

**FINAL
ENVIRONMENTAL ASSESSMENT
FOR
NEW GOLF DRIVING RANGE AT
BUCKLEY AIR FORCE BASE, COLORADO**



Prepared by

Headquarters Air Force Center for Environmental Excellence
Project Execution Division

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FINDING OF NO SIGNIFICANT IMPACT (FONSI)

NEW GOLF DRIVING RANGE AT BUCKLEY AIR FORCE BASE (AFB), COLORADO

AGENCY: United States Air Force (USAF), 460th Air Base Wing

BACKGROUND: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force NEPA implementing regulations (32 CFR 989), the USAF conducted an assessment of the potential consequences of constructing and operating a new golf driving range at Buckley AFB (Proposed Action) and the No Action Alternative. The Proposed Action would be to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

PROPOSED ACTION: The USAF proposes to construct and operate a golf driving range at Buckley AFB. The driving range would encompass approximately four acres of land within the AFB boundaries and would consist of eight tee boxes, associated sidewalks, an equipment storage shed and safety netting. Parking would be provided in an existing, nearby parking lot.

FACTORS CONSIDERED IN DETERMINING THAT NO ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED: The EA analyzed the environmental impacts of alternatives to the Proposed Action taking into account all relevant environmental resource areas and conditions. The USAF has examined the following resource areas and conditions and found that the Proposed Action will either have no or inconsequential impact: air quality, biotic resources, cultural resources, environmental justice, geology, hazardous materials/hazardous waste, land use and aesthetics, noise, socioeconomics, utilities and water. Portions of the area of the driving range that will not be disturbed by construction or operation do contain subsurface contamination. While the Proposed Action would not have any significant effect to contaminated sites, if remedial action were required at these sites in the future, the driving range could be inoperable during remedial activities. This situation affects the driving range, but is not an environmental consequence of the Proposed Action. The Environmental Assessment on the New Golf Driving Range at Buckley Air Force Base, Colorado, dated November 2002, is incorporated by reference.

PUBLIC NOTICE: NEPA, 40 CFR 1500-1508, and 32 CFR 989 require public review of the EA before approval of the FONSI and implementation of the Proposed Action. The public review period ended on November 27, 2002. One comment letter indicating concurrence with cultural resource assessments was received from the State Historic Preservation Office.

FINDING OF NO SIGNIFICANT IMPACT: Based on the requirements of NEPA, 40 CFR 1500-1508, and 32 CFR 989, I conclude the environmental effects of the Proposed Action are not significant, and therefore, an environmental impact statement will not be prepared. A notice of availability for public review was published in the Denver Post on Sunday, October 27, 2002 indicating a 30-day review period. Hard copies of the Draft EA and Draft FONSI were placed in the Denver and Aurora public libraries for dissemination. The signing of this FONSI completes the USAF Environmental Impact Analysis Process.


JAMES A. SANDS
Colonel, USAF
EPC Chairperson

2-12-03
Date

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SECTION 1

PURPOSE AND NEED FOR THE PROPOSED ACTION

This environmental assessment (EA) analyzes the potential environmental impacts resulting from constructing a new golf driving range at Buckley Air Force Base (AFB), Colorado. This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force NEPA implementing regulations (32 CFR 989).

1.1 PURPOSE AND NEED

Base Services (460 SVD/SV) proposes to construct and operate a golf driving range south of Buildings 1011 and 1012 between Aspen Way and the installation boundary at Buckley AFB (Figure 1.1). The purpose of the golf driving range would be to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB. No driving range or other golf opportunities (e.g., putting/chipping green or golf course) are available at Buckley AFB, and 460 SVD/SV has received many requests from military personnel to provide golf opportunities at the base. While off-site golf courses and driving ranges are available near Buckley (Springhill Municipal Golf Course is less than one mile from the north border of the base), these courses are not convenient for personnel to use during lunch hours and would be more expensive for users than a Buckley AFB driving range.

This EA will provide Buckley AFB with the information required to understand the potential environmental consequences of the construction and operation of the new driving range and support a Finding of No Significant Impact (FONSI) or a decision to prepare an Environmental Impact Statement.

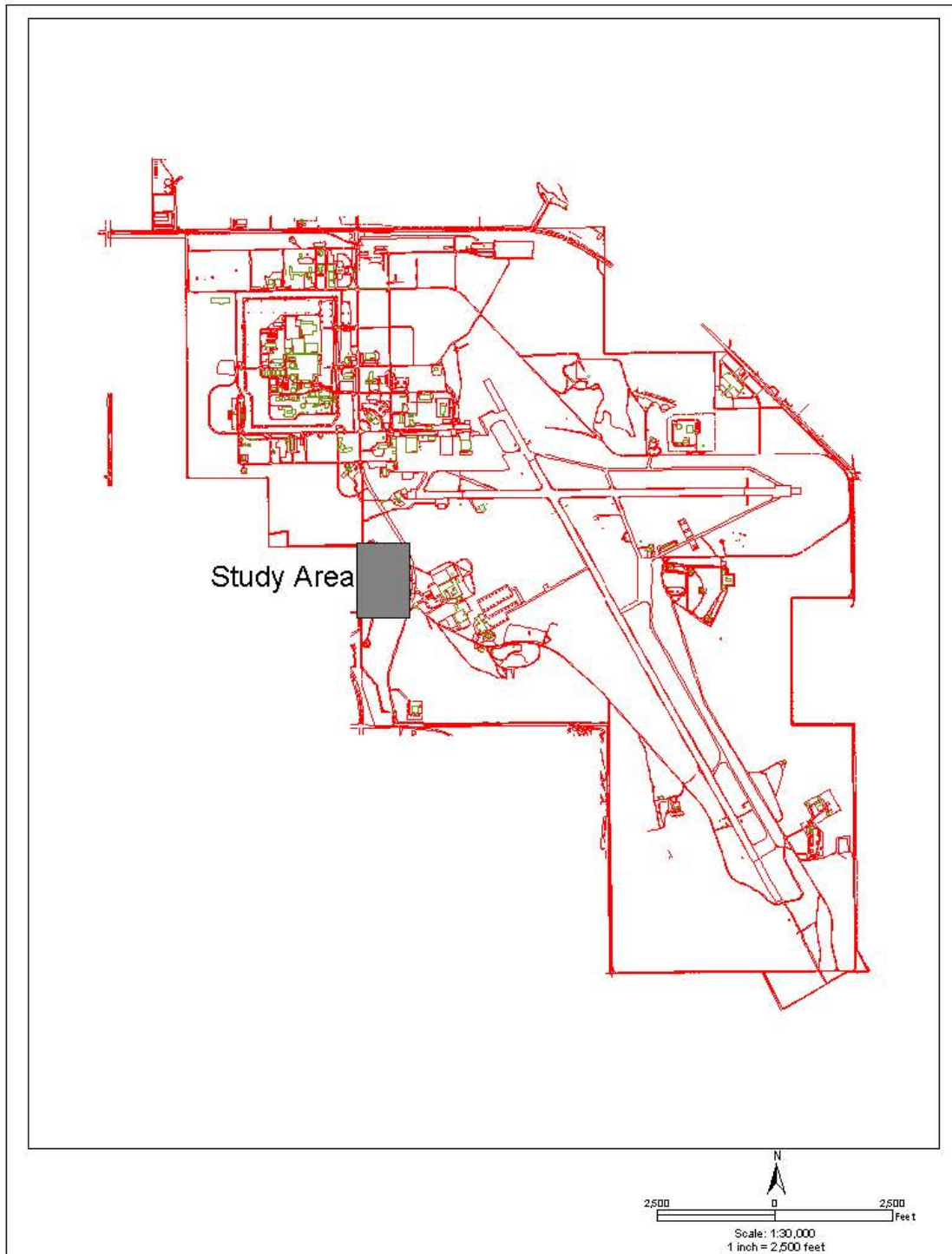


Figure 1.1 Location Map

1.2 LOCATION AND DESCRIPTION OF BUCKLEY AIR FORCE BASE

Buckley AFB is located on the northeast side of the city of Aurora in Arapahoe County, Colorado. The Proposed Action includes four acres within the 3,250-acre base. Figure 1.1 shows the study area within the larger base boundaries.

The 460th Air Base Wing (ABW) is the current host for Buckley AFB. The mission of the 460 ABW is to operate Buckley AFB and provide superior air and space support and services to the worldwide operational missions, and the Front Range Area Defense Community, their families, and the retiree community. The 460 ABW includes a total of 1,030 personnel.

Buckley AFB also supports many civilian and Department of Defense (DoD) tenants, including: 2nd Space Warning Squadron, Air Force Office of Special Investigations, Aerospace Data Facility, United States Property and Fiscal Office for Army and Air Force, Army Industrial Hygiene Midwest, 743rd Army Military Intelligence Battalion, Air National Guard (140th Wing), Army National Guard [2nd/35th Aviation Battalion, First Battalion, 89th Troop Command, 101st Army Band Detachment 1, 128th Military Public Affairs HQ, STARC (Detachment 5 Medical Support, 8th Civil Support Team), and Army Aviation Support], Navy/Marines (Navy/Marine Training Center, A-Battery, 5th Battalion, 14th Marines, Marine Air Control Squadron), and Civil Air Patrol.

1.3 SCOPE OF THE ENVIRONMENTAL REVIEW

The study area for this EA is a four-acre site within the boundaries of Buckley AFB. The region of influence for this project is limited to Buckley AFB and primarily to the four-acre site, although some additional area could be impacted by vehicle fueling approximately one mile from the study site. Impacts to water and air resources could potentially expand beyond the base boundaries.

1.4 ORGANIZATION OF THE EA

This EA is divided into seven sections. Section 1 of the EA describes the purpose and need for the proposed action. Section 2 of the EA describes the proposed action and no

action alternatives. Section 3 describes the affected environment and scope of environmental review. Section 4 presents the environmental consequences of the proposed action and no action alternative. Section 5 presents the list of preparers, and Section 6 presents a list of agencies, organizations, and persons to whom the EA was sent. Section 7 provides references.

1.5 APPLICABLE REGULATORY REQUIREMENTS

No environmental permitting is necessary for construction and use of the Golf Driving Range.

Solid waste from construction and operation must be managed in accordance with the Buckley AFB Facilities Excellence Plan (dumpsters), Executive Orders 13101 (recycling) and 13148 (landscape mulching), and Affirmative Procurement Plan (purchasing recycled materials, including fly ash).

SECTION 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section briefly describes the proposed golf driving range construction project at Buckley AFB. Only two alternatives are analyzed in this document: (1) the proposed action (constructing a driving range south-southwest of Building 1011) and (2) no action. Alternatives considered but eliminated from further analysis are described in Section 2.2.1.

2.1 PROPOSED ACTION

460 SVD/CC proposes to construct a golf driving range at Buckley AFB. As shown in Figure 2.1, the proposed location is an approximately four-acre triangular plot of land south of Buildings 1011 and 1012 and generally bounded by Aspen Way on the east and the installation boundary on the west. The range extends south 300 yards. The area is sparsely vegetated and dominated by noxious weeds. Bare dirt is present throughout the area. Some prairie dog mounds are present in the location, but the population is sparse in comparison to other locations on the base.

2.1.1 Construction and Site Preparation

Estimated ground disturbance resulting from construction and utility connections is expected to be no more than 11,000 square feet. The construction site is easily accessible from paved roads. Site preparation activities would be minimal because:

- The proposed site is located near an asphalt roadway that provides good access for construction equipment.
- The proposed tee-box area is already mostly paved and level. The ground would be prepared to avoid buildup of frozen or standing water areas around tees and walk areas to ensure user safety.
- Both water and electricity are available close to the site.

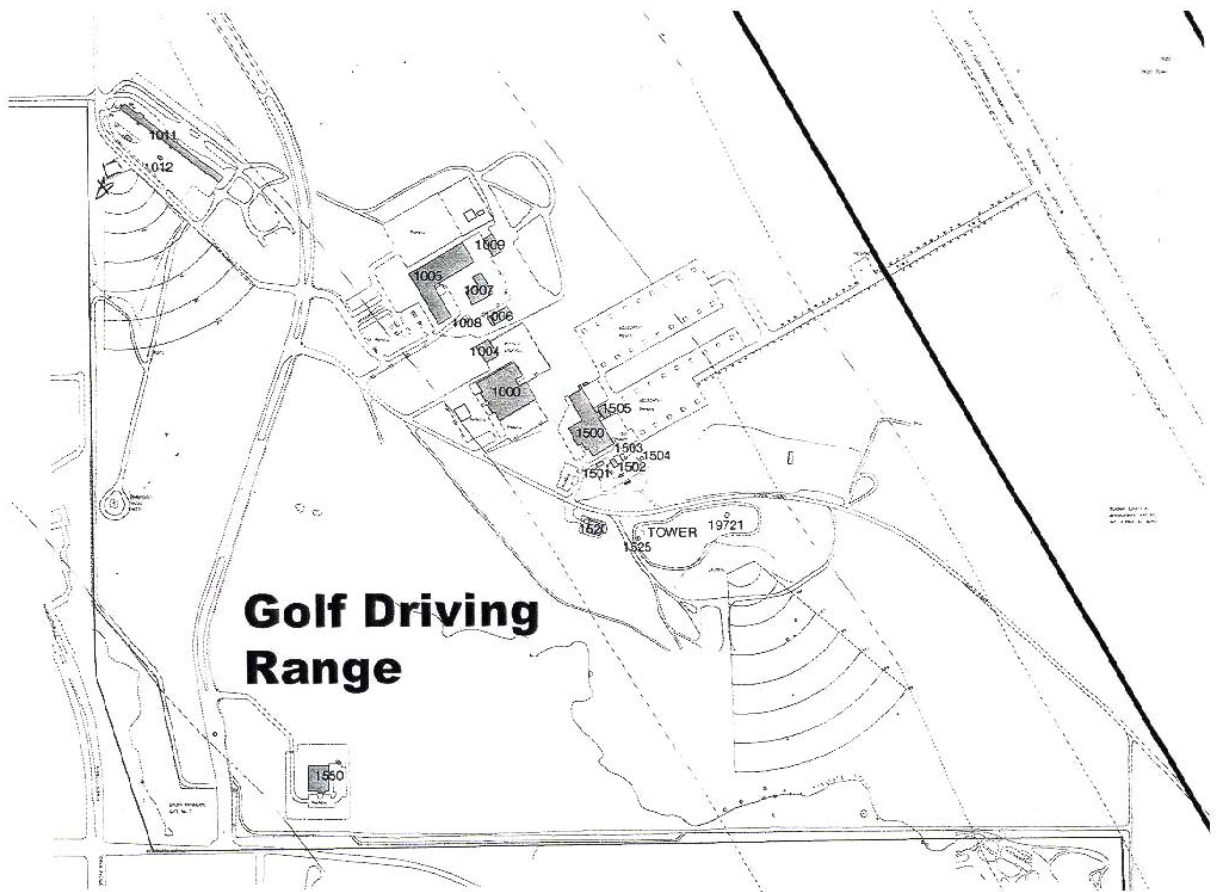


Figure 2.1 Site Location

Safety netting would be constructed on the east and west sides of the driving range. The netting on the east side would be 30 feet tall and anchored by fourteen, 40-inch circumference posts located every 65 feet, in accordance with industry standards for safety. The netting on the west side, which would generally follow the installation boundary fence, would be installed primarily to protect wetlands; it would be 20 feet tall and anchored by fourteen, 12-inch circumference posts located every 65 feet. The netting on the east side will protect traffic on the street from flying balls, and the netting on the west side will help keep balls within the driving range area. A low screen would be placed at the south end of the range to prevent balls from rolling into tall grass and shrubs near Toll Gate Creek.

Few improvements are expected to the turf. Overplanting of new, native grass is recommended for stabilization of the soils, increased erosion protection, and reduction of noxious weeds. Once established, no irrigation would be required for the new grass.

Construction of the driving range would take approximately four months. Winter weather could delay construction but is not a major concern because ground disturbance is minimal, and asphalt and cement contractors work year-round in the Colorado climate. Civil engineering is expected to complete this project with in-house engineering staff. Construction materials, such as cement, poles, and netting, are readily available from local suppliers. Specialized golf equipment would be purchased from civilian suppliers; some equipment is already on-hand.

2.1.2 Design and Operation

The golf driving range would be constructed to industry standards with associated equipment, netting, and fencing. The range would consist of a concrete pad with eight tee areas or boxes. Each tee box would be fitted with a "Turfmaster Air II Mat " and separated on each side by a prefabricated, polyethylene "Pro Tee Divider." Equipment specifications are presented in Appendix A. The tee boxes would be a minimum of five feet apart. A four-foot wide cement walkway would be constructed to connect the tees from the backside.

A three-sided storage shed that would shelter the ball dispensing and washing equipment is the only structure required for the driving range. The building foundation would be a concrete or asphalt pad no greater than a 12-foot square.

Access to the facility would be provided via Aspen Way, a main thoroughfare through the base. Parking demand for the driving range is estimated to be a maximum of ten spaces and would be at the Building 1011 parking lot, which has sufficient capacity. Building 1011 is scheduled to be demolished within next few years; an exact date is unknown. Parking for the driving range could be accommodated by new construction.

The driving range would be unmanned and operational during daylight hours. No artificial lighting would be provided.

Usage estimates for the driving range are four, 40-ball buckets per tee per day. Balls would be collected no more than once every 24-hour period and no less than once per week, depending on usage. The driving range would be operational year round, although it is estimated that there would be less use during the winter, and therefore less frequent ball collection from November through March. Peak usage is estimated to be from April through October. Balls would be collected with a Kawasaki Mule utility vehicle. The vehicle has a five-gallon gas tank and operates with regular unleaded fuel; it would be fueled from a nearby (about one mile away) fueling station. The vehicle would either push or pull a five-gang/five-section Ball Hawk ball pickup device. The vehicle would be stored at Building 1011 in the short-term and long-term at a new outdoor recreation facility estimated to be completed in 2005 or later.

The grass would be mowed to a height of three inches; mowing would be required when grass reaches more than six inches in height (approximately every week during April through November). Mowing would not be required during the winter (i.e., from December through May).

Electricity, water, and sanitary sewer would be required to operate the ball dispensing and washing machines, and the ball washing machine also requires water. These uses are minimal. Irrigation and lighting are not planned for the facility, and operation of the facility is not expected to increase daily utility demands on base.

2.2 DESCRIPTION OF ALTERNATIVES TO THE PROPOSED ACTION

2.2.1 Alternatives Considered but Eliminated from Further Study

Alternatives considered but dismissed from further study included (1) contracting with a local golf course to provide subsidized golf for military personnel and (2) alternative locations for the proposed range on Buckley AFB.

2.2.1.1 Contracting with Off-base Golf Course

There are private golf driving ranges near Buckley AFB, but the fees for these private ranges are higher than the proposed new facility charges. Rather than construct a golf course, 460 SVD/SV considered contracting with a private course to provide discounted rates for military personnel. However, there are no legal mechanisms available to do this type of contract, and under this type of arrangement, Buckley AFB would lose an opportunity to pay for an amenity on base (as the driving range is expected to fund itself and other recreation projects). Therefore, this alternative was dismissed from further consideration.

2.2.1.2 Alternative Locations

Three locations were initially considered for a golf driving range. Two of the three locations are shown on Figure 2.1, Location A is the preferred location for the driving range. Locations B and C were screened out from further consideration (and environmental analysis) because they were determined to be less feasible than the preferred location.

Location B, shown on Figure 2.1 south of the preferred Location A, was screened out from further consideration because it is collocated with an IRP site and has no nearby utilities and no plans to locate utilities to this area. The cost of running water and electricity to the area was substantially higher than the preferred Location A. Therefore, this location was dropped from further review.

Location C, not shown on Figure 2.1 but located northwest of Location B near the end of the runway, was screened out from further consideration because it presented potential conflicts with other land uses identified in the General Plan (which is to be finalized in August 2002). Because of its proximity to the runway, the most important land use conflict with this location is the potential safety concerns for both aircraft and golfers. However, other land use conflicts regarding future development of the base were also identified as concerns with this location.

2.2.1.3 No Action Alternative

Under the no action alternative, no golf driving range would be constructed, and this amenity would not be available to military and civilian personnel working on base at Buckley AFB.

SECTION 3

AFFECTED ENVIRONMENT

Buckley AFB is located on a 3,250-acre parcel within the city of Aurora in Arapahoe County, Colorado. Aurora is the second largest city in the Denver metropolitan area and is approximately five miles east of Denver (Colorado Air National Guard [COANG], 1997). 460 ABW became the host organization at Buckley AFB in October 2001.

In October 2000, the Air Force began providing infrastructure and quality of life services to Buckley AFB and more than 40 tenants. 460 ABW is responsible to provide multiple services to active-duty personnel at Buckley AFB and ultimately the entire Denver metropolitan military community including guard members, reservists, and retirees (USAF, 2001c).

This EA describes the potential environmental impacts of the activities associated with constructing and operating a golf driving range at Buckley AFB. The EA also addresses the environmental impacts of the No Action Alternative. The region of influence for this study is Buckley AFB. No offsite impacts would be anticipated, and no permits are required for construction or operation.

Construction and operation of the golf driving range involves potential disturbance to approximately four-acres of land at Buckley AFB. Resources that may be impacted and are analyzed in more detail in this EA are:

- Air Quality
- Geology
- Hazardous Materials/Hazardous Waste
- Biotic Resources
- Utilities
- Water

Resources not expected to be impacted by the proposed action and, therefore, not analyzed in this EA are described below.

Cultural Resources. The base has been broadly surveyed for cultural resources, and no cultural resources are known or expected in the project area. The only subsurface ground disturbance required by this project is at the tee boxes, which are to be located in an area of previous disturbance where discovery of intact archaeological resources would be extremely unlikely.

Socioeconomics and Environmental Justice. The driving range is to be used and maintained by on-site personnel. No changes to employment or payroll would result from this action. Of the ten surrounding zip-code areas, one zip code (80239) had a disproportionately high minority population. No adverse effects are expected for any population, including minority and/or low-income populations, as a result of the Preferred Alternative.

Land Use and Aesthetics. The driving range is to be located in an area that does not conflict with other uses. The driving range would have very little impact on the visual character of the area because the tee boxes, storage shed, and ball dispenser are low profile. The netting will be visible but not obtrusive and consistent with other fenced areas on base.

Noise. The construction or operation of the facility would generate no significant noise. The proposed driving range is not located near sensitive human populations. Noise levels at the proposed driving range would be generally lower than other areas of the base and would not be expected to affect wildlife.

Transportation. The proposed site is located near an existing roadway and parking lot. The roadway is paved and has capacity to handle additional traffic to the driving range. The parking lot also has plenty of capacity to support the driving range, and no transportation impacts are expected from this action.

3.1 AIR QUALITY

The Clean Air Act (CAA) of 1970 directed the United States Environmental Protection Agency (USEPA) to develop, implement, and enforce environmental regulations to ensure cleaner air. To do so, the USEPA developed concentration-based standards called National Ambient Air Quality Standards (NAAQS). Air quality is measured by the concentration of various pollutants in the atmosphere, typically expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The types and quantities of atmospheric pollutants in relation to such other factors such as surface topography, the size of the air basin, and prevailing meteorological conditions determine air quality.

The State of Colorado has adopted each of the federal NAAQS as the Colorado standards except for SO_2 as listed in Table 3.1. For SO_2 , Colorado has adopted more stringent standards for each of the averaging times (COANG, 2000a). Colorado standards are codified in the state implementation plan (SIP) that provides for implementation, maintenance, and enforcement of the NAAQS.

Buckley AFB is under the jurisdiction of the Colorado Department of Public Health and Environment (CDPHE), which is tasked with enforcing the CAA Title V Air Operating Permit (Permit No. 950PAR118, August 1997). The current permit expires 28 August 2002 and the installation has submitted a Title V renewal application per CDPHE regulations. The Denver metropolitan area, which includes most of Arapahoe County and Buckley AFB, is presently designated by the EPA as an attainment area for air pollutants of primary concern (EPA Press Release, August 9, 2002).

Table 3.1 National and State Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	Primary NAAQS ^{a,b,c}	Secondary NAAQS ^{a,b,d}	Colorado Standards ^{a,b}
Carbon Monoxide	8-hour	9 ppm (10 mg/m ³)	No standard	9 ppm (10 mg/m ³)
	1-hour	35 ppm (40 mg/m ³)	No standard	35 ppm (40 mg/m ³)
Nitrogen Dioxide	Annual	0.0543 ppm (100 µg/m ³)	0.0543 ppm (100 µg/m ³)	0.0543 ppm (100 µg/m ³)
Ozone	1 hour ^e	0.12 ppm (235 µg/m ³)	0.12 ppm (235 µg/m ³)	0.12 ppm (235 µg/m ³)
Lead (Pb)	Quarterly	1.5 µg/m ³	1.5 µg/m ³	
PM ₁₀	Annual	50 µg/m ³	50 µg/m ³	50 µg/m ³
	24-hour	150 µg/m ³	150 µg/m ³	150 µg/m ³
Sulfur Oxides (measured as SO ₂)	Annual	0.03 ppm (80 µg/m ³)	No standard	15 µg/m ³
	24-hour	0.14 ppm (365 µg/m ³)	No standard	100 µg/m ³
	3-hour	No standard	0.50 ppm (1,300 µg/m ³)	700 µg/m ³

PM₁₀ Particles with aerodynamic diameters less than or equal to a nominal 10 micrometers

^a The 8-hour primary and secondary ambient air quality standards are met at a monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.08ppm.

^b The NAAQS and Colorado standards are based on standard temperature and pressure of 25 degrees Celsius and 760 millimeters of mercury.

^c National Primary Standards: The levels of air quality necessary to protect the public health with an adequate margin of safety. Each state must attain the primary standards no later than three years after the state implementation plan is approved by the USEPA.

^d National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by the USEPA.

3.1.1 Meteorology

Buckley AFB and the surrounding area experience a semiarid climate characteristic of the high plains. Climatic conditions are typified by low humidity, abundant sunshine, low precipitation, and wide diurnal temperature fluctuations. The average annual temperature is 50.1 degrees Fahrenheit (°F). July is the hottest month with an average maximum temperature of 88.8 °F, and January is the coolest month with an average minimum temperature of 15.5 °F. The highest precipitation months throughout the year occur in spring and summer, and average annual precipitation is 16.3 inches, with approximately 53 inches of snowfall per year. The prevailing winds within the local area are predominantly from the south, averaging 8.6 miles per hour (COANG, 1999).

3.1.2 Regional Air Quality

The fundamental method by which USEPA tracks air quality compliance is the designation of a particular region as “attainment” or “non-attainment” with established NAAQS. The Denver metropolitan area, which includes most of Arapahoe County and Buckley AFB, is presently designated by the EPA as an attainment area for all criteria pollutants of primary concern (EPA Press Release, August 9, 2002).

3.1.3 Baseline Air Emissions

Buckley AFB and the off-base sites are in the Denver Metropolitan Intrastate Air Quality Control Region (AQCR) 36. The 2000 Air Emissions Inventory summary for Buckley AFB is presented in Table 3.2. The inventory data include mobile and stationary sources. An air emissions inventory is an estimate of total mass emission of pollutants generated from a source or sources over a period of time. The quantity of air pollutants is generally measured in tons per year from both mobile and stationary sources.

Table 3.2 Buckley AFB Stationary Air Emissions Inventory

Pollutant Emission Sources	CO (tpy)	VOC (tpy)	SO_x (tpy)	NO_x (tpy)	PM₁₀ (tpy)
1998 AQCR 36 Emission Inventory ¹	4,761	13,727	34,732	37,079	3,211
Buckley AFB Mobile Emissions ²	394	218	5.94	105	3.55
Buckley AFB Stationary Emissions ²	31.91	8.99	14.85	101.49	70.59
Conformity Rule De Minimis Threshold	100	NA	NA	NA	100

1 Source: COANG, 1999

2 Source: Booz-Allen & Hamilton, 2000

The stationary sources of regulated emissions at Buckley AFB include 58 natural gas fired boilers, 6 gasoline fired boilers, 33 dual fired boilers that primarily use natural gas but have diesel back-up, 46 diesel generators, 4 to 6 gasoline-fired arresting barrier engines, 32 regulated aboveground storage tanks (ASTs), 2 degreasing stations, and 1 abrasive paint removal station. Abrasive paint removal is performed in the Corrosion Control Hangar (Building 800) using hand-held sanders.

Mobile sources at Buckley AFB include on- and off-road vehicles and equipment, aerospace ground equipment, and aircraft operations (COANG, 2000a). Mobile sources are not considered under the CAA Title V operating permit or the Colorado operating permit program, but are significant components of total base emissions.

The Title V Air Operation Permit places base wide emission limits on all criteria pollutants, but does not impose operational restrictions. Buckley AFB's permit limits emissions to below major Prevention of Significant Deterioration (PSD) source thresholds effective for PM₁₀ attainment areas (BAH, 2000). The Permit Engineering Review established base 1996 actual emissions levels for SO_x and NO_x of 142 and 23 tpy, respectively. According to the 1997 Permit Technical Review, a major modification of source emissions resulting in a net increase of at least 40 tpy SO_x or NO_x above the base levels would subject Buckley AFB to Lowest Achievable Emission Rates (LAER), and

require emission offsets. Emissions of SO_x and NO_x for CY 2000 were less than the base levels; therefore no PSD issues are identified for CY 2000 (BAH, 2000).

Buckley AFB has developed its own operational restrictions as an internal strategy for compliance. The 2000 inventory shows Buckley AFB to be well below permit limits for all pollutants (COANG, 2000).

3.1.4 Radon Gas

Radon is an odorless and tasteless radioactive gas, which is released by the breakdown of uranium-bearing rocks. Radon is a naturally occurring gas in Colorado soils. The USAF requires that the air in buildings be tested for radon per 40 CFR Part 195, if personnel occupy the structure for more than 8 hours per day. Buckley AFB currently screens for radon in accordance with Air Force policy for structures occupied on a full time basis. Radon sampling was conducted between 1993 and 1997 at four buildings on base. The results range from 0.2 to 6.9 pCi/L (COANG, 2000a). All of the sampling results, except one, were below the USEPA standard of 4.0 pCi/L of air (the level at which USEPA recommends consideration of radon mitigation measures). Building 600 was the exception with radon levels of 6.9 pCi/L.

No buildings are currently located at the proposed golf driving range site, therefore no radon data are available for the potential golf driving range. Measurement against the mitigation standard is not meaningful, except inside structures where radon gas can accumulate.

3.2 GEOLOGY

Buckley AFB is located within the Denver Basin, a 60,000 square mile sedimentary rock depression east of the Front Range of the Rocky Mountains in east-central Colorado (Chronic 1980, INRMP 2002). The Denver Basin consists of several sedimentary formations containing shales, sandstones, and arkosic rocks up to approximately 300 million years old (Chronic 1980). These rocks are covered with a veneer of Holocene loess, eolian sand and colluvium, and Pleistocene alluviums consisting of unconsolidated materials including alluvial gravels, sands, and clays up to 3 million years old (Chase and McConaghy 1972).

The majority of the installation is developed on deep silt loam soils of the Fondis-Weld association. Soils at the site consist of loamy associations resulting from eolian deposited material, and soils of floodplains and terraces. Soil type locations are shown in Figure 3.1.

Soils at the proposed driving range site vary from silty loams to loams and clay loams. Although consolidated sediments do outcrop on the installation northwest of the proposed golf driving range, no surficial bedrock has been located at the site (INRMP 2002). Field observations also located sand, gravel, and cobble components exposed on the site surface. The coarse nature of surface materials suggests that portions of the proposed driving range site, particularly the tee box area, are well drained.

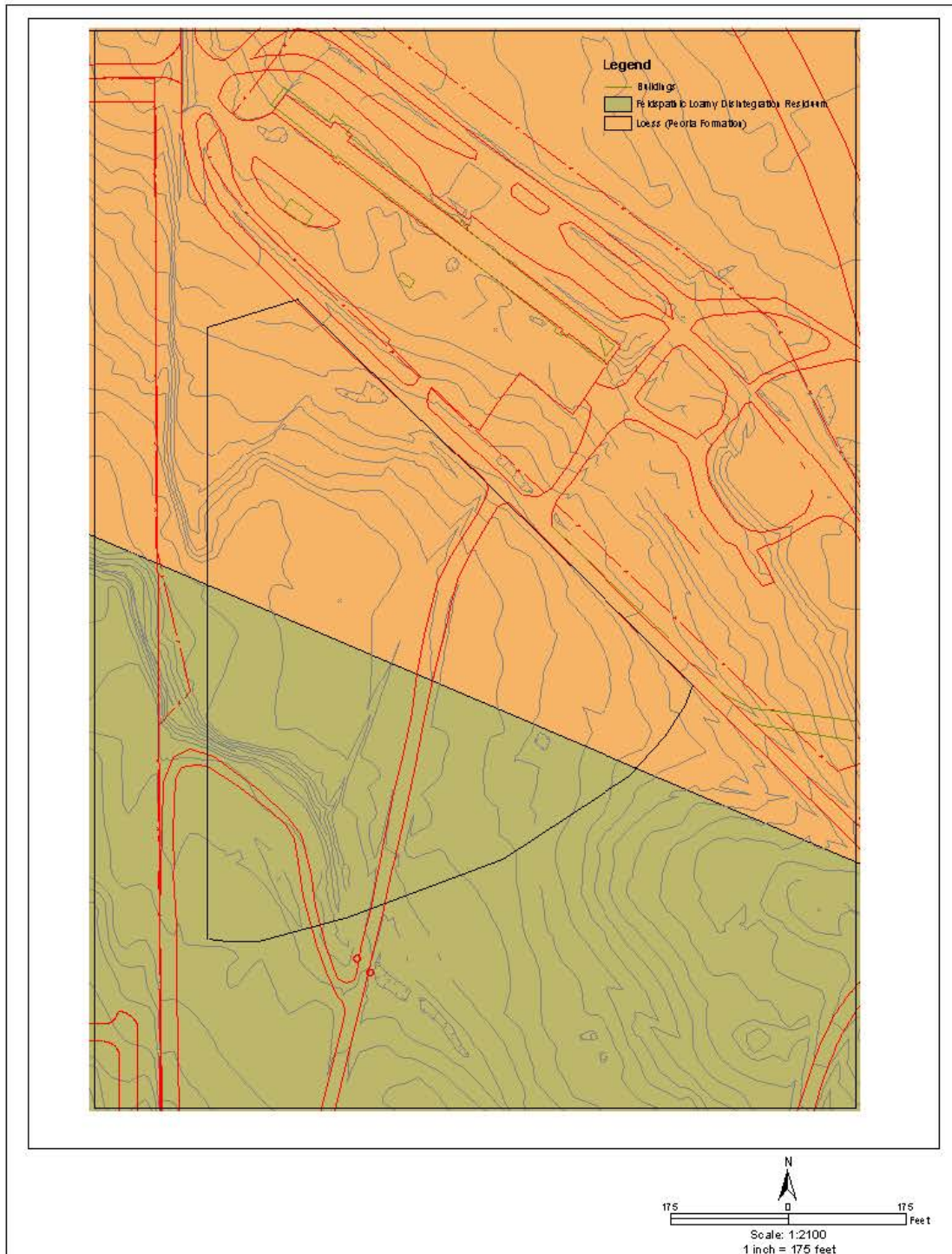


Figure 3.1 Soils at the Proposed Driving Range Site

3.3 HAZARDOUS MATERIALS/HAZARDOUS WASTE

Construction and operation of the golf driving range will not require significant amounts of hazardous materials. An existing asphalt pad scheduled for demolition does not contain asbestos, lead-based paint, or other hazardous materials.

The proposed golf driving range location has been surveyed for hazardous waste sites and is known to contain a former waste oil disposal pit and former landfill. The pit is located on the south side of Aspen Way approximately 600 feet from the tee box area [Science Applications International Corporation (SAIC 1992)]. The oil pit consists of a closed pit and a 100 ft² filled concrete lined pit. This site is presently scheduled for remedial investigation in 2004; however, known contamination is located in the subsurface and will not impact the driving range. Likewise, a former base landfill undergoing groundwater monitoring in the vicinity of the driving range will not impact driving range activities conducted on the ground surface.

The only hazardous materials used during the construction of the golf driving range would be paints and fuels to operate vehicles and equipment. The only hazardous materials used during the operation of the golf driving range would be those used to run and maintain the five-gallon tank Kawasaki mule (used to collect golf balls). Fuel use is minimal for both construction and operation.

3.4 BIOTIC RESOURCES

3.4.1 Vegetation

Vegetation at the site consists of low growing weedy forbs, native and introduced grasses, and a stand of maturing plains cottonwood trees (*Populus deltoides* var. *monilifera*). The plains cottonwood stand is located in the southwest corner of the site in the narrow, incised channel of East Tollgate Creek (Figure 3.2). Figure 3.3 shows the general plant community types at the site, Figure 3.4 shows representative photographs of the site vegetation, and Table 3.3 lists species identified at the site.

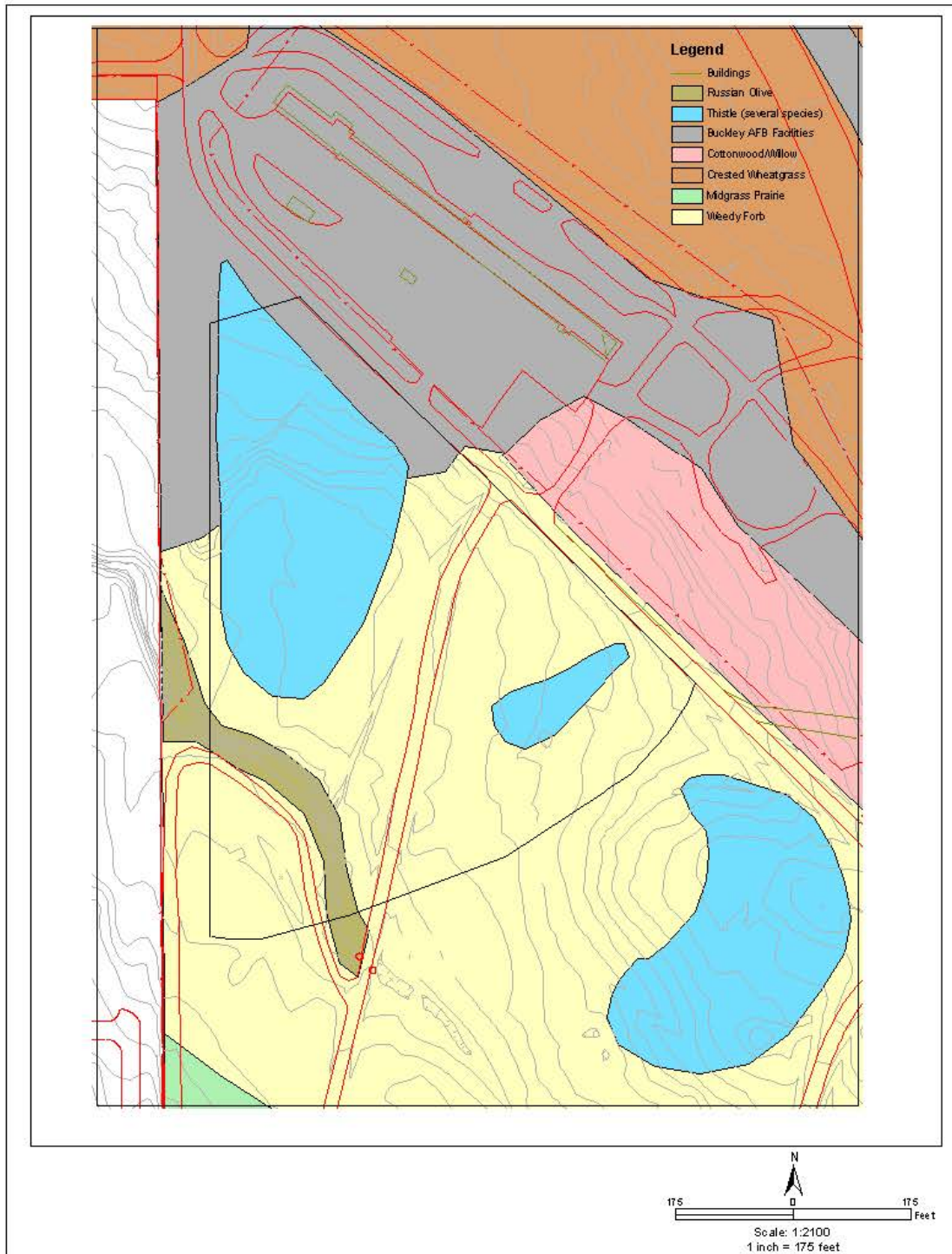


Figure 3.2 Plant Communities at the Proposed Driving Range Site



Figure 3.3 Photographs of Site Vegetation



Figure 3.4 Site with Cottonwood Stand in Background

The proposed driving range site occupies the northern half of the largest “weed forb” area at Buckley AFB (Buckley AFB 2002) and the fourth largest of over 30 stands of thistles identified on the installation (Buckley AFB 2002). More than 80 percent of the site plant cover consists of ruderal, weedy species including sweet yellow clover (*Melilotus officinale*), Bindweed (*Convolvulus arvensis*), lamb’s quarters (*Chenopodium album*), curly dock (*Rumex crispus*), hound’s tongue (*Cynoglossum officinale*), and tumble knapweed (*Acosta diffusa*). Also found at the site are blue grama (*Chondrosum gracile*), purple three awn (*Aristidia purpurea*), prickly pear (*Opuntia macrorhiza*), crested wheat grass (*Agropyron cristatum*), and common mullein (*Verbascum thapsus*). Woody and more mesic species found within the incised stream channel of East Tollgate Creek include plains cottonwood, Russian olive (*Elaeagnus angustifolia*), Virginia

creeper (*Parthenocissus quinquefolia*), wild rose (*Rosa woodsii*), showy milkweed (*Asclepias speciosa*), coyote and peach leaf willow (*Salix exigua*, *S. amygdaloides*), tall wheat grass (*Thinopyrum ponticum*), common plantain (*Plantago major*), and goldenrod (*Solidago*, ssp.). Two of these species, the plains cottonwood and coyote willow, are classified as a plant community of special concern when they occur as co-dominants (Colorado Natural Heritage Program (CNHP) 1999). A small stand of this community does exist along approximately 500 feet of East Tollgate Creek on the southwestern portion of the site (Figure 3.2 [labeled as Russian Olive]). This stand consists of approximately 24 maturing plains cottonwood trees up to 15 inches diameter, and an understory of coyote willow, including a dense 200 foot continuous stand on the southeast end of the stream channel. The community is not unique at Buckley AFB nor this portion of the Sand Creek drainage, but it is confined to stream channels and floodplains and thus not abundant. The stand is the western terminus of a mosaic of Plains Cottonwood Riparian Woodland extending downstream from Buckley AFB. Plains Cottonwood Riparian Woodland is discussed in Section 3.3.3.2 Species of Special Concern.

Of the species noted in Table 3.3, Plant Species Occurring At Proposed Golf Driving Range, the following are listed among the top ten most noxious weeds in Colorado (State of Colorado 2001):

- Bindweed (*Convolvulus arvensis*)
- Canada Thistle (*Breea arvensis*)
- Diffuse knapweed (*Acosta diffusa*)
- Hounds tongue (*Cynoglossum officinale*)
- Musk thistle (*Cardus nutans*)

The site also contains several native short/mid grass prairie species, including the native prairie grasses blue grama and purple three awn. A small stand of purple three

awn is located on the eastern boundary of the site adjacent to Aspen Way, and a scattered admixture of blue grama was found at the site.

No mix of species that would qualify the stream channel as wetland was found on the site. A five-row shelter break of alternating cedar and fruit trees exists on the southwest edge of the site and extends south from the site.

Table 3.3. Plant Species Occurring At Proposed Golf Driving Range*

Scientific Name	Common Name
<i>Acosta diffusa</i>	Tumble (diffuse) knapweed
<i>Agropyrum cristatum</i>	Crested wheatgrass
<i>Ambrosia psilostachya coronopifolia</i>	Western ragweed
<i>Anisantha tectorum</i>	Cheat grass
<i>Apocynum cannabinum</i>	Indian hemp
<i>Aristida purpurea</i>	Purple three awn
<i>Bassia sieversiana</i>	Kochia
<i>Brexa arvensis</i>	Canada thistle
<i>Bromopsis inermis</i>	Smooth brome
<i>Bromus japonicus</i>	Brome
<i>Cirsium vulgare</i>	Bull thistle
<i>Cardus nutans macrolepis</i>	Bristle thistle
<i>Chenopodium album</i>	Lamb's quarter
<i>Chondrosium gracile</i>	Blue grama
<i>Convolvulus arvensis</i>	Bindweed
<i>Cynoglossum officinale</i>	Hound's tongue
<i>Elaeagnus angustifolia</i>	Russian olive
<i>Lygodesmia juncea</i>	Skeleton Plant
<i>Opuntia mercerize</i>	Prickly pear
<i>Pathenocissus quinquefolia</i>	Virginia creeper
<i>Plantago major</i>	Common plantain
<i>Populus deltoides monilifera</i>	Plains cottonwood
<i>Rosa woodsii</i>	Wild rose
<i>Salix amygdaloides</i>	Peachleaf willow
<i>Salix exigua</i>	Coyote willow
<i>Solidago ssp.</i>	A Goldenrod
<i>Stipa comata</i>	Needle and Thread
<i>Thinopyrum ponticum</i>	Tall wheatgrass
<i>Tragopogon dubius major</i>	Salsify
<i>Verbascum thapsus</i>	Common mullein

*Nomenclature follows Weber and Wittmann, 2001. Common names follow Guennel 1995, Weber and Wittmann, 2001, and Wingate 1994.

3.4.2 Wildlife

Wildlife at the site is typical of the Denver east-side suburban/rural boundary. The wildlife community at the site is dominated by prairie rodents but also includes a bird community consisting of species that tolerate moderate levels of human activity. The dominant vertebrate at the site is the black-tailed prairie dog (*Cynomys ludovicianus*), a burrow-dwelling squirrel family rodent that occupies a significant portion of the undeveloped land at Buckley AFB (Buckley AFB 2002). The black-tailed prairie dog is discussed separately in Section 3.4.3 Threatened and Endangered Species, and Species of Special Concern.

Ground squirrel burrows, desert cottontail (*Sylvilagus nutallii*), magpies (*Pica pica*), cooper's hawk, robin (*Turdus migratorius*), morning dove, western meadowlark, western kingbird, brewer's blackbird, Bullock's oriole and killdeer were observed at the site during July 2002. Other species likely present include vertebrates typically associated with prairie dog colonies such as the badger (*Taxidea taxus*), prairie rattlesnake (*Crotalus viridis*), and bull snake (*Pituophis catenifer*). The burrowing owl (*Athene cunicularia*), although present in other portions of the installation, was not observed at the site. Several species typically associated with prairie dog colonies were not observed at the site, nor would they be expected to be present at the site due to the low population density of this ward in comparison to many other locations on and adjacent to Buckley AFB. These include the ferruginous hawk (*Buteo regalis*) (typically a winter visitor in this locale), golden eagle (*Aquila chrysaetos*), and red-tailed hawk (*Buteo Jamaicans*). The black-footed ferret (*Mustela nigripes*) would not be expected to exist on the installation because this prairie dog obligate is extinct in the wild in Colorado. Vertebrates common to all portions of the installation also exist at the site including magpies (*Pica pica*), robins (*Turdus migratorius*), and starlings (*Sturnus vulgaris*). Some mammalian predators commonly associated with prairie dog towns, such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and bobcat (*Lynx rufus*), are infrequent visitors at the installation due to the chain-link boundary fence (Buckley AFB 2002, Hatch 2002). Similarly, large herbivores such as the pronghorn (*Antilocapra americana*), white-tailed deer

(*Odocoileus virginianus*), and mule deer (*Odocoileus hemionus*) are excluded from the installation (Buckley AFB 2002).

3.4.3 Threatened and Endangered Species, and Species of Special Concern

3.4.3.1 Threatened and Endangered Species

Threatened and endangered species (E/T Species) are rare organisms protected by the Endangered Species Act (ESA), a Federal law established in 1973 to protect and restore critically rare animals and plants. Under the ESA and Integrated Natural Resources Management (AFI-32-7064), Buckley AFB must not engage in activities that might jeopardize the continued existence of either E/T Species or species which are being considered for E/T Species status (known as candidate species) (Littell 1992).

The bald eagle and the black-tailed prairie dog are the only species either currently protected or, in the case of the black-tailed prairie dog, being considered for protection under the ESA, that are known to exist at Buckley AFB (Buckley AFB 2002). The bald eagle is a winter resident at several locations in the Denver area and has also nested at Barr Lake in Adams County. Wintering bald eagles use prairie dog towns as one of their sources of prey, and it is likely that bald eagle visits to Buckley AFB are prairie dog hunts. The burrowing owl is a state threatened species that occurs on Buckley AFB; however, no burrowing owls inhabit the project site.

The black-tailed prairie dog is currently a candidate Federally Threatened species but has not been proposed for listing as a Threatened species because other species have a higher priority (U.S. Fish and Wildlife Service (USFWS) 1999). However AFI 32-7064 states that candidate species on Air Force installations should be managed so that their existence is not jeopardized. Buckley AFB drafted a prairie dog management plan in 2002 for inclusion in the INRMP.

The black-tailed prairie dog was once extremely common across the Great Plains. It has been estimated that one-fifth of the central U.S. prairies were used as prairie dog habitat (USFWS 1999). Marsh (1984) has estimated that although 100 million acres

were black-tailed prairie dog habitat at the turn of the century, that number today is only 900,000 acres or less than 1% of the former habitat area. This decrease in habitat coupled with prairie dogs susceptibility to sylvatic plague and other factors resulted in a USFWS determination that the black-tailed prairie dog may be threatened with extinction.

The black-tailed prairie dog is a permanent resident of Buckley AFB and exists on the installation in sufficient numbers to warrant special management. The current estimated black-tailed prairie dog population at Buckley AFB is 12,620 (Buckley AFB 2002). Black-tailed prairie dogs are distributed throughout the installation, with high-density wards located in the northwest/west, southern, and central portions of Buckley AFB (INRMP 2002). High and medium density prairie dog wards bound the proposed golf driving range site on the north, east, south, and northwest (Figure 3.5). The central portion of the site contains an unmapped low-density black-tailed prairie dog coterie. The southern/southeastern edge of the site is occupied by medium- and high-density wards. A field survey conducted in July 2002 located an estimated 143 burrow openings and a minimum population of 19 black-tailed prairie dogs on the proposed golf driving range site. Approximately 16% of the burrow openings in the low-density portion of the ward were abandoned. Prairie dog habitat at the site consists of very disturbed ground and is weedier than typical. These factors limit the prairie dog population. The lack of robust, multi-year-sized burrow mounds suggests that this ward is relatively new and likely the result of immigration from older wards surrounding the site.

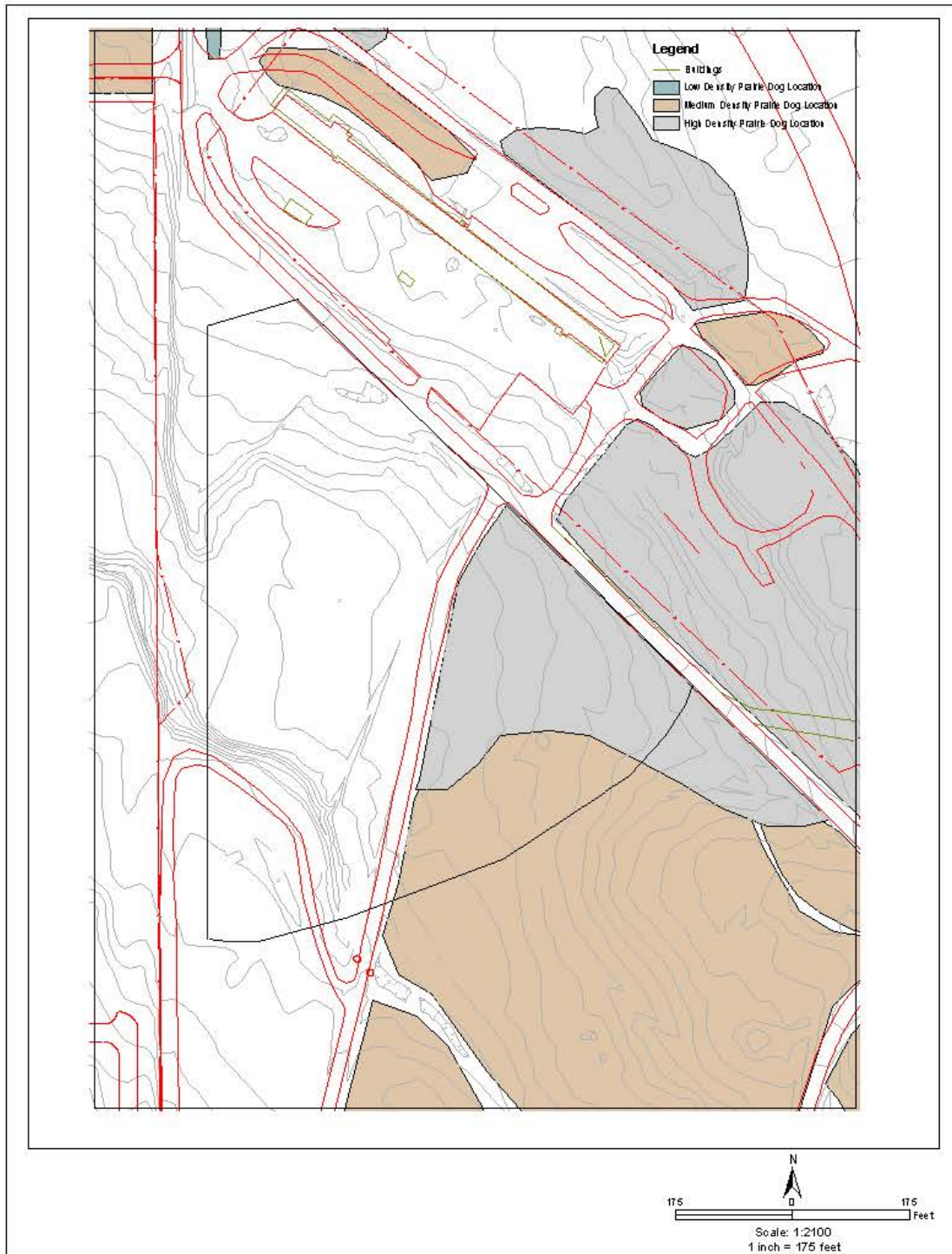


Figure 3.5 Prairie Dog Locations at the Proposed Driving Range Site

3.4.3.2 Species of Special Concern

Species of Special Concern are rare animals, plants, and plant communities listed by the Colorado Natural Heritage Program (CNHP). CNHP assigns rareness categories to listed species that denote both state and worldwide rarity. Natural resource managers can use this information to identify and prioritize conservation and impact mitigation needs. Five terrestrial species of special concern are known to occur at Buckley AFB (Buckley AFB 2002; CNHP 1999). These are black-tailed prairie dog, ferruginous hawk, bald eagle (*Haliaeetus leucocephalus*), burrowing owl, and the loggerhead shrike (*Lanius ludovicianus*). A small riparian stand of Plains Cottonwood Riparian Woodland, a plant community of special concern, occurs on the site. No sign of burrowing owl was found at the site, although this species is present at several locations on other installation prairie dog towns (Hatch 2002).

CNHP ranks the black-tailed prairie dog as being "...quite rare in parts of its [state] range, especially at the periphery" (CNHP 1999). See Section 3.4.3.1 for more thorough discussion of the status of the black-tailed prairie dog at Buckley AFB. CNHP ranks the Plains Cottonwood Riparian Woodland as "...vulnerable throughout [sic] its range or found locally in a restricted range (21 to 100 occurrences)"(CNHP 1999). See Section 3.3.1 for a description of this stand.

3.5 UTILITIES

3.5.1 Water supply

Buckley AFB obtains potable water from the city of Aurora. Water availability does not impose any water use limitations on the base (USAF, 2000b). Water is distributed to facilities on base for domestic use, process use, and fire protection. Buckley AFB used approximately 0.28 million gallons per day (MGD) of water during FY00 (Buckley AFB, 2001a).

3.5.2 Wastewater Treatment

Buckley AFB generates both domestic and industrial wastewater. The industrial wastewater consists of water from oil/water separators and does not require pre-treatment (USAF, 2000b). Buckley AFB has a wastewater permit that is issued by the Metro Wastewater Regional District. The Metro Wastewater Region treatment plant was designed to meet population estimates through 2010, with a hydraulic capacity of 185 MGD. No wastewater data for calendar year 2001 is available at this time.

3.5.3 Solid Waste

A private contractor handles solid waste collection and disposal services at Buckley AFB. Waste is collected from dumpsters located throughout the base and routinely transported to the Denver-Arapahoe Disposal Site, in Arapahoe County. The permitted portion of the landfill occupies 2,680 acres with an estimated design life of 40 to 50 years (USAF, 2000b). No solid waste data for calendar year 2001 is available at this time.

3.5.4 Electricity

The Public Service Company of Colorado (PSC) provides electricity. The PSC East Substation located at the intersection of Colfax Avenue and I-225 provides electrical power to the base through 13.2 kilovolt (kV) overhead distribution lines. Buckley AFB is the largest user of power from this substation. In FY2000, the facilities at Buckley AFB used approximately 270,000 kilowatt-hours (kWh) per day of electricity (Buckley AFB, 2001a).

3.5.5 Natural Gas

Natural gas is provided to Buckley AFB through a gas main beneath 6th Avenue (USAF, 2000b). The regional natural gas system has a capacity of 130 billion cubic ft. In FY2000, Buckley AFB used approximately 4,000 cubic ft of natural gas per day (Buckley AFB, 2001a).

3.6 WATER RESOURCES

Buckley AFB is located within the South Platte River drainage basin. East Tollgate Creek, Sand Creek, and Murphy Creek drain the installation. Williams Lake, located in the northeast portion of the installation, is the largest body of surface water at Buckley AFB. The proposed golf driving range site overlaps the floodplain and east terrace of East Tollgate Creek. East Tollgate Creek passes southeast to northwest through the southwestern third of the site. The 100-year floodplain for East Tollgate Creek on the installation has been estimated to be equal to the incised channel width (less than 50 feet) (Buckley AFB 2002). East Tollgate Creek is an intermittent stream within Buckley AFB; it drains northwest to a confluence with Sand Creek. Use of the stream channel and adjacent acreage for the golf driving range is a compatible floodplain use because the estimated 100-year floodplain surface area is small (less than an acre) and only low-value structures (driving range boundary netting) would be placed in proximity to the 100-year floodplain.

SECTION 4

CONSEQUENCES OF THE PROPOSED ACTION

4.1 PREFERRED ALTERNATIVE

4.1.1 Air Quality

The Preferred Alternative would have a negligible negative effect on air quality due to a slight increase in air emissions resulting from construction and operation of the golf driving range. Impacts during construction are from operation of construction equipment and site preparation. Native grass plantings at the site would result in a small, long-term decrease in dust transport on- and off-site. Other operational impacts are a result of exhaust emissions from landscaping equipment to maintain the area and operational equipment to collect balls. Operation of the ball collecting equipment would generate fugitive dust emissions, but this effect will be lessened by the increased vegetative cover. Calculations showing expected construction and operational emissions are included as Appendix B.

Emissions resulting from the construction phase of the golf driving range represent a short-term impact to air quality. During the construction phase of the Preferred Alternative, emissions are expected to increase by 0.3 tons annually for suspended particulates, 0.01 tons for hydrocarbons/volatile organic compounds, 0.2 tons for nitrogen oxides, 0.02 tons for sulfur oxides, and 0.04 tons for carbon monoxide. These annual increases in air emissions are negligible compared to total air emission at the installation (see Appendix B).

Emissions resulting from the operation of the golf driving range represent a minor long-term impact to air quality. During the operation of the Preferred Alternative emissions would be expected to increase by 1.0 tons per year for suspended particulates, 0.3 tons for hydrocarbons/volatile organic compounds, 0.2 tons for nitrogen oxides, and

4.0 tons for carbon monoxide. These annual increases in air emissions are negligible compared to total air emission at the installation (see Appendix B).

4.1.2 Geology

The Preferred Alternative would result in negligible impacts to installation geology and soils. No consolidated rock materials would be exposed or moved as a results of the Preferred Alternative, and surface soils would be disturbed only in the utility access, shed, net support pole, and tee box construction area locations. These new facilities would total approximately 1,000 square feet of surface disturbance to a depth of approximately 5 feet (10 feet at the 28 pole boring locations). There would be only a negligible removal of native materials, and more than 90 percent of the soil surface at the proposed golf driving range facility would be undisturbed.

4.1.3 Hazardous Materials/Hazardous Waste

The Preferred Alternative will result in a minimal use of hazardous materials such as fuels and paints during the construction of tee boxes and boundary netting. Operation of the facility will result in a small weekly use of unleaded gasoline to power golf ball retrieval equipment.

Construction and operation of the golf driving range is unlikely to affect existing subsurface sources of groundwater contamination. From the information known about the oil pit, it does not appear that there is significant surface soil contamination associated with this site that would be disturbed by mowing or ball retrieval operations. The oil pit is located in the far corner of the driving range. In the event than existing backfilled oil pit and buried landfill in proximity to the golf driving range require groundwater remediation, driving range use might be curtailed during portions of remedial action, or the excavated areas could be fenced off from the driving range, and part of the driving range would be unavailable for use.

4.1.4 Vegetation

The Preferred Alternative would result in a positive impact to vegetation due to long-term conversion of the weedy plant community at the site from ruderal species such as thistles, to a grass-dominated herbaceous cover. This would be accomplished through seeding with appropriate native short grass species. The linear stand of Plains Cottonwood Riparian Woodland would be little affected by the Preferred Alternative except for a slight decrease in growth rate resulting from chronic leaf damage from golf ball strikes. The affect of golf ball strikes mimic hail strikes, which the trees are well suited to withstanding at low densities due to the species flexible leaf stems.

4.1.5 Wildlife

The Preferred Alternative would utilize four acres of black-tailed prairie dog habitat for the installation golf driving range. The burrowing owl, often associated with black-tailed prairie dog colonies, was not observed inhabiting this prairie dog ward, and is not anticipated due to the small size of the colony and relative lack of open ground. In addition to the prairie dog habitat, the site contains approximately 500 feet of linear plains cottonwood riparian woodland. As a result of the Preferred Alternative the black-tailed prairie dog ward at the site would sustain a short-term impact during the construction process, and a lesser, long-term impact during the life of the facility.

Construction impacts to black-tailed prairie dogs and other wildlife species would consist of excess noise from construction equipment, and movement and close proximity of humans and moving equipment. This activity would result in startle and alarm behaviors and other stressful behaviors such as escape movements, extra time spent in burrows and a loss of foraging time. Construction would also result in a negligible adverse impact from the loss of low value habitat at the tee box location on the north end of the site. A positive impact to black-tailed prairie dogs during construction would result from the presence of construction workers who would act as a threat to raptors/predators, reducing predation attempts on this prairie dog ward. Although the draft Prairie Dog Management Plan recommends relocation of black-tailed prairie dogs displaced by construction projects, this project entails a very small construction square

footage at the perimeter of an existing low-density ward and therefore does not require relocation of the population. Due to the small construction area, relatively benign use of the site as a golf driving range, and the fact that the relocation of prairie dogs on site at Buckley AFB has not been approved by the Division of Wildlife, leaving the ward in-place would result in lower mortality than moving the ward to one of the conservation areas. Relocation results in both capture and relocation mortalities; relocation studies have reported capture mortalities up to five percent, and a study at the Rocky Mountain Arsenal suggests that lower relocation mortality is achieved when populations number 60 or more (Buckley AFB 2002). Thus a relocation of this small prairie dog group would likely result in more than five percent mortality, or more than three animals, and require considerable expense. It is unlikely that this mortality threshold would be exceeded as a result of golf driving range activities, and relocation funds would be saved.

Use of the golf driving range would likely result in a moderate initial increase in aversive behavior by vertebrates at the site. However, limiting some of the hours of use and habituation to human proximity and movement (i.e., during mowing and ball retrieval operations) during use of the golf driving range would minimize this impact. In addition, a small, negative impact would result from the periodic passage of golf ball pick-up equipment over the site surface. Ball pick-up is expected to not exceed a once-per-day frequency. The effect of this activity would be to force resident prairie dogs into their burrows for the short duration of the pick-up (less than one hour), and modification of burrow opening geometry which would result in prairie dogs expending extra energy on burrow maintenance. The disturbance created by golf ball collection can be mitigated to negligible if this activity is scheduled to coincide with prairie dog surface inactivity that typically occurs at mid-day and from late afternoon through dark.

The cumulative impact of the Preferred Alternative is negligible due to other black-tailed prairie dog conservation efforts at Buckley AFB.

4.1.6 Utilities

4.1.6.1 Water supply

There would be a slight increase in water usage during construction of the proposed golf driving range due to construction activities. There also would be a short-term increase in water usage following construction of the golf driving range to establish native short grass species planted at the proposed site. The increase in water due to the Preferred Alternative is negligible.

4.1.6.2 Wastewater Treatment

No significant change in the quantity of wastewater generation at the installation is expected to result from implementation of the Preferred Alternative.

4.1.6.3 Solid Waste

Solid, non-hazardous waste generation and construction debris (e.g., plastics, paper, and concrete) would increase as a result of construction but would represent short-term impacts. Wastes would be collected in dumpsters and routinely disposed of by a private contractor at the Denver-Arapahoe Disposal Site located in Arapahoe County.

No significant long-term increase in solid waste production is expected due to implementation of the Preferred Alternative.

4.1.6.4 Electricity

There would be a temporary increase in electrical use during the construction of the proposed golf driving range. This impact to electricity consumption would represent a short-term impact.

Although electricity would be required to operate the ball dispensing and washing equipment, these uses are minimal. No significant long-term increase in electricity usage is expected due to implementation of the Preferred Alternative.

4.1.6.5 Natural Gas

No significant change in the quantity of natural gas used at the installation is expected to result from implementation of the Preferred Alternative.

4.1.6.6 Overall Effect of the Proposed Action

The Proposed Action would have no long-term effects on installation consumption of natural gas, electricity, and water, and production of wastewater and solid waste.

4.1.6.7 Cumulative Effects of the Proposed Action

The Proposed Action would not significantly contribute to cumulative effects on utilities.

4.1.7 Water

The Preferred Alternative would have a negligible impact on water resources. Use of the Preferred Alternative site for golf driving range activities would not increase, and may possibly decrease the erodibility of the site, if the area is seeded in grasses that increase plant cover and diminish bare ground. Construction and operation of the golf driving range would not entail regrading or an increase in slope, which would increase runoff rates and erosion. Low fencing to inhibit golf balls from washing into East Tollgate Creek during storm events would prevent entraining golf balls in the stream channel and migrating offsite during large storm events. No structures would be placed in proximity to the 100-year floodplain with the exception of boundary netting along the west side of the golf driving range. This structure is of low value, and would be placed parallel to the stream channel so that it does not trap storm runoff.

4.2 NO ACTION ALTERNATIVE

4.2.1 Air Quality

The No Action Alternative would have a negligible impact on air quality.

4.2.2 Geology

The No Action Alternative would have a negligible impact on geology.

4.2.3 Hazardous Materials/Hazardous Waste

The No Action Alternative would have a negligible impact on hazardous materials and hazardous waste.

4.2.4 Biotic Resources

The No Action Alternative would have a negligible impact on natural resources.

4.2.5 Utilities

The No Action Alternatives would have a negligible impact on utilities.

4.2.6 Water Resources

The No Action Alternative would have a negligible impact on water resources.

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SECTION 5

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Denver, Colorado 80202

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SECTION 7 REFERENCES

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APPENDIX A

GOLF DRIVING RANGE EQUIPMENT SPECIFICATIONS

from Wittek, the leader and industry's
largest Supplier of Mats.

TurfMaster Air II Mat

The Only True Air Cushion Mat

... For the Most Discriminating Golfers

**"Great feel!
These mats fulfill the high
expectations of the players who
come to play at the 'Home of Golf'."**

Brenden Duffy, General Manager
ST. ANDREWS GOLF COURSE
St. Andrews, Scotland

The golf mat that has pro's in Europe talking,
is now available for golf ranges in the United States.
The TurfMaster Air II is the first air cushion
mat ever developed. . .

High Customer Satisfaction. Air cushion allows for true
shock absorption - providing the best feel and the most
comfort for golfers.

Heat-Bonding Assures Maximum Durability. Solid PVC layer
is heat-bonded to the air cushioned PVC pad. The gluing
process, which can lead to delamination, is eliminated.

Reinforced PVC Pad. For the ultimate in lasting performance.

Commercial Grade, 56 oz. Knitted Nylon.
For incredible strength against high volume wear.

#78185 TurfMaster Air II Mat

To place an order, call
1-800-869-1800
or fax
773-463-2150



Weight: 55lbs.
Thickness: 1 1/8"

ATTACH 3

The Letters Keep Coming...

Dear Wittek,
...I just received my order for 75
new Pro Tee Dividers...Wanted you to
see how great they look on my tee line!
My customers love them too...
...Thanks for creating such
great products!

Tom McClurg
Legend Sports Golf Center
Altamonte Springs, FL



7/16/85
11/2/85

Wittek's New Pro Tee Divider

provides a convenient tee station for
your range customers and it gives your
tee line a clean and well organized look.

- Long-lasting polyethylene construction.
- Built-in club rest holds up to four clubs.
- Holds beverage, keys, loose change and any size metal or plastic range pail.
- Designed for cement or grass tee areas.
- Available in two natural colors:
 D. Teal and Granite Grey.

Quality products on AstroTurf Mats!
Call or ask your Wittek
representative for more
information today!

Standard & Par Aide Course Accessories

Wittek - The largest distributor of Standard
and Par Aide golf equipment for your course.
Call 1-800-869-1800 for full-line catalogs or
more information.

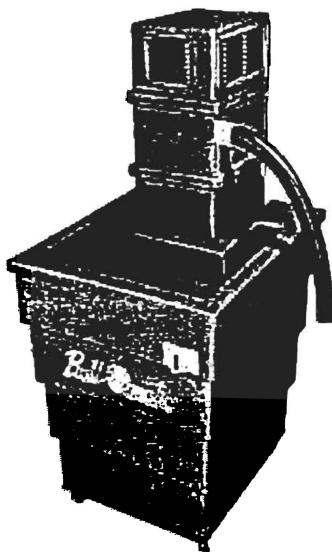
Upgrade to Wittek.

Now's the time to order Wittek parts for your Wittek
range equipment. Let Wittek's very own "Mr.
Weatherneck" help you with special savings on parts for
your packet, washer and dispenser.

WITTEK
Your One Stop Source.
1-800-869-1800



MODEL 350 BALL WASHER



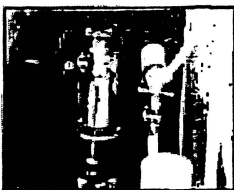
Model 350 Washer
RF350 Roller Frame
PED350 Riser Pedestal



Inlet Water Source



Fresh Water Rinse



Auto Fill Valve

MODEL 350 WASHER FEATURES

Sorts, washes, elevates and discharges balls.

Gentle auger/two brush wash system.

Washes 18,000 range balls per hour.

Non-corrosive, all polymer cabinet with aluminum & stainless steel components.

Sorting track allows only whole, rolling balls to pass.

Inlet water source for auto fill valve and fresh water rinse.

Sorting tray has 350 ball capacity. Optional Staging Chutes increase capacity (see next page).

Balls discharge at a height of 51 1/4". 54 1/2" with optional Roller Frame, 54 1/4" with optional Riser Pedestal.

Large 2" discharge fitting allows for fast water changes

Dimensions: 30 1/2"W x 35 1/2"D x 65 1/2"H.

MODEL 450 BALL DISPENSER

With 37 years of proven reliability backing it, our new **Model 450 Range Ball Dispenser** is equipped with Ball-O-Matic's patented turntable dispense system. We have housed this system in a new **RUST FREE**, molded polymer cabinet for even longer lasting durability. New options such as bill changers, numerical key pads, and computer integration make the Model 450 a ball dispenser for the future.

MODEL 450 DISPENSER FEATURES

Polyethylene cabinet with aluminum and stainless steel construction.

Ball Capacity: Approx. 10,000 balls; 18,500 balls with optional storage bin (see next page).

Patented turntable with Torque Limiter, provides damage proof dispense operation.

Ball count is adjustable from 6 to 300 balls per dispense and accurate within 1 to 2 balls.

Quadruple Dispense allows for dispensing of four different basket sizes.

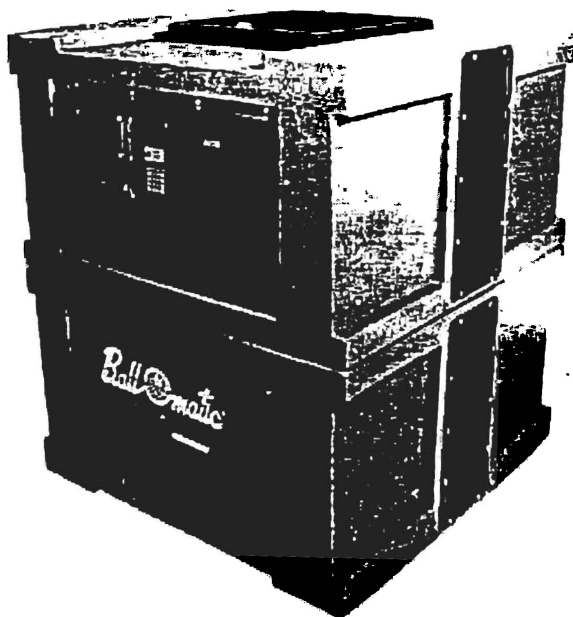
Solid State, single control board, easily replaceable.

Electrical: 115 volts, 60 cycle A/C, 3 amp.

Dimensions: 45"W x 45"D x 52 1/2"H.

Options:

Debit Card Acceptor
Token Comparator
Bill Acceptor
Membership Key Pad



The Model 450 may also be converted to a simple storage bin with on/off dispense only capabilities. This option is perfect for private facilities with unlimited range use, or as a handy storage bin with dispensing capabilities.

MODEL 450SBTD

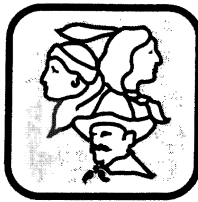
To Order Toll Free

(800)327-4718

or Fax: (616) 684-3888

Ball-O-Matic®

APPENDIX C
AGENCY AND PUBLIC COMMENTS



COLORADO
HISTORICAL
SOCIETY

The Colorado History Museum 1300 Broadway Denver, Colorado 80203-2137

November 5, 2002

Alfred C. Scharff, Lt Col., USAF
Base Civil Engineer
Department of the Air Force
460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

Re: Buckley Air Force Base Golf Driving Range

Dear Lt. Col Scharff:

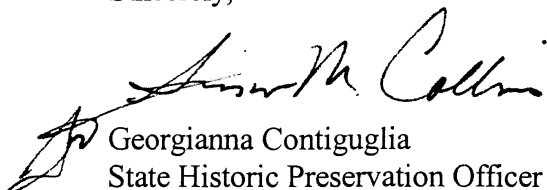
This is to acknowledge receipt of your October 28, 2002 correspondence concerning the project listed above.

A search of our files indicates that the location of this project has been surveyed for cultural resources and that no historic properties are located within the area of potential effect. Therefore, we find that no historic properties will be affected by the project.

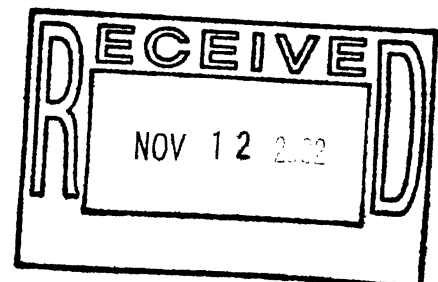
If unidentified archaeological resources are discovered in the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) in consultation with this office.

Thank you for the opportunity to comment. If we may be of further assistance, please contact Jim Green at 866-4674.

Sincerely,


Georgianna Contiguglia
State Historic Preservation Officer

GC/WJG



APPENDIX D
AGENCY LETTERS



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 South Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Georgianna Contiguglia
Colorado History Museum
1300 Broadway
CO 80203-2137

Dear Georgianna Contiguglia

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

There are no known historical or archaeological resources within the area of the proposed action. Therefore, we have determined that the proposed action would not have any adverse effects to historical or archaeological properties that are eligible for listing to the National Historic Register of Historic Places. Per Section 106 of the National Historic Preservation Act we are submitting a copy of the Draft EA and the Finding of No Significant Impact (FONSI) for the Golf Driving Range for your review and comment. Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

3. If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 S Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Lee Carlson
U.S. Fish and Wildlife Service
755 Parfet Street, Suite 361
Lakewood CO 80215

Dear Mr. Carlson

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review to ensure compliance with the Endangered Species Act and Section 7 consultation. Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 S Aspen Street, Stop 86
Buckley AFB CO 80011-9551

National Environmental Policy Act Manager
U.S. Fish and Wildlife Service
134 Union Boulevard
Lakewood CO 80228-1804

To Whom It May Concern

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review. Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 South Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Eliza Moore
Colorado Division of Wildlife
6060 South Broadway
Denver CO 80216

Dear Ms Moore

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB. A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review and comment.

Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 South Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Jerry Craig
Colorado Division of Wildlife
Wildlife Research Center
317 W. Prospect Road
Fort Collins CO 80526

Dear Mr. Craig

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB. A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review and comment.

Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely,


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 S Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Cynthia Cody
U.S. Environmental Protection Agency, Region 8
999 18th Street, Suite 500
Denver CO 80202

Dear Ms Cody

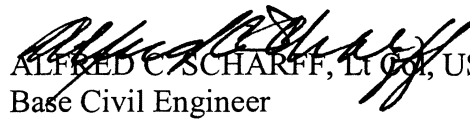
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Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 S Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Denise Balkas
City of Aurora
1470 South Havana
Aurora CO 80012

Dear Denise Balkas

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB. A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review and comment.

Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



DEPARTMENT OF THE AIR FORCE
460TH AIR BASE WING (AFSPC)

28 October 2002

Lt Col Alfred C. Scharff
660 S Aspen Street, Stop 86
Buckley AFB CO 80011-9551

Mark Cadnuck
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive, South
Denver CO 80246-1530

Dear Mark Cadnuck

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB. A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for your review and comment.

Please provide written comments within 30 calendar days of receipt of this letter to:

460 CES/CEV
660 South Aspen Street, Mail Stop 86
Buckley AFB CO 80011-9551

If you have any questions please feel free to contact Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977.

Sincerely


ALFRED C. SCHARFF, Lt Col, USAF
Base Civil Engineer

Attachment
Draft EA with Draft FONSI



October 28, 2002

Denver Public Library
Government Document Section
10 West Fourteenth Ave
Denver, CO 80204

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for public review. Written comments can be directed to:

460 CES/CEV
660 South Aspen Street, Stop 86
Buckley AFB, CO 80011-9551

Questions can be directed to Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977

Sincerely,

Mandy Whorton
Project Manager (under contract to 460 CDS/CEV)



October 28, 2002

Aurora Public Library
Government Document Section
14949 East Alameda Street
Aurora, CO 80012

The Air Force has prepared a Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for the construction of a golf driving range. The proposed action is required to provide additional recreation opportunities for the military and civilian workforce stationed at Buckley AFB.

A copy of the Draft EA and FONSI for the Golf Driving Range is enclosed for public review. Written comments can be directed to:

460 CES/CEV
660 South Aspen Street, Stop 86
Buckley AFB, CO 80011-9551

Questions can be directed to Ms. Elise Sherva at 303-677-9077 or Ms. Janet Wade at 303-677-9977

Sincerely,

Mandy Whorton
Project Manager (under contract to 460 CDS/CEV)

APPENDIX E
NOTICE OF AVAILABILITY

THE Denver Newspaper Agency
DENVER, CO

PUBLISHER'S AFFIDAVIT

City and County of Denver,
STATE OF COLORADO, SS.

Susan Sloan

..... being of lawful
age and being first duly sworn upon oath, deposes and says:
Legal Advertising Reviewer

That he/she is the
Of The Denver Newspaper Agency, publisher of the Denver Post and
Rocky Mountain News, daily newspapers of general Circulation published
and printed in whole or in part in Denver, in the County of Denver and
State of Colorado, and that said newspaper was Prior to and during
all the time hereinafter mentioned duly qualified For the publication of
legal notices and advertisements within the Meaning of an Act of the
General Assembly of the State of Colorado,
Approved April 7, 1921, as amended and approved March 30, 1923;
And as amended and approved March 5, 1935, entitled "An Act
Concerning Legal Notices, Advertisements and Publications and the
Fees of printers and publishers thereof, and to repeal all acts and parts
Of acts in conflict with the provision of this Act" and amendments
Thereto:

That the notice, of which the annexed is a true copy, was published in
The said newspaper to wit: (dates of publication)

October 27, 2002

Signature
Susan Sloan

Subscribed and sworn to before me this 6th

Of December A.D. 2002.

Lynn Marie Roth
Notary Public.

My commission expires 5.3.05

Public Notice
U.S. Air Force Notice of Availability

Draft Environmental Assessment (EA) and Draft
Finding of No Significant Impact (FONSI) for a new
golf driving range at Buckley Air Force Base. The
United States Air Force (USAF) has prepared this EA
to evaluate the potential environmental impacts from
the proposed construction and operation of a new golf
driving range at Buckley Air Force Base (Proposed
Action). The EA has been prepared per the National
Environmental Policy Act to analyze the potential envi-
ronmental consequences of the Proposed Action. The
golf driving range is required to accommodate the in-
creased numbers of on-site personnel that has resulted
from the realignment of Buckley Air National Guard
Base to Buckley Air Force Base.

Comments must be received by November 27, 2002.

Copies of the respective EA and FONSI may be found
at the following public libraries: Aurora Public Library,
Government Document section, 14949 East Alameda
Drive, Aurora, CO 80012, 303-739-6600 or Denver Pub-
lic Library, Government Document section, 10 West
Fourteenth Ave., Denver, CO 80204, 303-640-6200.

Interested parties should address their comments,
questions, or concerns to: Chief, Environmental Man-
agement, 460 CES/CEV, 660 South Aspen Street, Mail
Stop 86, Buckley AFB, Colorado, CO 80011-9551, 303-
677-9402.