mapped floodplain and wetland areas and any required setbacks. In addition, a construction SWPPP would be developed and implemented for this alternative to ensure that surface water runoff management during construction activities would comply with applicable regulatory and permit requirements, including Buckley AFB's existing National NPDES permits for on-base storm water management. The construction SWPPP would also contain measures to prevent potentially adverse discharges from entering Buckley AFB's surface and storm sewer discharge systems and their associated receiving bodies. Compliance with these measures would also ensure that Alternative 2 would not adversely affect Section 303(d)-listed watersheds (i.e., East Toll Gate and Sand Creeks) or associated floodplains and wetlands that receive runoff from the base. Therefore, impacts to water resources under this alternative would remain minor over the short and long term.

4.4.2.4 Alternative 3: No-Action Alternative

Under the No-Action Alternative, surface water, groundwater, and water management would remain unchanged from baseline conditions as described in Section 3.4, *Water Resources*, and no impacts would occur.

4.5 LAND USE

4.5.1 Approach to Analysis

The severity of potential land use impacts is based on the level of land use sensitivity in areas affected by a Proposed Action. In general, the Proposed Action would result in major land use impacts if it would: 1) be inconsistent or in noncompliance with applicable land use plans or policies; 2) preclude the viability of existing land use; 3) preclude continued use or occupation of an area; 4) be incompatible with adjacent or vicinity land use to the extent that public health or safety is threatened; or 5) conflict with airfield planning criteria established to ensure the safety and protection of human life and property.

4.5.2 Impacts

4.5.2.1 Proposed Action

No changes to existing land use patterns in the vicinity of the base would result from implementation of the Proposed Action and minimal changes to land use patterns on the base would be anticipated. Additionally, no changes in zoning would be required to implement the Proposed Action. All pipeline alignments would either be buried or serve as extensions to existing irrigation networks, and are not anticipated to impact land use patterns. The construction of the proposed 250,000 gallon AST would occur on Buckley AFB and potentially encroach on *Open Space* land uses on the base. However, the *Open Space* land use classification represents an existing conventional category and does not constitute specific restrictions of future land use and the proposed AST would not preclude the viability of existing land uses. Further, the Proposed Action as a whole would be consistent with the base's *General Plan*. Finally, since the proposed AST location is outside the designated airfield Accident Protection Zones (APZs) and Clear Zones (CZs), installation of the AST would not conflict with airfield planning criteria. Therefore, impacts to land use would be considered minor over the long term.

4.5.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Under either alternative, impacts to land use would be similar to those described under the Proposed Action. The location of an AST on land currently designated as *Open Space* for the purpose of storing irrigation water pumped from existing wells would occur under Alternatives 1 and 2; however, the *Open Space* land use classification represents an existing conventional category and does not constitute specific restrictions of future land use and an AST would not preclude the viability of existing land uses. Further, either alternative would be consistent with the base's *General Plan* and installation of an AST at either alternative location would not encroach upon established APZs and CZs or conflict with airfield planning criteria. Consequently, impacts to land use would be considered minor over the long term under either alternative.

4.5.2.3 Alternative 3: No-Action Alternative

Under this alternative, no impacts to land use at Buckley AFB or its vicinity would occur. There would be no encroachment onto land currently designated as *Open Space*, as none of the proposed construction would proceed. Consequently, land use would remain unchanged from current conditions as described in *Section 3.5* and no impacts to land use would be anticipated under implementation of this alternative.

4.6 SOCIOECONOMICS

4.6.1 Approach to Analysis

The degree of population and expenditure impacts are assessed in terms of their 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 20 employment positions may be unnoticed in an urban area but may have significant impacts in a more rural region. If potential socioeconomic impacts would result in substantial shifts in population trends, or adversely affect regional spending and earning patterns, they would be considered major.

4.6.2 Impacts

4.6.2.1 Proposed Action

Economic activity associated with proposed water well rehabilitation and the construction and installation of associated pipeline, such as construction employment and materials purchases, would provide short-term economic benefits to the local economy. However, such short-term beneficial impacts from temporary employment gains would be negligible on a regional scale and the Proposed Action would result in no long-term changes in employment levels or economic activity at Buckley AFB. Further, no impacts in population trends are anticipated as a result of the Proposed Action. Therefore, implementation of the Proposed Action would result in negligible beneficial impacts to socioeconomics over the short term and no impacts over the long term.

4.6.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Economic activity associated with both of these alternatives would be identical to that associated with the Proposed Action. Short-term construction employment gains and materials purchases would provide economic benefits to the local economy, but would remain negligible on a regional scale. Further, no impacts in population trends are anticipated under either alternative. Therefore,

implementation of either alternative would result in negligible beneficial impacts to socioeconomics over the short term and no impacts over the long term.

4.6.2.3 Alternative 3: No-Action Alternative

Implementation of the No-Action Alternative would not require any construction activity or accompanying employment gains and materials purchasing. No change to current socioeconomic conditions, as described in Section 3.6, would occur.

4.7 ENVIRONMENTAL JUSTICE

4.7.1 Approach to Analysis

In order to comply with Executive Order (EO) 12898 (*Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*), ethnicity and poverty status in the vicinity of Buckley AFB have been examined and compared to city, regional, state, and national data to determine if any minority or low-income communities could potentially be disproportionately affected by implementation of the Proposed Action or alternatives. Similarly, to comply with EO 13045 (*Protection of Children From Environmental Health Risks and Safety Risks*), the distribution of children and locations where numbers of children may be proportionately high on and in the vicinity of Buckley AFB was determined to ensure that environmental risks and safety risks to children are addressed.

4.7.2 Impacts

4.7.2.1 Proposed Action

In general, residents in communities near the base are not considered low-income. In addition, although minority populations in the vicinity of Buckley AFB comprise percentages that are slightly higher than statistics for the nation and the State of Colorado, no major, adverse environmental impacts associated with the Proposed Action are anticipated to affect on- or off-base communities. Therefore, no populations (minority, low-income, or otherwise) would be disproportionately adversely impacted and no adverse impact with regard to environmental justice would result.

With regard to protection of children, communities surrounding Buckley AFB and in the City of Aurora are comprised of a slightly higher percentage of children under age 18 as compared to the county, state, and nation. In addition, several schools exist in the vicinity of Buckley AFB as well as residential housing and a child day care center exists that are located on base. However, no major, adverse environmental impacts associated with the Proposed Action are anticipated to affect on- or off-base communities. In general, implementation of the Proposed Action would not result in increased exposure of children to

environmental health risks or safety risks such as the generation, use, or storage of hazardous materials. Short-term environmental health or safety risks to children could potentially occur if they were left unattended near construction sites; however, standard construction site safety precautions (e.g., fencing and other long-term security measures near well sites) would reduce potential risks to minimal levels. Therefore, with implementation of standard safety measures, impacts to children would be negligible and short-term.

4.7.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Implementation of either alternative would result in no disproportionate adverse impacts to populations (minority, low-income, or otherwise) and no adverse impact with regard to environmental justice would be anticipated. Additionally, similar potential health and safety risks to children would occur as those described under the Proposed Action. However, standard construction site safety precautions (e.g., fencing and other long-term security measures near well sites) would reduce potential risks to minimal levels. Therefore, with implementation of standard safety measures, impacts to children would be negligible and short-term under either alternative.

4.7.2.3 Alternative 3: No-Action Alternative

Implementation of this alternative would result in no disproportionate or adverse impacts to minority or low-income populations. Also, since no construction or installation activity would be undertaken, no short-term or long-term impacts to child health and safety would occur.

4.8 CULTURAL RESOURCES

As previously discussed in this section, an analysis of potential impacts to cultural resources has not been conducted because the Proposed Action and all project alternatives would not involve the removal or alteration of any buildings and the Colorado State Historic Preservation Office has previously concurred that no significant archaeological resources have been identified at Buckley AFB.

4.9 VISUAL RESOURCES

4.9.1 Approach to Analysis

Determination of the severity of impacts to visual resources is based on the level of visual sensitivity in the area. Visual sensitivity is defined as the degree of public interest in a visual resource and concern over adverse changes in the quality of that resource. In general, an impact to a visual resource is considered major if implementation of the Proposed Action would result in substantial alteration to an existing sensitive visual setting.

4.9.2 Impacts

4.9.2.1 Proposed Action

Implementation of the Proposed Action would require the construction of an AST for the purpose of storing irrigation water pumped from Wells #1, 2, and 3. In addition, Wells # 1 and 2 are not currently in operation and would require the installation of aboveground well-heads, pumping equipment, and safety fencing. All of these elements would potentially impact the visual resources of Buckley AFB; however, visual resources in the vicinity of the Proposed Action are not considered sensitive and only partial views of the AST and well-head equipment would be available to the public at a distance from Highway 30/E. 6th Avenue. Further, the addition of an AST in the proposed location would be consistent with other visual resources in its immediate vicinity, since a number of recreational vehicles are currently stored in a nearby lot and there is little public interest in visual resources at this particular location. In addition, the installation of proposed piping would not pose any long-term impacts to visual resources as alignments would be buried and not visible after completion. Therefore, installation of the proposed AST and associated piping and well-head equipment would comprise a minor impact to visual resources over the short term during construction activities and a negligible impact over the long term.

4.9.2.2 Alternative 1: Location of AST South of Camp Rattlesnake

Implementation of this alternative would require the construction of an AST as well as the installation of aboveground well-heads, pumping equipment, and safety fencing. The installation of an AST south of Camp Rattlesnake would result in minimal impacts to visual resources in its vicinity and only partial views of the AST and well-head equipment would be available to the public at a distance from Highway 30/E. 6th Avenue. The close proximity of the AST to Camp Rattlesnake, which consists of several structures used primarily as a training area, would allow the tank to fit in with existing visual resources in the area. Therefore, implementation of this alternative would comprise a minor impact to visual resources over the short term during construction activities and a negligible impact over the long term.

4.9.2.3 Alternative 2: Location of AST along Highway 30/ 6th Avenue

Implementation of this alternative would require the construction of an AST as well as the installation of aboveground well-heads, pumping equipment, and safety fencing. The location of an AST near Highway 30/E. 6th Avenue would result in slightly more severe impacts to visual resources as compared to the Proposed Action as the AST would be more easily viewed by the public traveling along this roadway. However, since this location is currently devoid of sensitive visual resources and is surrounded by undeveloped land, there is little potential for adverse impacts to result from the construction of an AST in this alternative. Further, only partial views of the well-head equipment would be available to the public at a distance from Highway 30/E. 6th Avenue. Therefore, although slightly more severe than under the Proposed Action, implementation of this alternative would still comprise a minor impact to visual resources over the short term during construction activities and a negligible impact over the long term.

4.9.2.4 Alternative 3: No-Action Alternative

No changes to existing visual resources, as described in Section 3.9, *Visual Resources*, would occur under implementation of the No-Action Alternative. Therefore, selection of this alternative would have no foreseeable impacts to visual resources in the vicinity of Buckley AFB.

4.10 AIR QUALITY

4.10.1 Approach to Analysis

Air Force Instruction (AFI) 32-7040, Air Quality Compliance and Resource Management, provides a framework for ensuring that USAF actions conform to appropriate implementation plans. Section 2.4 of AFI 32-7040, Conformity Planning, ensures that such actions would conform to the applicable implementation plan through the U.S. Environmental Protection Agency (USEPA) General Conformity Rule. In the case of the Proposed Action, conformity with the Colorado State Implementation Plan (SIP) would be required. Section 2.5, National Environmental Policy Act (NEPA) and Environmental Impact Analysis Process Planning, outlines the requirements under NEPA for analysis of air quality impacts with respect to the Prevention of Significant Deterioration (PSD)/New Source Review (NSR) (40 Code of Federal Regulations [CFR] Part 51), hazardous air pollutants (HAP) emissions, and emissions of any other regulated pollutants under the Clean Air Act (CAA) such as Ozone Depleting Substances (ODS) that will result from implementation of the Proposed Action. Direct and indirect emissions of criteria pollutants or their precursors associated with the Proposed Action must be calculated for all non-exempt emission sources, including mobile and stationary, as well as construction-phase emissions.

With respect to the General Conformity Rule, effects on air quality would be considered major if the Proposed Action would result in an increase of the Metropolitan Denver Air Quality Control Region's (AQCR's) emissions inventory by 10 percent or more, or if such emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants (Ozone [O_3]) or maintenance pollutants (carbon monoxide [CO] and particulate matter equal or less than 10 microns in diameter [PM_{10}]).

4.10.2 Impacts

4.10.2.1 Proposed Action

Fugitive Dust Emissions

Under the Proposed Action, fugitive dust would be generated from trenching, clearing, and grading activities, as well as combustion emissions from construction-related vehicles and equipment. Dust emissions generated from such activity can vary substantially depending on levels of activity, specific operations, and prevailing meteorological conditions. Using conservatively high estimates (based on moderate activity levels, moderate silt content in affected soils, and a temperate climate), the standard dust emission factor for construction activity is estimated at 1.2 tons of dust generated per acre per month of activity (USEPA 1995). This factor is referenced to total suspended particulates, instead of specifically PM_{10} or $PM_{2.5}$ (particulate matter equal or less than 2.5 microns in diameter), and consequently results in conservatively high estimates. Based on the conservatively-high estimate that all project acreage would be disturbed at any one time (1.20 acres or 52,362 square feet [sf]), a projected total of about 1.44 tons per month of dust would be generated if all construction activities were implemented simultaneously (refer to Appendix B).

Increased fugitive dust (i.e., PM_{10} emissions) resulting from activities under the Proposed Action would involve short-term adverse impacts that could be reduced through standard dust minimization practices (e.g., watering soils to depth of trenching, regularly watering exposed soils, soil stockpiling, and soil stabilization). These standard dust minimization measures can reduce dust generation by 75 percent, thereby reducing dust emissions to approximately 0.36 tons per month (USEPA 1995). Although any substantial increase in PM_{10} emissions is inherently adverse, implementation of these dust minimization measures would limit the total quantity generated during project implementation. Increased PM_{10} emissions associated with the Proposed Action would be short-term and temporary, and would be minimized using dust suppression techniques; therefore, impacts to air quality would be negligible.

Combustion Emissions

Combustion emissions associated with construction-related vehicles and equipment would be minimal because most vehicles would be driven to and kept at work sites for the duration of construction activities. Further, as is the case with PM_{10} emissions associated with trenching and site preparation activities, emissions generated by construction equipment would be temporary and short-term; therefore, no major impact to air quality would occur as a result of use and maintenance of construction-related vehicles or equipment.

Projected combustion emissions under implementation of the Proposed Action are listed in Table 4-1; they are based on the scenario of 10-hour workdays, five days per week, for simultaneous construction activity over the course of 6 months (24 weeks). Since a specific equipment list and horsepower rating for the equipment is not yet determined, emission factors were representative of a fleet-wide average, and a standard equipment list for construction was used. See *Appendix B* for a full list of assumptions and emission factors used in this analysis.

Table 4-1. Projected Combustion Emissions for Construction and Operational Activities (total tons)

Equipment	Emissions				
	CO	NO_x	PM_{10}	SO_x	VOCs
Grader	0.3402	0.9738	0.0504	0.0462	0.1656
Loader	0.2544	0.5148	0.0516	0.0474	0.069
Bobcat	0.1608	0.3048	0.0324	0.03	0
Dozer	0.7254	1.8222	0.0738	0.0678	0.2718
Paving equipment	0.2514	0.5766	0.0414	0.0378	0.0864
Paver	0.2694	0.5364	0.0402	0.0372	0.099
Excavator	0.78	2.76	0.192	0.186	0.444
Total Combustion Emissions	**2.78**	**7.49**	**0.48**	**0.45**	**1.14**
De minimis threshold value	100	100	100	N/A	100
10 percent of Denver Metropolitan AQCR Emissions	67,783	10,338	6,017	1,853	14,499

Note: See Appendix B for a full list of assumptions and emission factors used in this analysis.
Sources: Buckley AFB 2009a and 2009b.

Operational Emissions

Potential emissions from operation of facilities under the Proposed Action would be associated with water pumps used to convey water from Wells # 1, 2, and 3 to the proposed AST and from the proposed AST to the on-base irrigation system. However, these pumps would be electric and operational emissions related to this equipment would be negligible on a base-wide level and overall existing stationary emission sources at Buckley AFB would not be expected to measurably increase. Further, long-term operation and maintenance of facilities associated with the Proposed Action are expected to generate negligible additional vehicle traffic and related operational emissions. Therefore, operational emissions associated with the Proposed Action are expected to be negligible.

General Conformity

Emissions from construction and operational related activities associated with the Proposed Action would be well below *de minimis* thresholds values for O_3, CO, and PM_{10} (i.e., the only criteria pollutants for which the Denver AQCR is currently not in attainment for); therefore a General Conformity determination would not be required (refer to Table 4-1). In addition, criteria pollutant emissions resulting from the Proposed Action would not exceed 10 percent of the regional emissions inventories. Therefore, implementation of the Proposed Action would result in minor impacts.

4.10.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

All short- and long-term air quality impacts described in the Proposed Action would also occur with implementation of either project alternative. Under either alternative, a slightly greater amount of pipeline would need to be installed to accommodate the alternative AST locations, resulting in slightly higher acreages of overall disturbance under both alternatives (refer to Appendix B). However, standard dust minimization practices would be implemented under Alternatives 1 and 2, reducing these levels by 75 percent to approximately 0.39 tons per month and 0.41 tons per month, respectively. Therefore, local and regional air quality impacts would remain minor under either alternative.

4.10.2.3 Alternative 3: No-Action Alternative

If the No-Action Alternative were selected, short-term temporary air quality impacts anticipated to occur during implementation of the Proposed Action would not occur and air quality conditions and emissions associated with ongoing operations at Buckley AFB would remain as described in Section 3.10, *Air Quality*.

4.11 NOISE

4.11.1 Approach to Analysis

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 exposure to unacceptable noise levels). An increase in noise levels due to introduction of a new noise source can create an impact on the surrounding environment.

4.11.2 Impacts

4.11.2.1 Proposed Action

The construction of an AST for the purpose of storing irrigation water and the installation of pipeline alignments would create a temporary increase in noise levels at the base related to construction equipment and earth moving activities. However, these activities would be confined to normal working hours and would be short-term in nature. Therefore, construction-related noise impacts would be minor and short-term.

Once constructed, the operation of pumping equipment associated with the Proposed Action would not comprise a substantial source of new noise. The introduction of pumping equipment at Wells #1 and 2 would likely result in negligible localized noise impacts as these wells are located at a substantial distance from sensitive receptors. In addition, all noise-generating project components would be sited in an area where ambient noise levels are dominated by aircraft activity. Therefore, once operational, the Proposed Action would result in negligible impacts to noise resources over the long term.

4.11.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Impacts to noise resources under either alternative would remain similar to those described under the Proposed Action. Construction activities would create a temporary increase in noise levels at the base. However, these activities would be confined to normal working hours and would be short-term in nature, resulting in minor and short-term impacts to noise resources under either alternative. Once operational, pumping equipment at well sites would generate negligible impacts to noise levels and the equipment would be sited in areas currently dominated by noise related to aircraft activity. Therefore, implementation of either alternative would result in negligible impacts to noise resources over the long term.

4.11.2.3 Alternative 3: No-Action Alternative

If the No-Action Alternative were selected, noise impacts anticipated to occur during implementation of the Proposed Action would not occur and noise levels associated with ongoing operations at Buckley AFB would remain as described in Section 3.11, *Noise*.

4.12 HAZARDOUS MATERIALS AND WASTES

4.12.1 Approach to Analysis

Numerous local, state, and federal laws regulate the storage, handling, disposal, and transportation of hazardous materials and wastes; the primary purpose of these laws is to protect public health and the environment. The severity of potential impacts associated with hazardous substances is based on their toxicity, ignitability, and corrosively. Impacts associated with hazardous materials and wastes would be considered major if the storage, use, transportation, or disposal of hazardous substances substantially increases the human health risk or environmental exposure. Impacts to identified Environmental Restoration Program (ERP) sites would be considered major if the Proposed Action or project alternative disturbed or created contaminated sites resulting in adverse effects to human health or the environment.

4.12.2 Impacts

4.12.2.1 Proposed Action

<u>Hazardous Waste Generation and Storage</u>

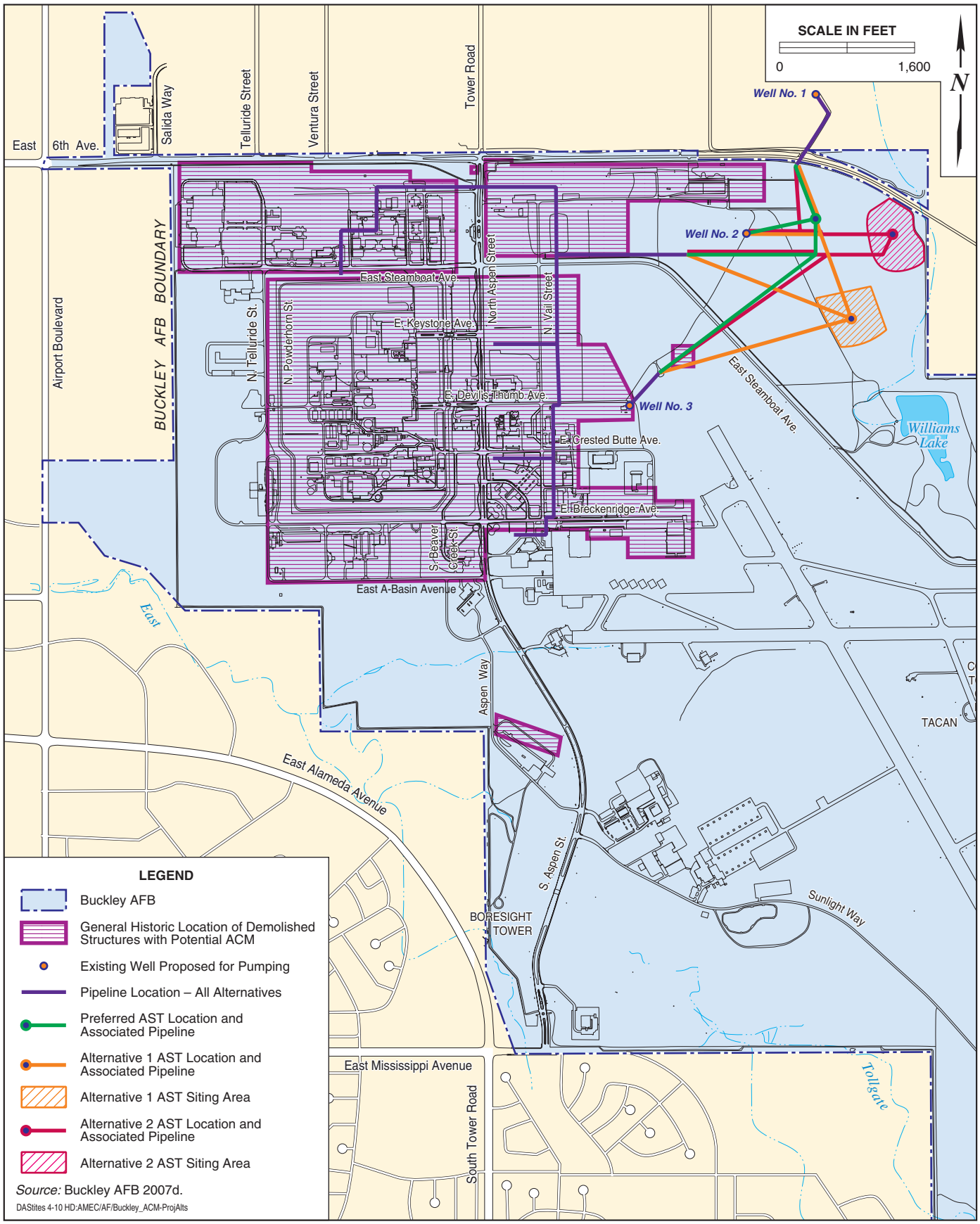
Implementation of the Proposed Action would not result in any substantial or long-term increase in the use, storage, or generation of hazardous materials or hazardous wastes. Use and storage of minor amounts of hazardous materials related to construction activities would increase temporarily only during construction phases of the Proposed Action. Any hazardous materials used or hazardous wastes generated as a result of implementation of the Proposed Action would be accumulated and removed in compliance with existing and approved Hazardous Waste Management Plans and related procedures. Therefore, construction-related impacts to hazardous materials and wastes would be negligible and short-term. Further, no use, generation, or storage of hazardous materials or hazardous wastes would result from long-term operation of the proposed water well development, water pipeline infrastructure, and AST. Therefore, no long-term impacts related to hazardous waste generation and storage would occur.

Asbestos

The Proposed Action would involve the construction of an AST, water pipeline, and water well rehabilitation. A majority of the new piping would be routed in the northwestern portion of the base in an area determined by the U.S. Army Corps of Engineers to contain asbestos (Figure 4-3). Asbestos Containing Material (ACM) is present within the soil to a depth of approximately 2 feet and would likely be encountered during trenching activities. All ACM encountered in the soil during construction would be handled in accordance with Buckley AFB's *Draft Soil Characterization and Management Plan* (Buckley AFB 2009g) which outlines special ACM handling requirements for on-site haul routes, project site preparation, excavation, transportation, disposal, and construction crew training on handling and disposal of ACM. In addition, storage and disposal of ACM would comply with the base's *Asbestos Management Plan*, as required by Compliance Order #03-09-30-01. If a significant friable material discovery has been made, based on a visual assessment by a Colorado-certified Asbestos Building Inspector, the control of fugitive emissions from ACM contaminated soils will be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) protocols in order to minimize the risk of asbestos exposure to workers and the general public. Further, in light of the fact that ACM disturbed during construction activities would likely include more than 260 linear feet of piping, 160 sfof surfaces, or a volume equivalent to 55 gallons, abatement procedures would comply with Colorado Air Regulation Number 8, Part B. Therefore, with proper control measures and construction crew training, exposure to asbestos would be minimized and asbestos waste would be properly disposed.

Environmental Restoration Program

Installation of pipeline near Wells #1 and 2 and their rehabilitation would be conducted within and in the vicinity of ERP Site 10 located along the northern perimeter of the base (Figure 4-4). Soils and groundwater at ERP Site 10 are contaminated with solvents and tetrachloroethylene (or perchloroethylene [PCE]), and there is a very low potential that such contaminants would be brought to the surface through pipeline trenching activities required to convey on-base irrigation water.

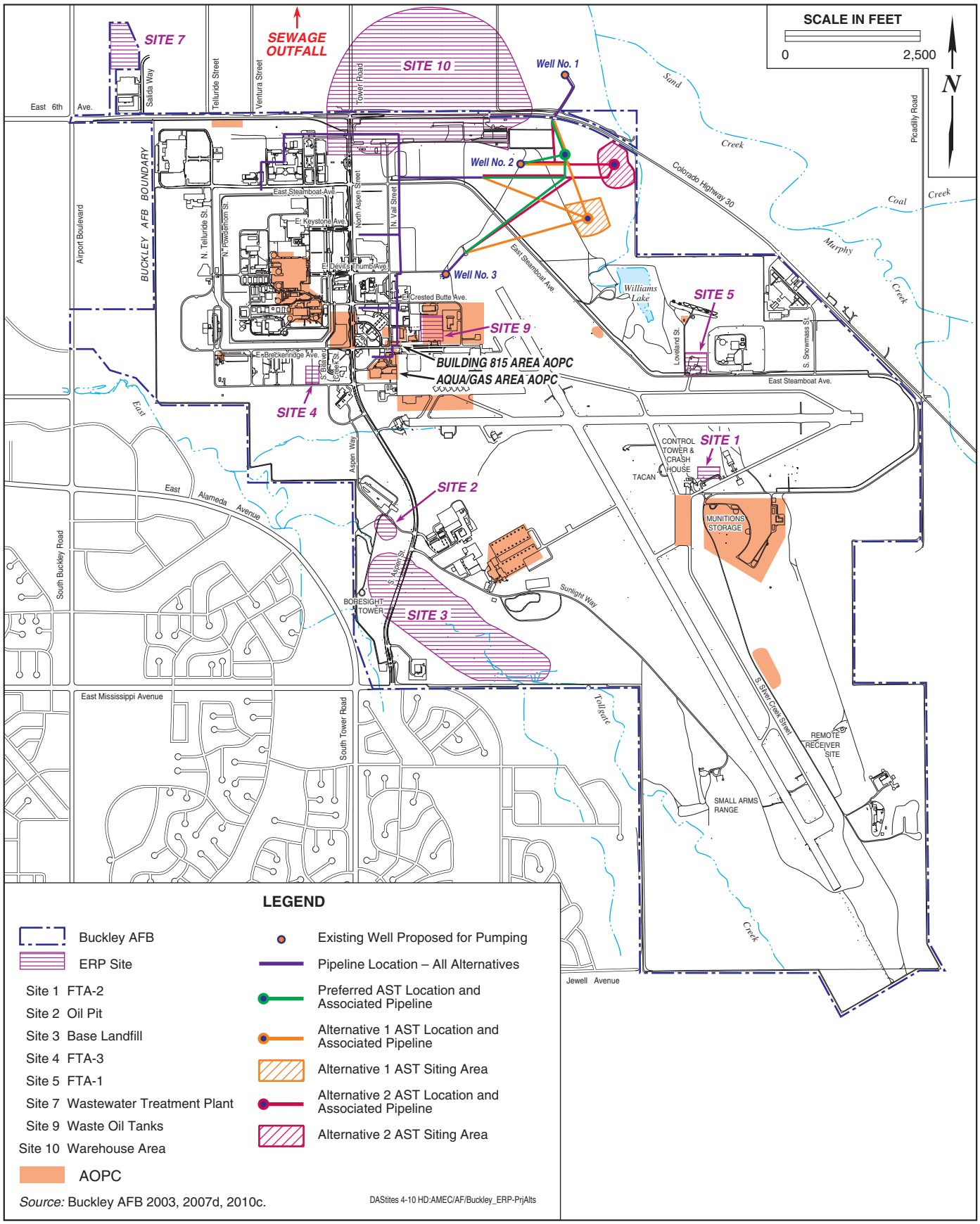


EA

Historic Location of Demolished Structures with Potential Asbestos-Containing Material (ACM) and Proposed Action and Alternatives

FIGURE 4-3

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.



EA

Environmental Restoration Program (ERP) Sites and Areas of Potential Concern (AOPCs) and Proposed Action and Alternatives

FIGURE 4-4

No warranty is made by the State/Territory as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

However, as described below, construction and operation of proposed on-base irrigation system would incorporate multiple management plans to minimize potential exposure to contaminated media. Development of a *Site Characterization and Disposal Plan* would be required to establish a set of accepted procedures for the sampling, analyzing, segregating, reporting, transporting, and disposing of any on-site debris and contaminated soil within ERP Site 10. Implementation of this plan would reduce any impacts to ERP Site 10 due to removal, transport, and disposal of debris to minimal levels.

Since contamination of surface soils at the site is considered low, potential human health hazards would be minimal provided that site personnel wear appropriate protective equipment. In order to address potential impacts to personnel, a *Health and Safety Plan* would be incorporated during all phases of construction activities. The plan would outline required protective clothing and other operating procedures which would be implemented to ensure the safety of personnel working on the project site. In addition, construction workers would be required to be *Hazardous Waste Operations and Emergency Response* (HAZWOPER) trained to further minimize potential exposure of personnel to contaminated media.

In addition, portions of the proposed pipeline would be installed within the Aqua Gas System Area of Potential Concern (AOPC) and the Building 815 AOPC located near the intersection of N. Vail Street and E. Breckenridge Avenue (refer to Figure 4-4). Groundwater at these AOPCs is contaminated with solvents and there is a potential that such contaminants would be brought to the surface through pipeline trenching and installation activities; however, development and incorporation of a site-specific *Site Characterization and Disposal Plan* and a *Health and Safety Plan* would be also required during all phases of construction activities and would reduce any impacts to the AOPCs due to removal, transport, and disposal of contaminated debris to minimal levels as well as ensure the safety of personnel working on the project site. In the event that maintenance activities or emergency scenarios would require excavation of soils, personnel working on-site would be subject to the same management and exposure prevention plans. Therefore, with development and incorporation of the previously described

management plans, impacts related to ERP sites and AOPCs would be considered minor and short-term.

4.12.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Implementation of either alternative would result in similar impacts to those described under the Proposed Action, as the majority of trenching and pipeline installation activities under both alternatives would follow the same alignments as under the Proposed Action (refer to Figures 4-3 and 4-4). However, compliance with previously described ACM-related regulations and plans and development and implementation of site-specific *Site Characterization and Disposal Plans* and *Health and Safety Plans* would ensure proper procedures are set in place to minimize disturbance of and exposure to hazardous materials and wastes and provide for proper handling and disposal. Therefore, with development and incorporation of the previously described management plans, impacts related to ACM, ERP sites, and AOPCs would be considered minor and short-term.

4.12.2.3 Alternative 3: No-Action Alternative

Under the No-Action Alternative, the proposed construction of the AST and installation of irrigation pipeline at Buckley AFB would not be implemented and no ground disturbance or additional use of hazardous materials required for construction would occur. Therefore, existing conditions with respect to hazardous materials and wastes would remain unchanged from the conditions described in Section 3.10, *Hazardous Materials and Wastes*.

4.13 BIOLOGICAL RESOURCES

4.13.1 Approach to Analysis

Determining the magnitude of potential impacts to biological resources is based on 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of concern are adversely affected over relatively large areas or disturbance causes reductions in population size or distribution.

When necessary, representatives of the U.S. Fish and Wildlife Service (USFWS), Colorado Division of Wildlife (CDOW), and Colorado Natural Heritage Program (CNHP) are contacted to determine the presence or potential occurrence of sensitive species and habitats in the study area. Potential physical impacts such as habitat loss, noise, and impacts to surface water were evaluated to assess potential impacts to biological resources resulting from implementation of the Proposed Action and identified alternatives.

4.13.2 Impacts

4.13.2.1 Proposed Action

<u>Vegetation</u>

A majority of the proposed pipeline would be located adjacent to existing roadways where vegetation consists mostly of invasive, weedy species or landscaped grasses. Where proposed pipeline alignments would not be located adjacent to existing roadways or developed areas, the primary vegetation type transected by the pipeline would include crested wheatgrass communities, with lesser inclusions of mid-grass prairie. In addition, rehabilitation of Wells #1 and 2 would be located primarily on crested wheatgrass communities, while the proposed AST would be located on mid-grass prairie. Direct impacts to vegetation would be primarily related to trenching activities associated with digging along proposed pipeline alignments, grading and clearing required for

construction of the proposed AST, and construction staging areas associated with the proposed rehabilitation activities at Well #1 and 2.

Where activities occur adjacent to existing roadways, impacts to vegetation are expected to be negligible due to the disturbed nature of these habitats. Proposed construction activities that occur away from these roadways would disturb grassland vegetation, including crested wheatgrass communities and mid-grass prairie. However, once the proposed pipeline is installed and buried, and construction activities related to rehabilitation of Wells #1 and 2 and installation of the proposed AST is completed, revegetation of disturbed sites would be accomplished using appropriate and proven reseeding techniques. Impacts to the grassland communities from the Proposed Action are expected to be localized and short-term due to revegetation efforts. The only anticipated long-term habitat loss would total approximately 1,150 sf, which would be associated with the footprint of the proposed AST and well house facility. Therefore, long-term impacts to vegetation are expected to be negligible.

Wildlife

Impacts to wildlife are expected to be minimal since much of the construction activities would occur adjacent to existing roadways and developed areas, which provide limited wildlife habitat. However, in areas where sensitive species such as the burrowing owl exist or are nesting, trenching and construction activities may need to be delayed during nesting season until surveys are conducted (see discussion below). Once constructed, operation and maintenance of the proposed project components would pose a negligible threat to wildlife at Buckley AFB assuming that appropriate precautions and avoidance measures for burrowing owls are implemented during any required maintenance that would involve earth-moving activity. Therefore, implementation of the Proposed Action would constitute a minor impact to wildlife over the short and long term.

Sensitive Species

Three sensitive bird species are known to occur at Buckley AFB; bald eagle, ferruginous hawk, and burrowing owl. Both the bald eagle and ferruginous hawk forage at and around Buckley AFB. The Proposed Action is not expected to affect these species due to the temporary nature of most impacts associated

with the Proposed Action and because ample foraging areas are available elsewhere throughout the base.

The burrowing owl is known to nest mainly in the northwestern portion of the base and along the airfield flightlines. All identified nesting burrows are currently located near busy roads or flightlines, which indicates that these owls are accustomed to human activity. The CDOW recommends a 150-foot buffer around burrowing owl sites during the nesting season (March 1 through October 31). If trenching activities must occur between March 1 and October 31, surveys would first be conducted for burrowing owls within 150 feet of the Proposed Action. If a burrowing owl is located within the buffer zone, construction activities in that area would be delayed until the owl migrated out of the area (November 1 through February 28). If construction could not be delayed, Buckley AFB personnel would consult with the CDOW and USFWS prior to conducting any earth-moving activities. According to the CDOW, another option is to encourage the owl out of the area, once fledged. Care should be taken to observe the owls to be sure they have relocated away from the proposed construction site (CDOW 2010a). Therefore, with implementation of appropriate avoidance and management procedures, the Proposed Action would have minor impacts on burrowing owls.

Black-tailed prairie dogs inhabit many areas throughout the base, but are most common in the cantonment and flightline areas. It is likely that pipeline alignments would either transect or occur adjacent to existing prairie dog towns. Some disturbance to these towns is unavoidable and limited mortality or displacement of prairie dogs is expected. However, since trenching activities are linear they would only impact a small portion of the many prairie dog towns on base. Prairie dogs are expected to recolonize disturbed areas soon after completion of the Proposed Action. Therefore, impacts to the current population of black-tailed prairie dogs at Buckley AFB are expected to be minor and short-term.

The mountain plover, Baird's sparrow, and swift fox have the potential for occurring on base as rare transients; however, impacts to these species are not expected, because more suitable habitat is located outside of the areas affected by the Proposed Action.

Wetlands

There are two wetlands associated with an unnamed tributary of Sand Creek In the northeast part of Buckley AFB, as well as wetland areas adjacent to Williams Lake. To avoid sedimentation of wetlands from trenching activity runoff, erosion control measures outlined in the geological resource section (Section 4.3) would be used and no construction activities would occur within 50 feet of a wetland. Further, no construction equipment or supplies would be staged within a wetland, and the contractor would be required to develop a project and staging area map before construction activities would begin. Implementation of the Proposed Action is not anticipated to impact wetland resources if these precautions are followed.

4.13.2.2 Alternative 1: Location of AST South of Camp Rattlesnake

Under Alternative 1, potential short- and long-term impacts to biological resources would be similar to those described under the Proposed Action. Under this alternative, a slightly higher amount of mid-grass prairie would be disturbed by trench digging activities than under the Proposed Action. In addition, the location of the potential AST siting area to the south of Camp Rattlesnake could potentially disturb bottomland meadow habitat type. However, revegetation of disturbed sites would be accomplished using appropriate and proven reseeding techniques and impacts to the vegetation are expected to be localized and short-term. Therefore, impacts to biological resources under Alternative 1 are expected to remain the same as those described under the Proposed Action.

4.13.2.3 Alternative 2: Location of AST along Highway 30/6th Avenue

Under Alternative 2, potential short- and long-term impacts to biological resources would be similar to those described under the Proposed Action. Under this alternative, a slightly higher amount of mid-grass prairie would be disturbed by trench digging activities than under the Proposed Action. However, revegetation of disturbed sites would be accomplished using appropriate and proven reseeding techniques and impacts to the vegetation are expected to be localized and short-term. In addition, the potential siting area for

the location of the AST along Highway 30/E. 6th Avenue overlays mapped wetland areas located on the northeast portion of the base (refer to Figure 4-2). However, the potential siting area under Alternative 2 is substantially large enough to accommodate an exact location of an AST such that it would avoid directly disturbing the mapped wetland areas and any required setbacks. In addition, a construction SWPPP would be developed and implemented for this alternative to ensure that surface water runoff management during construction activities would comply with applicable regulatory and permit requirements, including Buckley AFB's existing NPDES permits for on-base storm water management. The construction SWPPP would also contain measures to prevent potentially adverse discharges from entering Buckley AFB's surface and storm sewer discharge systems and their associated receiving bodies. Compliance with these measures would also ensure that Alternative 2 would not adversely affect wetlands that receive runoff from the base. Therefore, with the addition of a potentially minor, short-term impact to wetlands, impacts to biological resources under Alternative 2 are expected to remain the same as those described under the Proposed Action.

4.13.2.4 Alternative 3: No-Action Alternative

Implementation of the No-Action Alternative would result in no changes to the existing vegetation, wildlife, wetlands, or sensitive species occurring at Buckley AFB. Conditions would remain as described in Section 3.13, *Biological Resources*.

4.14 SAFETY

4.14.1 Approach to Analysis

If implementation of the Proposed Action would substantially increase risks associated with aircraft mishap potential or flight safety relevant to the public or the environment, it would represent a major impact. For example, if an action involved an increase in aircraft operations such that mishap potential would increase substantially, air safety would be compromised.

Further, if implementation of the Proposed Action would result in incompatible land use with regard to safety criteria such as APZs or quantity-distance (QD) arcs, impacts would be considered major.

4.14.2 Impacts

4.14.2.1 Proposed Action

Mishap Potential and Bird-Aircraft Strike Hazard

Implementation of the Proposed Action would not result in changes to the frequency or type of aircraft operations performed at Buckley AFB. Construction of the proposed AST and installation of irrigation pipeline are ground-based and would require only short-term construction activity for development. No long term impacts, other than standard maintenance, would occur to the tank or the alignment. Further, implementation of the Proposed Action would have no contribution to Bird-Aircraft Strike Hazard (BASH) at Buckley AFB. Therefore, with regard to aircraft mishaps BASH, no short- or long-term impact would result from implementation of the Proposed Action.

Accident Potential Zones

The Proposed Action would not result in a change in shape or shift in location of established APZs and no habitable structures are proposed for development in the CZs or APZs associated with the airfield. Construction activity would be short-term and the presence of construction equipment and personnel would not impede flight operations. Since Well #3 is located within the flight line fencing, some construction activity associated with this well would likely occur in part of

the flight line and CZs. Personnel involved with airfield activities would be notified of these activities, and construction equipment would not be stored within restricted areas. All trenching, pipe installation, and related construction and maintenance activities would be coordinated with Air Traffic Control staff to ensure that no disruption to aircraft operations would occur. The proposed AST would be located outside of CZs and APZs, and would not impede the airfield's imaginary surfaces. Therefore, with regard to airfield safety, the Proposed Action would result in negligible short- and long-term impacts.

Explosives Safety

Implementation of the Proposed Action would not involve the storage or use of explosives and would not conflict with established QD arcs. Accordingly, no impact to explosives safety would occur under the Proposed Action.

4.14.2.2 Alternatives 1 and 2: Alternative AST Locations at Buckley AFB

Implementation of either alternative would result in similar impacts as described under the Proposed Action. All alternative AST locations would be sited outside of CZs and APZs, and would not impede the airfield's imaginary surfaces. Coordination with Air Traffic Control would occur before construction or maintenance activities were conducted in any CZ or APZ area. Therefore, no impacts with regard to aircraft mishap, BASH, or explosives safety are anticipated and only minor airfield safety impacts would be anticipated.

4.14.2.3 Alternative 3: No-Action Alternative

If the No-Action Alternative were selected, Buckley AFB would not implement proposed AST construction or pipeline installation. Current safety conditions, as described in Section 3.14, would remain unchanged.

SECTION 5
CUMULATIVE IMPACTS

Cumulative impacts on environmental resources result from incremental impacts of the Proposed Action which, when combined with other past, present, and reasonably foreseeable future projects in an affected area, may collectively cause more substantial adverse impacts. Cumulative impacts can result from minor but collectively substantial actions undertaken over a period of time by various agencies (Federal, state, or local) or persons. In accordance with the National Environmental Policy Act (NEPA), a discussion of cumulative impacts resulting from projects which are proposed, under construction, recently completed, or anticipated to be implemented in the near future is required.

The cumulative projects list included in this analysis includes both on- and off-base projects that have been identified through a review of public documents and information provided by Buckley Air Force Base (AFB) (Buckley AFB 2009f).

5.1 OFF-BASE ACTIVITIES

Buckley AFB is located in the northeast part of the City of Aurora, along the eastern fringe of the city's developed core. Present land use in the vicinity of the base is comprised of light industrial and residential uses to the northwest, west, and southwest, and agricultural, undeveloped space, and grassland conservation areas to the northeast, east, and southeast (City of Aurora 2009a). The City of Aurora's 2009 *Comprehensive Plan* identifies three planning areas in the vicinity of Buckley AFB, each containing its own planned development pattern.

<u>Colfax Corridor East of Interstate (I-) 225/Northeast Colfax Area</u>—The *Colfax Corridor* is located along East Colfax Avenue, approximately 1 mile north of Buckley AFB. The properties along East Colfax Avenue tend to include older commercial uses, many of which are vacant. The *Northeast Colfax Area* comprises established residential neighborhoods and industrial areas located to the north and south of the Colfax Corridor. Presently, there are no major development projects proposed in these areas, and proposed development strategies would preserve open space and minimize development outside of existing residential, commercial, and industrial areas (Buckley AFB 2009f).

I-225 Corridor and City Center Strategic Area—This area comprises the *I-225 Corridor* and the *City Center* of Aurora, both of which are located approximately 3 miles west of Buckley AFB. The I-225 Corridor is lined with regional office and retail centers, and older and newly-established residential areas. The City Center is comprised of regional office, retail, and government administration facilities, including the recently-completed City of Aurora Municipal Center, the Arapahoe County Administrative Annex, and the Aurora Mall. Several additional projects have been proposed for the City Center, including multiple residential apartment and townhouse complexes, corporate office buildings, and a regional bus transfer facility. Light rail transit may eventually be extended into the area in the future (City of Aurora 2009f).

Expressway 470 (E-470) Corridor Strategic Area—Areas to the east of the base are part of the *E-470 Corridor*, a 25-mile planned future growth corridor established along the toll highway E-470. The area is mostly undeveloped, but planned development includes large areas of regional and commercial activity, over 40,000 residential dwelling units, and park and open space areas. Corridor areas east of Buckley AFB would be developed as campus-oriented research and development facilities, while areas southeast of the base would remain as open space. The development timeframe for the E-470 Corridor extends well into the future, and a majority of the corridor has not been annexed into the city (City of Aurora 2009c). However, development is underway in some portions of the corridor, including two residential developments comprising 915 acres located within 0.5 mile of the southern boundary of Buckley AFB (Buckley AFB 2009f).

5.2 ON-BASE ACTIVITIES

Buckley AFB has implemented a *General Plan* to guide current and future development at the base. The General Plan establishes long-range land use planning goals, including defining the most appropriate layout of land uses and transportation corridors to support functional effectiveness, efficiency, and compatibility at the base. Both on- and off-base factors are considered. The General Plan is intended to guide infill development on currently vacant land, as well as functional consolidation and redesignation of land uses to accommodate the anticipated doubling of the base's current staffing levels (Buckley AFB 2009f).

There are a number of recently completed, in progress, and planned *Capital Improvement Projects* to support Buckley AFB's continuing transition from an Air National Guard Base to an AFB, and to facilitate future growth at the base. As the prioritization, initiation, and completion of projects is dynamic, Table 5-1 represents the current schedule of construction and demolition projects available at the time of this EA. The scope, priority, and schedule of individual projects could potentially change. The information in Table 5-1 is provided as a reference to compare the Proposed Action in the context of other planned projects at the base.

For the purposes of this EA, recently completed, in progress, and planned cumulative construction and demolition projects at Buckley AFB through Fiscal Year (FY) 2011 have been evaluated. Proposed projects include administration buildings, infrastructure upgrades, and training and support facilities. These cumulative projects would result in a net increase of approximately 944,100 square feet (sf) of facilities and a net increase of approximately 1.17 million square yards (sy) of paved surfaces at Buckley AFB (Buckley AFB 2009f).

Utilities

With regard to utilities, the potential exists for moderate cumulative adverse impacts to occur. These impacts would result from increases in long-term electricity, natural gas, and water consumption, as well as increased solid waste generation. Under the Proposed Action, long-term on-base electricity consumption may increase due to the installation of additional water pumping and pump regulation facilities. However, the additional electricity use is not anticipated to exceed existing utility provider capacities. In addition, an increase in on-base irrigation water supply is anticipated under the Proposed Action, constituting a moderate long-term beneficial effect on utilities. Overall, the Proposed Action would constitute a minor contribution to cumulative impacts on utilities.

Transportation and Circulation

With regard to transportation and circulation, the potential exists for moderate cumulative adverse impacts to occur, since a long-term increase in on-base traffic volume would likely occur as development of additional residential units occurs.

Table 5-1. Projects Planned at Buckley AFB

Project Title	Land Use	Size		Status
		Building Area (sf)	Parking Area (sy)	
Construction Projects				
(1) Car Wash	Mercantile	5,000	1,235	Recently completed
(2) Chapel	Assembly	22,305	3,280	Recently completed
(3) Child Development Center	Educational	21,837	2,502	Recently completed
(4) Communications Center	Business	53,403	8,054	Recently completed
(5) Consolidated Services	Business	11,384	2,000	Recently completed
(6) Leadership Development Center	Assembly	18,674	1,000	Recently completed
(7) Outdoor Recreation	Mercantile	8,688	3,750	Recently completed
(8) Privatized Housing	Residential	N/A	N/A	Recently completed
(9) Vehicle Inspection Facility	Factory/Industrial	4,000	500	Recently completed
(10) Consolidated Fuels Storage	Factory/Industrial	10,000	5,000	Currently under construction
(11) VQ/TLF - Phase I (NAF)	Residential	109,002	25,000	Currently under construction
(12) Squadron Operations Facility (COANG)	Business	35,768	5,000	Currently under construction
(Basewide) Utility Infrastructure Support (BRAC)	N/A	N/A	N/A	Currently under construction
(13) Security Forces (BRAC)	Business	9,375	5,000	Currently under construction
(14) Official Mail Center	Mercantile	4,000	1,000	Fiscal Year 2009
(15) Alert Crew Quarters - West Ramp (COANG)	Business	6,500	500	Fiscal Year 2009
(16) Air Reserve Personnel Center (BRAC)	Business	105,336	25,000	Fiscal Year 2009
(17) Base Ops (Squad Ops - COANG)	Business	22,950	10,000	Fiscal Year 2009
(18) MWD Dog Kennel SFS	Factory/Industrial	4,305	500	Fiscal Year 2009
(19) Family Camp (NAF)	Residential	1,044	522,720	Fiscal Year 2009
(20) Freight Transfer Facility	Factory/Industrial	12,000	5,000	Fiscal Year 2009
(21) AFR Training Facility (BRAC)	Business	28,500	5,000	Fiscal Year 2009

Table 5-1. Projects Planned at Buckley AFB (Continued)

Project Title	Land Use	Size		Status
		Building Area (sf)	Parking Area (sy)	
(22) Pharmacy	Mercantile	5,712	1,000	Fiscal Year 2009
(23) Shopette (AAFES)	Mercantile	7,500	1,000	Fiscal Year 2009
(24) Youth Center	Educational	32,291	5,000	Fiscal Year 2009
(25) Weapons Release (COANG)	Factory/Industrial	17,500	1,000	Fiscal Year 2009
(26) Freight Transfer Facility	Factory/Industrial	12,000	5,000	Fiscal Year 2009
(27) Commissary Addition	Mercantile	5,000	500	Fiscal Year 2010
(28) Medical Clinic	Business	10,000	500	Fiscal Year 2010
(29) Military Entry Processing Station (MEPS)	Business	10,000	2,000	Fiscal Year 2010
(30) Repair South Runway (COANG)	N/A	N/A	59,856	Fiscal Year 2010
(31) Consolidated Support Facility (ADF)	Business	94,940	10,000	Fiscal Year 2011
(32) EOD Training Range (COANG)	Utility/ Miscellaneous	N/A	N/A	Fiscal Year 2011
(33) 460 Security Forces Operations Facility *	Business	35,768	10,000	Fiscal Year 2011
(34) Fire Trainer	Utility/ Miscellaneous	8,000	500	Fiscal Year 2012/13
(35) Replace AGE/ASE (COANG)	Business	5,000	500	Fiscal Year 2012/13
(36) Taxiway Arm/Disarm Pads (COANG)	N/A	N/A	50,000	Fiscal Year 2012/13
(37) Upgrade Taxiways Juliet and Lima (COANG)	N/A	N/A	50,000	Fiscal Year 2012/13
(38) CATM Small Arms Indoor Range	Utility/ Miscellaneous	23,735	500	Fiscal Year 2012/13
(39) RV Storage Lot (NAF) ** (FY12)	N/A	N/A	5,000	Fiscal Year 2012/13
(43) Relocate East Parking Apron (COANG)	N/A	N/A	40,300	Fiscal Year 2014
(44) North Runway Extension (COANG)	N/A	N/A	59,856	Fiscal Year 2014
(45) Main Ramp Expansion I (COANG)	N/A	N/A	50,000	Fiscal Year 2014
(46) Main Ramp Expansion II (COANG)	N/A	N/A	50,000	Fiscal Year 2014

Table 5-1. Projects Planned at Buckley AFB (Continued)

Project Title	Land Use	Size		Status
		Building Area (sf)	Parking Area (sy)	
(47) Weapons Live Load/ Hot Cargo (COANG)	N/A	N/A	50,000	Fiscal Year 2014
(48) Logistics Readiness Facility *	Factory/Industrial	24,650	10,000	Fiscal Year 2014
(49) ADF Overflow Parking	N/A	N/A	20,000	Fiscal Year 2015+
(50) Alert Crew Quarters - East Ramp (COANG)	Business	5,000	500	Fiscal Year 2015+
(51) Arts, Crafts and Auto Skills	Factory/Industrial	11,119	1,000	Fiscal Year 2015+
(52) Athletic Fields (Place Holder)	Utility/ Miscellaneous	N/A	5,000	Fiscal Year 2015+
(53) Camp Rattlesnake	Utility/ Miscellaneous	N/A	N/A	Fiscal Year 2015+
(54) Cold Storage	Factory/Industrial	5,000	500	Fiscal Year 2015+
(55) Community Activity Center/ Bowling	Mercantile	35,600	2,000	Fiscal Year 2015+
(56) Covered Storage	Factory/Industrial	5,000	500	Fiscal Year 2015+
(57) Airman Dining Facility	Residential	10,000	500	Fiscal Year 2015+
(58) Dormitory Three	Residential	25,000	5,000	Fiscal Year 2015+
(59) Dormitory Four	Residential	25,000	5,000	Fiscal Year 2015+
(60) Entry Control Facility (6th Ave)	Business	9,528	1,000	Fiscal Year 2015+
(61) Entry Control Facility (Gun Club Rd)	Business	9,709	1,000	Fiscal Year 2015+
(62) Entry Control Facility (Mississippi)	Business	9,709	1,000	Fiscal Year 2015+
(63) Entry Control Facility (Telluride)	Business	6,107	1,000	Fiscal Year 2015+
(64) Fire/Crash Rescue (Joint with COANG)	Utility/ Miscellaneous	23,000	1,000	Fiscal Year 2015+
(65) Fitness Center Addition	Mercantile	34,207	1,000	Fiscal Year 2015+
(68) Logistics Readiness Complex/ Base Warehouse	Factory/Industrial	55,000	1,000	Fiscal Year 2015+
(69) Missile Shop	Factory/Industrial	5,000	500	Fiscal Year 2015+
(70) Missile Storage	Factory/Industrial	5,000	500	Fiscal Year 2015+
(71) PAX Terminal	Business	5,000	500	Fiscal Year 2015+
(72) Privatized Housing	Residential	N/A	N/A	Fiscal Year 2015+

Table 5-1. Projects Planned at Buckley AFB (Continued)

Project Title	Land Use	Size		Status
		Building Area (sf)	Parking Area (sy)	
(73) Shopette	Mercantile	7,500	500	Fiscal Year 2015+
(74) SBIRS Operations Support Facility	Business	10,000	2,000	Fiscal Year 2015+
(75) Joint Vehicle Maintenance Facility	Factory/Industrial	19,525	5,000	Fiscal Year 2015+
(76) VQ/TLF - Phase II (NAF)	Residential	37,950	10,000	Fiscal Year 2015+
(76) VQ/TLF - Phase II (NAF)	Residential	39,722	10,000	Fiscal Year 2015+
(77) Add/Alter Fire Station	Utility/ Miscellaneous	21,531	1,000	Fiscal Year 2015+
(78) Education Center/Library	Business	22,000	2,000	Fiscal Year 2015+
Demolition Projects				
Consolidated Fuels Storage Area	Factory/Industrial	10,000	555	Fiscal Year 2010
CATM Range	Utility/ Miscellaneous	3,023	3,872	Fiscal Year 2010
Haz Storage (344), H-70 Hydrazine Storage (310), Entomology (306)	Factory/Industrial	2,140	N/A	N/A
Fuel storage tanks next to Buildings 200 and 341	Factory/Industrial	1,792	N/A	Fiscal Year 2010
Former Wastewater Treatment Facility	Factory/Industrial	243,778	N/A	Fiscal Year 2015+
Building 940	Factory/Industrial	14,758	N/A	Fiscal Year 2015+
Building 1606 (control tower) related to construction of fire station building	Utility/ Miscellaneous	8,783	N/A	Fiscal Year 2015+

N/A - Not available
sf - square feet
sy – square yard
Source: Buckley AFB 2009f.

Additionally, short-term construction-related traffic increases, as well as potential road and lane closures would occur during the construction phases of these projects. The Proposed Action would constitute a minor contribution to these cumulative impacts given the small scale of the project.

Geological Resources

With regard to geological resources, on-base cumulative project development would locally impact soils at Buckley AFB. Soils at Buckley AFB have been modified by past developments and are capable of supporting development. In addition, individual projects would implement best management practices (BMPs) to limit any impacts to soils which may result from construction activities including watering and/or soil stockpiling, thereby reducing the amount of exposed soil to negligible levels. Consequently, cumulative impacts to geological resources are expected to be minor and the Proposed Action's contribution to cumulative impacts would be negligible.

Water Resources

With regard to water resources, the potential exists for moderate cumulative adverse impacts to occur, since a long-term increase in impermeable surfaces would likely occur as on-base development occurs. Additionally, short-term construction-related water resource impacts would occur. However, all projects planned at Buckley AFB would be required to develop and implement project-specific plans (e.g., Storm Water Pollution Prevention Plan) and adhere to all applicable permitting regulations and BMPs to minimize potential impacts to water resources. Therefore, the Proposed Action would constitute a minor contribution to this potentially moderate cumulative impact.

Land Use

With regard to land use, the potential exists for moderate cumulative adverse impacts to occur, since long-term shifts in land use may occur resulting from residential and business development at Buckley AFB, and urban development off-base. However, the Proposed Action would constitute a negligible contribution to these cumulative impacts, since no changes to existing land use patterns in the vicinity of the base would result from implementation of the Proposed Action.

Socioeconomics

With regard to socioeconomics, the potential exists for moderate cumulative impacts to occur, since long-term shifts in employment and regional economics may occur as planned on-base and off-base projects are implemented. Minor short-term cumulative impacts may also occur during construction-related activities. However, the Proposed Action would constitute a minor contribution to short-term spending and employment gains during construction but would not contribute to long-term cumulative impacts to socioeconomics as the project would not result in permanent employment gains or impacts to population and housing.

Environmental Justice

With regard to environmental justice, the potential exists for minor short-term impacts to occur to the health and safety of children due to construction activity as planned on-base and off-base construction projects are executed; however, individual projects would implement standard safety measures to reduce these cumulative short-term impacts to negligible levels. Additionally, moderate cumulative impacts to minority and low-income populations could be anticipated as continued development on- and off-base occurs. The Proposed Action would constitute a negligible contribution to the cumulative impacts regarding child safety and impacts to minority and low-income populations, given the small scale of the project and since no major, adverse impacts are anticipated.

Cultural Resources

With regard to cultural resources, the potential exists for moderate cumulative adverse impacts to occur as planned on- and off-base projects are implemented. However, the Proposed Action would constitute a negligible contribution to these cumulative impacts, since it would not include removal or alteration of any buildings. Further, the Colorado State Historic Preservation Office has previously concurred that no significant archaeological resources have been identified at Buckley AFB and that various past proposed actions would, therefore, unlikely impact any resources.

Visual Resources

With regard to visual resources, cumulative impacts are expected to be moderate and adverse as future growth would increase the levels of factory, industrial, and residential development on-base, and residential and commercial development off-base. The Proposed Action's contribution to cumulative visual resource impacts would be negligible due to the small scale of the project and the fact that visual resources in the vicinity of the Proposed Action are not considered sensitive.

Air Quality

Although the scope, priority, and schedule of individual projects could potentially change, the potential exists for cumulative impacts to occur with regard to air quality as future growth at Buckley AFB and the City of Aurora is anticipated to result in increased traffic and construction emissions. Cumulative air quality impacts are expected to result in moderate adverse impacts related to construction activities and increased use- and personnel-related emissions. The Proposed Action would constitute a minor contribution to these cumulative impacts given the small scale of the project. Additionally, the Proposed Action and all individual projects would be required to implement BMPs to reduce fugitive dust and combustion emissions during construction activities to acceptable levels.

Noise

With regard to noise, cumulative impacts are expected to be moderate and adverse, since future growth would include new noise-sensitive development including residential additions on- and off-base. The Proposed Action's contribution to cumulative noise impacts would be negligible as the operation of proposed facilities would not constitute a substantial noise source and noise impacts related to construction would be limited to short-term activities.

Hazardous Materials and Wastes

With regard to hazardous materials and waste, cumulative impacts are expected to be moderate and adverse as future development would include the use and/or generation of hazardous materials and wastes. These impacts would be localized to Buckley AFB only. The Proposed Action's contribution to these

cumulative impacts would be negligible since operation of proposed facilities is not expected to substantially increase generation, use, or storage of hazardous wastes and materials and since the Proposed Action, as well as all individual projects, would be required to use and dispose of hazardous materials and waste in accordance with all applicable regulations.

Biological Resources

With regard to biological resources, cumulative impacts are expected to be moderate and adverse. Future developments may include the disruption and/or removal of native vegetation communities and wildlife habitat, and the alteration of surface water flows. The Proposed Action's contribution to these cumulative impacts would be minor, since much of the proposed linear pipeline would occur either adjacent to existing roadways and developed areas or cut across crested wheatgrass community types.

Safety

Cumulative impacts to safety would include moderate long-term beneficial effects as new development would comply with Antiterrorism/Force Protection standards as the Proposed Action would create an on-base sustainable irrigation water supply. These impacts would be localized to Buckley AFB only and anticipated off-base projects would not impact safety conditions on-base. Furthermore, cumulative impacts with regard to occupational health would be minor and adverse due to short-term risks associated with construction activity; however, all individual projects would be required to adhere with appropriate regulations and BMPs to minimize these risks and the Proposed Action's contribution to this cumulative impact would be negligible.

SECTION 6
SUMMARY OF FINDINGS

Summaries of environmental impacts anticipated to result from implementation of the Proposed Action at Buckley Air Force Base (AFB) are provided in this section for the following resources:

Utilities. Implementation of the Proposed Action would result in no impacts to solid waste disposal and natural gas utilities, and negligible, short-term impacts to electric utilities. Negligible impacts to potable water would occur due to a slight reduction in the amount of water purchased from the City of Aurora for irrigation supplies. Since collection of irrigation wastewater would be the same as existing conditions, and no changes to wastewater utilities would occur, no impacts would result. Installation of a self-sustaining on-base irrigation system under the Proposed Action would result in moderate beneficial impacts to irrigation utilities at the base. Prior to construction and operational maintenance activities under the Proposed Action, advanced coordination and inspections would occur to verify existing utilities locations; therefore, negligible impacts to existing utilities would result.

Transportation and Circulation. Construction activities under the Proposed Action would result in negligible increases in traffic; however, any increases would be short-term and would cease upon the completion of construction activities. Construction and operational maintenance activities beneath and adjacent to active roadways would result in localized, minor impacts over the short term and negligible impacts over the long term due to road closures and other circulation disruptions; however, any impacts would be localized and would follow procedures in a Transportation Management Plan.

Geological Resources. Potential impacts to geological resources associated with the Proposed Action would be limited to ground-disturbing activities (i.e., excavation/trenching) during construction or operational maintenance activities. BMPs would be implemented to minimize potential occurrences of erosion, siltation, and soil compaction, and any impacts would be minor and would last only for the duration of ground-disturbing activities. No additional impacts to

geological resources are anticipated to result from implementation of the Proposed Action.

Water Resources. Construction activities under the Proposed Action would incorporate BMPs to minimize erosion, runoff, and sedimentation, and a Storm Water Pollution Prevention Plan (SWPPP) containing additional best management practices (BMPs) and other procedures would be implemented to prevent adverse impacts to surface water. On-site well rehabilitation would incorporate BMPs to prevent adverse impacts to groundwater. Operation of the Proposed Action would have no foreseeable impacts on surface water, and would comply with all applicable regulatory and permit requirements, and applicable measures in Buckley AFB's operational SWPPP. Further, the Proposed Action would not affect the water quality of any surface water receiving bodies, create an overdraft of available groundwater, or exceed any decreed groundwater rights.

Land Use. Construction and operation of the Proposed Action would be consistent with established land use policies and designations, and would not change existing land use patterns or require any changes in zoning. Although the construction of the proposed aboveground storage tank (AST) would potentially encroach on *Open Space* land uses on the base, this land use classification represents an existing conventional category and does not constitute specific restrictions of future land use and the proposed AST would not preclude the viability of existing land uses. Therefore, minor impacts to land use would result.

Socioeconomics. Construction activities associated with the Proposed Action would result in negligible beneficial socioeconomic impacts due to temporary increases in construction-related employment. No long-term changes in economic activity associated with operation of the Proposed Action are expected to occur.

Environmental Justice. No impacts, associated with the Proposed Action adverse or otherwise, would affect any on- or off-base minority or low-income populations, or children under 18.

Visual Resources. All aboveground components (e.g., storage tank, well-heads, pumping equipment, etc.) installed under the Proposed Action would be located away from sensitive visual resources, and negligible impacts to visual resources would result.

Cultural Resources. No impact to cultural resources is anticipated as the Proposed Action would not involve the removal or alteration of any buildings and the Colorado State Historic Preservation Office has previously concurred that no significant archaeological resources have been identified at Buckley AFB.

Air Quality. Under implementation of the Proposed Action, fugitive dust would be generated from construction activities, including excavation, trenching, and other ground-disturbing activities. Implementation of standard BMPs for dust control (e.g., regularly watering exposed soils, soil stockpiling, soil stabilization, etc.) would reduce potential impacts to negligible levels. Combustion emissions resulting from construction activities would be below *de minimis* thresholds for a General Conformity determination, and would not exceed 10 percent of the regional emissions inventory. Any emissions resulting from operation of the Proposed Action would be negligible. Therefore, implementation of the Proposed Action does not require a conformity analysis and would result in minor air quality impacts.

Noise. Under the Proposed Action, construction activities would generate temporary localized minor noise increases in the vicinity of the project footprint. Once operational, any noise increases would be negligible and would be limited to newly-installed pumping equipment at the rehabilitated wells. All noise-generating activities would occur in an environmental heavily dominated by aircraft noise.

Hazardous Materials and Wastes. The Proposed Action would result in a short-term increase in the storage of construction-related hazardous materials and wastes; however, the increase would be temporary and would constitute a negligible impact. The Proposed Action footprint would partially traverse an area of Buckley AFB identified as containing Asbestos-Containing Material (ACM) present within surface soils that could potentially be encountered during construction activities. Any ACM encountered in the soil during construction

would be handled in accordance with Buckley AFB's *Draft Soil Characterization and Management Plan* which outlines special ACM handling requirements for on-site haul routes, project site preparation, excavation, transportation, disposal, and construction personnel training on handling and disposal of ACM. In addition, storage and disposal of ACM would also comply with the base's *Asbestos Management Plan*, as required by Compliance Order #03-09-30-01. The Proposed Action footprint would partially traverse an identified Environmental Restoration Program (ERP) site – *ERP Site 10* – where tetrachloroethylene, metals, and other contaminants have been identified in surface soils and could potentially be encountered during construction activities. In addition, the proposed pipeline would also partially traverse two Areas of Potential Concern (AOPC) where groundwater has been contaminated by solvents. For both sites, a site-specific *Soil Characterization and Management Plan* and *Health and Safety Plan* would be prepared outlining special requirements for addressing site preparation and construction activities in the ERP site and AOPC footprints. Accordingly, impacts would be moderate and localized.

Biological Resources. Construction activities would result in localized minor impacts to vegetation and wildlife due to excavation, trenching, and other site preparation activities. However, all impacts would be short-term and last only for the duration of construction activities and revegetation of disturbed sites would be accomplished using appropriate and proven reseeding techniques. The Proposed Action is expected to have negligible impacts on special-status species, and BMPs and appropriate avoidance and management procedures (e.g., conducting species surveys, scheduling construction outside of migratory bird nesting season, etc.) would be incorporated as applicable and where recommended by applicable agencies (e.g., U.S. Fish and Wildlife Service, Colorado Division of Wildlife, etc.). All construction activities and installed project components would be located outside the vicinity of any adjacent wetland areas, and BMPs to minimize erosion, runoff, and sedimentation into wetland areas would be implemented. Accordingly, no adverse impacts to wetlands would result.

Safety. Implementation of the Proposed Action would not impact aircraft mishaps potential or increase the likelihood of bird-aircraft strikes. Construction activities taking place in Accident Potential Zones (APZs) associated with the

Buckley AFB airfield would be coordinated with Air Traffic Control to ensure no disruption to aircraft operations would occur, and no equipment would be stored within established APZs. All aboveground components (e.g., storage tank, well-heads, pumping equipment, etc.) would be located outside of APZs and would not impede the airfield's imaginary surfaces. Therefore, negligible impacts to airfield safety would result.

SECTION 7
SPECIAL PROCEDURES

Impact evaluations conducted during preparation of this Environmental Assessment (EA) have determined that no major environmental impacts would result from implementation of the Proposed Action at Buckley Air Force Base (AFB). This determination is based on a thorough review and analysis of existing resource information, the application of accepted modeling methodologies, and coordination with knowledgeable, responsible personnel from the U.S. Air Force and relevant local, state, and Federal agencies.

Special procedures required prior to implementation of the Proposed Action include development of a site-specific *Soil Characterization and Management Plan* outlining special requirements for addressing site preparation and construction activities in the footprint of an identified Environmental Restoration Program site or Area of Potential Concern, in addition to following procedures within Buckley AFB's *Draft Soil Characterization and Management Plan* and the base's *Asbestos Management Plan* to address any Asbestos Containing Material present within surface soils that could potentially be encountered during construction activities in an identified on-base "asbestos" area.

Further, required special procedures regarding the sensitive burrowing owl species include mandatory buffers around known owl sites, required surveys if earth moving activities occur during the nesting season, and the delay of construction activities if nesting owls would be impacted or proper consultations with the Colorado Department of Wildlife and U.S. Fish and Wildlife Service prior to earth-moving activities if delays are infeasible. The implementation of all appropriate avoidance and management procedures to reduce impacts on burrowing owls, especially during nesting season, would be required prior to executing the Proposed Action.

In addition to standard best management practices such as implementation of control measures for reducing fugitive dust emissions; safe identification and removal of any asbestos and other potentially hazardous materials; silt fencing and suspension of construction during rainy periods; soil stockpiling and replacement during excavation activities; use of appropriate avoidance and

management procedures regarding burrowing owls; and conforming to all Federal, state, and local requirements relating to storm water pollution prevention during construction activities, including development of a Notice of Intent and Storm Water Pollution Prevention Plan under the General Permit for Storm Water Discharges from Construction Activities Program, no other special procedures are required prior to implementation of the Proposed Action.

SECTION 8
REFERENCES

APS 2010a. Aurora Public Schools (APS). 2010a. *Fast Facts about APS*. Updated 11 January. Available at: http://www.aps.k12.co.us/communications/docs/General.pdf. Accessed: 23 March 2010. Aurora, CO.

APS 2010b. APS. 2010b. *APS Building Addresses*. Updated 25 January. Available at: http://www.aps.k12.co.us/district-info/maps/address.pdf. Accessed: 23 March 2010. Aurora, CO.

APS 2010c. APS. 2010c. *APS – Aurora Quest K-8*. Updated 22 March. Available at: http://quest.aurorak12.org. Accessed: 23 March 2010. Aurora, CO.

APS 2010d. APS. 2010d. *APS – Williams Smith High School*. Available at: http://www.aps.k12.co.us/wmsmith. Accessed: 23 March 2010. Aurora, CO.

APS 2010e. APS. 2010e. *APS – Pickens Technical College*. Available at: http://www.aps.k12.co.us/pickens. Accessed: 23 March 2010. Aurora, CO.

Buckley AFB 2000. Buckley Air Force Base (AFB). 2000. *Environmental Assessment (EA) for Buckley Air National Guard (ANG) Base Realignment*. Aurora, CO.

Buckley AFB 2002. Buckley AFB. 2002. *Bird-Aircraft Strike Hazard (BASH) Plan for Buckley AFB*. Aurora, CO.

Buckley AFB 2003. Buckley AFB. 2003. *Final EA for Phase III Infrastructure Upgrade and Expansion*. November. Aurora, CO.

Buckley AFB 2005. Buckley AFB. 2005. *Executive Summary for Aircraft Accident Investigation – F-16C, S/N 87-0337, 120th Fighter Squadron, Buckley AFB*. 28 June. Available at: http://usaf.aib.law.af.mil/F-16C_28June05.pdf. Accessed: 23 February 2010. Aurora, CO.

Buckley AFB 2006. Buckley AFB. 2006. *Final EA for Capital Improvement Projects*. Volume I or II. March. Aurora, CO.

Buckley AFB 2007a. Buckley AFB. 2007a. *Natural Infrastructure Assessment for Buckley AFB*. Final Baseline Report. 31 December. Aurora, CO.

Buckley AFB 2007b. Buckley AFB. 2007b. *Final EA for Proposed Construction and Operation of a New Vehicle Maintenance Facility at Buckley AFB*. August. Aurora, CO.

Buckley AFB 2007c. Buckley AFB. 2007c. *Final EA for Proposed Replacement of the Squadron Operations Facility at the 140th Wing, Colorado ANG, Buckley AFB*. September. Aurora, CO.

Buckley AFB 2007d. Buckley AFB. 2007d. *Final EA for Proposed Construction of a Freight Transfer Facility at Buckley AFB*. June. Aurora, CO.

Buckley AFB 2008a. Buckley AFB. 2008a. *Draft EA for Proposed Upgrades at the 6th Avenue, Mississippi, and Telluride Entry Control Facilities at Buckley AFB*. March. Aurora, CO.

Buckley AFB 2008b. Buckley AFB. 2008b. *Final EA for Perimeter Road Maintenance at Buckley AFB*. May. Aurora, CO.

Buckley AFB 2009a. Buckley AFB. 2009a. *Water Well Study*. Final Report. 30 July. Aurora, CO.

Buckley AFB 2009b. Buckley AFB. 2009b. *Water Well Study*. Addendum to the Final Report. 3 November. Aurora, CO.

Buckley AFB 2009c Buckley AFB. 2008c. *Calendar Year 2008 Stationary Sources Air Emissions Inventory – Buckley AFB*. 28 April 2009. Aurora, CO.

Buckley AFB 2009d Buckley AFB. 2007e. *Calendar Year 2007 Mobile Sources Air Emissions Inventory – Buckley AFB*. 13 February 2009. Aurora, CO.

Buckley AFB 2009e Buckley AFB. 2009c. *Final Environmental Assessment for Proposed Additions and Alterations (ADAL) of the Fitness Center Complex at Buckley Air Force Base, Colorado.* December. Aurora, CO.

Buckley AFB 2009f	Buckley AFB. 2009f. *General Plan for Buckley Air Force Base, Colorado, Validated for FY 2009*. Buckley AFB, Colorado.
Buckley AFB 2009g	Buckley AFB. 2009g. *Draft Soil Characterization and Management Plan.* August. Buckley AFB, Colorado.
Buckley AFB 2009h	Buckley AFB. 2009h. *460th Space Wing Buckley AFB, Integrated Natural Resources Management Plan*. March. Buckley AFB, Colorado.
Buckley AFB 2010a.	Buckley AFB. 2010a. *Final EA for Williams Lake Wildlife Control at Buckley AFB*. January. Aurora, CO.
Buckley AFB 2010b.	Buckley AFB. 2010b. *Buckley AFB – Heritage*. Available at: http://www.buckley.af.mil/library/factsheets/factsheet.asp?id=4420. Accessed: 22 March 2010. Aurora, CO.
Buckley AFB 2010c.	Buckley AFB. 2010c. *Basewide Site Investigation Presentation.* January. Aurora, CO.
Colorado Air Quality Control Commission (CAQCC) 2007.	CAQCC. 2007. 2004-2007 Activities: Ozone Early Action Compact. Available at: http://www.cdphe.state.co.us/ap/ozone.html. Accessed 21 December 2007.
CDOT 2008.	Colorado Department of Transportation (CDOT). 2008. *CDOT – Traffic Data*. Available at: http://www.dot.state.co.us/app_dtd_dataaccess/Traffic/index.cfm?fuseaction=TrafficMain. Accessed: 18 February 2010. Denver, CO.
CDOW 2010a.	Colorado Division of Wildlife (CDOW). 2010a. *CDOW – Conservation Planning Page*. Available at: http://ndis.nrel.colostate.edu/conservation.asp. Accessed: 23 March 2010. Denver, CO.
CDOW 2010b.	CDOW. 2010b. *CDOW – Wildlife Species Page*. Available at: http://ndis.nrel.colostate.edu/wildlife.asp. Accessed: 23 February 2010. Denver, CO.

City-Data.com 2008. City-Data.com. 2008. *Buckley AFB – Wildlife Incidents – Airplane Bird Strikes*. Available at: http://www.city-data.com/wildlife/Buckley-Afb-Airport-Aurora-Colorado.html. Accessed: 23 February 2010. Flossmoor, IL.

City of Aurora 2007. City of Aurora. 2007. *Approval Status of Master Planned Area and Future Residential Growth Areas*. April. Aurora, CO.

City of Aurora 2009a. City of Aurora. 2009a. *Zoning Map*. December. Aurora, CO.

City of Aurora 2009b. City of Aurora. 2009b. *2009 Comprehensive Plan – Buckley AFB Area*. Aurora, CO.

City of Aurora 2009c. City of Aurora. 2009c. *2009 Comprehensive Plan – Expressway 470 (E-470) Area*. Aurora, CO.

City of Aurora 2009c. City of Aurora. 2009d. *E-470/Northeast Plains – Zoning Map*. June. Aurora, CO.

City of Aurora 2009e. City of Aurora. 2009e. *E-470/Northeast Plains – (Future) Land Use*. Aurora, CO.

City of Aurora 2009f. City of Aurora. 2009f. *2009 Comprehensive Plan – I-225 Corridor and City Center Area*. Aurora, CO.

Federal Aviation Administration 2007. Federal Aviation Administration. 2007. *Advisory Circular, Hazardous Wildlife Attractants on or Near Airports*. August.

HAMweather 2010. HAMweather. 2010. *Climatological Normals Report – Yearly Normals for Buckley AFB*. Available at: http://weather.hamweather.com/us/co/buckley+afb/normals.html. Accessed: 22 February 2010. Excelsior, MN.

Jensen 2002. Jensen, Michael E. 2002. *Technical Review Document for Renewal of Operating Permit 95OPAR118*. June.

Plains Conservation Center 2010. Plains Conservation Center. 2010. *Plains Conservation Center – About Us*. Available at: http://www.plainscenter.org/aboutus.asp. Accessed: 22 March 2010. Aurora, CO.

U.S. Army Corps of Engineers 2003. U.S. Army Corps of Engineers. 2003. *Final Project Report, Asbestos Soil Abatement Action Former Hospital Site/Future Fitness Center Location, Buckley Air Force Base, Aurora, Colorado.* Prepared by Weston Solutions, Inc., Lakewood, Colorado. 18 April.

U.S. BEA 1990a. U.S. Bureau of Economic Analysis (BEA). 1990a. *U.S. BEA – Total Employment by Industry (1990)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA25. Accessed: 19 February 2010. Washington, DC.

U.S. BEA 1990b. U.S. BEA. 1990b. *U.S. BEA – Total Wages, Wage Employment, Average Wage per Job (1990)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA34. Accessed: 19 February 2010. Washington, DC.

U.S. BEA 2000a. U.S. BEA. 2000a. *U.S. BEA – Total Employment by Industry (2000)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA25. Accessed: 19 February 2010. Washington, DC.

U.S. BEA 2000b. U.S. BEA. 2000b. *U.S. BEA – Total Wages, Wage Employment, Average Wage per Job (2000)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA34. Accessed: 19 February 2010. Washington, DC.

U.S. BEA 2007a. U.S. BEA. 2007a. *U.S. BEA – Total Employment by Industry (2007)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA25. Accessed: 19 February 2010. Washington, DC.

U.S. BEA 2007b. U.S. BEA. 2007b. *U.S. BEA – Total Wages, Wage Employment, Average Wage per Job (2007)*. Available at: http://www.bea.gov/regional/reis/default.cfm?selTable=CA34. Accessed: 19 February 2010. Washington, DC.

U.S. BLS 2008a. U.S. Bureau of Labor Statistics (BLS). 2008a. *U.S. BLS – Local Area Unemployment Statistics – December 2008*. Available at: http://data.bls.gov/PDQ/outside.jsp?survey=la. Accessed: 19 February 2010. Washington, DC.

U.S. BLS 2008b. U.S. BLS. 2008b. *U.S. BLS – Labor Force Statistics from the Current Population Survey – December 2008*. Available at: http://data.bls.gov/PDQ/outside.jsp?. Accessed: 19 February 2010. Washington, DC.

U.S. BLS 2009a. U.S. BLS. 2009a. *U.S. BLS – Local Area Unemployment Statistics – December 2009*. Available at: http://data.bls.gov/PDQ/outside.jsp?survey=la. Accessed: 19 February 2010. Washington, DC.

U.S. BLS 2009b. U.S. BLS. 2009b. *U.S. BLS – Labor Force Statistics from the Current Population Survey – December 2009*. Available at: http://data.bls.gov/PDQ/outside.jsp?. Accessed: 19 February 2010. Washington, DC.

U.S. BLS 2010. U.S. Bureau of Labor Statistics (BLS). 2010. *BLS--Inflation Calculation*. Available at: http://www.bls.gov/data/inflation_calculator.htm. Accessed: 19 February 2010. Washington, DC.

U.S. Census Bureau 1990. U.S. Census Bureau. 1990. *1990 Decennial Census*. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Accessed: 19 February 2010. Washington, DC.

U.S. Census Bureau 1999. U.S. Census Bureau. 1999. *2000 Decennial Census (1999 Poverty Data)*. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Accessed: 19 February 2010. Washington, DC.

U.S. Census Bureau 2000. U.S. Census Bureau. 2000. *2000 Decennial Census*. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Accessed: 19 February 2010. Washington, DC.

U.S. Census Bureau 2007. U.S. Census Bureau. 2007. *2007 American Community Survey*. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Accessed: 19 February 2010. Washington, DC.

U.S. Census Bureau 2008. U.S. Census Bureau. 2008. *2008 American Community Survey*. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Accessed: 19 February 2010. Washington, DC.

USDA 1971. U.S. Department of Agriculture (USDA). 1971. *Soil Survey of Arapahoe County, Colorado*. Washington, DC.

USEPA 1995. U.S. Environmental Protection Agency (USEPA). 1995. *Compilation of Air Pollutant Emission Factors, Volume 1 – Stationary Point and Area Sources*. Available at: http://www.epa.gov/ttn/chief/ap42. Accessed 22 February 2009.

USEPA 2006. USEPA. 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Available at: http://www.epa.gov/ttnchie1/net/2002inventory.html. Accessed: 15 April 2010.

USEPA 2008a. USEPA. 2008a. *USEPA – 303(d) List for 2008 – State of Colorado*. Available at: http://oaspub.epa.gov/tmdl/waters_list.control?state=CO&p_cycle=2008. Accessed: 23 March 2010. Washington, DC.

USEPA 2008b. USEPA. 2008b. *USEPA – 303(d) List for 2008 – Water Body Information – Sand Creek*. Available at: http://oaspub.epa.gov/tmdl/enviro.control?p_list_id=COSPUS16A_00&p_cycle=2008. Accessed: 23 March 2010. Washington, DC.

USEPA 2008c. USEPA. 2008c. *USEPA – 303(d) List for 2008 – Water Body Information – East Toll Gate Creek*. Available at: http://oaspub.epa.gov/tmdl/enviro.control?p_list_id=COSPUS16C_0601&p_cycle=2008. Accessed: 23 March 2010. Washington, DC.

USEPA 2009. USEPA. 2009. *USEPA – Who Has to Obtain a Title V Permit*. Available at: http://www.epa.gov/oar/oaqps/permits/obtain.html. Accessed: 16 February 2010. Washington, DC.

USEPA 2010a. USEPA. 2010a. *USEPA Green Book of Nonattainment Areas – Listed by State, County, Pollutant then Area*. Updated 6 January 2010. Available at: http://www.epa.gov/oar/oaqps/greenbk. Accessed: 16 February 2010. Washington, DC.

USEPA 2010b. USEPA. 2010b. *USEPA – Asbestos.* Available at: http://www.epa.gov/asbestos/. Accessed: 29 March 2010. Washington, DC.

USFWS 2010. U.S. Fish and Wildlife Service (USFWS). 2010. *Threatened & Endangered Species Reports*. Available at: http://ecos.fws.gov/tess_public/pub/stateListingIndividual.jsp?state=CO&status=listed. Accessed: 23 February 2010. Washington, DC.

WRCC 2010a. Western Regional Climate Center (WRCC). 2009a. *Period of Record Monthly Climate Summary for Denver WSFO Airport, Colorado (052220). Period of Record: 8/1/1948 to 12/31/2005*. Available at: http://www.wrcc.dri.edu/summary/climsmco.html. Accessed: 16 February 2010. Reno, NV.

WRCC 2010b. WRCC. 2010b. *Average Wind Speeds by State. Period of Record: 1992 to 2002*. Available at: http://www.wrcc.dri.edu/htmlfiles/westwind.final.html. Accessed: 22 February 2010. Reno, NV.

WRCC 2010c. WRCC2009c. *Average Wind Direction by State. Period of Record: 1992 to 2002.* Available at: http://www.wrcc.dri.edu/htmlfiles/westwinddir.html. Accessed: 16 February 2010. Reno, NV.

SECTION 9
LIST OF PREPARERS

This report was prepared for, and under the direction of, the U.S. Air Force by AMEC Earth & Environmental, Inc. Members of the professional staff are listed below:

Project Management

Aaron Goldschmidt, Environmental Program Manager
M.A. Geography

Technical Analysts

Andrea Bardsley
M.A. Anthropology

Andrew Chen
B.A. Environmental Studies

Steven Ricchiazzi
B.S. Forestry and Natural Resources

Scott Sjulin
B.S. Urban Design and Development

Production

Janice Depew
Production

Deirdre Stites
Graphic Artist

APPENDIX A

IICEP CORRESPONDENCE

APPENDIX A
IICEP DISTRIBUTION LIST

Mr. Dan Beley
Colorado Dept. of Public Health & Environment
Water Quality Control Division
WQCD-OQ-B2
4300 Cherry Creek Drive, South
Denver, CO 80246-1530

Ms. Nancy Chick
Colorado Dept. of Public Health & Environment
Air Pollution Control Division
APCD-TS-B2
4300 Cherry Creek Drive, South
Denver, CO 80246-1530

Mr. Ed Nichols
State Historic Preservation Officer
Colorado History Museum
1300 Broadway
Denver, CO 80203-2137

Mr. John Fernandez
City of Aurora
Environmental Management Section
15151 E. Alameda
Aurora, CO 80012

Mr. Eugene Jansak
Industrial Waste Specialist
Metro Wastewater Reclamation Dist.
6450 York Street
Denver, CO 80229-7499

Mr. Lee Pivonka
Colorado Dept. of Public Health & Environment
Federal Facilities
HMWM 2800
4300 Cherry Creek Drive, South
Denver, CO 80246-1530

Ms. Eliza Moore
Wildlife Manager
Colorado Division of Wildlife
6060 South Broadway
Denver, CO 80216

Mr. David Rathke
U.S. Environmental Protection Agency
Region 8
1595 Wyncoop St.
Denver, Co 80202-1129

Mr. Bruce Rosenlund
Colorado Field Supervisor
U.S. Fish & Wildlife Service
134 Union Blvd., Suite 675
Lakewood, CO 80228-1807

Mr. Larry Svoboda
NEPA Unit Chief
U.S. Environmental Protection Agency
Region 8
1595 Wyncoop St.
Denver, Co 80202-1129

Mr. Robert Watkins
Director of Planning
City of Aurora
15151 E. Alameda
Aurora, CO 80012

Ms. Carol Foreman
Central Library Reference Supervisor
Aurora Public Library
Administrative Offices
14949 E. Alameda Pkwy.
Aurora, CO 80012

Mr. Brent Bibles
Wildlife Researcher
Colorado Division of Wildlife
317 W. Prospect Road
Fort Collins, CO 80526

Ms. Patricia Mehlhop
U.S. Fish & Wildlife Service
134 Union Blvd.
Lakewood, CO 80228-1807

TRIBAL CONSULTATION LIST

Ms. Carol Harvey
Colorado Commission of Indian Affairs
130 State Capitol
Denver, CO 80203

Chairman Ernest House, Sr.
Ute Mountain Ute Tribe
P.O. Box JJ
Towoac, CO 81334

Mr. Terry Knight, Sr.
NAGPRA Representative, Ute Mountain Ute Tribev
P.O. Box 468
Towoac, CO 81334

Chairman Matthew Box
Southern Ute Indian Tribe
356 Ouray Drive, P.O. Box 737
Ignacio, CO 81137

Mr. Neil Cloud
NAGPRA Representative, Southern Ute Indian Tribe
P.O. Box 737
Ignacio, CO 81137

Chairwoman Janice Prairie Chief-Bosell
Cheyenne & Arapaho Business Committee
P.O. Box 38
Concho, OK 73022

Mr. Bill Hamilton, Director
Cultural Heritage Program
Cheyenne & Arapaho Tribes of Oklahoma
200 Wolf Robe Circle
P.O. Box 145
Concho, OK 73022

Ms. Karen Little Coyote
Arapaho representative for NAGPRA
Cheyenne & Arapaho Tribes of Oklahoma
Cultural Heritage Program
200 Wolf Robe Circle
P.O. Box 145
Concho, OK 73022

APPENDIX B

AIR EMISSION FACTORS AND ASSUMPTIONS

APPENDIX B
AIR EMISSION FACTORS AND ASSUMPTIONS

B.1 FUGITIVE DUST EMISSIONS ASSOCIATED WITH CONSTRUCTION ACTIVITIES

Table B-1. Disturbed Land Area from Construction-Related Activities

Construction Operation	Proposed Action		Alternative 1		Alternative 2	
	Linear feet	Area*	Linear feet	Area*	Linear feet	Area*
Trenching						
Well 1 to AST (8" pipeline)	1,633	3,266 sf	2,940	5,880 sf	2,921	5,842 sf
Well 2 to AST intake pipeline (8" pipeline)	838	1,676 sf	1,911	3,822 sf	1,698	3,396 sf
Well 3 to AST intake pipeline (8"pipeline)	3,282	6,564 sf	2,888	5,776 sf	3,867	7,734 sf
AST to irrigation system (12" pipeline)	13,233	39,699 sf	13,365	40,095 sf	13,863	41,589 sf
Grading/Leveling*						
AST	707 sf		707 sf		707 sf	
Well House	450 sf		450 sf		450 sf	
Total area	**52,362 sf**		**56,730 sf**		**59,718 sf**	
Total area	**1.2021 acres**		**1.3023 acres**		**1.3709 acres**	

*Includes assumption that trenching for pipeline installation would require disturbing a width of three times the diameter of the piping being installed. In addition, dimensions of the proposed AST footprint would be approximately 30 feet in diameter and the proposed well house footprint would be 30 feet by 15 feet.

B.2 COMBUSTION EMISSIONS ASSOCIATED WITH CONSTRUCTION ACTIVITIES

Table B-2. Construction-Related Combustion Emission Factors

Equipment	Days	Hours of Operation	Emission Factors (lbs/hr)					
			CO	NO_x	PM_{10}	$PM_{2.5}$	SO_x	ROG
grader	120	1,200	0.567	1.623	0.084	0.077	0.276	0.148
loader	120	1,200	0.424	0.858	0.086	0.079	0.115	0.132
bobcat	120	1,200	0.268	0.508	0.054	0.050	0.0	0.09
dozer	120	1,200	1.209	3.037	0.123	0.113	0.453	0.232
paving equipment	120	1,200	0.419	0.961	0.069	0.063	0.144	0.117
paver	120	1,200	0.449	0.894	0.067	0.062	0.165	0.12
excavator	120	1,200	1.300	4.600	0.320	0.310	0.740	0.340

ROG = reactive organic gasses
Source: Santa Barbara County Air Pollution Control District (APCD) Form 24 -Table 2, 1997 (for all emission factors except for $PM_{2.5}$) South Coast Air Quality Management District, California Environmental Quality Act (CEQA) Air Quality Handbook, 1993 (for $PM_{2.5}$ emissions fraction of PM_{10} for off-road diesel equipment), USEPA 2006 (for emission factors for excavator)

Construction Assumptions: 6 month construction period, 4 weeks/month, 5 work days per week, 10 hours per work day; 1,200 hours of operation total.