COLORADO SPRINGS REGIONAL
JOINT LAND USE STUDY

FINAL | DECEMBER 2018

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Pikes Peak Area
Council of Governments
Communities Working Together

ACKNOWLEDGEMENTS

This study was prepared under contract with the Pikes Peak Area Council of Governments (PPACG) with financial support from the Office of Economic Adjustment, Department of Defense. The content of this document reflects the views of PPACG and does not necessarily reflect the views of the Office of Economic Adjustment.

This document serves as an ongoing framework for local government and military strategies necessary to enhance compatibility around the Air Force Academy, Fort Carson, Peterson Air Force Base, Schriever Air Force Base and Cheyenne Mountain Air Force Station and improve quality of life in the surrounding communities.

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PPACG also thanks the dedicated members of the JLUS Policy and Technical Committees, including Policy Committee Chair **Darryl Glenn** and Technical Committee Chair **Greg Dorman** for their leadership in this effort. We are deeply grateful to the numerous community members who participated in many working groups which helped to develop the findings and recommendations found in this study.

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1 INTRODUCTION

1.01 WHAT IS A JOINT LAND USE STUDY?

A Joint Land Use Study (JLUS) is a collaborative planning effort among active military installations, surrounding communities, and other affected agencies to identify and address compatibility issues facing the region. The JLUS program is an interjurisdictional partnership and planning process funded by the Department of Defense (DOD) Office of Economic Adjustment (OEA) and the Colorado Department of Local Affairs. The Pikes Peak Area Council of Governments (PPACG) was the sponsor and managed the grant and study process.

The JLUS process encourages residents, local decision-makers, and installation representatives to study compatibility issues in an open and public forum. The goal is to balance military and community interests by identifying encroachment issues that affect civilian communities and military installations. The resulting recommendations are intended to reduce or mitigate potential conflicts while accommodating growth, sustaining the economic health of the region, and protecting public health and safety.

The OEA's JLUS program has two primary objectives:

1. Encourage cooperative land use planning between military installations and surrounding communities so that growth and development are compatible with the training and/or operational missions of the installations.
2. Seek ways to reduce operational impacts on installations, land, and communities adjacent to installations.

1.02 WHAT IS THE COLORADO SPRINGS REGIONAL JLUS?

Although the title of this study includes the name of the largest city in the region, all of the communities within the four-county study area were involved in the success of this effort:

- El Paso County
  - City of Colorado Springs
  - City of Fountain
  - City of Manitou Springs
  - Town of Calhan
  - Town of Ellicott
  - Town of Green Mountain Falls
  - Town of Monument
  - Town of Palmer Lake
  - Town of Ramah
- Fremont County
  - City of Cañon City
  - City of Florence
  - Penrose
  - Town of Brookside
  - Town of Coal Creek
  - Town of Rockvale
  - Town of Williamsburg
- Pueblo County
  - Avondale
  - Beulah
  - Colorado City Metropolitan District
  - City of Pueblo
  - Pueblo West Metropolitan District
  - Town of Boone
  - Town of Rye

- Teller County
  - City of Cripple Creek
  - City of Victor
  - City of Woodland Park
  - Divide

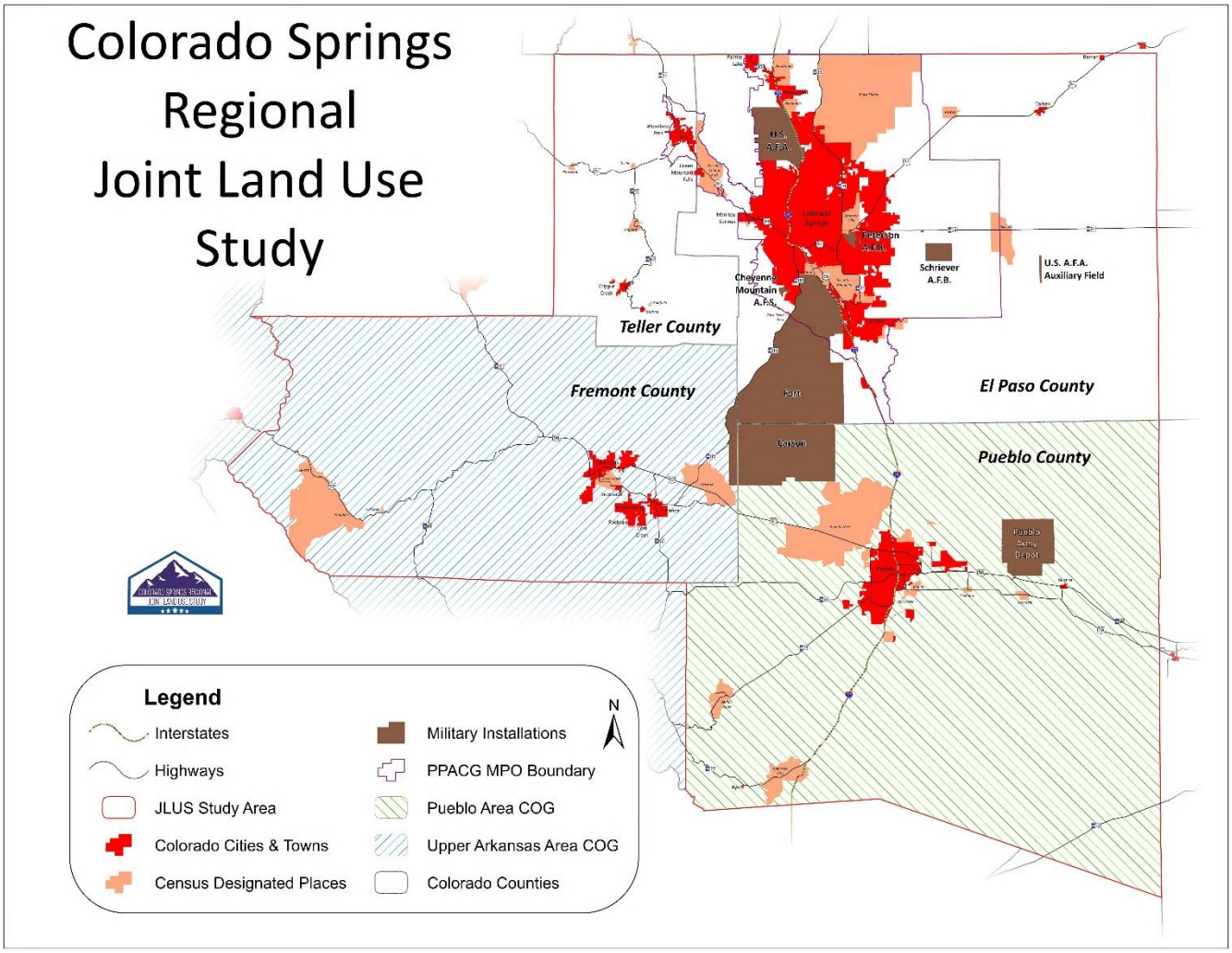
All five military installations in the region were key partners in this effort:

- The Air Force Academy (AFA)
- Fort Carson
- Peterson Air Force Base (AFB)
- Cheyenne Mountain Air Force Station (AFS)
- Schriever Air Force Base (AFB)

The purpose of this JLUS is to create a community-driven, cooperative, strategic planning process among the five installations, the local municipalities, and other stakeholders within the four-county region. This study considers how the region can plan for a future that ensures successful growth, economic health, and continued military operations for all five installations.

Figure 1.1

COLORADO SPRINGS REGIONAL JLUS STUDY AREA



MPO: metropolitan planning organization; COG: council of governments

1 INTRODUCTION

The JLUS planning process supports effective communication and establishes recommended strategies and actions for military participation and stakeholder coordination in community development review and planning. It includes an interjurisdictional implementation plan to augment the JLUS recommendations. Each listed action includes a responsible party and supporting roles for partnering stakeholders. These recommended actions should include land use planning principles and practices that balance potentially conflicting interests.

What makes this study different from other JLUS projects is the wide scope needed to cover five distinct military installations and the different approaches used to explore compatibility issues and develop recommended strategies. The process began by identifying 17 potential compatibility issues (defined in Chapter 3) through research, discussions with military installations and local officials, and public outreach to understand which issues were applicable to each installation and each community. Many meetings were held to provide progress updates and verify that community and military interests were accurately reflected as the study proceeded.

JLUS GOALS AND OBJECTIVES

Goals

This JLUS process encourages local governments and stakeholders, together with the state of Colorado, to:

- Work closely with the military installations to implement measures that avoid and mitigate incompatible civilian development that may impair the continued operational utility of the military installations.
- Preserve and protect the public health, safety, and welfare of those living near an active military installation.
- Increase public awareness of the military missions within this region and provide context for how the installations are a part of the regional economy.

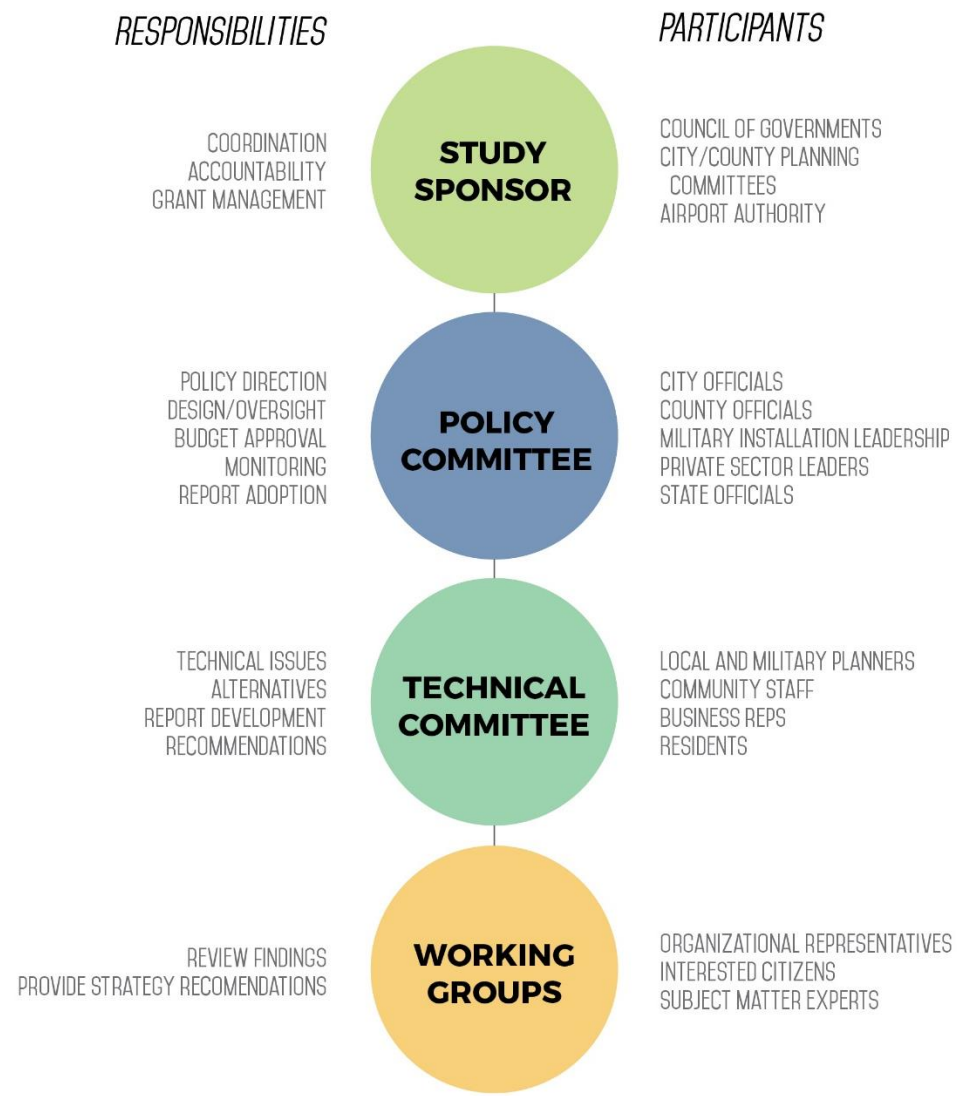
Objectives

Three key objectives, described below, are designed to achieve these goals and serve as the basis for the implementation strategies and actions provided in Chapter 10.

- **Understanding.** Convene community and military representatives to study the issues in an open forum, considering both community and military viewpoints and needs. This includes public outreach and input.
- **Collaboration.** Encourage cooperative land use and resource planning between military installations and surrounding communities so that future community growth and development are compatible with military training and missions while reducing the military's operational impacts on adjacent lands and allowing sustainable economic growth. Collaboration between communities and the military to accommodate future military mission growth as it occurs.
- **Actions.** Provide a set of recommendations and strategies for local jurisdictions, agencies, and the military to use in solving the compatibility issues identified and discussed throughout this process.

1.03 JLUS ORGANIZATION AND PUBLIC PROCESS

Figure 1.2
EXAMPLE JLUS ORGANIZATION



Source: Joint Land Use Study Program Guidance Manual, 2006

COLORADO SPRINGS REGIONAL JLUS ORGANIZATION

Figure 1.2, Example JLUS Organization, shows how a typical JLUS is set up.

The Policy Committee, Technical Committee, and issue-specific working groups guided the direction of the JLUS. Federal agencies and military installations participated as non-voting members of committees and working groups to inform the process as needed.

The Policy Committee consisted of elected officials from local communities, legislative representatives, state and federal agency representatives, and military personnel. Its role was to represent the participating communities and interests during this

process, provide guidance to JLUS staff, approve all actions pertaining to the study (including the creation of the Technical Committee and working groups), and provide a review of the final study document.

The Technical Committee consisted primarily of planning and land use officials from local governments and military installations. This committee provided recommendations to the Policy Committee, technical review of strategies and material created by working groups, and an in-depth review and critique of the study document as it was created.

Nine issue-specific working groups formed by the Policy and Technical Committees throughout the JLUS process delved into the subject matter to discuss compatibility issues and identify potential strategy recommendations. These working groups, listed below, were made up of various stakeholders, including but not limited to local government and military representatives, other stakeholder groups, and residents.

- Air Force Academy Flight Training
- Agriculture/Conservation
- Land Use and Development Review
- Monument Creek Watershed (formed as a stakeholder group by other entity)
- New Santa Fe Trail
- Public Communication
- Regional Airspace
- Southern Stormwater
- Transportation

In coordination with the Policy and Technical Committees, the working groups drafted background for and developed strategies to address their respective subject matter areas. These efforts formed the basis of this report.

Each of these committees and working groups included stakeholders and citizens who have knowledge of land use issues or are affected by military operations, including residents, homeowner associations, legislators and community leaders, local developers, and government officials from the local, state, and federal levels.

Rosters of the Policy and Technical Committees can be found in Appendix B.

JLUS INPUT PROCESS

Leadership

The initial phase of the study included meetings with military installation representatives, key stakeholders, and contacts to provide information on the JLUS process and to identify mission operation characteristics and compatibility issues. JLUS staff reviewed documents that included military plans, local land use plans and regulations, and state and federal documents.

The Policy and Technical Committees held their first meetings in the first quarter of 2016. Research, public input, and stakeholder meetings resulted in the land use compatibility matrix and its 17 compatibility issues (see Chapter 3 for more details).

The initial study scope included Fort Carson, Peterson AFB including Cheyenne Mountain AFS, and the Air Force Academy. Shortly thereafter, Schriever AFB requested to participate in the JLUS process and was formally included during the summer of 2016. This addition required an expansion of the scope and extended the study completion deadline to 2018.

Public Engagement and Review

PPACG collected public input from residents in 2016 with an online survey and telephone town hall focused on reaching those living in rural areas.

The first public input meeting was held for the AFA area on Thursday, February 23, 2017, at Library 21c in Colorado Springs due to the resident and political interest in flight training activities and the New Santa Fe Trail. Attendance was approximately 100 people. Stakeholders that joined this event included local elected officials; City of Colorado Springs staff working on the city's comprehensive plan update, Plan COS; Larry Small from the Fountain Creek Watershed Flood Control and Greenway District;

Council of Neighbors and Organizations (CONO), and officials from the AFA. Representatives from working groups attended and volunteered to assist with answering residents' questions. The information stations were designed to inform residents and ask for specific input on the draft recommended strategies while also seeking suggestions to guide staff on further issue research.

Three public input meetings were held during the report development process to present preliminary study results. These meetings were held:

- Monday, June 25, 2018, at Falcon High School
- Tuesday, June 26, 2018, at Discovery Canyon Campus High School
- Thursday, June 28, 2018, at City of Fountain Fire Station 1

The final stage in the report process involved opening the draft report to public comment by posting the report and comment forms online for three weeks beginning November 16, 2018. Public comments and corresponding edits to the report were reviewed by the Policy and Technical Committees. The Policy Committee voted to accept the study and report as complete on December 19, 2018.

2 STUDY AREA PROFILE

2.01 COMMUNITY PROFILES

EL PASO COUNTY

El Paso County encompasses more than 2,158 square miles – slightly more than twice the area of the state of Rhode Island – and is the most populous county in the State of Colorado. The western portion of El Paso County is extremely mountainous while the eastern part is prairie land where dairy cows and beef cattle are the main source of ranchers' income. The altitude ranges from about 5,095 feet on the southern border at Black Squirrel Creek to 14,115 feet on the summit of Pikes Peak. Primary communities and their year of incorporation in this county include:

- City of Colorado Springs (1871)
- City of Fountain (1900)
- City of Manitou Springs (1888)
- Town of Calhan (1919)
- Town of Ellicott (1897)
- Town of Green Mountain Falls (1880)
- Town of Monument (1879)
- Town of Palmer Lake (1889)
- Town of Ramah (1927)

PUEBLO COUNTY

Pueblo County encompasses approximately 2,397 square miles, has a population of 160,852, a population density of 67.08 people per square mile, and topography that ranges from farms in riparian land along the Arkansas River to rangeland, forests, and mountains. Located at the confluence of the Arkansas River and Fountain Creek, Pueblo has been an important crossroads for transportation and trading for more than 150 years. Pueblo is international, multiracial, and multicultural with a well-established Hispanic community that encompasses more than 40 percent of the population. The City of Pueblo is the county seat and most populous city in Pueblo County, serving as the economic hub of southeastern Colorado. As one of the largest steel-producing cities in the United States, Pueblo is sometimes referred to as the "Steel City." Pueblo's economy is bolstered by education, healthcare services, and high-profile employers such as Colorado State University (CSU) Pueblo, Vestas Wind Systems, Mission Foods, and Professional Bull Riders, Inc. Military convoys and transportation of supplies and equipment travel throughout the region as well. Active and retired military personnel live in Pueblo County and commute to the Colorado Springs area to access the installations and services there, and they have a shared interest in maintenance of Interstate 25. Primary communities and their year of incorporation in this county include:

- Avondale (1892)
- Beulah (1876)
- City of Pueblo (1885)
- Colorado City Metropolitan District (1866)
- Pueblo West Metropolitan District (1969)
- Town of Boone (1956)
- Town of Rye (1937)

TELLER COUNTY

Teller County was carved out of El Paso County in 1899 from the western slope of Pikes Peak. The county has a population of 23,472 people with a median age of 49.5 and a median household income of $63,723. Cripple Creek is the county seat, and Woodland Park is the most populous city. Compared to other counties, Teller County has a high number of mining jobs with one of the

largest gold mines in the country in Victor and Cripple Creek. Tourism, recreation, and gaming are primary economic drivers. Primary communities and their year of incorporation in this county include:

- City of Cripple Creek (1892)
- City of Victor (1894)
- City of Woodland Park (1891)
- Divide (1889)

FREMONT COUNTY

Fremont County encompasses more than 1,534 square miles and has a population of 6,824 with a density of 31 persons per square mile. The economy of Fremont County specializes in public administration including correctional institutions; mining, quarrying, and oil and gas extraction; and real estate. Fremont County is home to 13 prisons generating more than half of the jobs in the area. The Colorado Department of Corrections operates nine facilities, including the oldest prison in the state, the Colorado Territorial Correctional Facility, which is in the county seat of Cañon City. The four federal prisons include the United States Penitentiary Administrative Maximum Facility (ADX), also known as "Supermax," the highest-security prison in the United States. Primary communities and their year of incorporation in this county include:

- City of Cañon City (1872)
- City of Florence (1887)
- Town of Brookside (1913)
- Penrose (1860)
- Town of Coal Creek (1882)
- Town of Rockvale (1886)
- Town of Williamsburg (1888)

2.02 HISTORY

Various economic and cultural forces have driven development over time throughout the region. Many of the communities within this region share a common heritage beginning with military expeditions sent to the area in the 1800s. Many communities and economic enterprises were founded by former military officers. The history of military operations and community interaction within the Pikes Peak region, particularly since World War II, provides important context for this Joint Land Use Study (JLUS).

TIMELINE OF REGIONAL ECONOMIC, COMMUNITY, AND MILITARY DEVELOPMENT

The 1700s

The Arkansas River was the northernmost extension of Spain and Mexico. The area saw an influx of French fur trappers in the late 1700s.

The Early 1800s

In 1806, Lt. Zebulon Pike explored the area along the Arkansas River basin. From his camp in the Florence area, Pike attempted to summit the "great peak," which would eventually become his namesake, Pikes Peak. In 1820, the second U.S. military expedition into Colorado, led by Major Stephen Long, explored the Front Range, primarily between what is now Rocky Mountain National Park and Colorado Springs.

The Mid-1800s

During the 1850s, activity began to pick up in the area. Sawmills were founded in the Black Forest area to provide materials for construction of the Kansas Pacific, Denver & Rio Grande, and New Orleans Railroad lines. In 1842, a small settlement on the Arkansas River called "El Pueblo" was established, and in 1854 it was attacked by a Ute Indian war party, becoming the site of the Fort Pueblo Massacre. Despite the loss of 15 lives, the

area continued to draw people because of its prime location at the junction of Fountain Creek and the Arkansas. In 1858, Cañon City was platted, sparked by the Pikes Peak Gold Rush. Several ore smelters were built in the city following the discovery of gold at Cripple Creek in 1890. In 1859, Fountain was built as a railroad shipping center for local ranches and farms. In that same year, Colorado City was founded. It was envisioned that the town would be a major supply hub, via Ute Pass, for the gold mines in South Park (now Park County) and along the Blue River. Colorado City served as the El Paso County seat until 1873 and processed much of the gold from Cripple Creek and Victor at the Golden Cycle Mill.

Originally known as the Colorado Volunteer Militia, the Colorado National Guard was founded in 1860, sixteen years prior to Colorado being recognized as a state. In 1865, the area now within the Town of Monument was homesteaded. General William Jackson Palmer, a Civil War Medal of Honor recipient, first visited the Pikes Peak area in 1869.

The Late 1800s

In 1870, General Palmer founded the Denver & Rio Grande Railroad and bought land along the route to create Colorado Springs, which was founded in 1871.

Pueblo formally became a town within the Colorado Territory in 1870. During the 1870s the establishment of the Crystola area began. In 1872 Colorado Springs was incorporated and was planned according to the "Palmer Pattern of Responsibility." Palmer's pattern included schools, libraries, churches, parks, and a college. Citizens of "good moral character and strict temperance habits" were sought. Manitou Springs was also founded that year by Palmer and Dr. William Bell. Manitou Springs was intended to be a scenic health resort. The town was incorporated in 1876, the same year Colorado was recognized as a state.

Henry Childs built a house in the Crystola area in 1876. His wife was involved in mysticism and, through a medium, announced that the area was rich in gold. This event started a "gold rush," but gold was never actually found.

In 1881, oil was discovered near Florence, spurring growth in the area. Florence incorporated as a town in 1887. Palmer constructed the first Bessemer furnace south of the Arkansas River in 1881. This area became the Town of Bessemer to house steel mill workers when it was platted in 1886. The Pueblo area now had four distinct cities. Pueblo capitalized on its location to function as the regional smelting hub. By the 1890s, Pueblo was becoming the largest city in Colorado, and became known as the "Pittsburgh of the West." Also, in 1881, the Town of Palmer Lake was platted and served as a vital stop for Palmer's railroad because of its lake, crucial as a water supply for train engines.

The ranching area known now as Green Mountain Falls was bought by W.J. Foster and established in 1887 as a summer resort. This same year also witnessed the founding of "Manitou Park," which was incorporated as Woodland Park in 1891.

In 1888, land within the newly platted Town of Falcon was advertised in the Colorado Springs Gazette. The Falcon Land & Town Company, part of the Chicago Rock Island Railroad, began selling lots to newcomers. The railroad brought more people to the area. In 1887, the first crude road to the summit of Pikes Peak was built, which drew many tourists to the Cascade area, including Katharine Lee Bates, famous for writing the poem that became "America the Beautiful."

The community of Chipita Park opened a hotel via the Ute Pass Land and Water Company in 1890 and became a draw for tourists. This year also marked the discovery of gold in Cripple Creek. The Divide area, at the summit of Ute Pass (9,165 feet), was the primary access point to Cripple Creek.

The Early 1900s

By 1900, Colorado Springs was the wealthiest city per capita in the United States. The Town of

Fountain, named for Fountain Creek, was formally incorporated that year. In 1903, the Colorado Fuel and Iron Company (CF&I), the largest steel mill in Pueblo, was bought by the Rockefeller family and Jay Gould. They modernized the plant and built schools and hospitals in the region. Italians and southern Europeans immigrated in waves and established many ethnic neighborhoods in Pueblo. In 1921, a massively destructive flood swept through Pueblo, resulting in a change of course of the Arkansas River by a half mile. This is the current course of the river. The flood destroyed communities along the river, put the business district under water, and washed away the bridges across the Arkansas.

During the 1900s Spencer Penrose organized the Beaver Land and Irrigation Company and began buying water rights along the creek. By 1907 he began building Schaeffer Dam and Lake McNeil. Spencer also planned a 722-acre town to be named Fremont. The town never fully developed and is now the area known as Penrose, known for its fruit orchards, melons, apples, pumpkins, and other produce.

In 1917, Colorado City was annexed into the City of Colorado Springs. Spencer Penrose developed The Broadmoor resort in 1918. Penrose bought property on the northern part of Cheyenne Mountain and built the Cheyenne Mountain Highway in 1925. In 1926, Mr. Penrose built the Cheyenne Lodge at the top of Cheyenne Mountain and established the Cheyenne Mountain Zoo.

The Mid-1900s

In 1942, Camp Carson was established following the Japanese attack on Pearl Harbor. The City of Colorado Springs bought the land and donated it to the War Department. Camp Carson was named for the legendary Army Scout General Christopher "Kit" Carson, who explored much of the area in the 1800s. Camp Carson was built to hold 35,173 enlisted men, 1,818 officers, and 592 nurses. During World War II, Camp Carson trained over 100,000 soldiers and housed approximately 9,000 prisoners of war.

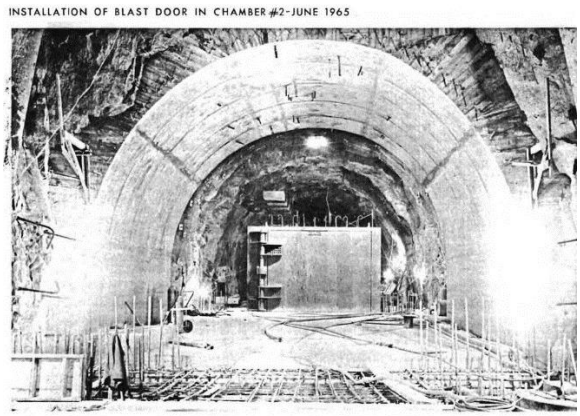
Camp Carson was renamed Fort Carson in 1954. Also known as the "Mountain Post," it is made up of approximately 140,000 acres. An additional 237,000 acres, known as the Piñon Canyon Maneuver Site (not included in this study), was purchased in 1983.

The Colorado Springs Army Air Base was established in 1942 in support of Lowry Air Field in Denver and Camp Carson. It was renamed Peterson Army Air Base (Peterson Field) for World War II Army Air Forces 1st Lieutenant Edward J. Peterson, Jr. a Colorado native. The Pueblo Army Depot was established in 1942 to store munitions, ordnance, and military equipment returning from the various campaigns in World War II. In 1952, the first shipment of chemical weapons was received from Rocky Mountain Arsenal in Denver. Currently, the Pueblo Army Depot (not included in this study) is processing the dismantling and destruction of these chemical weapons and is expected to complete these operations and close in 2022.

The U.S. Air Force was established in 1947 as a separate military service branch. In 1948, the Air Force appointed a board headed by Dwight D. Eisenhower and Robert L. Stearns to study the existing military academies and potential options for an Air Force Academy. In 1950, Congress passed the bill establishing the Air Force Academy, and the Secretary of the Air Force appointed a commission to recommend a location for it. After traveling 21,000 miles and considering hundreds of sites all over the country, the commission recommended Colorado Springs as its first choice. The State of Colorado contributed $1 million (equivalent to over $10 million today) to the purchase of the 18,500-acre ranch located northwest of the city limits. The United States Air Force Academy (AFA) was established in 1954, and

construction was completed in 1959. The academy operated out of Lowry Air Force Base in Denver from 1955-58 while the present-day site was under construction.

At the height of the Cold War in the late 1950s, the idea of a hardened command and control center was conceptualized as a defense against long-range Soviet bombers. The U.S. Army Corps of Engineers supervised the excavation of Cheyenne Mountain and the construction of an operational center within the granite mountain. The Cheyenne Mountain facility became fully operational as North American Aerospace Defense Command (NORAD) Combat Operations Center on February 6, 1967.



The installation came to house elements of the NORAD, U.S. Strategic Command (USSTRATCOM), Air Force Space Command (AFSPC), and U.S. Northern Command (USNORTHCOM). Under what became known as the Cheyenne Mountain Operations Center (CMOC), several centers supported the NORAD missions of aerospace warning, aerospace control, and warning of ballistic missile or air attacks against North America.

The Late 1900s

In 1978, the United States Olympic Committee created an Olympic Training Center at the site of what was Ent Air Force Base.

By the mid-1970s, the Air Force's national satellite operations facility at Sunnyvale, California, had become surrounded by commercial and residential development, creating security concerns and allowing no room for mission expansion. Because of this, the Air Force developed plans to merge Air Force space operations at a Consolidated Space Operations Center and to house an operations support center for the National Aeronautics and Space Administration (NASA). In 1979, the DoD approved plans for the development of an installation (Falcon Air Force Station [AFS]) to support these missions.

During the 1980s, housing construction began within the Gleneagle area south of the AFA, marking the beginning of significant development along the Interstate 25 corridor in what is now northern Colorado Springs and Monument. Falcon AFS opened in 1985. Colorado Springs was home to U.S. Space Command from 1985 to 2002. In 1988, the City of Colorado Springs extended its eastern city limits to encompass the 30,000 acres known as Banning Lewis Ranch (BLR). This area located approximately 3.5 miles west of Falcon AFS was master planned to house up to 175,000 residents.

AFSPC activated the Space Battle Lab at Falcon AFB in 1997. The following year, Falcon AFB was renamed Schriever AFB in honor of Gen. Bernard A. Schriever, known as the father of the Air Force space and missile program.

The 2000s

NORAD's focus and facilities evolved to meet the threats of the 21st century. On July 28, 2006, the Cheyenne Mountain Directorate was re-designated as the Cheyenne Mountain Division, with the mission to assist in establishing an integrated NORAD and USNORTHCOM Command Center within the headquarters building at Peterson AFB.

On the 50th anniversary of the NORAD agreement in 2008, the Command Center located within Cheyenne Mountain was officially re-designated as the NORAD and USNORTHCOM Alternate Command Center.

Cheyenne Mountain AFS is owned and operated by AFSPC, specifically the 21st Space Wing housed at Peterson AFB. Several missions are based inside the Cheyenne Mountain, including NORAD and

USNORTHCOM's Alternate Command Center and training site for crew qualification along with USSTRATCOM's Missile Warning Center.

Extensive development, both residential and commercial, continued in the region until the recession hit in 2008. The owners of BLR declared bankruptcy in 2010, and development ceased for several years. The region has largely recovered from the recession, and the housing market has exploded once again. As this region has become one of the fastest-growing in the country, agricultural land adjacent to many of the military installations continues to be developed.

3 COMPATIBILITY ISSUES

3.01 COMPATIBILITY ISSUES

The Colorado Springs Regional Joint Land Use Study (JLUS) considered a variety of compatibility issues that relate to impacts of military operations and community growth on one another. The 17 issues examined during the course of this study are shown in Table 3.1. These issues illustrate the many ways in which military personnel and civilians have shared interest in many resources, including, but not limited to, air, land, water, and infrastructure.

Table 3.1

COMPATIBILITY ISSUES - OVERVIEW

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	x	x	x	x	x
Land Use Regulations	x	x	x	x	x
Safety Zones	x	x	x		x
Vertical Obstructions	x	x	x		x
Security	x	x	x	x	x
Noise and Vibration	x	x			
Dust/Smoke		x			
Light and Glare		x			
Transportation	x	x	x	x	x
Utility Infrastructure		x	x		x
Stormwater	x	x		x	
Airspace	x	x	x	x	x
Frequency Spectrum			x		x
Water Supply	x	x	x	x	x
Air Quality					
Wildfire	x	x	x	x	x
Noxious Weeds	x	x	x	x	x

Note: x indicates issue studied related to this installation.

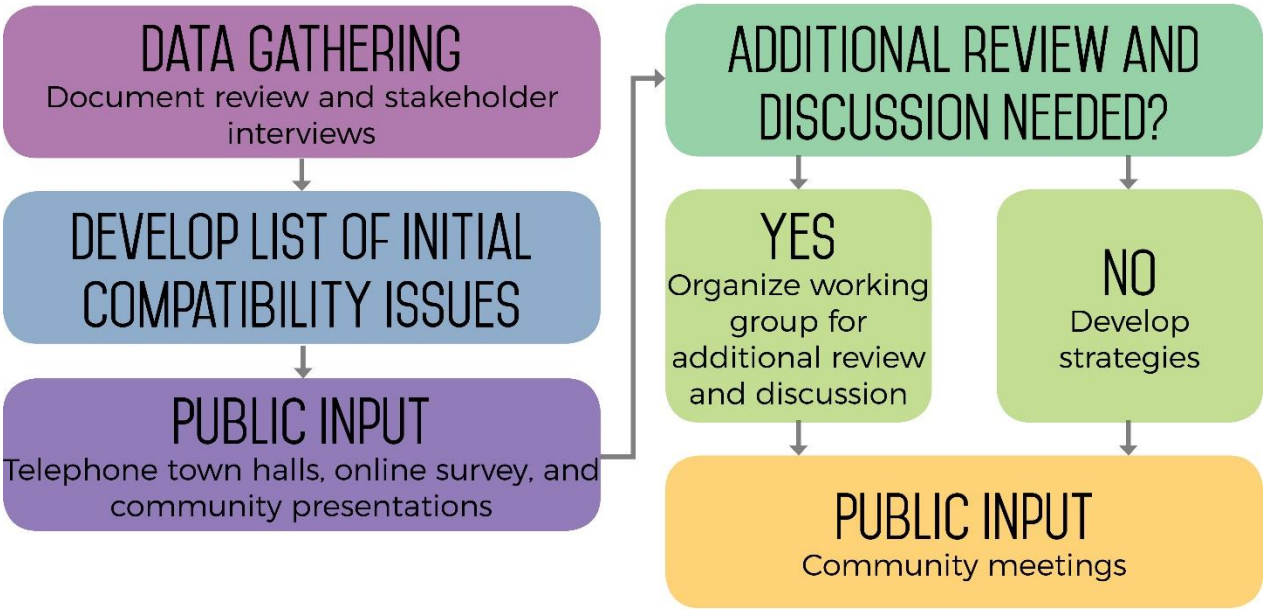
ISSUE IDENTIFICATION

As shown in Table 3.1, not all compatibility issues are applicable to each installation. In addition, not all issues required working groups to explore the issue in depth or identify related strategies. Where existing community plans have identified relevant strategies, that information has been referenced and incorporated into this study to provide guidance to regional stakeholders about the topics described in this section.

To determine the approach needed for each issue, Pikes Peak Area Council of Governments (PPACG) staff initially reviewed publicly available community and military documents to develop a preliminary understanding of issues previously identified. Then PPACG staff met with federal, state, and local government representatives; community organizations; and military officials to understand what compatibility issues they are experiencing as well as what feedback they have received from their respective constituencies. After drafting an initial list of compatibility issues, telephone town hall meetings and an online survey gathered additional input from the public. The survey reinforced which specific issues were of greatest importance to the public and provided additional details about their perceptions of military operations throughout the study area.

In many cases, there are relationships between these issues, and many of the strategies found in Chapter 10 cannot be compartmentalized within only one of the compatibility issues listed in Table 3.1. For example, the compatibility issues of Land Use and Development Review and Interagency and Community Coordination/Communication relate to many of the other compatibility issues.

Figure 3.1
ISSUE IDENTIFICATION PROCESS



3.02 COMPATIBILITY ISSUE DEFINITIONS

REGIONAL COORDINATION

This category relates to timing and frequency of communication, coordination, and collaboration related to compatibility issues among military installations, jurisdictions, land and resource management agencies, and conservation authorities.

BUILT ENVIRONMENT AND MILITARY READINESS

Land Use Regulations: The basis of land use planning relates to the local jurisdictions' roles in protecting the public's health, safety, and welfare by ensuring that the use of one property does not negatively impact the use of another. Land use is governed by zoning ordinances and guided by comprehensive plans developed and administered by local jurisdictions.

Safety Zones: Safety zones are areas in which there are higher risks to public safety surrounding aircraft accident potential zones (APZs), flight paths, firing range safety zones, explosive safety zones, and electromagnetic field radiation zones. Safety zones are governed by strict civilian and military protocols and must be protected and properly managed to ensure the success of military missions.

Vertical Obstructions: Vertical obstructions are created by buildings, trees, structures, cell towers, wind turbines, or other features that could encroach into the navigable airspace used for military operations (aircraft approaches, military training routes, and helicopter landing zones).

Security: Installations provide protection from external threats to reduce the vulnerability of individuals, Department of Defense (DOD) personnel (and their families), property, resources, and critical information.

Noise and Vibration: Exposure to high noise levels can have a significant impact on human activity, health, and safety, as well as limited impacts on wildlife and livestock. Sources of noise include, but are not limited to, civilian sources such as vehicular traffic, commercial aircraft, and private aircraft, and military training operations that involve aircraft, ground vehicles, and weaponry. Vibration may also occur because of an impact, explosion, noise, mechanical operation, or other change in the environment created by either civilian or military activities.

Dust/Smoke: Dust results from the suspension of particulate matter in the air. Dust and smoke can be created by fire (e.g., controlled burns, agricultural burns, artillery exercises, and wildfire), ground disturbance (e.g., agricultural activities, military operations, and grading), industrial activities, or other similar processes.

Light and Glare: Artificial lighting from commercial, industrial, recreational, and residential uses at night can cause excessive off-site glare and illumination creating visual disruptions that can interfere with both civilian and military activities.

Transportation: Roadway, railway, and air capacity relates to the ability of existing transportation infrastructure (e.g., highways, arterials, local roads, railroad corridors, airfields, etc.) to provide adequate mobility and access to, from, and between military installations and the surrounding communities.

Utility Infrastructure: This factor covers the extension or provision of new infrastructure (e.g., water, power, and natural gas) near an installation, including from renewable and non-renewable sources.

Stormwater: The combination of development patterns, infrastructure, and characteristics of precipitation events can generate potential stormwater issues that negatively impact transportation networks, military and civilian land uses, and wildlife habitat.

Airspace: The military requires the use of airspace of an adequate size and quality to accomplish training and operational missions. Competition for this shared resource can impact the future growth of civilian and military uses.

Frequency Spectrum: Frequency spectrum impedance and interference refer to the interruption of electronic signals by a structure or object (impedance) or the inability to distribute/receive a particular frequency because of similar frequency competition (interference). Frequency spectrum capacity is critical for maintaining existing and future missions and communications on installations. Advances in consumer electronics have increased use of frequency spectrum and can impact military operations.

NATURAL RESOURCE FACTORS

Water Supply: Military operations and regional development require an evaluation of water supply issues due to Colorado's variability of precipitation and arid climate, along with state laws regarding water rights that require innovative water supply use and reuse strategies.

Air Quality: Pollutants (e.g., particulates, ozone, etc.) can limit visibility and affect the ability to meet state and federal air quality standards. Nonattainment may limit future operations at the installation or in the area.

Wildfire: Wildfire is a natural part of local ecosystems and climate fueled by dry conditions and lightning strikes; they may also be caused by human activities. Wildfire prevention is managed through land use planning and logistical coordination between military and local government organizations to minimize associated risks to life, property, and installation missions.

Noxious Weeds: Noxious weeds replace native vegetation, reduce agricultural productivity, cause wind and water erosion, and increase the threat of wildfire. Management techniques to control and eradicate invasive species should be coordinated among landowners, local jurisdictions, and military installations.

4 REGIONAL COMPATIBILITY

4.01 INTRODUCTION

Because of the number of communities and military installations involved in the Colorado Springs Regional Joint Land Use Study (JLUS), addressing compatibility issues often requires a regional approach involving multiple partners: residents, local decision-makers, and military installation representatives. This chapter provides background at a regional scale on the relationships among compatibility issues, mission operations, and community stakeholders. Compatibility issues specific to each installation are described in their respective chapters (Chapters 5-9).

Source: PPACG

Table 4.1

COMPATIBILITY ISSUES - REGIONAL

KEY REGIONAL ISSUES:

1. **Regional Coordination** – Working to maximize the effectiveness of coordination across multiple military installations, local jurisdictions, community organizations, and residents is crucial to effectively address all other JLUS challenges.
2. **Transportation** – Adequate transportation will affect development and services for military installations and drive adjacent land uses that can affect their missions.
3. **Stormwater** – Stormwater management can exacerbate runoff, degrade stream stability and water quality, and increase flood risks.
4. **Water Supply** – Water plans at the state and regional level have identified future water supply gaps, efficiencies that can be achieved, and planning efforts to encourage best practices.
5. **Wildfire** – Fires affect buildings and infrastructure and damage watersheds and other natural areas. This can also result in flash flooding and mudslides.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	**x**	**x**	**x**	**x**	**x**
Land Use Regulations	**x**	**x**	**x**	**x**	**x**
Safety Zones	x	x	x		x
Vertical Obstructions	**x**	**x**	**x**		**x**
Security	x	x	x	x	x
Noise and Vibration	x	x	x		
Dust/Smoke		x			
Light and Glare		x			
Transportation	**x**	**x**	**x**	**x**	**x**
Utility Infrastructure		**x**	**x**		**x**
Stormwater	**x**	**x**	**x**	**x**	**x**
Airspace	**x**	**x**	**x**	**x**	**x**
Frequency Spectrum			x	x	x
Water Supply	**x**	**x**	**x**	**x**	**x**
Air Quality					
Wildfire	**x**	**x**	**x**	**x**	**x**
Noxious Weeds	x	**x**	x	x	x

Note: x indicates issue studied related to this installation.

REGIONAL COORDINATION

Because of the presence of five military installations in the region, effectively communicating with and gathering feedback from the public can be a challenge. Information relating to deployments, flight operations, and public events is regularly distributed via broadcast and print media, as well as online sources, including social media. In some cases, residents can contact military installations directly to obtain information.

As discussed by stakeholders in the Communication Working Group, effective communication is based on what the installation or organization wants to communicate, what information the public is most interested in knowing, and how the public is commonly receiving information.

Public communication around JLUS issues occurs through four distinct exchanges between:

1. Military representatives and residents
2. Military representatives and local governments
3. Military representatives and local private organizations or businesses
4. Local governments and residents

In the past, military installations have utilized existing and new methods for communicating with the public and listening to public concerns even if there were no updates on the issue. Regularly checking in with political representatives, attending and providing updates at city or town council meetings, and keeping local civilian leaders and their staff informed has created effective conduits to communicate information to the public in addition to dissemination through online tools and media outlets.

In addition to general coordination and communication that takes place between the regional military installations and the community, coordination is required to address specific areas relevant to this JLUS, most notably relating to land use regulation and wildfire management.

State Tools

The Colorado House of Representatives and state Senate each have a State, Veterans, and Military Affairs Committee that considers matters concerning elections, campaign finance, military and veterans affairs, and other subject areas related to state government. In addition, the committee has legislative oversight responsibility for the Department of Military and Veterans Affairs (DMVA). The Executive Director of the DMVA, the Adjutant General, is a member of the Governor's Cabinet.

Colorado Revised Statutes (CRS) 43-1-1103 (5) (b.5) requires that state transportation plans shall be developed in "coordination with federal military installations in the state to identify the transportation infrastructure needs of the installations and ensure that those needs are given full consideration during the formation of the state plan."

Colorado House Bill 10-1205 modifies law relating to land use planning by county and municipal governments to address the impacts of military installations in close proximity to local governments. Previously, a local government with a military installation, or a portion of a military installation within its territory, was required to submit to the commanding officer of the installation information about proposed changes to the local government's zoning plan or land development regulations within two miles of the installation. The act alters this provision by applying the information submission requirements to local governments within two miles of military installations and requiring local governments to also submit the information to installations flying mission commanding officers. *Under the act, a military installation now has 14 business days to review the information and submit comments to the local government; previously, there was no set deadline for comments in state law. {Emphasis added}*

HB 17-1054 was passed pursuant to the 2013 National Defense Authorization Act, 10 U.S. Code sec. 2679, which created an intergovernmental support agreement program between the federal DOD and state and local entities to support cooperative agreements between military installations and their host communities. The state legislation directs the Department of Local Affairs to support cooperative intergovernmental agreements between military installations and local governments within existing programs, resources, and technical expertise.

The Colorado Thirty Group is a nonprofit with over 150 distinguished participants from across the state. Participation is by invitation only and participants are entrusted with communicating between local Colorado communities and the military to ensure good relations and provide a supportive environment for all.

Other state programs that support the military families beyond the JLUS scope:

- Spousal licensure: The Colorado Department of Regulatory Agencies has implemented a distinctive program to support the mobility and transportability of a military spouse's professional license in instances when a military spouse has been relocated to Colorado by military orders and has an active license in good standing from another state.
- In-state tuition is available for military children even if the parents are deployed elsewhere.

Local Tools

- Pikes Peak Area Council of Governments: includes all installation military leadership as non-voting members of the Board of Directors, and installation planning representatives as non-voting members of the Transportation Advisory Committee.
- Chamber of Commerce and Economic Development Corporation (Chamber/EDC)-Military Affairs Council (MAC): Established in 1941 and meets monthly in Colorado Springs. Honorary members include all levels of local, state, and federal delegation as well as active duty in command positions and their senior enlisted leaders.
- Area Chiefs of Staff: The group meets monthly and is hosted by the Chamber/EDC, the MAC, and includes representatives from local governments.
- Defense Mission Task Force (DMTF): This task force was established in 1995 and meets bi-monthly in Colorado Springs. The group includes installation leadership, congressional delegation representatives, and other stakeholders brought together when their input is needed on a specific issue. Task organizers work through issues as they arise.
- Community Relations (ComRel): This group consists of the Chamber of Commerce and Economic Development Corporation, Military Affairs Council, and Public Information Officers from each installation. ComRel meets monthly to discuss and deconflict upcoming events.
- Senior Enlisted Breakfast: This group meets bi-monthly. At these meetings, the MAC and Chamber/EDC leadership meet with the most senior enlisted members, major commands, and other representatives from each of the five installations in the Pikes Peak region.
- Informal Professional Networks: This consortium general consists of the leadership of local chapters of national organizations associated with military and defense issues. As needed, these organizations are called together to rally around a particular issue requiring broad-based support.

There are many other notable local military partners that provide additional support that are outside the scope of the JLUS but important to acknowledge, including:

- El Pomar Foundation: This is a local non-profit with strong military ties that is a foundation for Colorado with the mission that is dictated by the values of Spencer and Julie Penrose, prominent early residents of Colorado Springs. The organization operates in the areas of arts

and culture, civic and community initiatives, education, health, and human services.

- Homefront Cares: A non-profit that helps with supporting local military through providing emergency financial assistance and responsive support to Colorado's military members, veterans and their families.
- Warrior Family Community Partnership: This partnership is associated with Fort Carson and is an extension of the Army Community Covenant, an Army program that partners units and installations with local communities to improve the quality of life for soldiers and their families.
- Peak Military Care Network: This previous planning effort that began in PPACG as the Fort Carson Growth Plan generated the creation of a network that connects military service members, veterans and their families in the study region to 44 partner agencies (at the time of this study) who are committed to understanding military and veteran culture and the unique needs of service members, veterans and their families.

Informing the Public

Multiple working groups had discussions about how to help homebuyers access publicly available information that would help them understand the experience of living in an area where military operations occur. Residents living near an airfield and/or military installation experience periodic noise, transportation impacts, and irregular or seasonal flight activity. These impacts, which may not have been present when the homebuyer was considering neighborhood qualities, can cause strained relations with the installation. Figure 4.1, Regional Growth Map, shows structures built before and after the first military installations were established in the area in the 1940s in preparation for World War II.

Residential development in accident potential zones (APZs) or beneath flight patterns need specific resources associated with those areas. Plat notes, information provided by developers and real estate professionals, zoning regulations, websites, and informational handouts can help potential residents understand that daily life near an installation will include the sights and sound of aircraft, artillery, or other weapon systems.

Input gathered as part of a resident survey in 2016 indicated that most interest in military operations is simply curiosity about what aircraft are flying overhead and what military events or operations may affect residents' daily lives. The community is generally supportive of military operations and related impacts because they are seen as a necessary part of fulfilling the installations' respective missions and a core element of the community's collective identity.

However, several residents also expressed concerns about potential negative safety impacts or noise disturbances.

Wildfire Coordination

Military and civilian fire departments have developed integrated communication networks to jointly share resources when a wildfire occurs. This protects the region regardless of where the fire takes place. Media outlets are also well integrated into this effort to communicate with the public during wildfires.

In addition, coordination prior to wildfire emergencies has taken place on many fronts. PPACG transportation planners worked with the City of Colorado Springs to identify optimal evacuation routes. Fire departments and fire prevention agencies have created educational materials and conducted public outreach to help residents protect their properties from fire.

There are additional opportunities where focused efforts could occur within neighborhoods along installation boundaries, including Cheyenne Mountain Air Force Station (AFS), Fort Carson, and the Air Force Academy. Working with residents to create defensible space on their properties on or near installation boundaries is a proactive measure to protect private property that also reduces the chance that fire will spread.

Land Use and Development Review

The basis of land use planning is to protect the public's health, safety, and welfare by ensuring that the use of one property does not negatively impact the use of another. Land use is governed by local zoning ordinances and guided by comprehensive plans developed and administered by local jurisdictions. The military also has a vested interest in land use planning and maintaining compatible land uses to sustain military missions.

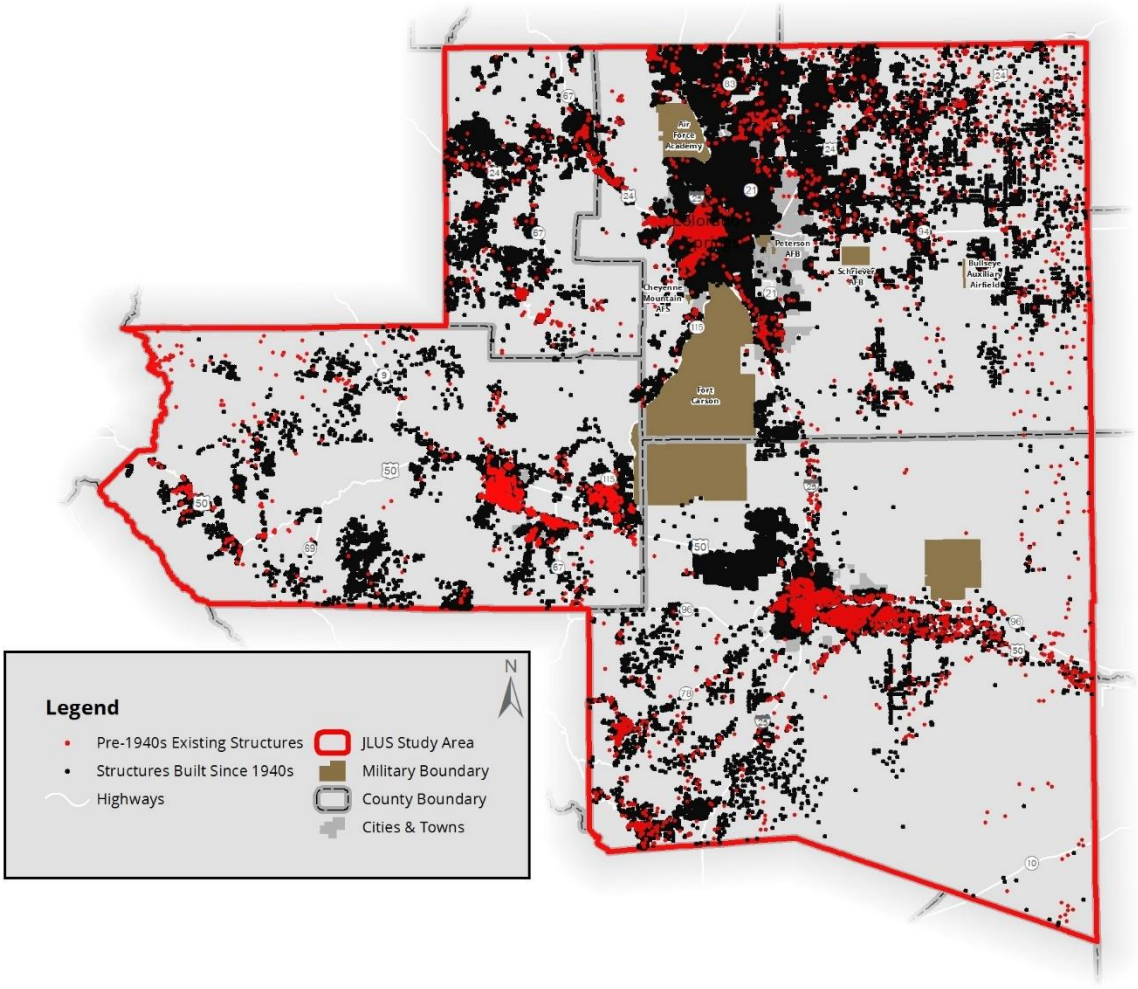
To evaluate development projects within the context of these requirements, military and civilian land use planners have a review process for land use development applications. Development applications are typically submitted to a local government office and include, but are not limited to, site plans, grading plans, landscape plans, lighting plans, utility plans, geological hazard reports, soil reports, traffic studies, and/or fire flow plans. One of the unique factors in the review process is the Colorado State Statutes that require civilian agencies to submit development applications to military installations when those developments are located within two miles of the installation boundary. Each jurisdiction has its own system of communication and review deadlines for the development application process. Generally, the review process works well between civilian agencies and the military, but historically, there have been challenges with resolving compatibility issues within this process. Both civilian and military land use review groups have internal protocols that can conflict with review timelines and deadlines which have caused certain types of development and land uses that are in direct conflict with or impact military missions. The JLUS process identified opportunities for improvement, some of which have been resolved through the connections made as part of the JLUS working group efforts. Other development review process challenges will be worked on through the implementation process, set to begin in January 2019. The review process – including meeting deadlines, holding application meetings, and collaborating between civilian and military planners – was among the topics that were discussed by the Land Use and Development Review Working Group throughout this study.

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation."

Public Lands

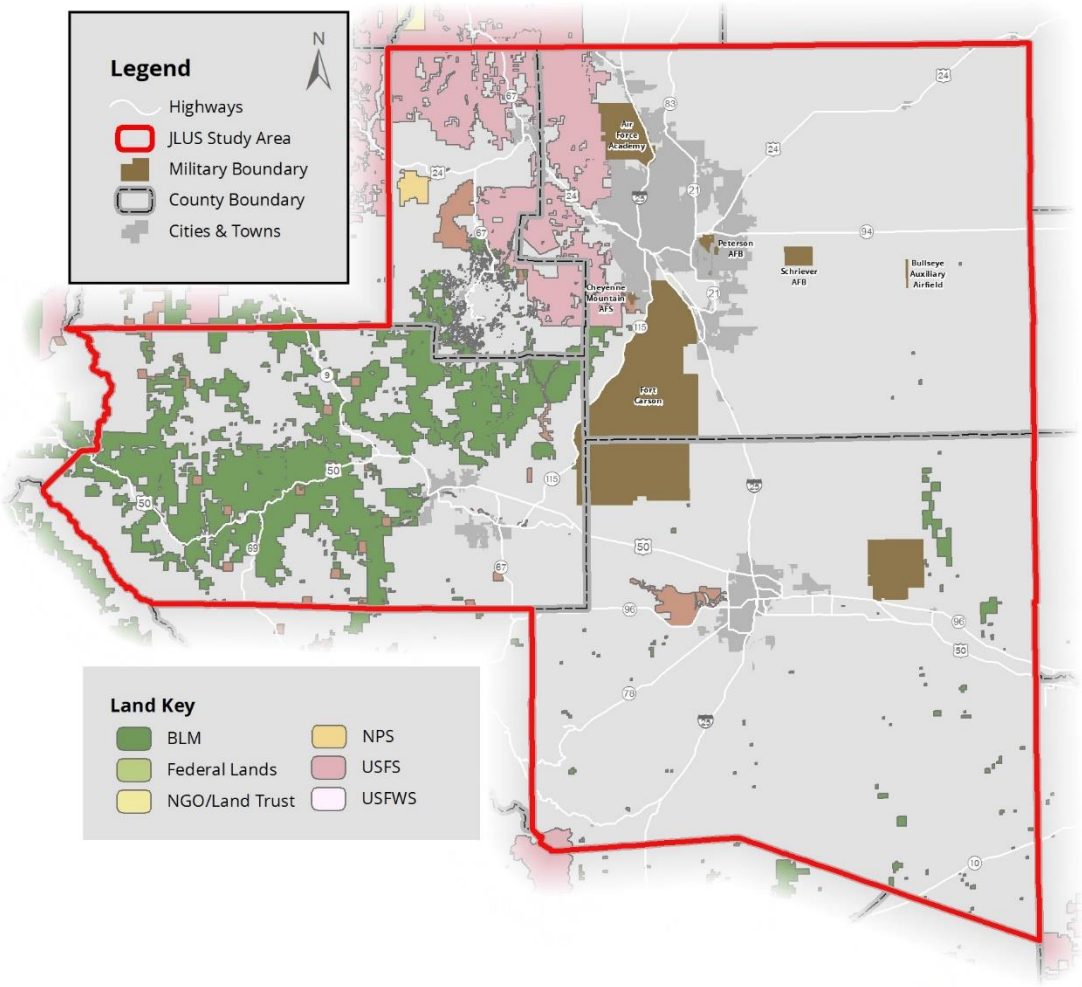
Recreational opportunities on public lands are a primary draw of new population to this region. It also serves as an essential military training asset due to the topography, varied environments, and undeveloped land under flight training routes. However, public land management also impacts wildfire severity, watersheds, and wildlife and ecosystem health. As shown in Figure 4.2, The Bureau of Land Management, National Park Service, U.S. Forest Service, U.S. Fish & Wildlife, Non-Government Owned Land, and State Land Trusts, and other entities, illustrate the abundance and diversity of public lands and stakeholders in the region.

Figure 4.1
REGIONAL GROWTH MAP



Data Source: Pikes Peak Regional Building Department, PPACG

Figure 4.2
REGIONAL FEDERAL LANDS

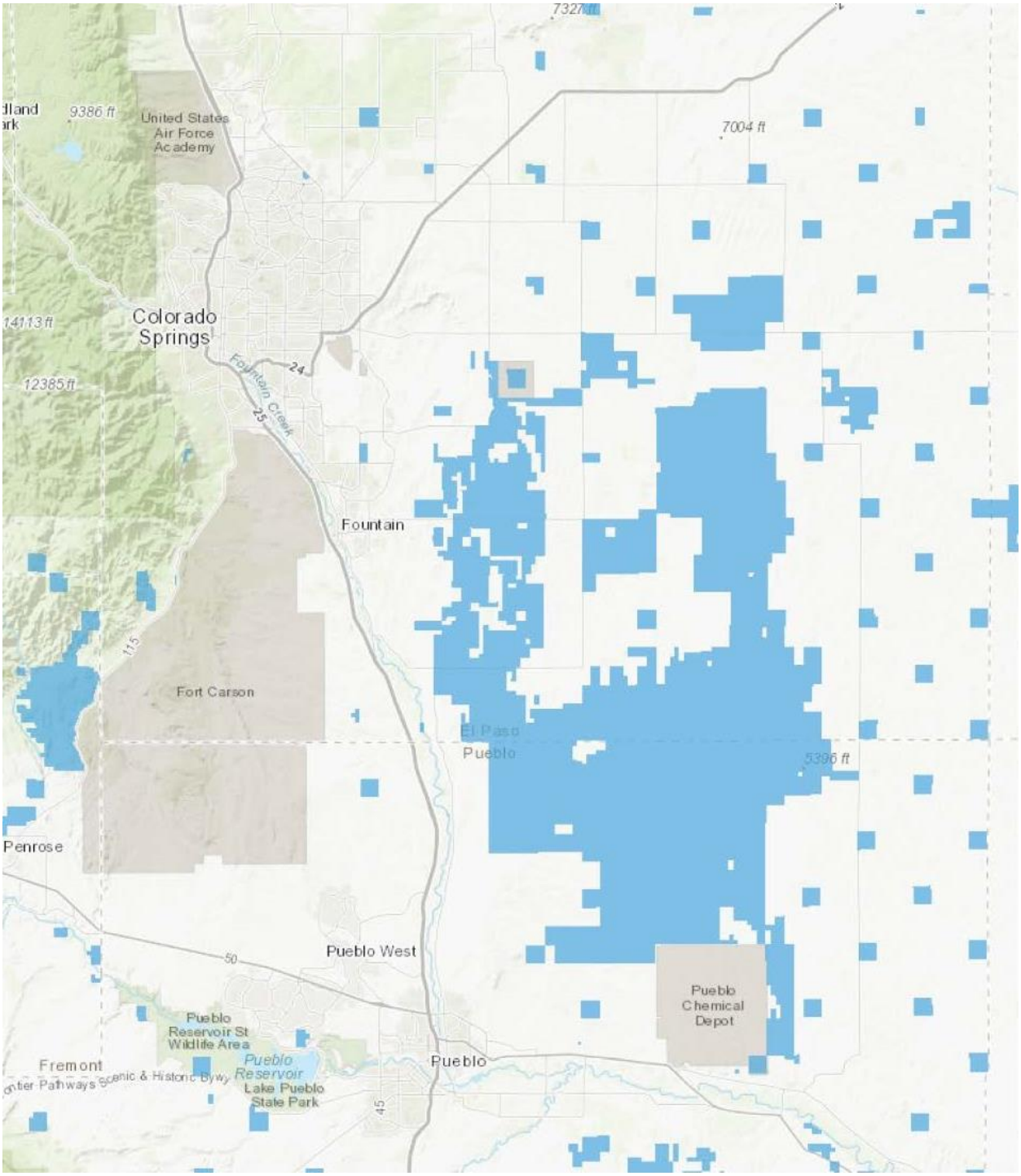


Data Source: PPACG

BLM: Bureau of Land Management; NGO: Nongovernmental Organization; NPS: National Park Service; USFS: United States Forest Service; USFWS: United States Fish and Wildlife Service

Figure 4.3

LANDS MANAGED BY THE COLORADO STATE LAND BOARD



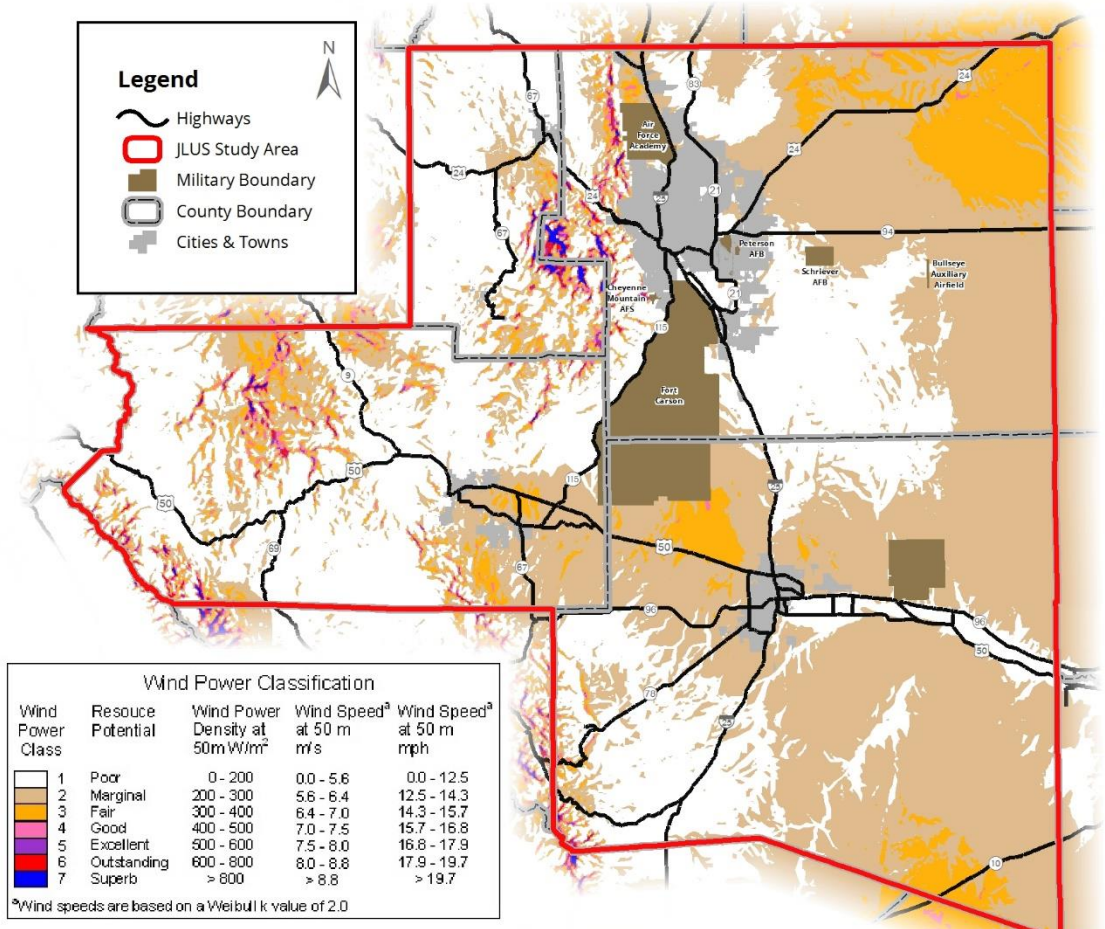
Data source: Colorado State Land Board website. The areas represented in blue indicate are lands managed or owned by the Colorado State Land Board. Within these lands is the 50,000 acre Chico Basin Preservation Area (not depicted): 22,000 acres in Pueblo County; 28,000 in El Paso county.

VERTICAL OBSTRUCTIONS

Wind energy provides 17 percent of the total electric energy produced in Colorado. The wind energy generation potential represented on Figure 4.4, Regional Wind Power Classifications, indicates that additional future wind energy generation projects could be proposed within the study area. Effective coordination with the military installations, the Federal Aviation Administration (FAA), and National Oceanic and Atmospheric Administration (NOAA) radar operations are essential for compatible wind energy generation development.

Source: https://www.awea.org/resources/free-use-wind-energy-image-gallery

Figure 4.4
REGIONAL WIND POWER CLASSIFICATIONS



Data Source: National Renewable Energy Labs (NREL), PPACG; 2016 data

Map Terms: m: meter; W/m²: watt per square meter; m/s: meters per second; mph: miles per hour

TRANSPORTATION

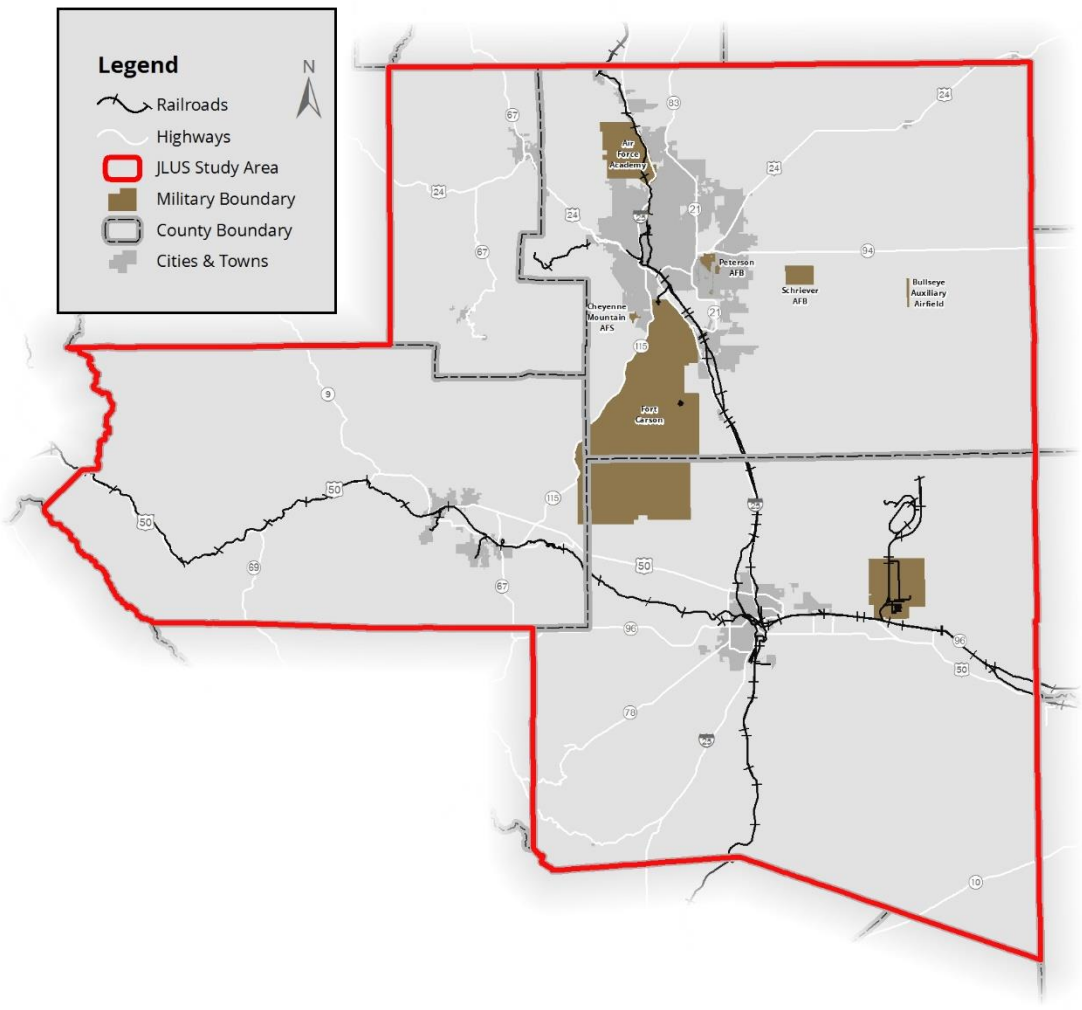
Military planners and civilian transportation planning officials have been using the TAC at PPACG to address regional transportation needs. This committee coordinates various transportation stakeholder groups at a regional level to discuss transportation needs for both the community and the military installations. It is a valuable resource for newly elected officials to access institutional knowledge related to regional transportation.

While the community's transportation interests are far reaching, installations are primarily concerned with the interface with the community and whether traffic/transportation needs are met for their personnel. Adequate transportation will affect development and services for military members and drive adjacent land uses that can affect military missions.

Rail lines in the region such as Burlington Northern & Santa Fe, Pikes Peak Cog Railway, Amtrak, among others, illustrate the regional railroad transportation network. As shown in Figure 4.5, Regional Railroad Network, railroad freight corridors are active in this region and utilized by Fort Carson to transport equipment.

Source: PPACG

Figure 4.5
REGIONAL RAILROAD NETWORK



Data Source: PPAC

STORMWATER

As shown in Figure 4.6, Regional Water Basins, the Pikes Peak region is home to several stormwater basins, many of which originate within Pike National Forest. The JLUS region contains the Fountain Creek Watershed, which extends 927 square miles from Palmer Lake to Pueblo and is one of the more complex watersheds in the nation for several reasons, including:

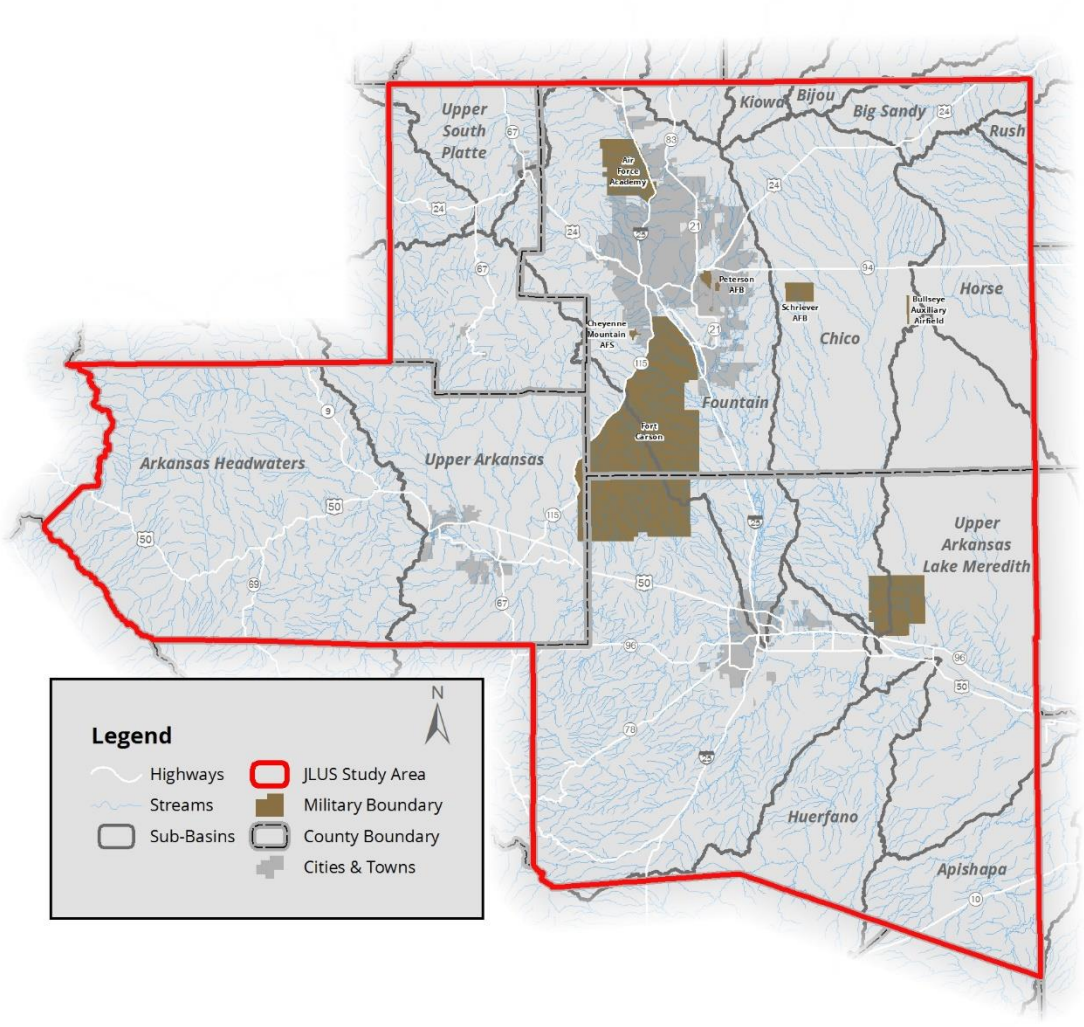
- the natural settling of decomposing Pikes Peak granite
- a 9,500-foot elevation change over 60 miles
- more than 50 intermittently flowing creeks
- rapid development of the City of Colorado Springs and surrounding region
- Expansion of impervious surfaces
- two major fires in the last 5 years and subsequent flooding

The regional stormwater system has its own network of piping/conveyance infrastructure. Additional water basins, including the Upper Arkansas, Upper South Platte, Fountain, and Chico water basins are important components to the water supplies for the region. Stormwater runoff does not go into the wastewater collection system or treatment plants. Instead, it flows directly into local waterways, ultimately ending up primarily in the Fountain Creek drainage basin, along with any pollutants it collects along the way.

Watersheds in the Pikes Peak region are characterized by a variety of land uses, including areas of rapid urban and suburban development. This has the potential to exacerbate runoff and undermining the natural geomorphic protection and stream stability. This can in turn impact water quality and flood risks. The communities and installations in this region have a shared interest in managing water, from how it flows as stormwater to how it is managed as part of the region's water supplies for urban and agricultural uses.

The JLUS recognizes there are multiple segments of Fountain Creek, but for the purposes of this study, the Southern Stormwater Working Group focused on those segments on Fountain Creek that affect or are affected by military missions.

Figure 4.6
REGIONAL WATER BASINS



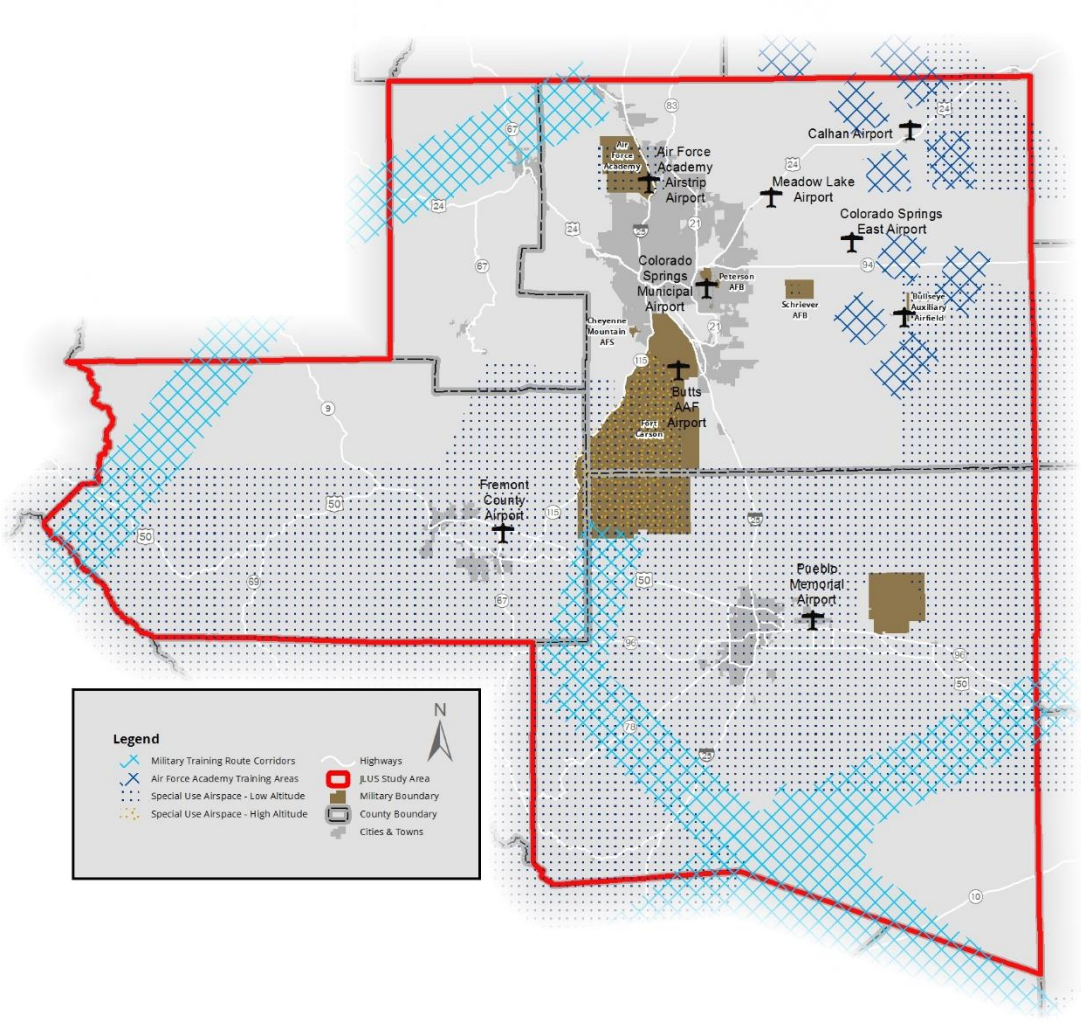
Data Source: PPACG

AIRSPACE

As shown in Figure 4.7, Regional Airfields and Training Areas, airspace within the study area is active with civilian and military flight. Many of the region's civilian airports are utilized by military aircraft for training purposes. Peterson Air Force Base (AFB) and Colorado Springs Airport share an airfield that is experiencing increasing civilian flight and residential development on adjacent lands. The AFA Airfield is one of the busiest in the Air Force. Encroachment from development and civilian airspace use have had adverse impacts on the Air Force Academy's flight training operations causing a need to reconfigure airspace and flight routes. This issue became a core rationale for performing the Joint Land Use Study, and the related noise study (Appendix E). Discussion of installation-specific concerns on airspace use can be found within each installation chapter.

In May 2016, the JLUS Policy Committee established a Regional Airspace Committee to discuss and address common regional airspace issues of concern for the military installations, local airports, and airspace users. Discussions included topics such as collaboration between planners and airspace professionals, incompatible development around airfields, Unmanned Aerial Systems (UAS/drones), communication with citizens, real estate disclosures, military training operations, and potential community-military partnerships (see Appendix B for more information on this working group).

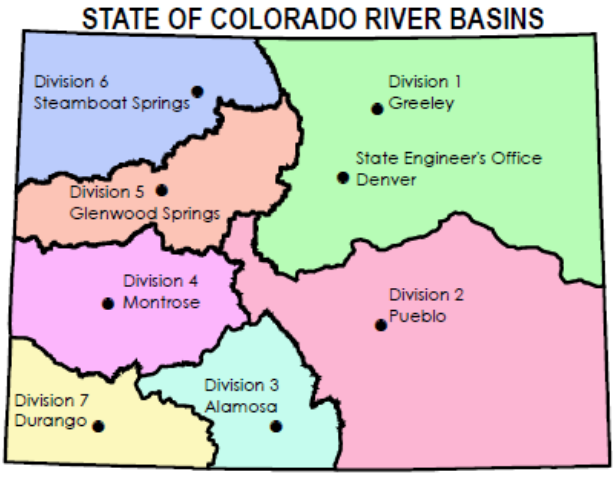
Figure 4.7
REGIONAL AIRFIELDS AND TRAINING AREAS

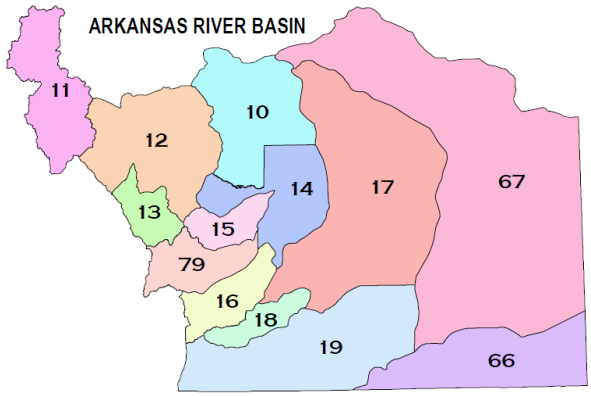


Data Source: PPACG, DOD; Acronyms: AAF: Army Airfield

WATER SUPPLY

Colorado has eight major river basins and several aquifers (see Figure 4.6, Regional Water Basins). Most of the water supply falls as snow in the Rocky Mountains. Because of weather patterns, more snow falls in the Colorado River Basin west of the Continental Divide. To deliver this water to the populated areas along the Front Range, transmountain diversions, such as the Colorado-Big Thompson Project and Fryingpan-Arkansas Project have been developed.





District	District Name	District	District Name
10	Fountain Creek	17	Arkansas: Fowler to Las Animas
11	Arkansas: Headwaters to Salida	18	Apishapa River
12	Arkansas: Salida to Portland	19	Purgatoire River
13	Wet Mountain Valley	66	Cimarron River Basin
14	Arkansas: Portland to Fowler	67	Arkansas: Las Animas to Stateline
15	Saint Charles	79	Huerfano River
16	Cucharas River		

Data Source: State of Colorado, Department of Natural Resources, Division of Water Resources

Though originally designed primarily for agricultural water supply, both projects have been increasingly supplying Colorado's growing municipalities. Because of river compacts, Colorado doesn't control all the water originating within its borders, and out-of-state players have their own interests, particularly for the "big four" Colorado rivers: the Arkansas, Colorado, South Platte, and Rio Grande.

Colorado's Water Plan has identified a substantial gap for the Pikes Peak region between the future demand for water compared to the current supply. El Paso County's Water Master Plan has helped develop further understanding of current water supply and demand conditions, has identified efficiencies that can be achieved, and has taken steps through the comprehensive planning and development review process to encourage best practices for water demand management, water efficiency, and water conservation.

The City of Colorado Springs' largest enterprise, Colorado Springs Utilities, is the primary water supplier for the region's military installations, except for Schriever AFB. Colorado Springs Utilities recently finalized its integrated water resource plan (IWRP), for which members of the military were seated on the committee. Modeling within the IWRP took the potential for increased military personnel into consideration. Colorado Springs Utilities is confident that this plan incorporates water supply needs for future military missions.

Schriever AFB receives water and sanitary sewer services from the Cherokee Metropolitan District (CMD), a not-for-profit, quasi-municipal governmental entity originally established in 1957. They primarily provide water and sanitary sewer operations for Cimarron Hills customers, as well as maintenance of street lighting. CMD lies outside the city limits of Colorado Springs and is located east of and adjacent to the city in El Paso County. CMD's service area includes Peterson AFB (not served by CMD) on the south; Powers Boulevard on the west; a northern boundary approximately 2 miles north of Constitution Avenue to Barnes Road; and the

eastern boundary follows Highway 24 approximately one mile east of Marksheffel Road to Constitution Avenue. This district is roughly 6,300 acres and serves some 17,945 customers including Schriever AFB, which is technically outside of the CMD boundary. As the installation grows, it will be important for CMD to understand its anticipated infrastructure and usage needs to accommodate future mission growth and avoid water and sewer capacity issues

Communities within this region experienced groundwater issues that were beyond the scope of this study due to the urgent nature of contamination related to past use of firefighting substances (PFOA/PFCs). However, it is important to note that continued monitoring and coordination with the military on water quality management fits within the scope of coordination and communication surrounding water supplies.

WILDFIRE

As urban and suburban development expands into natural areas – such as forests, grasslands, or prairies – homes and businesses may be situated in or near areas susceptible to wildfires, known as the wildland-urban interface (WUI). Wildfire potential is greatest during periods with little or no rainfall and high winds, and most are human-caused.

Fires affect transportation, gas, power, communications, and other services. Flying embers can set fire to buildings more than a mile away from the wildfire itself. Extensive acreage can be burned, damaging watersheds and critical natural areas. Flash flooding and mudslides often occur in the aftermath of a fire, and the negative effects on the land can last for many years.

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5 AIR FORCE ACADEMY

5.01 OVERVIEW

The Air Force Academy's (AFA) core mission is to *"educate, train, and inspire men and women to become officers of character, motivated to lead the United States Air Force in service to our nation."*

Newly commissioned second lieutenants celebrate at the end of the Air Force Academy's Class of 2015 graduation ceremony. (Photo by U.S. Air Force)

Figure 5.1

AFA QUICK FACTS

DATE FOUNDED	APRIL 1, 1954
DIVISION	10TH AIR BASE WING
LAND AREA	18,500 ACRES
MILITARY PERSONNEL (2016)	6,113
CADETS (2018)	4,400
CIVILIAN EMPLOYEES (2016)	1,878
ESTIMATED TOTAL ASSOCIATED POPULATION (2017)	25,000
ECONOMIC IMPACT (2017)	$1 BILLION

Table 5.1

AIR FORCE ACADEMY COMPATIBILITY ISSUES

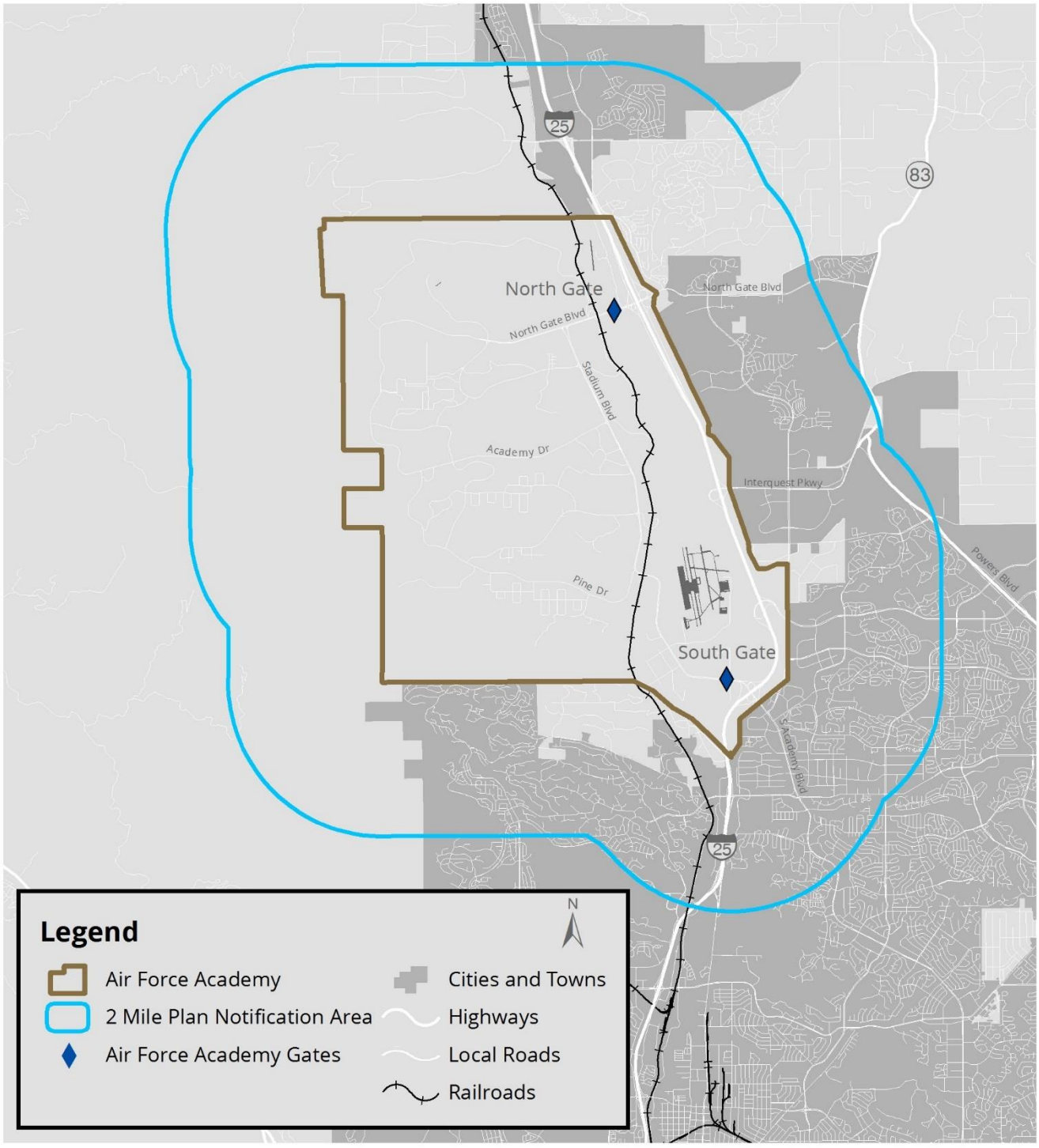
KEY ISSUES:

1. **Land Use Regulations** – Ongoing issues created by incompatible development adjacent to the Air Force Academy are not addressed in land use regulations.
2. **Noise and Vibration** – Aircraft noise from the Air Force Academy flight training is a major concern for nearby residents.
3. **Transportation** – A designated alternative route for the New Santa Fe Trail does not exist for when the trail is closed due to security threats, flood damage, or maintenance.
4. **Stormwater** – Numerous regional stormwater projects within the Monument Creek watershed would occur within drainages that impact the Air Force Academy.
5. **Airspace** – Regional changes to airspace and the development of wind turbines has affected the Air Force Academy flight training and flight patterns.
6. **Wildfire** –Wildfires on and near the Air Force Academy have the potential to disrupt training exercises.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	**x**	x	x	x	x
Land Use Regulations	**x**	x	x	x	x
Safety Zones	**x**	x	x		x
Vertical Obstructions	**x**	x	x		x
Security	**x**	x	x	x	x
Noise and Vibration	**x**	x	x		
Dust/Smoke		x			
Light and Glare		x			
Transportation	**x**	x	x	x	x
Utility Infrastructure		x	x		x
Stormwater	**x**	x	x	x	x
Airspace	**x**	x	x	x	x
Frequency Spectrum			x	x	x
Water Supply	**x**	x	x	x	x
Air Quality					
Wildfire	**x**	x	x	x	x
Noxious Weeds	**x**	x	x	x	x

Note: x indicates issue studied related to this installation.

Figure 5.2
AIR FORCE ACADEMY MAP



Data Source: PPACG

AIR FORCE ACADEMY MISSION AND OPERATIONAL FOOTPRINT

The Air Force Academy was established to prepare future officers for service in the Air Force. Inherent in the name is a focus on flight that requires cadets to spend a significant number of hours learning how to pilot an airplane. National defense priorities have created a need for more pilots than are currently in the Air Force in order to meet these objectives. Without the ability to conduct flight training at the Air Force Academy, this would have negative consequence nationally and locally. The cessation of airfield operations would means lost jobs and income to the community; but also greatly impact the Air Force Academy's mission and growing flight operation requirements of the Department of Defense in alignment with the 2018 National Defense Strategy.

The operational footprint associated with these training activities includes use of public and military airspace over public and private lands, use of transportation networks, and public utility infrastructure. Actions associated with development off of the installation have created stormwater flows into the installation that negatively impact on-base training activities by affecting roads, bridges, and environmental conditions.

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation."

For more information about the Air Force Academy, visit www.usafa.af.mil.

5.02 COMPATIBILITY ISSUES

This chapter discusses the relationships among compatibility issues, mission operations, community stakeholders, and current actions to provide background for the strategies listed in Chapter 10, Implementation Strategies.

The Air Force Academy, when it was founded, was located far away from communities in order to reduce potential compatibility issues. The last twenty years of growth that occurred near the installation resulted in incompatible zoning adjacent to flight training and field training areas as well as stormwater issues from upstream development.

Although there are existing compatibility issues as noted in this study, it is also important to recognize that there has been effective coordination and communication between the Air Force Academy and community partners on many issues such as fire mitigation, emergency response, and utilities. Some of these partnerships include but are not limited to the U.S. Fish and Wildlife Service, U.S. Forest Service, and Colorado Springs Fire Department.

In recent years, several factors necessitated flight patterns changes for Air Force Academy cadet flight training operations over residential areas (approximate flight training routes are shown in Figure 5.3). The FAA changed the regional airspace configuration due to increased airspace use by Denver International Airport (DIA), Centennial Airport, and Colorado Springs Airport. This resulted in adjustments to Air Force Academy flight training routes in northern El Paso County and northern Colorado Springs. Residents living in these areas began to experience the effects of these new civilian and military flight patterns and contacted the Office of U.S. Representative Doug Lamborn regarding noise and safety concerns. In response, the Air Force Academy began to engage citizens in 2015 pursuant to these concerns through a series of public meetings and outreach efforts including

inviting concerned residents to the airfield to describe the details of flight training operations. As part of the JLUS process, the Air Force Academy Flight Training Working Group met in 2016 and concluded in 2017 to continue discussions. This will be ongoing issue after this study is complete.

REGIONAL COORDINATION

Please see Chapter 4, Regional Compatibility, for a complete discussion.

BUILT ENVIRONMENT AND MILITARY READINESS

Land Use Regulations

The Air Force Academy has experienced significant encroachment over the past three decades due to Colorado Springs growing north from North Academy Boulevard and the Town of Monument growing south from State Highway 105. Former rural agricultural land in El Paso County annexed by Colorado Springs east of Interstate 25 has been developed primarily as residential, with some commercial and light industrial uses. Land has been converted to high-rise zoning directly under low, established flight patterns, along with conversion of commercial and industrial land uses to residential land uses adjacent to flight training. A corresponding reduction in adequate open space in these areas is both a public safety concern and a training concern.

Figure 5.12, Air Force Academy-Area Growth Map, shows the population growth around the Air Force Academy since the first military installations were established in the area in the 1940s in preparation for World War II.

Regional growth has impacted flight training more than any other Air Force Academy mission, and continued incompatible zoning such as high-rise commercial may create such a risk to flight training that this program could cease operating.

The study reviewed land use and other operational documents related to land use outside the Air Force Academy, local jurisdictions, and entities that may impact land use or the installation mission. Air Force installations with a flight component, such as the Air Force Academy, are required by the Department of Defense to develop an Air Installation Compatible Use Zone (AICUZ) Program to protect the health, safety and welfare of the public and installation personnel from noise and hazards through compatible development in the airport environment. The program was instituted to address the problem of land development surrounding military air installations. It provides for the development and implementation of a plan to determine those land areas for which development should be significantly influenced by the operation of the airfield. These land areas are then designated as the AICUZ for that installation. On the civilian side, local jurisdictions are included in this process since they have regulatory authority over these lands adjacent to the installation. Therefore, it is critical for the installation and local jurisdictions to collaborate on developing the AICUZ with the idea that land use regulations will be responsive to airfield operational needs. Local decision-makers play a role in evaluating how regulations can support these common goals.

The AICUZ Study for the Air Force Academy, completed in 2005, was found to be the most relevant document since it is a collective effort by the Air Force Academy and surrounding communities that defined potential issues, strategies, and ways to preserve installation mission and operations. The Colorado Springs Regional JLUS recognizes that some components of the AICUZ are now outdated, and planners from local jurisdictions should participate in future AICUZ updates and support those recommendations to sustain the mission. Nevertheless, some AICUZ recommendations were useful in informing JLUS strategies.

Internal to the installation, an Installation Complex Encroachment Management Action Plan (ICEMAP) was completed in 2015 and identified actions the installation could take to address specific

encroachment issues. This plan was also useful in informing the JLUS process.

While one of the airstrips is no longer used for flight training, Section 4.2, page 4-4 of the 2005 AICUZ is important context to understand current recommendations for addressing encroachment:

"The main land use concern is the potential for certain areas in the vicinity of the Air Force Academy to experience a high volume of overflights, especially in the safety zones (clear zones [CZs] and accident potential zones [APZs]) and the areas under the flight tracks. The Academy has recommended that the City of Colorado Springs, El Paso County, and the Town of Monument planning departments develop a means of notifying landowners in certain areas near the Air Force Academy that they live in areas that may experience numerous overflights." In addition, the AICUZ study provided recommended land use guidelines.

Air Force Academy leadership and community partners collaborated on the AICUZ in 2005. While the community may have completed some actions during the intervening years, the current assessment is that more needs to be done to prevent encroachment on the Air Force Academy's mission, specifically for flight training. It is imperative that all respective leaders, land use professionals, and stakeholders begin to implement the work that began more than a decade ago.

Figure 5.4, Land Use Map, and Figure 5.5, Air Accident Potential Zones, shows generalized land use with the locations of Air Force Academy flight routes and APZs, respectively. Indicated flight routes do not necessarily reflect actual flight patterns as they may differ or vary to account for real-world conditions, such as weather, winds, or other factors.

Figure 5.6, Windfarm Locations, shows the Golden West Windfarm that has been built beneath Air Force Academy flight training areas. In 2015, El Paso County received an application for the Golden West Wind Energy Project operated by NextEra Energy. The application was referred to the Air Force Academy for comment in accordance with state statutes. Due to a variety of compounding factors, the wind energy project location created a potential safety issue since turbines were located on land below airspace used for training that were being reconfigured by central Air Force at the same time.

Due to mission safety needs, these training areas are now utilized as a last resort due to the location of the turbines since they create undesirable conditions should a pilot need to eject or conduct emergency landing.

Many training activities take place in the Jacks Valley training complex within wooded areas along the northern portion of the Air Force Academy. The firing range is also within Jacks Valley. Should future residential development occur along the northern boundary, noise associated with these training activities could be audible to residents.

To reduce impacts where Air Force Academy operations occur over or near existing and future development, it is important to provide accessible information about training operations to the public to help current and future residents understand what they may experience in their neighborhood. Including this information into planning entitlement documents and real estate transactions can help to address the ongoing issues created by development adjacent to Air Force Academy training areas (such as Jack's Valley) and its airfield. This study recommends educating businesses and residents about the regular activities that occur adjacent to this installation due to the core mission of cadet training. Stakeholders should continue to identify ways to plan for development so that it can occur without creating a public safety issue or precluding operations. Development plans that include open lands such as parks and open space can provide unobstructed areas in case a flight instructor and cadet face a situation that requires execution of an emergency landing of an aircraft.

Developing more robust land use tools near the Air Force Academy, similar to the airfield overlay zoning

already in place near the Colorado Springs Airport, can also limit negative impacts from future development on training missions.

Ongoing coordination among military officials, local jurisdictions, utility service providers, and transportation officials inside and outside of the development review process will also be essential to preserving and sustaining current and future Air Force Academy missions.

Open space, conservation, and wildlife professionals can partner with the installation to address habitat and biologic issues through land conservation. Creating buffers between installation operations and developed areas can also create and preserve open space within the community as a public amenity.

Buffering could be utilized to support the important training activities in the Jack's Valley area by preserving open space along the northern boundary. The Department of Defense has a program called the Readiness and Environmental Protection Integration (REPI) Program.

According to the website of for this program (REPI.mil; see Appendix C):

"The REPI Program is a key tool for combating encroachment that can limit or restrict military training, testing, and operations. This protects these military missions by helping remove or avoid land-use conflicts near installations and addressing regulatory restrictions that inhibit military activities."

It is likely that should development occur along the northern boundary of the Air Force Academy, residents would hear noise from weapons training and other ground-based training activities at various hours of day and night that could impact these residents. It is important for local jurisdictions, conservation stakeholders, and the Air Force Academy to look at ways of utilizing this tool to create a mutually beneficial outcome in this area.

Figure 5.3
NON-POWERED FLIGHTS

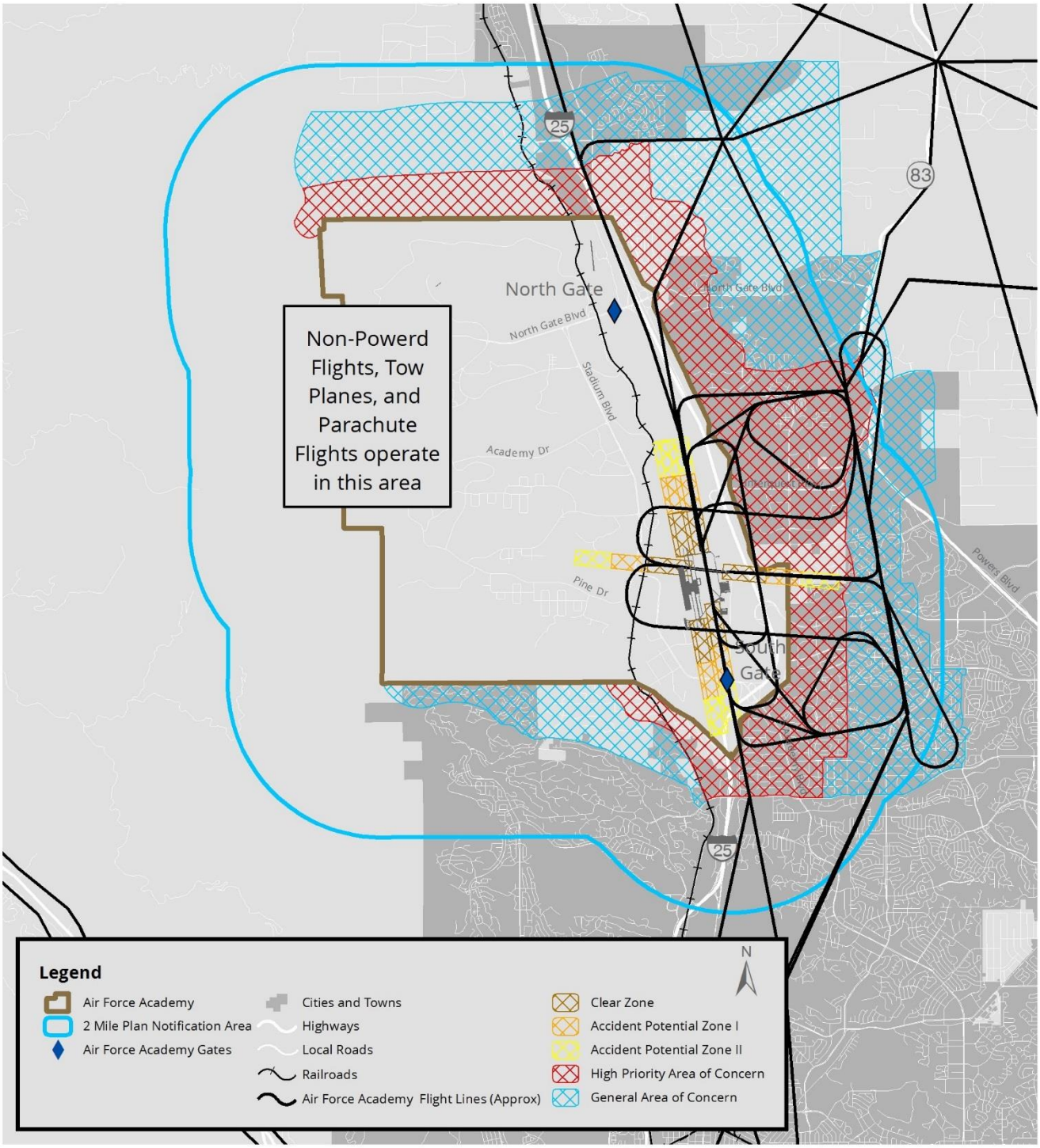
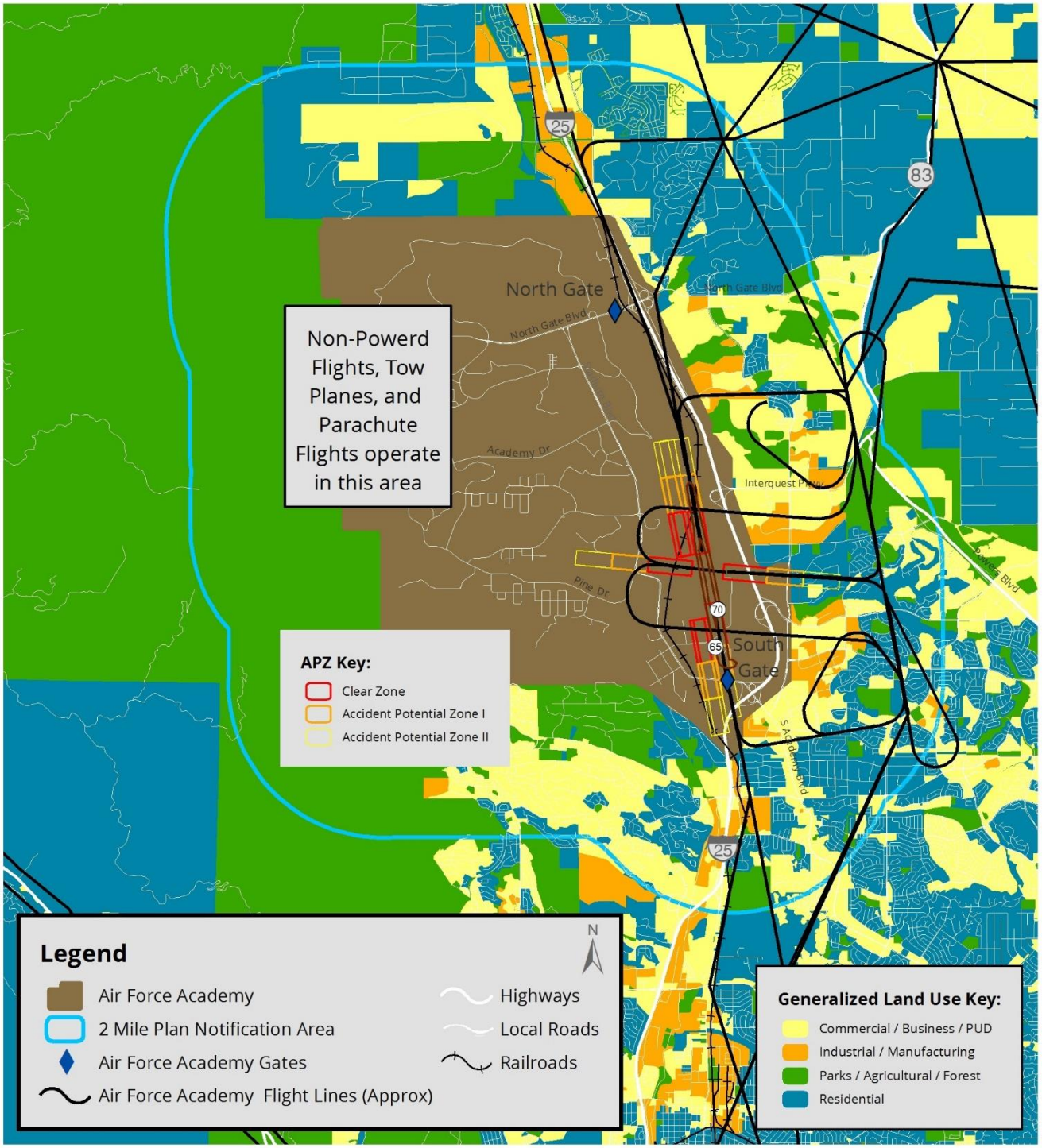


Figure 5.4

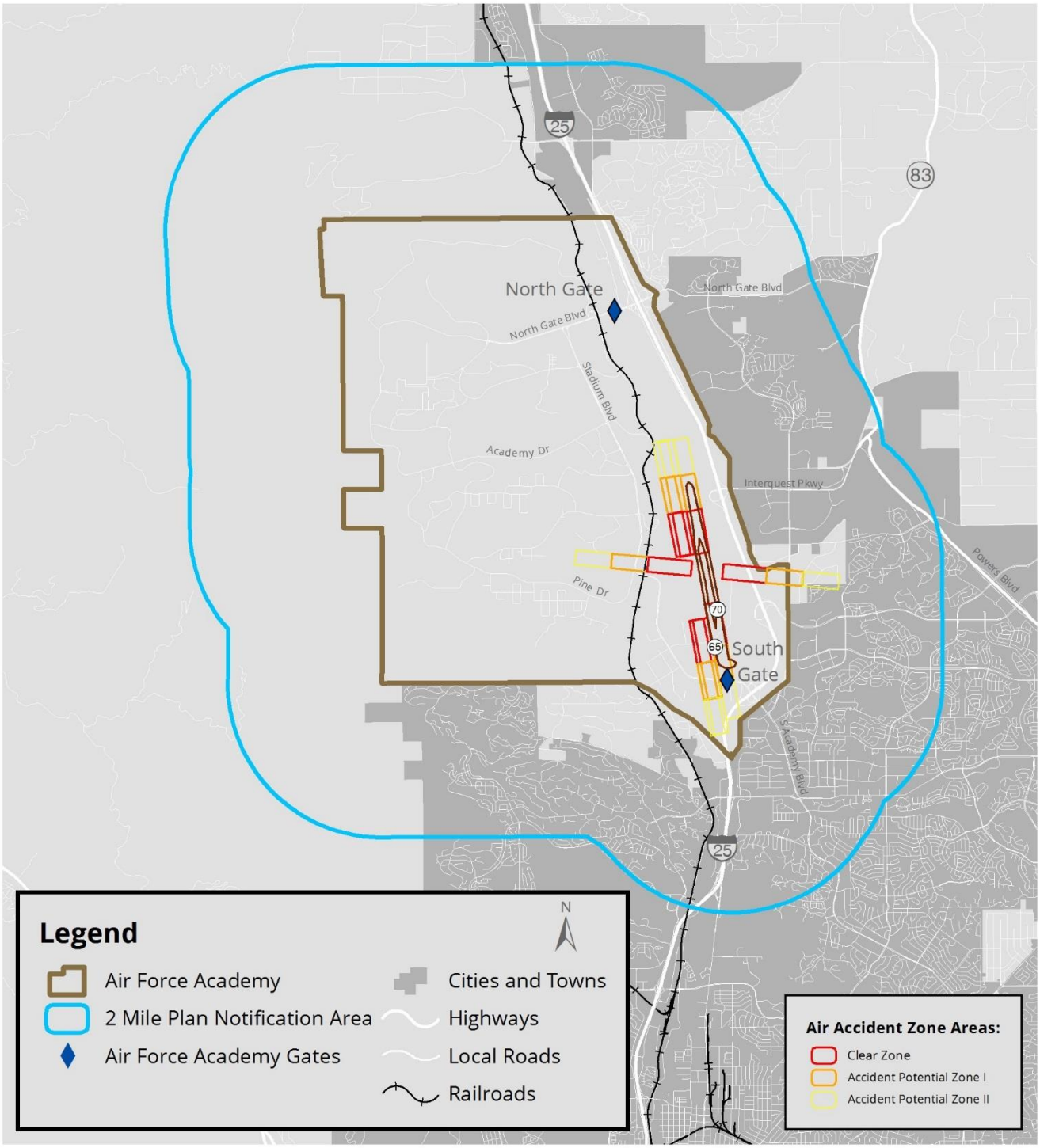
AIR FORCE ACADEMY LAND USE MAP



Data Source: AFA, PPACG, El Paso County Planning, City of Colorado Springs Planning, Town of Monument Planning

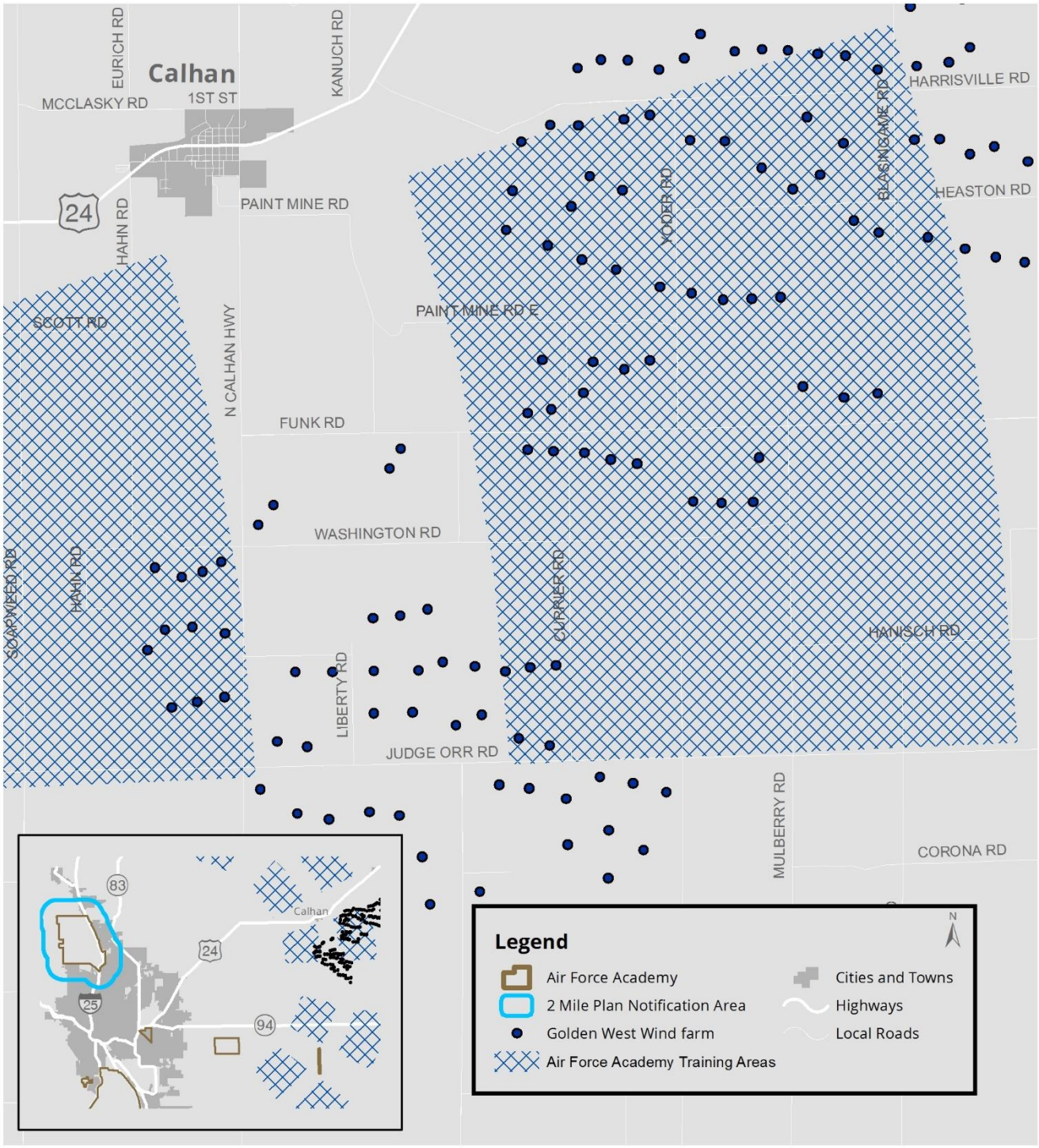
PUD: planned unit development

Figure 5.5
AIR FORCE ACADEMY AIR ACCIDENT POTENTIAL ZONES



Data Source: AFA, PPACG

Figure 5.6
WINDFARM LOCATIONS



Data Source: PPACG

Noise and Vibration

To assist the Air Force Academy Flight Training Working Group with strategy development in response to ongoing resident concerns related to aircraft noise, Blue Ridge Research and Consulting (BRRC) was hired as an independent consultant to collect data and perform sound analyses. Findings of the sound study include:

- In most instances, overflights were not as loud as other observed sounds, such as lawnmowers, vehicular traffic, wind, and construction activities.
- Some sites experienced frequent overflights.
- Low ambient noise within some residential areas (45 to 50 decibels) can create a situation where an overflight can seem loud for a resident experiencing it.
- Not all overflights could be attributed to the Air Force Academy training activities.

Transportation

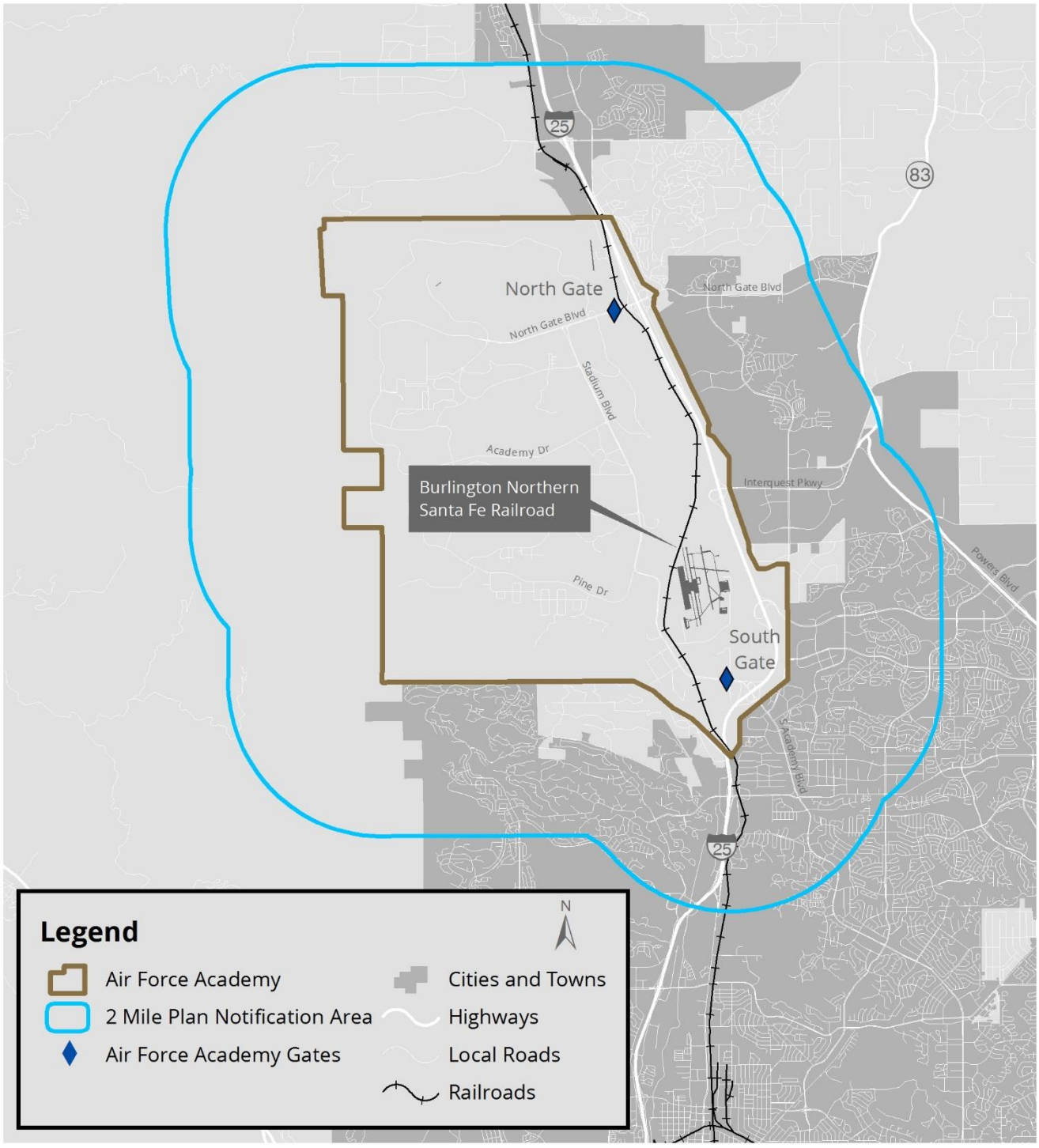
Neighboring communities, transportation users, and the Air Force Academy share numerous transportation pathways. Three major routes cross from north to south through the eastern portion of the Air Force Academy property, including the non-motorized New Santa Fe Trail (see page 52 for more discussion), an 8-mile portion of Interstate 25, and the rail corridor shown on Figure 5.7, owned and operated by Burlington Northern Santa Fe (BNSF) Railroad. The BNSF railroad that passes through the Air Force Academy was operating prior to the establishment of the installation.

Monument, Colorado Springs, and El Paso County all have guiding documents on multimodal connectivity in this area, and occasionally update plans to accommodate new conditions and development. This complexity of entities involved with this transportation network produces an ongoing need for collaboration to balance the needs of the Air Force Academy's mission and the needs of public and private users of these corridors.

The Air Force Academy regularly hosts public events that generate traffic on transportation corridors that lead to the installation including sporting events, concerts, graduation, and D-20 schools on the installation. The Air Force Academy is one of the most visited tourist attractions in the state so adequate roadway capacity is an important issue that requires ongoing coordination with transportation planners from CDOT, El Paso County, and the City of Colorado Springs. The existing Visitor's Center is a 31,600-square-foot building located on campus. A new mixed-use visitors center development is planned as a public-private partnership project near the North Gate west of the North Gate Boulevard exit on I-25. The proposed development will include hotels, offices, and a "Santa Fe Trailhead Center." During this process, citizens, school officials, and neighboring property owners such as the Western Museum of Mining and Industry expressed concerns about the potential traffic demand on existing roadway networks, pedestrian and bicycle safety, and future configuration of transportation infrastructure associated with this development. Recommendations associated with Strategy 2.4 in Chapter 10 should be referenced with regard to this issue.

PPACG's small-area forecast data was used to show where future growth may occur to inform transportation planning processes, as shown in Figure 5.8, Air Force Academy Small-Area Jobs Forecast, and Figure 5.9, Air Force Academy Small-Area Residential Unit Forecast. The maps reflect the forecasted changes in jobs and residential units, respectively, based on state forecasted population growth for the region. Both maps indicate that growth is likely to continue in this area.

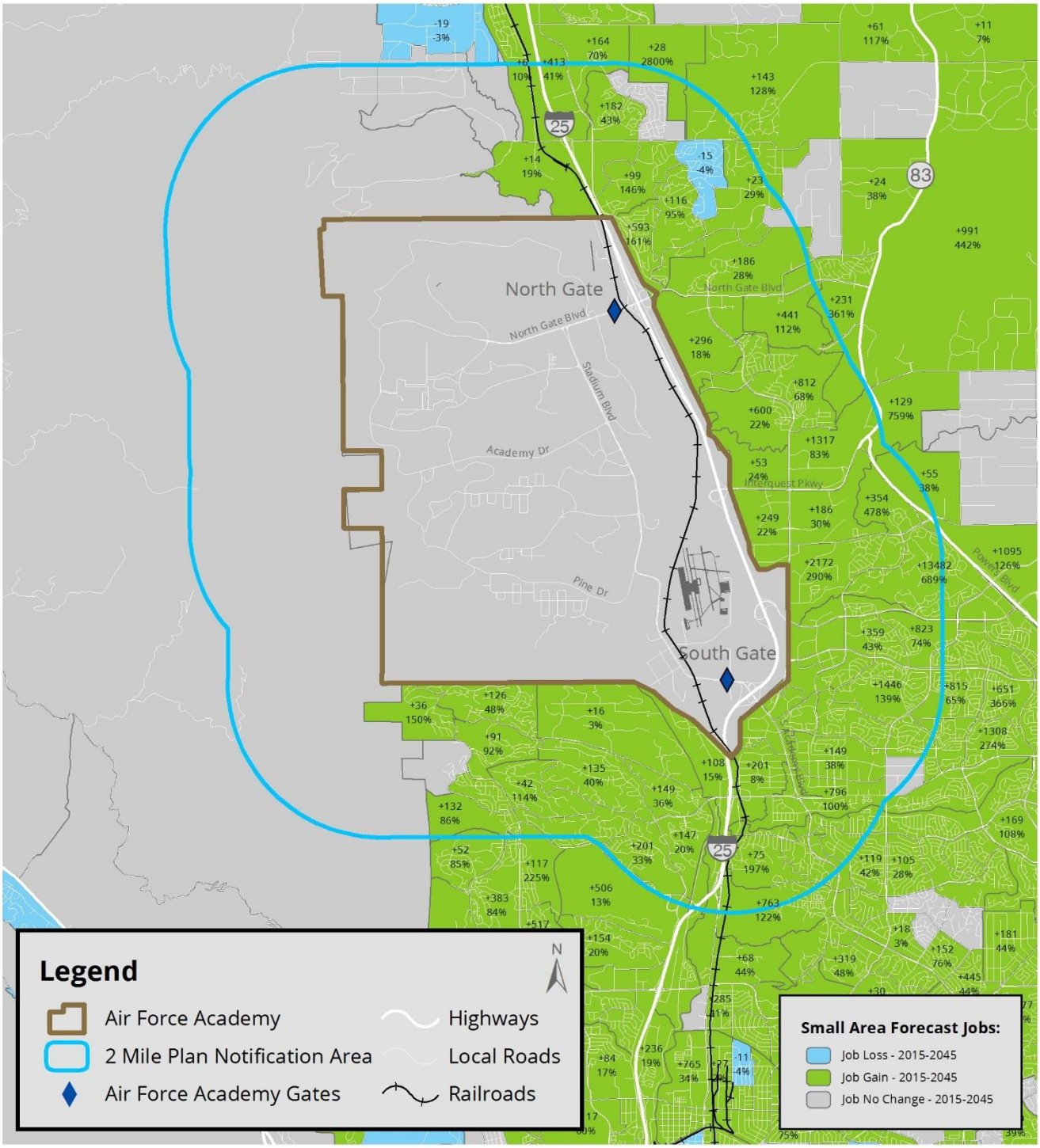
Figure 5.7
BNSF RAILROAD



Data Source: AFA, PPACG

Figure 5.8

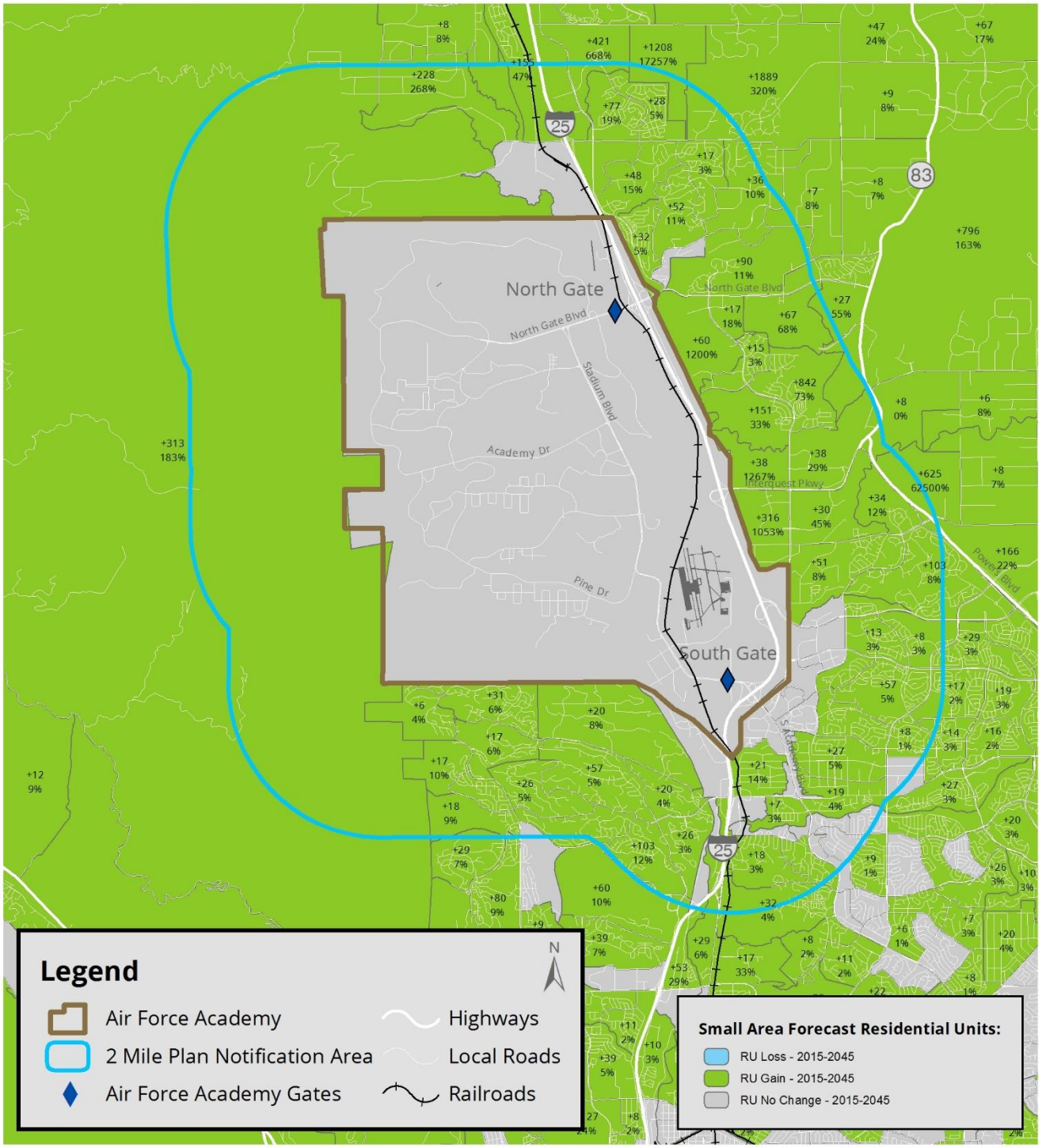
AIR FORCE ACADEMY SMALL-AREA JOBS FORECAST



Data Source: PPACG, AFA

Figure 5.9

AIR FORCE ACADEMY SMALL-AREA RESIDENTIAL UNIT FORECAST



Data Source: PPACG, Air Force Academy

View of Interstate 25 along the eastern edge of the Air Force Academy. (photo by PPACG)

Trails and Open Space

The New Santa Fe Trail Working Group met on October 4, 2016, and October 27, 2016, to discuss issues relating to the trail, which runs north to south along the eastern portion of the Air Force Academy. These included keeping the trail open; the future of the trail; communication among stakeholders, the Air Force Academy, and trail users; the potential for use of other trails and open space corridors; and security procedures and concerns on and around the Air Force Academy. A recent yearlong trail closure due to security concerns and stormwater damage prompted stakeholders to work together to identify strategies to improve nonmotorized transportation through this corridor.

Public input gathered throughout the JLUS process indicated two top priorities for the trail:

1. Establishing safe and optimal alternative on-street and off-street routes, including a route with a natural character like the existing New Santa Fe Trail.
2. Trail sustainability (maintenance and improvements) and security for the installation and users.

Bikers and runners enjoy the New Santa Fe Trail, which runs along the eastern portion of the Air Force Academy. (photo by the Colorado Springs Convention & Visitors Bureau)

Trail alternatives mentioned included a parallel trail system along the east side of Interstate 25; a trail connection between The Shops at Briargate/Pine Creek drainage and Woodmen Road, and a designated paved bicycle commuter trail within allocated right-of-way. There was also interest in creating methods for users to receive information on trail status.

Trail Alternatives

When the New Santa Fe Trail is closed due to security threats, flood damage, or maintenance, a designated alternative route (or routes) is needed. Local plans have identified potential routes, and some work has been done to create new routes along existing roadways. The alternative route could also accommodate trail users who live east of Interstate 25 and prefer not to use the New Santa Fe Trail. Alternative routes could be established using public-private partnerships with developers to create new neighborhood and office amenities while connecting to the larger surrounding trail system. To accomplish this goal, locations need to be identified and coordinated between all stakeholders involved with this strategy, and then costs and funding opportunities (federal, Great Outdoors Colorado [GOCO], etc.) can be identified.

Rerouting the southern portion of the New Santa Fe Trail is the highest priority. This alternative would divert trail users off the southern half of the Air Force Academy using the existing La Foret Trail underpass and existing open space to the east of Interstate 25.

1. Short-term: Identify a preferred alternative trail route using existing routes identified in plans such as the Non-Motorized Plan.
2. Medium-term: Establish safety improvements on the on-street alternative route.
3. Long-term: Create an alternative trail through public and private open space on the east side of Interstate 25.

Maintenance

While the Air Force Academy is not responsible for maintenance of the New Santa Fe Trail, it plays a key role in coordinating with the community maintenance and improvement efforts. Through community partnership efforts, maintenance problems can be identified and funding sources secured among community stakeholders. One potential component of this partnership could include a "friends of the trail" group to help with regular trail maintenance and clean up. The Air Force Academy and partner governments will need to coordinate on access and scheduling when maintenance activities occur.

Communication

Trail users experience challenges getting information about trail closures (planned or unplanned). One solution could be an integrated system using a central online trail information center (potentially a website run by PPAGC or a dedicated regional trails website) and a smartphone app. Signage can also provide information on alternative routes and use variable message boards.

For some of the online tools, there may be an opportunity to collaborate with a private entity or public educational institution like University of Colorado at Colorado Springs. There are existing open-source software tools where information could be posted within an existing trail application.

Stormwater

The 2016 Monument Creek Watershed Restoration Master Plan supports a collaborative and regional approach to addressing stormwater issues by prioritizing projects within the Monument Creek watershed. A large portion of these projects would occur within drainages that impact the Air Force Academy. Strategies from this plan were adapted to fit within the context of the JLUS as follows:

1. Community stakeholders should continue to use the Monument Creek Watershed Restoration Master Plan to coordinate stormwater efforts across the watershed and ensure funding is allocated within annual budgets. Project priorities can be adjusted as work is completed in the watershed.
2. Stabilize the creek and floodplain to reduce erosion and sediment transport using the projects and techniques identified within the Monument Creek Watershed Restoration Master Plan.
3. Naturally filter runoff to improve water quality in the creek, improve existing wetlands, and create new wetlands in the floodplain.
4. Establish performance criteria that can be applied to the design of future detention, stabilization, habitat restoration, and sediment-reduction projects in Monument Creek.
5. Stabilize eroding banks along Monument Creek that contribute large quantities of sediment downstream.
6. Restore, enhance, and conserve riparian vegetation to help stabilize Monument Creek and the floodplain.
7. Through development of new stormwater management and land use regulations, encourage stormwater management standards and techniques to reduce runoff, peak flows, and runoff volumes that result from development within the watershed.

Figure 5.10, Water Basins Near the Air Force Academy, shows the installation's location in the

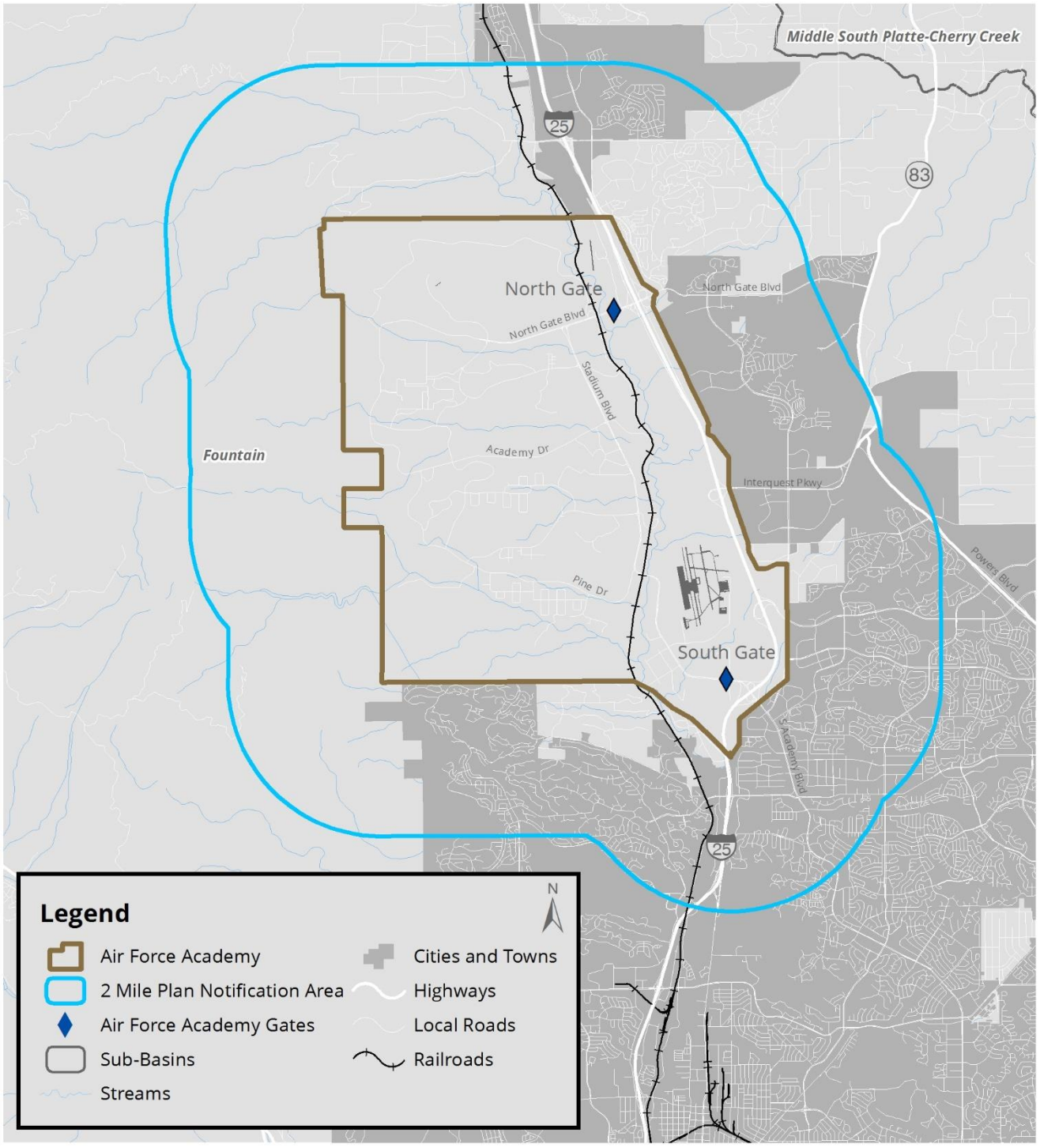
middle of the Fountain Creek Basin within the Monument Creek Watershed. The majority of stormwater within this basin flows across the installation property.

Habitat Conservation

Sections of Monument Creek and its tributaries include riparian habitat with populations of the Preble's meadow jumping mouse, which is listed as a threatened species. The Monument Creek Watershed Restoration Master Plan was created to identify critical projects to reduce damage and help protect Preble's meadow jumping mouse habitat. As shown in Figure 5.11, Conservation Areas, Preble's meadow jumping mouse habitat is common along the waterways within and outside of the installation within the Monument Creek watershed.

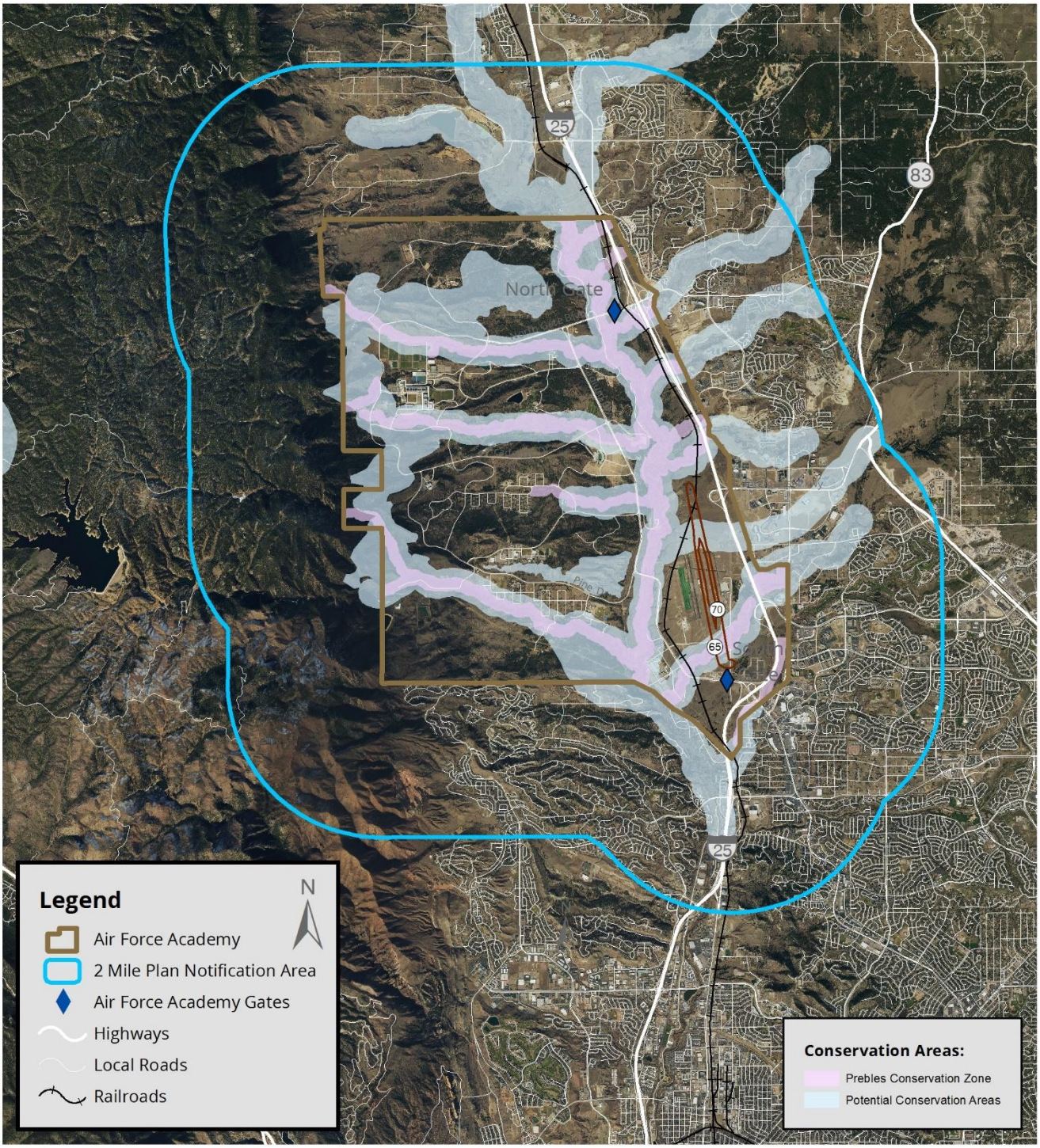
The Air Force and U.S. Fish and Wildlife Service (USFWS) have funded past projects to mitigate damage to riparian ecosystems from stormwater flows and related erosion with some success. However, there are limitations on how effective stormwater and habitat rehabilitation projects can be without collaboration with developers and community partners for projects outside the installation boundary. Coordination has been increasing in the last few years.

Figure 5.10
WATER BASINS NEAR THE AIR FORCE ACADEMY



Data Source: PPACG, State of Colorado

Figure 5.11
CONSERVATION AREAS



Data Source: PPACG

Airspace

Many military and civilian pilots use the airspace over the study area, particularly around the Air Force Academy. Frequently, citizens attribute all flight around the installation to the Air Force Academy; however other military missions use the airspace, and private pilots cross through the airspace on nontraining days.

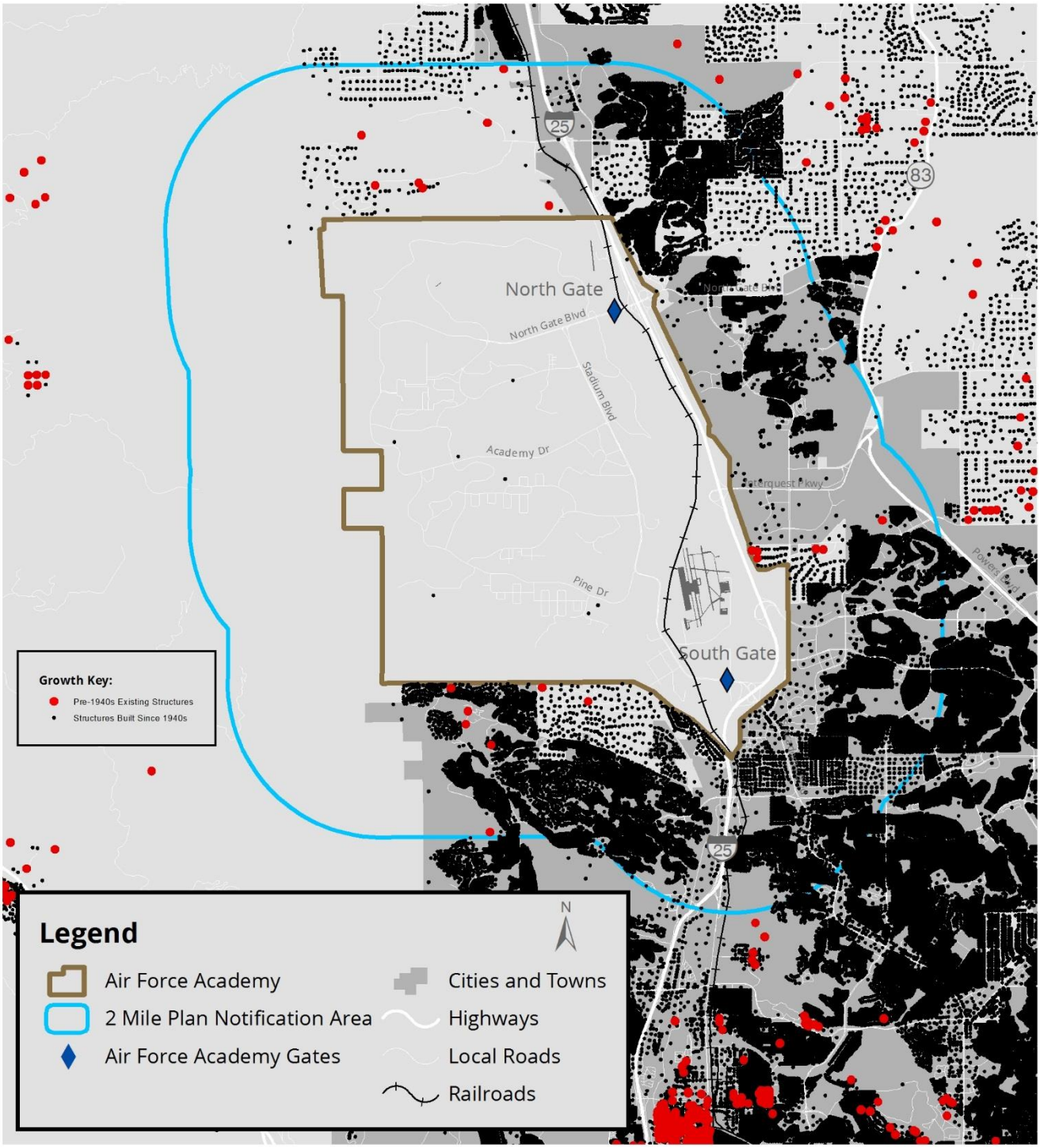
This study covers only the aspects of flight training that arose in relation to encroachment. Complete overviews and greater detail on specific aspects of flight training are available on the Air Force Academy's website under the "About Us>Flight Operations" section at the time of this study's completion. The FAQ page is a useful online tool for citizens and community stakeholders.

Changes to airspace configuration due to increased civilian air traffic forced flight paths to be altered in 2013. Complaints and feedback from residents related to these flight pattern changes generated a series of public meetings in 2014 and 2015 to hear concerns and provide information about flight training operations. As part of this JLUS process, the Air Force Academy Flight Training Working Group was created in early 2016 and met 12 times over 14 months to continue this process, with an emphasis on developing recommendations to address concerns. This group included four Air Force Academy representatives, six residents, and representatives from El Paso County Planning and Community Development, City of Colorado Springs Planning and Development, Town of Monument Planning Department, Colorado Springs Chamber and EDC, Pikes Peak Association of Realtors, Colorado Springs Homebuilders Association, and developer's representatives from Classic Homes and La Plata. All stakeholders recognized that flight safety is the top priority, though noise was an equally important concern for the working group, particularly for residents (see Appendix C for more details on the Air Force Academy Flight Training Working Group and work for this group produced as the Sound Study in Appendix E).

The Air Force Academy conducts cadet training for Unmanned Aerial Systems (UAS), commonly known as drones. All of this training takes place within airspace above the Academy and does not extend over civilian airspace. However, civilian use of drones could potentially involve accidental or intentional flight and encroachment into Air Force Academy airspace. The Regional Airspace Working Group (see Appendix C) conducted extensive discussion on the potential impacts of private and commercial drone use on military operations. During the course of this study, the FAA created restrictions over installation airspace to protect military operations and authorize installations to intercept unauthorized drones. In order to sustain the UAS training at the Air Force Academy, civilian and military airspace professionals will need to collaborate to resolve airspace conflicts related to this issue.

Based on these meetings, strategies were developed; see Chapter 10 for details.

Figure 5.12
AIR FORCE ACADEMY-AREA GROWTH MAP



Data Source: Pikes Peak Regional Building Department, PPACG

NATURAL RESOURCE FACTORS

Wildfire

Past wildfires on and near the Air Force Academy have disrupted training exercises and resulted in the closure and evacuation of residents and employees. The Air Force Wildland Fire Center (AFWFC), part of the Air Force Civil Engineer Center Environmental Directorate, was established in July 2012 to manage increasing wildland fire threats to Air Force missions. The AFWFC is a collaborative operation with the U.S. Fish and Wildlife Service and the U.S. Forest Service to focus on fire threats using risk-based data and maximizing shared resources. The AFWFC utilizes the vision, national goals, and guiding principles of the National Cohesive Wildland Fire Management Strategy.

The headquarters office at Eglin AFB, Florida, provides national oversight, operational risk management, policy development, corporate program management, interagency agreements, and centralized wildfire management on Air Force lands.

Three regional and one overseas offices will be established at Vandenberg AFB, California, Peterson AFB, Colorado, Eglin AFB, Florida, and Joint Base Elmendorf-Richardson, Alaska (overseas program). Twelve wildland support teams are being established which will report to the regional offices. These teams will be trained and equipped to handle wildland fire response and management either on a seasonal or full-time basis.

National Wildfire Coordinating Group (NWCG) qualified firefighters located within installation fire and emergency services and natural resources organizations will lend additional support, and will be provided with training, support, certifications tracking and other services from the AFWFC.

The Natural Resources offices and Fire and Emergency Services work together to reduce the fire threat by working with Air Force Academy residents to reduce fuels next to homes and structures and educate residents about fire safety and preparation.

Public input from some property owners near the installation boundary reflected concerns about mitigating wildfire risk from vegetation such as areas along the right-of-way for I-25 and Smith Creek. It is important for neighboring property owners to relay these concerns to the Air Force Academy fire officials to discuss how these ongoing concerns can be addressed.

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6 FORT CARSON

6.01 OVERVIEW

At Fort Carson, the 4th Infantry Division's mission is *"4th Infantry Division and Fort Carson build and maintain combat-ready expeditionary forces necessary to fight and win in complex environments as members of a Joint, Interagency, Intergovernmental, and Multinational team or as a Mission Command Element; provide first-class support to Soldiers, Airmen, Civilians, and Families; and enable unified action with community, state, and interagency partners to accomplish all assigned missions."*

Figure 6.1

FORT CARSON QUICK FACTS

DATE FOUNDED	1942
DIVISION	4TH INFANTRY
LAND AREA	137,404 ACRES
MILITARY PERSONNEL	25,514
CIVILIAN EMPLOYEES	6,527
ESTIMATED TOTAL ASSOCIATED POPULATION	98,409
ECONOMIC IMPACT (FY17)	$2.1 BILLION

Fort Carson soldiers conducting a flying mission over the foothills of Cheyenne Mountain (photo by U.S. Army).

Table 6.1

FORT CARSON COMPATIBILITY ISSUES

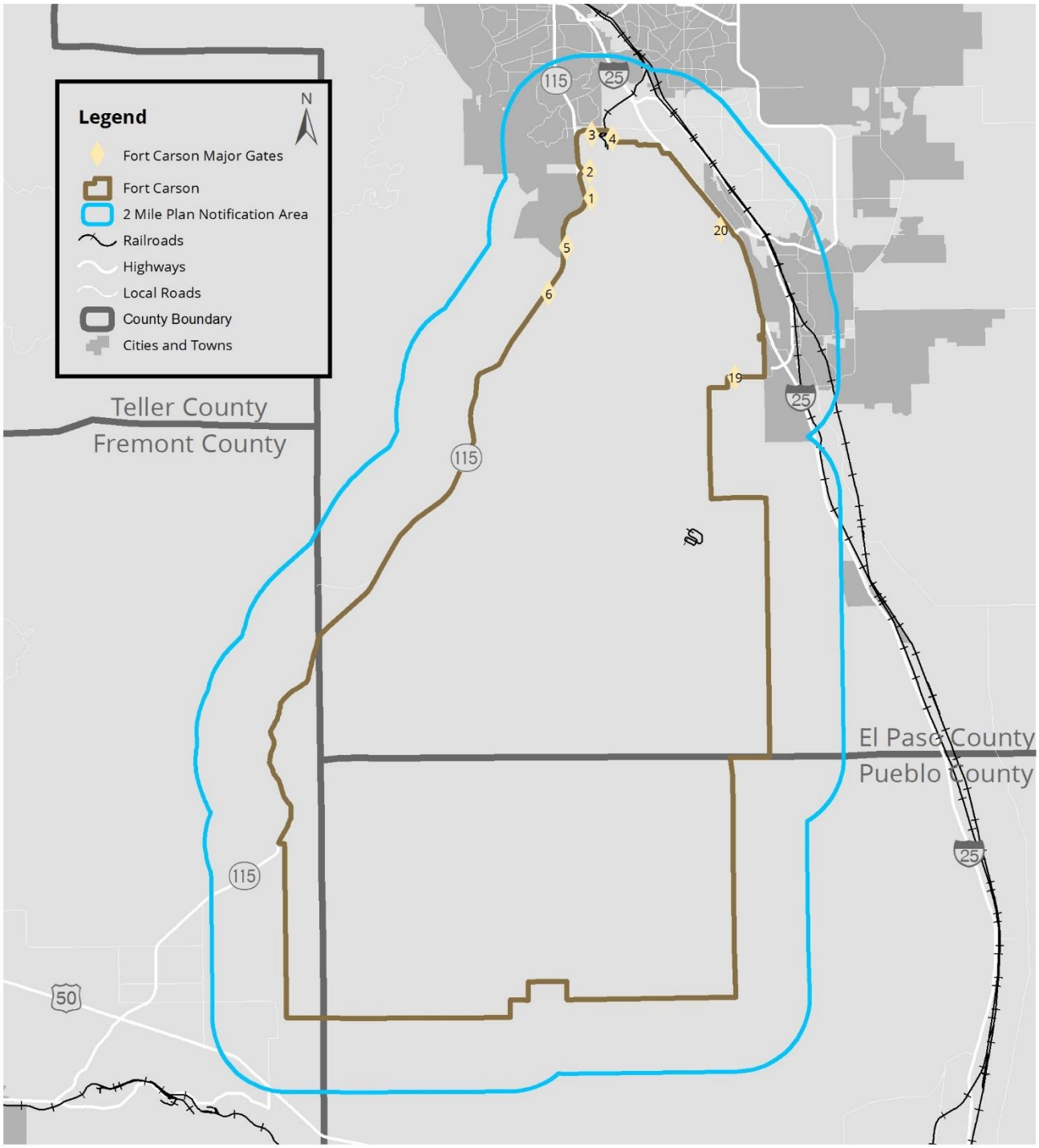
KEY ISSUES:

1. **Land Use Regulations** – Ongoing issues created by incompatible development should be addressed in land use regulations.
2. **Noise and Vibration** – Noise and vibrations from weaponry (along with smoke and dust) can affect adjacent property owners and communities.
3. **Transportation** – Land on the northern portion of the eastern boundary could be developed and affect traffic at Gate 19; additional traffic on Academy Boulevard could also affect gate traffic. More capacity is needed for rail transportation.
4. **Stormwater** – Flows across the cantonment area downstream from Cheyenne Mountain Air Force Station (AFS) and adjacent to Pikes Peak Community College (PPCC) can affect the installation.
5. **Airspace** –Vertical obstructions and development of residential areas can affect helicopter flight. Fort Carson has experienced issues in the past related to landing zones in Teller and Fremont counties.
6. **Water Supply** – Fort Carson receives its drinking water from Colorado Springs Utilities.
7. **Wildfire** – Wildfires in and around Fort Carson are an ongoing concern.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	x	**x**	x	x	x
Land Use Regulations	x	**x**	x	x	x
Safety Zones	x	**x**	x		x
Vertical Obstructions	x	**x**	x		x
Security	x	**x**	x	x	x
Noise and Vibration	x	**x**	x		
Dust/Smoke		**x**			
Light and Glare		**x**			
Transportation	x	**x**	x	x	x
Utility Infrastructure		**x**	x		x
Stormwater	x	**x**	x	x	x
Airspace	x	**x**	x	x	x
Frequency Spectrum			x	x	x
Water Supply	x	**x**	x	x	x
Air Quality					
Wildfire	x	**x**	x	x	x
Noxious Weeds	x	**x**	x	x	x

Note: x indicates issue studied related to this installation.

Figure 6.2
FORT CARSON MAP



Data Source: PPACG

FORT CARSON MISSION AND OPERATIONAL FOOTPRINT

The U.S. Army Garrison Fort Carson mission is to provide *"readiness, support, and services for Fort Carson Soldiers, Families, and the Community to fight and win our nation's wars."* Fort Carson consists of 137,404 acres – including the cantonment (main post) and training areas – that are situated in El Paso, Fremont, and Pueblo Counties. (Note: Piñon Canyon Maneuver Site, a 235,000-acre training area in Las Animas County, is administered by Fort Carson but was not included as part of this Joint Land Use Study.) Fort Carson is home to the 4th Infantry Division, 10th Special Forces Group, 10th Combat Support Hospital, 13th Air Support Operations Squadron, 759th Military Police Battalion, 71st Ordnance Group (Explosive Ordnance Disposal), Colorado Army National Guard, and Evans Army Community Hospital. Fort Carson has 85 training ranges. Weapons training that occurs on these ranges includes small-arms qualification, tank, artillery, and helicopter gunnery.

For more information about Fort Carson, visit www.carson.army.mil.

6.02 COMPATIBILITY ISSUES

This chapter discusses the relationships among compatibility issues, mission operations, community stakeholders, and current actions to provide background for the strategies presented in Chapter 10, Implementation Strategies.

REGIONAL COORDINATION

Please see Chapter 4, Regional Compatibility, for a complete discussion.

BUILT ENVIRONMENT AND MILITARY READINESS

Land Use Regulations

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation." The 2-mile notification area can be seen in Figure 6.2, Fort Carson Map.

As shown in Figure 6.3, Surrounding Land Uses Near Fort Carson, land use around the installation is a mix of agricultural, ranch, residential, commercial, educational, and state park land. Significant growth and development have occurred in this area over the last few decades, generating construction and improvements to local transportation networks.

Figure 6.4, Urban Growth Near Fort Carson, shows population growth around this installation, represented by structures built since the first military installations were established in the area in the 1940s in preparation for World War II, including Camp Carson in 1942.

Fort Carson's physical land and operational training area footprint extends through all four counties of the study area and to various parts of the state. Because this study focuses on development that encroaches on the installation mission, it does not cover any of Fort Carson's operational footprints beyond El Paso, Fremont, Pueblo, and Teller county boundaries. Installation boundaries are primarily within El Paso County but extend into Fremont County and Pueblo County.

The JLUS development review process considers Fort Carson comments, according to feedback from working group stakeholders. Fort Carson officials and local planning and transportation officials must continue to collaborate and communicate when development proposals are under review, particularly when proposed development could be incompatible with military missions. Examples include tall structures such as communications

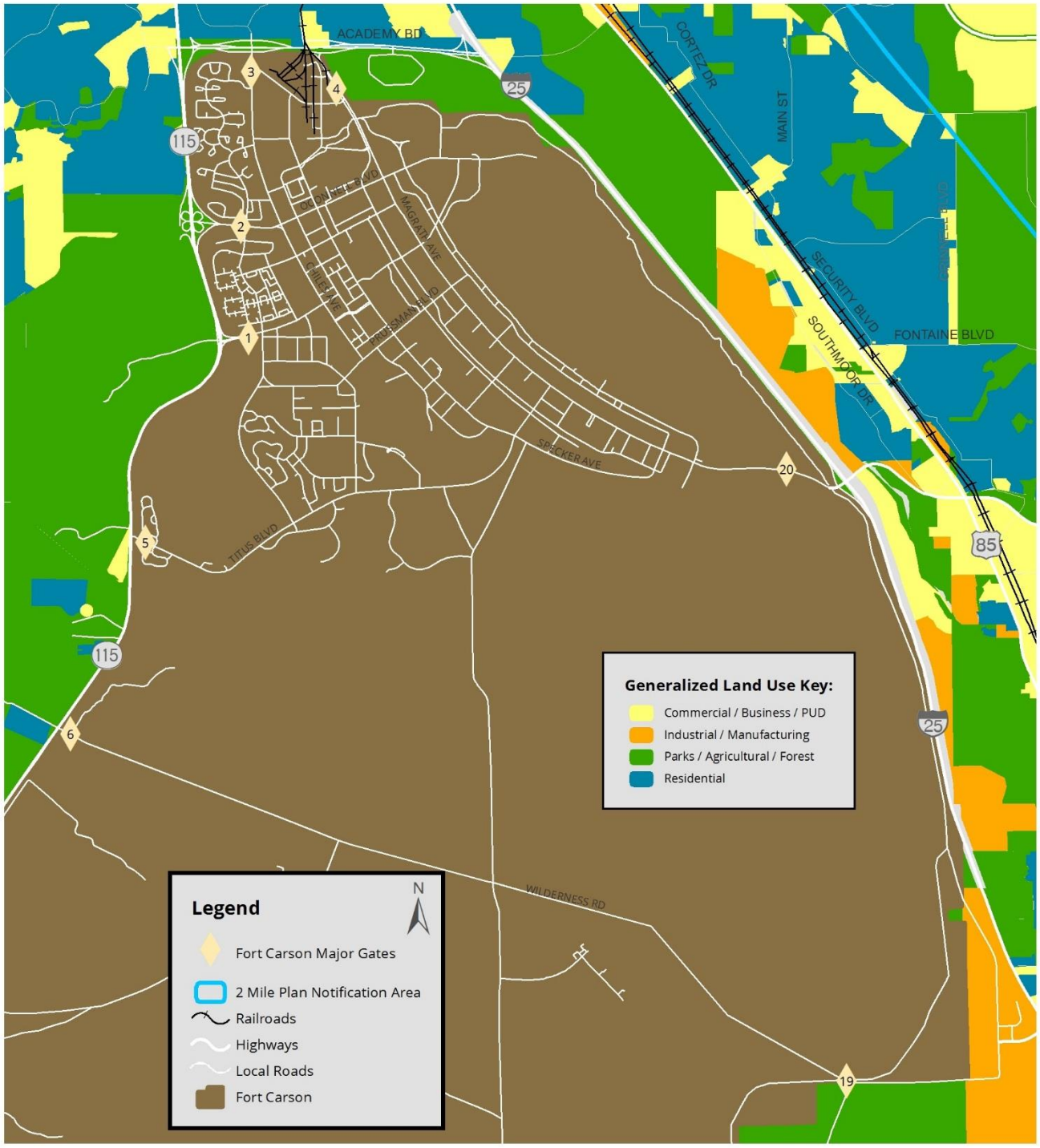
facilities, wind turbines, and transmission towers; solar farms, which could cause glare and affect open emergency-landing areas; or development around airfields and landing zones. Fort Carson's proactive communication with communities throughout the region and long-term use of the Army Compatible Use Buffer (ACUB) program in partnership with surrounding communities and landowners have reduced the probability of significant encroachment issues from future development.

Many of the buffering strategies recommended for installations within the study area are adaptations of encroachment mitigation successes of the ACUB program at Fort Carson. Effective coordination and planning among military officials, local jurisdictions, utility service providers, railroads, and transportation officials through the development review process will be essential to sustain current and future missions at Fort Carson.

Land use planning and development compatibility issues that may affect Fort Carson include:

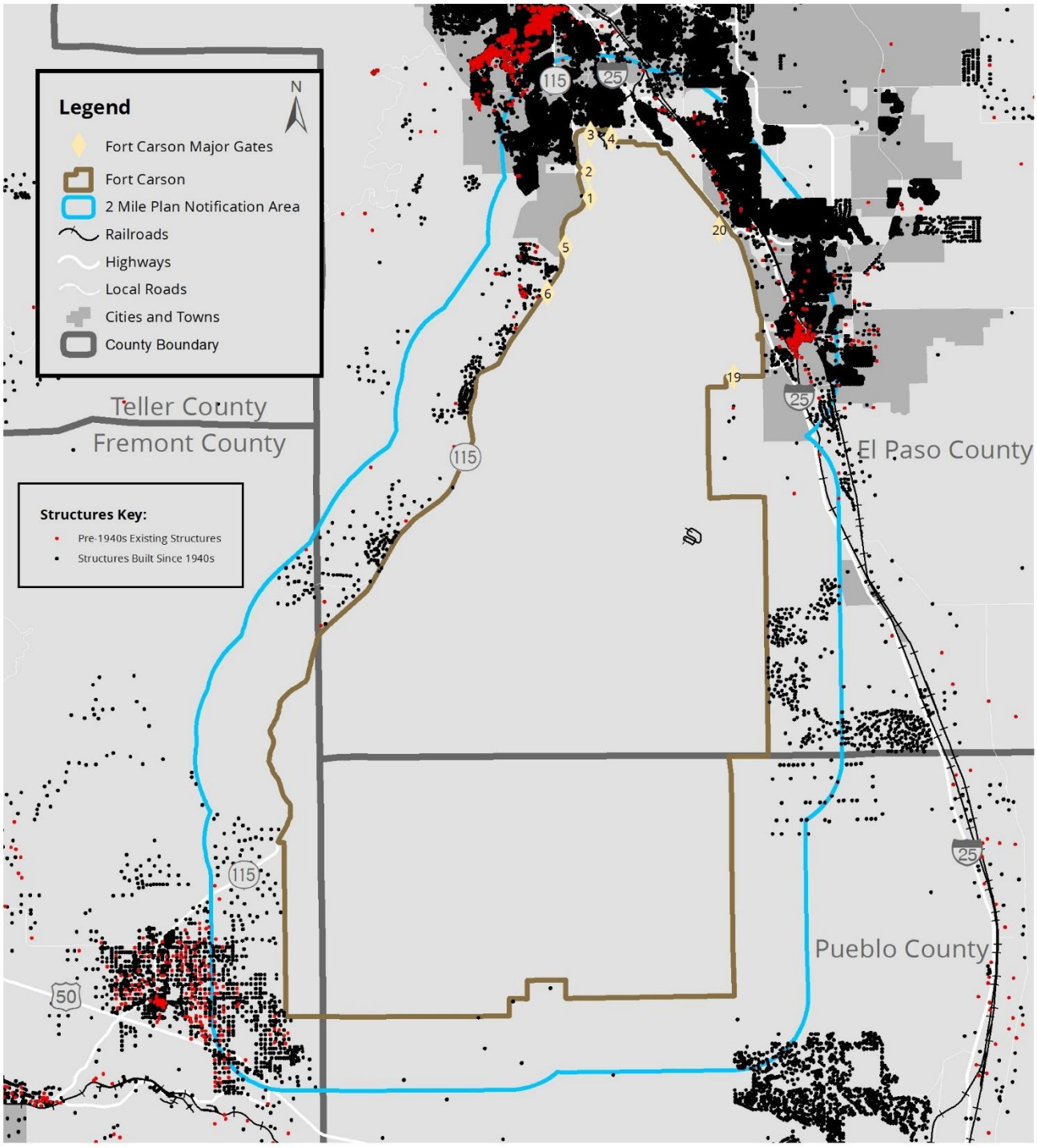
- Training areas on public lands off-base used for helicopter High-Altitude Mountain Environmental Training (HAMET) must be preserved.
- Vertical obstructions and development of residential areas can affect helicopter flight corridors.
- Residential development near boundaries or along flight paths can impact aviation flight routes and military training on Fort Carson.
- Any proposed development on private lands near Gate 19 should be compatible with Fort Carson activities.

Figure 6.3
SURROUNDING LAND USES NEAR FORT CARSON



Data Source: City of Fountain, City of Colorado Springs, El Paso County, PPACG, Fort Carson

Figure 6.4
URBAN GROWTH NEAR FORT CARSON



Data Source: Pikes Peak Regional Building Department, PPACG

Noise and Vibration

Noise and vibrations from weaponry (occasionally accompanied by smoke and dust) can affect adjacent property owners and communities. Fort Carson has engaged in ongoing efforts to limit these impacts.

Input from residents and public officials indicates that neighboring stakeholders and community members understand the general nature of training impacts as a regular component of Fort Carson's military operational footprint. The Post's Public Affairs Office announces upcoming training operations via various media outlets. Helicopter training, particularly as it relates to the HAMET program, has been a major focus of outreach during the last 5 years. Routes, training areas, timing, and other aspects of training have been adjusted in response to public input and in coordination with the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) for operations on public lands. Along the installation's eastern and southern boundary, Fort Carson used the ACUB program to obtain conservation easements or to acquire properties from willing landowners within the buffer area.

Transportation

Colorado Department of Transportation (CDOT), the City of Colorado Springs, El Paso County, and the City of Fountain have jurisdiction over road networks that serve Fort Carson. Due to training involving convoys, CDOT, Pueblo County, and Fremont County also maintain roadways that are used by Fort Carson operations. As shown on Figure 6.5, Convoy Routes, Fort Carson convoys regularly use civilian highways to train or transport personnel and equipment to Piñon Canyon Maneuver Site in Las Animas County.

As shown in Figure 6.6, A/DACG, the installation uses the Arrival/Departure Airfield Control Group (A/DACG) facility at the Colorado Springs Airport for force deployment operations, approximately 12 miles from Fort Carson. Adequate transportation capacity on this route continues to be a priority for local transportation planning.

As shown in Figure 6.7, Fort Carson Small-Area Jobs Forecast, and Figure 6.8, Fort Carson Small-Area Residential Unit Forecast, PPACG's small-area forecast data was used to show where future growth may occur to inform transportation planning processes. The maps reflect the forecasted changes in jobs and residential units, respectively, based on state forecasted population growth for the region. Both maps indicate that growth is likely to continue in this area.

In 2005 the Base Realignment and Closure (BRAC) Commission announced that Fort Carson had been selected as a growth installation with the potential to double the size of the installation's military population. One result of this event was the creation of the Fort Carson Growth Plan as a PPACG project. Civilian transportation agencies, working through the PPACG, immediately set to work to provide transportation improvements to meet projected traffic demands. Major improvements which were completed between 2005 and 2014 primarily consisted of:

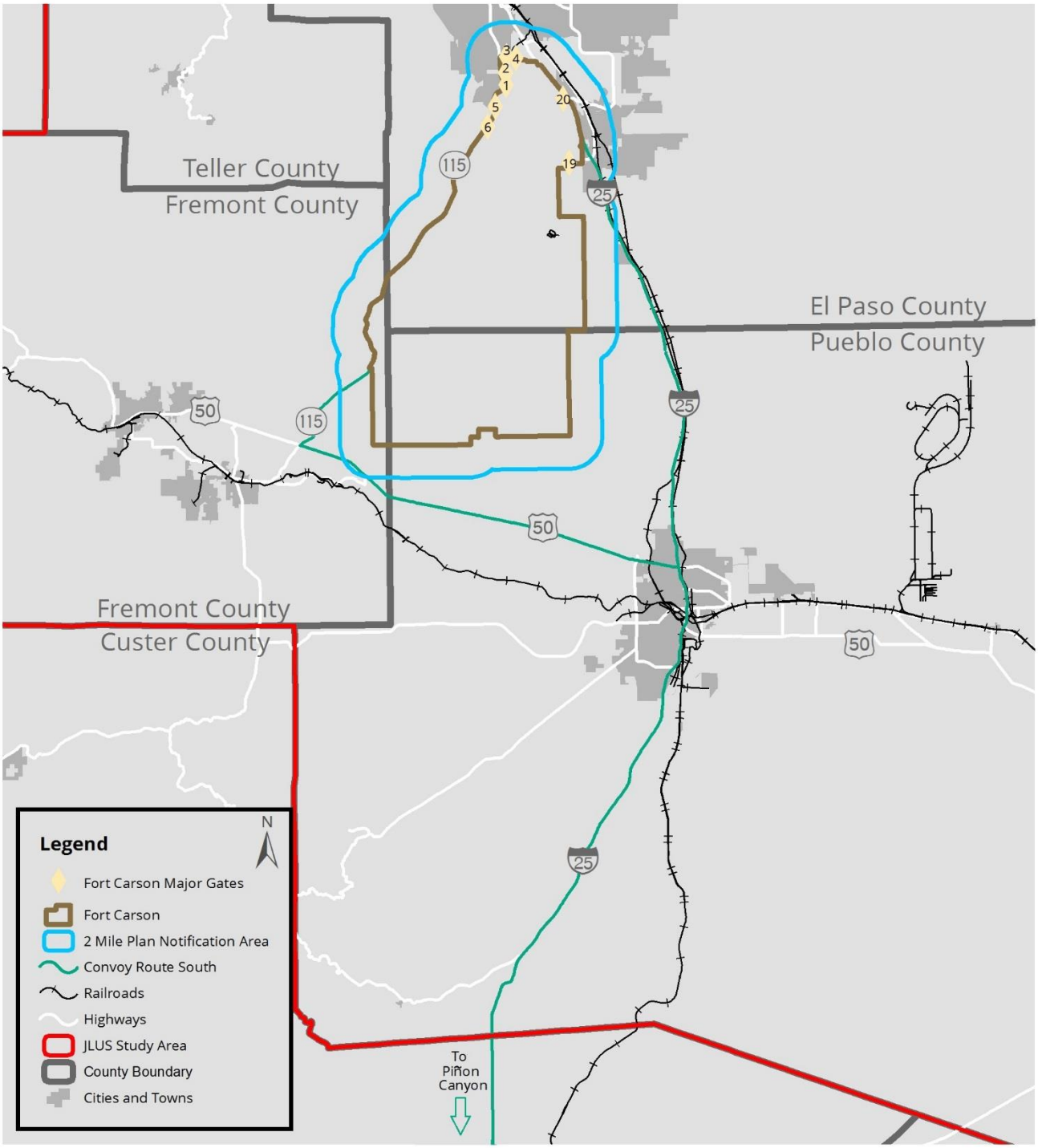
- The reconstruction and widening of Colorado State Highway (SH) 16 and improvements to SH 21 (Powers Boulevard): Colorado Department of Transportation (CDOT) provided this series of improvements totaling $82.3 million. These projects involved the reconstruction of the I-25/SH 16 and SH 85/SH 16 highway interchanges; widening SH16 from two lanes to four lanes: the related construction of 4 bridges; and safety and capacity improvements on SH 21. These improvements not only supported Fort Carson's growing daily traffic demands but also provided a critical rapid deployment route linking Fort Carson with its Aerial Deployment Facility (A/DACG) at the Colorado Springs Airport.
- The reconstruction and widening of South Academy Boulevard: The El Paso County Department of Transportation provided a

series of improvements between State Highway 115 and Interstate 25 as part of the $77.7 million South Metro Accessibility projects. The projects adjacent to Fort Carson involved widening the roadway from two lanes to four lanes and the related construction of 3 new bridges. The project also provided safety and capacity improvements to highway interchanges serving the two primary gates along Fort Carson's northern boundary.

Within the last five years, off-post roadway improvements were constructed with civilian transportation partners benefitting the Fort Carson military community through improvements to State Highway 115. CDOT provided three projects totaling $19 million. These projects involved widening the roadway from two lanes to four lanes and providing safety and capacity improvements to intersections serving the four primary gates along the western boundary of Fort Carson. New traffic signals were provided at two of the highway intersections and the existing signal at a third was upgraded. The bridge at the highway interchange serving the fourth gate was reconstructed.

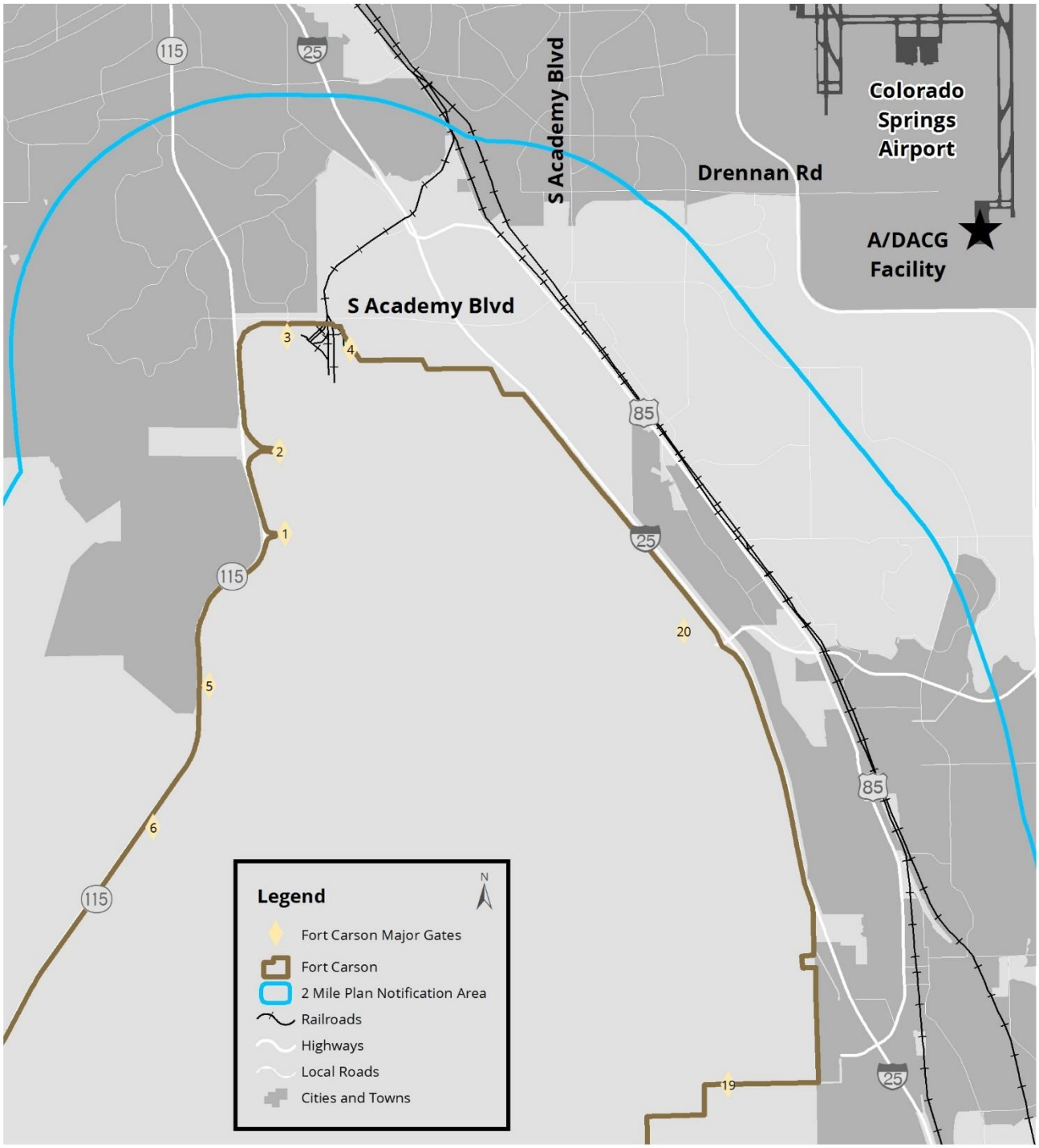
El Paso County is coordinating with Fort Carson on pending improvements to Charter Oak Ranch Road. El Paso County will be reconstructing this county road to provide improved access to a gate on Fort Carson's eastern boundary. Estimated cost of this project is $12.5 million. This project will upgrade an existing quarry access road to support commuter traffic between Fort Carson's newest gate and nearby Interstate 25 and off-post communities. The project is awaiting the receipt of pending Defense Access Road Program funding to proceed.

Figure 6.5
CONVOY ROUTES



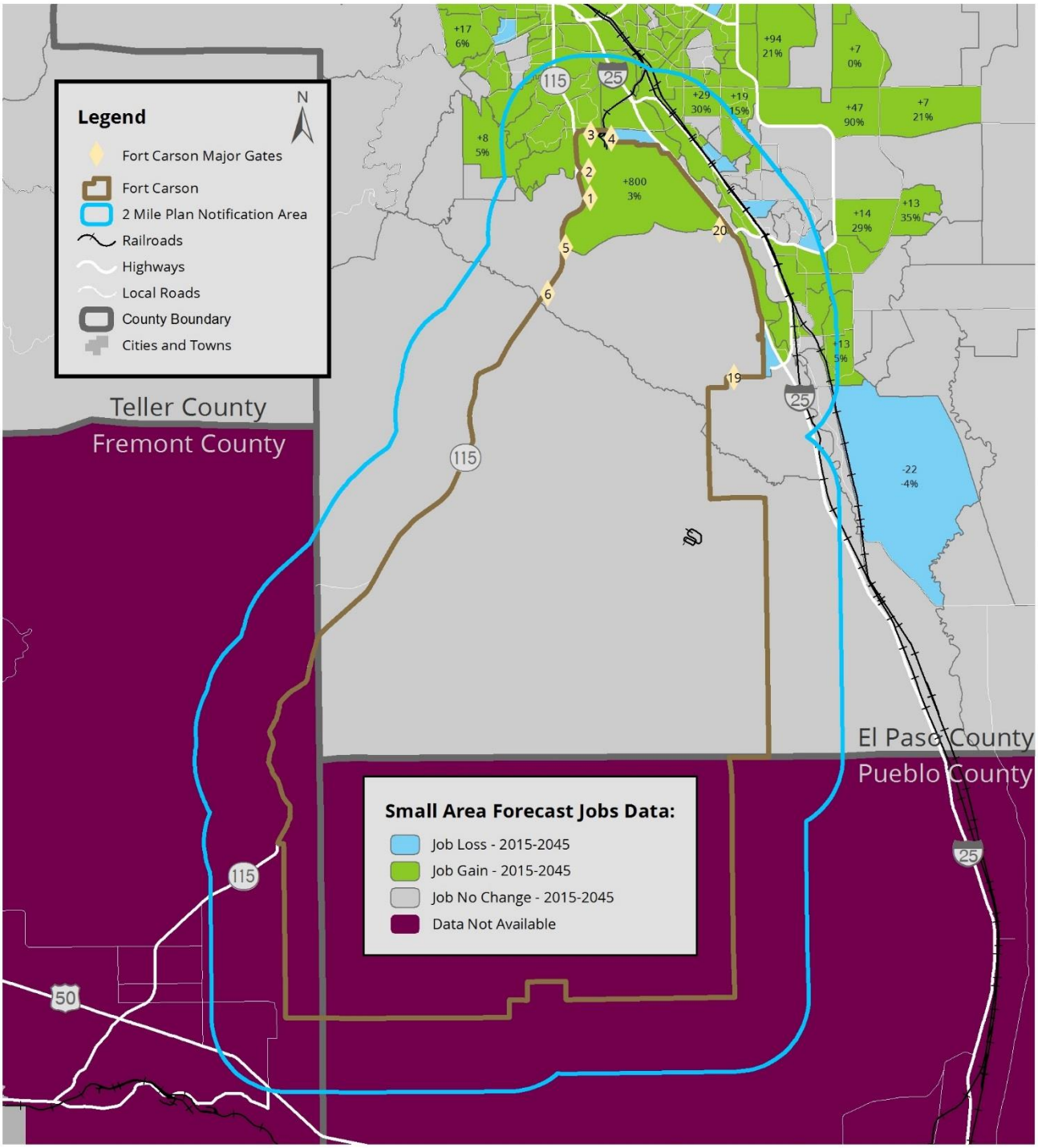
Data Source: PPACG

Figure 6.6
A/DACG



Data Source: Fort Carson, PPACG

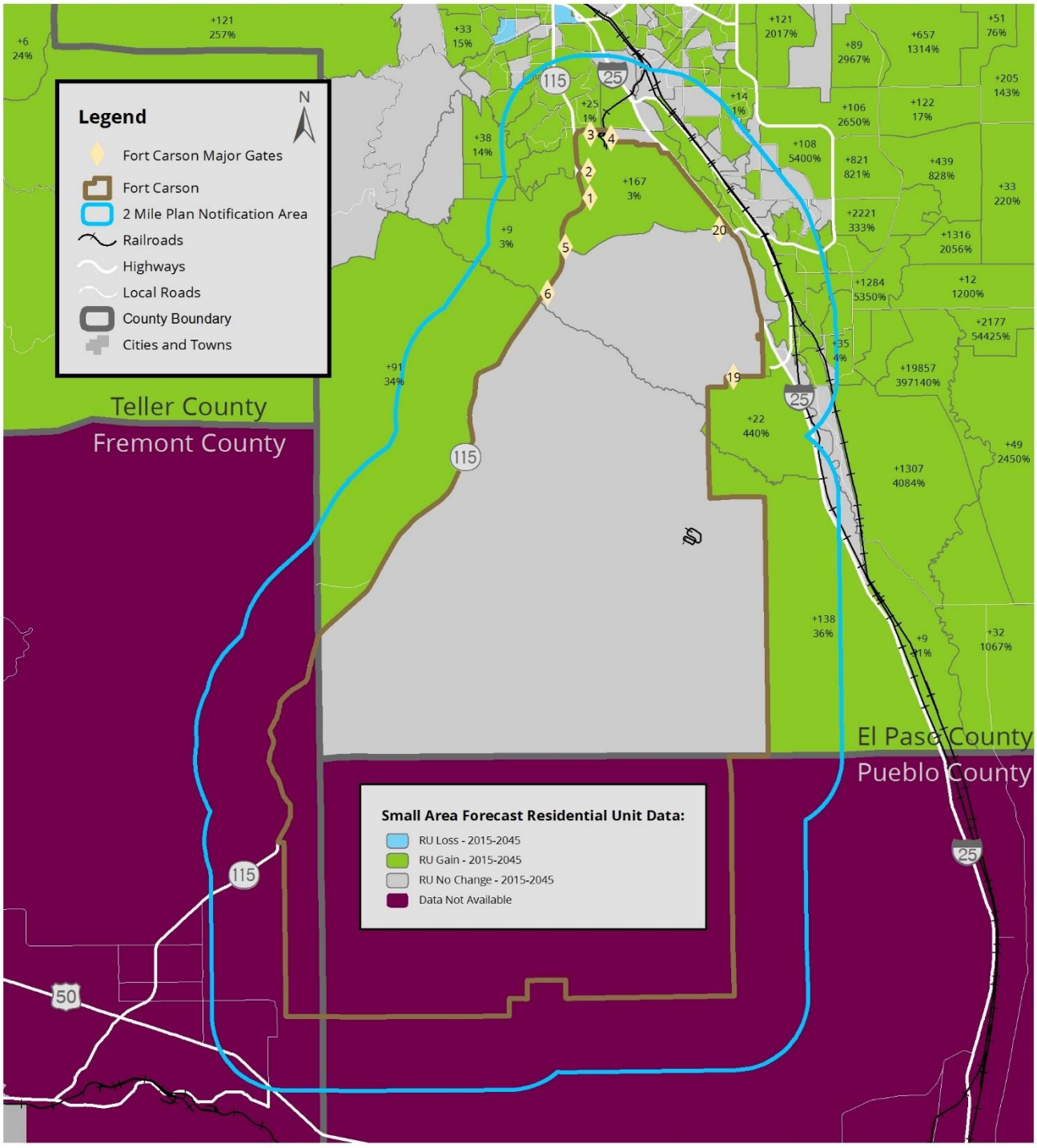
Figure 6.7
FORT CARSON SMALL-AREA JOBS FORECAST



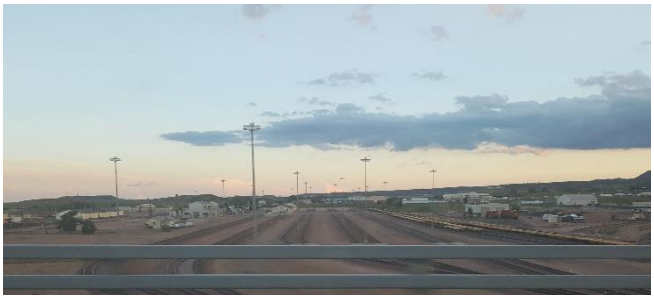
Data Source: PPACG, Fort Carson

Figure 6.8

FORT CARSON SMALL-AREA RESIDENTIAL UNIT FORECAST



Data Source: PPACG, Fort Carson



Fort Carson railyard (photo by PPACG).

Rail is used to move equipment during deployment activities. Redundancy is needed in the rail network to improve readiness and capacity. Rail transportation stakeholders, Colorado Springs Utilities, Fort Carson, the City of Fountain, and El Paso County are collaborating on options for addressing this mission need.

Local jurisdictions have a long track record of working with Fort Carson to accommodate transportation needs immediately around the installation boundary. The Pikes Peak Area Council of Governments (PPACG) Transportation Advisory Committee provides continuity in professional relationships and policies between military and civilian transportation planning organizations.

Stormwater

Fort Carson's stormwater permit requires the installation develop a comprehensive Stormwater Management Plan (SWMP). The SWMP outlines measures to reduce the discharge of pollutants to the maximum extent practicable and to protect water quality. Stormwater management is a major focus for both Fort Carson and adjoining property owners. Current stormwater issues identified by Fort Carson personnel include:

1. **Gate 4 and the Railyard with PPCC:** Localized runoff issues affect the railyard and B Ditch. The existing slope from PPCC goes right up to the installation boundary, creating storm runoff that impacts Gate 4 and the railyard.

Drainage from PPCC towards Fort Carson (photo by PPACG).

2. **Teller Dam:** Built in 1908, Teller Dam is a large, high-hazard dam located on the southern boundary of Fort Carson. It was constructed to support agricultural uses and was not intended for flood control. The dam has insufficient hydraulic capacity to pass the required inflow design flood. Water is also seeping through the abutments in multiple locations. Fort Carson plans to make repairs to the dam to fix both problems within the next few years.
3. **Central Unnamed Ditch – Infantry Creek:** Stormwater comes off NORAD Road and State Highway 115 onto Fort Carson via this waterway, and flooding in September 2013 caused major impacts. Fort Carson continues to repair damage from those floods in the cantonment ditches, parks, housing, and stormwater infrastructure.
4. **State Highway 115 and Rock Creek:** There are occasional stormwater issues within existing developed areas around the Broadmoor Bluffs development and State Highway 115 corridor. CDOT and local jurisdictions can continue to sustain the Fort Carson mission by mitigating stormwater concerns during reviews of any new development and by identifying specific improvements.

Airspace

As shown in Figure 6.9, Fort Carson Airspace, training operations at Fort Carson primarily use the restricted airspace over Fort Carson; however, low-altitude flight training occurs throughout the area. The figure also shows adjacent special-use and other military airspace corridors.

Fort Carson has experienced issues when using landing zones near residential properties in mountainous areas in Teller County and near detention facilities in Fremont County. New vertical obstructions (such as cell towers, communication towers, and water towers) and development of residential areas can affect helicopter flight.

NATURAL RESOURCE FACTORS

Water Supply

The Directorate of Public Works (DPW) Environmental Division manages the water quality program for the installation. Fort Carson receives its drinking water from Colorado Springs Utilities. Colorado Springs Utilities maintains an extensive testing program that assures full compliance with the requirements of the Safe Drinking Water Act. In addition, the DPW operations and maintenance contractor performs routine supplementary testing on the drinking water distribution system for chlorine levels, coliform contamination, and chlorination byproducts. On an annual schedule, testing for lead and copper is conducted on water samples collected from schools, child development centers, and family housing.

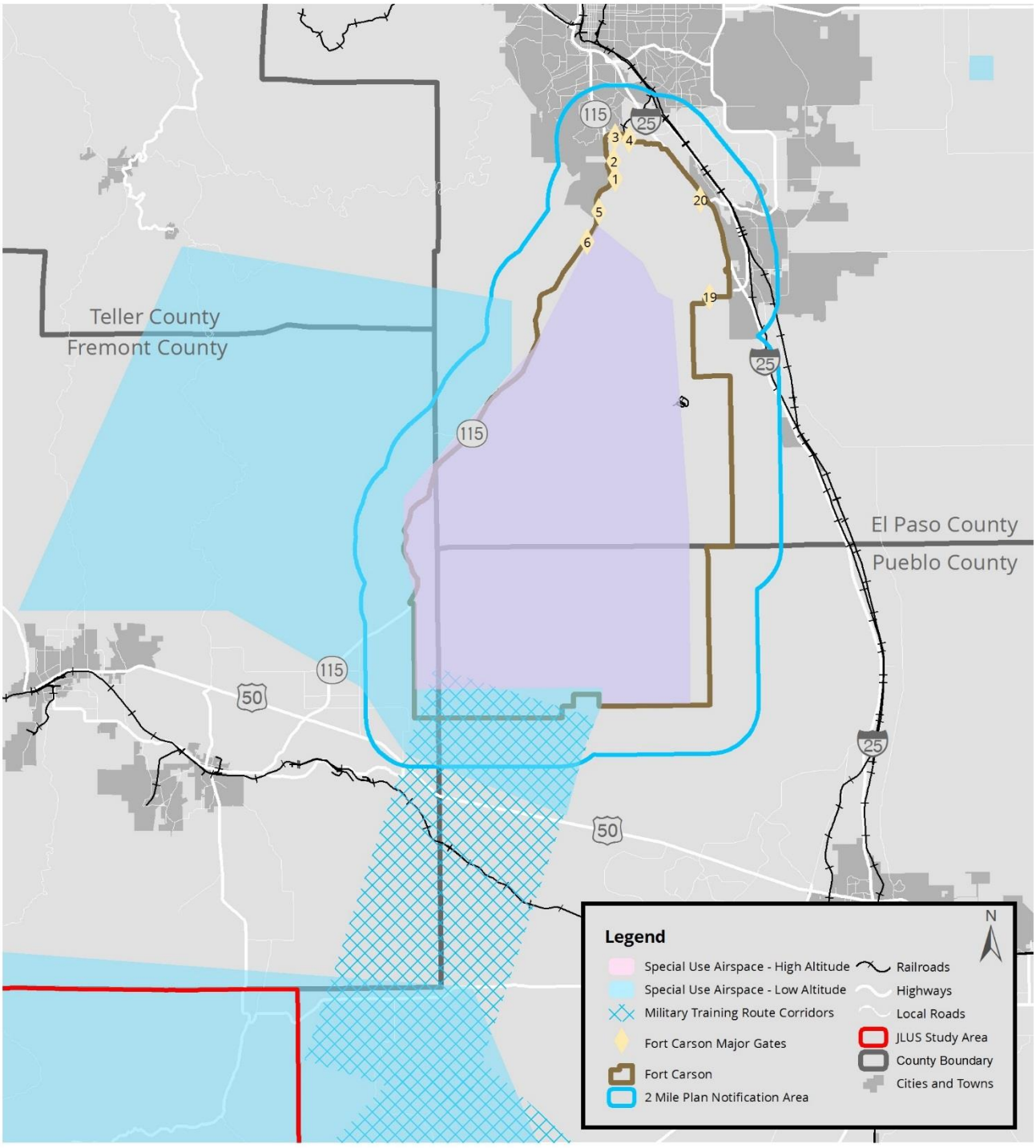
Sources:
http://www.carson.army.mil/organizations/dpw.html

Wildfire

Fort Carson Fire and Emergency Services is responsible for wildland fire protection and fire suppression on the installation's 137,404 acres (and on the Piñon Canyon Maneuver Site, which is outside of the study area). The installation has agreements with local, state, and federal agencies to assist in combating wildfires. The prescribed burn program reduces the amount of accumulated vegetation, lessening the threat of unwanted wildfires in the small- and large-arms range areas. This ensures that military training can continue uninterrupted, and also reduces the possibility of a large wildfire escaping the boundary of the installation.

However, both civilian and military fire officials are always looking for ways to improve their methods. Fort Carson firefighters actively monitor training activities that could result in an unexpected fire. As incidents occur, Fort Carson personnel evaluate fire responses and examine ways to improve firefighting methods and training practices to minimize fire risk on and off-post. Civilian and military fire officials exchange information as new methods are developed to mitigate and fight wildfire. Fort Carson continues to assist in regional firefighting activities and did so during this study as fires occurred in all four counties, including major wildland fires in Fremont and Teller Counties. Ongoing collaboration and dialogue between civilian fire officials, Fort Carson representatives, and citizens is essential to continue work on wildfire management.

Figure 6.9
FORT CARSON AIRSPACE

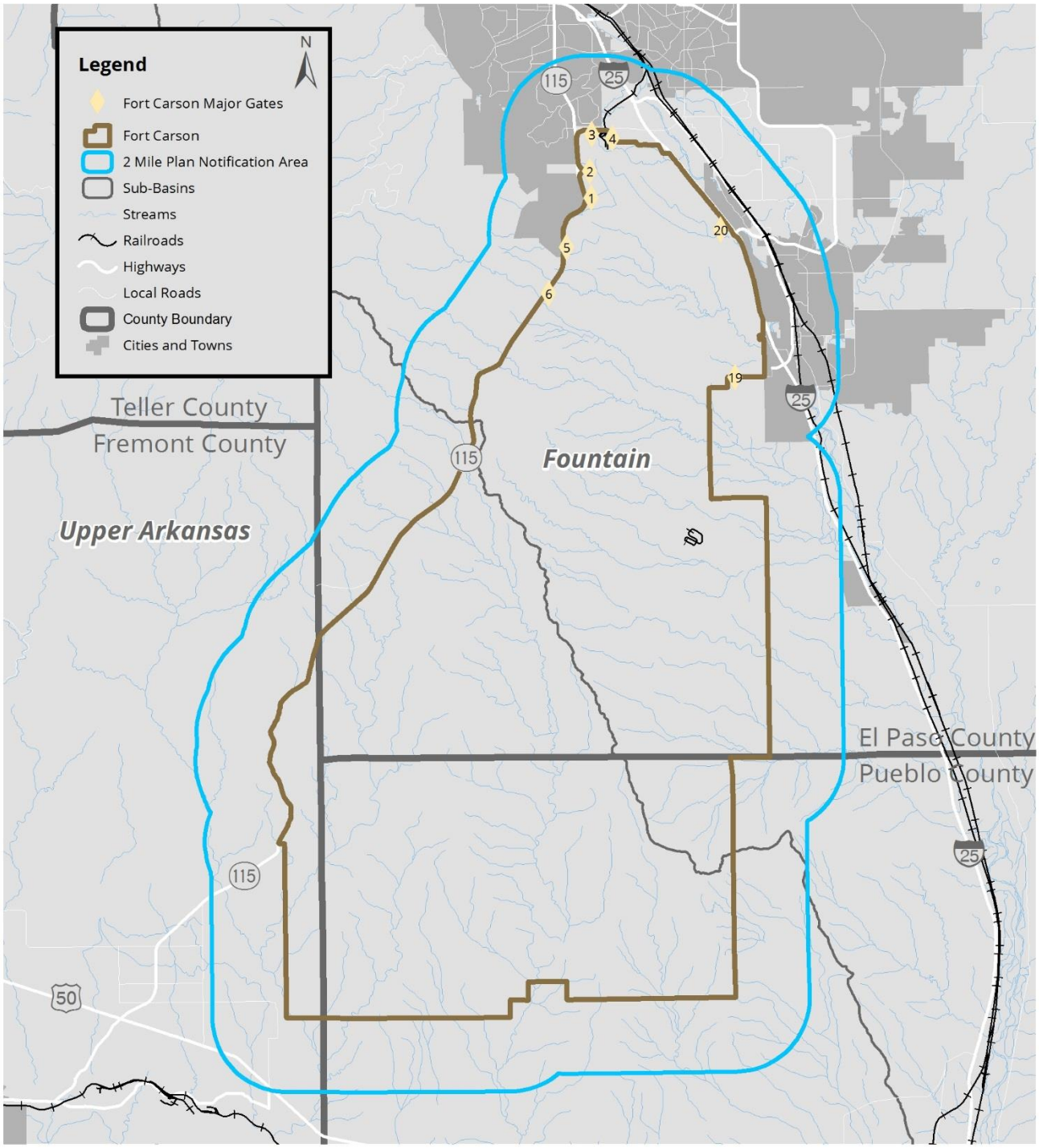


Data Source: FAA, Fort Carson, PPACG

6.03 ADDITIONAL FIGURES

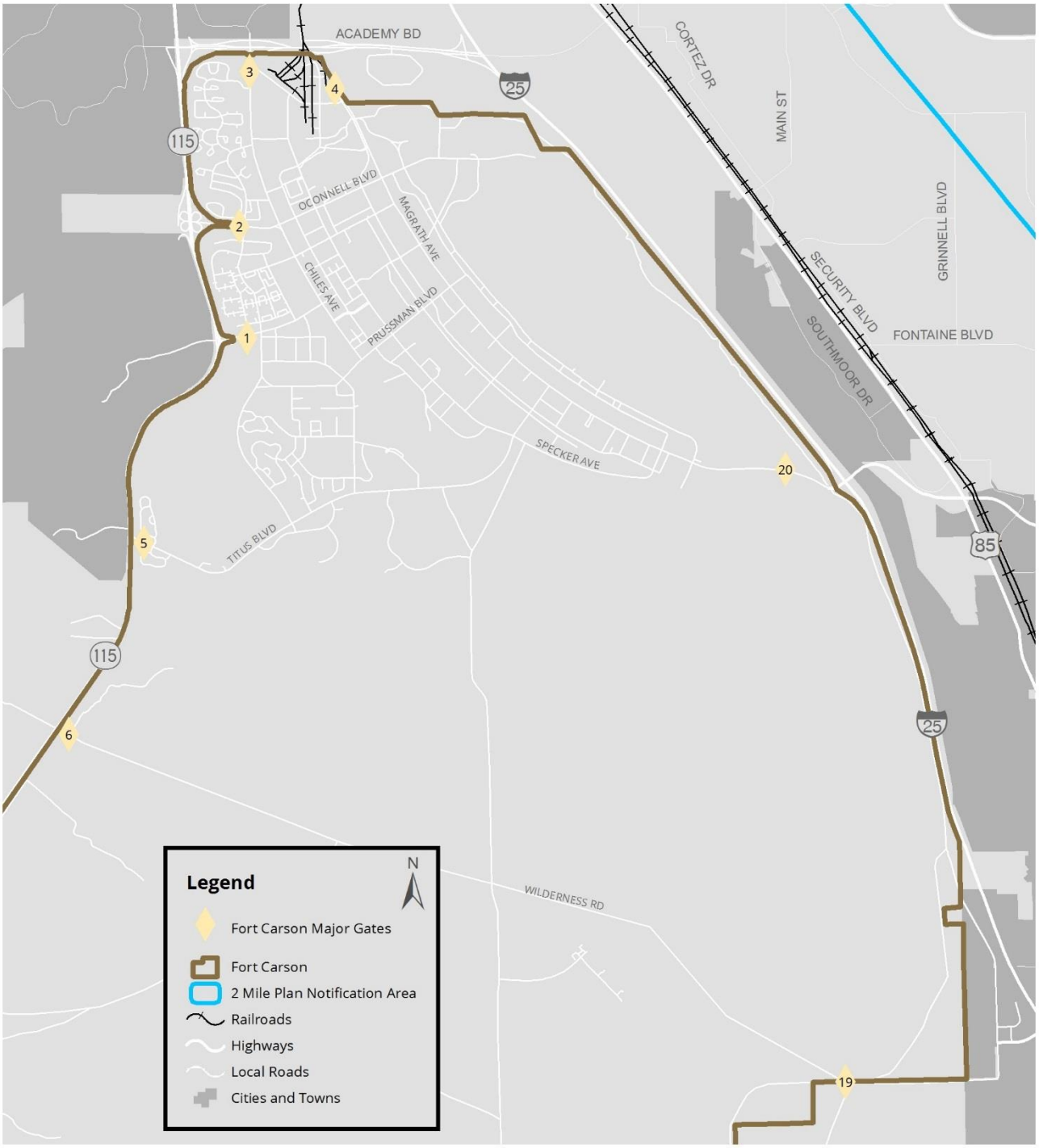
Figure 6.10

WATER BASINS NEAR FORT CARSON



Data Source: PPACG, State of Colorado

Figure 6.11
MAJOR GATES AT FORT CARSON



Data Source: Fort Carson

7 PETERSON AIR FORCE BASE

7.01 OVERVIEW

Peterson Air Force Base's (AFB) host unit is the 21st Space Wing (21 SW), whose mission is to *"execute combined global capabilities to defend the homeland and enable space combat operations."*

Peterson AFB Air Park with Pikes Peak and the Rocky Mountain Front Range in the background (photo by U.S. Air Force).

Figure 7.1
PETERSON AFB QUICK FACTS

DATE FOUNDED	1942
DIVISION	21ST SPACE WING
LAND AREA	1,457 ACRES
MILITARY PERSONNEL	5,565
CIVILIAN EMPLOYEES	4,306
ESTIMATED POPULATION	18,303
ECONOMIC IMPACT*	$1,2 BILLION

Table 7.1

PETERSON AFB COMPATIBILITY ISSUES

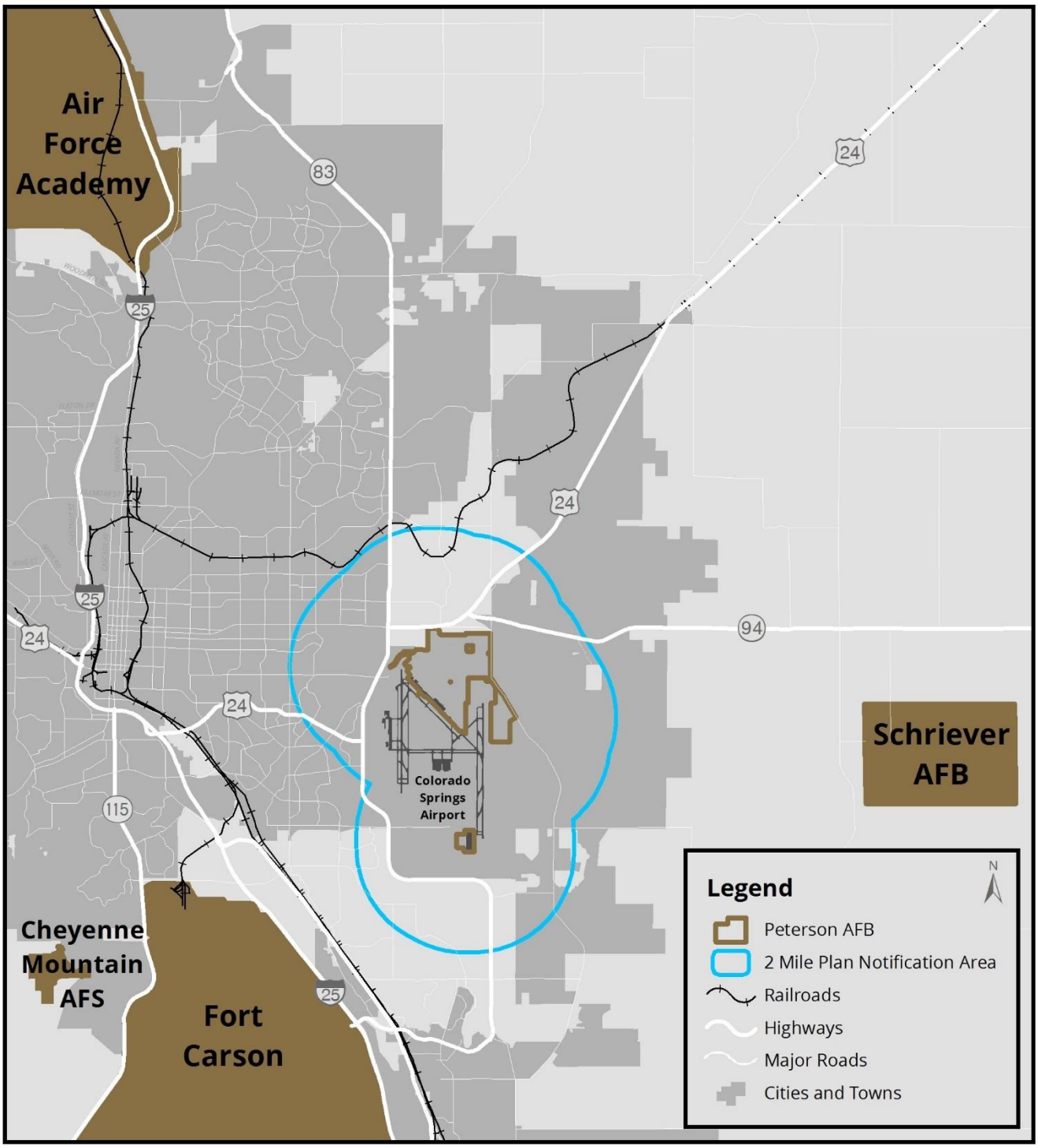
KEY ISSUES:

1. **Land Use Regulations** – Residential land use and zoning pose safety concerns within accident potential zones (APZs), including developments proposed along Troy Hill Road.
2. **Safety** – Peterson AFB Bird/Wildlife Aircraft Strike Hazard (BASH) program personnel conduct approximately 6,000 wildlife dispersals annually around the airfield.
3. **Transportation** – Future road capacity is a concern as development occurs around the installation and future mission operations increase travel demand. Development along Powers Boulevard, Marksheffel Road, and U.S. Route 24 may impact missions.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	x	x	**x**	x	x
Land Use Regulations	x	x	**x**	x	x
Safety Zones	x	x	**x**		x
Vertical Obstructions	x	x	**x**		x
Security	x	x	**x**	x	x
Noise and Vibration	x	x	**x**		
Dust/Smoke		x			
Light and Glare		x			
Transportation	x	x	**x**	x	x
Utility Infrastructure		x	**x**		x
Stormwater	x	x	**x**	x	x
Airspace	x	x	**x**	x	x
Frequency Spectrum			**x**	x	x
Water Supply	x	x	**x**	x	x
Air Quality					
Wildfire	x	x	**x**	x	x
Noxious Weeds	x	x	**x**	x	x

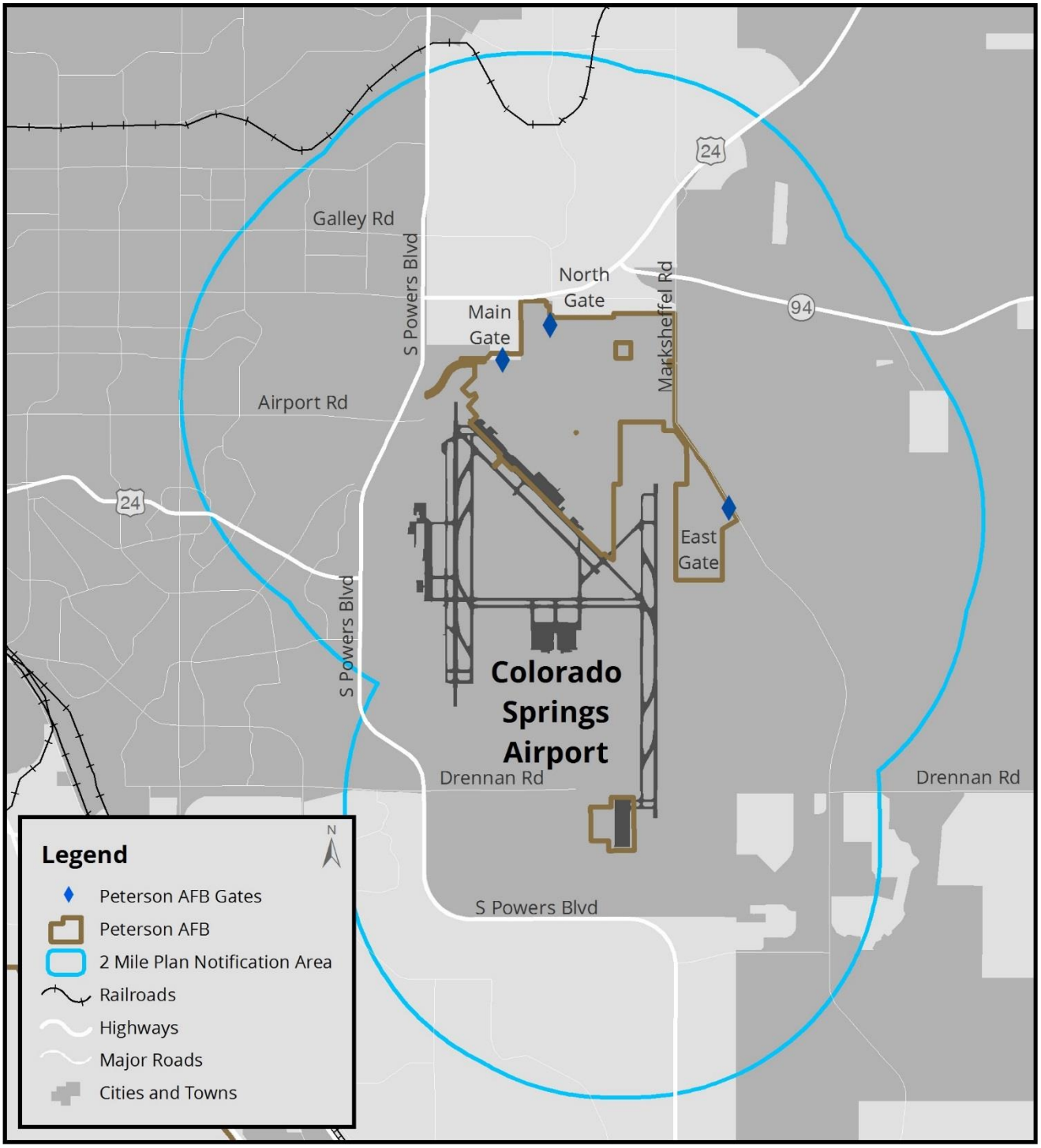
Note: x indicates issue studied related to this installation.

Figure 7.2
AREA INSTALLATIONS



Data Source: PPACG, Peterson AFB

Figure 7.3
PETERSON AFB MAP



Data Source: PPACG, Peterson AFB

PETERSON AFB MISSION AND OPERATIONAL FOOTPRINT

Peterson AFB is home to Air Force Space Command (AFSPC), North American Aerospace Defense Command (NORAD), U.S. Northern Command (USNORTHCOM), U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT), 21 SW, and the 302nd Airlift Wing (Air Force Reserve). The 21 SW, which operates out of Peterson AFB, Schriever AFB, and Cheyenne Mountain AFS, is responsible for worldwide missile warning and space control. The joint-use Peterson AFB/Colorado Springs Airport airfield also contains facilities used by Fort Carson for the deployment of troops and resources.

As shown in Figure 7.2, Area Installations, Peterson AFB is the only installation in this study that is entirely within the city limits of Colorado Springs. Peterson AFB encompasses approximately 1,457 acres, of which 218 acres are fee-owned and 1,209 acres are leased from Colorado Springs. The Colorado Springs Airport borders Peterson AFB on the south, with Platte Avenue (U.S. Route 24) serving as its boundary on the north, Powers Boulevard on the west, and Marksheffel Road on the east.

For more information about Peterson AFB, visit www.peterson.af.mil.

7.02 COMPATIBILITY ISSUES

REGIONAL COORDINATION

Please see Chapter 4, Regional Compatibility, for a complete discussion.

BUILT ENVIRONMENT AND MILITARY READINESS

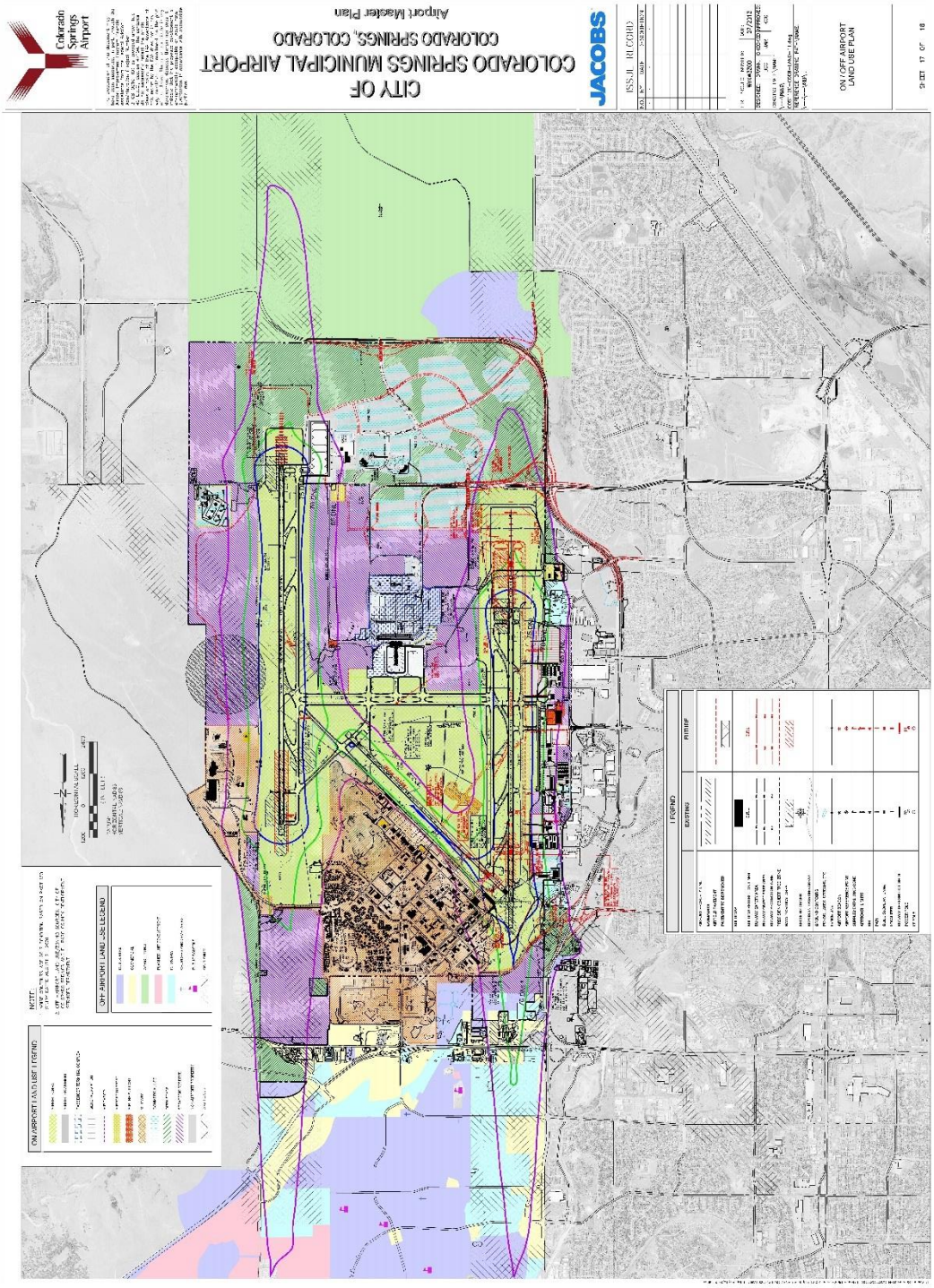
Land Use Regulations

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation." This study found that the size of Peterson AFB's operational footprint justifies expansion of the notification area beyond 2 miles, particularly because of nearby development (including Banning Lewis Ranch) that could impact utility infrastructure and transportation routes and may generate vertical obstructions beneath airspace utilized by flight operations.

Peterson AFB, as shown in Figure 7.3, Peterson AFB Map, uses one of the multitudes of joint-use military/civilian airfields nationwide. Typically, joint-use airfields are owned and operated by the Department of Defense (DOD), but civilian use is permitted. At Peterson AFB, the Colorado Springs Airport owns and operates the airfield. This partnership between Colorado Springs and Peterson AFB allows for cost sharing at the airfield and opportunities for mutual aid.

Because the city owns the airport, land use and development review procedures are more closely integrated with city regulations, policies, and officials. Federal Aviation Administration (FAA) requirements treat the land used by Peterson AFB as a civilian airfield. The Colorado Springs Airport Master Plan guides land use planning immediately around Peterson AFB and the Colorado Springs Airport, in conformance with FAA requirements for Airport Noise Compatibility Planning (14 Code of Federal Regulations [CFR] Part 150). Either Colorado Springs or El Paso County land use regulations control development on other land adjacent to the airfield. See Figure 7.4, On/Off Airport Land Use Plan.

Figure 7.4
ON/OFF AIRPORT LAND USE PLAN



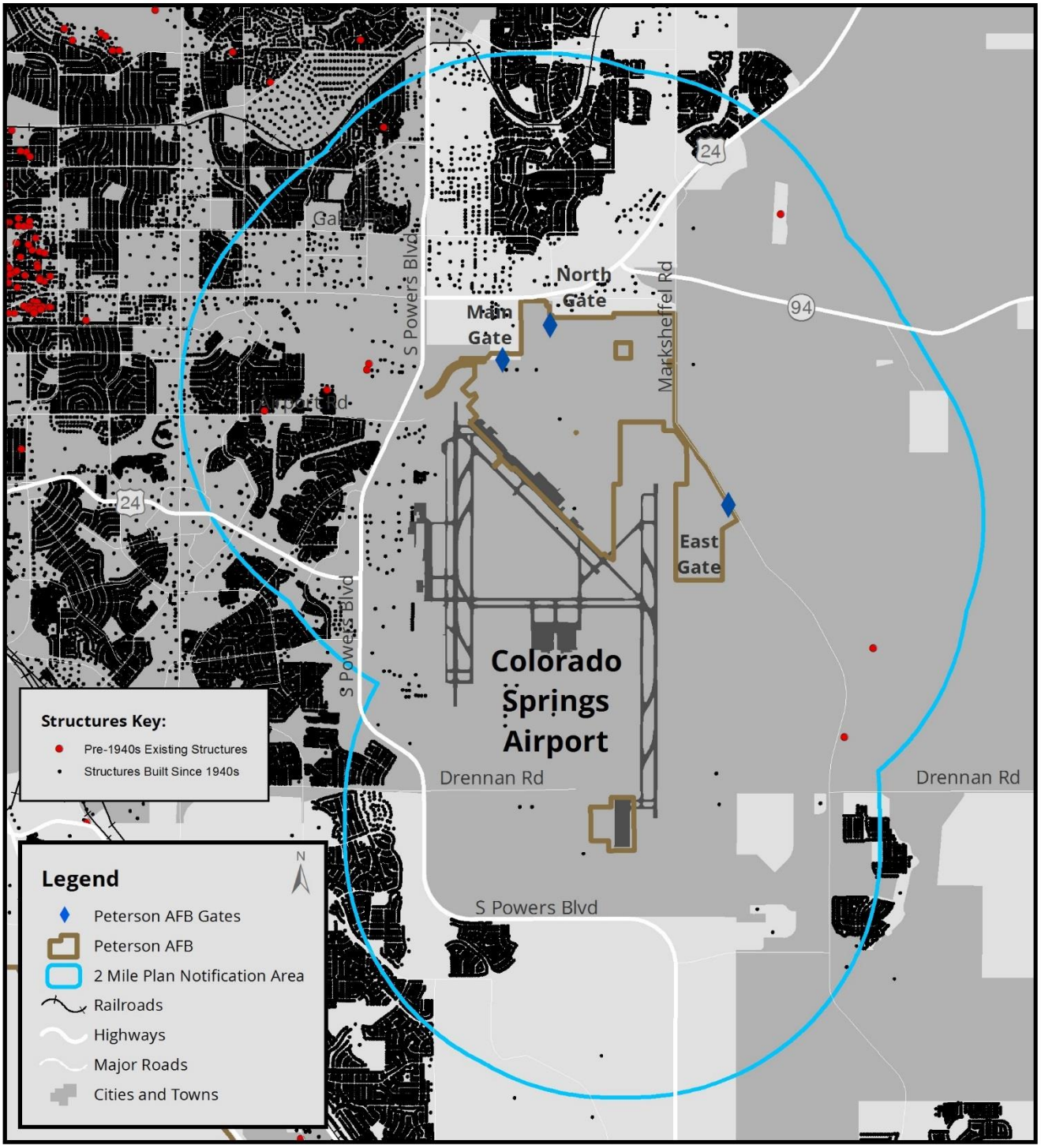
Data Source: Colorado Springs Airport Master Plan

As shown in Figure 7.5, Peterson AFB Growth Map, nearly all population growth around the installation has occurred since 1940, and the area is expected to grow in the future. Figure 7.6, Peterson AFB Small-Area Jobs Forecast, and Figure 7.7, Peterson AFB Small-Area Residential Unit Forecast, show where future growth may occur, according to PPACG's small-area forecast data. The maps reflect the forecasted changes in jobs and residential units, respectively, based on state forecasted population growth for the region. Both maps indicate that growth is likely to continue near the airport and Peterson AFB.

Growth and development must continue to be coordinated effectively among all stakeholders to preserve military and civilian flight operations. Many of the strategies address these concerns, which are shared by both civilian and military stakeholders.

Peterson AFB can be seen across the airfield from the Colorado Springs Airport passenger terminal (photo by PPACG).

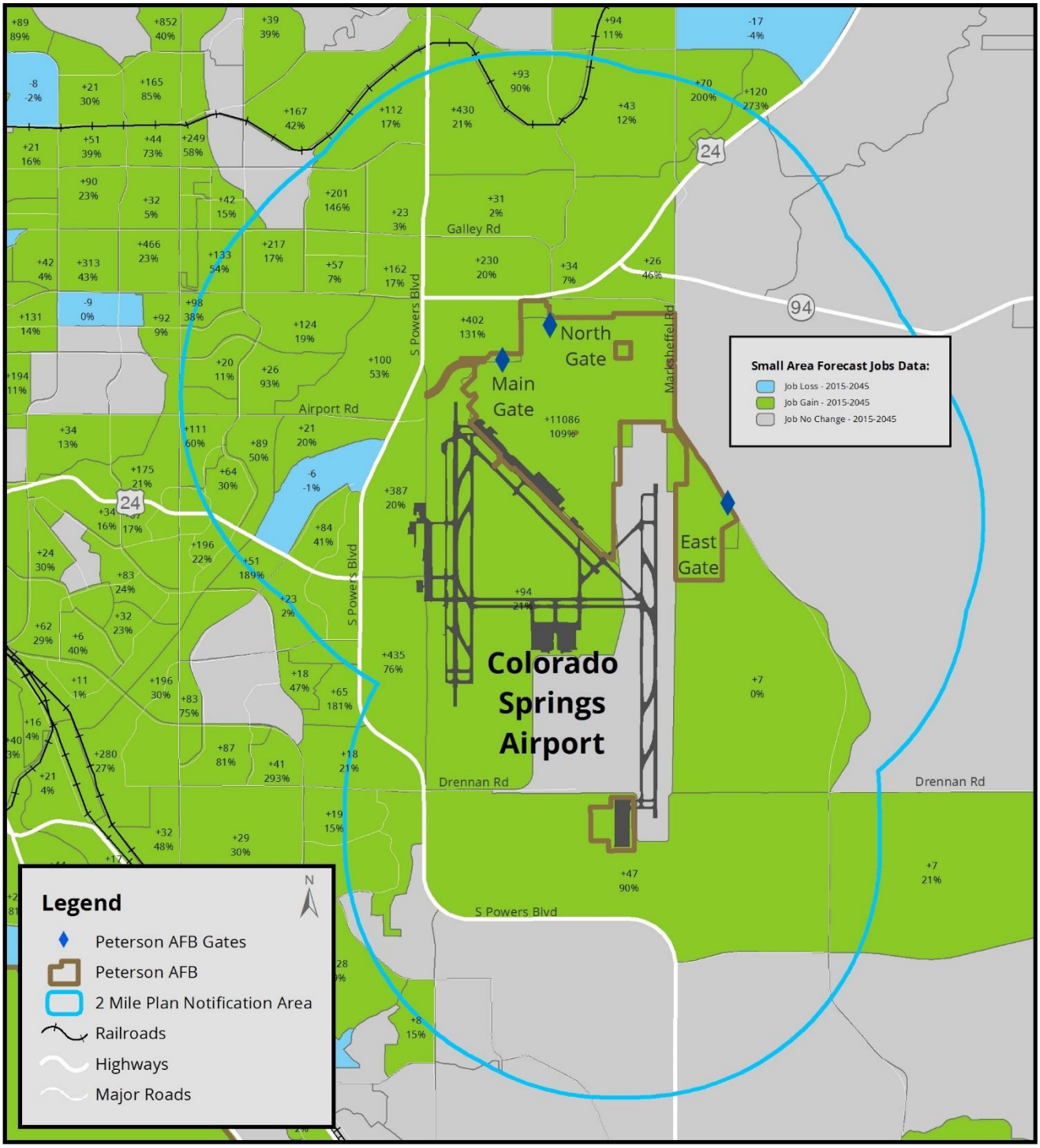
Figure 7.5
PETERSON AFB GROWTH MAP



Data Source: Pikes Peak Regional Building Department, PPACG

Figure 7.6

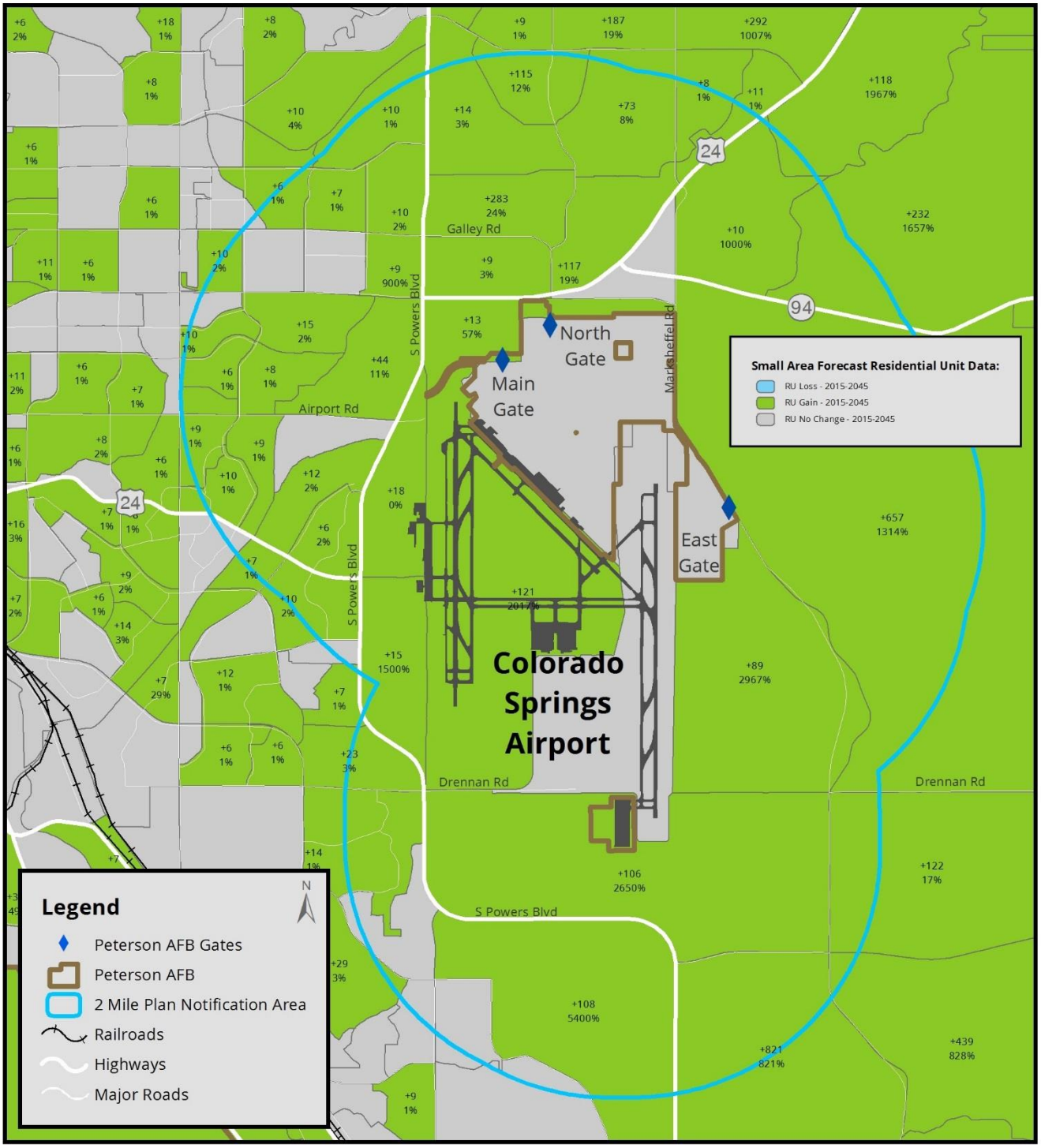
PETERSON AFB SMALL-AREA JOBS FORECAST



Data Source: PPACG, Peterson AFB

Figure 7.7

PETERSON AFB SMALL-AREA RESIDENTIAL UNIT FORECAST



Data Source: PPACG, Peterson AFB

Safety

The BASH program ensures the safe coexistence of aircraft and wildlife. Peterson AFB, in conjunction with U.S. Department of Agriculture (USDA) Wildlife Services, uses a variety of wildlife mitigation techniques, both direct and indirect, to find balance between nature and mission safety on the installation. Peterson AFB BASH program personnel conduct approximately 6,000 wildlife dispersals annually around the airfield. While no significant BASH issues exist off the airfield, it is essential that local land use officials and developers cooperate as the areas surrounding the airfield grow.

Transportation

Primary roads that serve Peterson AFB are Powers Boulevard (State Highway 21/U.S. Route 24) for access to the Main (West) Gate, East Platte Avenue (U.S. Route 24) for access to the North Gate, and Marksheffel Road for access to the East Gate. Powers Boulevard and East Platte Avenue are main arterials that serve eastern areas of the City of Colorado Springs and often become congested. El Paso County, the City of Colorado Springs, and CDOT all have maintenance and plowing responsibilities on the routes to and from Peterson AFB. Coordination on road construction, capacity and safety issues, and maintenance is essential to sustaining functional access for the installation.

Eastward view of neighboring residences across Marksheffel Boulevard from Peterson AFB (photo by PPACG).

As the mission and operations at Peterson AFB increase and development occurs on BLR east of the installation, military and civilian transportation planning officials need to collaborate to meet capacity needs. Operational growth on-base is expected to increase the number of vehicles accessing the East Gate, which may warrant upgrades to the intersection at Marksheffel Road, including adding traffic signals.

Current forecasts anticipate the potential addition of thousands of new personnel to Peterson AFB prior to 2050. The rate of installation population increases and the subsequent demand on roadway capacity will be incremental, and forecasts will require continual adjustments. The small area forecast produced by PPACG is a key tool in planning for future transportation needs in this area, and it will continue to be informed by estimates on personnel growth through the TAC.

Water Supply

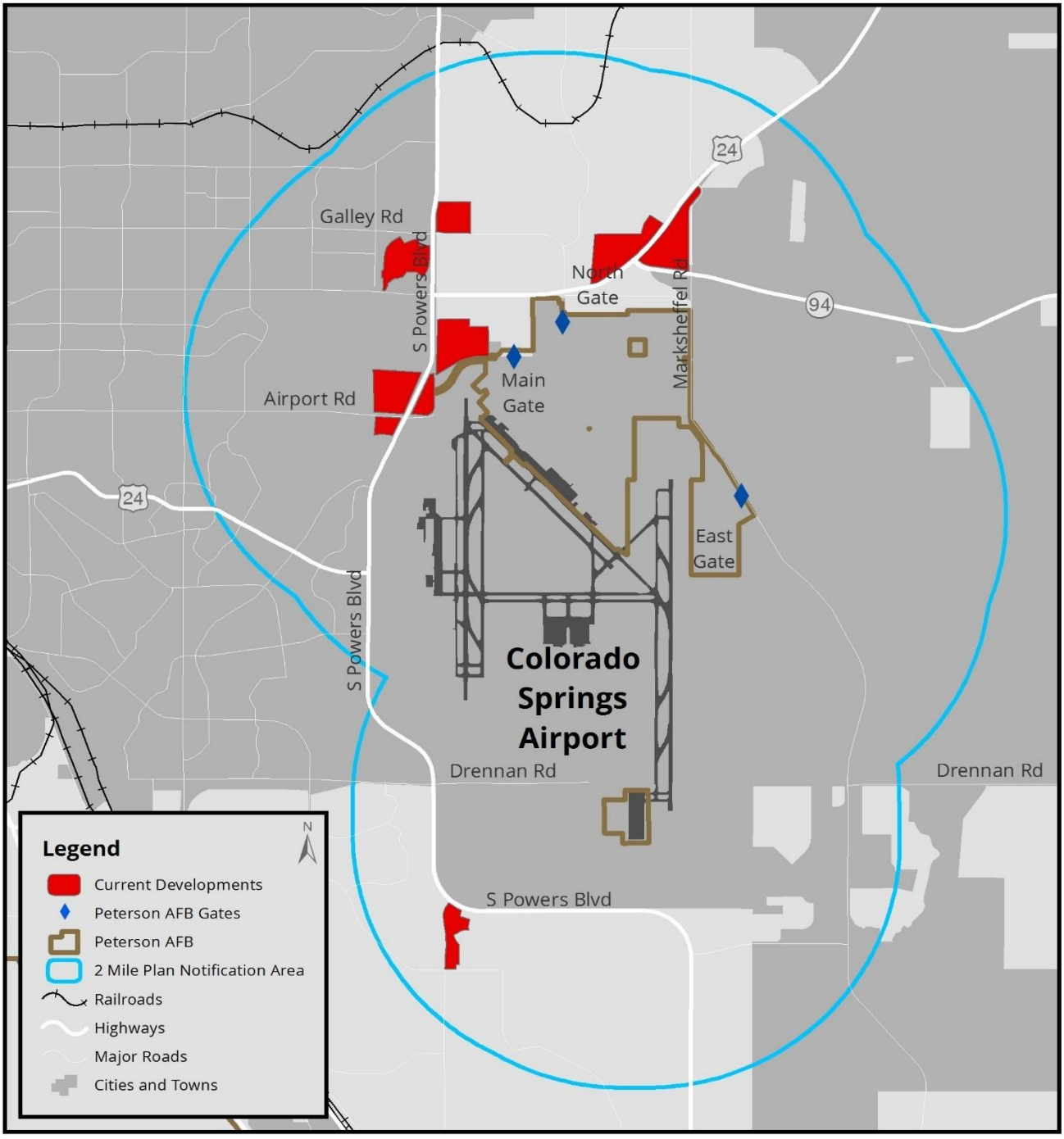
During this study in 2016, concerns about perfluorinated compounds (PFCs) and perfluorooctanoic acid (PFOA) within local groundwater arose within this study area along with many sites throughout the country due to the EPA issuing a health advisory limit for PFCs/PFOA at 70 parts-per-trillion. While this issue was outside the scope of this study, it was important to note its occurrence and that collaboration and communication occurred between the Air Force, Peterson AFB, local communities, citizens, and regulatory agencies on the federal, state, and local level, in order to study this issue and work together towards a solution. After the EPA advisory, subsequent testing of water supplies by water officials in the Fountain, Security, and Widefield area, with follow-up testing at additional sites by the Air Force, indicated groundwater supplies were either close to or exceeding this limit. Because there were concerns that this substance had originated from past use of firefighting foam (this chemical is no longer used) at Peterson AFB, all civilian and military stakeholders with concerns or expertise in this issue began a process of addressing the

contamination. As of the end of this study, there is still some work to be completed but the City of Fountain has tested their water and found it to be below the limits recommended per the EPA advisory. Additional resources that discuss this issue in depth can be found on the websites for Peterson AFB, City of Fountain Water Quality, and the El Paso County Public Health Department.

7.03 ADDITIONAL FIGURES

Figure 7.8

DEVELOPMENT ADJACENT TO PETERSON AFB



Data Source: Local jurisdictional planning offices. Note: This map represents either proposed or approved developments at the end of 2018 and may not fully capture all developments in the area.

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8 CHEYENNE MOUNTAIN AIR FORCE STATION

8.01 OVERVIEW

Cheyenne Mountain Air Force Station (AFS) is owned and operated by Air Force Space Command (AFSPC) and hosts the activities of several tenant units.

Soldiers from the 4th Infantry Division at Fort Carson conduct an exercise at Cheyenne Mountain AFS (photo by 1st Stryker Brigade Combat Team, 4th Infantry Division).

Figure 8.1

CHEYENNE MOUNTAIN AFS QUICK FACTS

DATE FOUNDED	1967
DIVISION	21ST SPACE WING
LAND AREA	568 ACRES
MILITARY PERSONNEL	100
CIVILIAN EMPLOYEES	50

Table 8.1

CHEYENNE MOUNTAIN AFS COMPATIBILITY ISSUES

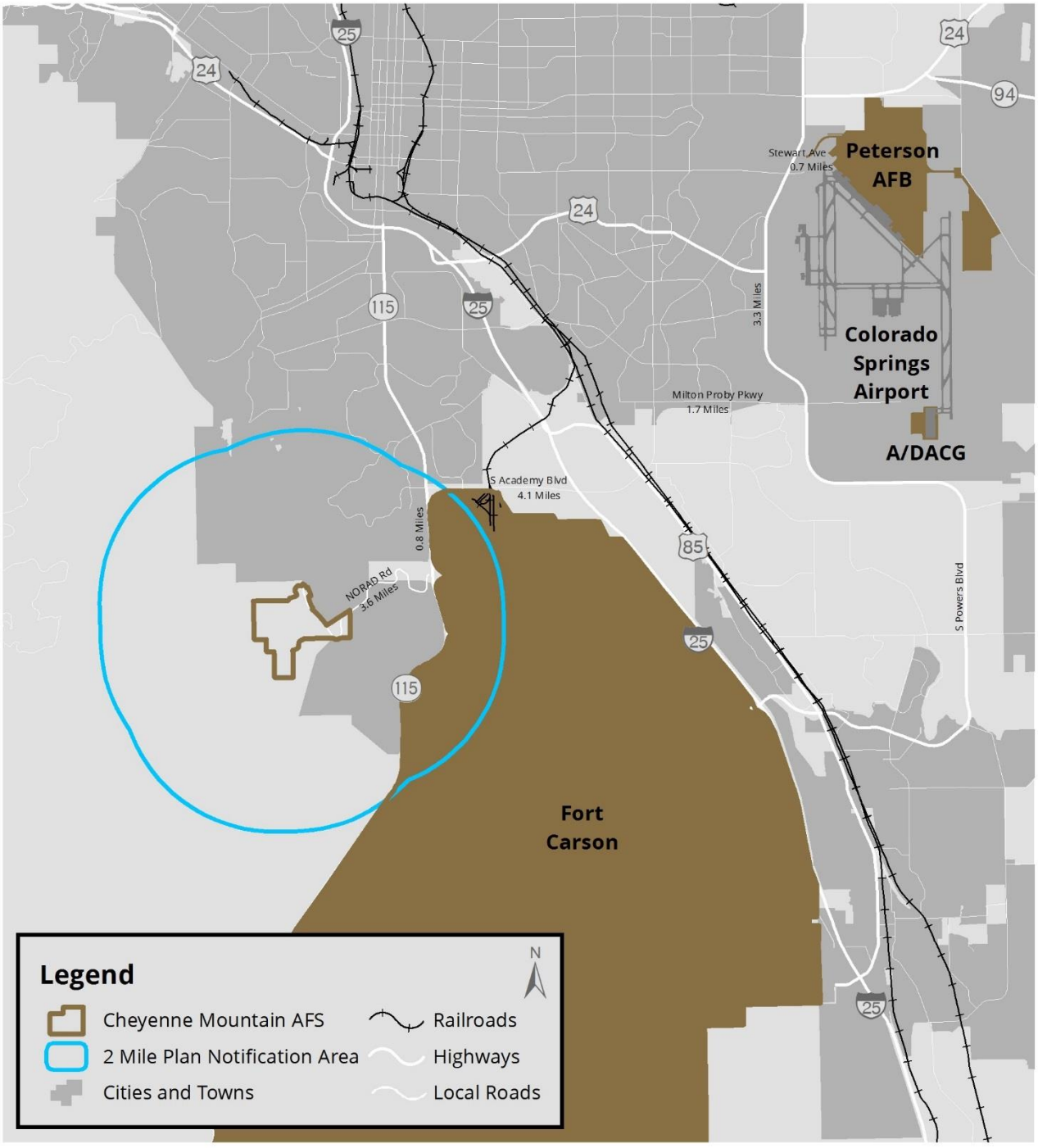
KEY ISSUES:

1. **Land Use Regulations** – Existing residential development in the Broadmoor Bluffs neighborhood creates most of the compatibility issues, primarily trespassing, airspace use, and the need for fire mitigation on properties along the installation perimeter.
2. **Transportation** – Viable routes between Peterson Air Force Base (AFB) and Cheyenne Mountain AFS via State Highway 115 and North American Aerospace Defense Command (NORAD) Road must be maintained during wildfire or other emergencies.
3. **Stormwater** – Development north of NORAD Road could increase stormwater runoff onto the road and State Highway 115 if not properly mitigated.
4. **Airspace** – Civilian use of airspace (including unmanned aircraft systems (UAS) near Cheyenne Mountain AFS) increases the risk of a midair collision and surveillance of the missions at the installation.
5. **Frequency Spectrum** – Cheyenne Mountain AFS must regularly work with local and regional spectrum users to mitigate potential spectrum interference.
6. **Wildfire** – Wildfire management in the Broadmoor Bluffs neighborhood varies from house to house and poses a fire risk to the neighborhood and the installation. Management of the surrounding forestlands will require moth and beetle mitigation.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	x	x	x	**x**	x
Land Use Regulations	x	x	x	**x**	x
Safety Zones	x	x	x		x
Vertical Obstructions	x	x	x		x
Security	x	x	x	**x**	x
Noise and Vibration	x	x	x		
Dust/Smoke		x			
Light and Glare		x			
Transportation	x	x	x	**x**	x
Utility Infrastructure		x	x		x
Stormwater	x	x	x	**x**	x
Airspace	x	x	x	**x**	x
Frequency Spectrum			x	**x**	x
Water Supply	x	x	x	**x**	x
Air Quality					
Wildfire	x	x	x	**x**	x
Noxious Weeds	x	x	x	**x**	x

Note: x indicates issue studied related to this installation.

Figure 8.2
REGIONAL INSTALLATION MAP



Data Source: PPACG

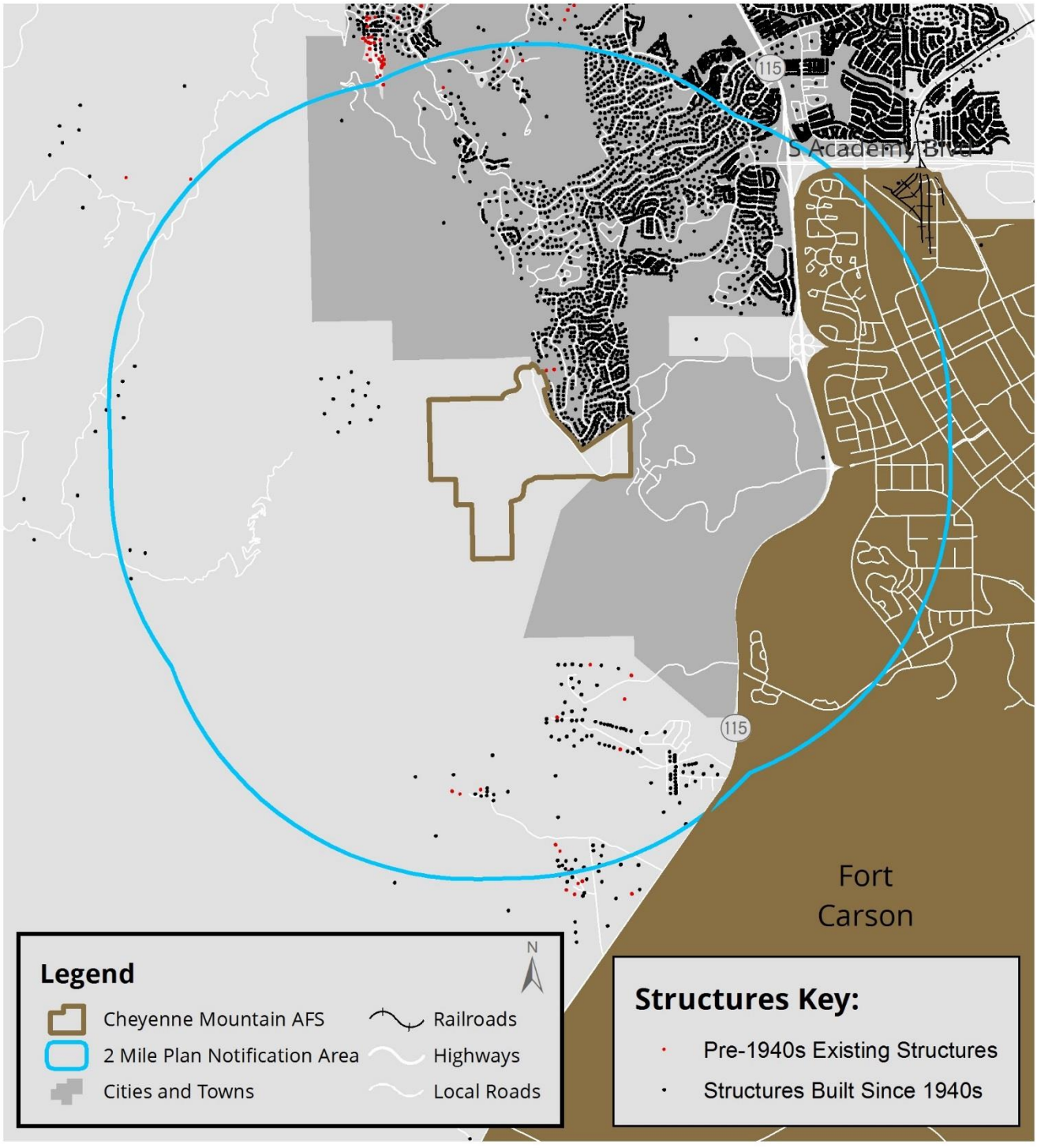
CHEYENNE MOUNTAIN AFS MISSION AND OPERATIONAL FOOTPRINT

Cheyenne Mountain AFS is an Air Force Space Command (AFSPC) installation assigned to the 21st Space Wing (SW) at Peterson AFB that hosts missions, units, and/or elements from United States Strategic Command (USSTRATCOM), United States Northern Command (USNORTHCOM), NORAD, the Defense Intelligence Agency, the Defense Information Systems Agency, and the Air Force Technical Applications Center. The Cheyenne Mountain Operations Center served as the NORAD and USNORTHCOM command center from February 1967 to May 2008, when it was redesignated as the NORAD and USNORTHCOM Alternate Command Center.

The installation does not anticipate growth in employees, but future mission adjustments could occur. Increased traffic and other changes in installation needs regarding encroachment are not expected since the mission operational footprint should remain relatively static. Figure 8.3, Cheyenne Mountain AFS Growth Map, shows that nearly all population growth around Cheyenne Mountain AFS has occurred since 1940.

For more information about Cheyenne Mountain AFS, visit www.norad.mil/About-NORAD/Cheyenne-Mountain-Air-Force-Station/.

Figure 8.3
CHEYENNE MOUNTAIN AFS GROWTH MAP



Data Source: Pikes Peak Regional Building Department, PPACG

8.02 COMPATIBILITY ISSUES

REGIONAL COORDINATION

Please see Chapter 4, Compatibility, for a complete discussion.

BUILT ENVIRONMENT AND MILITARY READINESS

Land Use Regulations

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation."

Areas outside of the 2-mile buffer that may impact military operations should be mapped to assist planners with evaluating development that may affect issues such as roads, potential vertical obstructions, and stormwater.

Existing residential development in the Broadmoor Bluffs neighborhood along the installation boundary creates most of the compatibility issues for the installation, primarily trespassing, airspace use by aircraft and drones, and the need for fire mitigation on properties along the installation perimeter. Remaining vacant lands near the installation also have the potential to affect the mission. Strategies related to this installation focus on strengthening processes and communication to effectively address these potential impacts and ensure recreational land use, trail development, and transportation network enhancements continue to preserve and support Cheyenne Mountain AFS missions (as a component of the Peterson AFB mission footprint).

Residences in the Broadmoor Bluffs neighborhood that adjacent to Cheyenne Mountain AFS (photo by PPACG).

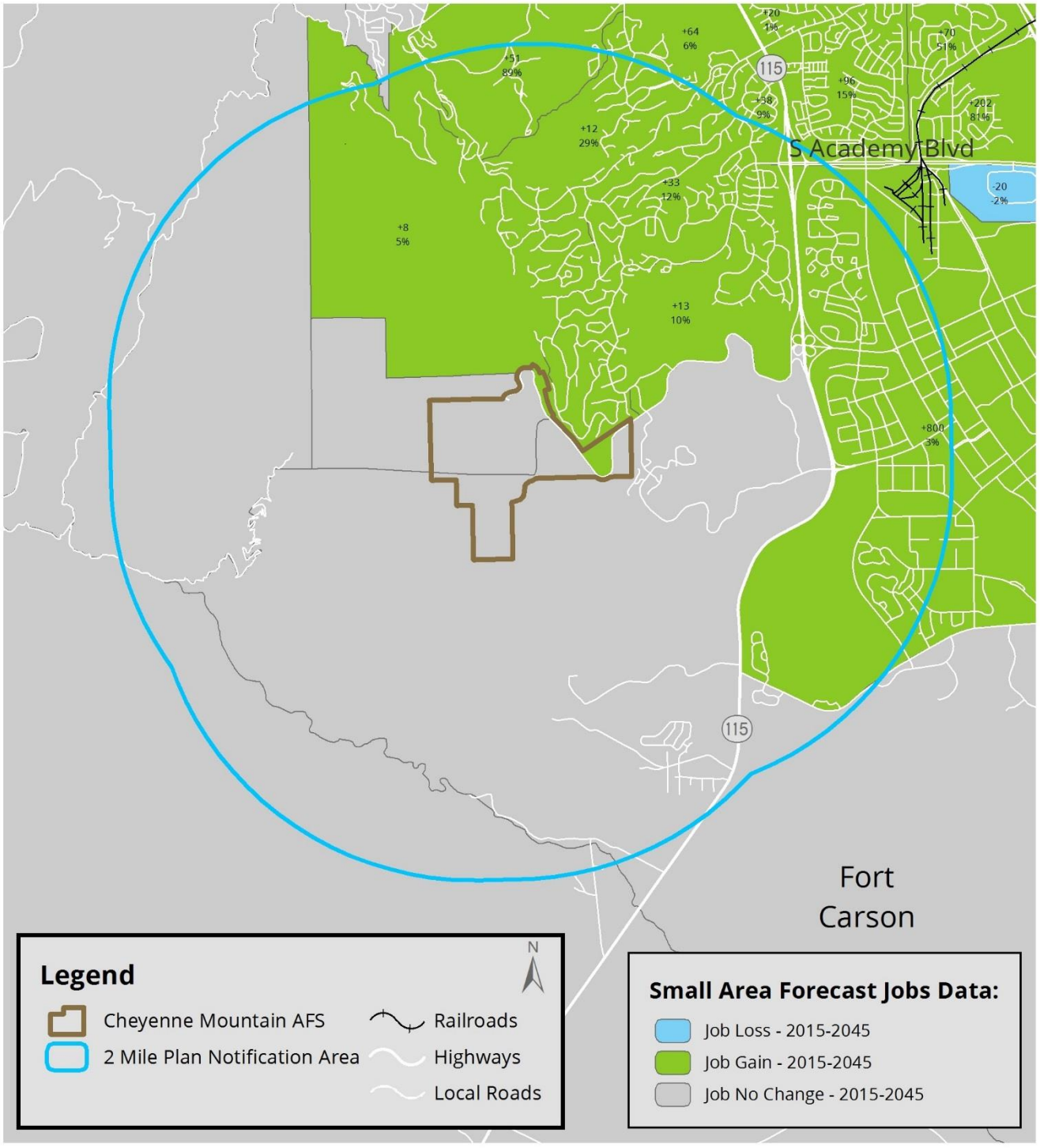
Transportation

Viable routes between Peterson AFB and Cheyenne Mountain AFS (shown on Figure 8.2, Regional Installation Map) using State Highway 115 and NORAD Road must be maintained during wildfire or other emergencies. There is no access to NORAD Road from the south for new development, and all development on the north side of NORAD Road must use the current access point to Broadmoor Bluffs or directly access State Highway 115. The current plat for Broadmoor Bluffs #12, the subdivision adjacent to the northern installation boundary, no longer indicates an emergency access easement that would allow Cheyenne Mountain AFS to provide emergency assistance during a wildfire or other incident. The installation recommends this easement be reestablished to provide a route for emergency services to access the neighborhood during a potential evacuation scenario.

PPACG's small-area forecast data was used to show where future growth may occur to inform transportation planning processes; see Figure 8.4, Cheyenne Mountain AFS Small-Area Jobs Forecast, and Figure 8.5, Cheyenne Mountain AFS Small-Area Residential Unit Forecast. The maps reflect the forecasted changes in jobs and residential units, respectively, based on state forecasted population growth. Both maps indicate that growth is likely to continue in this area.

Figure 8.4

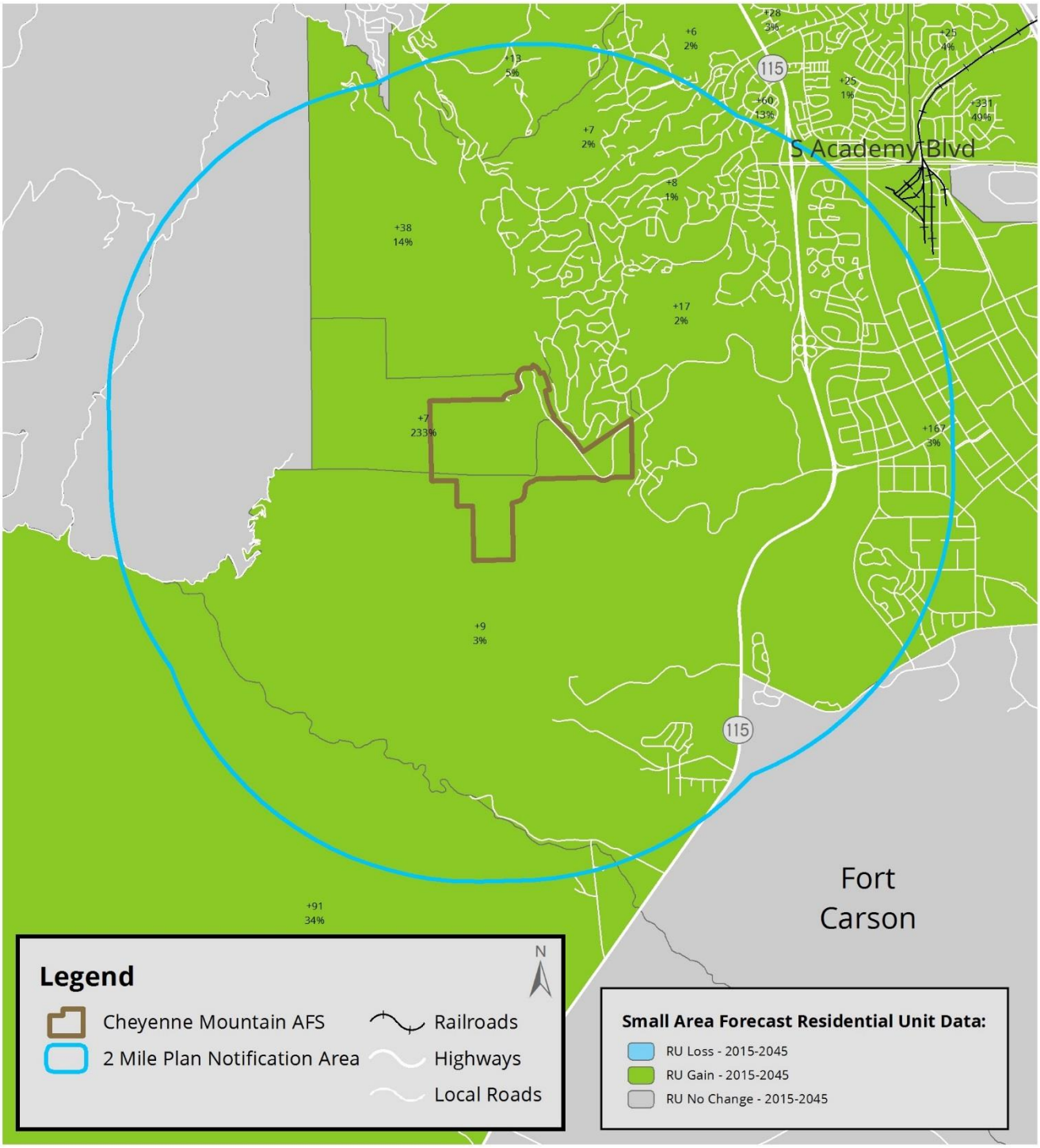
CHEYENNE MOUNTAIN AFS SMALL-AREA JOBS FORECAST



Data Source: PPACG

Figure 8.5

CHEYENNE MOUNTAIN AFS SMALL-AREA RESIDENTIAL UNIT FORECAST



Data Source: PPACG

Stormwater

When Cheyenne Mountain AFS was constructed in the 1960s, it was isolated, and its stormwater runoff had no impact on the surrounding countryside, which was mainly agricultural in nature. Since the 1960s there has been significant development north of the installation, including Broadmoor Bluffs homes adjacent to the installation perimeter.

Stormwater runoff passes through Cheyenne Mountain AFS into Cheyenne Mountain State Park, Broadmoor Bluffs, State Highway 115, and Fort Carson. Stormwater and slope stability management studies were completed in spring 2018, and the installation is developing projects to address deficiencies and problem areas. Impacts to NORAD Road were included in the studies, as well as residential runoff impacts along NORAD Road and State Highway 115. Development north of NORAD Road could increase stormwater runoff onto the road and State Highway 115 if not properly mitigated. Since the 100-year flood event in September 2013, Cheyenne Mountain AFS has invested approximately $7 million in storm drainage improvements on the installation.

View of Cheyenne Mountain State Park near Cheyenne Mountain Air Force Station (photo by PPACG).

Airspace

Receiving and departing helicopter flights occur several times per year at Cheyenne Mountain AFS with approaches and departures over Cheyenne Mountain State Park. The helipad is not currently registered with, or acknowledged by, the Federal Aviation Administration (FAA) as a component of the National Airspace System. A project is underway to repair the helipad and bring it up to the standards required for an Air Force limited-use helipad with single-direction ingress/egress that will then be registered and annotated on appropriate FAA documents. Existing urban development; rising terrain to the west, north, and south; density altitude; and the influence that these geographic realities have on weather patterns can produce real challenges to any type of flight operations near the installation and along the entire Rocky Mountain Front Range. In addition to the helipad, Cheyenne Mountain AFS also has a landing zone (LZ) to receive either larger or additional helicopters for emergency response and evacuation of personnel.

Civilian use of airspace (either manned or UAS) near and above Cheyenne Mountain AFS increases the risk of a midair collision and surveillance of the missions at the installation. The registration of the helipad with the FAA, coupled with potential inclusion in and enforcement of the FAA's 14 Code of Federal Regulations (CFR) Part 107, Small Unmanned Aircraft Systems, will help mitigate this risk.

Frequency Spectrum

Cheyenne Mountain AFS communication systems are primarily underground and do not pose a visual or spectrum impact on the community. In 2006, Colorado Springs updated its telecommunications facilities ordinance to codify the public participation process and encourage comments on the land use compatibility of all proposed commercial mobile radio service facilities. This process allows Cheyenne Mountain AFS spectrum managers to protect its interests from spectrum competition while promoting regular communication with local and regional spectrum users to mitigate any potential spectrum interference in the region.

NATURAL RESOURCE FACTORS

Wildfires

Significant work has been done by Cheyenne Mountain AFS and Cheyenne Mountain State Park, on a cooperative basis, to thin timber stands and clear-cut scrub oak to create a 30- to 40-foot fire break along the southern perimeter of the installation. The proximity of Broadmoor Bluffs housing along the northern perimeter of Cheyenne Mountain AFS creates a true Wildland/Urban Interface (WUI), where structures built within flammable vegetation pose an elevated risk for wildfire. Although the Colorado Springs Fire Department has a very active public education presence through the National Fire Prevention Association's Firewise USA program, mitigated spaces in Broadmoor Bluffs vary from house to house and pose a fire risk to the neighborhood and the installation. Additional funding, local government staff, and resident education and action programs would help reduce the wildfire risk shared by the installation and the community.

The greatest need is for Cheyenne Mountain AFS and the U.S. Forest Service District Office for Pike National Forest to collaborate on mitigating the Tussock moth and Western spruce budworm infestations, which resulted in significant forest kills immediately to the south and southwest of the installation.

9 SCHRIEVER AIR FORCE BASE

9.01 OVERVIEW

Approximately 7,000 personnel are employed at Schriever Air Force Base (AFB), which is located 3.5 miles east of the Colorado Springs city limits and 5.5 miles west of the Town of Ellicott. The installation is unique in that no airfield or aircraft assets exist on Schriever AFB.

Mission growth and base operating support requirements are expected to increase in the future. Promoting compatible off-base development and improving the area transportation network will help sustain current and future missions at Schriever AFB.

Community partners can play a role in protecting communications spectrum capacity and look angles to sustain the mission at Schriever AFB (photo by U.S. Air Force).

Colorado Springs Joint Land Use Study (JLUS) objectives related to Schriever AFB:

1. To protect airspace above and protect satellite antenna look angles adjacent to the installation.
2. To improve safety and capacity for key transportation corridors that connect Schriever AFB to surrounding communities.

Figure 9.1

SCHRIEVER AFB QUICK FACTS

DATE FOUNDED	1985
DIVISION	AIR FORCE SPACE COMMAND
LAND AREA	3,840 ACRES
MILITARY PERSONNEL	2,087
CIVILIAN EMPLOYEES	4,891
DEPENDENTS	2,692
ECONOMIC IMPACT (2015)	$1.3 BILLION

Table 9.1

SCHRIEVER AFB COMPATIBILITY ISSUES

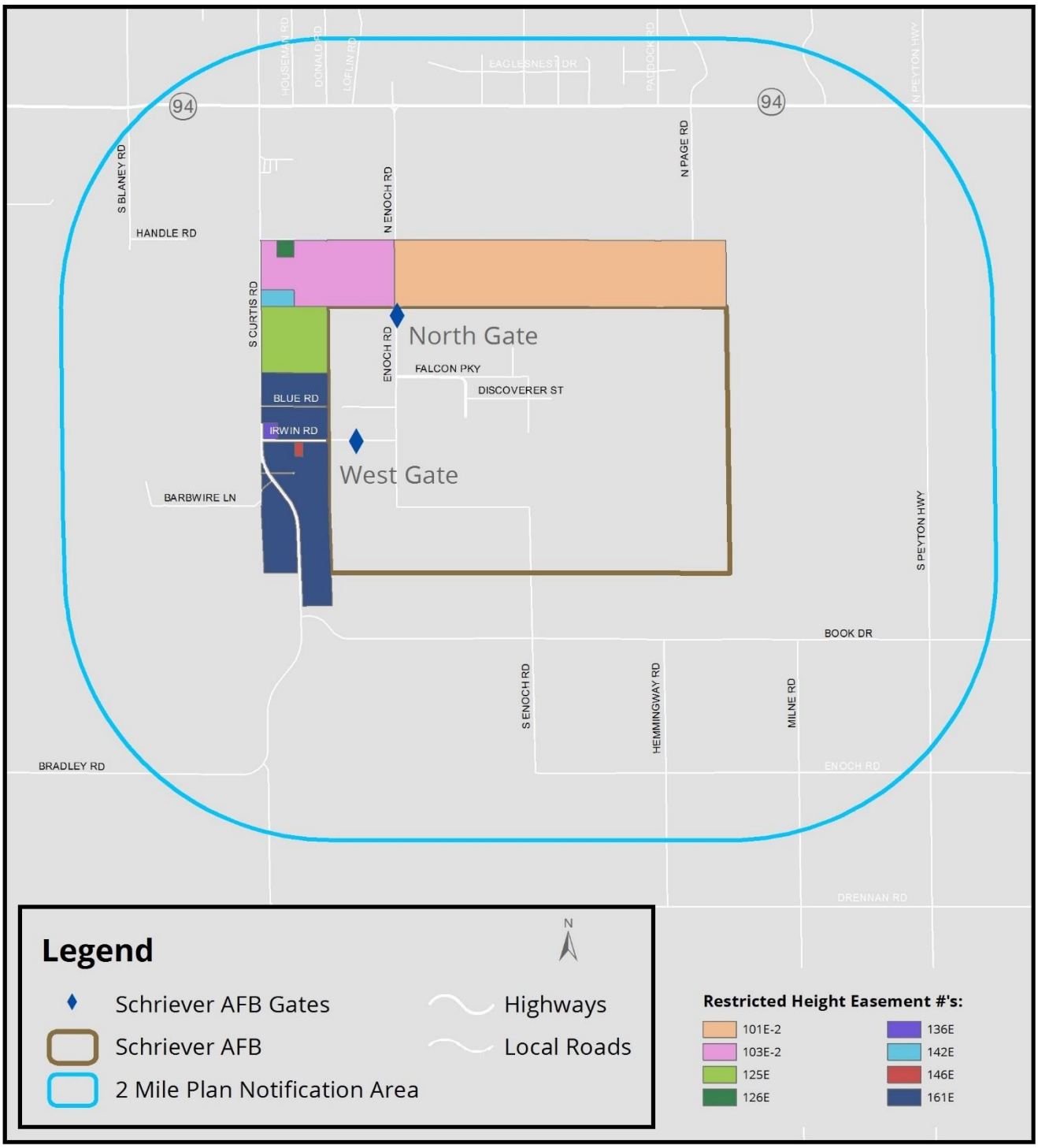
KEY ISSUES:

1. **Land Use Regulations** – No incompatible development exists in areas surrounding Schriever AFB. However, creating a compatible use buffer around the installation could protect frequency spectrum and enhance perimeter security to sustain existing and future Schriever AFB missions.
2. **Safety Zones** – Electromagnetic frequency radiation hazard zones are an existing compatibility issue.
3. **Transportation** – State Highway 94 safety and capacity considerations are of significant interest for Schriever AFB personnel and residents.
4. **Utility Infrastructure** – Schriever AFB is interested in partnering with utility providers to improve resiliency through natural gas and electric infrastructure enhancements.
5. **Airspace** – Maintaining special-use airspace is necessary to provide a safety buffer between Schriever AFB's communications systems on the surface and air traffic.
6. **Frequency Spectrum** – Communications spectrum considerations at Schriever AFB include line of sight, radio frequency (RF) interference, and radiation hazard zones.
7. **Noxious Weeds** – State and federally listed noxious plant species exist at Schriever AFB.

	AIR FORCE ACADEMY	FORT CARSON	PETERSON AFB	CHEYENNE MOUNTAIN AFS	SCHRIEVER AFB
Regional Coordination	x	x	x	x	**x**
Land Use Regulations	x	x	x	x	**x**
Safety Zones	x	x	x		**x**
Vertical Obstructions	x	x	x		**x**
Security	x	x	x	x	**x**
Noise and Vibration	x	x	x		
Dust/Smoke/Steam		x			
Light and Glare		x			
Transportation	x	x	x	x	**x**
Utility Infrastructure		x	x		**x**
Stormwater	x	x	x	x	**x**
Airspace	x	x	x	x	**x**
Frequency Spectrum			x	x	**x**
Water Supply	x	x	x	x	**x**
Air Quality					
Wildfire	x	x	x	x	**x**
Noxious Weeds	x	x	x	x	**x**

Note: x indicates issue studied related to this installation.

Figure 9.2
SCHRIEVER AFB MAP



Data Source: PPACG

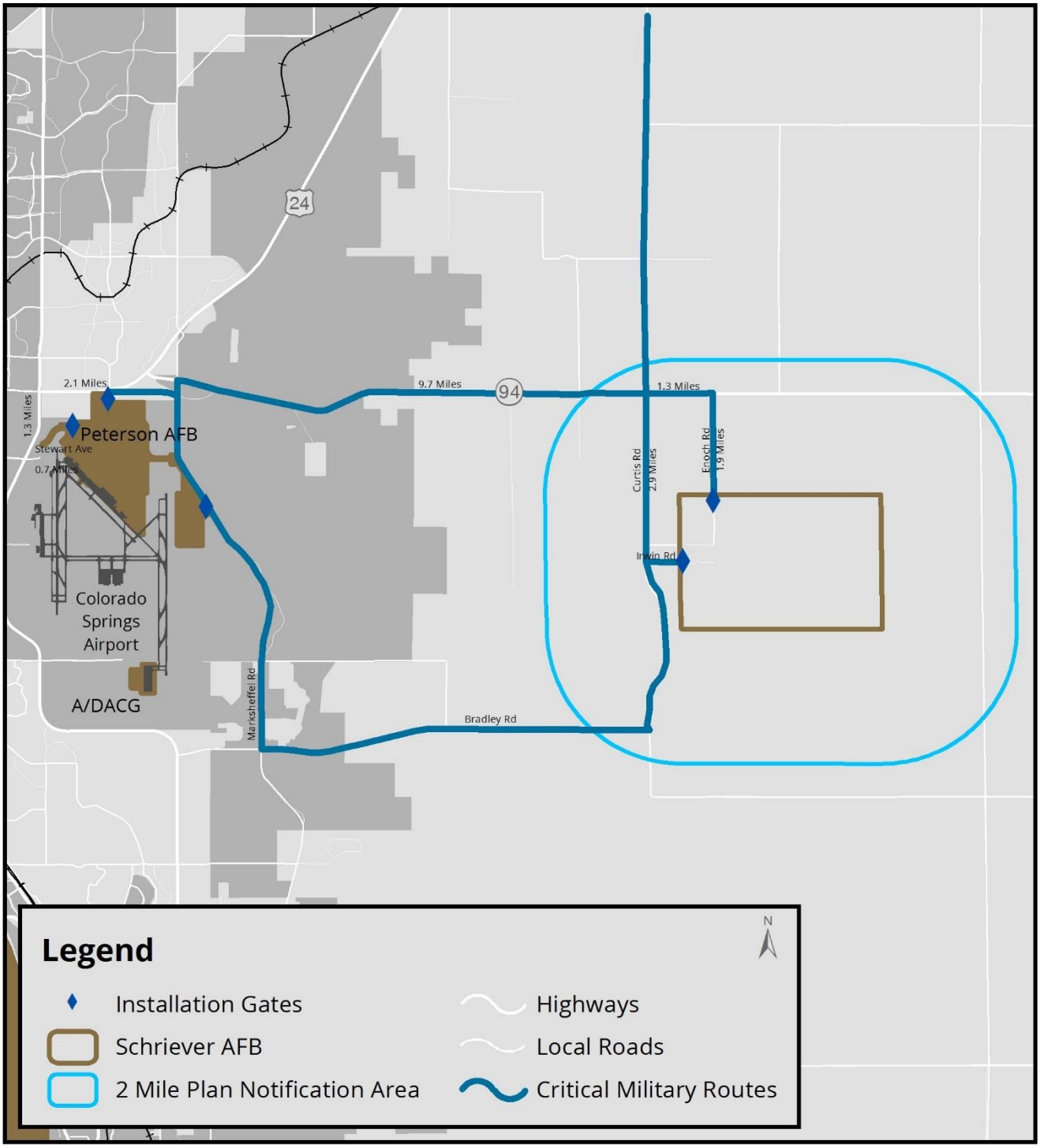
9.02 SCHRIEVER AFB MISSION AND OPERATIONAL FOOTPRINT

The host unit at Schriever AFB, the 50th Space Wing (SW), is proudly called the "Master of Space." The 50 SW is a component of Air Force Space Command (AFSPC). The 50 SW's mission is to *"Evolve space and cyberspace warfighting superiority through integrated and innovative operations."* The 50 SW hosts several key mission partners, including the United States Air Force Warfare Center, elements of the Missile Defense Agency, 310th Space Wing, National Reconnaissance Office Operations Squadron, National Space Defense Center, Joint Force Space Component staff, and elements of the Naval Space Operations Command, among others.

For more information about Schriever AFB, visit www.schriever.af.mil.

Figure 9.3

TRANSPORTATION NETWORK IN THE VICINITY OF SCHRIEVER AFB



Data Source: PPACG

9.03 COMPATIBILITY ISSUES

This chapter discusses the relationships among compatibility issues, mission operations, community stakeholders, and current actions to provide background for the strategies within Chapter 10, Implementation Strategies.

REGIONAL COORDINATION

Please see Chapter 4, Regional Compatibility, for a complete discussion.

BUILT ENVIRONMENT AND MILITARY READINESS

Land Use Regulations

Unlike the other four installations in this study, Schriever AFB is not immediately adjacent to an urbanized area. Land adjacent to Schriever AFB is used almost exclusively for agricultural activities, with cattle grazing occurring on many of the larger parcels. Some residential development is also scattered throughout the area on 2.5-acre, 5-acre, and 35-acre lots. Colorado's State Land Board owns and manages a significant portion of the agricultural land area around Schriever AFB. Existing agricultural uses around the installation are compatible with mission requirements. No incompatible development currently exists in areas surrounding the installation. As shown in Figure 9.4, Schriever AFB Growth Map, nearly all growth around the installation has occurred since 1940.

From 1987 to 1991, eight easements were obtained for parcels surrounding Schriever AFB to the north and west (Figure 9.2). No buildings, structures, overhead power lines, vegetation, or other obstructions over 45 feet above ground level (AGL) shall be allowed in perpetuity for these parcels.

Colorado House Bill 10-1205 created requirements (C.R.S. 29-20-105.6) for local governments to "provide to the installation commanding officer and the flying mission commanding officer, or their designees, information relating to proposed zoning changes, and amendments to the local government's comprehensive plan, or land development regulations that, if approved, would affect the use of any area within two miles of the military installation." Planning efforts for Schriever AFB should be focused within the established 2-mile notification area due to distances from developing areas that could impact transportation networks, frequency spectrum, and installation security.

Creating a compatible use buffer around the installation to limit traffic congestion, protect communications spectrum, and enhance installation security would support existing and future Schriever AFB missions.

Schriever AFB is within the boundaries of the State Highway 94 Comprehensive Plan (2003), which is an element of the El Paso County Master Plan that covers 120 square miles. El Paso County's Planning and Community Development Department administers surrounding land uses and zoning regulations. Schriever AFB personnel participate in the El Paso County development review process as a referral agency. For those areas outside El Paso County's jurisdiction within either Colorado Springs or Schriever AFB, the expectation is that those entities will recognize the State Highway 94 Comprehensive Plan in a spirit of cooperation and coordination until it is replaced by a new El Paso County Master Plan. This process is anticipated to begin in 2019 and is intended to replace the existing subarea plan. To inform that plan, several strategies have been identified to support the development review process (see Chapter 10).

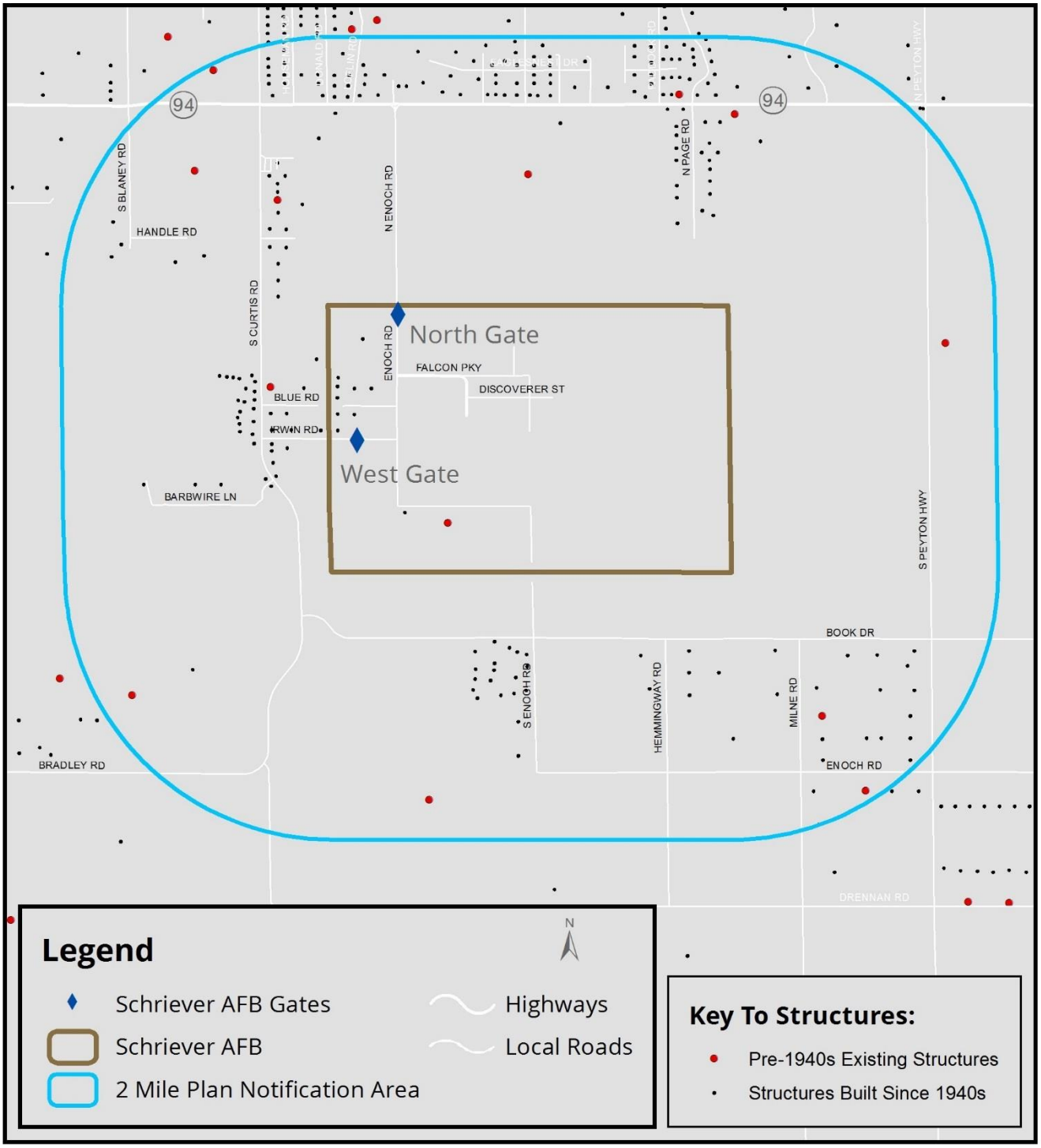
Even though the eastern edge of Colorado Springs is 3.5 miles west of Schriever AFB, development within the city can indirectly affect installation commuters and residents. PPACG's small area forecast data was used to show where future growth may occur to inform transportation planning processes, as shown in Figure 9.5, Schriever AFB Small Area Jobs Forecast, and Figure 9.6, Schriever AFB Small Area Residential Unit

Forecast. These maps reflect the forecasted changes in jobs and residential units, respectively, based on state forecasted population growth. Both maps indicate that growth is likely to continue in this area. The development of BLR over the next few decades will create additional growth pressures that may affect the transportation networks that Schriever AFB relies upon.

Effective coordination and planning among military officials, local jurisdictions, utility service providers, and transportation officials will be essential to sustaining current and future missions at Schriever AFB.

Cattle graze on currently undeveloped BLR property near Schriever AFB (photo by PPACG).

Figure 9.4
SCHRIEVER AFB GROWTH MAP



Data Source: Pikes Peak Regional Building Department, PPACG

Figure 9.5

SCHRIEVER AFB SMALL-AREA JOBS FORECAST

Data Source: PPACG

Figure 9.6

SCHRIEVER AFB SMALL-AREA RESIDENTIAL UNIT FORECAST

Data Source: PPACG

Safety Zones

Electromagnetic frequency safety zones are present at Schriever AFB. These zones are related to the frequency spectrum and radiation hazard.

Transportation

State Highway 94 is the primary access route that connects Schriever AFB with Colorado Springs and other El Paso County communities where installation personnel reside. The installation relies on State Highway 94, along with Curtis Road, Bradley Road, Enoch Road, and Irwin Road, for safe and efficient access. State Highway 94 safety and capacity considerations are of significant interest for Schriever AFB personnel and residents. The base partners with local, state, and federal transportation representatives to emphasize the importance of these considerations for State Highway 94 and other area roadways.

The Southern Delivery System (SDS) Components Plan includes potential construction of the Upper Williams Creek Reservoir. The proposed reservoir would be located in the vicinity of Bradley Road, a designated Defense Access Road. Planning for all SDS reservoirs needs to consider the military's transportation needs in order to maintain the current level of service for Bradley Road.

Waste Management operates a Colorado Springs landfill north of State Highway 94 and west of Curtis Road. All parties who use State Highway 94 should be consulted in the future to identify future safety concerns associated with trash hauling and potential remedies.

Multiple studies by El Paso County and the Colorado Department of Transportation (CDOT) have analyzed accident data and vehicle trips over the previous decade and found that roadway improvements are needed. However, these timing and type of improvements will be impacted by transportation funding constraints at the state and federal levels and competing priorities. In spring 2018, CDOT initiated a study to identify the specific State Highway 94 improvements.

Utility Infrastructure

To improve resiliency at the installation, Schriever AFB is interested in natural gas and other utility infrastructure extensions from its utility providers. The base will continue to evaluate needs for additional electrical capacity and distribution to serve expansion of current missions and new missions. Renewable energy opportunities may be identified through collaboration with utility service providers in the future.

Schriever AFB receives water and sanitary sewer services from the Cherokee Metropolitan District (CMD), a not-for-profit, quasi-municipal governmental entity originally established in 1957. They primarily provide water and sanitary sewer operations for Cimarron Hills customers as well as maintenance of street lighting. CMD lies just east of the city limits of Colorado Springs in El Paso County. CMD's service area includes Peterson AFB (not served by CMD) on the south, Powers Boulevard on the west, a northern boundary approximately two miles north of Constitution Avenue to Barnes Road, and the eastern boundary follows U.S. Highway 24 approximately one mile east of Marksheffel Road to Constitution Avenue. This district is roughly 6,300 acres and serves some 17,945 customers including Schriever AFB, which is technically outside of the CMD boundary. As the installation grows, it will be important for CMD to understand the anticipated infrastructure and usage needs to accommodate future mission growth to avoid water and sewer capacity issues.

Electrical service is provided by Mountain View Electric Association, Inc., (MVEA), which serves portions of eastern El Paso County and territory outside of the study area in Lincoln and Elbert counties farther east. Much like CMD, effective communication and planning efforts between MVEA and Schriever AFB should support future electrical needs associated with anticipated mission growth.

Airspace

A special-use airspace covers a portion of Schriever AFB. This airspace, designated as R-2602, provides a safety buffer between Schriever AFB's

communications systems on the surface and air traffic. This airspace also protects aircraft from electromagnetic frequency (EMF) radiation hazards. 50 SW has authority to schedule access to R-2602, and the Federal Aviation Administration's Denver Center provides air traffic control services for aircraft requiring access. R-2602 vertical dimensions are from ground level to 1,000 feet AGL. A key objective is to protect airspace above Schriever AFB to enable continued communications, cybersecurity, and space operations enabling mission sustainment and community development.

Frequency Spectrum

The Air Force and other federal agencies share the electromagnetic (EM) spectrum and use the RF spectrum for communications, navigation, and other critical purposes. The following may constrain Air Force missions:

- Spectrum regulations, reallocation, or commercialization
- Increased EM interference
- Military-civilian competition for limited bandwidth

Installation personnel document communications antenna locations and any associated electromagnetic frequency radiation zones. Communications spectrum considerations at Schriever AFB include line of sight, RF interference, and radiation hazard zones.

NATURAL RESOURCE FACTORS

Noxious Weeds

Noxious weeds are a compatibility issue at Schriever AFB. Seven state and federally listed noxious plant species (and six other noxious weeds) were identified at Schriever AFB during a survey conducted in 2016 and measures have been taken to address the issue. It is likely that noxious weeds exist near Schriever AFB so adjacent property owners around the installation may face the same noxious weeds issue.

10 IMPLEMENTATION STRATEGIES

10.01 OVERVIEW

The Joint Land Use Study (JLUS) strategies and actions in this section have been developed through a collaborative effort among the JLUS Policy and Technical Committees, working groups, and other stakeholders. These recommendations reflect consensus around coordinated strategies and actions and are intended to address the compatibility issues described in previous chapters. In addition to these strategies, the stakeholder relationships either formed or fostered by this process have been the most important outcome of the JLUS. The recommended strategies and actions consider the unique operations and associated impacts of each installation in the region.

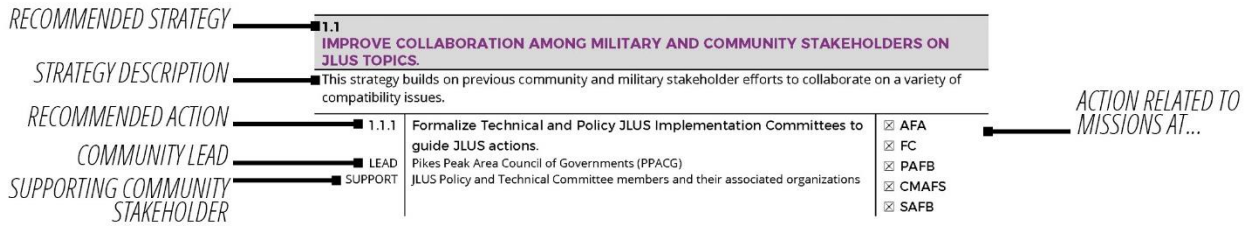
Strategies and implementation plans are organized by compatibility category. Each action identifies the leading and supporting community stakeholders for implementation and the military installations affected by or involved in each action. Installations identified by a checked box next to an action should be involved in future discussions regarding that action.

It is anticipated that the prioritization of these actions will be determined by the Policy Implementation Committee following their approval of this JLUS.

To aid with implementation, the actions listed in the following tables identify lead and support organizations and notes which installations may be involved with or affected by each action to facilitate coordination across organizations. Figure 10.1, Strategy Key, offers a description of each box in the tables that follow. All strategies are intended to support compliance with all applicable federal regulations, which take precedence over any recommendation, particularly with FAA regulatory compliance with regard to all military and civilian airfields.

Figure 10.1

STRATEGY KEY



REGIONAL COORDINATION

1.1 IMPROVE COLLABORATION AMONG MILITARY AND COMMUNITY STAKEHOLDERS ON JLUS TOPICS.

This strategy builds on previous community and military stakeholder efforts to collaborate on a variety of compatibility issues.

1.1.1	**Formalize Technical and Policy JLUS Implementation Committees to guide JLUS actions.** LEAD: Pikes Peak Area Council of Governments (PPACG) SUPPORT: JLUS Policy and Technical Committee members and their associated organizations	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.1.2	**Support ongoing efforts by state and local organizations to preserve, protect, expand, and attract new military missions, assets, and installations.** LEAD: PPACG SUPPORT: Colorado Springs Regional Chamber and EDC; Colorado Springs Military Affairs Committee (MAC)	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.1.3	**Organize an annual Colorado Military Summit to discuss and develop ways for defense communities, military installations, and local and state leaders to enhance military readiness and economic development opportunities.** LEAD: JLUS Implementation Committees SUPPORT: PPACG; Colorado Springs Regional Chamber and EDC; Colorado Springs MAC; Colorado Department of Military and Veterans Affairs	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.1.4	**Create and maintain a master list of civilian and military points of contact for the various JLUS compatibility issues (land use, airspace, stormwater, etc.) to facilitate regional communication among stakeholders.** LEAD: PPACG SUPPORT: JLUS Technical Committee, Airport Staff, Installation Representatives, Airport Advisory Commission	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

1.1.5	**Ensure that information distributed at existing committees/forums (MAC, PPACG, State of the Base, Community-Relations Meeting, Area Chiefs of Staff, etc.) is shared among organization leaders, staff members, and public affairs officials.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	JLUS Implementation Committees; Military and Community Public Information Officers	
1.1.6	**Continue to incorporate regular communication and follow-up within communication plans to effectively address public concerns.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	JLUS Implementation Committees	
SUPPORT	Local Governments; Relevant State Agencies	
1.1.7	**Coordinate with military installation committees or other groups (e.g., Air Force Academy Installation Encroachment Management Team) to address ongoing JLUS issues.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	JLUS Policy and Technical Committees	
1.1.8	**Identify opportunities to address JLUS objectives within the Air Force Community Partnership Program.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	JLUS Policy Committee	
SUPPORT	PPACG	
1.1.9	**Formalize the Airspace Working Group to address ongoing issues as they arise.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	JLUS Implementation Committees, Airport Staff, Installation Representatives, Airport Advisory Commission	

1.2 UTILIZE ONLINE MAPPING AND DATA TOOLS TO ASSIST STAKEHOLDERS WITH MANAGING MISSION ENCROACHMENT ISSUES.

Other states, including Arizona and California, have created mapping tools documenting statewide compatibility issues. Similar tools for Colorado communities and military installations will address compatibility challenges throughout at the local, regional, and state level.

1.2.1	**Create a publicly accessible, interactive, and unified geographic information system (GIS) map of lands underneath airspace used for military training and adjacent to installations for use by installations and conservation partners.** LEAD: PPACG SUPPORT: JLUS Technical Committee; community and installation GIS managers	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.2.2	**Produce "Area of Concern" maps to assist local jurisdictions with zoning overlays or other compatible land use considerations where impacts from military operations may occur, as appropriate.** LEAD: PPACG SUPPORT: JLUS Technical Committee; community and installation GIS managers, Airport Staff, Installation Representatives, AAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.2.3	**Facilitate interjurisdictional mapping of land uses and vacant parcels near military installations to assist military-community coordination on mission support and compatible development.** LEAD: PPACG SUPPORT: JLUS Technical Committee; community and installation GIS managers	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.2.4	**Incorporate military accident potential zone (APZ) standards into city and county GIS zoning codes and maps.** LEAD: PPACG SUPPORT: Local jurisdictions with zoning and development controls for land around military and civilian airfields, Airport Staff, Installation Representatives, AAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.2.5	**Map High-Altitude Environmental Training (HAMET) landing zones where landowners or other entities with real property interests should be contacted prior to training operations.** LEAD: PPACG SUPPORT: Agencies that manage local GIS data	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB

1.2.6	Make the Colorado Springs wildfire evacuation planning traffic control plan and associated evacuation routes publicly available on the PPACG website. LEAD PPACG SUPPORT Local jurisdictions and fire agencies	☒ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB
1.2.7	Combine resources on wildfire prevention and public education campaigns, including public presentations, educational brochures, and other media outreach. LEAD Civilian and military fire officials SUPPORT PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.2.8	Provide mapping of private and public utility locations around gates to installations to improve installation knowledge about what exists and could be disturbed during construction. LEAD Utilities; local Jurisdictions SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

1.3
DEVELOP METHODS TO INFORM AND COLLABORATE WITH RESIDENTS AND COMMUNITY LEADERS TO ADDRESS COMPATIBILITY.

Raising the general awareness of the community about military operations and their impacts will support the implementation efforts of community and military leaders to address compatibility issues.

1.3.1	Produce web- and print-based materials for civilian partners including, but not limited to: • Military flight operations (fixed and rotary wing) • Wildfires • Civilian drone use • Other JLUS topics of public interest as needed LEAD PPACG SUPPORT Community stakeholders as needed; installations	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

1.3.2	**Develop neighborhood-specific materials to foster greater understanding of areas of shared interest among nearby landowners, residents, and/or business owners. For example, Cheyenne Mountain AFS materials could address topics such as NORAD Road use, fence security, and wildfire prevention.** LEAD: PPACG SUPPORT: CONO; others as determined by JLUS Implementation Committees	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.3	**Develop materials to educate real estate agents and developers about military operations and impacts, including at BLR and other areas where significant future growth may occur.** LEAD: PPACG SUPPORT: Real estate agent associations; developers; CONO; military installations; local government public communications officials; Airport Staff; AAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.4	**Develop standard sellers' disclosure language as a means for real estate agents to inform residents of flight/military operations in airspace near affected homes.** LEAD: PPACG SUPPORT: Real estate agent associations; developers; CONO; Installation Representatives; local government public communications officials and planners; Airport Staff; AAC;	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.5	**Create a centralized online tool to address resident inquiries regarding flight activity.** LEAD: PPACG SUPPORT: Regional Airspace Task Force	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.6	**Seek feedback from the public about the types of airspace- and flight-operation-related information they want to receive and by what methods.** LEAD: PPACG SUPPORT: Local government public communications officials; CONO; airspace and airfield managers; AAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.7	**Develop methods to inform and collaborate with residents and community leaders to manage impacts from flight operations.** LEAD: Regional Airspace Task Force SUPPORT: JLUS Implementation Committees; PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

1.3.8	**Examine long-term approaches to reduce flight operation impacts on surrounding neighborhoods, including sound attenuation and flight schedules.** LEAD Regional Airspace Task Force SUPPORT Specific stakeholders to be determined by JLUS Implementation Committees and Regional Airspace Task Force	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB
1.3.9	**Coordinate with Air Force installations during AICUZ study updates to provide land use changes that have occurred outside of the installations since previous studies.** LEAD Local government planning officials SUPPORT JLUS Implementation Committees; PPACG; Regional Airspace Task Force; AAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☐ SAFB
1.3.10	**Work with local, state, federal, and private-sector partners on educating the public on drone safety and creating awareness of potential airspace conflicts.** LEAD PPACG SUPPORT Regional Airspace Task Force	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
1.3.11	**Make land use compatibility-related documents (e.g., AICUZ studies) publicly available on local government websites.** LEAD PPACG SUPPORT JLUS Implementation Committees; local government planning officials; local government and military public communications officials	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☐ SAFB

1.4 INCLUDE MILITARY STAKEHOLDERS IN LAND USE PLANNING PROCESSES TO ADDRESS REGIONAL COMPATIBILITY ISSUES.

Improving coordination between community and military planners will reduce the frequency and severity of instances of preventable compatibility challenges.

1.4.1	**Continue support for land-lease between city and Peterson AFB and all contingencies that surround that agreement.** LEAD City of Colorado Springs SUPPORT JLUS Implementation Committees	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB

1.4.2	**Include military installation representatives in regional planning processes (master plans, transportation planning, etc.).**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG; CDOT; local government planning officials	
SUPPORT	Military representatives	

BUILT ENVIRONMENT AND MILITARY READINESS

2.1 ACCOUNT FOR MILITARY REQUIREMENTS IN REGIONAL UTILITY DEVELOPMENT.

Reducing impacts from renewable energy development and meeting current and future military infrastructure requirements are crucial in sustaining the readiness of the military installations throughout the region.

2.1.1	**Support national defense goals to improve the resilience and sustainability of local installation plans (e.g., the Fort Carson 25-Year Sustainability Goal Plan) through maintenance and future infrastructure development.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	Utilities; energy developers	
SUPPORT	JLUS Implementation Committees; PPACG	

2.1.2	**Work with local jurisdictions and stakeholders regarding potential wind farm developments within operations and overflight areas, including in areas outside the JLUS study area as needed.**	☒ AFA ☒ FC ☒ PAFB ☐ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	Regional Airspace Task Force; military representatives	

2.1.3	**Address electrical transmission line placement with utility industry organizations, including the Colorado Public Utilities Commission, Colorado Coordinated Planning Group, and Mountain View Electric Association.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	JLUS Implementation Committees; local utilities	

2.2 MINIMIZE INCOMPATIBLE LAND USES AND DEVELOPMENT AFFECTED BY MILITARY FLIGHT OPERATIONS.

Limiting incompatible development around military installations will preserve both military missions and community health and safety.

2.2.1	**Improve disclosure policies regarding military and flight operations in zoning documents and subdivision plats and include standardized language for avigation easements and plat notes.** LEAD: PPACG SUPPORT: Local government planning officials; Regional Airspace Task Force; military planners	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.2.2	**Educate local land use officials on the effects of incompatible development on military operations.** LEAD: PPACG SUPPORT: Regional Airspace Task Force; airspace and airfield professionals; Local government planning officials	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.2.3	**Incorporate flight safety information to establish specific criteria for evaluating development that would affect military flight or airspace operations.** LEAD: PPACG; Regional Airspace Task Force SUPPORT: Local government planning officials; military airspace and flight professionals; FAA	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.2.4	**Refer all types of development within 20,000 feet of military airfields for review for public safety, flight safety, and vertical obstructions, including cell towers, temporary cranes, and multi-story buildings.** LEAD: PPACG SUPPORT: JLUS Implementation Committees; local government leadership; Regional Airspace Task Force; FAA; military installation representatives; local government planning officials	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☐ SAFB
2.2.5	**Recognize the AFA Airfield as an airport to ensure development complies with FAA regulations and protects public safety.** LEAD: PPACG SUPPORT: JLUS Implementation Committees; local government leadership; Regional Airspace Task Force; FAA; military installation representatives; local government planning officials	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB

2.2.6	**Establish airport overlay zoning for all military airfields within the JLUS study area.**	☒ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB
LEAD	Local government planning officials	
SUPPORT	PPACG; JLUS Implementation Committees; local government leadership; Regional Airspace Task Force; FAA; military installation representatives	
2.2.7	**Formalize development notification and review processes between local jurisdictions and military installations through memoranda of understanding. Items to be addressed include:** • Review and comment processes • Participation in development review meetings • Handling of unique applications (such as renewable energy or tall structures) • Incorporating FAA and military program elements (including Part 150 and AICUZ considerations) • Inclusion of military considerations in staff reports to public decision makers	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	Local governments	
SUPPORT	Military installation representatives; PPACG; JLUS Implementation Committees; local government leadership; Regional Airspace Task Force; FAA	
2.2.8	**Coordinate with economic development professionals to address planning efforts relating to military airfield/airspace operations, including FAA Part 150 and AICUZ programs.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	Local economic development organizations	
2.2.9	**Engage with 12th Flying Training Wing personnel at Joint Base San Antonio-Randolph to explore methods for adapting airfield management and encroachment mitigation strategies utilized within the San Antonio region.**	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
LEAD	PPACG	
SUPPORT	JLUS Implementation Committees; Regional Airspace Task Force	

2.2.10	**Manage encroachment issues from development that can interfere with operations on Runway 13/31 and special-use aircraft taking off in hot weather.**	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB
LEAD	City of Colorado Springs; El Paso County	
SUPPORT	PPACG; JLUS Implementation Committees; Regional Airspace Task Force; Peterson AFB; FAA; Colorado Springs Airport; AAC; local government leadership; Local government planning officials	
2.2.11	**Minimize airspace use directly above installations using aircraft notifications on FAA maps and working with local control towers.**	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	FAA; Regional Airspace Task Force; civilian and military airspace and airfield managers	
2.2.12	**Initiate sector (sub-area) planning to create interjurisdictional mapping of land uses by incorporating the Airport Master Plan, mission compatible land use evaluation of vacant parcels, areas of concern, and recommendations on compatible development in key areas around Peterson AFB and the Colorado Springs Airport.**	☐ AFA ☒ FC ☒ PAFB ☐ CMAFS ☐ SAFB
LEAD	PPACG; local government planners	
SUPPORT	FAA; Regional Airspace Task Force; civilian and military airspace and airfield managers	
2.2.13	**Implement consistent and compatible zoning regulations and policies for land areas within APZs that involve more than one local planning jurisdiction.**	☒ AFA ☒ FC ☒ PAFB ☐ CMAFS ☐ SAFB
LEAD	PPACG	
SUPPORT	El Paso County; City of Colorado Springs	
2.2.14	**Limit commercial or industrial uses that pose a security threat to Colorado Springs Airport and Peterson AFB operations (storage, shipping, truck trailers, etc.).**	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB
LEAD	El Paso County leadership and planning; City of Colorado Springs leadership and planning	
SUPPORT	Colorado Springs Chamber and EDC; Peterson AFB representatives; Colorado Springs Airport Advisory Commission; PPACG	

2.2.15 LEAD SUPPORT	**Preserve training areas on public lands for HAMET.** Bureau of Land Management/U.S. Forest Service (BLM); USFS PPACG; Fort Carson representatives	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.2.16 LEAD SUPPORT	**Continue to pursue conservation and compatible land use buffering efforts with Fort Carson through various programs and initiatives, including the Sentinel Landscape Program and Army Compatible Use Buffer (ACUB).** PPACG El Paso County; Pueblo County; conservation stakeholders	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.2.17 LEAD SUPPORT	**Minimize community impacts when utilizing Landing Zones (LZs) near residential properties in mountainous areas in Teller and Fremont counties.** Fort Carson representatives Teller and Fremont county representatives; PPACG	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.2.18 LEAD SUPPORT	**Notify detention facilities in Fremont County when flight training operations will occur near these facilities.** Fort Carson representatives PPACG	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.2.19 LEAD SUPPORT	**Adopt Dark Skies guidance or other requirements as needed for development underneath airspace frequently used for night-training exercises.** PPACG Local government planning officials; local government leadership	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB

2.3 PURSUE LAND USE BUFFERING AND CONSERVATION OPPORTUNITIES TO PRESERVE MISSION.

Land use buffers have been a highly effective tool to preserve compatibility in communities with military installations in Colorado and throughout the nation.

2.3.1	**Manage spectrum interference concerns near military installations (for example, near Peterson AFB near Marksheffel Road).**	☐ AFA ☐ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	Local government planning officials; local government leadership; stakeholders that own and install civilian communication facilities	

2.3.2	**Pursue conservation partnering opportunities for compatible land use buffering under flight training areas and other critical areas as needed.**	☒ AFA ☒ FC ☒ PAFB ☐ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	Local jurisdictions; conservation stakeholders	

2.3.3	**Work with developers and other open space and parks professionals to mitigate future BASH risk.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☐ SAFB
LEAD	Local government planning officials	
SUPPORT	JLUS Implementation Committees; PPACG	

2.3.4	**Minimize development that can negatively affect Cheyenne Mountain AFS's mission, including the impact on NORAD Road, for those areas of land along the route to the installation that could be developed.**	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB
LEAD	City of Colorado Springs	
SUPPORT	JLUS Implementation Committees	

2.4
ADDRESS TRANSPORTATION NEEDS AROUND INSTALLATIONS.

Effective coordination on regional transportation issues relating to military installations will both enhance military readiness and the quality of life of the surrounding community.

2.4.1	**Reserve space in corridors for complete transportation options near military installations, including bus and bicycle lanes, as well as sidewalks and trails.** LEAD: Civilian transportation planning agencies and planners SUPPORT: PPACG TAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.2	**Leave adequate space for future capacity for corridors that are critical for installation transportation needs.** LEAD: Civilian transportation planning agencies and planners SUPPORT: PPACG TAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.3	**Ensure that new nonmotorized routes maintain compatibility with installation traffic patterns around gates and related access roads.** LEAD: Civilian transportation planners; trail and open space planners; military planners SUPPORT: Local government planning officials; PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.4	**Create access points to connect installations to nearby public trails.** LEAD: Civilian and military officials SUPPORT: PPACG; Trails and Open Space Coalition (TOSC)	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.5	**Identify and resolve transportation safety issues that impact key regional access routes for those who commute to military installations.** LEAD: Civilian transportation planning agencies and planners SUPPORT: PPACG TAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

2.4.6	**Support ongoing transportation needs for military convoys that cross multiple transportation planning districts.**	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
LEAD	PPACG	
SUPPORT	CDOT; Pueblo Area COG; Upper Arkansas Area COG	
2.4.7	**Ensure the Regional Transportation Improvement Program project list includes, to the extent possible, transportation projects essential to supporting installations' operational needs**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG	
SUPPORT	CDOT; Pueblo Area COG; Upper Arkansas Area COG	
2.4.8	**Improve Charter Oak Ranch Road outside Gate 19 at Fort Carson.**	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
LEAD	El Paso County	
SUPPORT	PPACG TAC	
2.4.9	**Manage future transportation projects that could affect gate traffic and associated stormwater impacts.**	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
LEAD	PPACG TAC	
SUPPORT	CDOT; El Paso County; City of Colorado Springs	
2.4.10	**Create a way for trail users to receive information on the status of the New Santa Fe Trail.**	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
LEAD	PPACG	
SUPPORT	City of Colorado Springs (Trails); TOSC	
2.4.11	**Establish safe and optimal alternative on-street and off-street routes, including a route that complements the existing New Santa Fe Trail.**	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
LEAD	City of Colorado Springs (Trails)	
SUPPORT	PPACG; TOSC; private land owners	

2.4.12 LEAD SUPPORT	**Update existing wayfinding along the New Santa Fe Trail corridor.** City of Colorado Springs (Trails) TOSC; trail users; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.4.13 LEAD SUPPORT	**Create a major maintenance and improvement program to address trail sustainability and enhance security for the installation and users.** PPACG City of Colorado Springs (Trails); Air Force Community Partnerships Program	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.4.14 LEAD SUPPORT	**Coordinate with El Paso County regarding the design of critical intersections south of Colorado Springs Airport.** Civilian transportation planning agencies and planners PPACG TAC	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB
2.4.15 LEAD SUPPORT	**Ensure transportation projects leave at least one access route unaffected by interference from road construction at any given time.** Pikes Peak Rural Transportation Authority (PPRTA); CDOT; City of Colorado Springs; El Paso County PPACG TAC	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.16 LEAD SUPPORT	**Protect strategic transportation corridors/"highways of significance" for the installations.** PPACG TAC CDOT	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB
2.4.17 LEAD SUPPORT	**Develop an alternate rail connection to Fort Carson to support redundant and increased rail service.** City of Fountain; Colorado Springs Chamber and EDC BNSF Railway; Colorado Springs Utilities; El Paso County; Pueblo County; MAC	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB

2.4.18	**Address capacity and safety issues relating to transportation corridors used by convoys and other deployment operations.** LEAD Civilian transportation planning agencies and planners SUPPORT PPACG TAC	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.4.19	**Review nonmotorized trails and corridors within El Paso County and City of Colorado Springs plans to identify elements that are not possible due to installation security or gate functions. Work with jurisdictions to identify alternatives that are compatible with Fort Carson missions.** LEAD PPACG SUPPORT Civilian transportation planning agencies and planners	☐ AFA ☒ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.4.20	**Identify specific needed improvements to safety and capacity of State Highway 94 pursuant to CDOT studies.** LEAD CDOT SUPPORT PPACG TAC	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB
2.4.21	**Address transportation impacts of new development both on-base and off-base on State Highway 94 and U.S. Highway 24 or changes to jurisdictional boundaries.** LEAD CDOT SUPPORT PPACG TAC	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB
2.4.22	**Evaluate current methods for addressing road safety issues associated with trash-hauling activities on State Highway 94.** LEAD PPACG SUPPORT Waste Management; El Paso County; CDOT, City of Colorado Springs	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB
2.4.23	**Work with stakeholders that regulate or operate trash-hauling services to identify potential opportunities for improving safety on State Highway 94.** LEAD PPACG SUPPORT CDOT; other stakeholders to be determined by JLUS Implementation Committees	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB

2.4.24	Identify specific improvements and funding for safety and capacity to secondary and alternative routes between Schriever AFB and Peterson AFB, as well as other areas in the community (including Curtis Road, Bradley Road, etc.). LEAD PPACG TAC SUPPORT CDOT; PPRTA	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☒ SAFB
2.4.25	Continue to include military representatives in the PPACG TAC. LEAD PPACG TAC SUPPORT JLUS Implementation Committees	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.4.26	Recognize that NORAD Road is not a public road and cannot be used for access to new development, trails, or open spaces. LEAD City of Colorado Springs SUPPORT PPACG; JLUS Implementation Committees	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB
2.4.27	Identify appropriate trail routes, access, and buffering opportunities to secure Cheyenne Mountain AFS and provide recreational opportunities for the for the Broadmoor Bluffs neighborhood to reduce improper recreational or pedestrian use of restricted roads and reduce trespassing risk. LEAD City of Colorado Springs SUPPORT PPACG; JLUS Implementation Committees	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB
2.4.28	Establish additional access routes to Cheyenne Mountain AFS to relieve primary access points and routes during emergency evacuations of the installation and surrounding neighborhoods. LEAD City of Colorado Springs SUPPORT PPACG; JLUS Implementation Committees	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB
2.4.29	Maintain accessibility to State Highway 115. LEAD CDOT SUPPORT Civilian transportation planning agencies and planners, PPACG TAC	☐ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB

2.4.30	**Ensure trail planning is conducive to requirements of Cheyenne Mountain AFS and Cheyenne Mountain State Park while meeting public needs.** LEAD: Civilian trails and open space planners SUPPORT: PPACG; Cheyenne Mountain State Park	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB

2.4.31	**Divert unauthorized pedestrian and bicycle traffic away from NORAD Road through trail planning efforts.** LEAD: Civilian trails and open space planners SUPPORT: PPACG; Cheyenne Mountain State Park	☐ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB

2.5 MINIMIZE IMPACTS TO MILITARY INSTALLATION PROPERTY AND NATURAL SYSTEMS FROM STORMWATER FLOWS.

The historic lack of adequate stormwater infrastructure has negatively affected many communities and military installations throughout the JLUS study area. Coordination between the military installations and local communities will reduce costs and negative impacts to quality of life throughout the region.

2.5.1	**Ensure stormwater projects adjacent to installation property do not create new stormwater issues.** LEAD: Civilian agencies that plan and construct stormwater projects SUPPORT: PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

2.5.2	**Adjust stormwater project priorities as work is completed in the Monument Creek watershed.** LEAD: Civilian agencies that plan and construct stormwater projects SUPPORT: JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB

2.5.3	**Stabilize creek and floodplain areas to reduce erosion and sediment transport using the methods identified within the Monument Creek Watershed Restoration Master Plan.** LEAD: Civilian agencies that plan and construct stormwater projects SUPPORT: JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB

2.5.4	**Establish performance criteria that can be applied to the design of future detention, stabilization, habitat restoration, and sediment reduction projects in Monument Creek.** LEAD Civilian agencies that plan and construct stormwater projects SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.5.5	**Stabilize eroding banks along Monument Creek that contribute large quantities of sediment downstream.** LEAD Civilian agencies that plan and construct stormwater projects SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.5.6	**Restore, enhance, and conserve riparian vegetation to help stabilize Monument Creek and floodplain.** LEAD Civilian agencies that plan and construct stormwater projects SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☐ CMAFS ☐ SAFB
2.5.7	**Encourage stormwater management standards and techniques to reduce runoff, peak flows, and runoff volumes that result from development within the watershed through development of new stormwater management and land use regulations.** LEAD Civilian agencies that plan and construct stormwater projects SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☐ PAFB ☒ CMAFS ☐ SAFB
2.5.8	**Manage upstream stormwater flows across public lands, Cheyenne Mountain AFS and Fort Carson cantonment areas, and downstream flows that will involve partnerships and coordination with Pueblo West, Pueblo County, and the city of Pueblo.** LEAD Civilian agencies that plan and construct stormwater projects SUPPORT JLUS Implementation Committees; PPACG	☐ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB
2.5.9	**Encourage and conduct outreach to developers on low-impact stormwater development practices.** LEAD Civilian planning agencies SUPPORT JLUS Implementation Committees; PPACG	☒ AFA ☐ FC ☒ PAFB ☒ CMAFS ☐ SAFB

2.5.10 LEAD SUPPORT	**Facilitate public outreach and communication from Peterson AFB regarding perfluorooctanoic acids (PFOAs) and water-quality issues.** Local government public communications officials PPACG	☐ AFA ☐ FC ☒ PAFB ☐ CMAFS ☐ SAFB

2.6 PLAN FOR LONG-TERM STORMWATER AND UTILITY INFRASTRUCTURE CHALLENGES EXPECTED FROM FUTURE MISSION GROWTH.

Stormwater management has been a major regional focus. These actions are intended to support coordination between local communities and military installations.

2.6.1 LEAD SUPPORT	**Address future water supply and capacity beyond what is currently projected.** Water utilities PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.6.2 LEAD SUPPORT	**Coordinate maintenance, future extensions, and regional utility infrastructure with military installations.** Public utility agencies PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.6.3 LEAD SUPPORT	**Address military stormwater concerns in agency plans.** Civilian agencies that manage stormwater PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB

2.7 PROTECT FREQUENCY SPECTRUM CAPACITY THROUGH LAND AND AIRSPACE BUFFERING.

Frequency spectrum plays a key but largely role in military operations. These actions will help ensure this valuable resource is preserved for both military and civilian use.

2.7.1	**Consider creating a wind turbine exclusion zone within the 2-mile notification boundary adjacent to military installations.** LEAD: Civilian planning agencies SUPPORT: FAA; PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.7.2	**Establish conservation easement buffers within the 2-mile notification boundary adjacent to military installations in cooperation with neighboring property owners, state land board, and other stakeholder partners.** LEAD: PPACG SUPPORT: Conservation partners	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.7.3	**Develop or regularly update area of concern maps for development review of pertinent areas beyond the 2-mile distance requirement.** LEAD: PPACG SUPPORT: Installations	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
2.7.4	**Assess whether additional FAA airspace protections are needed to preserve spectrum and mission.** LEAD: Regional Airspace Taskforce SUPPORT: PPACG; FAA	☐ AFA ☐ FC ☒ PAFB ☒ CMAFS ☒ SAFB

NATURAL RESOURCE FACTORS

3.1
COLLABORATE TO ADDRESS MISSION AND COMMUNITY IMPACTS FROM NATURAL DISASTERS.

Supporting established practices that enable cooperation and collaboration when responding to wildfire will limit risks to both military installations and the surrounding community.

3.1.1	Create a fire mitigation plan with residents (potential fire-resistant materials, defensible space, fire suppression systems, etc.) to reduce potential wildfire impacts in neighborhoods adjacent to installations and training areas. LEAD: JLUS Implementation Committees; PPACG SUPPORT: El Paso County; Pueblo County; fire agencies	☒ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB
3.1.2	Refine coordination and emergency response for combating wildfires throughout the JLUS area. LEAD: Emergency service professionals SUPPORT: PPACG	☒ AFA ☒ FC ☒ PAFB ☒ CMAFS ☒ SAFB
3.1.3	Reduce potential fire severity through improved fire mitigation on lands adjacent to the installation. LEAD: Civilian agencies that engage in fire mitigation SUPPORT: PPACG	☒ AFA ☒ FC ☐ PAFB ☒ CMAFS ☒ SAFB
3.1.4	Craft a wildfire mitigation and watershed preservation plan for higher elevation forest areas west of the installation to include insect infestation management. LEAD: PPACG SUPPORT: El Paso County and Fire Department; Colorado State Parks; USFS; Colorado Springs Utilities	☒ AFA ☒ FC ☐ PAFB ☒ CMAFS ☐ SAFB

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A ACRONYMS AND ABBREVIATIONS

AAF	Army Airfield
ACUB	Army Compatible Use Buffer
A/DACG	Arrival/Departure Airfield Control Group
ADX	United States Penitentiary Administrative Maximum Facility
AFA	Air Force Academy
AFB	Air Force Base
AFS	Air Force Station
AFSPC	Air Force Space Command
AFWFC	Air Force Wildland Fire Center
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
APZ	Accident Potential Zone
ARSTRAT	United States Army Forces Strategic Command
BASH	Bird/Wildlife Aircraft Strike Hazard
BLM	Bureau of Land Management
BLR	Banning Lewis Ranch
BNSF	Burlington Northern Santa Fe
BRRC	Blue Ridge Research and Consulting
CDOT	Colorado Department of Transportation
CF&I	Colorado Fuel and Iron Company
CFR	Code of Federal Regulations
CMAFS	Cheyenne Mountain Air Force Station
CMD	Cherokee Metropolitan District
COG	Council of Governments
CONO	Council of Neighbors and Organizations
CRS	Colorado Revised Statutes
CSU	Colorado State University
CZ	Clear Zone
DMTF	Defense Mission Task Force
DOD	Department of Defense
DPW	Directorate of Public Works
EDC	Economic Development Corporation
EM	Electromagnetic
EMF	Electromagnetic Frequency
FAA	Federal Aviation Administration

FC	Fort Carson
GIS	Geographic Information System
GOCO	Great Outdoors Colorado
HAMET	High-Altitude Mountain Environmental Training
HB	House of Representatives Bill
ICEMAP	Installation Complex Encroachment Management Action Plan
IWRP	Integrated Water Resource Plan
JLUS	Joint Land Use Study
LZ	Landing Zone
m	Meter
MAC	Military Affairs Committee
mph	Miles per Hour
MPO	Metropolitan Planning Organization
m/s	Meters per Second
NASA	National Aeronautics and Space Administration
NGO	Nongovernmental Organization
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Aerospace Defense Command
NPS	National Park Service
NREL	National Renewable Energy Labs
NWCG	National Wildfire Coordinating Group
OEA	Department of Defense Office of Economic Adjustment
PAFB	Peterson Air Force Base
PFOA	Perfluorooctanoic Acid
PPACG	Pikes Peak Area Council of Governments
PPCC	Pikes Peak Community College
PPRTA	Pikes Peak Rural Transportation Authority
PUD	Planned Unit Development
REPI	Readiness and Environmental Protection Integration Program
RF	Radio Frequency
SAFB	Schriever Air Force Base
SDS	Southern Delivery System
SW	Space Wing
SWMP	Stormwater Management Plan

TAC	Transportation Advisory Committee
TOSC	Trails and Open Space Coalition
UAS	Unmanned Aircraft System
USAFA	United States Air Force Academy
USASMDC	U.S. Army Space and Missile Defense Command
USDA	U.S. Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USNORTHCOM	United States Northern Command
USSTRATCOM	United States Strategic Command
W/m^2	Watts per Square Meter
WUI	Wildland-Urban Interface

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B JLUS COMMITTEE ROSTERS

B.01 JLUS POLICY COMMITTEE

NAME	ORGANIZATION	TITLE
Darryl Glenn (Chair)	El Paso County	Commissioner
Tim Payne (Vice Chair)	Fremont County	Commissioner
Joan Armstrong	Pueblo County	Director of Planning and Development
Norm Steen	Teller County	Commissioner
Greg Dorman	Department of Military and Veterans Affairs	Resource Director/Legislative Liaison
Turner Smith	PPACG	Ramah Trustee
Rich Burchfield	Colorado Springs Chamber & EDC	Chief Defense Industry Officer
Bill Murray	City of Colorado Springs	Councilmember
Phil Thomas	City of Fountain	Mayor Pro Tem
Judy Leonard	Pueblo West Metro District	Vice President
Scott Hobson	City of Pueblo	Pueblo Assistant City Manager
Pamela Smith	Town of Monument	Acting Town Manager
Non-voting members		
Oscar Martinez	U.S. Forest Service	District Ranger, Pike San Isabel National Forest
Ed Morris	FAA	Air Traffic Representative
Rod Chisholm	Fort Carson	Deputy Garrison Commander
Todd Moore	Peterson Air Force Base	21st Space Wing Commander
Jennifer Grant	Schriever Air Force Base	50th Space Wing Commander
David Kincaid	Air Force Academy	10th Mission Support Group Commander
Rick Solander	Office of Economic Adjustment	Compatible Use Program Director (2018)
Dale Anderson	U.S. Congressional District 5 - Doug Lamborn	Regional Director
Heba Abdelaal	U.S. Senator Cory Gardner	Senior Defense Advisor
Annie Oatman-Gardner	U.S. Senator Michael Bennet	Regional Director
Cyrena Chiles Eitler	Office of Economic Adjustment	Compatible Use Program Director (2015-2017)

B.02 JLUS TECHNICAL COMMITTEE

NAME	ORGANIZATION	TITLE
Greg Dorman (Chair)	Department of Military and Veterans Affairs	Resource Director/Legislative Liaison
Peter Wysocki (Vice Chair)	City of Colorado Springs	Director of Planning and Community Development
Kristy Martinez	City of Fountain	Planning Supervisor
Craig Dossey	El Paso County	Executive Director of Planning and Community Development
Lynda Morgan	Teller County	Director, Community Development Services
Mark Andrew	Colorado Department of Transportation	Resident Engineer
Harley Gifford	Pueblo West Metro District	District Manager
Steven Meier	City of Pueblo	Director of Planning and Parks
Marshall Butler	Fremont County	Planning Director
Joan Armstrong	Pueblo County	Director of Planning and Development
Larry Manning	Town of Monument	Planning Director
Keith Klaehn	Military Affairs Council	Military Affairs Council Chairman
Brian Whitehead	Colorado Springs Utilities	Systems Extensions, Manager
Karen Voltura	DNR - Parks and Wildlife	CPW Conservation Biologist
Darrin Tangeman	Pueblo West Metro District	District Manager
Shannon Ford	Colorado Department of Transportation	Environmental Specialist, Region 2
Non-voting members		
Hal Alguire	Fort Carson	Director of Public Works
Glenn Messke	Peterson Air Force Base	Senior Community Planner
Mike Kozak	Cheyenne Mountain Air Force Station	Installation Programmer/Community Planner
Devon Thomas	Schriever Air Force Base	Strategic Basing Manager
Darren Horstmeier	Schriever Air Force Base	Community Planner
Bob Fant	Air Force Academy	Chief, Installation Management
Keith Berger	Bureau of Land Management	Field Manager, Royal Gorge Field Office
Troy Stover	FAA - CO Springs Regional Airport	Air Traffic Manager, WNG-COS
Greg Langer	USDA Soil Conservation Service	NRCS District Conservationist

B.03 JLUS WORKING GROUP ORGANIZATIONAL INFORMATION

The following working groups were recommended by JLUS staff for consideration by the Technical Committee and approval by the Policy Committee. Topics identified prior to and during working group meetings were refined into potential recommended strategies and actions for consideration by the Technical Committee and Policy Committee.

- Air Force Academy Flight Training
- Conservation/Agricultural Working Group
- Land Use and Development Review
- New Santa Fe Trail
- Public Communication
- Regional Airspace
- Southern Stormwater
- Transportation

AIR FORCE ACADEMY FLIGHT TRAINING WORKING GROUP

Air Force Academy Stakeholders

- Flight Training and Tower Representatives
- PIO Representative
- Installation Planner

Community Stakeholders

- El Paso County
- City of Colorado Springs
- Town of Monument

Private or Non-Governmental Stakeholders

- Colorado Springs Chamber and Economic Development Corporation
- Developers (La Plata and Classic Homes)
- Colorado Springs Home Builders Association (HBA)
- Pikes Peak Association of Realtors
- Citizen representation from neighborhoods around the Air Force Academy (4 members)
- MAC representative
- CAC representative (2 members)

AIR FORCE ACADEMY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Carrie Muchow	Air Force Academy	Community Planner
LTC Vivien Wu	Air Force Academy	306th Operations Support Squadron Commander
Melissa Porter	Air Force Academy	Director of Community Outreach
Robert Fant	Air Force Academy	Chief, Installation Management
COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
EL PASO COUNTY		
Raimere Fitzpatrick		Project Manager/Planner II
Sylvia Leon Guerrero		Project Manager/Planner II
CITY OF COLORADO SPRINGS		
Megan Herington		Planning Manager-LUR/DRE

TOWN OF MONUMENT		
Larry Manning		Planning Director
NEIGHBORHOOD RESIDENTS		
Frank McCann		
Vince Rusinak		
Mark Morris		
Martha Brewer		
Michelle Glover		
Harold Moffat		
PPACG		
Brian Potts	PPACG	JLUS Program Manager
COLORADO SPRINGS REGIONAL BUSINESS ALLIANCE		
Keith Klaehn		Military Affairs Council Representative
PIKES PEAK ASSOCIATION OF REALTORS		
Cherri Fisher	ERA Shields	Realtor/GRI, CRS
George Nehme	The Nehme Team	PPAR Board Director, GRI
HOME BUILDERS ASSOCIATION		
Marla Novak	HBA	Director of Government Affairs
DEVELOPERS		
Jerry Richardson	Classic Homes	Vice President
Cody Humphrey	La Plata	Director of Planning

CONSERVATION/AGRICULTURE WORKING GROUP

Most of the land within the Joint Land Use Study region can be characterized by agricultural or natural land uses. The Bureau of Land Management (BLM), US Forest Service (USFS), Colorado State Land Board, and the Department of Defense (DoD) are the primary owners and managers of government-owned land with the rest owned by private landowners, namely ranchers. These vast undeveloped landscapes provide a variety of topography on public lands (BLM and USFS) used for High Altitude Mountain Environment Training (HAMET) training by military units based at Fort Carson and from other installations all over the country. Most of the remaining landscapes are below airspace that is used to varying degrees by the Air Force Academy, Peterson Air Force Base, and Fort Carson, and may have designated Military Operating Areas (MOAs). Where possible, installations also seek partnerships with landowners near the installation boundary to preserve buffers from development, where the core method is to maintain the existing agricultural uses or preserve natural habitat since they are considered to be land uses that are compatible with military operations. There are certain core assumptions that have presented themselves through the study process that were examined by this group:

- The military installations, agricultural producers, and conservation professionals have a mutual interest in stewardship of the rural landscape.

- Military missions within this region include flight training in airspace at various elevations above rural agricultural lands and it is important for these existing compatible land uses to continue.
- Rural landowners and users have an interest in forming partnerships that will help preserve existing agricultural and natural landscapes that they value.
- Local governments have an interest in strategically preserving open space for recreational purposes, and other public interests.

Due to logistical reasons, no in-person meetings were held. Instead, a series of phone calls were conducted individually with the following stakeholders:

- Bureau of Land Management
- Cattlemen's Association
- Colorado State Forest Service
- Colorado Division of Wildlife
- CSU Extension
- El Paso County Open Space
- Installation Representatives
- Fire Marshalls
- Great Outdoors Colorado
- Nature Conservancy
- State Historic Preservation Office
- State Land Board
- Trails and Open Space Coalition
- Tribal Representatives
- Trust for Public Land
- USDA Soil and Conservation District
- US Fish and Wildlife
- US Forest Service

MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Hal Alguire (Env Rep)	Fort Carson	Director of Public Works
Glenn Messke	Peterson Air Force Base/Cheyenne Mountain Air Force Station	Senior Community Planner, CE
Darren Horstmeier	Schriever Air Force Base	Community Planner
Carrie Muchow	Air Force Academy	Community Planner

COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
	Bureau of Land Management	
	Cattlemen's Association	
	Colorado State Forest Service	
	Colorado Division of Wildlife	
	CSU Extension	
	El Paso County Open Space	
	Great Outdoors Colorado	
	Military Affairs Council	
	Nature Conservancy	

	State Historic Preservation Office	
	State Land Board	
	Trails and Open Space Coalition	
	Tribal Representatives	
	Trust for Public Land	
	USDA Soil and Conservation District	
	US Fish and Wildlife	
	US Forest Service	
PPACG		
Brian Potts	PPACG	JLUS Program Manager
Ann Werner	PPACG	JLUS Planner II

LAND USE AND DEVELOPMENT REVIEW WORKING GROUP

Land Use & Development was identified as one of 12 JLUS Compatibility Challenges within the Built Environment and Military Readiness category. The JLUS Policy Committee identified this process to be significant and as such, to work on through the JLUS Working Group progression.

Land Use review typically entails professional planning evaluation by county or local jurisdictions, of proposed development applications through administrative and public hearing processes. The overall emphases of county and local government land use codes are to preserve and improve the public's health, safety and general welfare. The JLUS study evaluated county and local governmental comprehensive and master plans, zoning codes and military installation master plans. The Working Group focused on determining goals and strategies to improve areas of concern for both local jurisdictions and military installations. Development can be residential, commercial, industrial or special use. The review portion is how each entity receives notification of the development and reviews the project based on regulations, codes, specifications, etc. for their group, department, governmental jurisdiction, or installation. The review procedure is typically called the "buckslip" process.

The Land Use and Development Working Group progression has included multiple small, focused meetings, and two in-depth discussions by the Technical Committee to identify key issues and determine goals and strategies to improve areas of concern for both local jurisdictions and military installations, particularly regarding the review procedures typically referred to the "buckslip" process. This has resulted in an extensive list of potential strategies and actions that overlap with many issues previously or currently being discussed by other working groups (e.g. - Regional Airspace, USAF Academy Flight Training).

Land Use and Development Working Groups status:

- Phase I: November 2016 – January 2017
  - Initial meetings with all installations.
  - Areas of opportunity were identified as well as areas where current processes were effective.
- Phase II: February 2017 – August 2018
  - Working Group meetings between JLUS, City of Colorado Land Use Review, El Paso

County Planning, Town of Monument, City of Pueblo, Pueblo West, Pueblo County, City of Fountain, Colorado Springs Utilities, local developers, the Housing and Building Association, the Air Force Academy, Fort Carson, Cheyenne Mountain Air Force Station, Schriever Air Force Base, and Peterson Air Force Base were conducted.

- Second round of meetings between JLUS and the Chamber of Commerce & EDC, Plan COS, Airport Advisory Committee, City of Colorado Springs Engineering, and the San Antonio Alamo Area Council of Governments.

Core Values: To learn from existing strategies and develop new methods to Improve and streamline information flows between land use officials, development review authorities and military installations.

- Fountain
- Fremont County
- Pueblo County
- Teller County
- Pueblo West
- Colorado Springs Planning
- El Paso County Planning
- State agencies like DNR or CDHPE Water Quality Control Division
- NFS/BLM
- MAC
- CAC
- Monument
- Installation planners

MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Bob Fant	Air Force Academy	Chief, Installation Management
Melissa Porter	Air Force Academy	Director of Community Outreach
Carrie Muchow	Air Force Academy	Community Planner
Jennifer McCorkle	Air Force Academy	Environmental Planner
Mike Kozak	Cheyenne Mountain Air Force Station	Installation Programmer/Community Planner
Kimberly Van Treadway	Cheyenne Mountain Air Force Station	Community Planner/EIA Program Manager
Hal Alguire	Fort Carson	Director of Public Works
John Sanders	Fort Carson	Master Planner, DPW
Thomas Wiersma	Fort Carson	Community Planner, DPW
Anthony Marvin	Fort Carson	Modularity Planner, DPW
Jonathan Wasche	Peterson Air Force Base	Deputy Director
Michael Shafer	Peterson Air Force Base	Community Planner, EIAP Program Manager
Glenn Messke	Peterson Air Force Base	Senior Community Planner
Courtney Davis	Peterson Air Force Base	Chief Airfield Operations Flight
Paul Poppert	Peterson Air Force Base	Landscape Architect
Darren Horstmeier	Schriever Air Force Base	Community Planner
Devon Thomas	Schriever Air Force Base	Strategic Basing Manger

COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Ann Oatman-Gardner	Office of Senator Michael Bennet	Regional Director, Pikes Peak Region
Meggan Herrington	City of Colorado Springs	Manager Land Use Review Division
Katie Carleo	City of Colorado Springs	Principal Planner Land Use Review Division
Lonna Thelen	City of Colorado Springs	Principal Planner Land Use Review Division
Daniel Sexton	City of Colorado Springs	Planner II Land Use Review Division
Bob Cope	City of Colorado Springs	Economic Development Manager
Anna Bergmark	City of Colorado Springs	Civil Engineer II, Water Resources Engineering
Kristy Martinez	City of Fountain	Planning Supervisor
Hannah Parsons	Colorado Springs Chamber of Commerce and Economic Development Council	Chief Economic Development Officer
Tammy Fields	Colorado Springs Chamber of Commerce and Economic Development Council	Senior Vice President
Rich Burchfield	Colorado Springs Chamber of Commerce and Economic Development Council	Chief Defense Development Officer
Elena Nunez	Colorado Springs Utilities	Business Development Manager
Steve Carr	Colorado Springs Utilities	Strategic Account Manager
Brett Gracey	Colorado Springs Utilities	Water Quality Manager
Andi Biancur	COS Airport Advisory Commission	Airport Advisory Commission Chairman
Craig Dossey	El Paso County	Executive Director, Development Services Department
Mark Gebhart	El Paso County	Deputy Director, Development Services Department
Raimere Fitzpatrick	El Paso County	Project Manager/Planner II
DeAnne McCann	El Paso County	Economic Development Manager
Mike Hrebenar	El Paso County	Project Manager/Planner II
Tim Seibert	Norwood Development	Vice President
Joan Armstrong	Pueblo County	Director of Planning and Development
Darrin Tangeman	Pueblo West	District Manager
Larry Manning	Town of Monument	Planning Director
Steven Lamb	Alamo Area Council of Governments	JLUS Planner II
Timothy Trevino	Alamo Area Council of Governments	Senior Director of Strategic Partnerships and Communications
Celina Barron	Alamo Area Council of Governments	JLUS Project Coordinator

Brian Martinez	Alamo Area Council of Governments	JLUS Planner
Robert Bob Brach	Bexar County	Development Services Manager, Public Works Department
Ana Sanchez	Bexar County	Representative
Renee Green	Bexar County	Representative
David Marquez	Bexar County	Executive Director Economic Development Manager
Tony Felts	City of San Antonio	Development Services Department
Karen Roliraid	City of San Antonio	GPA
Melissa Ramirez	City of San Antonio	Assistant Director Development Services
Margaret Meg Reyes	JBSA-Randolph AFB	Director, Community Initiatives
Paul Strom, Lt. Col	JBSA-Randolph AFB	Representative
Valerie Ramirez	JBSA-Randolph AFB	Representative
Curtis Robertson	JBSA-Randolph AFB	Representative
Sharonn Brew	JBSA-Randolph AFB	Representative
Curt Robertson	JBSA-Randolph AFB	Representative
Douglas Opie Opersteny	JBSA-Randolph AFB	Director, Community Initiatives
Brian Potts	PPACG	JLUS Project Manager
Ann Werner	PPACG	JLUS Planner II

NEW SANTA FE TRAIL WORKING GROUP

The New Santa Fe Trail Working Group met on October 4, 2016, and October 27, 2016, to discuss issues relating to the New Santa Fe Trail that runs north and south along the eastern portion of the USAF Academy. Stakeholders worked together to identify strategies to address concerns with improving non-motorized transportation through this corridor. The need for this working group arose due to experiences with a long-term trail closure from May 2015 to June 2016 and recognizing the real possibility that future security concerns and impacts from stormwater may be cause for future closure. More specifically, discussion focused on keeping the trail open; the future of the trail; communication between stakeholders, USAF Academy, and trail users; the potential for utilization of other trails and open space corridors; and security procedures and concerns on and around the USAF Academy.

Core Values

- The community and the Air Force Academy share an interest in keeping the New Santa Fe Trail open to the public as much as is feasible.
- Coordination between community stakeholders and the Air Force Academy is important in order to address trail access issues.
- The Air Force Academy and the community share an interest in maintaining the safety and security of the installation.

AIR FORCE ACADEMY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Brian Mihlbachler	Air Force Academy/US Fish and Wildlife	Natural Resources Manager
Melissa Porter	Air Force Academy	Director of Community Outreach
Carrie Muchow	Air Force Academy	Community Planner
Jennifer McCorkle	Air Force Academy	Environmental Planner
Bob Fant	Air Force Academy	Chief, Installation Management
Sylvette Rivera-Eliza	Air Force Academy	Environmental Element Chief
Paul Ceciliani	Air Force Academy	Anti-Terrorism/Force Protection
COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
EL PASO COUNTY		
Jason Meyer	Planning Division	Project Manager
CITY OF COLORADO SPRINGS		
Kate Brady	City of Colorado Springs Public Works	Senior Bicycle Planner
Rich Mulledy	City of Colorado Springs Public Works	Stormwater Division Manager
Brian Kelley	City of Colorado Springs Public Works	Stormwater Development and Erosion Control Manager
Sarah Bryarly	City of Colorado Springs Parks, Recreation, and Cultural Services	Landscape Architect
Chris Lieber	City of Colorado Springs Parks, Recreation, and Cultural Services	Manager
TOWN OF MONUMENT		
Larry Manning	Planning Department	Planning Director
COMMUNITY MEMBERS		
Jen Knellinger	Community Advisory Committee	Chair
Kevin Walker	Community Advisory Committee	2nd Vice Chair
Susan Davies	Trails and Open Space Coalition	Executive Director
Lynne Hall	Pikes Peak Road Runners	President
PPACG		
Brian Potts	PPACG	JLUS Project Manager
Kevin Rayes	PPACG	Transportation Planner
Tom Miller	PPACG	GIS Analyst
MAC		
Maj. Gen. Wes Clark	Military Affairs Council	US Air Force, Retired
STATE		
Robert Seel	Colorado Parks and Wildlife	Trails Coordinator, SE Region

PUBLIC COMMUNICATIONS WORKING GROUP

A common starting point for most encroachment issues is the public's understanding of the issue and importance to their everyday lives. A group of public communications officials from local governments, military installations, and community stakeholder groups met on February 27, 2018, and March 1, 2018, to discuss communications practices for exchanging information with the public, military installation, local officials, and community groups.

Military Stakeholders

- Air Force Academy PR representative
- Peterson Air Force Base PR representative
- Cheyenne Mountain Air Force Station PR representative (?)
- Fort Carson PR representative
- Schriever Air Force Base PR representative

Local Governmental Stakeholders

- Major City PIO
- County PIO

Community Stakeholders

- Press Association
- Southern CO Press Association
- MAC
- CAC

MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Ms. Billie Garner	Fort Carson	Public Affairs Specialist / Chief, Community Relations Installation Management Command Public Affairs Office
Jeff Bohn	Peterson Air Force Base/Cheyenne Mountain Air Force Station	21st Space Wing Public Affairs Officer
James Hodges	Schriever Air Force Base	Chief, Community Outreach
Melissa Porter	Air Force Academy	Director of Community Outreach
COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Dave Rose	El Paso County	Chief Public Information Officer
Kim Melchor	City of Colorado Springs	Lead Communications Specialist
John Trylch	City of Fountain	Community Engagement Manager
Jay-Michael Baker	Pueblo West	Communications and Engagement Director
Paris Elliott	Pueblo County	Community Information Manager
Lisa Bachman	Bachman PR	
Keith Klaehn	Military Affairs Council	Chairman
Max Cupp	Council of Neighbors and Organizations (CONO)	Program Officer
PPACG		
Jessica McMullen	PPACG	Policy and Communications Manager
Jim Moore	PPACG	1st Vice Chair, CAC
Brian Potts	PPACG	JLUS Program Manager
Ann Werner	PPACG	JLUS Planner II

REGIONAL AIRSPACE WORKING GROUP

The Policy Committee created the Regional Airspace Committee to discuss and address common regional airspace issues of concern for the military installations, local airports, and airspace users. Meetings were held on March 23, June 15, July 13, 2017, and April 17 and April 30, 2018. After the April 17 meeting, a second meeting was held between the City of Colorado Springs and the Air Force Academy to discuss potential strategies that emerged during recent development reviews. Strategy areas under consideration by this working group were as follows:

1. **Support collaboration and understanding between local planning officials and airspace professionals**: Discussions with local planning officials are coming to the forefront as development projects continue around the Air Force Academy airfield and the airfield used jointly by Peterson Air Force Base and Colorado Spring Airport.
2. **Conduct regular meetings of airspace and airfield professionals within this region to discussion shared airspace issues.** This task will be supported by PPACG as we move into the implementation phase after the study has been finalized.
3. **Create additional methods of communication to respond to public inquiries about flight activity.** Citizens regularly call airports and military installations to ask questions or express concerns about flight activity within this region. Better communication with citizens is needed to help them understand how flight activity occurs around both civilian and military airfields and airports.
4. **Continue to educate local private and commercial UAS users on flight safety and airspace use.** The group recognizes that this is a large issue where there is little local control or influence on how private UAS users operate. The only viable option that appears to be available at this time is to work with local, state, and federal partners on educating the public on safe UAS flight and creating awareness of potential airspace conflicts. Future actions by the FAA and military airfields may shift how UAS is dealt with after this study is completed so the Regional Airspace Group will continue to monitor.
5. **Additional tools need to be created to support compatible land use around the region's military and civilian airfields.** The land around airfields should not interfere with the ability for airfields to operate. In some instances, planners will need additional tools to ensure development is in compliance with FAA review requirements and that high-rise development and temporary cranes are properly evaluated for potential flight safety impacts. During the implementation phase, JLUS staff will engage with County commissioners and city councils for neighboring jurisdictions to develop these tools. Also, additional tools for informing buyer/sellers of flight and military operations information will need to be developed for public consumption.

Concurrent with this process, the Colorado Springs Airport Advisory Commission had in-depth discussions about the potential for future development impacts around the Colorado Springs Airport during their regular meetings. The dialogue between that commission and the JLUS staff was productive in identifying a need for strategies that can preserve flight not only at that airport but also at military installations. Future implementation will involve continued dialogue and coordination with the Colorado Springs Airport Advisory Commission. Many of the topics discussed within the Regional Airspace Working Group overlapped with topics discussed by other working groups, including Air Force Academy Flight Training, Land Use and Development Review Working Group, and the Public Communications Working Groups.

Military Stakeholders

- Air Force Academy representative
- Peterson Air Force Base representative
- Fort Carson representative

Community Stakeholders

- All airports in study area
- MAC
- CAC

Federal Stakeholders

- FAA

MUNICIPAL AIRPORTS		
NAME	**ORGANIZATION**	**TITLE**
Troy Stover	Colorado Springs Airport	Interim Director of Aviation
Brett Miller	Colorado Springs Airport	Operations & Airfield Maintenance Manager
Tom Andersen	Colorado Springs East Airport	President
Andi Biancur	COS Airport Advisory Commission	Chair
Randy Courduff	COS Airport Advisory Commission	Vice-Chair
Richard Baker	Fremont County Airport	Airport Supervisor
Dave Elliott	Meadow Lake Airport	President, Airport Board or Directors
Ian Turner	Pueblo Memorial Airport	Director of Aviation
MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Benjamin Couchman	Buckley AFB/Airburst Range	Representative
Josh Day	Colorado Air National Guard	Representative
Frederick Taijeron	Fort Carson - Butts Army Airfield	Airfield Manager
Ted Wilson	Fort Carson - Butts Army Airfield	Air Traffic Chief
Courtney Davis	Peterson Air Force Base	Chief Airfield Operations Flight
Lt. Col. Bradley Ross	Peterson Air Force Base	302nd OSS Operations Officer
Kevin Weaver	Peterson Air Force Base	AFSPC, OSS/OSA
Mike Kozak	Cheyenne Mountain Air Force Station	Installation Programmer/Community Planner
Steve Rose	Cheyenne Mountain Air Force Station	Deputy Director
Darren Horstmeier	Schriever Air Force Base	Community Planner
Devon Thomas	Schriever Air Force Base	Strategic Basing Manager
Don Alexander	Air Force Academy	Airfield Manager
Dan Rund	Air Force Academy	Chief of Airspace Management
John Gladney	Air Force Academy	Air Traffic Controller/Airspace Manager
LTC Vivien Wu	Air Force Academy	Commander, 306th Operations Support Squadron
OTHER STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Greg Dorman	CO Dept of Military and Veterans Affairs	Resource Director/Legislative Liaison

Ed Morris	FAA-COS/Pueblo	Air Traffic Manager
Larry Fortner, MG USAF (Ret)	Military Affairs Council	Representative
Denny Cripps, Col, US Army (Ret)	Military Affairs Council	Representative
Samantha Gunther	Office of Senator Cory Gardner	Regional Director
Annie Oatman-Gardner	Office of Senator Michael Bennet	Regional Director, Pikes Peak Region
Lee Colburn	Office of Representative Doug Lamborn	Senior Military and Defense Advisor
Greg Dorman	CO Dept of Military and Veterans Affairs	Resource Director/Legislative Liaison

SOUTHERN STORMWATER WORKING GROUP

Phase I was completed in October-November, 2016. Initial meetings were held with Ft. Carson and Cheyenne Mountain Air Force Station. Phase II, secondary meetings with stakeholders following the Fountain Creek Watershed E.coli/TMDL monthly meetings, began in December 2016 and continued monthly. Phase III, meeting coordination with PPCC, Colorado Department of Transportation and Stormwater engineers to identifying specific areas of opportunity, immediately followed Phase II.

Southern Stormwater Working Group:

- Phase I - October 2016 – November 2017:
  - initial meetings were held with all installations.
  - Areas of opportunity for improvement were identified as well as effective processes currently in use.
- Phase II - February 2017 – May 2018:
  - Meetings held with Colorado Springs Utilities, local developers, City of Colorado Springs Engineering, PPCC, the Air Force Academy, Fort Carson, Cheyenne Mountain Air Force Station, Schriever Air Force Base, and Peterson Air Force Base.

Installations Stakeholders

- Fort Carson
- Peterson Air Force Base
- Cheyenne Mountain Air Force Station

Natural Resource Stakeholders

- US Fish and Wildlife Service Region/Field Office/Refuge
- National Forest Supervisor
- State Department of Natural Resources – Wildlife
- State of Colorado – CDHPE-Water Quality Control Division

Private or Non-Governmental Stakeholders

- Conservation Organizations (i.e. The Nature Conservancy, Trust for Public Land, The Conservation Fund)
- Sportsmen or Recreational Groups (i.e. Ducks Unlimited)
- Local Land Trusts
- Landowner Organizations (i.e. Local Cattlemen's Association)
- Private or Non-Governmental Stakeholders
- MAC
- CAC

Local Governmental Stakeholders

- Pueblo
- El Paso County
- Pueblo County
- Colorado Springs
- Fountain

MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Mike Kozak	Cheyenne Mountain Air Force Station	Installation Programmer/Community Planner
Dino Bonaldo	Cheyenne Mountain Air Force Station	Director, CE
Wanda Burns	Cheyenne Mountain Air Force Station	Representative (Stormwater)
James Lassard	Fort Carson	Directorate of Public Works-Env Division Chief
Chester Chip Hahn	Fort Carson	Stormwater Program Manager, DPW
John Wachter	Fort Carson	Environmental Compliance Branch Chief, DPW
Hal Alguire	Fort Carson	Director of Public Works
John Sanders	Fort Carson	Master Planner, DPW
Thomas Wiersma	Fort Carson	Community Planner, DPW
Anthony Marvin	Fort Carson	Modularity Planner, DPW
Christopher Simpson	Cheyenne Mountain Air Force Station	Representative (Stormwater)
Suzanne Rohrs	Fort Carson	Environmental Protection Specialist, DPW
COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Larry Small	Fountain Creek Watershed	Executive Director of Fountain Creek Flood Control and Greenway District
Kim Gortz	Colorado Springs Utilities	Water Source Protection Project Manager
John Chavez	El Paso County	Stormwater Quality Coordinator
Kristy Martinez	City of Fountain	Planning Supervisor
Mark Shea	Colorado Springs Utilities	Watershed Planning Supervisor
Craig Dossey	El Paso County	Executive Director, Planning and Community Development Department
Mark Gebhart	El Paso County	Deputy Director, Planning and Community Development Department
Mike Hrebenar	El Paso County	Project Manager/Planner II
Joan Armstrong	Pueblo County	Director of Planning and Development
Brian Mihlbachler	Air Force Academy	U.S. Fish and Wildlife Service Natural Resources Manager
Rich Mulledy	City of Colorado Springs	Stormwater Division Manager
JP Pete Galusky	PPACG	Environmental Program Manager
Brian Potts	PPACG	JLUS Program Manager
Ann Werner	PPACG	JLUS Planner II

TRANSPORTATION WORKING GROUP

This working group met on October 12, 2017, and October 30, 2017, to discuss issues and strategy recommendations. Due to the existing transportation groups such as the Transportation Advisory Committee (TAC), the meetings covered a lot of information and recommended strategies quickly yielding the following potential strategy concepts:

1. Need to "preserve space in corridors for complete transportation options" including bus, bus rapid transit (BRT), bicycle, trails, pedestrian options as development occurs.
2. Maintain the current use of PPACG Transportation Advisory Committee (TAC) as the forum for regional cooperation and networking on transportation issues and projects.
3. Land use and transportation patterns should support installation desire for community services to be close but not too close. They need to be at an optimal distance to preserve the installations' missions.
4. Continue the involvement of transportation officials in the Installation Development Plan (IDP) process as one more way to help inform them of future changes.
5. Maintain this system of one point of installation contact for transportation issues and explain what position and department (information flows to be documented in the JLUS).

State and Local Governmental Stakeholders

- Colorado Department of Transportation
- Colorado Springs Roads/Public Works
- El Paso County Transportation
- Installation planners for transport
- Mountain Metro Transit
- Fountain
- Installation Representatives
- TAC representatives
- MAC representative
- CAC representative
- PPACG

MILITARY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Mike Kozak	Cheyenne Mountain Air Force Station	Installation Programmer/Community Planner, 721st Civil Engineer Squadron
Steve Rose	Cheyenne Mountain Air Force Station	Deputy Director, 721st Mission Support Group
John Sanders	Fort Carson	Master Planner, DPW
Rick Orphan	Fort Carson	Traffic Engineering and Planning, DPW
Glenn Messke	Peterson Air Force Base	Senior Community Planner, CE
Darren Horstmeier	Schriever Air Force Base	Community Planner
Devon Thomas	Schriever Air Force Base	Strategic Basing Manager
COMMUNITY STAKEHOLDERS		
NAME	**ORGANIZATION**	**TITLE**
Anthony "Anton" Ramage	El Paso County	Project Manager/Planner II
Tim Roberts	City of Colorado Springs	Planning Manager-LUR/DRE

Brandy Williams	City of Fountain	City Engineer
Shannon Ford	Colorado Department of Transportation	Director of Planning
Brian Vitulli	City of Colorado Springs	Planning Supervisor, Mountain Metro Transit
Keith Klaehne	Military Affairs Council	Military Affairs Council Representative
Mike Jorgensen	Military Affairs Council	Military Affairs Council Representative
PPACG		
Brian Potts	PPACG	JLUS Program Manager
Kevin Rayes	PPACG	Transportation Planner
Ann Werner	PPACG	JLUS Planner II

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C COMPATIBILITY ISSUE BACKGROUND

C.01 INTRODUCTION

This Appendix contains selected notes and research collected for this report for a portion of the compatibility issues as report background. It does not constitute a comprehensive study of each issue but useful information that goes beyond what was needed within the main body of the report.

C.02 AGRICULTURE, CONSERVATION, AND INSTALLATION BUFFERS

CORE ASSUMPTIONS GUIDING RESEARCH

1. The military installations, agricultural producers, and conservation professionals have a mutual interest in stewardship of the rural landscape.
2. Military missions within this region include flight training in airspace at various elevations above rural agricultural lands and it is important for these existing compatible land uses to continue.
3. Rural land owners and users have an interest in forming partnerships that will help preserve existing agricultural and natural landscapes that they value.
4. Local governments have an interest in strategically preserving open space for recreational purposes, and other public interests.

SUMMARY

A majority of the land within the Joint Land Use Study region can be characterized by agricultural or natural land uses. The Bureau of Land Management (BLM), US Forest Service (USFS), Colorado State Land Board, and the Department of Defense (DoD) are the primary owners and managers of government-owned land with the rest owned by private land owners, namely ranchers. These vast undeveloped landscapes provide a variety of topography on public lands (BLM and USFS) used for High Altitude Mountain Environment Training (HAMET) training by military units based at Fort Carson and from other installations all over the country. Most of the remaining landscapes are below airspace that is used to varying degrees by the Air Force Academy, Peterson AFB, Fort Carson, and Schriever AFB, and may have designated Military Operating Areas (MOAs). Where possible, installations also seek partnerships with land owners in close proximity to the installation boundary to preserve buffers from development, where the core method is to maintain the existing agricultural uses or preserve natural habitat since they are considered to be land uses that are compatible with military operations.

Multiple tools are available to facilitate mutually beneficial partnerships between government agencies, private property owners, and conservation organizations to preserve rural landscapes, bolster rural economies, and support military operations. Sections of the JLUS will identify the common interests of rural land use stakeholders, including military installations, and recommended strategies and programs that can be utilized to achieve these common goals. To study these issues, the JLUS Policy Committee approved

creation of the Conservation and Agricultural Working Group on April 27, 2017. The JLUS was intended to cover compatibility issues related to conservation and agriculture including open space preservation, wildlife habitat and corridors, riparian habitat, wildfire, land use goals shared by the agricultural community and military installations, cultural landscapes, and similar topics. This group will review current programs and action taken by installations and stakeholders.

PROGRAMS FOR MILITARY AND RURAL STAKEHOLDER COOPERATION ON COMPATIBLE LAND USE

Fort Carson has been utilizing the Army Compatible Use Buffer (ACUB) Program in partnership with individual landowners, Walker Ranch (in Pueblo County), the Nature Conservancy, El Paso County, and other partners. We understand that the Air Force installations in our region have been looking into ways that the Readiness and Environmental Protection Integration (REPI) Program could be utilized. The following programs and partnerships are described using excerpts from each respective website to provide an overview of the program.

EXCERPTS AND NOTES FROM WEBSITES

1. Readiness and Environmental Protection Integration (REPI) Program - http://www.repi.mil/

The Department of Defense (DoD)'s REPI Program is a key tool for combating encroachment that can limit or restrict military training, testing, and operations. The REPI Program protects these military missions by helping remove or avoid land-use conflicts near installations and addressing regulatory restrictions that inhibit military activities. The REPI Program is administered by the Office of the Secretary of Defense (OSD).

A key component of the REPI Program is the use of buffer partnerships among the Military Services, private conservation groups, and state and local governments, authorized by Congress at 10 U.S.C. § 2684a. These win-win partnerships share the cost of acquisition of easements or other interests in land from willing sellers to preserve compatible land uses and natural habitats near installations and ranges that helps sustain critical, at-risk military mission capabilities. For more information on REPI buffer partnerships, review the primer here.

REPI also supports large landscape partnerships that advance cross-boundary solutions and link military readiness, conservation, and communities with federal and state partners through a common, collaborative framework. The Western Regional Partnership (WRP) and Sentinel Landscapes Partnership are other programs can work in concert with REPI among DoD and the Departments of Agriculture and the Interior.

The evaluative process for funding REPI buffer projects starts with the Services submitting proposals to the Office of the Secretary of Defense for the annual buffer project funding process. OSD uses tailored qualitative and quantitative criteria to evaluate the proposals and works with the Services to take into consideration the value and priority of the missions being protected. OSD also encourages proposals that provide multiple benefits to the community and environment and strengthen partner cost-sharing. OSD works to ensure that the REPI Program supports the Department's Better Buying Power initiatives for affordable programs by increasing innovation and delivering better value to the taxpayer and warfighter.

2. Sentinel Landscapes - http://www.repi.mil/Large-Landscapes/Sentinel-Landscapes/; and, http://www.sentinellandscapes.org/

The U.S. Departments of Agriculture, Defense and the Interior announced a new initiative in 2013 — the Sentinel Landscapes Partnership, a nationwide federal, local and private collaboration dedicated to promoting natural resource sustainability in areas surrounding military installations. The Partnership

identifies opportunities that benefit national defense, local economies and conservation of natural resources. Where shared interests can be identified within a landscape, the Partnership will coordinate mutually beneficial programs and strategies to preserve, enhance or protect habitat and working lands near military installations; reduce, prevent or eliminate restrictions that inhibit military testing and training; prevent incompatible development near our military facilities.

Sentinel Landscapes are working or natural lands important to the nation's defense mission — places where preserving the working and rural character of key landscapes strengthens the economies of farms, ranches and forests; conserves habitat and natural resources; and protects vital test and training missions conducted on those military installations that anchor such landscapes.

The Partnership identifies opportunities that benefit national defense, local economies and conservation of natural resources. Where shared interests can be identified within a landscape, the Partnership will coordinate mutually beneficial programs and strategies to preserve, enhance or protect habitat and working lands near military installations; reduce, prevent or eliminate restrictions that inhibit military testing and training; prevent incompatible development near our military facilities.

Sentinel Landscapes are working or natural lands important to the nation's defense mission — places where preserving the working and rural character of key landscapes strengthens the economies of farms, ranches and forests; conserves habitat and natural resources; and protects vital test and training missions conducted on those military installations that anchor such landscapes.

3. Western Regional Partnership - http://wrpinfo.org/

The Western Regional Partnership was established in 2007 when the Department of Defense partnered together with representatives of Federal agencies and State and Tribal leadership in the States of Arizona, California, Nevada, New Mexico and Utah. The WRP was expanded in 2015 to include the State of Colorado.

The mission of WRP is to provide a proactive and collaborative framework for senior-policy level Federal, State and Tribal leadership to identify common goals and emerging issues in the states of Arizona, California, Colorado, Nevada, New Mexico, and Utah and to develop solutions that support WRP Partners and protect natural and cultural resources, while promoting sustainability, homeland security and military readiness.

The WRP region contains significant military assets, federal and Tribal lands, infrastructure systems such as energy and transportation, and wildlife ecosystems; making WRP valuable in leveraging resources and linking efforts to help partners share best practices. The goals of WRP are to:

- *Serve as a catalyst for improved regional coordination among State, Federal and Tribal agencies*
- *Address common goals, identify and solve potential conflicts and develop solutions that protect our natural and cultural resources, while promoting sustainability and mission effectiveness*
- *Provide a forum for information exchange, issue identification, problem solving and recommendations across the WRP region*
- *Adopt strategic priorities at the annual Principals' meeting*
- *Leverage existing resources and linking of efforts to better support key projects*
- *Identify geospatial requirements and leverage existing tools and resources to support WRP priorities.*

4. Army Compatible Use Buffer (ACUB) Program - http://aec.army.mil/index.php?cID=329

The ACUB program supports the Army's mission to fight and win the nation's wars. Winning wars requires a trained and ready force. Trained and ready Soldiers require land for maneuver exercises, live-fire training, equipment and Soldier skill testing, and other operations. Training restrictions, costly

workarounds, and compromised training realism can result from incompatible development surrounding the installation (external encroachment) and from threatened and endangered species on the installation (internal encroachment). Title 10, Section 2684a of the United States Code authorizes the Department of Defense to form agreements with non-federal governments or private organizations to limit encroachments and other constraints on military training, testing, and operations by establishing buffers around installations. The Army implements this authority through the ACUB program, which is managed overall at Army Headquarters level by the office of the Assistant Chief of Staff for Installation Management (OACSIM). Active Army cooperative agreements are managed by USAEC (a subcommand of Headquarters Installation Management Command [IMCOM]) and Army National Guard Directorate ACUB cooperative agreements are managed by the Army National Guard Environmental Programs Division.

The ACUB program allows installations to work with partners to encumber off-post land to protect habitat and buffer training without acquiring any new land for Army ownership. Through ACUB, the Army reaches out to partners to identify mutual objectives of land conservation and to prevent development of critical open areas. The Army can contribute funds to the partner's purchase of easements or properties from willing landowners. These partnerships preserve high-value habitat and limit incompatible development in the vicinity of military installations. Establishing buffer areas around Army installations limits the effects of encroachment and maximizes land inside the installation that can be used to support the installation's mission.

C.03 STORMWATER - MONUMENT CREEK WATERSHED RESTORATION MASTER PLAN

At the meeting on February 25, 2016, the JLUS Policy Committee approved the efforts of the Monument Creek Watershed Restoration Master Plan (MCWRMP) stakeholder group that was already underway as the official JLUS Monument Creek Working Group. JLUS staff attended the monthly meetings until the master plan with formal recommendations was completed on November 1, 2016. The Master Plan, through its strategies, is focused on the following objectives:

- Improve health and safety
- Improve water quality
- Improve wildlife habitats
- Improve stream bed and bank stability
- Improve fisheries
- Improve general creek health
- Reduce flooding magnitude and incidents
- Reduce sedimentation
- Improve access and visibility

The Fountain Creek Watershed, Flood Control and Greenway District managed the project with Matrix Design Group as the contractor. This Master Plan was drafted with input from dozens of community stakeholders and the public and the USAF Academy was a partner in funding this project along with El Paso County, Colorado Springs, and Colorado Springs Utilities. The process included two rounds of public open houses and a public comment period so these strategies have been vetted through a public process. The resulting recommendations support a collaborative and regional approach to addressing stormwater issues by prioritizing projects within the Monument Creek watershed of which a large portion would occur within drainages that impact the USAF Academy.

Stakeholders addressing stormwater issues within the Monument Creek watershed should utilize the following recommended strategies that were derived from this plan:

1. Utilize the Monument Creek Watershed Restoration Master Plan to coordinate stormwater efforts with community partners and adjust project priorities as work is completed in the watershed.
2. Stabilize the creek and floodplain to reduce erosion and sediment transport using the projects and techniques identified within the Monument Creek Watershed Restoration Master Plan Naturally filter runoff to improve water quality in the Creek, improve existing wetlands and create new wetlands in the floodplain.
3. Establish performance criteria that can be applied to the design of future detention, stabilization, habitat restoration, and sediment reduction projects in the Creek.
4. Stabilize eroding banks along the Creek that contribute large quantities of sediment downstream.
5. Restore, enhance, and conserve riparian vegetation to help stabilize the Creek and floodplain.
6. Through development of new stormwater management and land use regulations, encourage stormwater management standards and techniques to reduce runoff, peak flows and runoff volumes that result from development within the watershed.
7.

C.04 NEW SANTA FE TRAIL WORKING GROUP DISCUSSION NOTES FROM APRIL 27, 2017

WORKING GROUP CORE VALUES:

- The community and the US Air Force Academy share an interest in keeping the New Santa Fe Trail open to the public as much as is feasible.
- Coordination between community stakeholders and the US Air Force Academy is important in order to address trail access issues.
- The US Air Force Academy and the community share an interest in maintaining the safety and security of the installation.

STRATEGY DEVELOPMENT PROCESS

1. Identify the issues, priorities and needs.
2. Discuss and develop strategies corresponding to Core Values and priorities.
3. Stakeholders: Who needs to be involved and how?
4. Timeframe for strategies:
   - Short-term (1-2 years): Begin implementation as soon as possible or within the next two years
   - Medium-term (3-5 years): May take additional time to implement or second priority strategies
   - Long-term (5-10 years): More complex strategies with a long-term time horizon

PRIORITIES

- Trail security
- Trail user security and safety
  - Short-term: Adequate trail maintenance
- Preservation of habitat
- Quick and easy communication on trail status
  - Online/phone app
  - Some form of information available at trailhead
- Non-motorized connection along this corridor
  - Short-term: Identifying safe and optimal alternative routes
  - Long-term: Establish safe and optimal alternative routes

- Increase access for residents within this corridor, particularly east side of I-25
- Identify actions to minimize non-security closures

PUBLIC INPUT FROM THE AFA AREA MEETING ON FEBRUARY 23, 2017:

The strategies below are in order of importance per citizen feedback (number of dots placed next to each strategy):

1. Establish safe and optimal alternative on-street and off-street routes, including a route with a natural character similar to the existing New Santa Fe Trail (12)
2. Create a major maintenance and improvement program to address trail sustainability and enhance security for the installation and users (12)
3. Create a way for trail users to receive communication on trail status (4)
4. Update existing wayfinding within this corridor (1)

SUMMATION OF WRITTEN COMMENTS

- The primary public sentiment is to keep the trails that are located on the USAF Academy open to the public.
- Communication related to trail status is the next most significant request of the public. The use of smart phone applications, website announcements, social media, and signage are methods to be considered as communication medium.
- Trail alternatives were emphasized, such as a parallel trail system along the east side of I-25; establishment of trail connections between The Shops at Briargate/Pine Creek drainage and Woodmen Road and a designated paved bicycle commuter trail that is allocated right-of-way.

Strategy 1: Create a way for trail users to receive communication on trail status.

Background: Trail users experience challenges with getting information on trail status regarding when there will be closures (planned or unplanned). There is a need for integration of information from all trail administrators associated with not only the New Santa Fe Trail, but for trails that feed into it. An overall integrated information system would benefit use in this corridor by using some form of central online information center (potentially a website run by Pikes Peak Area Council of Governments or a dedicated regional trails website) and using a phone app. There are trail apps already available so stakeholders could identify and designate use of an app if it adequately serves the needs of users. Signage associated with Strategy #2 could also provide information on alternative routes and utilize variable message boards.

Which stakeholders need to be involved (public/trail users, installation, government, developers) and what is the role of each stakeholder in implementation?

Stakeholders that should be included are El Paso County, City of Colorado Springs, Monument, the AFA, trail user organizations, and Homeowner Associations. For some of the online tools, there would be an opportunity to collaborate with a private entity or public educational institution like UCCS (e.g. State had an app building competition) to develop these online tools or phone applications. There are existing open source software tools where information could be posted within an existing trail application.

When should it be implemented?

Short-term: As soon as practicable

Strategy 2: Update existing wayfinding within this corridor.

Background: In many cases it can be difficult for trail users to navigate trails that are created and maintained by multiple jurisdictions, or to determined alternate routes while using the trails.

Additional signage and methods for providing information while on the trail is needed to notify trail users about closures, hazards, and alternate routes.

Which stakeholders need to be involved (public/trail users, installation, government, developers) and what is the role of each stakeholder in implementation?

All trail administrators including Colorado Springs, El Paso County, the AFA, Monument and Palmer Lake.

When should it be implemented?

Short-term: Immediate need for current users and current trail network; Long-term: Coordinated plan for wayfinding to ensure safe and optimal re-routing when trail closures/maintenance occurs.

Strategy 3: Establish safe and optimal alternative on-street and off-street routes, including a route that complements the existing New Santa Fe Trail.

Background: Local plans have identified potential routes and some work has been done to create new routes along existing roadways. However, there is a need to establish a designated alternative route or routes that will be safe and implementable in instances when the New Santa Fe Trail experiences closures due to security threats, flood damage, or maintenance. The working group recognizes that this alternative route could also accommodate new and existing trail users who live on the east side of Interstate 25 and would prefer an alternative that does not utilize the New Santa Fe Trail. Alternative routes could be established using public-private partnerships (P3) with developers for new resident amenities and office parks with employees that commute by bicycle. Further assessment is needed to understand potential users and could be opportunity driven as new developments are planned (user counts, origination and destination, current development that may generate additional users). To accomplish this goal, costs and funding opportunities (REPI, federal, GOCO) with need to be identified and coordinated between all stakeholders involved with this strategy. As part of creating a complete alternative north-south route on the east side of Interstate 25, stakeholders should consider a first phase for the southern portion of an alternative route that would divert trail users off of the southern half of the existing trail using the existing underpass, and take them east under the interstate to a new north-south trail through open space to specifically reduce security concerns related to the southern half of the existing New Santa Fe Trail.

Which stakeholders need to be involved (public/trail users, installation, government, developers) and what is the role of each stakeholder in implementation?

Trail administrators and planners from the City of Colorado Springs, El Paso, and Monument; the AFA, trail users and organizations; developers/companies may be able to dedicate portions/build to accomplish this goal.

When should it be implemented?

1. Short-term: Identify a preferred alternative trail route using existing routes identified in plans such as the Non-Motorized Plan.
2. Middle-term: Establish safety improvements on the on-street alternative route.
3. Long-term: Create an alternative trail through public and private open space on the east side of Interstate 25.

Strategy 4: Create a major maintenance and improvement program to address trail sustainability and enhance security for the installation and users.

Background: Trail administrators and the AFA need to work together on creating a maintenance and improvement plan to ensure that the trail continues to be safe and secure for all users. This strategy would encourage partnerships between the AFA, trail maintenance administrators, and trail users to help identify maintenance problems, solutions, and funding sources. A potential component of this

could be creation of a “friends of the trail” group to help with regular trail maintenance and clean up. The AFA and partner governments would coordinate on facilitating security measures as needed. Strategy #1 could be utilized to report recurring maintenance issues and problem areas that need to be incorporated into this program.

Which stakeholders need to be involved (public/trail users, installation, government, developers) and what is the role of each stakeholder in implementation?

All trail administrators, the AFA, trail users, State (funding), other governmental entities that could assist with technical and financial assistance.

When should it be implemented?

Medium-term: As funding and staff time permits

D RESEARCH RESOURCES

COMMUNITY STAKEHOLDERS

Local Governments

Cañon City www.canoncity.org
City of Colorado Springs www.coloradosprings.gov
City of Fountain www.fountaincolorado.org
City of Pueblo www.pueblo.us
City of Manitou Springs www.manitousprings.org
City of Victor https://cityofvictor.com
Pueblo West Metropolitan District (Pueblo West) www.pueblowestmetro.com
Town of Monument www.townofmonument.org

Counties

El Paso County www.elpasoco.com
Fremont County www.fremontco.com
Pueblo County www.county.pueblo.org
Teller County www.co.teller.co.us

Regional Governments

Pikes Peak Area Council of Governments www.ppacg.org
Pueblo Area Council of Governments www.pacog.net
Upper Arkansas Area Council of Governments www.uaacog.com

FEDERAL GOVERNMENT

BLM www.blm.gov
EPA www.epa.gov
OEA/DoD www.oea.gov/www.defense.gov
NRCS-USDA - Sentinel Landscapes www.nrcs.usda.gov
US Fish and Wildlife www.fws.gov
US Forest Service www.fs.fed.us

LOCAL LAND USE PLANNING

El Paso County Master Plan https://planningdevelopment.elpasoco.com
City of Manitou Springs Comprehensive Plan www.planmanitou.com/
PlanCOS-City of Colorado Springs Comprehensive Plan www.coloradosprings.gov/PlanCOS
El Paso County Open Space https://communityservices.elpasoco.com/parks-and-recreation
City of Colorado Springs Trails and Open Space https://coloradosprings.gov/parks/page/parks-trails-open-spaces

LOCAL STAKEHOLDERS

Colorado Springs Chamber and Economic Development Corporation
https://coloradospringschamberedc.com
Colorado Springs Home Builders Association www.cshba.com
Council of Neighbors and Organizations (CONO) www.cscono.org

MILITARY

Air Force Academy www.usafa.af.mil
Fort Carson www.carson.army.mil
Peterson AFB www.peterson.af.mil
Cheyenne Mountain AFS: http://www.norad.mil/About-NORAD/Cheyenne-Mountain-Air-Force-Station
Schriever AFB www.schriever.af.mil
North American Aerospace Defense Command www.norad.mil
U.S. Northern Command www.northcom.mil

STATE OF COLORADO

State of Colorado www.colorado.gov
Colorado Department of Transportation www.codot.gov
State Department of Military and Veterans Affairs https://www.colorado.gov/dmva

STORMWATER

Monument Creek Watershed Restoration Master Plan https://www.fountain-crk.org/files
Fountain Creek Watershed, Flood Control and Greenway District https://www.fountain-crk.org
http://fountain-crk.org/upper-fountain-cheyenne-creek/ufc-cc-watershed-coalition,-monument-ck.html
https://coloradosprings.gov/waterresources
https://coloradosprings.gov/sites/default/files/images/dcm_volume_1.pdf
https://coloradosprings.gov/sites/default/files/images/dcm_volume_2.pdf
https://adm.elpasoco.com/transportation/Pages/DrainageCriteriaManual.aspx

UTILITIES/ENERGY

Colorado Springs Utilities www.csu.org
Mountain View Electric Association www.mvea.coop
Colorado Public Utilities Commission www.colorado.gov/pacific/dora/puc
NREL – Wind Resource Mapping www.nrel.gov/gis/wind.html
DoD Siting Clearinghouse for Energy Development www.acq.osd.mil/dodsc

WATER

El Paso County Water Master Plan www.elpasoco.com/development-el-paso-county-water-master-plan/
PFOA: https://www.niehs.nih.gov/health/materials/perflourinated_chemicals_508.pdf

WILDFIRE

http://wildfiretoday.com/tag/colorado-springs/
https://inciweb.nwcg.gov/

Blue Ridge Research and Consulting, LLC

Technical Report – February 8, 2017

Sound Analysis for the PPACG Colorado Springs Regional Joint Land Use Study

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Report Number
BRRC 17-01

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Acronyms and Abbreviations

AICUZ	Air Installation Compatible Use Zone (AICUZ)
ANSI	American National Standards Institute
BRRC	Blue Ridge Research and Consulting, LLC
dB	Decibel
dBA	A-Weighted Decibel
GPS	Global Positioning System
HS	High School
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz
JLUS	Joint Land Use Study
kHz	Kilohertz (1,000 Hz)
L_{01}	1% Percent Time Exceeded Level
L_{10}	10% Percent Time Exceeded Level
L_{50}	50% Percent Time Exceeded Level
L_{90}	90% Percent Time Exceeded Level
L_{99}	99% Percent Time Exceeded Level
L_{Aeq}	A-Weighted Equivalent Sound Level
NEPA	National Environmental Policy Act
No.	Number
OTOB	One-third Octave Band
PPACG	Pikes Peak Area Council of Governments
SLM	Sound Level Meter
USAFA	United States Air Force Academy
WAV	Windows Wave Audio Format

1 Overview

The Pikes Peak Area Council of Governments (PPACG) is evaluating the sound level experienced by communities adjacent to the United States Air Force Academy (USAFA). Blue Ridge Research and Consulting, LLC (BRRC) was hired as independent acoustics specialists to document the sound environment at specific locations of interest as a component of the broader JLUS objectives.[(1)] This technical report provides detailed analysis of the sound associated with flight training operations at the USAFA. Report elements include a tutorial on understanding the science of acoustics, the measurement procedures performed, the data analysis methodology, descriptions of the monitoring site locations, measurement results, sound level exceedance methodology and analysis, a discussion of potential future evaluations, and appendices that include the organization of associated data file deliverables, monitoring and equipment logs, and field observations.

Sound levels were measured at ten monitoring locations within the JLUS study area from the evening of Monday, July 25 through the morning of Friday, July 29, 2016. Each measurement site recorded second-by-second sound levels on an overall and one-third octave band (OTOB) frequency basis. Additionally, over twenty hours of direct observations were performed to correlate the measured sound levels with community activity. The measurement results are tabulated on an hourly basis to reflect the 99, 90, 50, 10, and 1 percentiles of sound levels at each monitoring site. Summary charts of the soundscapes are also provided for context.

Sound level exceedance analysis identifies the most distinctive events within a soundscape. BRRC developed an algorithm, refined by the observation logs, to distinguish potential aircraft events at each monitoring site using the distinctive tones that propeller planes produce. However, much of the observed aircraft activity blended into the background soundscape because neither the overall sound level nor the tones generated by the aircraft sufficiently exceeded residential and community sounds, principally traffic and construction activity. Specifically, the 100 Hz tone produced by the propeller planes was often masked by certain vehicles, lawn mowers, hedge trimmers, and construction activity. BRRC thus performed an intensive, manual review of the potential aircraft events to identify Doppler shifts characteristic of propeller planes. The results are site-specific assessments of the degree to which aircraft activity is acoustically distinctive at each monitoring site.

Due to the typically low sound levels produced by aircraft activity relative to the background soundscape, the algorithmic exceedance analysis – by necessity – only identifies the aircraft events with the greatest sound levels. When BRRC personnel were present, visually-identified yet relatively-quiet aircraft are logged and discussed within the context of the overall soundscape. Overflights were the "loudest" events at 9 of the 10 monitoring sites during direct observations, yet the maximum 1-second sound levels were not regularly elevated over the background soundscape in most locations. The periods of elevated sound from the most distinctive overflights were brief, most often less than 36 cumulative (not necessarily continuous) seconds within any one-hour duration of the day.

BRRC documented 72 overflights during the three days of direct observations, equaling 3.3 overflights per hour between the hours of 7 AM and 7 PM, and an additional 108 overflights identified via the intensive spectral-data inspection seeking evidence of Doppler shift (from a subset of the possible 1,458 aircraft events identified from the BRRC exceedance algorithm). With minor adjustments to the algorithm to capture other transient sound event such as traffic and construction activity, there are tens-of-thousands more distinctive periods of elevated sound. In general, much of the sound generated by flight activity around the individual monitoring sites blended into the commercial and residential background soundscape, including the distinctive tones produced by propeller planes.

Monitoring Site 3 offered the best opportunity for assessing how propeller planes can affect the general JLUS soundscape, due to the low ambient background, unobstructed open areas, and distinct flight characteristics identifiable at Site 3. Contrary to the expected USAFA flight tracks at the time of this noise study, propeller planes flew directly over the monitoring equipment at Site 3 under clear sky conditions, enabling confident identification of overflights within the measurement data when BRRC personnel were not present. Based on Site 3, a typical overflight by a propeller plane anywhere within the JLUS area (with topographical and atmospheric conditions similar to Site 3 during the monitoring period) would likely produce a maximum 1-second sound level around 66 dBA, before decreasing into the background soundscape over a span of less than 30 seconds, on average. Thus, a typical overflight under conditions similar to Site 3 begins with a sound level equivalent to quiet urban daytime and then increases to a quiet conversation at one meter, and reaches a maximum 1-second sound level equivalent to an air conditioner at 100 feet.

During the measurement period, the average $L_{Aeq,12hr}$ for all ten monitoring locations, inclusive of all sounds from traffic, construction, and aircraft activity, as well as residential activity and the ambient soundscape, was 54.5 dBA. The range of daily $L_{Aeq,12hr}$ values was 47.8 dBA at Site 8 to 60.4 dBA at Site 4, which was dominated by traffic along I-25. Although aircraft overflights in the JLUS area are audible to the community and therefore potentially annoying to certain members, the $L_{Aeq,12hr}$ sound level does not approach the typical standards for noise mitigation, even with the inclusion of all traffic, construction, aircraft and other sounds comprising the soundscape.

2 Understanding the Science of Acoustics

To assist the reader in understanding the terminology used in characterizing soundscapes, the content within this section provides an overview of sound-related terms and metrics.

Any unwanted sound that interferes with normal activities or the natural environment can be defined as noise. As detailed in the US Navy's *Discussion of Noise and Its Effect on the Environment* ("Noise Appendix"):[2]

> The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration.
>
> - Intensity is a measure of the acoustic energy of the sound and is related to sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound.
> - Frequency determines how the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.
> - Duration is the length of time the sound can be detected.
>
> The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain.[3]
>
> …
>
> Because of the logarithmic nature of the decibel unit, sound levels cannot simply be added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:
>
> 60 dB + 60 dB = 63 dB, and
>
> 80 dB + 80 dB = 83 dB.
>
> Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:
>
> 60.0 dB + 70.0 dB = 70.4 dB.

In a community, "it is unlikely that the average listener would be able to correctly identify at a better than chance level the louder of two otherwise similar… events which differed in maximum sound level by < 3 dB."[4] The Noise Appendix provides insightful examples of the logarithmic decibel scale in relation to human hearing:[2]

> On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness. This relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90% decrease in sound intensity but only a 50% decrease in perceived loudness because the human ear does not respond linearly.

Sound sources can contain a wide range of frequency (pitch) content as well as variations in extent from short-durations to continuous, such as back-up alarms and ventilation systems, respectively. Human hearing ranges in frequency from 20 Hz to 20,000 Hz, although perception of these frequencies is not equivalent across this range. Per the Noise Appendix: "Human hearing is most sensitive to frequencies in the 1,000 to 4,000 Hz range. The notes on a piano range from just over 27 Hz to 4,186 Hz, with middle C equal to 261.6 Hz." Standard weighting filters help to shape sounds; an "A-weighting" filter adjusts low and high frequencies to match the sensitivity of human hearing for moderate sound levels, as shown in Figure 2-1 below for A-weighting. For this reason, the A-weighted decibel level (dBA) is commonly used to assess community sound.

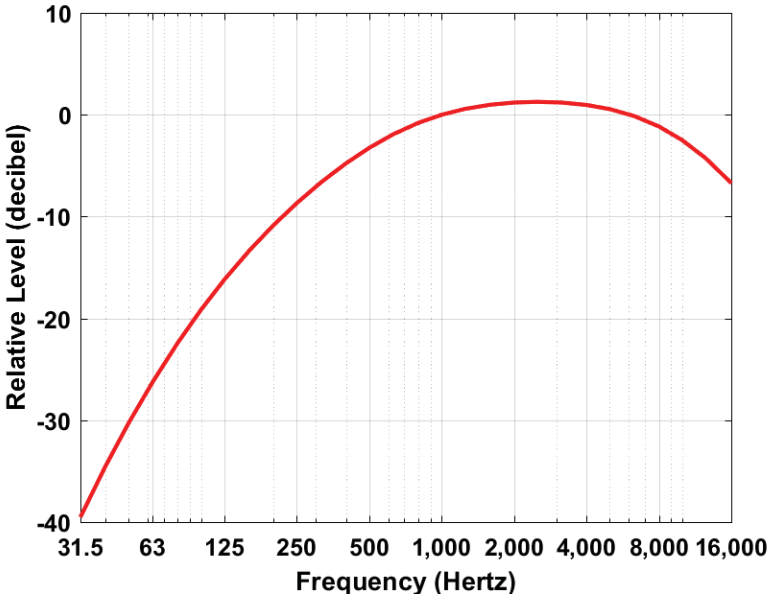

Figure 2-1. Frequency Adjustments for A-Weighting[5]

Figure 2-2 is a chart of A-weighted sound levels from typical sounds.[6] Some sound sources (air conditioner, lawn mower) are continuous with levels that are constant for a given duration; others (vehicles passing by) are the maximum sound during an event, and some (urban day and nighttime) are averages over extended periods.[7] Per the US Environmental Protection Agency, "Ambient noise in

urban areas typically varies from 60 to 70 dB, but can be as high as 80 dB in the center of a large city. Quiet suburban neighborhoods experience ambient noise levels around 45-50 dB."[8]

A variety of acoustical metrics have been developed to describe sound events and to identify any potential impacts to receptors within the environment. These metrics are based on the nature of the event, and who or what is affected by the sound. To assist the reader in understanding the terminology used in characterizing soundscapes, the following definitions are provided:

Acoustical Metrics – Physical measures of sound to quantify different aspects of sound.

Ambient Soundscape – Background sounds normally occurring within an area, which can include both natural and human-made sounds.

Equivalent Sound Level – The Equivalent Sound Level is the sound level that represents the decibel average of all sound exposures occurring with a defined period. The period of an L_{eq} measurement is typically related to an activity, and the L_{eq} duration is provided along with the value (e.g. $L_{eq(24)}$ denotes a 24-hour duration).

Natural Soundscape – A subset of the soundscape that includes only naturally generated sounds such as animal vocalizations, wind-in-foliage, and flowing water.

NN% Time Exceeded Level, L_{NN} – The sound level that is exceeded NN% of the time for a given period, such that for NN=99, the L_{99} represents the lowest level and for NN=01, L_{01} the highest. L_{90} is the sound level that is exceeded 90% of the time, and L_{50} is exceeded 50% of the time. L_{50} is statistically referred to as the median value, and it is always greater than or equal to L_{90}.

Noise – Any sound judged by a receiver as unwanted sound.

Maximum Sound Level – The highest A-weighted sound level measured during a single event, in which the sound changes with time, is called the maximum A-weighted sound level or Maximum Sound Level (abbreviated as L_{max}). L_{max} is important in judging if a noise event will interfere with conversation, TV or radio listening, or other common activities. Although it provides some measure of the event, L_{max} does not fully describe the noise because it does not account for how long the sound is heard.

One-third Octave Band, OTOB – Standardized frequency ranges defined by a lower and upper bound that are used to represent spectral content for analysis.

Sound Exposure Level, SEL – SEL combines both the intensity of a sound and its duration. For an aircraft flyover, SEL includes the maximum and all lower noise levels produced as part of the overflight, together with how long each part lasts. It represents the total sound energy in the event.

Sound Level – A logarithmic measure of the acoustic pressure level, measured in decibels.

Soundscape – The totality of sounds occurring within a given area. These sounds include natural and human-made sounds.

Spectral Content – The variations in frequencies contained within a sound pressure wave.

Time Above, TA_{xx} – Amount of time a specified sound level is exceeded for a given period.

Transient Event – A sound generator that transits an area such that its sound rises above the local ambient to a maximum level and then decreases back below the ambient.

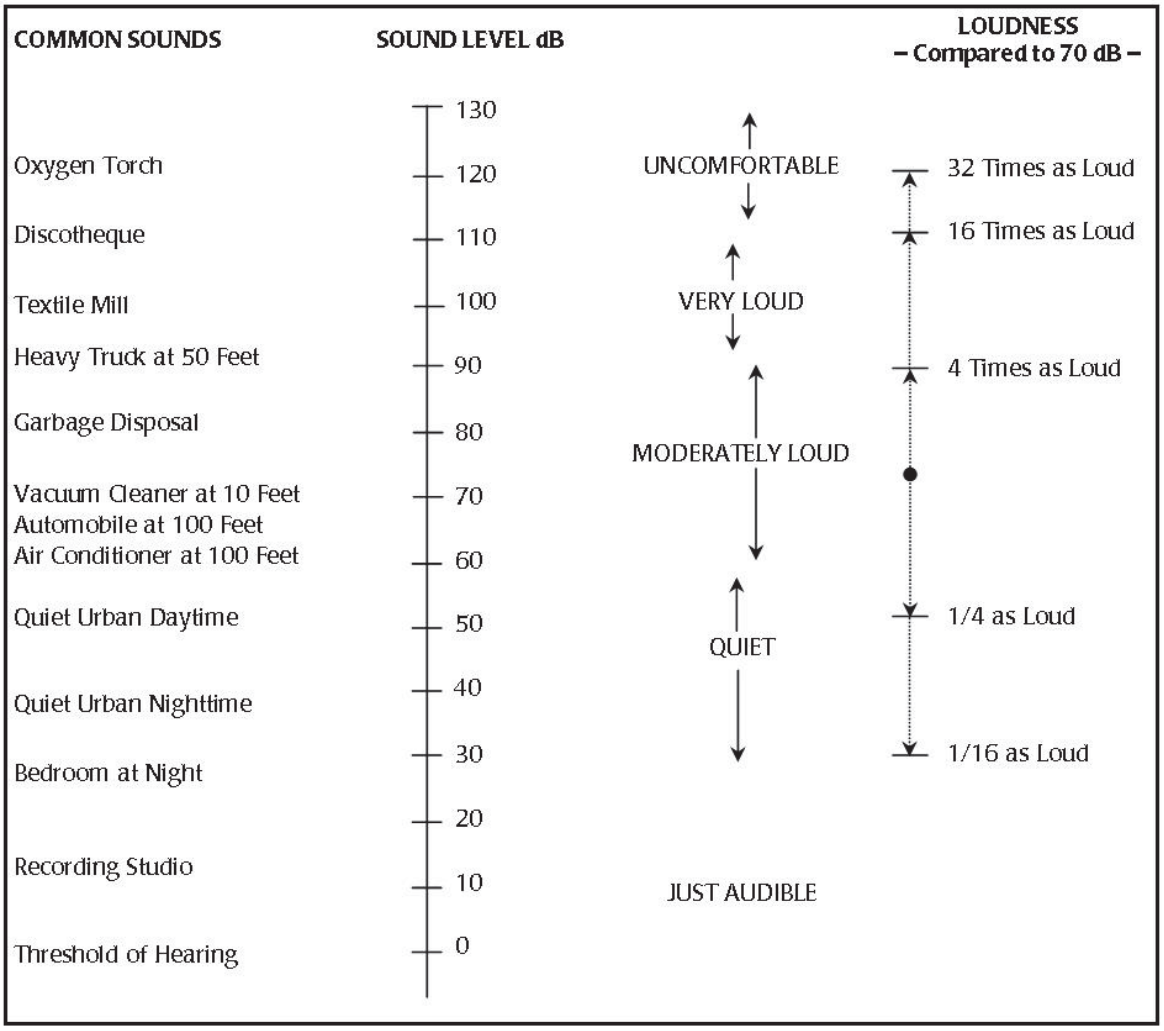

Figure 2-2. Typical A-weighted Sound Levels of Common Sounds

3 Sound Monitoring Approach

The monitoring methods and procedures employed by BRRC follow similar studies conducted at Zion National Park,[9] the East Coast Outlying Landing Field,[10] Wallops Island[11] as well as technical guidelines developed by the National Park Service[12] and by the American National Standards Institute. The sound measurements enable soundscape characterization using statistical acoustical metrics to describe the diurnal (i.e. day/night) pattern at the monitoring sites and an assessment of sound intrusions.

Sound measurements are utilized to describe the soundscape and its variations. The characterization of the soundscape in the vicinity of the USAFA involved monitoring ten sites of interest during three consecutive 24-hour periods. The monitoring period was selected to coincide with typical USAFA flight activity. Sound measurements were recorded at all ten sites from 7:19pm on Monday, July 25 through 10:19am on Friday, July 29, 2016, or approximately 3.6 consecutive 24-hour periods.

Along with the sound level data, detailed observations were made to identify the primary sound sources received at the monitoring sites. Total logged observation time by BRRC field personnel was 23.3 hours. In addition, 130 recordings of flight, vehicle, construction, and ambient sounds were cumulatively collected at the monitoring sites. These recordings are provided in a Windows Wave (WAV) audio format and are itemized in the observer logs in Appendix A.3. Within each monitoring location, BRRC selected the optimal microphone placement and height based on existing flight paths, local terrain, nearby activity, and security conditions, in coordination with PPACG.

3.1 Equipment

BRRC deployed Larson Davis 831[13] and LxT Sound Level Meters (SLM).[14] The specific SLM models utilized are sophisticated data recorders, precisely calibrated, and capable of high-fidelity sound capture over extended periods. In addition, the pairing of the SLMs with the environmental cases and windscreens ensures reliable sound monitoring against substantial weather variations. The SLM setup included an omni-directional, random incidence microphone, environmental pre-amplifier, windscreen, mounting tripod, securable environmental case, and eight D-cell batteries. The microphones were placed at a height of 5 ft above the ground, oriented vertically. The SLMs were set to collect 1-second L_{Aeq} and OTOB spectral data.

3.2 Installation Procedures

The SLMs were installed and tested for proper operation at the selected monitoring locations, following these set-up procedures:

- Install eight new D-cell batteries into SLM;
- Insert desiccants into pre-amplifier holding tube;
- Mount microphone to tripod;
- Set microphone height given local conditions;
- Confirm SLM program setup;
- Synchronize SLM clock to uniform time;
- Note SLM-reported battery level and memory capacity;
- Calibrate SLM microphone and record calibration tone for 30 seconds;
- Ensure microphone extension cable is secured;
- Secure SLM environmental case with chain and lock;
- Test SLM response to ensure proper functioning;
- Confirm active recording;
- Photograph SLM setup and area; and
- Document time at departure.

These procedures are encapsulated in the field logs provided in Appendix A.2.

3.3 Site Servicing Procedures

During the study, each site was regularly visited to perform SLM maintenance, site-specific sound observations, and data downloading. This process ensured positive data collection throughout each monitoring period. Service field logs were used to document each visit, including deployment and removal, as shown in Appendix A.2. Once the sound level measurements were downloaded from the SLM, the data were backed up to multiple hard drives and servers, inspected and reviewed.

3.4 Observations

During the monitoring period, detailed observations were conducted to identify the sound sources received at the monitoring locations. These observations noted static sound sources, road sounds and flow, transient sound events including flight activity, and wind conditions. Observation periods ranged from 0.9 hours to 3.3 hours total per site, depending on variable sound-source activity. Although only ten contracted hours were planned, additional observation hours were conducted to capture more sound condition scenarios for later analysis. In total, BRRC field observations covered a 23.3-hour period, as itemized in Figure 3-1. The complete set of observation logs from each monitoring site is provided in Appendix A.3.

Site	Tue, July 26, 2016	Wed, July 27, 2016	Thu, July 28, 2016	Fri, July 29, 2016	Duration
1		5:18pm - 6:30pm	6:35am - 7:51am	3:39pm - 4:00pm	**2.8 Hours**
2	2:59pm - 3:59pm		10:37am - 11:29am	4:55pm - 5:14pm	**2.2 Hours**
3	4:09pm - 5:00pm		11:41am - 12:10pm	5:19pm - 5:40pm	**1.7 Hours**
4	5:12pm - 6:04pm		12:34pm - 12:58pm	12:42pm - 1:00pm	**1.6 Hours**
5	6:19pm - 7:01pm		1:23pm - 2:01pm	12:11pm - 12:28pm	**2.9 Hours**
6		6:35am - 7:52am	2:20pm - 2:44pm	11:44am - 12:04pm	**2.7 Hours**
7		8:28am - 10:27am	3:22pm - 3:52pm	11:00am - 11:28am	**2.2 Hours**
8		10:54am - 12:06pm	4:07pm - 4:31pm	10:14am - 10:42am	**0.9 Hours**
9	9:29am - 11:48am		7:58am - 8:40am	4:01pm - 4:18pm	**3.3 Hours**
10	12:51pm - 2:23pm		9:17am - 10:28am	4:27pm - 4:47pm	**3.1 Hours**
Subtotal	**7.3 Hours**	**5.7 Hours**	**6.8 Hours**	**3.5 Hours**	**23.3 Hours**

Figure 3-1. Timing and Duration of Field Observation at Each Monitoring Site

4 Measurement Data Analysis Methodology

4.1 Overview

The sound level and spectral data collected from each site were used to describe the overflights and ambient soundscapes measured at the ten locations of interest. The following specific analyses were performed:

- Quantifying and documenting the sound characteristics of each flight identified in the observer data logs, including: location, date, time, maximum sound level, duration of sound, and sound exposure level.
- Quantifying the ambient sound levels occurring at the ten observer sites to provide context for the sound levels generated by flight activity.
- Expanding the number of flights characterized, beyond the observed flyovers, using an exceedance level-based algorithm to identify the date, time, and sound level characteristics of potential flight activity at each monitoring site.
- Summarizing the findings from the acoustical analysis.

The resolution and breadth of the data collected under this effort provides a benchmark for any potential future comparison sound studies in the vicinity of the USAFA. If the PPACG elected to pursue modeling of the USAFA flight paths via BRRC or another acoustics firm (using a standard DoD modeling program such as NoiseMap), the measured data and subsequent analysis within this report could serve as a comparison.

4.2 Measurement Data Integration Into Observation Logs

The observation logs in Appendix A.3 list sound-generating activities that occurred while BRRC personnel were present. BRRC personnel initially recorded average sound levels based on a handheld SLM to offer a reference and validation for the ten monitoring SLMs. Now that the data from the individual monitoring site SLMs have been downloaded and organized, the precise sound levels at each monitoring site can be correlated to the logged activity. For example, BRRC personnel logged the absence of visible and audible aircraft activity at Site 9 from 8:21:04 AM to 8:22:28 AM on Thursday, July 28, 2016 (see Table 5-10). During this period, the dominate sound source transitioned from the ambient background (consisting primarily of wind through nearby vegetation) to the presence of two trucks passing each other along Pauma Valley Dr. The maximum sound level (L_{max} dBA) was then extracted from the SLM measurements at Site 9 during this period, resulting in a 65.0 dBA L_{max} sound level. This sound level approximates the upper limit of typical speech between two people spaced 1 meter apart, and thus some speech interference attributable to the passing trucks is likely. The loudest sound level logged during the observation period at Site 9 was on Tuesday, July 26, 2016 from 9:56:00 AM to 9:58:00 AM, involving a propeller plane overflight with a prominent 100 Hz tone and an L_{max} of 69.9 dBA. Although the sound level was briefly elevated at Site 9 due to this overflight, the maximum sound level is only 4.9 dBA above what a person would experience at Site 9 due to common traffic events. A typical person

cannot differentiate between two sounds with a sound level difference less than 3.0 dBA, so this differential is likely noticeable at 4.9 dBA, but not substantially.

The pairing of the measurement data with the observation logs also offers context: although overflights typically yield the highest L_{max} values at each site, including Site 9, there is a broad range of overflight L_{max} values revealed by the monitoring data. Using Site 9 again as an example, an overflight occurred between 10:27:00 AM and 10:28:00 AM that produced a relatively low L_{max} of 49.5 dBA, and multiple observed overflights occurred between the range of 49.5 and 69.9 dBA L_{max}, along with non-aircraft periods that involved traffic along Gleneagle Dr and Pauma Valley Dr, as well as residential construction. It is important to note that for this analysis L_{max} is the maximum $L_{eq,1s}$ sound level occurring over a single second during any defined period. Thus, although overflights have a range of L_{max} values that typically include the loudest event at each site, the actual L_{max} values are not particularly "loud" – the *most elevated* L_{max} values at each monitoring site ranged from 65.2 to 74.6 dBA during the 23.3 hours of direct observations.

The majority of traffic and construction events are not captured in the tables of observed background sounds, whereas every overflight and observed mid-range aircraft is logged. The purpose of the observation logs is to capture a representative subset of the non-aircraft sources of sound generation in the area, yet the underrepresentation of non-aircraft activity can provide a false impression. Sound events from traffic and construction activity were so numerous that manually logging each observation was impractical, whereas aircraft events are relatively rare. Hence, non-aircraft events are included in the observation logs, but only as representatives of the many more instances that were not notated. Thus, the observation tables are best used for comparing the relative maximum sound levels produced by the sound event, not the comparative frequency of occurrence. Although the observation logs do not show every passing car, train whistle, hammer strike, dog bark, strong wind, forklift alarm, leaf blower, etc., all sound sources were measured and are thus included in the hourly sound level variance charts (e.g. Figure 5-6) and in the exceedance analysis in Section 6. More generally, all sound sources in the area of each monitoring site were recorded by the SLMs every second, irrespective of how often the event occurred.

4.3 Hourly Sound Level Variations

Following the observed activity tables with L_{max} values are site-specific charts of the hourly variations in the measured sound level. The purpose of these charts is to provide a characterization of the sound levels occurring at each measurement location on an hourly basis, averaged over all monitoring days. Each monitoring site displayed a diurnal sound level pattern, yet the sound level ranges differ between sites and between the hour of the day, sometimes substantially.

The one-second sound level data across all monitored days were sorted to provide the range of sound levels that occurred within each hour of the day on an L_{NN} basis. As introduced in Section 2, L_{NN} is a metric that refers to the percentage of time that a specific sound level was exceeded, where "NN" is any percentage value from 99% to 1%. The L_{01} metric denotes the sound level exceeded only 1% of the time during the defined period (in this case, one hour). Thus, L_{01} provides the highest sound levels relative to

any NN values greater than 1, and L_{01} only includes the loudest 36 seconds of sound levels during a one-hour period (i.e. there are 3,600 seconds in an hour). Conversely, L_{99} denotes the sound level exceeded 99% of the time at the measurement location during each hour of the day, such that L_{99} will be low relative to L_{01} in a variable soundscape environment. L_{90} is typically used as the ambient background sound level, since sound levels are above this level 90% of the time, with L_{50} describing the median sound level, and L_{10} denoting the top 10% of sound levels within each hour (or the "loudest" 6 minutes).

The hourly sound level variation for each monitoring site is provided on an L_{99}, L_{90}, L_{50}, L_{10}, and L_{01}basis in bar charts. Using Figure 5-6 for Site 1 as an example, the upper dashed lines mark the L_{01} value (again, this sound level is only exceeded for a cumulative 36 seconds during the 1-hour period) and the lower dashed line marks the L_{99} value; 98% of the measured sound levels are captured between L_{01} and L_{99}. (Note that the L_{max} metric used in the observation tables differs from L_{01}. L_{max} is the loudest 1 second of measured sound levels, whereas L_{01} is the loudest 1 percent of sound levels within a defined duration. Because the temporal resolution of the measurement data is 1 second, L_{max} is appropriate for the shorter event durations found in the observation tables, and L_{01} is suitable for longer durations such as hourly data.). The top of the blue vertical bars denotes L_{10} and the bottom denotes L_{90}. The black bar within the blue vertical bars is L_{50}, which is the median sound level within each hour at each site, averaged over all monitored days.

USAFA aircraft operations, as well as aircraft of unknown affiliation (when BRRC personnel were not present to observe flights originating at the USAFA airfield), occurred from 7 AM to 7 PM during the observation periods at all sites. All observations were performed during weekdays. The sound levels shown in the hourly variation charts, such as Figure 5-6 for Site 1, are only influenced – if at all – by aircraft activity from the 07 to 19 hour on the x-axis; the remaining hourly data are provided for context. As with all monitored sites, Figure 5-6 shows lower L_{NN} values during nighttime hours, specifically 11 PM to 4 AM, and more generally 10 PM to 6 AM. This result is expected based on typical diurnal community patterns related to traffic, construction periods, and other human activity. The sound levels also tend to be less variable at night, with a smaller ambient range between the L_{99} and L_{90}.

Comparing the L_{max} tables with the corresponding hourly sound level variations for each site can provide a sense of duration, revealing that the elevated sound levels from overflights are both short in duration and not particularly "loud" (the highest observed L_{max} values range from a typical conversational sound level to the sound level of a vacuum cleaner closer than 10 feet, per Figure 2-2).

Please note that the methodology for sound level exceedance analysis is discussed in Section 6.

5 Monitoring Site Descriptions and Results

The ten monitoring sites are located within the northwest portion of the Colorado Springs Regional JLUS project area shown in Figure 5-1.[(1)] More specifically, the monitoring sites are east of the USAFA and west of Black Forest, south of Monument and north of downtown Colorado Springs, as identified in Figure 5-2 and itemized in Table 5-1. Sites 1 through 6 were selected by PPACG personnel after careful consideration of pertinent USAFA-related sound sources and receiver areas of interest in the surrounding community. Sites 7 through 10 were selected by BRRC personnel, in coordination with PPACG, from a pre-identified set of potential sites near existing USAFA flight paths. A description of each of the ten monitoring locations is provided in Section 5.1 through 5.10 including a discussion of site-specific sound sources and general observations. Each section includes a more detailed site location map and photos of the microphone position, as well as a ranking of observed background sounds on an L_{max} basis and the hourly variation in sound levels measured at the monitoring location. Most overflights observed at the ten monitoring sites could not be definitively attributed to the USAFA, with Site 1 and Site 2 being the exceptions because the entire flight path from the USAFA airstrip is visible from the monitoring locations.

Table 5-1. Adjacent Addresses and GPS Coordinates of Monitored Locations

Site	Location	Latitude	Longitude
1	Donala Water District at 15850 Holbein Dr	39.056127° N	-104.815635° W
2	Adjacent to a Residential Gate at 1112 Mt Estes Dr	39.009392° N	-104.804464° W
3	Off Stanley Canyon Rd near 12441 Mt Baldy Dr	39.011151° N	-104.795926° W
4	Field Near 1020 Old Ranch Rd	38.980489° N	-104.807792° W
5	Mt Ridge Middle School at 9150 Lexington Dr	38.964154° N	-104.775837° W
6	Rampart High School at 8250 Lexington Dr	38.951158° N	-104.772232° W
7	Across from 1050 Garlock Ln down a Rocky Hill	38.920991° N	-104.805437° W
8	Between 2694 and 2671 Rockhurst Blvd	38.899322° N	-104.799106° W
9	Across from 375 Pauma Valley Dr near Open Covering	39.043937° N	-104.821362° W
10	Across from 604 Spectrum Loop inside Pasture Gate	39.024858° N	-104.815118° W

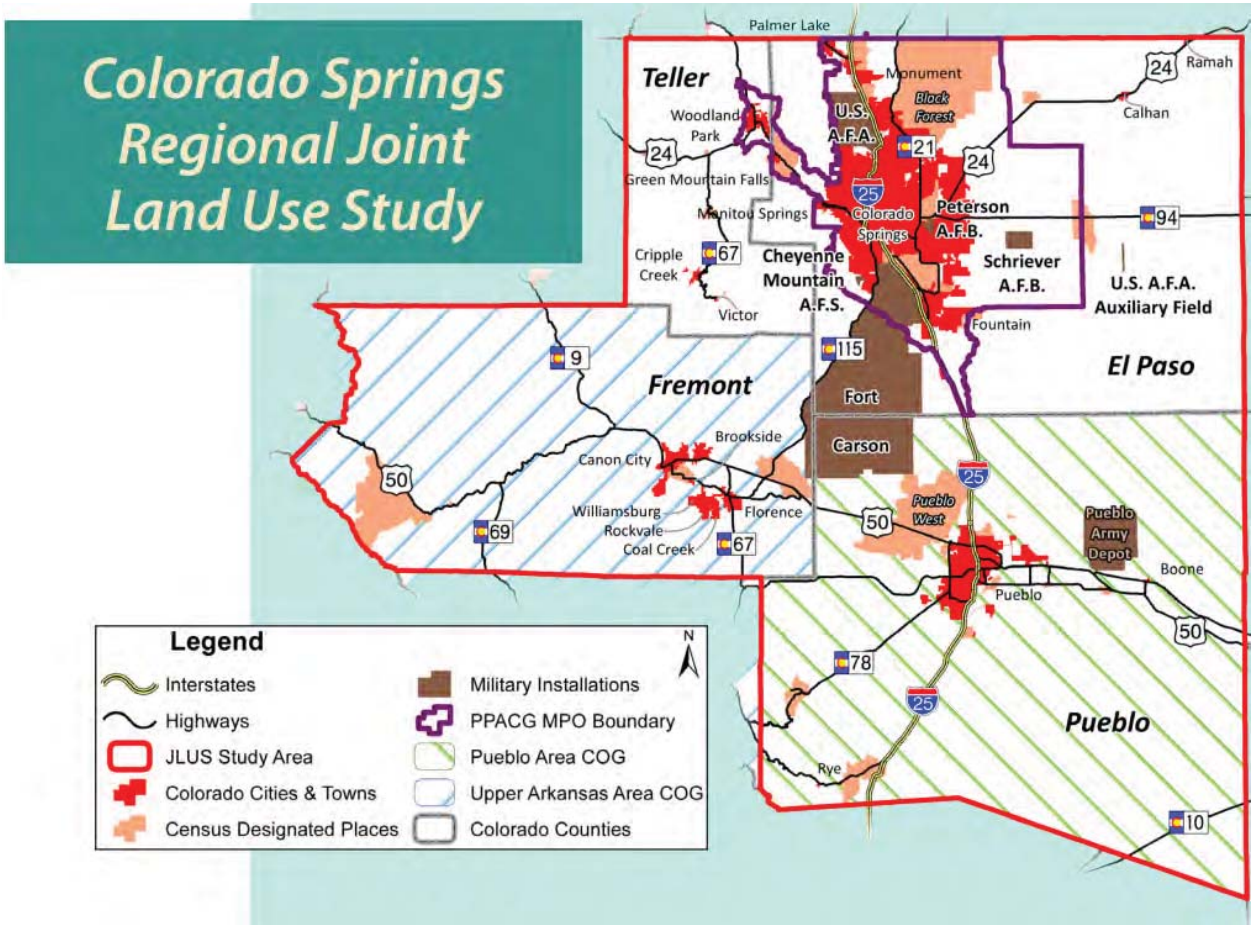

Figure 5-1. Colorado Springs Regional JLUS Project Area (Graphic from PPACG)

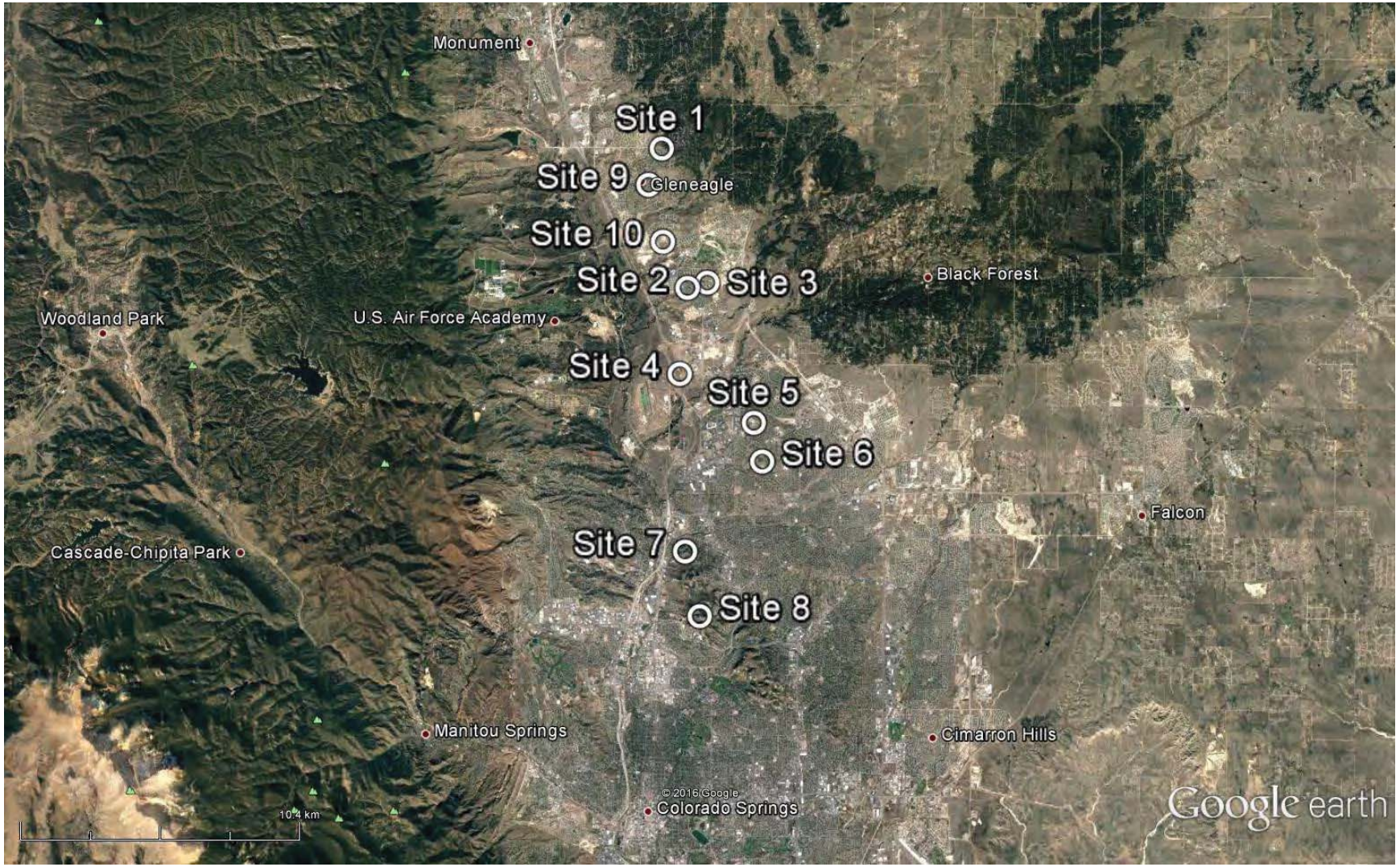

Figure 5-2. Sound Monitoring Locations Adjacent to the USAFA

5.1 Monitoring Site 1 at Donala Water District

The location of the first monitoring site was selected to capture USAFA aircraft sounds emanating from multiple nearby intersecting flight paths during the measurement period (note that USAFA flight paths may have changed since this noise study was completed). The SLM was placed within the front yard of the Donala Water and Sanitation District building at 15850 Holbein Dr in a residential area adjacent to E Baptist Rd (see Figure 5-3 through Figure 5-5). The Site 1 microphone was mounted 5 ft above the ground on a tripod. Although traffic sounds from E Baptist Rd was partially shielded by the utility building, the dominate and regular sound source at Site 1 was typically road sounds from E Baptist Rd. When operating, HVAC sounds internal to the Donala Water and Sanitation District building were a secondary source of sound, followed by wind through nearby vegetation and chirping birds. From the property of the Donala Water and Sanitation District building, BRRC personnel observed propeller planes originating from the USAFA runway and flying toward and over monitoring Site 1 (see Appendix A.3). During periods of direct observation, dominate transient events included direct flyovers of USAFA aircraft and vehicles passing on Holbein Dr. (Note that BRRC's observations do not preclude the possibility that non-USAFA aircraft flew in the vicinity of Site 1 when BRRC personnel were not present.)

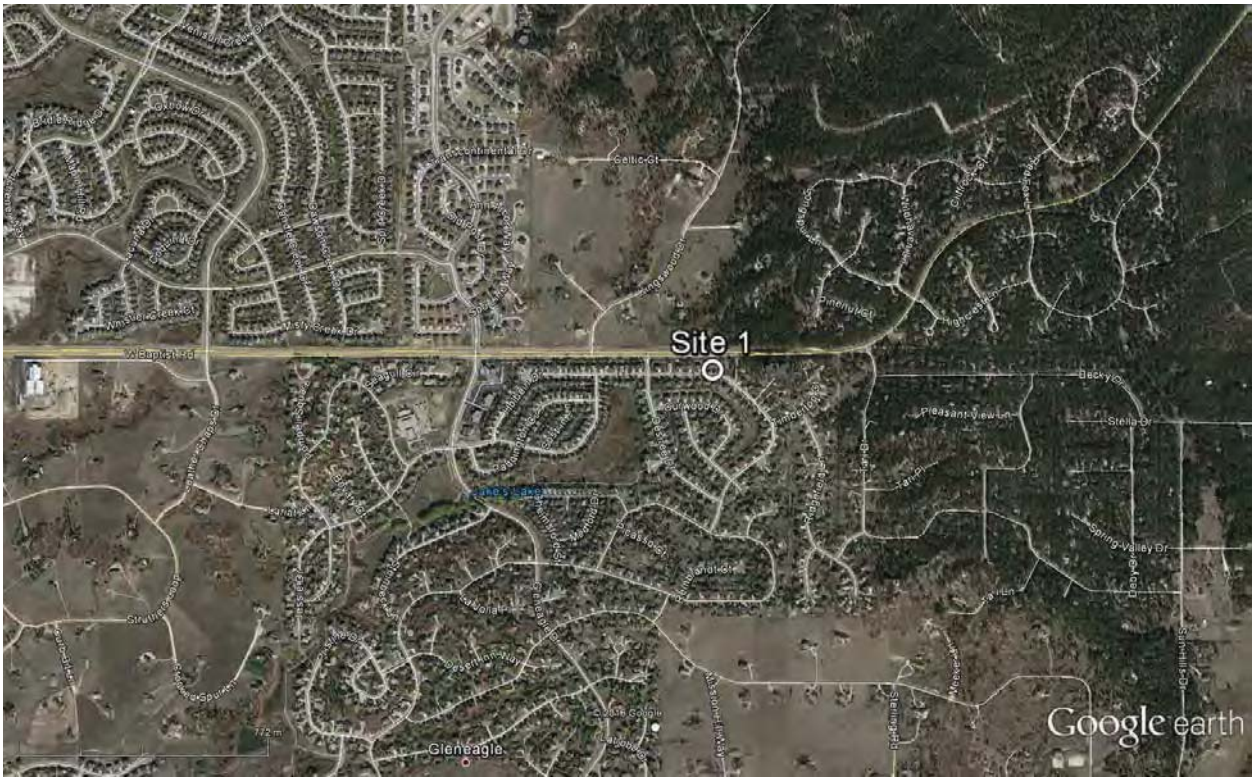

Figure 5-3. Location of Monitoring Site 1

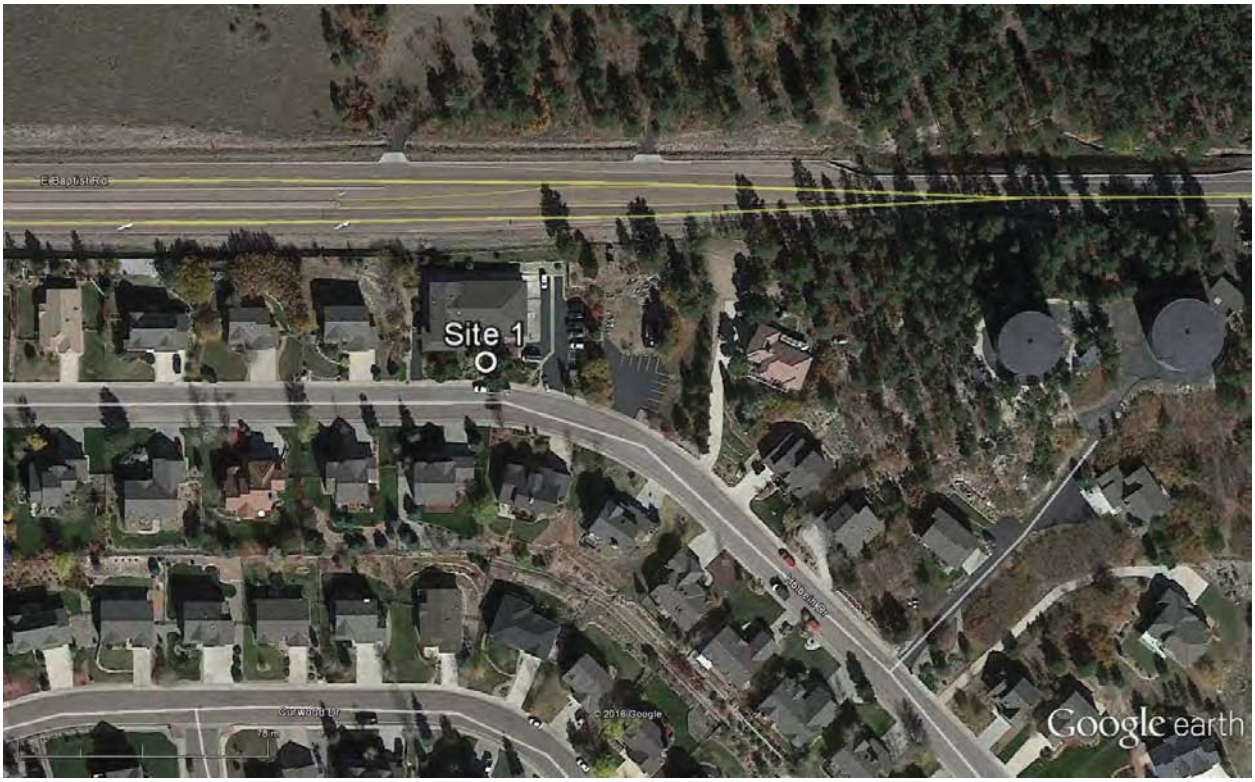

Figure 5-4. Location of Monitoring Site 1 at Donala Water District on 15850 Holbein Dr

Figure 5-5. Position of the Site 1 Microphone Near the Front Entrance of the Donala Water and Sanitation District Building Facing (a) the USAFA, (b) Holbein Dr

Only 4 overflights were observed during the 2.4 hours of observation (after 7 AM, when USAFA flight activity begins, and per Table 5-2), although all four overflights occurred within the 7 AM hour on July 28, 2016. BRRC personnel confirmed that USAFA flight activity did not occur until after 7 AM, based on visual observation of the USAFA airstrip starting at 6:35 AM. Residential and commercial traffic along Holbein Dr and E Baptist Rd were the primary sound sources at Site 1, with overflights comprising rare events ranging from 59.6 to 70.7 dBA; traffic often produced more elevated sound levels than aircraft activity. The maximum sound levels from mid-range aircraft (approximately ½ mile away or more) to distant aircraft (visible but unheard) were surpassed by residential and commercial traffic near Site 1. As shown in Table 5-2, the SLM at Site 1 measured nearly identical L_{max} sound levels for (a) the loudest observed overflight, and (b) a single vehicle passing along Holbein Rd with limited to no traffic along E Baptist Rd.

Table 5-2. Observed Background Sounds at Site 1, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
28-Jul-16	7:05:20	7:06:32	**Overflight**	70.7
27-Jul-16	18:00:25	18:00:45	Jeep passing on Holbein Dr with no/limited traffic on E. Baptist Rd	70.6
28-Jul-16	6:52:25	6:52:45	Two vehicles along Holbein Dr	69.8
28-Jul-16	7:10:02	7:11:50	**Overflight**	68.4
27-Jul-16	17:51:30	17:51:50	SUV passing on Holbein Dr with no/limited traffic on E. Baptist Rd	66.3
27-Jul-16	17:57:50	17:58:10	Truck passing on Holbein Dr with no/limited traffic on E. Baptist Rd	66.1
28-Jul-16	6:42:04	6:43:15	Jeep idling in residential area, car passing on E. Baptist, Jeep passing on Holbein Dr, traffic on E. Baptist	64.1
28-Jul-16	7:46:57	7:47:51	**Overflight** with traffic on Holbein	63.5
28-Jul-16	7:31:32	7:32:21	*Ambient:* traffic on E. Baptist and Holbein Dr and birds	63.3
27-Jul-16	18:23:18	18:24:08	Vehicles passing on Holbein Dr --> 2x vehicles on E. Baptist Rd	63.0
27-Jul-16	18:21:00	18:21:20	Dump truck along E. Baptist Rd	60.3
27-Jul-16	17:43:10	17:43:30	Vehicle passing on Holbein Dr with no/limited traffic on E. Baptist Rd	60.0
28-Jul-16	7:40:26	7:42:02	**Overflight** with traffic on E. Baptist	59.6
28-Jul-16	7:19:41	7:20:34	Donala HVAC with **3x distant aircraft** over USAFA (although not audible)	56.5
28-Jul-16	6:56:50	6:58:10	Traffic along E. Baptist and distant I-25 and other traffic	56.0
28-Jul-16	7:27:24	7:28:37	*Ambient:* traffic on E. Baptist and Donala HVAC, birds, **distant aircraft**	54.3
27-Jul-16	18:29:50	18:30:10	*Note:* No visible/audible flight activity during the Wednesday Coverage Period	54.1
27-Jul-16	17:23:50	17:24:10	Car passing along Holbein Dr	53.0
28-Jul-16	7:03:50	7:04:10	*Note:* First **plane visible** over the USAFA area	52.1
27-Jul-16	17:20:00	17:21:00	*Ambient:* Donala internal HVAC and E. Baptist Rd traffic and birds	50.9
29-Jul-16	15:42:49	15:43:49	*Ambient:* **mid-range aircraft** (unseen), E. Baptist traffic, wind	50.5
27-Jul-16	18:04:50	18:05:10	Vehicles along E. Baptist Rd, with none on Holbein Dr	50.4
27-Jul-16	17:22:10	17:22:30	*Low Ambient:* No E. Baptist Rd traffic and Donala HVAC	49.3
28-Jul-16	6:53:20	6:53:40	*Ambient:* Birds, and no nearby vehicles on Holbein or Baptist (distant I-25 and other traffic)	48.2
27-Jul-16	18:29:00	18:29:20	*Ambient: N* o traffic on Holbein or E. Baptist	47.7
27-Jul-16	18:08:25	18:08:45	Birds are the dominate noise source, then distant traffic	41.7

The two loudest overflights observed at Site 1 (see Table 5-2) had sound levels that reached 70.7 and 68.4 dBA for at least 1 second (but no higher than these stated sound levels). Based on Figure 5-6 for Site 1, at no time during the day did a cumulative 36 seconds of activity during any hour yield sound levels that reached 68.4 dBA. For a single sound source to determine the L_{10} sound level, the duration of the sound source would need to extend to at least 6 minutes *and* be louder than other area sound sources. The lowest of the 1-second L_{max} values listed in Table 5-2 for the four observed Site 1 overflights is 59.6 dBA, which is above the 55.6 dBA value for the L_{10} during the 7 to 8 AM hour in Figure 5-6 when all four overflights occurred. Hence, the L_{max} values from all observed overflights at Site 1 did not determine the hourly L_{10} value; the hourly L_{10} value during the 7 AM hour, and at all other hours, is likely determined by traffic along Holbein Dr and E Baptist Rd. The L_{50} and L_{90} from 7 AM to 7 PM (corresponding to 19 on chart) are also likely determined by residential and commercial vehicular activity, given the regular traffic along E Baptist Rd, specifically. The L_{99} at Site 1 and all other sites is comprised of the quietest 36 seconds within each hour and, with the exception of Site 4 along I-25, the L_{99} is unlikely to include any nearby passing vehicles on adjacent roads. The L_{01} values are provided to offer additional context for the variable sound levels during each hour at each monitoring site, and additional analysis of the most elevated sound levels for each site is encompassed in the exceedance analysis is Section 6.

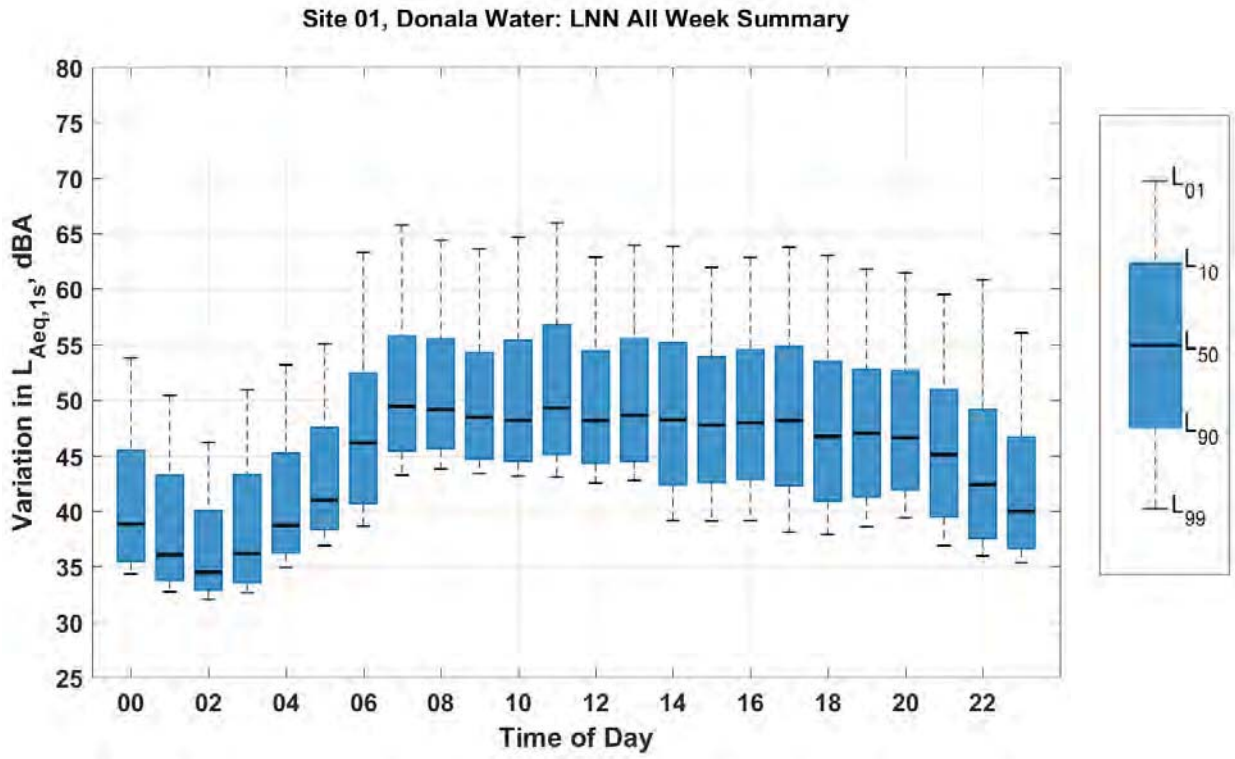

Figure 5-6. Variation in the Hourly Sound Level at Site 1

5.2 Monitoring Site 2 at 1112 Mt Estes Dr

The SLM for Site 2 was placed in a field adjacent to the property line fence of 1112 Mt Estes Dr near Voyager Parkway (see Figure 5-7 through Figure 5-9). Commercial traffic sounds along Voyager Parkway were the most frequent dominate source of sound received at Site 2, followed distantly by wind through nearby vegetation and chirping birds. Observed transient events included USAFA overflights as well as rare traffic in the Mt Estes Dr cul-de-sac, leaf blowers along Voyager Parkway, and sporadic residential hammering and sawing at 1112 Mt Estes Dr. The presence of USAFA overhead flight activity was inferred based on the following observations: (1) the aircraft were observed as originating from or reentering USAFA airspace, and (2) the aircraft were individual propeller planes or propeller planes followed by gliders. However, as previously noted, non-USAFA aircraft may have flown in the vicinity of Site 2 when BRRC observers were not present.

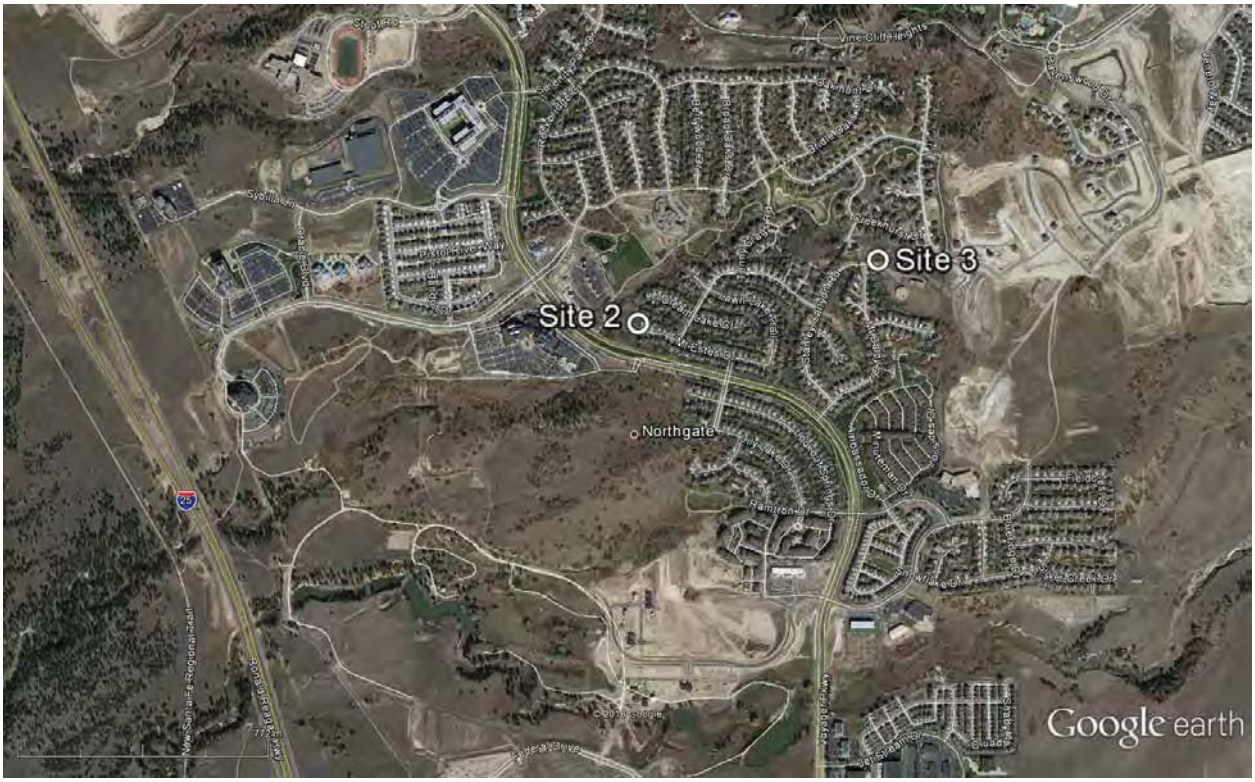

Figure 5-7. Location of Site 2

Figure 5-8. Location of Monitoring Site 2 near Voyager Parkway and 1112 Mt Estes Dr

Figure 5-9. Position of the Site 2 Microphone Facing (a) 1112 Mt Estes Dr, (b) Voyager Parkway

Five overflight events were observed within 2.2 hours of observations by BRRC personnel (see Table 5-3), all of which occurred between 11:03 AM and 11:24 AM on July 28, 2016. The 5 overflights occurred in quick succession, but these were the only overflights observed, for an overall average rate of 2.3 overflights per observed-hour.

Table 5-3. Observed Background Sounds at Site 2, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
28-Jul-16	11:16:00	11:17:19	**Overflight** and turning toward USAFA	65.2
28-Jul-16	11:22:43	11:23:42	**Overflight** performing a turn, Voyage Parkway traffic, birds, resident hammering	64.3
28-Jul-16	11:21:10	11:21:54	**Overflight**, traffic, birds	64.0
28-Jul-16	11:02:58	11:04:06	**Flight** along Voyager and turning toward USAFA	63.9
28-Jul-16	11:19:53	11:20:43	Resident sawing in immediate vicinity, **approximate overflight**, train whistle, traffic on Voyager Parkway, birds	61.6
26-Jul-16	15:22:12	15:23:16	Limited traffic along Voyager Parkway	60.0
26-Jul-16	15:00:59	15:01:37	2nd leaf blower along Voyager Parkway with 1st blower now distant from Site 2	59.6
29-Jul-16	16:57:52	16:59:30	Residents talking, Voyager Parkway traffic, train horn, no visible flights	59.6
26-Jul-16	15:44:32	15:45:43	Heavier traffic along Voyage Parkway	58.3
26-Jul-16	15:49:10	15:50:23	Medium traffic along Voyage Parkway	57.9
26-Jul-16	14:59:20	14:59:40	Leaf blower along Voyager Parkway	57.2
26-Jul-16	15:05:50	15:06:10	*Ambient:* traffic along Voyager Parkway (no leaf blower)	56.0
28-Jul-16	10:38:27	10:39:53	*Ambient:* traffic along Voyage Parkway and **distant aircraft** over USAFA	56.0
28-Jul-16	11:00:49	11:01:23	End of a low/landing flight turning from Voyage Parkway into USAFA	55.1
26-Jul-16	15:33:44	15:34:33	Traffic along Voyage Parkway	55.1
28-Jul-16	10:40:10	10:42:24	*Ambient:* traffic along Voyage Parkway and **distant aircraft** over USAFA	54.4
26-Jul-16	15:53:50	15:54:10	Limited traffic	52.2
26-Jul-16	15:58:50	15:59:10	*Note:* Rare traffic in Mt Estes Dr cul-de-sac	52.2
26-Jul-16	15:58:50	15:59:10	*Note:* No visible/audible overflights during the Tuesday Coverage Period	52.2

Site 2 had the lowest maximum L_{max} value (65.2 dBA) associated with an overflight of all ten monitoring sites. All observed overflights at Site 2 corresponded with L_{max} values that are equivalent to two people conversing at 1 meter, and since the L_{max} is only the loudest 1 second, the overflights were quieter during the majority of their time in the vicinity of Site 2. Although the L_{max} values are relatively low, they still exceeded the hourly L_{10} values at any time during the day, including the approximate overflight at 11:20 AM on July 28, 2016 that is associated with an L_{max} of 61.6 dBA.

The diurnal pattern at Site 2 is likely due to traffic along Voyager Parkway, and the L_{01} values are likely the result of hammering and other light construction activities that occurred in the driveway immediately adjacent to the SLM at 1112 Mt Estes Dr.

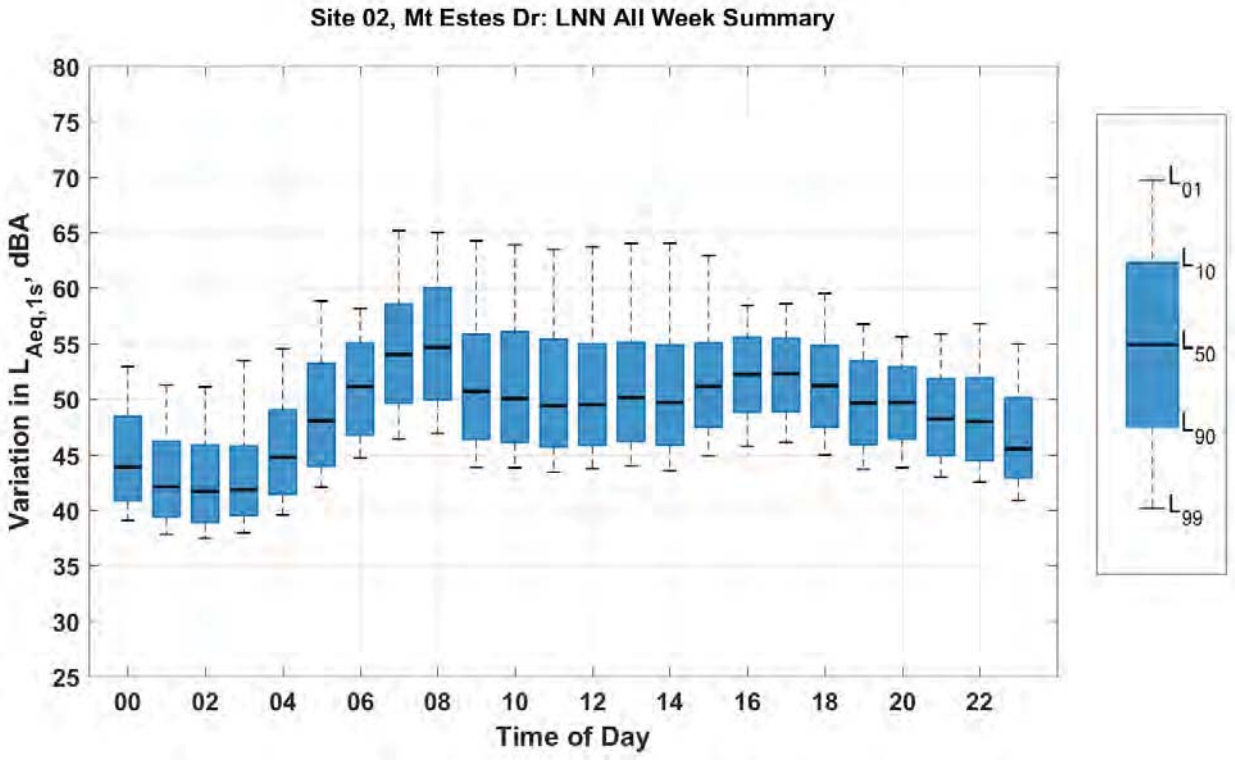

Figure 5-10. Variation in the Hourly Sound Level at Site 2

5.3 Monitoring Site 3 Near Northgate Reservoir

The SLM tripod for Site 3 was chained to a fence parallel to Stanley Canyon Rd across from 12441 Mt Baldy Rd, near the entrance to the Northgate Reservoir and Pumping Station (see Figure 5-11 through Figure 5-13). Site 3 was in the vicinity of multiple USAFA flight paths during the measurement period. When present, aircraft dominate the sound environment at Site 3, followed by rare traffic turning from Mt Baldy Dr to Stanley Canyon Rd. The ambient environment during the observed monitoring period consisted of residential activity, such as audible music and gas powered grass trimmers, as well as birds and insects chirping, dogs barking, children playing, and light wind through nearby vegetation. Sound originating from the Northgate Reservoir and Pumping Station was not observed while BRRC personnel were present.

Figure 5-11. Location of Site 3 Near Northgate Reservoir and Pumping Station

Figure 5-12. Location of Monitoring Site 3 Off Stanley Canyon Rd near 12441 Mt Baldy Dr

Figure 5-13. Position of Site 3 Microphone Facing (a) Creekhurst Dr Houses, (b) 12441 Mt Baldy Dr

Only two overflights are presented in Table 5-4, although a total of seven overflights were observed. The differential is due to the additional flight activity logged during standard maintenance performed on the Site 3 SLM during which WAV files were recorded (to capture audio examples of onsite sound experiences). Like Site 3, all seven overflights occurred in rapid succession, in this case over the 22-minute period from 11:47 AM to 12:09 PM on July 28, 2016. Outside this period, only a single distant aircraft was observed on July 26, and one mid-range flight approximately two-minutes prior to the seven overflights.

Table 5-4. Observed Background Sounds at Site 3, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
28-Jul-16	11:46:51	11:49:29	**Overflight** turning over Northgate R. and over Site 3, 360° then 270° turn	66.7
28-Jul-16	12:07:52	12:09:11	**Flight transit** from near-overhead then departure	61.6
26-Jul-16	16:52:50	16:53:10	Bird chirps	59.2
28-Jul-16	11:44:41	11:45:49	**Mid-range flight** ~0.5-miles away --> Ambient	56.6
28-Jul-16	11:43:20	11:43:40	*Ambient :* Residential music and bird calls	54.9
26-Jul-16	16:42:00	16:42:20	Car turning from Stanley Canyon	52.6
26-Jul-16	16:40:45	16:41:05	Dogs barking	51.9
26-Jul-16	16:49:11	16:51:06	**Distant aircraft** and bird chirps (brief 50 dB)	51.4
29-Jul-16	17:19:43	17:21:32	*Ambient:* Residential construction, residents talking, birds, insects, light wind, dogs, kids playing	51.3
26-Jul-16	16:47:55	16:48:15	Birds chirping nearby	51.0
26-Jul-16	16:45:20	16:45:40	USAFA Revelry Horn	48.5
26-Jul-16	16:46:35	16:46:55	National Anthem played on USAFA speakers	44.1
26-Jul-16	16:34:22	16:35:20	*Ambient:* birds and residential hammering	42.8
26-Jul-16	16:10:20	16:10:40	*Ambient :* distant residential weed-whacking, hammering, birds, ducks	42.0
26-Jul-16	16:59:50	17:00:10	*Note:* No overflights during the Tuesday Coverage Period	41.6
26-Jul-16	16:46:05	16:46:25	*Ambient:* with no wind and few birds	40.2

Aircraft overflights may be driving the L_{01} values from 7 AM to 2 PM at Site 3 (the exceedance analysis in Section 6 provides greater clarification for non-observed overflights). Natural sounds such as bird calls are likely responsible for the L_{10} values, followed by light residential activity in relation to the L_{50}. Site 3 is situated in a quiet urban environment and aircraft activity will therefore tend to be more noticeable, even though the overall, brief sound levels produced by the aircraft are not discernably louder than a typical conversation at a distance of one meter.

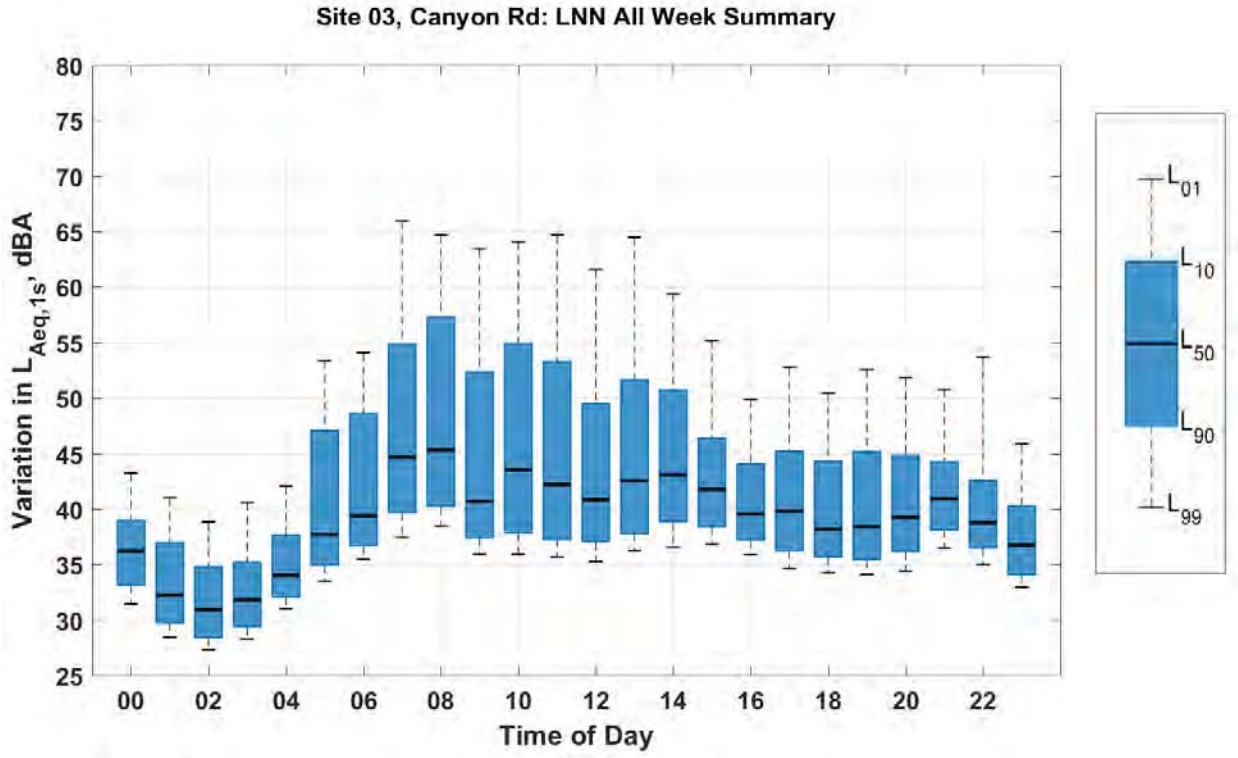

Figure 5-14. Variation in the Hourly Sound Level at Site 3

5.4 Monitoring Site 4 Near 1020 Old Ranch Rd

The SLM for Site 4 was placed at the fence of the USAFA boundary at the end of Old Ranch Rd (see Figure 5-15 through Figure 5-17). Due to the close proximity and regularity, traffic along I-25 and USAFA flight activity were observed as dominating the sound environment at Site 4. The elevated sound level at Site 4 limited the presence of prominent transient events to aircraft activity directly above Site 4 (i.e. other flight activity approximates sounds from traffic). However, the USAFA propeller planes produce a 100 Hz tone that is detectable even without direct overflights; this frequency is distinctive against the more broadband traffic sounds. Vehicles turning from Old Ranch Rd onto Montezuma Rd were rare, and no audible activity was observed from the adjacent Kettle Creek Lift Station at 1020 Old Ranch Rd.

Figure 5-15. Location of Site 4 Near I-25 and the USAFA Airfield

Figure 5-16. Location of Monitoring Site 4 in a Field near 1020 Old Ranch Rd and I-25

Figure 5-17. Position of the Site 4 Microphone Facing (a) Northeast (b) USAFA and I-25

Although Site 4 is across from the USAFA airfield, heavy traffic along I-25 regularly dominates the soundscape. Numerous takeoffs and landings were visible from Site 4, as well as general distant aircraft activity over the USAFA area, but only 3 overflights were observed over a 1.5-hour period, or two overflights per hour. Here also, the overflights occurred in close temporal proximity: over just a 13-minute period. As the later exceedance analysis will demonstrate, the observation logs in Table 5-5 that appear to indicate a substantial aircraft contribution to the soundscape are actually dominated by traffic sounds. That is, the characteristic 100 Hz tones (with Doppler shift) are rarely apparent over the continuous traffic along I-25. The logged observations are less meaningful at Site 4 because traffic sounds are so elevated and continuous; the L_{max} values associated with observed flight activity are likely just coincidental to the actual source of the L_{max} values: traffic.

Table 5-5. Observed Background Sounds at Site 4, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
28-Jul-16	12:39:43	12:40:52	**Overflight**	68.9
28-Jul-16	12:27:09	12:38:05	**Plane** taking off with **2x aircraft** landing at USAFA airfield	68.0
26-Jul-16	17:14:40	17:15:40	*Ambient:* traffic along I-25 dominates, **2x distant aircraft**	65.9
29-Jul-16	12:42:44	12:45:13	I-25 traffic (no flight activity visible)	65.5
26-Jul-16	17:39:40	17:40:40	**5x aircraft** over USAFA area (not overflights)	64.3
26-Jul-16	17:57:55	17:59:17	**2x aircraft** taking off and 1x aircraft landing at USAFA	63.7
26-Jul-16	17:49:35	17:51:52	**4x aircraft** over USAFA area (3x coming in and landing)	63.7
28-Jul-16	12:34:53	12:35:38	**2x aircraft** taking off from USAFA airfield with continuous I-25 traffic	62.5
26-Jul-16	17:17:00	17:17:20	*Ambient:* traffic without planes (and lighter traffic)	61.6
28-Jul-16	12:50:54	12:52:37	**Flight** over I-25 with a turn near Site 4 --> **overflight**	58.2
28-Jul-16	12:47:03	12:49:04	180° flight turn around Site 4 --> I-25 traffic --> **flight**	57.8
28-Jul-16	12:56:16	12:57:42	I-25 traffic (no flight activity visible)	54.8

Figure 5-18 displays a classic heavy traffic pattern with "rush-hour" sound levels increasing and decreasing from 4 AM to 9 AM and again from 4 PM to 9 PM, with depressed sound levels in between 9 AM and 4 PM, and a standard diurnal pattern delineated from 9 PM to 4 AM. Although the regularity of USAFA aircraft activity is highest at Site 4 due to the proximity of the USAFA airfield, I-25 is closer to Site 4 and remains the dominate sound-generating source, driving the variability of the hourly sound levels at Site 4.

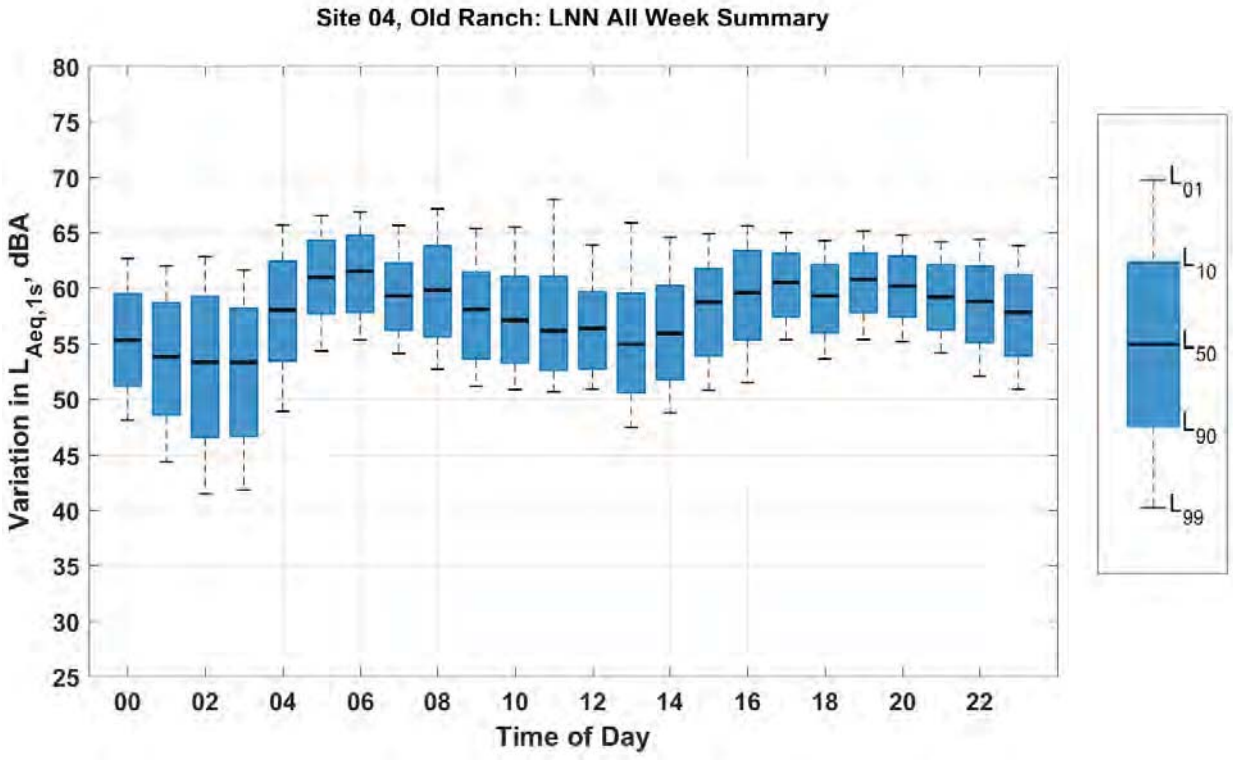

Figure 5-18. Variation in the Hourly Sound Level at Site 4

5.5 Monitoring Site 5 at Mt Ridge Middle School

SLM 5 was chained to a wooden pole between the Mt Ridge Middle School building and the running track on 9150 Lexington Dr (see Figure 5-19 through Figure 5-21). The microphone location was selected such that it was set back from traffic sounds on Lexington and Dynamic Dr. The track was sparsely used during the observation periods, and vehicles passing along the south side of the Mt Ridge Middle School building below the Site 5 position were rare. Commercial and residential traffic still dominated the sound environment at Site 5, followed by wind in the adjacent trees, birds chirping, and joggers talking. Transient events included propeller plane overflights, gas power grass trimmers within 100 ft of SLM 5, and residential lawn mowers. The Middle School parking lot remained mostly empty (typically consisting of two vehicles or less).

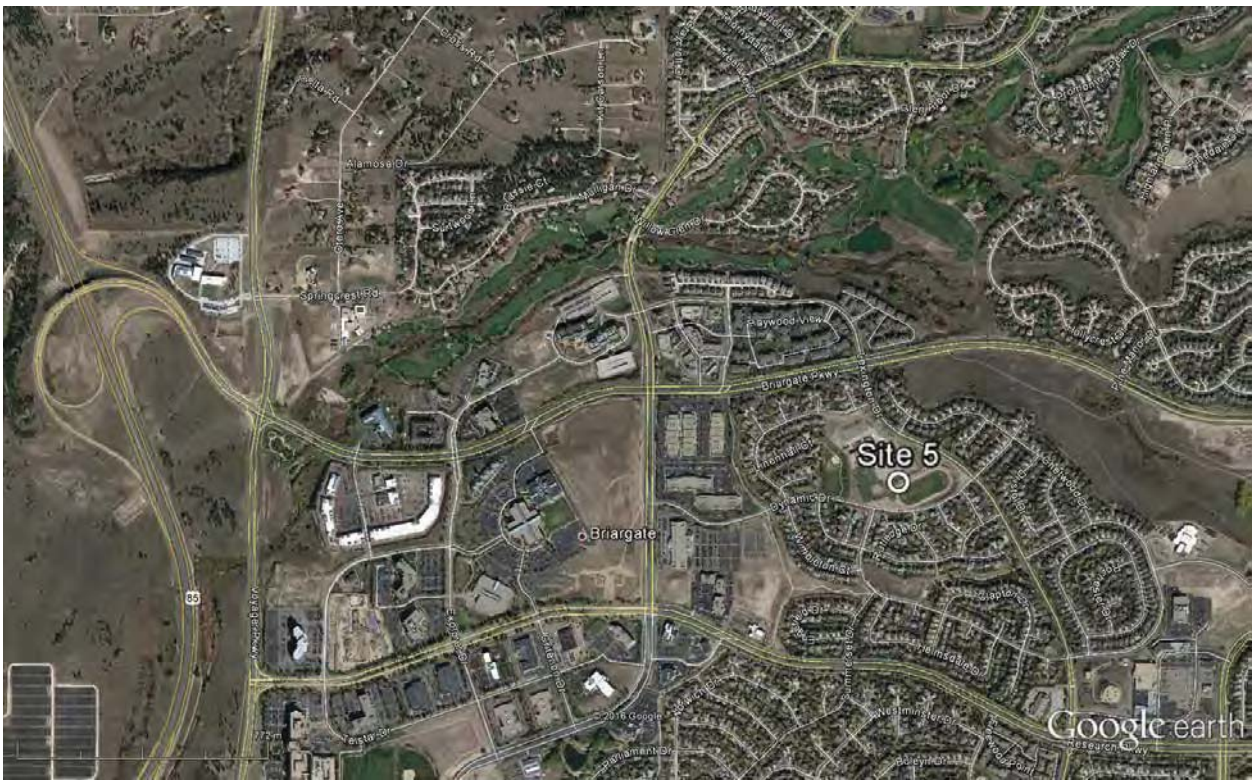

Figure 5-19. Location of Site 5 at Mt Ridge Middle School

Figure 5-20. Location of Monitoring Site 5 at Mt Ridge Middle School on 9150 Lexington Dr

Figure 5-21. Position of the Site 5 Microphone Facing (a) Mt Ridge Middle School Building, (b) Track and Houses Along Dynamic Dr

The SLM at Site 5 was set away from the adjacent roads to better capture flight activity during periods outside direct observations, and additional detail is provided in Section 6. When present, overflights are the loudest common sound source at Site 5 based on 1.6 hours of observations and ten overflights. Every observed overflight occurred between 1:25 PM and 2 PM on July 28, 2016.

Table 5-6. Observed Background Sounds at Site 5, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
28-Jul-16	13:55:08	13:55:59	Weed-whacker ~30 feet from Site 5	70.2
28-Jul-16	13:26:59	13:28:36	**Overflight** then 180° turn	65.8
28-Jul-16	13:34:55	13:37:11	**Overflight** with 90° turn --> MS lawn mower loading into truck	64.9
28-Jul-16	13:47:02	13:48:53	Middle School weed-whacker and residential lawn mower --> **overflight**	63.8
28-Jul-16	13:49:34	13:51:15	**Overflight** --> 2nd **overflight** with weed-whacker/lawn mower throughout	63.6
28-Jul-16	13:24:30	13:25:30	**Overflight** and then a turn ~0.5-mile from Mt Ridge Middle School	63.3
28-Jul-16	13:31:34	13:32:35	**Overflight** then 180° turn over Middle School	62.4
28-Jul-16	13:56:50	13:57:35	Weed-whacker ~100 feet away and **overflight**	61.2
28-Jul-16	13:29:22	13:30:48	**Overflight** then 90° turn long past Middle School	61.1
28-Jul-16	13:58:22	13:59:40	**Overflight** and turn	61.0
28-Jul-16	13:52:03	13:52:47	**Flight** turning ~0.3 miles from Mt Ridge Middle School with no weed-whacker activity, but continued lawn mower noise	58.2
26-Jul-16	18:21:50	18:22:10	*Ambient:* Limited traffic on Lexington, wind, talking on nearby track	50.5
26-Jul-16	18:46:00	18:46:47	Traffic along Dynamic Dr toward Lexington	50.0
26-Jul-16	18:43:40	18:44:00	Cars passing on Lexington	48.6
26-Jul-16	18:51:59	18:52:38	5x cars along Lexington	47.3
26-Jul-16	18:50:25	18:51:25	**Distant flight** over USAFA and few cars	44.3
26-Jul-16	18:44:00	18:44:20	*Ambient:* Birds and distant traffic	42.5

Traffic along Dynamic Dr and Lexington is not steady yet vehicle activity occurs with sufficient regularity to likely drive the L_{10} and L_{50} values in Figure 5-22, based on the observation periods. The origin of the spike in the L_{01} at 2 AM and 8 PM are unknown but likely unrelated to aircraft (given their occurrence outside 7 AM to 7 PM), the same is likely true for the uncharacteristic L_{01} spike after 1 PM. Flight activity is likely determining the L_{01} values between 7 AM and 1 PM.

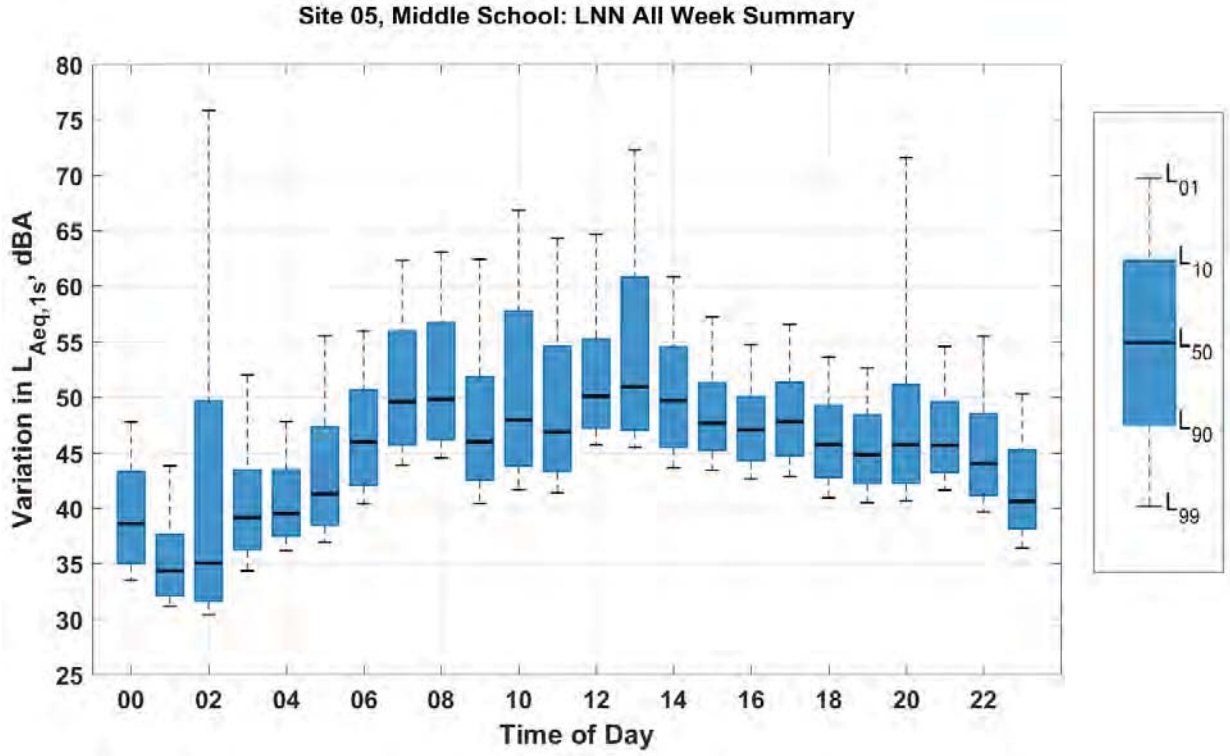

Figure 5-22. Variation in the Hourly Sound Level at Site 5

5.6 Monitoring Site 6 at Rampart High School

Site 6 was located inside a secured fence within the grounds of Rampart High School (HS) on 8250 Lexington Dr (see Figure 5-23 through Figure 5-25). Maintenance and construction were present on nearby HS tennis courts as well as next to the north side of the HS building, and heavier construction occurred on the opposite side of the parking lot. Propeller plane and helicopter overflights would briefly dominate the construction sounds, with other unique area sounds including HS marching band practice (notably a loud metronome), HS football practice, HS leaf blowers and lawn mowers, and cars squealing in the parking lot. Ambient sounds included residential dogs barking, traffic along Lexington Dr, elevated winds through the nearby trees and fence, and students talking.

Figure 5-23. Location of Site 6 at Rampart High School

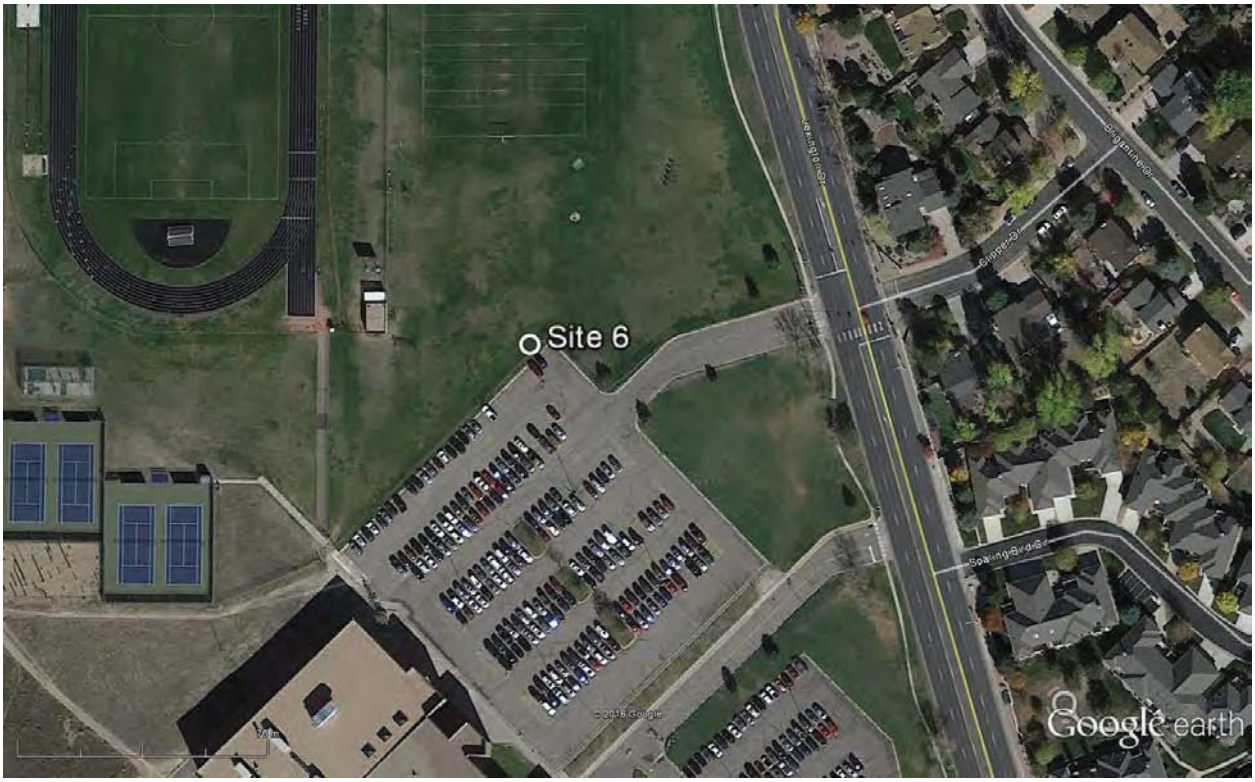

Figure 5-24. Location of Monitoring Site 6 at Rampart High School on 8250 Lexington Dr

Figure 5-25. Position of the Site 6 Microphone Facing (a) Rampart High School Parking Lot Entrance, (b) Tennis Courts

Like Site 5, the SLM at Site 6 was positioned away from major known sound sources (e.g. traffic along Lexington, and construction at the HS tennis courts and across the parking lot) to enhance later algorithmic identification of flight activity (see Section 6). Ten overflights were observed in a 1.6-hour period. In contrast to all other sites, the overflights at Site 6 were observed across all three observational days. Note that Site 6 was also used as a confirmatory location for verifying that USAFA aircraft activity did not occur until after 7 AM.

Table 5-7. Observed Background Sounds at Site 6, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
29-Jul-16	11:48:01	11:49:26	**Overflight** plus Lexington traffic	74.6
28-Jul-16	14:24:03	14:25:52	**Overflight** with a 360° turn over the HS (and high winds)	69.8
27-Jul-16	7:47:50	7:48:51	**Overflight** --> loud HS construction noise	68.4
27-Jul-16	7:45:20	7:46:10	**Overflight**	67.4
27-Jul-16	7:50:30	7:56:30	**2x overflights**	66.9
28-Jul-16	14:21:43	14:23:22	**Helicopter** (~1 mile away) --> high winds --> **overflight** followed by a turn	65.2
28-Jul-16	14:29:49	14:30:33	**Overflight** and turn, plus HS band metronome beat	63.5
29-Jul-16	11:45:45	11:47:11	**Overflight** with a turn over HS, plus a car entering the HS parking lot	62.3
27-Jul-16	7:28:20	7:28:40	Car squealing in HS parking lot	62.3
27-Jul-16	7:46:35	7:46:55	HS construction noise	61.5
27-Jul-16	7:37:59	7:39:20	**Overflight** and cars along Lexington	59.7
27-Jul-16	6:56:00	6:57:00	*Ambient:* construction and cars arriving into HS parking lot	58.3
27-Jul-16	6:50:03	6:51:03	**2x chinook helicopters** --> HS leaf blower	58.1
27-Jul-16	7:39:50	7:40:10	*Note:* Propeller planes regularly visible over USAFA	57.7
28-Jul-16	14:38:03	14:38:56	*Ambient:* High winds in trees, Lexington traffic, HS tennis court maintenance	56.9
27-Jul-16	7:44:00	7:45:00	*Ambient:* vehicles along Lexington dominate soundscape	56.6
27-Jul-16	7:33:39	7:34:28	**Distant flight** and distant train whistle with cars along Lexington	54.7
28-Jul-16	14:40:04	14:40:40	**Flight** ~1 mile from HS	54.2
27-Jul-16	6:45:57	6:47:03	Construction activity beginning at HS with cars along Lexington	54.1
27-Jul-16	7:05:50	7:06:10	*Note:* No visible or audible USAFA aircraft yet	53.6
27-Jul-16	6:36:55	6:37:30	*Ambient:* Cars along Lexington and in the HS parking lot (dog barking)	52.2
27-Jul-16	7:31:50	7:32:10	*Low Ambient:* no nearby vehicles	51.5
27-Jul-16	7:29:45	7:30:00	*Ambient:* Traffic along Lexington and limited HS construction noise	51.2
27-Jul-16	6:39:45	6:40:05	*Low Ambient:* No nearby traveling vehicles	50.5
27-Jul-16	7:11:00	7:12:00	*Note:* 1st **distant** USAFA propeller plane	47.5
27-Jul-16	6:59:20	6:59:40	*Low Ambient:* Distant HS leaf blower and no cars along Lexington	46.0

The most elevated L_{max} value of 74.6 dBA was associated with an observed overflight from all monitoring sites occurred at Site 6 at 11:48 AM on July 29, 2016, although this value was atypical. The maximum 1-second sound level for all other observed overflights ranged from 59.7 to 69.8 dBA at Site 6 and thus, the 74.6 dBA L_{max} is likely the ombination of sounds occurring in the area. The steep incline in sound levels from 5 AM through the 7 AM hour is likely associated with high school activities and associated traffic, as well as construction at the high school.

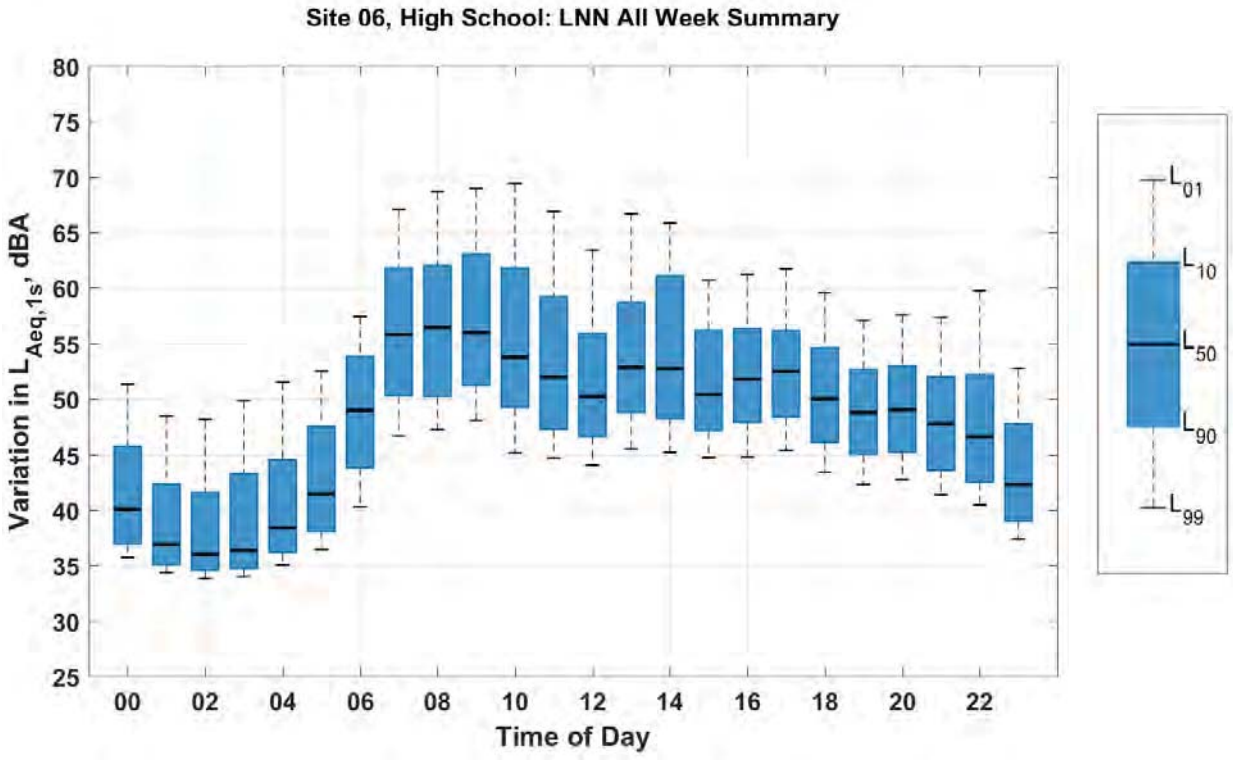

Figure 5-26. Variation in the Hourly Sound Level at Site 6

5.7 Monitoring Site 7 Across from 1050 Garlock Ln

Site 7 is located on a rocky hillside across from 1050 Garlock Ln (see Figure 5-27 through Figure 5-29). Ambient sound sources included distant traffic, primarily from I-25, and distant aircraft, as well as birds chirping and wind in the adjacent hillside trees. During the morning of July 27, residential construction was observed at 1120 Garlock Ln involving a forklift and crushed concrete. This activity occurred in a driveway 120 to 150 meters from the position of SLM 7, based on a Google Earth distance estimation, and the construction sounds dominated the sound environment when present. Residential construction activity was not observed during the following monitoring days. Transient events included overhead and mid-range aircraft activity. Vehicles along Garlock Ln were rare.

Figure 5-27. Location of Site 7 near I-25

Figure 5-28. Location of Monitoring Site 7 Across from 1050 Garlock Dr and near Residential Construction Activity on July 27

Figure 5-29. Position of the Site 7 Microphone Facing (a) a Rocky Embankment Across from 1050 Garlock Dr, (b) North

As shown in Table 5-8, seven overflights were observed at Site 7, primarily on July 27, 2016 but not in rapid succession. Given the 3-hour observational period, there were only 2.4 overflights observed per hour. Site 7 is located on a hill with an expansive northward view that enabled numerous mid-range and distant aircraft to be logged; however, the mid-range and distant aircraft are likely not the determinate of the associated L_{max} based on the broad range of L_{max} values present during these non-overflight aircraft activities. Instead, the residential forklift activity was likely producing the L_{max} values.

Table 5-8. Observed Background Sounds at Site 7, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
27-Jul-16	10:14:47	10:15:49	**Low overflight** with forklift, birds, I-25	74.0
27-Jul-16	10:04:45	10:07:50	**Low overflight** with forklift, birds, I-25	72.1
29-Jul-16	11:11:10	11:16:02	**2x overflights** conducting slow turns over Site 7 --> **high jet liner** --> **mid-range flight** turn ~2-mile away	65.1
27-Jul-16	8:50:40	8:52:17	**Mid-range flyover** with residential construction saw, birds, I-25	63.9
27-Jul-16	9:52:14	9:53:28	**Overflight** with residential forklift, birds, I-25	62.5
27-Jul-16	10:12:25	10:13:25	**Low overflight** with forklift, birds, I-25	61.3
27-Jul-16	8:34:13	8:35:20	*Ambient:* Residential forklift noise dominates, followed by I-25	61.2
27-Jul-16	8:53:28	8:55:55	**Overflight** with low residential construction noise plus I-25	60.6
27-Jul-16	9:51:00	9:51:30	Residential forklift plus I-25 with **mid-range flights**	60.3
27-Jul-16	8:43:00	8:44:00	*Ambient:* No mid-range flight activity (**distant aircraft**)	59.3
27-Jul-16	8:31:00	8:32:00	*Ambient:* Residential construction activity at 1120 Garlock Ln (~200 yard by road, and ~100 yards direct), and distant I-25 traffic ongoing	58.9
27-Jul-16	10:22:28	10:23:39	No audible flights (visible in far-field, **distant aircraft**) with forklift, I-25	57.8
27-Jul-16	9:37:30	9:38:44	Residential forklift plus I-25 with no audible flights (**distant aircraft**)	56.8
29-Jul-16	11:00:39	11:02:41	**4x distant aircraft** with 1x turning within 2x miles	56.5
27-Jul-16	10:11:45	10:12:05	*Ambient:* Without forklift, but with birds, I-25	56.2
27-Jul-16	9:15:15	9:15:45	Residential forklift and **distant flight** plus I-25	55.9
27-Jul-16	8:44:13	8:46:04	**Mid-range flight** with residential construction & birds --> 2nd **mid-range flight**	55.6
27-Jul-16	8:41:30	8:42:30	**Distant aircraft** around USAFA, plus construction activity & I-25	55.3
28-Jul-16	15:45:20	15:45:40	*Ambient:* Medium wind plus I-25	54.3
27-Jul-16	9:35:30	9:36:00	Continued residential forklift and **distant flight** plus I-25	53.9
28-Jul-16	15:27:06	15:27:56	*Ambient:* Medium wind in vegetation, and I-25 traffic	53.5
28-Jul-16	15:37:18	15:38:13	**Distant aircraft** heard but not seen, plus I-25	52.9
28-Jul-16	15:48:46	15:49:58	*Ambient:* No planes visible over USAFA	52.1
27-Jul-16	8:55:50	8:56:10	*Ambient:* No mid-range flights and idling residential forklift plus I-25	51.3
27-Jul-16	10:26:20	10:26:40	Birds, talking, I-25 (no forklift noise)	48.9

Based on the observed activity at Site 7, including the rarity of overflights, the residential forklift that was operating 120 to 150 meters away from the SLM was likely driving the L_{01} and most L_{10} values between 8 AM and 12 PM. Measured L_{max} values for non-construction, non-aircraft sounds from 10 AM to 4 PM were 48.9 to 56.2 dBA. These mid-day ambient sounds are determining the L_{50} and some L_{10} values during the aircraft operational period of 7 AM to 7 PM.

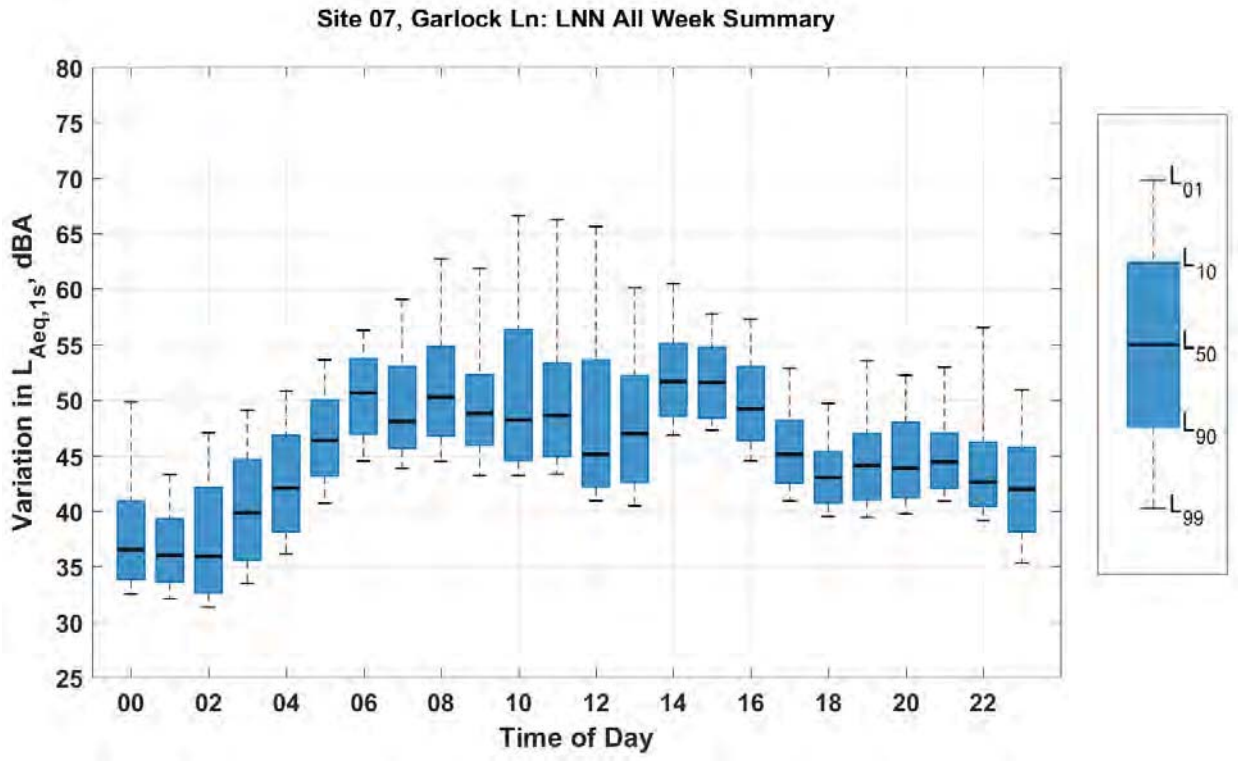

Figure 5-30. Variation in the Hourly Sound Level at Site 7

5.8 Monitoring Site 8 on Rockhurst Blvd

Site 8 is located on an undeveloped lot between 2694 and 2671 Rockhurst Blvd (see Figure 5-31 through Figure 5-33). Wind through the nearby vegetation was the dominate, although relatively quiet, sound source in the vicinity of Site 8, followed by distant traffic. Vehicles on Rockhurst Blvd were rare and Site 8 was set back from the cul-de-sac. Additional ambient sound sources included distant aircraft, birds and insects chirping, and dogs barking. Direct overflights dominated when present, although the propeller planes regularly cut/reduced their engine power over Site 8 such that the sound received from the overflights depended on the engine power condition.

Figure 5-31. Location of Site 8 a Half-mile from Austin Bluffs Parkway

Figure 5-32. Location of Monitoring Site 8 on an Undeveloped Lot Between 2694 and 2671 Rockhurst Blvd

Figure 5-33. Position of the Site 8 Microphone Facing (a) Rockhurst Blvd, (b) USAFA

Nine overflights were observed at Site 8 during a 2.1-hour period, equaling 4.4 per hour (i.e. the eight overflights listed in Table 5-9 plus one more overflight captured in a WAV file during standard SLM maintenance). The soundscape environment at Site 8 is relatively quiet such that overflights are more distinctive and tightly correlated with the stated L_{max} values in Table 5-9. Hence, in contrast to louder environments, the low ambient background at Site 8 enabled a greater correlation between the flight activity, including mid-range aircraft, and the resultant L_{max} values in Table 5-9.

Table 5-9. Observed Background Sounds at Site 8, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
27-Jul-16	10:58:15	10:59:10	**Overflight**	67.8
27-Jul-16	11:33:14	11:35:41	**Overflight** (with birds, residents talking, wind)	63.8
27-Jul-16	11:56:32	11:57:55	**Overflight** with engines cut past Site 8 --> *Ambient*	61.4
27-Jul-16	11:29:25	11:30:25	**Overflight** (55 dB) with engines cut/reduced past Site 8 (40 dB)	59.0
27-Jul-16	11:54:28	11:55:22	**Overflight** with engines cut past Site 8	58.9
27-Jul-16	12:00:30	12:01:30	**Overflight** (did not cut engines)	58.4
27-Jul-16	11:49:07	11:51:05	*Ambient* --> **overflight** with engines cut --> *Ambient*	56.8
27-Jul-16	11:22:22	11:23:52	*Ambient:* distant traffic, nearby birds and insects, wind through vegetation and unseen **mid-range aircraft**	55.1
27-Jul-16	11:39:12	11:40:12	**Mid-range overflight** by an unseen aircraft	52.8
27-Jul-16	11:00:05	11:00:25	**Distant aircraft**	49.1
28-Jul-16	16:22:02	16:23:06	*Ambient:* wind, distant traffic and no flights visible/audible	46.1
27-Jul-16	12:04:25	12:05:25	**Overflight** with engines cut before Site 8	45.5
27-Jul-16	16:08:30	16:09:39	*Ambient:* wind, distant traffic and no flights visible/audible	43.7
29-Jul-16	10:14:16	10:14:58	*Ambient:* no wind, birds, distant traffic	43.5
27-Jul-16	11:20:10	11:20:30	*Ambient:* distant traffic, nearby birds and insects, wind through vegetation	43.4
27-Jul-16	12:05:35	12:05:55	*Ambient:* wind, distant traffic and **distant aircraft**	40.7
27-Jul-16	10:56:35	10:56:55	*Ambient:* distant traffic, wind in vegetation, **distant aircraft**, birds, dog barking	39.9
27-Jul-16	11:43:32	11:44:12	*Ambient:* wind and distant traffic	39.6

Site 8 was isolated from traffic sounds along major roads, relative to the other monitoring locations, and vehicles along Rockhurst Blvd were rare. Overflights produced readily-identifiable sound signatures, yet most overflights were not "loud" – ranging from 58.4 to 67.8 dBA during typical engine powers and averaging 61.6 dBA for the loudest one second. Flight activity is likely determining the L_{01} values between 7 AM and 3 PM, with birds, insects, wind, and distant traffic responsible for the L_{50} and L_{10} values.

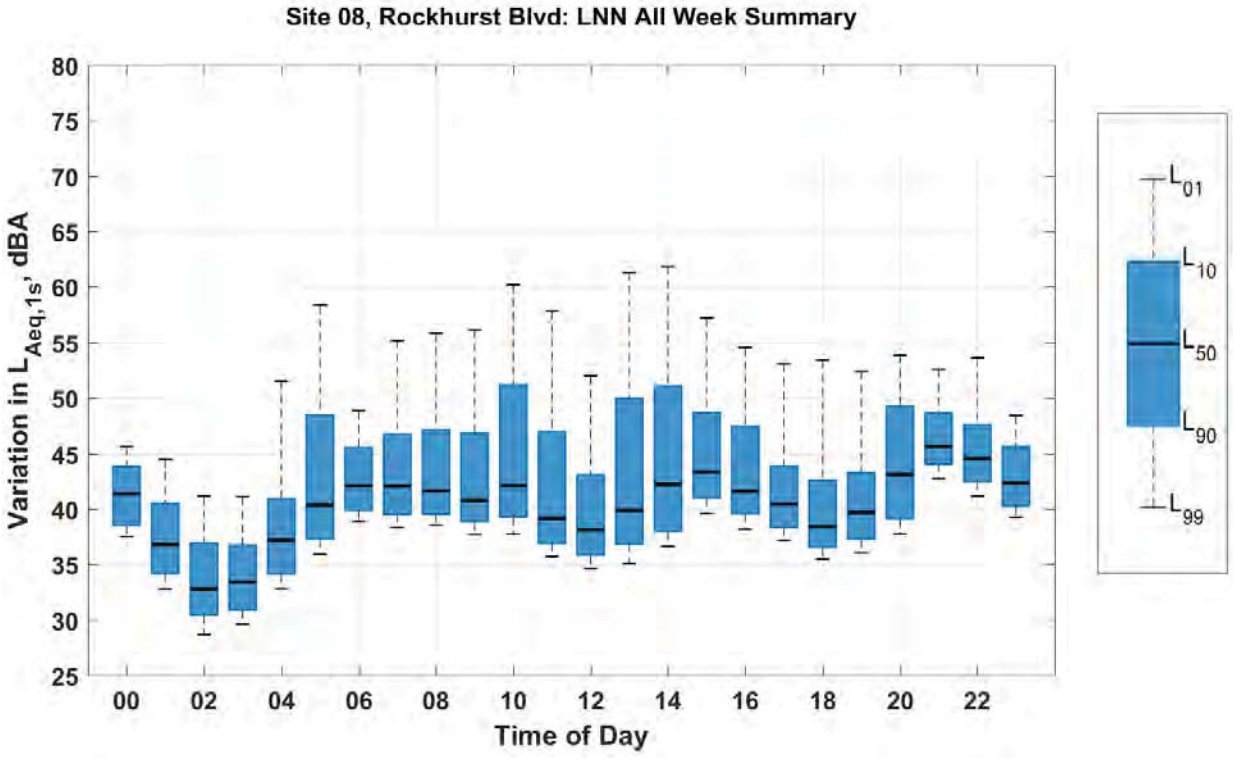

Figure 5-34. Variation in the Hourly Sound Level at Site 8

5.9 Monitoring Site 9 Across from 375 Pauma Valley Dr

The SLM at Site 9 was chained to an open, square covering situated across from 375 Pauma Valley Dr (see Figure 5-35 through Figure 5-37). Residential construction activity was occurring on the morning of July 26 at 355 Pauma Valley Dr, and this construction approximated the sound level produced from infrequent vehicles passing along Pauma Valley Dr. Traffic along Gleneagle Dr was more regular, and the ambient environment was composed of wind through the nearby trees and marshland vegetation, and people conversing on a nearby walking path. No sound activity or human presence was observed from the house located at 375 Pauma Valley Dr. Non-vehicle transient events primarily consisted of propeller plane overflights.

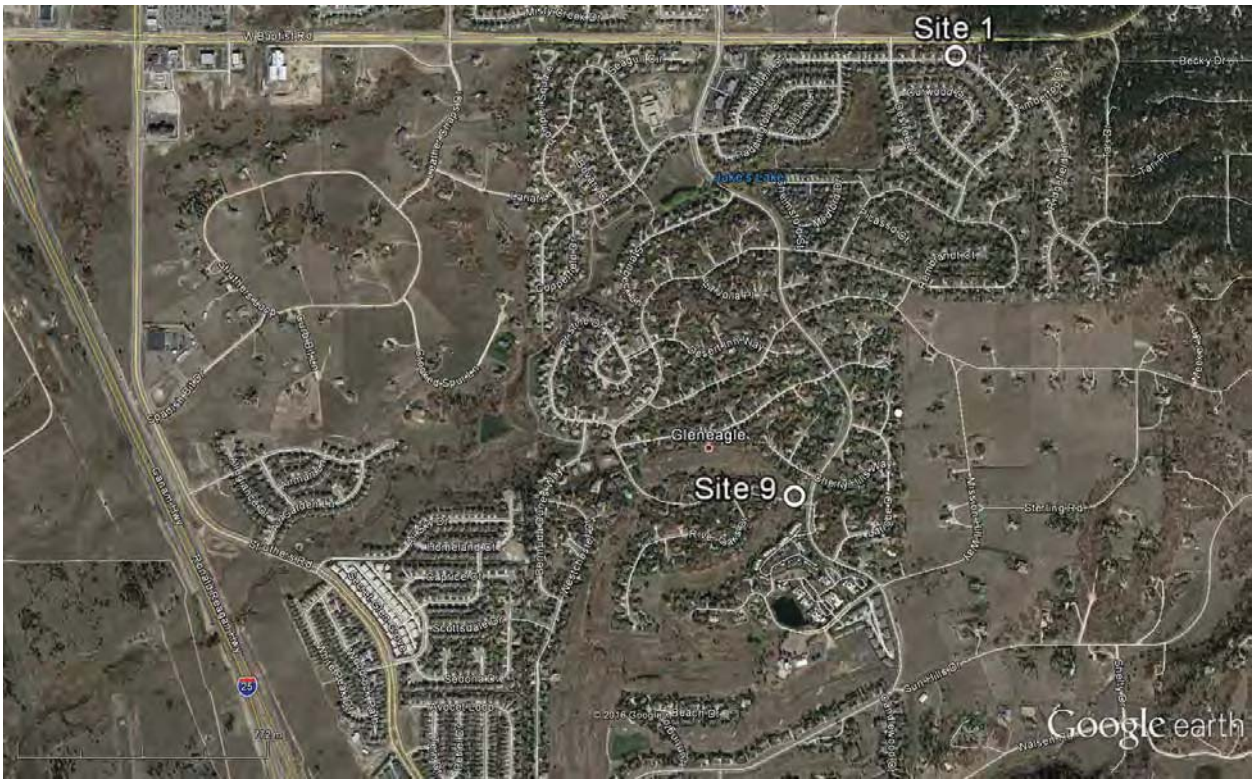

Figure 5-35. Location of Monitoring Site 9 near Gleneagle Dr

Figure 5-36. Location of Monitoring Site 9 on Pauma Valley Dr near Gleneagle Dr and Residential Construction

Figure 5-37. Position of the Site 9 Microphone Facing (a) NE Walking Path, (b) 375 Pauma Valley Dr

The most observed overflights occurred at Site 9 (16 in total), although the most time (3.3 hours) was also spent logging aircraft activity. The rate of overflights per hour ranged from 1.0 at Site 10 (once per hour) to 6.3 at Site 6 (9.3 times per hour), with an overall average of 3.3 overflights during the 7 AM to 7 PM period across all monitoring locations. The rate at Site 9 was 4.8 overflights per hour, which equals one overflight every 12.5 minutes on average. Six of the overflights occurred between 9:56 AM and 10:35 AM on July 26, 2016, which is an effective rate of approximately 9.3 overflights per hour, equal to the maximum at Site 6. However, even with the relatively-elevated occurrence of overflights at Site 9,

there were hundreds more traffic events per day along Pauma Valley Dr and Gleneagle Dr. Half of the overflights at Site 9 did not corresponded with L_{max} values that were greater than a single car passing along Pauma Valley Dr.

Table 5-10. Observed Background Sounds at Site 9, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
26-Jul-16	9:56:00	9:58:00	**Overflight** (prominent 100 Hz tone)	69.9
26-Jul-16	10:22:00	10:26:00	**Overflight** (prominent 100 Hz tone)	69.7
28-Jul-16	8:10:57	8:13:12	Traffic along Gleneagle Dr, **overflight** --> Pauma Valley Dr car	67.7
28-Jul-16	8:21:04	8:22:38	*Ambient* --> 2x trucks passing on Pauma --> *Ambient* (wind through vegetation)	65.0
26-Jul-16	10:17:00	10:18:35	**Overflight**	64.7
26-Jul-16	9:31:00	9:33:00	**Overflight** (prominent 100 Hz tone)	63.1
26-Jul-16	11:33:06	11:33:56	**Overflight** with a car passing along Gleneagle Dr (plus **distant aircraft**)	61.9
28-Jul-16	8:14:59	8:16:17	**Overflight** with engines cut/reduced at Site 9 --> engines restarted/increased	59.2
28-Jul-16	7:59:03	7:59:41	**Overflight** after plane cut engines --> 2x cars along Pauma Valley Dr	58.4
26-Jul-16	11:07:10	11:07:30	Truck passing along Pauma Valley Dr (example)	57.6
26-Jul-16	9:27:50	9:28:10	Gas-powered engine from adjacent residential construction at 355 Pauma Valley Dr (opposite side of the street and one house down from Site 9)	57.1
26-Jul-16	9:27:50	9:28:10	*Ambient:* no vehicles passing with residential construction activity	57.1
26-Jul-16	11:05:00	11:07:00	**Distant aircraft** with elevated winds	56.9
26-Jul-16	11:05:40	11:06:00	Car passing along Pauma Valley Dr (example)	56.9
26-Jul-16	11:17:00	11:18:30	**Overflight**	56.2
26-Jul-16	11:38:21	11:42:08	**3x consecutive overflights** with 3 to 4 cars along Gleneagle Dr plus wind	55.5
26-Jul-16	11:46:47	11:48:18	2x cars passing along Pauma Valley Dr	55.1
26-Jul-16	10:33:00	10:35:00	**Overflight** (quiet – lower than previous overflights)	54.8
26-Jul-16	10:54:50	10:55:10	*Note:* **Distant aircraft** were frequently audible during the Coverage Period	54.5
28-Jul-16	8:34:59	8:36:22	*Ambient:* **Distant aircraft** activity near USAFA and traffic on Gleneagle plus one car passing on Pauma Valley Dr	54.4
26-Jul-16	11:30:10	11:31:02	**Distant aircraft**	53.5
26-Jul-16	9:29:50	9:30:10	Car passing along Pauma Valley Dr (example)	52.4
26-Jul-16	11:08:35	11:08:55	Cars passing along Gleneagle Dr (example)	52.3
26-Jul-16	9:38:00	9:40:00	**Overflight**	51.9
26-Jul-16	10:03:00	10:05:00	**Overflight**	51.4
26-Jul-16	11:04:50	11:05:10	Car passing along Pauma Valley Dr (example)	49.9
26-Jul-16	10:27:00	10:28:00	**Overflight** (quiet – lower than previous overflights)	49.5
26-Jul-16	9:35:50	9:36:10	Cars passing along Gleneagle Dr (example)	49.4
26-Jul-16	9:35:50	9:36:10	*Ambient:* no vehicles and paused residential construction activity	49.4
26-Jul-16	9:53:50	9:54:10	Wind through trees and marshland vegetation	47.2
26-Jul-16	9:52:50	9:53:10	Truck passing along Pauma Valley Dr (example)	46.4
29-Jul-16	16:04:45	16:05:00	*Ambient:* Wind through vegetation & Gleneagle traffic with no visible flights	46.3
26-Jul-16	9:51:50	9:52:10	*Ambient*	38.5
26-Jul-16	9:51:50	9:52:10	Car passing along Pauma Valley Dr (example)	38.5
26-Jul-16	11:07:45	11:08:05	*Ambient:* Elevated wind	37.4

Site 9 featured a broad range of L_{max} values associated with observed overflights, and the consistency of the L_{NN} values presented in Figure 5-38 indicate that the day-night flow of traffic determined the L_{99} through L_{01} values, not overflights. When overflights did occur, they were audible due to the distinctive tone, and overflights were sometimes the dominate sound source if the overflight happened to coincide with a brief period of diminished commercial and residential traffic.

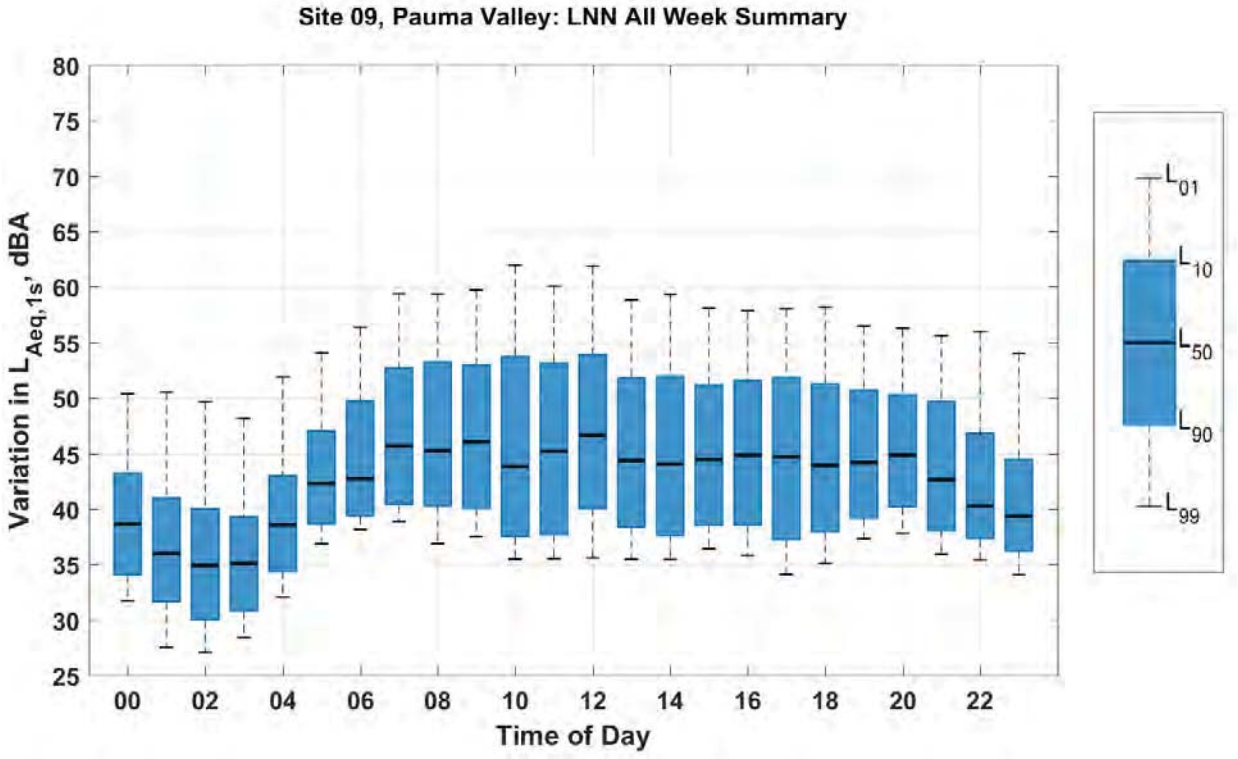

Figure 5-38. Variation in the Hourly Sound Level at Site 9

5.10 Monitoring Site 10 Across from 604 Spectrum Loop

Site 10 was located in a fenced pasture (without cattle) across from a commercial zone along Spectrum Loop (see Figure 5-39 through Figure 5-41). Regular construction activity was present in the vicinity of 604 Spectrum Loop as well as across Voyager Parkway at the intersection with Spectrum Loop. Construction sounds varied, with traffic along Voyager Parkway dominating during low construction periods, followed by less frequent vehicles along Spectrum Loop. Other sound sources included commercial activity in the block bordered by Voyager Parkway, North Gate Blvd, Grey Hawk Dr, and Spectrum Loop, as well as insects and birds chirping, wind through vegetation, and dogs barking.

Figure 5-39. Location of Site 10 near the Intersection of Voyager Parkway and Northgate Blvd, and Adjacent to I-25

Figure 5-40. Location of Monitoring Site 10 in a Fenced Pasture Across from 604 Spectrum Loop and Commercial Construction Activity

Figure 5-41. Position of the Site 10 Microphone Facing (a) Spectrum Loop, (b) East to Houses Along Diamond Rim Dr

Site 10 had the lowest rate of observed overflights per hour: just three total overflights in a 3.1-hour period. The substantial commercial construction activity across Spectrum Loop was most often the loudest sound-generating activity, and the overflight at 12:51 to 12:53 PM on July 26, 2016 is likely not the cause of the listed L_{max} value. Instead, this overflight just happened to occur during construction clanging that produced this 1-second L_{max} value. This assessment is based on (a) the atypically high L_{max} value of 74.3 dBA relative to other overflights recorded at all 10 sites, including the two references at Site 10, and (b) the logged average L_{Aeq} sound level recorded by BRRC personnel of approximately 60 dBA during this period (see the full observer notes for Site 10 in Appendix A.3).

Table 5-11. Observed Background Sounds at Site 10, Ranked by L_{max} (dBA)

Date	Start	End	Description	L_{max} (dBA)
26-Jul-16	12:51:00	12:53:00	**Overflight**	74.3
26-Jul-16	13:39:40	13:40:00	Construction activity	68.9
26-Jul-16	13:39:55	13:40:15	Truck along Spectrum Loop amid construction activity	68.9
28-Jul-16	9:56:19	9:57:29	Construction truck on Spectrum Loop	68.2
28-Jul-16	9:19:15	9:20:08	*Ambient:* limited construction across Spectrum Loop; one car passing on Spectrum Loop; one truck passing on Spectrum Loop	65.3
26-Jul-16	14:04:30	14:04:50	Truck along Spectrum Loop	65.2
26-Jul-16	13:41:55	13:43:17	Construction activity across from Site 2 with an **overflight** and car passing	64.5
26-Jul-16	13:45:35	13:45:55	Construction at Spectrum Loop commercial zone (CAT and saw)	64.4
26-Jul-16	13:57:50	13:58:10	*Ambient* : construction and traffic	63.6
26-Jul-16	14:18:07	14:19:22	Diminished construction activity with no nearby cars	63.3
26-Jul-16	14:00:33	14:02:29	Continued construction	62.9
28-Jul-16	9:39:30	9:40:12	**Flight** with a ~1/2-mile offset from Site 10	62.9
26-Jul-16	14:04:50	14:05:10	Construction backup alarm	61.9
26-Jul-16	12:57:40	12:58:00	Construction-related generator and saw	61.6
29-Jul-16	16:28:19	16:29:30	*Ambient:* no construction, vehicle passing on Spectrum Loop, Voyager traffic	61.6
26-Jul-16	12:58:00	12:59:00	**Overflight**	60.3
26-Jul-16	13:00:15	13:00:35	Vehicles along Spectrum Loop	60.2
28-Jul-16	10:18:15	10:19:42	*Ambient:* No near/mid-flight activity (although **distant aircraft** over USAFA was present)	60.0
28-Jul-16	9:51:21	9:52:37	**2x distant aircraft** over USAFA Spectrum Loop construction and traffic, train whistle	59.9
26-Jul-16	13:00:55	13:01:15	Construction saw, with construction along Voyage Ave in background	57.4
28-Jul-16	9:26:00	9:27:00	*Ambient:* train in distance, limited construction, and Voyage Ave traffic	52.4
26-Jul-16	13:05:00	13:05:20	*Ambient:* limited construction and vehicle traffic {no overflights}	46.9

Substantial, long-term construction activity across from Site 10 along Spectrum Loop and, separately, along Voyager Parkway, contributed significantly to the soundscape. In addition, commercial traffic on Voyager Parkway provided a regular, elevated sound source. The measured L_{max} values that occurred during overflights over the observation period are likely *unrelated* to the flight activity and more generally, none of the L_{NN} values in Figure 5-42 are likely associated with flight operations at Site 10.

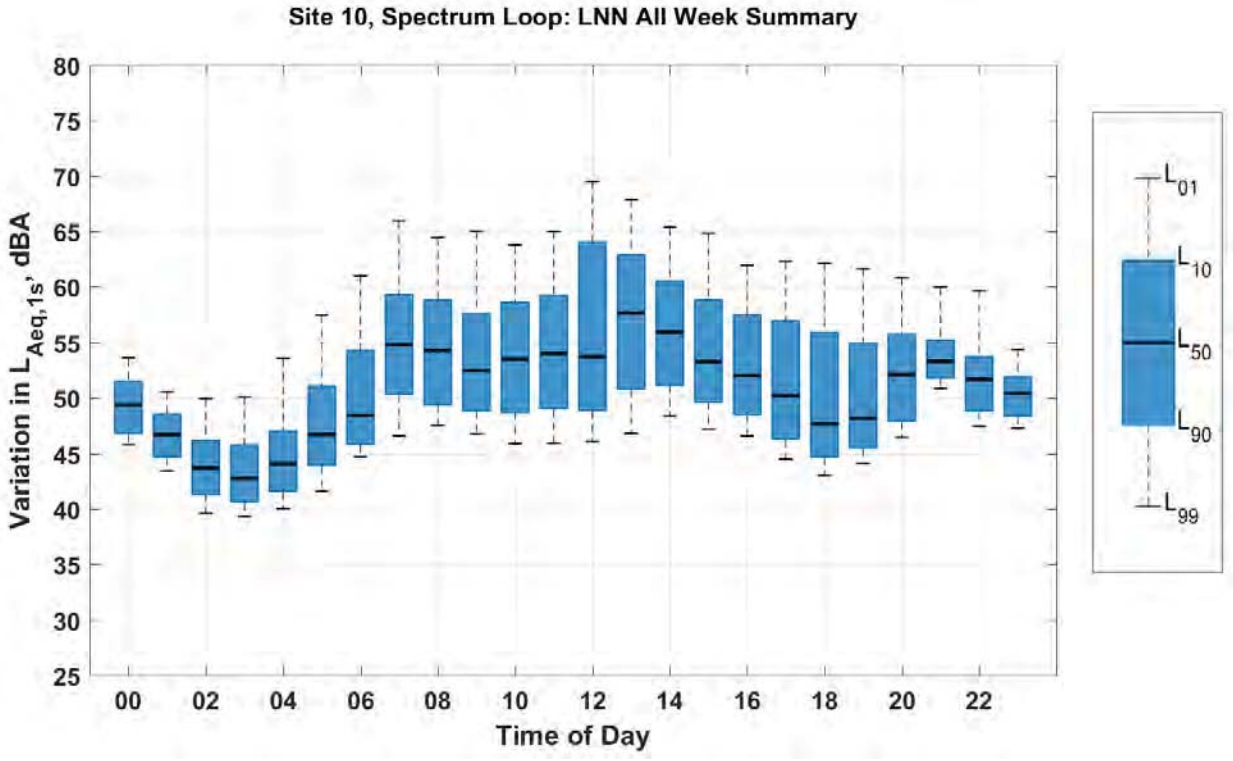

Figure 5-42. Variation in the Hourly Sound Level at Site 10

5.11 Soundscape Summary

Figure 5-43 provides a comparison of the site-by-site variation in average L_{NN} values during periods of aircraft activity (7 AM to 7 PM), whereas the prior hourly variation charts included hours before 7 AM and after 7 PM for context. Given the 12-hour period (720 minutes), L_{01} is the sound level that was exceeded for a cumulative 7.2 minutes, on average, from the evening of Monday, July 25 through the morning of Friday, July 29, 2016. L_{10} is the sound level exceeded for at least a cumulative hour and 12 minutes (with individual seconds adding separately to this total time). L_{50} captures the louder half of the 7 AM to 7 PM period (6 hours), L_{90} and L_{99} include all but the quietest 72 and 7.2 minutes, respectively.

During these aircraft operational-hours, substantial traffic and construction activity were present at monitoring locations 4, 6, and 10, and these sites correspondingly have the highest values in each L_{NN} category. Given the presence of aircraft at all sites and the similar observed altitude, the elevated levels at locations 4, 6, and 10 are not the result of aircraft activity. Aircraft would be rarely distinct over the background sound levels at Sites 4, 6, and 10, and aircraft are not a significant contributor to the soundscape. Sites 1, 2, 5, and 9 were adjacent to major roads and thus each of these sites feature similar L_{10} values that are likely due to passing vehicles, not aircraft. Residential construction sounds were received at the elevated location of Site 7, resulting in atypical sound levels. Sites 3 and 8 were located in relatively quiet areas that are isolated from regular traffic and construction, and Sites 3 and 8 therefore offered the best monitoring locations for distinguishing the contribution from aircraft activity. Flight activity likely comprised the "loudest" 7.2 minutes (L_{01}) at Sites 3 and 8 in a 12-hour period, although neither L_{01} values exceed the lower end of a conversation between two people at 1 meter (60 dBA).

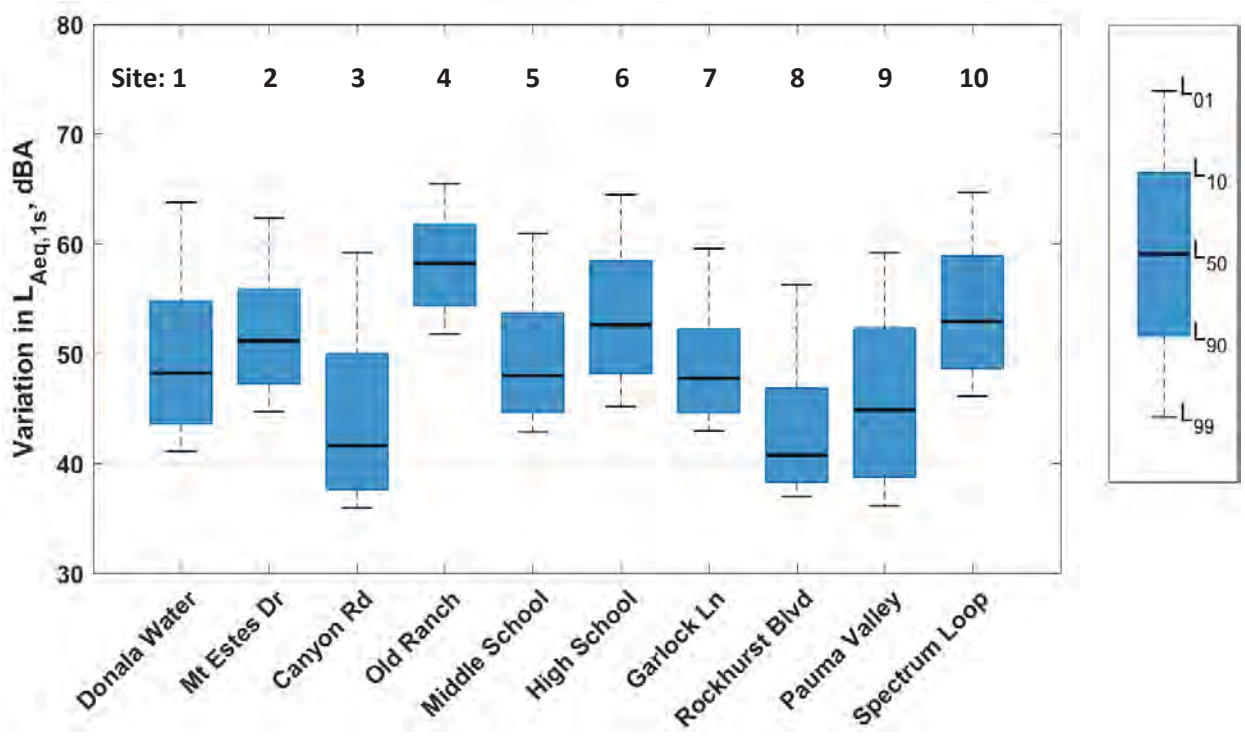

Figure 5-43. Average Variation in $L_{Aeq,1s}$ Sound Levels for All Monitoring Sites Between 7 AM and 7 PM

Another assessment of sound levels is the average measured $L_{Aeq,12hr}$ sound levels for each measurement location for the operational hours of USAFA activity, displayed in Figure 5-44. During the measurement period, the overall average $L_{Aeq,12hr}$ for all ten monitoring locations, inclusive of all sounds from traffic, construction, and aircraft activity, as well as residential activity and the ambient soundscape, was 54.5 dBA. The range of average $L_{Aeq,12hr}$ values was 47.8 dBA at Site 8 to 60.4 dBA at Site 4, which was dominated by traffic along I-25. Although aircraft overflights in the JLUS area are audible to community members, the $L_{Aeq,12hr}$ sound level does not approach the typical level of concern for noise impacts.

Site	Location	$LAeq_{,12hr}$ Values (dBA)
1	Donala Water	53.7
2	Mt Estes Dr	55.1
3	Canyon Rd	52.5
4	Old Ranch Rd	60.4
5	Middle School	56.4
6	High School	58.5
7	Garlock Ln	53.1
8	Rockhurst Blvd	47.8
9	Pauma Valley Rd	50.8
10	Spectrum Loop	56.9

Figure 5-44. Average $L_{Aeq,12hr}$ Sound Levels for Each Monitoring Location

6 Sound Level Exceedance Analysis

6.1 Methodology

The purpose of exceedance analysis is to identify prominent sound events of interest, like aircraft activity, that are occurring within the soundscape. BRRC applied a tailored algorithm to the vast quantities of collected measurement data to identify aircraft events at each monitoring location, leveraging the distinctive tone that the propeller planes produce at approximately 100 Hz. The SLMs at each measurement location collected individual sound levels for the OTOB frequencies between 6 Hz and 20,000 Hz every one second. These OTOB frequencies include 6, 8, 10, 13, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 16000, and 20000 Hz, where every third frequency is a doubling of the initial frequency. The overall sound level is a combination of the sound energies at each frequency. BRRC's algorithm makes use of the overall sound level and the combined energy from just 3 of the 36 OTOB frequencies listed above. The algorithm determines potential overflights by the following Criteria:

(1) Identify periods where the $L_{Aeq,1s}$ sound level exceeds the hourly ambient background (L_{90}) by 10 dBA or more for durations between 5 seconds and 6 minutes, from 7 AM to 7 PM;

(2) Determine whether the combined acoustic energy in the 80, 100, and 125 Hz OTOB frequencies exceeds the hourly L_{90} of the 80, 100, and 125 Hz OTOB frequencies by 10 dBA or more for 70% of the periods lasting at least 20 seconds and no more than 2 minutes on a 1-second basis.

Any non-overlapping period that meets algorithm Criteria 1 and 2 above constitutes an "Algorithm Event."

Under Criterion 1, a 10 dBA differential was selected because humans typically perceive a 10 dBA increase in the overall sound level as being twice as loud as the former sound level (even though an increase of 10 dBA on the logarithmic scale means that the sound energy increased by one order of magnitude). The rationale for using a minimum duration of 5 seconds was to avoid capturing the tens-of-thousands of brief construction sounds that briefly elevate the sound level more than 10 dBA over the ambient background. The daily period from 7 AM to 7 PM was used based on the observed flight activity; no flights were observed before 7 AM or after 7 PM.

Under Criterion 2, the algorithm attempts to eliminate non-aircraft activity by comparing the relative energy levels in the combined 80, 100, and 125 Hz frequency bands against the L_{90} for the same frequency bands during each hourly period (e.g. 8 AM to 9 AM). If, for example, the identified duration under Criterion 1 was 100 seconds, then the combined energy from this set of frequency bands would need to exceed the hourly L_{90} by 10 dBA for 70 individual seconds (not necessarily continuous seconds), where the comparative hourly L_{90} in this case is only the combined 80, 100, and 125 Hz frequency bands in the other 3,600 seconds during the specified hour. The OTOBs immediately adjacent to 100 Hz (i.e. 80

and 125 Hz) were necessary due to Doppler shift: as aircraft approach the monitoring site, the measured frequency shifts upward based on the airspeed of the plane; likewise, the frequency shifts downward as the plane recedes from the monitoring site. A maximum of 2 minutes was used to capture pattern work performed by aircraft in the vicinity of the monitoring sites while also avoiding continuous sounds by lawn mowers or large idling trucks that (a) may extend beyond 2 minutes and, (b) may contain elevated 100 Hz tones. The 70% delineation was selected based on repeated trials involving the observed overflights. For example, a standard of 100% would eliminate nearly all observed overflights because other frequencies dominated for at least one second during the Criterion 1 period, typically due to a non-flight activity. In addition, overflights involve a gradual onset and decay in sound level as aircraft approach and depart from the monitoring site, in contrast to a vehicle that may quickly fade into the background or a hammer that only briefly generates sound level spikes. The generally low sound level of the aircraft activity relative to the background soundscape is such that aircraft are difficult to distinguish on a sound level basis, and a third Criterion was necessary:

(3) Manually review the Algorithm Events, via visual inspection, for spectral content that indicates the presence of Doppler shifts to and from 100 Hz.

BRRC used a series of charts for each Algorithm Event, on a second-by-second basis, to identify spectral content that is characteristic of propeller plane overflights. The set of charts for each Algorithm Event is provided within the deliverables listed in Appendix A.1. BRRC was successful in identifying selected overflights using this methodology; however, the sound levels produced by most aircraft activity were not sufficiently elevated to appear as a distinct event. The background traffic and construction activity, as well as residential lawn mowing and hedge trimming (with motors that can produce 100 Hz tones), often rivaled or exceeded the aircraft sound levels, even within the three OTOB frequencies characteristic of the propeller planes in flight. Thus, this algorithm only yields the most distinctive overflights. Even with this distinctive subset of all overflights, the measured sound levels are not substantially elevated relative to other long-term community sound-generating activities, principally commercial traffic. Much of the sound generated by flight activity around the individual monitoring sites blended into the commercial and residential background soundscape.

Note that the sound levels in the OTOB charts for Algorithm Events (listed as deliverables in Appendix A.1) often appear to exceed the sound level in the L_{Aeq} charts. This differential results from the A-weighting in the L_{Aeq} charts, which represents the sound level perceived by humans. In contrast, the OTOB charts are “flat” (unweighted), without the attenuation in the lower frequencies. (The human ear is less responsive to lower frequencies, including the 80 to 125 Hz OTOBs.) Thus, while the 80 Hz through 125 Hz OTOBs are useful for algorithmic analysis, the L_{Aeq} overall sound level charts display the lower sound levels that a typical human would perceive.

Many other potential algorithm variables and parameters were considered, including the duration and percentage specifications discussed above, as well as alternative metrics. BRRC evaluated using the first harmonics related to the propeller-planes’ 100 Hz tone, which include the 160, 200, and 250 Hz OTOBs, after accounting for Doppler shift. Incorporating the sound energy from the first harmonics captured too

many non-aircraft events based on comparisons with the observation data, although analysis of the first harmonics was a useful supplementary tool under Criterion 3. More generally, applicable algorithm elements were narrowed based on known overflight activity versus traffic, residential, and construction activity logged during direct observations, as well as the absence of potential events outside the 7 AM to 7 PM USAFA flight activity.

BRRC personnel manually reviewed the spectral data from a selection of the 1,458 Algorithm Events for distinct Doppler shifts consistent with aircraft airspeeds. Potential overflights detected by algorithm Criteria 1 and 2 were visually screened starting with the measurement data on Tuesday, July 26, 2016, at 7 AM until at least ten instances of highly-probable overflights were identified (the exception is Site 4, where only four non-observed overflights could be distinguished from all of the measurement data, due to heavy traffic across I-25). Within Criterion 3 only, the first harmonics were used as a secondary tool to screen for higher frequencies that would be indicative of aircraft approaching and departing from the monitoring sites. In total, BRRC manually identified 118 events from the measurement data that are highly likely to correspond to aircraft activity. Graphical representations of the 118 events are included as deliverables referenced in Appendix A.1 as "Aircraft Events."

Figure 6-1 and Figure 6-2 show Algorithm Events at Site 9 on July 26, 2016 during the 10 AM hour. Criterion 1 is illustrated in the top graph in each figure, where the event duration is indicated by the red line between the two vertical bars. Under Criterion 1, 100% of the $L_{Aeq,1s}$ sound levels must exceed the ambient L_{90} (the green horizontal line) by 10 dBA (the orange horizontal line). Under Criterion 2, the middle graph shows that at least 70% of the combined sound energy in the 80, 100, and 125 Hz OTOBs exceeds the L_{90} for the same frequencies through the 10 AM hour. After visually inspecting the spectra content in the bottom graph, per Criterion 3, Figure 6-1 provides a clear indication of Doppler shift from an approaching aircraft that transitions from a 125 Hz tone to a 100 Hz tone, with supporting first and second harmonics also undergoing Doppler shift. In addition, the measurement data in Figure 6-1 also coincides with an observed overflight at Site 9. In contrast, the data graphically represented in Figure 6-2 fails Criterion 1 through 3, even though an overflight was *also* observed at Site 9 during this time. Hence, even though aircraft were observed to be operating directly over the monitoring sites, the sound generated by the aircraft activity was often not sufficiently elevated or distinctive to exceed sounds from regular traffic or construction activity.

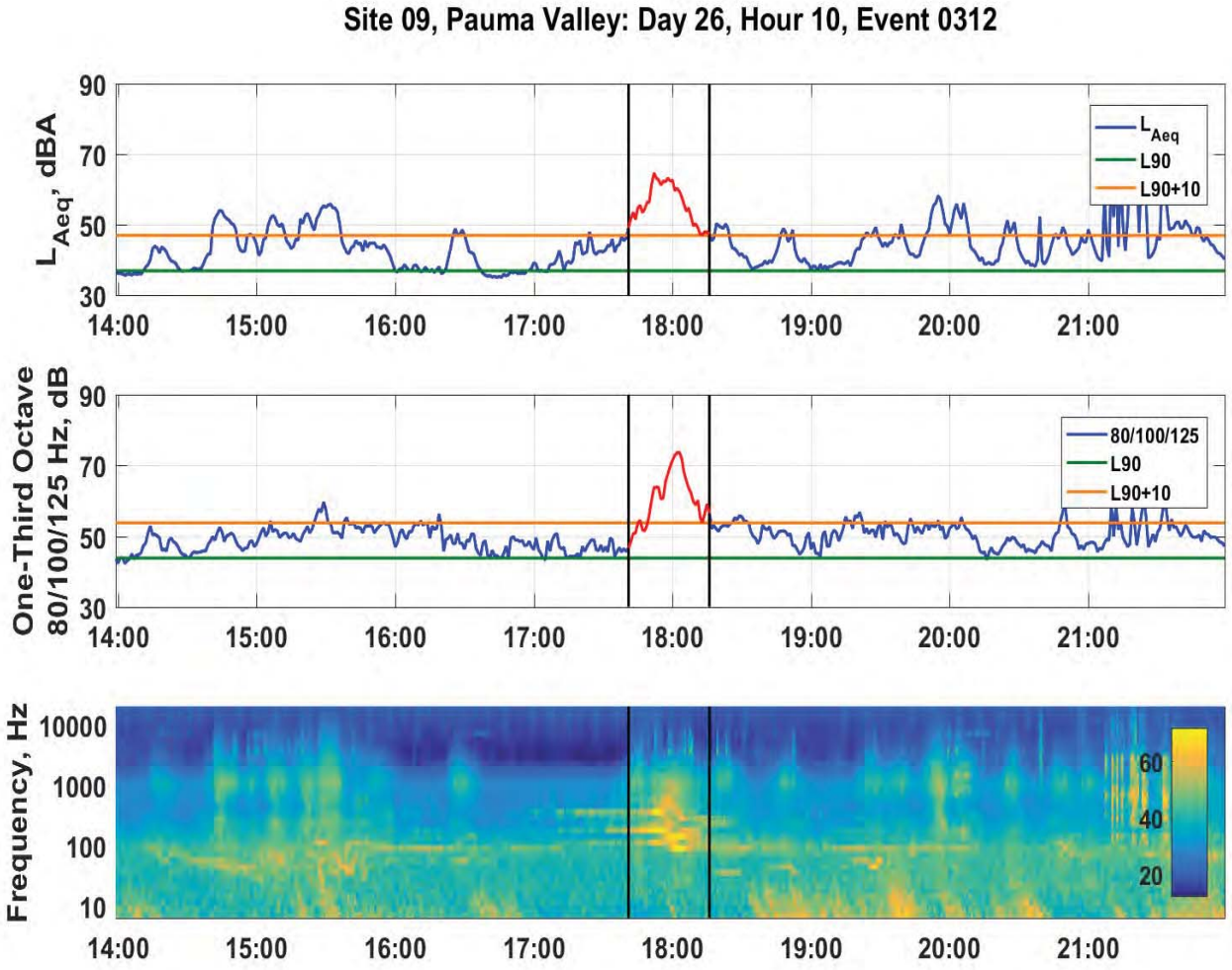

Figure 6-1. Example Overflight Determined by Algorithmic Identification and Visual Review

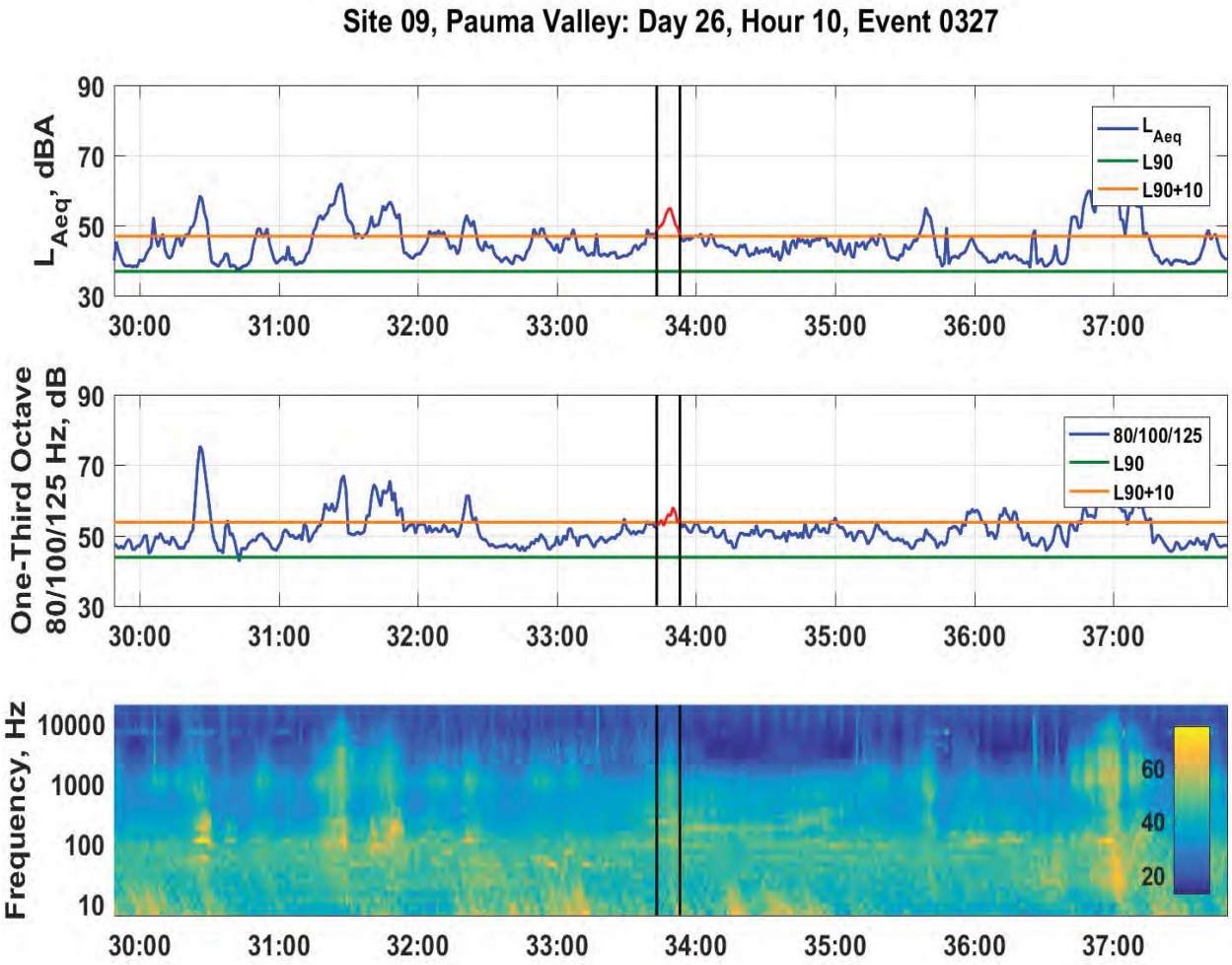

Figure 6-2. Example Observed Overflight that Does Not Meet Criteria 1 through 3

For the visually-screened overflights identified from the broader set of events determined by Criteria 1 and 2, tables are provided in the following section with the date, start and end time of the aircraft event, L_{max}, SEL, and L_{90} levels, as well as an event-specific number associated with the set of Aircraft Events referenced in Appendix A.1.

6.2 Aircraft Exceedances

As discussed in Section 6.1, the overflights in the tables below were identified by first applying an algorithm that sorted through over 10 million individual sound levels measured across all ten monitoring locations. Then, the spectral data from this narrowed set of 1,458 Algorithm Events were manually reviewed by BRRC personnel, beginning with measurement data on July 26, 2016 at 7 AM until at least ten clearly-distinguished overflights were catalogued, totaling 118 Aircraft Events with supporting data referenced in Appendix A.1. The data presented in Table 6-1 through Table 6-10 list an initial subset of the site-specific overflights identified via the exceedance algorithm (Criteria 1, 2, and 3). The minimum of ten aircraft overflights identified under Criterion 3 are detailed to provide representative sound data on the overflights occurring at the monitored locations. The data in these tables are listed by descending order of the overflights' L_{max} values. The durations for all events exceed 5 seconds based on the minimum specification under Criterion 1, during which the $L_{Aeq,1s}$ exceeded the L_{90} by 10 dBA during the specified hour. For example, Event Number 477 in Table 6-1 exceeded Criterion 1 for 22 seconds as the sound levels were at least 10 dB above the measured L_{90} value of 46.4 dBA for the period from 7:00:00 AM through 7:59:59 AM. For this overflight, the resultant equivalent sound level of the overflight event ($L_{Aeq,event}$) was 68.6 dBA; L_{max} was 74.4 dBA, and the SEL (the time-dependent, cumulative sound exposure level) was 82.0 dBA.

Site 1: Twelve clear overflights found at Site 1 between 7 AM and 12:33 PM (see Table 6-1), equating to 2.2 Aircraft Events per hour, with an average duration of 28 seconds and an average L_{max} and SEL of 66.9 dBA and 76.7 dBA, respectively. In comparison, the traffic-dependent L_{10} value for Site 1 was approximately 55 dBA from 7 AM to 7 PM. Hence, these "loudest" overflights (which Table 6-1 through Table 6-10 reflect) were rare and typically equivalent to two people conversing one meter apart, but still likely noticeable against the commercial and residential traffic at Site 1.

Table 6-1. Selected Overflights Identified via Criteria 1-3 for Site 1

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
477	7/26/3916	7:05:04 AM	7:05:25 AM	74.4	22	82.0	50.1	46.4
480	7/26/3916	7:08:34 AM	7:08:53 AM	72.3	20	78.8	50.1	46.4
485	7/26/3916	7:12:45 AM	7:13:07 AM	71.3	23	79.1	50.1	46.4
486	7/26/3916	7:14:41 AM	7:15:02 AM	66.0	22	75.7	50.1	46.4
629	7/26/3916	11:58:03 AM	11:58:42 AM	65.9	40	76.4	47.5	44.1
533	7/26/3916	8:49:23 AM	8:49:50 AM	65.6	28	76.6	50.0	46.7
644	7/26/3916	12:25:12 PM	12:25:37 PM	65.5	26	76.3	48.3	45.1
578	7/26/3916	10:17:33 AM	10:17:55 AM	65.1	23	75.1	47.2	43.3
569	7/26/3916	9:56:50 AM	9:57:20 AM	64.5	31	76.2	49.2	45.5
612	7/26/3916	11:32:58 AM	11:33:26 AM	63.2	29	74.4	47.5	44.1
582	7/26/3916	10:24:22 AM	10:25:05 AM	63.1	44	74.4	47.2	43.3
648	7/26/3916	12:31:59 PM	12:32:37 PM	62.7	39	75.1	48.3	45.1

Site 2: The conditions and analysis of Site 2 are similar to Site 1: eleven Aircraft Events were identified at Site 2 between 7 AM and 12:25 PM (see Table 6-2), equating to 2.0 Aircraft Events per hour, with an average duration of 38 seconds and an average L_{max} and SEL of 68.8 dBA and 79.4 dBA, respectively. In comparison, and like Site 1, the traffic-dependent L_{10} value for Site 2 was approximately 56 dBA from 7 AM to 7 PM. The most prominent overflights (shown in the table below) were rare and typically equivalent to two people conversing one meter apart, but still likely noticeable against the commercial traffic at Site 2. The SLM at Site 2 was in an area that was less obstructed than Site 1, likely leading to the 36% longer Aircraft Event duration at Site 2 (i.e. an average of 38 seconds vs. 28 seconds).

Table 6-2. Selected Overflights Identified via Criteria 1-3 for Site 2

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
194	7/26/3916	12:23:47 PM	12:24:32 PM	75.7	46	84.8	52.3	47.8
148	7/26/3916	9:55:11 AM	9:56:22 AM	72.6	72	84.0	51.4	47.1
183	7/26/3916	11:29:49 AM	11:30:12 AM	70.6	24	79.8	50.6	47.0
174	7/26/3916	10:33:21 AM	10:33:41 AM	70.3	21	78.0	51.2	47.0
169	7/26/3916	10:24:37 AM	10:25:08 AM	69.2	32	80.8	51.2	47.0
171	7/26/3916	10:26:34 AM	10:27:06 AM	68.7	33	77.6	51.2	47.0
184	7/26/3916	11:33:43 AM	11:34:44 AM	68.1	62	80.8	50.6	47.0
125	7/26/3916	8:44:44 AM	8:45:06 AM	67.8	23	77.4	55.6	50.1
189	7/26/3916	11:56:38 AM	11:57:26 AM	66.2	49	79.1	50.6	47.0
192	7/26/3916	11:59:58 AM	12:00:18 PM	63.9	21	74.6	52.3	47.8
143	7/26/3916	9:32:03 AM	9:32:41 AM	63.8	39	76.7	51.4	47.1

Site 3: The absence of regular, high-speed traffic and commercial trucks near Site 3, as well as the absence of nearby construction, made overflight events at Site 3 readily identifiable. Eighteen Aircraft Events were manually identified from the Algorithm Events at Site 3 between 7 AM and 7:57 AM (see Table 6-3), equating to the highest rate among all monitoring sites: 19.0 Aircraft Events per hour. The average duration of each Aircraft Event was 27 seconds and the average L_{max} and SEL were 66.4 dBA and 75.4 dBA, respectively. Given the low ambient background (L_{90}) of 42.8 dBA, Site 3 offers perhaps the best representation of how aircraft events affect the general JLUS soundscape, particularly because the observed propeller planes flew directly over the monitoring location. Based on the measurement data at Site 3, a typical overflight by a propeller plane anywhere within the JLUS area (under conditions similar to Site 3 during the monitoring period) would likely produce overflights events with SELs around 75 dBA, reaching an L_{max} of 66 dBA before decreasing below the ambient soundscape in a period under 30 seconds, on average. Thus, a typical overflight at Site 3 begins with a sound level equivalent to a quiet urban daytime and then increases to a quiet conversation at one meter, and reaches a maximum sound level equivalent to an air conditioner at 100 feet, per Figure 2-2, before decreasing below the ambient soundscape.

Table 6-3. Selected Overflights Identified via Criteria 1-3 for Site 3

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
98	7/26/3916	7:10:13 AM	7:10:40 AM	72.8	28	80.7	46.2	42.8
101	7/26/3916	7:14:39 AM	7:15:13 AM	71.3	35	79.1	46.2	42.8
95	7/26/3916	7:04:17 AM	7:04:53 AM	70.8	37	79.0	46.2	42.8
100	7/26/3916	7:13:39 AM	7:14:10 AM	70.6	32	78.7	46.2	42.8
97	7/26/3916	7:06:07 AM	7:06:42 AM	70.4	36	78.6	46.2	42.8
96	7/26/3916	7:05:13 AM	7:05:40 AM	68.7	28	76.6	46.2	42.8
99	7/26/3916	7:12:45 AM	7:13:17 AM	67.4	33	77.4	46.2	42.8
110	7/26/3916	7:27:08 AM	7:27:39 AM	66.6	32	75.8	46.2	42.8
115	7/26/3916	7:43:23 AM	7:43:48 AM	66.0	26	74.9	46.2	42.8
116	7/26/3916	7:45:06 AM	7:45:33 AM	65.9	28	75.1	46.2	42.8
107	7/26/3916	7:25:20 AM	7:25:41 AM	64.6	22	74.4	46.2	42.8
113	7/26/3916	7:39:03 AM	7:39:26 AM	64.0	24	74.1	46.2	42.8
119	7/26/3916	7:56:37 AM	7:56:58 AM	63.8	22	73.3	46.2	42.8
109	7/26/3916	7:26:10 AM	7:26:30 AM	63.7	21	73.0	46.2	42.8
117	7/26/3916	7:48:51 AM	7:49:10 AM	62.9	20	71.8	46.2	42.8
111	7/26/3916	7:36:58 AM	7:37:17 AM	61.9	20	71.2	46.2	42.8
118	7/26/3916	7:54:48 AM	7:55:07 AM	61.7	20	71.3	46.2	42.8
106	7/26/3916	7:19:09 AM	7:19:35 AM	61.2	27	72.5	46.2	42.8

Site 4: Traffic sounds from I-25 dominates the soundscape at Site 4, even with regular aircraft departures and arrivals at the adjacent USAFA airfield. Only four unobserved overflights were discernable from the measurement data over the entire monitoring period (see Table 6-4), equating to 1 Aircraft Event every 9 hours, or approximately 1 per day, when commercial traffic happens to ebb at the same moment that an aircraft flies overhead. The average duration for the identified Aircraft Events was just 23 seconds, with an average L_{max} and SEL of 68.1 dBA and 77.5 dBA, respectively. In comparison, the traffic-dependent L_{10} value for Site 4 was approximately 54 dBA from 7 AM to 7 PM. During most of the average 23-second duration of these rare overflights, the sound from the aircraft is likely not distinguishable by a human from the ongoing background traffic sound levels.

Table 6-4. Selected Overflights Identified via Criteria 1-3 for Site 4

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
526	7/27/3916	1:43:46 PM	1:44:06 PM	71.0	21	80.1	52.3	49.5
531	7/27/3916	1:55:41 PM	1:56:01 PM	69.2	21	78.1	52.3	49.5
779	7/28/3916	12:37:09 PM	12:37:31 PM	68.0	23	76.5	55.8	48.9
543	7/27/3916	2:41:10 PM	2:41:34 PM	64.3	25	75.3	51.1	48.3

Site 5: Ten aircraft events were manually identified at Site 5 between 7 AM and 10:23 AM (see Table 6-5), equating to 3.0 Aircraft Events per hour with an average duration of 32 seconds, and an average L_{max} and SEL of 66.3 dBA and 76.8 dBA, respectively. In comparison, the traffic-dependent L_{10} value for Site 5 was approximately 55 dBA from 7 AM to 7 PM. As with Site 1 and 2, overflights were relatively rare and typically equivalent to two people conversing one meter apart, but likely noticeable against the residential traffic at Site 5.

Table 6-5. Selected Overflights Identified via Criteria 1-3 for Site 5

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
123	7/26/3916	8:43:32 AM	8:44:06 AM	72.3	35	81.1	50.2	46.1
107	7/26/3916	8:12:33 AM	8:13:07 AM	71.5	35	80.8	50.2	46.1
86	7/26/3916	7:15:40 AM	7:15:59 AM	67.4	20	77.0	49.7	45.7
151	7/26/3916	10:20:59 AM	10:21:50 AM	67.2	52	79.1	46.7	43.3
144	7/26/3916	10:01:44 AM	10:02:13 AM	65.9	30	76.2	46.7	43.3
152	7/26/3916	10:22:29 AM	10:22:49 AM	65.8	21	74.0	46.7	43.3
140	7/26/3916	9:27:45 AM	9:28:32 AM	65.7	48	78.4	45.1	41.6
109	7/26/3916	8:16:51 AM	8:17:11 AM	63.1	21	74.1	50.2	46.1
131	7/26/3916	9:02:21 AM	9:02:53 AM	63.1	33	74.8	45.1	41.6
129	7/26/3916	8:56:59 AM	8:57:19 AM	61.3	21	72.1	50.2	46.1

Site 6: Twelve exceedance events were identified at Site 6 between 7 AM on July 26, 2016 and 10:57 AM on June 27, 2016 (see Table 6-6), equating to 0.75 Aircraft Events per hour (i.e. 1 discernable overflight every 1.3 hours) with an average duration of 25 seconds, and an average L_{max} and SEL of 70.5 dBA and 80.1 dBA, respectively. In comparison, the traffic and construction-driven L_{10} value for Site 6 was approximately 58 dBA from 7 AM to 7 PM. Based on the 6.3 observed aircraft per hour at Site 6, most overflights occurring at Site 6 are not significantly exceeding the background soundscape, and thus only the loudest overflight every 1.3 hours is reflected in Table 6-6. Given the relatively-elevated L_{max} and SEL values, the values in Table 6-6 are likely attributable to construction occurring at the high school, not flight activity.

Table 6-6. Selected Overflights Identified via Criteria 1-3 for Site 6

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
239	7/26/3916	8:20:26 AM	8:20:47 AM	76.1	22	83.6	58.1	52.0
226	7/26/3916	7:57:30 AM	7:57:50 AM	75.8	21	83.3	57.8	51.9
240	7/26/3916	8:20:52 AM	8:21:18 AM	74.0	27	83.0	58.1	52.0
770	7/27/3916	10:04:00 AM	10:04:26 AM	72.1	27	81.6	53.8	49.9
790	7/27/3916	10:56:48 AM	10:57:09 AM	71.1	22	79.9	53.8	49.9
225	7/26/3916	7:54:00 AM	7:54:22 AM	70.7	23	80.9	57.8	51.9
276	7/26/3916	10:30:07 AM	10:30:30 AM	69.7	24	80.3	57.7	53.6
230	7/26/3916	8:04:05 AM	8:04:25 AM	69.1	21	79.1	58.1	52.0
768	7/27/3916	10:02:25 AM	10:03:00 AM	68.5	36	80.5	53.8	49.9
682	7/27/3916	7:48:20 AM	7:48:44 AM	68.4	25	77.2	52.5	47.6
674	7/27/3916	7:45:24 AM	7:45:56 AM	67.4	33	78.3	52.5	47.6
696	7/27/3916	7:59:15 AM	7:59:35 AM	63.1	21	74.0	52.5	47.6

Site 7: The low traffic volume near Site 7 enabled twelve overflights to be clearly discerned between 7 AM and 10:18 AM (see Table 6-7), equating to 3.6 Aircraft Events per hour with an average duration of 40 seconds, and an average L_{max} and SEL of 71.1 dBA and 80.5 dBA, respectively. With the addition of temporary residential forklift activity, the average L_{10} value for Site 7 was approximately 53 dBA from 7 AM to 7 PM. The overflights were therefore likely distinguishable by residents in the immediate vicinity, approximately every 17 minutes.

Table 6-7. Selected Overflights Identified via Criteria 1-3 for Site 7

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
118	7/26/3916	8:34:09 AM	8:34:43 AM	77.4	35	86.3	48.1	45.3
111	7/26/3916	7:26:31 AM	7:26:59 AM	75.0	29	81.3	46.0	43.4
127	7/26/3916	9:52:38 AM	9:53:05 AM	74.6	28	81.7	46.2	43.8
112	7/26/3916	7:28:01 AM	7:28:32 AM	74.3	32	81.5	46.0	43.4
133	7/26/3916	10:17:48 AM	10:18:18 AM	73.6	31	81.2	46.3	43.7
120	7/26/3916	8:46:33 AM	8:48:02 AM	72.1	90	84.4	48.1	45.3
126	7/26/3916	9:49:57 AM	9:50:22 AM	69.7	26	77.3	46.2	43.8
124	7/26/3916	9:25:38 AM	9:26:45 AM	69.4	68	82.5	46.2	43.8
131	7/26/3916	10:17:05 AM	10:17:35 AM	68.7	31	78.0	46.3	43.7
130	7/26/3916	10:13:27 AM	10:13:50 AM	67.0	24	76.6	46.3	43.7
123	7/26/3916	9:24:19 AM	9:24:44 AM	66.5	26	76.7	46.2	43.8
117	7/26/3916	7:44:07 AM	7:45:06 AM	65.6	60	78.1	46.0	43.4

Site 8: The ambient soundscape at Site 8 features low sound levels, rendering overflights easily discernable. However, flight activity was rare at Site 8 (see Table 6-8), with just 0.67 Aircraft Events per hour (once every 90 minutes), with an average duration of 32 seconds and an average L_{max} and SEL of 62.7 dBA and 72.6 dBA, respectively. Like Site 3, the measurement data associated with overflights at Site 8 are likely caused by the flight activity (as opposed to simply correlated), and the moderately-lower average L_{max} and SEL values at Site 8 relative to Site 3 may be attributable to the often-observed practice of reduced engine power-settings by the aircraft flying over Site 8. Hence, the lower sound levels measured at Site 8 are likely less representative of sound levels produced in the general JLUS area by aircraft activity.

Table 6-8. Selected Overflights Identified via Criteria 1-3 for Site 8

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
136	7/26/3916	1:46:54 PM	1:47:24 PM	67.8	31	76.5	43.1	38.2
263	7/27/3916	10:58:05 AM	10:58:53 AM	67.8	49	78.3	41.9	39.8
129	7/26/3916	1:28:13 PM	1:28:44 PM	65.1	32	74.7	43.1	38.2
224	7/27/3916	8:07:20 AM	8:07:47 AM	63.8	28	74.4	44.2	42.5
134	7/26/3916	1:40:49 PM	1:41:10 PM	63.3	22	71.1	43.1	38.2
138	7/26/3916	1:48:26 PM	1:48:56 PM	62.9	31	72.4	43.1	38.2
105	7/26/3916	11:02:23 AM	11:03:02 AM	61.3	40	70.1	37.7	35.8
135	7/26/3916	1:42:15 PM	1:42:53 PM	60.1	39	71.9	43.1	38.2
117	7/26/3916	1:06:44 PM	1:07:11 PM	59.9	28	70.3	43.1	38.2
235	7/27/3916	9:05:59 AM	9:06:29 AM	59.1	31	70.8	42.8	40.6
266	7/27/3916	11:29:12 AM	11:29:31 AM	59.0	20	68.2	39.5	37.3

Site 9: Regular traffic adjacent to Site 9 as well as nearby residential construction caused overflight sound signatures to blend into the soundscape. When present, BRRC personnel identified sixteen flights over 3.3 hours, although half of the observed flights had associated L_{max} values that were less than the L_{max} from a single car passing along Pauma Valley Dr. Overflights with relatively low sound levels could not be identified via the algorithm because the flight activity is not sufficiently distinctive. Using the algorithm and manual review of the spectral charts, BRRC identified sixteen overflights over 8.9 hours (see Table 6-9). Whereas observed overflights (whether audibly distinctive or not) occurred at a rate of 4.8 per hour, unobserved and distinctive overflights only appeared within the measurement at a rate of 1.8 per hour. The average duration of the Aircraft Events was 47 seconds, with an average L_{max} and SEL of 64.3 dBA and 73.9 dBA, respectively. Again, the overflights listed in Table 6-9 only reflect the most elevated flight activity relative to the background soundscape; the actual average SEL for all overflights is likely to be less. The traffic-dependent L_{10} value for Site 9 was approximately 53 dBA from 7 AM to 7 PM.

Table 6-9. Selected Overflights Identified via Criteria 1-3 for Site 9

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
293	7/26/3916	9:56:21 AM	9:57:43 AM	69.9	83	81.7	45.4	41.4
452	7/26/3916	12:31:13 PM	12:31:51 PM	69.7	39	75.7	45.5	37.1
473	7/26/3916	12:47:52 PM	12:49:12 PM	69.6	81	79.5	45.5	37.1
446	7/26/3916	12:24:32 PM	12:26:22 PM	69.5	111	80.8	45.5	37.1
479	7/26/3916	12:52:07 PM	12:53:15 PM	68.4	69	77.0	45.5	37.1
331	7/26/3916	10:36:41 AM	10:37:12 AM	65.7	32	74.9	42.1	37.0
453	7/26/3916	12:31:53 PM	12:32:46 PM	65.5	54	75.1	45.5	37.1
313	7/26/3916	10:17:41 AM	10:18:16 AM	64.7	36	74.3	42.1	37.0
282	7/26/3916	9:31:05 AM	9:31:59 AM	63.1	55	74.5	45.4	41.4
398	7/26/3916	11:34:24 AM	11:34:56 AM	62.9	33	71.8	42.9	36.9
691	7/26/3916	3:50:52 PM	3:51:13 PM	62.8	22	69.9	44.3	36.8
396	7/26/3916	11:33:11 AM	11:33:46 AM	61.9	36	72.3	42.9	36.9
264	7/26/3916	9:01:27 AM	9:01:46 AM	61.3	20	71.0	45.4	41.4
518	7/26/3916	1:42:05 PM	1:42:29 PM	59.8	25	69.4	44.3	40.2
672	7/26/3916	3:37:38 PM	3:37:59 PM	58.4	22	66.3	44.3	36.8
377	7/26/3916	11:17:40 AM	11:18:05 AM	56.2	26	67.8	42.9	36.9

Site 10: Substantial commercial traffic and construction activity occurred during the entire monitoring period at Site 10. As a result, the elevated background soundscape made flight activity difficult to distinguish. In addition, flight activity was rare at Site 10: 3.1 hours of total direct observations over 3 days between the hours of 7 AM to 7 PM only resulted in one observed overflight per hour. The algorithm, including manual screening, identified eleven Aircraft Events (see Table 6-10) at a rate of 0.26 overflights per hour (i.e. 1 discernable overflight every 3.9 hours). The average duration of most prominent overflights was 34 seconds, with an average L_{max} and SEL of 70.3 dBA and 80.4 dBA, respectively. Since the L_{10} value for traffic and construction at Site 10 was approximately 59 dBA from 7 AM to 7 PM, both the L_{max} and SEL associated with overflights may be dependent on non-aircraft activity

– the background soundscape is too elevated and highly variable, particularly due to the long-term construction activity, for flight activity to be reliably distinguished when an observer is not present.

Table 6-10. Selected Overflights Identified via Criteria 1-3 for Site 10

Number	Date	Start Time	End Time	L_{max} (dBA)	Duration (s)	SEL (dBA)	L_{50} (dBA)	L_{90} (dBA)
691	7/28/3916	7:08:30 AM	7:08:53 AM	77.1	24	84.8	54.1	50.9
696	7/28/3916	7:18:01 AM	7:18:21 AM	75.3	21	83.6	54.1	50.9
169	7/26/3916	12:52:20 PM	12:53:15 PM	74.3	56	82.8	52.5	47.2
149	7/26/3916	12:24:14 PM	12:24:51 PM	73.5	38	83.1	52.5	47.2
1188	7/29/3916	10:18:42 AM	10:19:15 AM	72.0	34	80.9	51.2	46.2
33	7/26/3916	8:45:06 AM	8:45:25 AM	68.4	20	79.1	55.9	51.4
122	7/26/3916	11:34:12 AM	11:35:06 AM	67.9	55	81.8	54.3	48.1
64	7/26/3916	10:29:04 AM	10:29:45 AM	67.6	42	78.6	54.7	47.6
35	7/26/3916	9:31:48 AM	9:32:09 AM	67.1	22	79.0	56.3	53.5
1292	7/29/3916	2:04:23 PM	2:05:00 PM	65.5	38	77.5	55.0	48.2
1187	7/29/3916	10:17:24 AM	10:17:45 AM	64.2	22	73.5	51.2	46.2

6.3 Soundscape Exceedances

To provide additional context beyond the subset of aircraft exceedances, the broader range of events with sound levels that exceeded the hourly L_{90} by 10 dBA or more for at least 5 seconds but no more than 6 minutes are summarized in the figures below. Figure 6-3 displays the numerous events captured per hour, many of which are traffic and construction activities.

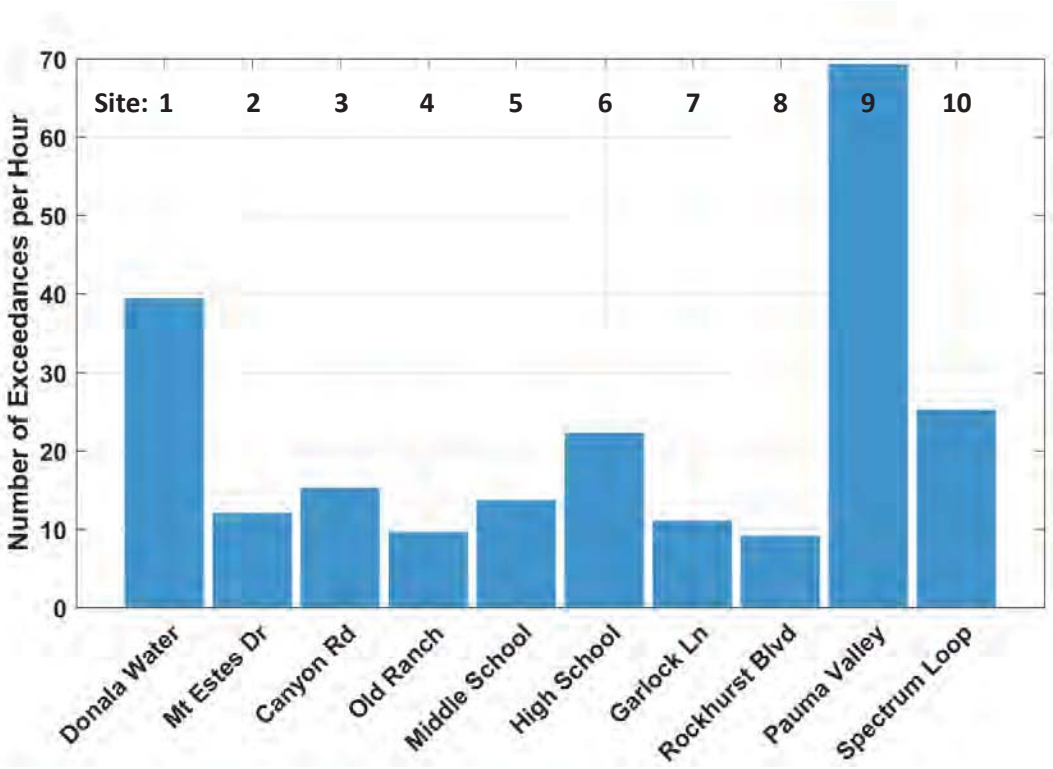

Figure 6-3. Regularity of Algorithm-Derived Events ("Exceedances") per Hour Between 7 AM to 7 PM

Figure 6-4 displays the variability in L_{max} over all events. Note that the full range of L_{max} values are displayed in the chart below, from the lowest 1-second maximum sound level to the highest L_{max} measured. The average L_{max} values presented in the discussions of the manually identified overflights all occur at the upper end of the variable range in Figure 6-4, typically near the L_{10} value. As discussed, only the most distinctive overflights appear in Table 6-1 through Table 6-10, and the associated L_{max} values in the tables tend to be the most elevated events.

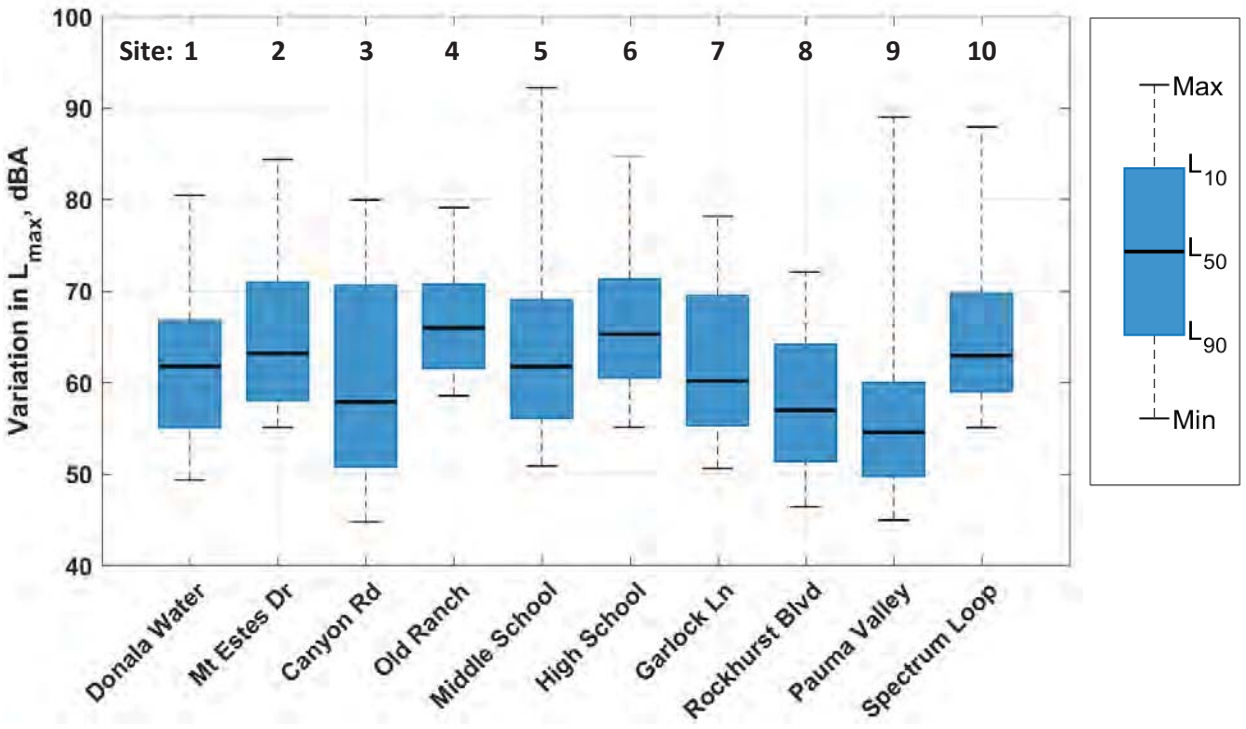

Figure 6-4. Variation in L_{max} for All Algorithm-Derived Events Between 7 AM and 7 PM

Figure 6-5 shows the variation in event duration derived from the measurement data during periods of aircraft activity (7 AM to 7 PM). As previously emphasized, numerous non-aircraft, elevated sound events occurred, and most of these events are not related to aircraft, but instead involved lawn mowing, generators, construction equipment, hedge trimming, and moderate to heavy traffic. Although flight activity tends to occur for longer durations than other similar non-aircraft events, overflights are a small portion of the many elevated events at each site, and some non-aircraft events lasted for 3 minutes or more. The maximum duration of a confirmed Aircraft Event was 111 seconds, and the average duration of all Aircraft Events was just 33 seconds.

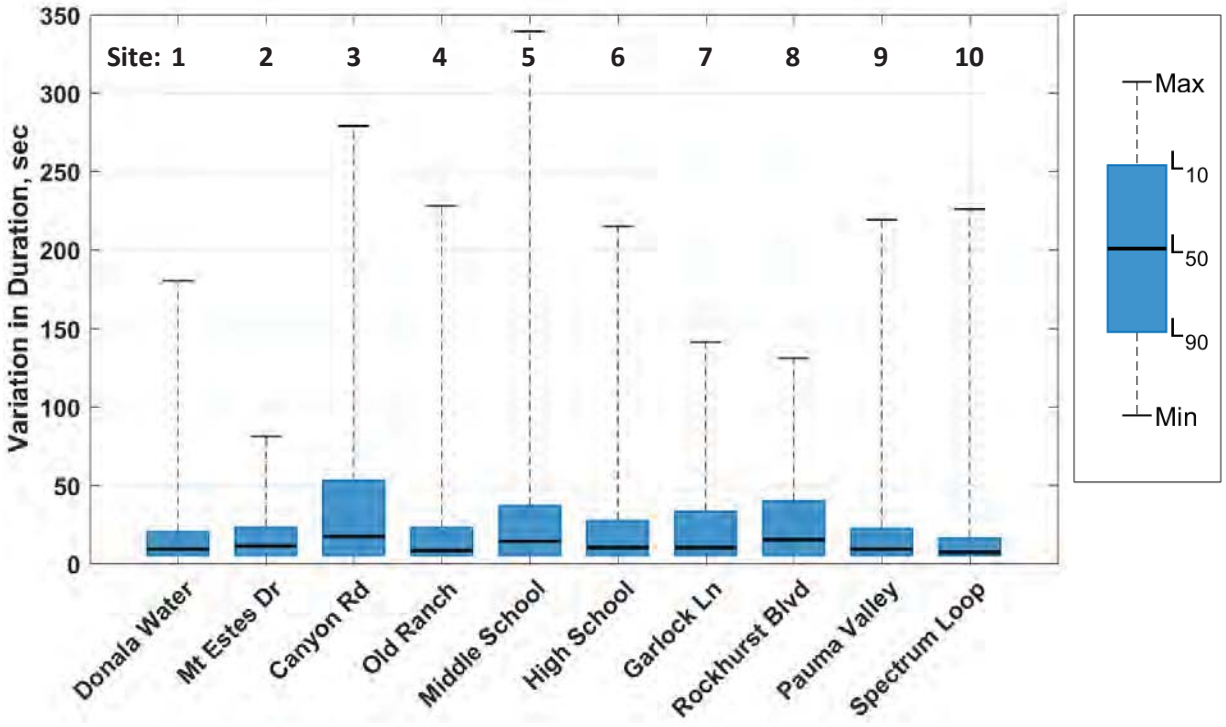

Figure 6-5. Variation in Algorithm Event Duration Between 7 AM to 7 PM

7 Future Evaluations

The results presented in this Technical Report offer detailed soundscape information at ten locations in the vicinity of the USAFA. The measurements captured high-fidelity sound levels over a multi-day period at areas of interest, with direct observations performed at each site to correlate the sound levels with visible and audible site-specific activity. The monitoring data provides a snapshot of aircraft activity within the broader conditions of background sound-generating activities in the communities adjacent to the USAFA. As emphasized in Section 4.2, the data collected under this effort provide a benchmark for any later comparison sound studies. If the PPACG sought to model the USAFA flight paths, the data collected under this effort could be used to confirm the aircraft sound levels received at the ten monitoring sites. Modeling the flight activity would enable estimates of the sound exposure at locations other than the ten monitoring sites, and the flight profiles could also be used for flight simulation visualizations of the sound exposure from USAFA aircraft to enhance public understanding. Modeling is often employed to forecast soundscape changes from contemplated flight path revisions, in which case the monitored data analyzed in this Technical Report could be used as a baseline for comparison with the modeled pending or changed USAFA operations.

8 References

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(6) Harris, C.M. Handbook of Acoustical Measurements and Noise Control. 1998.

(7) US Air Force. "Supplemental Environmental Impact Statement for F-35 Beddown at Eglin Air Force Base, Florida," Draft Appendix E: Noise, September 2010.

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(9) Downing, J.M. and C.M. Hobbs. "The Soundscape in ZION National Park," Wyle Report, WR 03-08, March 2003.

(10) Downing, J.M., Bell, D., James, M., and Hobbs, C.M. "OLF Ambient Soundscape Characterization," Wyle Technical Note, TN 06-02, May 2006.

(11) Ikelheimer, B., and James, M., "Noise Monitoring and Airfield Operations Data Collection in Support of NASA Wallops Flight Facility Site-wide Programmatic EIS," Blue Ridge Research and Consulting Technical Noise Report, October 2011.

(12) Plotkin, K.J. "Review of Technical Acoustical Issues Regarding Noise Measurements in National Parks," Wyle Report, WR 01-20, January 2002.

(13) Larson Davis Inc. "Model 831 Sound Level Meter Operation Manual," 1831.01 Rev B. 2006a.

(14) Larson Davis Inc. "LxT Operation Manual," 1770.01 Rev E. 2006b.

Appendix A: Deliverables/Data Products

The deliverables that accompany this Technical Report include SLM and WAV digital files, ambient soundscape SLM field logs, and soundscape observer notes. Each of these deliverables is described further in this Appendix.

A.1 SLM Acoustic Data Organization

The datasets and graphical files developed for this Technical Report are provided as four zipped files:

1. CO Springs JLUS L_{NN} Analysis.zip
2. CO Springs JLUS Exceedance Analysis.zip
3. CO Springs JLUS SLM Data 25 to 29July16.zip
4. CO Springs JLUS WAV Recordings 26 to 29July16.zip

The L_{NN} Analysis (No. 1 above) contains the following folder structure and content for all ten Sites:

- L_{01}, L_{10}, L_{50}, L_{90}, L_{99}
  - Level – Hourly % Time Exceeded Covering a 24-Hour Period for Each Day and the Average
    (10 Line Charts and 10 Data Tables per L_{NN})
  - Spectra – OTOB Frequency Data Covering a 24-Hour Period for Each Day, the Average, and the Standard Deviation (STD) (7 Spectral Charts and 1 Spectral Table per Site, per L_{NN})
- Summary
  - Level – Hourly % Time Exceeded Covering a 24-Hour Period, Averaged Over the Monitoring Period, for L_{01}, L_{10}, L_{50}, L_{90}, L_{99} (10 Line Charts and 10 Box Charts)
  - Spectra – OTOB Frequency Data Covering a 24-Hour Period for Each Day, Averaged Over the Monitoring Period, for L_{01}, L_{10}, L_{50}, L_{90}, L_{99} (10 Line Charts)

The Exceedance Analysis (No. 2 above) contains the following folder structure and content for all ten Sites:

- Aircraft_Events – Screened Overflights Meeting Algorithm Criteria 1-3 (118 Charts);
- Hourly – $L_{Aeq,1s}$ Relative to the Hourly L_{90} and L_{90} + 10 dBA for Criteria 1 (946 Charts);
- Summary – Overall Monitoring Results from 7 AM to 7 PM (4 Charts);

The acoustic monitoring data (No. 3 above) was downloaded from the ten individual SLMs and converted from the Larson Davis SLM files into more accessible MS Excel data files. Note that the data collected over the entire monitoring period is split over multiple Excel data files for each site, because

the sound level data was downloaded multiple times as a component of standard data security. The set of SLM files are provided as a single zipped file. The file names are standardized in the following format:

COS_XX_ID00X_2016072X.xlsx, where:

- COS – Designates "Colorado Springs JLUS Study"
- XX – Identifies the Site Number
- ID00X – Specifies a Unique File Identification Number Per Site
- 2016072X – Identifies the Measurement Ending Date

For example, COS_03_ID005_20160726.xlsx is an Excel data file containing the acoustic measurement data taken at Site 3, follows file ID004 in sequential time order, and was downloaded on July 26, 2016.

Similarly, the WAV files (No. 4 above) have a standardize file naming convention for ease of reference, using the following format, COS_02.XXX.SOUND1_2XJul2016 XX.XX.XX.wav, where:

- COS – Designates "Colorado Springs JLUS Study"
- 02.XXX – Identifies the Distinctive File Reference Number, from 1 to 132*
- 2XJul2016 – Specifies the Date when the Recording Took Place
- XX.XX.XX – Identifies the Time when the Recording Began in Hour-Minute-Second Format

For example, COS_02.021.SOUND1_26Jul2016 18.31.55.wav is a WAV data file containing the high-fidelity sound recording taken at Site 2, with a distinctive file reference of 02.021, on July 26, 2016 with a start time of 6:31:55 pm. The set of WAV data files are provided as a single zipped file.

**File 02.024 contained an error such that a total of 131 WAV files are provided, not 132, with file 02.001 provided as a reference calibration tone at 94 dB and 1000 Hz (i.e. 130 soundscape recordings).*

A.2 Ambient Soundscape SLM Maintenance Logs

Maintenance logs were used to document SLM site visits for deployment, maintenance, and recovery of the SLM as well as data downloading. The maintenance logs utilized for this sound study are shown below.

Title: Field Notes for CO Springs Regional JLUS
Location: Vicinity of USAFA Flight Paths
Date: July 25, 2016 Deployment (July 26-27 Download)
Recorder: Josh Mellon, Sr. Scientist, BRRC

Number		SLM Download and Tear Down					SLM Deployment												Notes
SLM #	Site #	Memory & Battery	Pre-Cal Overload?	Cal Level	Time Δ	Downloaded File Name	Replace Battery	Confirm Setup	Date/Time Sync	Memory & Battery	Confirm "Nrml"	Cal Level	Cal Record	Confirm Record	Ambient $L_{aeq,1s}$	Case Locked	Non-OBA	Cord Secure	Time of Departure	Comments
1	1	68% 5.5v	No	94.1	21s Fast	COS_01.001	New	COS_01	2s Slow	84% 6.6v 831 222 MB	✓ +20 dB	✓Hotel ✓Field	30s	✓	45 - 50	✓	✓	✓	12:27pm	
15	2	98% 5.7v	No	93.8	9s Fast	COS_15.001	New	COS_15	3s Slow	99% 6.6v 831 1.9 GB	✓ +20 dB	✓Hotel ✓Field	30s	✓	~50	✓	✓	✓	1:08pm	
3	3	78% 5.7v	No	93.9	11s Fast	COS_03.004	New	COS_03	1s Slow	85% 6.6v 831 222 MB	✓ +20 dB	✓Hotel ✓Field	30s	✓	~40	✓	✓	✓	1:42pm	
4	4	71% 5.7v	No	93.9	Sync ✓	COS_04.001	New	COS_04	1s Slow	72% 6.2v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~61 60 - 65	✓	✓	✓	2:14pm	
5	5	72% 5.7v	No	93.9	Sync ✓	COS_05.001	New	COS_05	1s Slow	73% 6.3v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~48 47 - 50	✓	✓	✓	3:11pm	
6	6	66% 5.7v	No	93.9	1s Fast	COS_06.003	New	COS_06	1s Fast	67% 6.5v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~48 47 - 54	✓	✓	✓	4:05pm	
7	7	64% 5.6v	No	93.9	4s Fast	COS_07.003	New	COS_07	4s Fast	65% 6.4v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~48 47 - 50	✓	✓	✓	4:42pm	
8	8	65% 5.6v	No	94.0	Sync ✓	COS_08.001	New	COS_08	1s Slow	66% 6.3v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~45 44 - 54	✓	✓	✓	5:31pm	
9	9	64% 5.9v	No	93.8	1s Slow	COS_09.001	New	COS_09	1s Slow	65% 6.3v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~43 42 - 50	✓	✓	✓	6:25pm	
10	10	99% 5.9v	No	94.0	Sync ✓	COS_10.001	New	COS_10	1s Slow	99% 6.4v LxT	✓ LxT	✓Hotel ✓Field	30s	✓	~47 46 - 54	✓	✓	✓	7:19pm	Modal Shop Replacement for BRRC SLM #10

Number		SLM Site Description						
SLM #	Site #	Serial # (SLM, Mic, & Pre-Amp)	Location	Pictures	Cloud Cover %	Rain	Microphone Height	Ambient Description
1	1	SLM 1418 B02 Mic 105222 831 PreA	Donala Water District 15850 Holbein Dr, CO Springs	✓	35%	None	5 Ft	(1) Traffic noise dominates (2) Bldg HVAC (3) Residential traffic (4) Wind through vegetation (5) Birds
15	2	SLM 1306 B02 Mic 106213 831 PreA	Adjacent to 1112 Mt Estes Dr Just outside front side gate	✓	50%	None	5 Ft	(1) Commercial traffic dominates *Low Wind*
3	3	SLM 1417 B02 Mic 106212 831 PreA	Stanley Canyon Rd near 12441 Mt Baldy Dr	✓	40%	None	5 Ft	(1) Residential lawn mower (2) Distant traffic (3) Wind through vegetation (4) Children *Windy*
4	4	SLM 4015 B20 Mic 142878 LxT PreA	Near 1020 Old Ranch Rd	✓	75%	None	5 Ft	(1) Commercial traffic (2) Regular overflights *Windy*
5	5	SLM 4016 B20 Mic 149313 LxT PreA	Mt Ridge Middle School 9150 Lexington Dr	✓	90%	None	5 Ft	(1) Residential traffic (2) Middle School HVAC (3) Distant thunder (4) Lawn Mower *Low Wind*
6	6	SLM 4017 B20 Mic 148990 LxT PreA	Rampart High School 8250 Lexington Dr	✓	95%	*Rare Drops*	5 Ft	(1) Mowing and adjacent construction at HS (2) Traffic (3) Construction at opposite end of HS (4) HS Band *High Wind*
7	7	SLM 4018 B20 Mic 148905 LxT PreA	Across from 1050 Garlock Ln Down rocky hill	✓	50%	None	5 Ft	(1) Distant traffic (2) Bird calls (3) Wind through vegetation *Low Wind*
8	8	SLM 4019 B20 Mic 148910 LxT PreA	Between 2694 & 2671 Rockhurst Blvd Down dirt clearing	✓	95%	None	5 Ft	(1) Wind through vegetation dominates (2) Distant traffic *Medium to High Wind*
9	9	SLM 4020 B20 Mic 142928 LxT PreA	Across from 375 Pauma Valley Dr Near small square covering	✓	95%	None	5 Ft	(1) Wind through vegetation (2) Residential traffic (3) Lite residential construction at 355 Pauma Valley Rd *Low Wind*
10	10	SLM 4714 B02 Mic 140146 LxT PreA	Across from 604 Spectrum Loop Just inside pasture gate	✓	98%	*Rare Drops*	5 Ft	(1) Passing traffic along Spectrum Loop and adjacent roads dominates (2) Insects (3) Commercial HVAC unit (4) Dog barking

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Title: Field Notes for CO Springs Regional JLUS
Location: Vicinity of USAFA Flight Paths
Date: July 26-27, 2016 Deployment (July 29 Deployment)
Recorder: Josh Mellon, Sr. Scientist, BRRC

Number		SLM Download and Tear Down					SLM Deployment													Notes
SLM #	Site #	Memory & Battery	Pre-Cal Overload?	Cal Level	Time Δ	Downloaded File Name	Replace Battery	Confirm Setup	Date/Time Sync	Memory & Battery	Confirm "Nrml"	Cal Level	Cal Record	Confirm Record	Ambient $L_{aeq,1s}$	Case Locked	Non-OBA	Cord Secure	Time of Departure	Comments
1	1	55% 5.2v 831	No	93.0 30s	20s Fast	COS_01.002	Used	COS_01	✓ Sync	68% 5.5v 831 222 MB	✓	94.0	30s	✓	41 - 48	✓	✓	✓	6:30pm	Redeployed on Wednesday, July 27
15	2	96% 5.3v 831	No	93.8 30s	13s Fast	COS_15.003	Used	COS_15	✓ Sync	98% 5.7v 831 1.9 GB	✓	94.0	30s	✓	~48	✓	✓	✓	4:00pm	Redeployed on Tuesday, July 26
3	3	57% 5.3v 831	No	93.9 30s	12s Fast	COS_03.006	Used	COS_03	1s Fast	78% 5.7v 831 222 MB	✓	94.0	30s	✓	41 - 50	✓	✓	✓	5:00pm	Redeployed on Tuesday, July 26
4	4	69% 5.4v LxT	No	93.9 30s	1s Slow	COS_04.002	Used	COS_04	✓ Sync	71% 5.7v LxT	✓	94.0	30s	✓	~60	✓	✓	✓	6:04pm	Redeployed on Tuesday, July 26
5	5	70% 5.3v LxT	No	94.0 30s	2s Fast	COS_05.003	Used	COS_05	1s Fast	72% 5.6v LxT	✓	93.9	30s	✓	> ~42	✓	✓	✓	7:01pm	Redeployed on Tuesday, July 26
6	6	64% 5.4v LxT	No	94.0 30s	1s Slow	COS_06.004	Used	COS_06	✓ Sync	66% 5.6v LxT	✓	94.0 Cal.	30s	✓	48 - 53	✓	✓	✓	7:54pm	Redeployed on Wednesday, July 27
7	7	62% 5.3v LxT	No	93.9 30s	✓ Sync	COS_07.004	Used	COS_07	1s Fast	64% 5.6v LxT	✓	93.9	30s	✓	54 - 56	✓	✓	✓	10:28am	Redeployed on Wednesday, July 27
8	8	63% 5.4v LxT	No	93.9 30s	✓ Sync	COS_08.002	Used	COS_08	1s Fast	65% 5.6 LxT	✓	94.0	30s	✓	39 - 42	✓	✓	✓	12:08pm	Redeployed on Wednesday, July 27
9	9	62% 5.5v LxT	No	94.2 30s	✓ Sync	COS_09.004	Used	COS_09	1s Fast	64% 5.9v LxT	✓	94.0	30s	✓	38 - 50	✓	✓	✓	~11:50am	Redeployed on Tuesday, July 26
10	10	96% 5.4v 831	No	93.8 30s	1s Fast	COS_10.002	Used	COS_10	✓ Sync	99% 5.6v LxT	✓	94.0	30s	✓	~57	✓	✓	✓	2:24pm	Redeployed on Tuesday, July 26

Number		SLM Site Description						
SLM #	Site #	Serial # (SLM, Mic, & Pre-Amp)	Location	Pictures	Cloud Cover %	Rain	Microphone Height	Ambient Description
1	1	SLM 1418 B02 Mic 105222 831 PreA	Donala Water District 15850 Holbein Dr, CO Springs	✓	20%	None	5 Ft	Traffic on E. Babtist dominates *Light Wind*
15	2	SLM 1306 B02 Mic 106213 831 PreA	Adjacent to 1112 Mt Estes Dr Just outside front side gate	✓	98%	*Rare Drops*	5 Ft	Applied "Power Save" mode *Light Wind*
3	3	SLM 1417 B02 Mic 106212 831 PreA	Stanley Canyon Rd near 12441 Mt Baldy Dr	✓	100%	None	5 Ft	Birds are the primary noise source
4	4	SLM 4015 B20 Mic 142878 LxT PreA	Near 1020 Old Ranch Rd in USAF area	✓	95%	None	5 Ft	Traffic along I-25 is the primary source
5	5	SLM 4016 B20 Mic 149313 LxT PreA	Mt Ridge Middle School 9150 Lexington Dr	✓	60%	None	5 Ft	Traffic along Lexington is the primary source
6	6	SLM 4017 B20 Mic 148990 LxT PreA	Rampart High School 8250 Lexington Dr	✓	10%	None	5 Ft	Traffic along Lexington is the primary source
7	7	SLM 4018 B20 Mic 148905 LxT PreA	Across from 1050 Garlock Ln Down rocky hill	✓	5%	None	5 Ft	Residential forklift is the primary source
8	8	SLM 4019 B20 Mic 148910 LxT PreA	Between 2694 & 2671 Rockhurst Blvd Down dirt clearing	✓	10%	None	5 Ft	Distant traffic noise dominates
9	9	SLM 4020 B20 Mic 142928 LxT PreA	Across from 375 Pauma Valley Dr Near small square covering	✓	90%	None	5 Ft	*Windy*
10	10	SLM 4714 B02 Mic 140146 LxT PreA	Across from 604 Spectrum Loop Just inside pasture gate	✓	95%	None	5 Ft	Applied "Power Save" mode after a discussion with the Model Shop (SLM was > 120 °F in case due to direct sunlight) *Light Wind*

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A.3 Soundscape Observer Notes

Field observation notes were collected to identify the sound sources received at the monitoring locations as well as to describe the sound-generating activity occurring during WAV recordings. These observations noted ambient and transient sound events, sound level on a $L_{Aeq,1s}$ basis, and the time and reference number for WAV recordings. The set of observation logs from all ten monitoring sites appears below.

To aid the reader in reviewing the field observation notes, the following definitions may be helpful: "overhead" refers to aircraft flying above the monitoring site (where the *majority* of the aircraft were no more than ~500 ft away, laterally, from the microphone position, and *all* overhead aircraft were within ~0.25 NM laterally). "Mid-range" refers to aircraft that were audible yet not on a flight path directly over the monitoring site. Mid-range aircraft were further than ~0.25 NM away laterally from the monitoring site. When aircraft were visible to BRRC personnel but not distinctly audible, they were classified as "distant."

In addition, note that the dB values under the $L_{Aeq,1s}$ column are provided as a confirmatory reference when performing more detailed analysis with the site-specific SLM data, and not as standalone statement on the sound level. That is, the sound levels as measured by the SLMs will typically vary beyond 1 dB unless ambient conditions are stable. Hence, many of the reported dB levels feature a "~" to indicate that levels fluctuated during the reported period. When conditions were stable (fluctuating less than 1 dB during the noted time), the "~" is not present. Lastly, the "high" reference next to the dB level indicates that the reported $L_{Aeq,1s}$ value was the highest observed by BRRC personnel for a transient event during the reported time. In contrast, the "low" values are associated with ambient backgrounds with the lowest $L_{Aeq,1s}$ value selected from the values shown on the SLM screen every 1-second during the noted timeframe.

SITE 1

Coverage Period(s): **Wed, July 27: 5:18–6:30pm** **July 28: 6:35–7:51am** **July 29: 3:39–4:00pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 1, Donala Water District**

Wed, July 27	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
5:20 – 5:21 pm	45 – 50 dB	*Ambient:* Donala internal HVAC and E. Baptist Rd traffic and birds
~5:22:20 pm	40 dB (low)	*Low Ambient* with no E. Baptist Rd traffic and Donala HVAC
5:24+ pm	59 dB (high)	Car passing along Holbein Dr
5:35:38 – 36:21 pm		Vehicle passing on Holbein Dr with no/limited traffic on E. Baptist Rd **– COS_02.046**
5:43:20 pm	61 dB (high)	Vehicle passing on Holbein Dr with no/limited traffic on E. Baptist Rd
5:51:40 pm	66 dB (high)	SUV passing on Holbein Dr with no/limited traffic on E. Baptist Rd
5:58:00 pm	66 dB (high)	Truck passing on Holbein Dr with no/limited traffic on E. Baptist Rd
6:00:35 pm	69 dB	Jeep passing on Holbein Dr with no/limited traffic on E. Baptist Rd
6:05:00 pm	50 dB	Vehicles along E. Baptist Rd, with none on Holbein Dr
6:08:35 pm	40 dB (low)	Birds are the dominate sound source, then distant traffic
6:21:10 pm	60 dB (high)	Dump truck along E. Baptist Rd
6:23:18 – 24:08 pm		Vehicles passing on Holbein Dr → 2x vehicles on E. Baptist Rd **– COS_02.047**
6:29:10 pm	41 dB	*Ambient:* no traffic on Holbein or E. Baptist
6:30 pm		*General Note: {No visible/audible flight activity during the Coverage Period}*
Thurs, July 28		
6:42:04 – 43:15 am		Jeep idling in residential area, car passing on E. Baptist, Jeep passing on Holbein Dr, traffic on E. Baptist **– COS_02.048**
6:52:35 am	69 dB (high)	Two vehicles along Holbein Dr
6:53:30 am	45 dB (low)	*Ambient* with birds, and no nearby vehicles on Holbein or Baptist (distant I-25 and other traffic)
6:56:50 – 58:10 am		Traffic along E. Baptist and distant I-25 and other traffic **– COS_02.049**
7:04 am		*General Note: {First plane visible over the USAFA area}*
7:05:20 – 06:32 am		**Direct flyover – COS_02.050**
7:10:02 – 11:50 am		**Direct flyover – COS_02.051**
7:19:41 – 20:34 am		Donala HVAC with **3x distant aircraft** over USAFA (although not audible) **– COS_02.052**
7:27:24 – 28:37 am		*Ambient* with traffic on E. Baptist and Donala HVAC, birds, **distant aircraft –**
7:31:32 – 32:21 am		*Ambient* with traffic on E. Baptist and Holbein Dr and birds **– COS_02.054**
7:40:26 – 42:02 am		**Direct flyover** with traffic on E. Baptist **– COS_02.055**
7:46:57 – 47:51 am		**Direct flyover** with traffic on Holbein **– COS_02.056**
Fri, July 29		
3:42:49 – 43:49 pm		*Ambient:* **mid-range aircraft** (unseen), E. Baptist traffic, wind **– COS_02.123**
3:52:29 – 53:21 pm		*Ambient:* car passing on Holbein, E. Baptist traffic, wind, & flag pole string **–**

SITE 2

Coverage Period(s): **Tues, July 26: 2:59–3:59pm** **July 28: 10:37–11:29am** **July 29: 4:55–5:14pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 2, 1112 Mt Estes Dr**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
2:59:30+ pm	~40 dB	Leaf blower along Voyager Parkway
3:00:59 – 01:37 pm		2nd leaf blower along Voyager Parkway with 1st blower now distant from Site 2 **– COS_02.009**
3:06:00 pm	~53 dB	*Ambient:* traffic along Voyager Parkway (no leaf blower)
3:11:26 – 12:36 pm		Traffic along Voyager Parkway **– COS_02.010**
3:22:12 – 23:16 pm		Limited traffic along Voyager Parkway **– COS_02.011**
3:33:44 – 34:33 pm		Traffic along Voyage Parkway **– COS_02.012**
3:44:32 – 45:43 pm		Heavier traffic along Voyage Parkway **– COS_02.013**
3:49:10 – 50:23 pm		Medium traffic along Voyage Parkway **– COS_02.014**
3:54:00 pm	~49 dB	Limited traffic
3:59 pm		*General Note: {Rare traffic in Mt Estes Dr cul-de-sac}*
3:59 pm		*General Note: {No visible/audible overflights during the Coverage Period}*
Thurs, July 28		
10:38:27 – 39:53 am		*Ambient:* traffic along Voyage Parkway and **distant aircraft** over USAFA **– COS_02.067**
10:40:10 – 42:24 am		*Ambient:* traffic along Voyage Parkway and **distant aircraft** over USAFA **– COS_02.068**
10:49:08 – 50:11 am		**Flight** along I-25 with traffic along Voyage Parkway and residential hammer **– COS_02.069**
11:00:49 – 01:23 am		End of a **low/landing flight** turning from Voyage Parkway into USAFA **– COS_02.070**
11:02:58 – 04:06 am		**Flight** along Voyager and turning toward USAFA **– COS_02.071**
11:16:00 – 17:19 am		**Direct overflight** and turning toward USAFA **– COS_02.072**
11:19:53 – 20:43 am		Resident sawing in immediate vicinity, **approximate overflight**, train whistle, traffic on Voyager Parkway, birds **– COS_02.073**
11:21:10 – 21:54 am		**Direct overflight**, traffic, birds **– COS_02.074**
11:22:43 – 23:42 am		**Direct overflight** performing a turn, Voyage Parkway traffic, birds, resident hammering **– COS_02.075**
Fri, July 29		
4:57:52 – 59:30 pm		Residents talking, Voyager Parkway traffic, train horn, no visible flights **– COS_02.129**
5:09:05 – 10:01 pm		*Ambient:* Voyager traffic, no visible flights **– COS_02.130**

SITE 3

Coverage Period(s): **Tues, July 26: 4:09–5:00pm** **July 28: 11:42am–12:10pm** **July 29: 5:19–5:40pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 3, Near Northgate Reservoir**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
4:10:30 pm	~40 dB	*Ambient:* distant residential weed-whacking, hammering, birds, ducks
4:20:15 – 21:12 pm		*Ambient* (40 with brief 50 dB due to dog barking) **– COS_02.015**
4:34:22 – 35:20 pm		*Ambient* with birds and residential hammering **– COS_02.016**
4:40:55+ pm	~48 dB	Dogs barking
4:42:10 pm	43 dB (high)	Car turning from Stanley Canyon
4:45:30 pm	43 dB (high)	USAFA Revelry Horn
4:46:15 pm	~37 dB	*Ambient* with no wind and few birds
4:46:45+ pm	43 dB	National Anthem played on USAFA speakers
4:48:05 pm	50 dB	Birds chirping nearby
4:49:11 – 51:06 pm		**Distant aircraft** and bird chirps (brief 50 dB) **– COS_02.017**
4:53 pm	58 dB (high)	Bird chirps
5:00 pm		*General Note: {No overflights during the Coverage Period}*
Thurs, July 28		
11:43:30 am	36 – 50 dB	*Ambient:* Residential music and bird calls
11:44:41 – 45:49 am		**Mid-range flight** ~0.5-miles away → *Ambient* **– COS_02.076**
11:46:51 – 49:29 am		**Direct overflight** turning over Northgate R. & over Site 3, 360° then 270° turn **– COS_02.077**
11:55:31 – 57:01 am		90° **flight** turn over Northgate R. to USAFA then 90° back **– COS_02.078**
11:57:18 am – 12:01:38 pm		**2x direct overflights** turning 180° over Northgate → **mid-range flight** ~0.5-miles away → **2x direct overflight** turns (90°) **– COS_02.079**
12:02:07 – 04:42 pm		**Direct overflight** → 90° turn → 2nd **overflight – COS_02.080**
12:05:50 – 06:53 pm		**Mid-range flight transit** across Northgate ~0.5-miles away (no turn) **– COS_02.081**
12:07:52 – 09:11 pm		**Flight transit** from near-overhead then departure **– COS_02.082**
Fri, July 29		
5:19:43 – 21:32 pm		*Ambient:* Residential construction, residents talking, birds, insects, light wind, dogs, kids playing **– COS_02.131**
5:28:34 – 29:23 pm		*Ambient:* Residential construction, residents talking, birds, insects, light wind, kids playing (no dogs) **– COS_02.132**

SITE 4

Coverage Period(s): **Tues, July 26: 5:12–6:04pm** **July 28: 12:34–12:58pm** **July 29: 12:42–1:00pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 4, near 1020 Old Ranch Rd**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
5:14:40 pm	~64 dB	*Ambient:* traffic along I-25 dominates, **2x distant aircraft**
5:17:10 pm	~60 dB	*Ambient:* traffic without planes (and lighter traffic)
5:24:42 – 26:11 pm		**4x aircraft** over USAFA area (not overflights) **– COS_02.018**
5:39:40 pm	~63 dB	**5x aircraft** over USAFA area (not overflights)
5:49:35 – 51:52 pm		**4x aircraft** over USAFA area (3x coming in and landing) **– COS_02.019**
5:57:55 – 59:17 pm		**2x aircraft** taking off and **1x aircraft** landing at USAFA **– COS_02.020**
Thurs, July 28		
12:27:09 – 38:05 pm		**Plane** taking off with **2x aircraft** landing at USAFA airfield **– COS_02.084**
12:34:53 – 35:38 pm		**2x aircraft** taking off from USAFA airfield with continuous I-25 traffic **– COS_02.083**
12:39:43 – 40:52 pm		**Direct overflight – COS_02.085**
12:47:03 – 49:04 pm		180° **flight** turn around Site 4 → I-25 traffic → **flight – COS_02.086**
12:50:54 – 52:37 pm		**Flight** over I-25 with a turn near Site 4 → **overflight – COS_02.087**
12:56:16 – 57:42 pm		I-25 traffic (no flight activity visible) **– COS_02.088**
Fri, July 29		
12:42:44 – 45:13 pm		**2x aircraft** over adjacent USAFA with I-25 traffic **– COS_02.121**
12:54:45 – 56:54 pm		**Aircraft** 2-3 miles away for parachute drops over USAFA, with I-25 traffic **– COS_02.122**

SITE 5

Coverage Period(s): **Tues, July 26: 6:19–7:01pm** **July 28: 1:23–2:01pm** **July 29: 12:11–12:28pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 5, Mt Ridge Middle School**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
6:22 pm	44 – 47 dB	*Ambient:* Limited traffic on Lexington, wind, talking on nearby track
6:31:48 – 33:00 pm		**3x distant aircraft** visible over USAFA; wind and traffic are the primary sound sources and voices audible on the nearby jogging track **– COS_02.021**
6:43:50 pm	46 dB	Cars passing on Lexington
6:44:10 pm	41 dB	*Ambient:* birds and distant traffic
6:46:00 – 46:47 pm		Traffic along Dynamic Dr toward Lexington **– COS_02.022**
6:50:25 pm	~40 dB	**Distant flight** over USAFA and few cars
6:51:59 – 52:38 pm		5x cars along Lexington **– COS_02.023**
Thurs, July 28		
1:24:30+ pm	~55 dB	**Overflight** and then a turn ~0.5-mile from Mt Ridge Middle School
1:26:59 – 28:36 pm		**Direct overflight** then 180° turn **– COS_02.089**
1:29:22 – 30:48 pm		**Direct overflight** then 90° turn long past Middle School **– COS_02.090**
1:31:34 – 32:35 pm		**Direct overflight** then 180° turn over Middle School **– COS_02.091**
1:34:55 – 37:11 pm		**Direct overflight** with 90° turn → MS lawn mower loading into truck **– COS_02.092**
1:47:02 – 48:53 pm		Middle School weed-whacker and residential lawn mower → **direct overflight – COS_02.093**
1:49:34 – 51:15 pm		**Overflight** → 2nd **overflight** with weed-whacker/lawn mower throughout **– COS_02.094**
1:52:03 – 52:47 pm		**Flight** turning ~0.3 miles from Mt Ridge Middle School with no weed-whacker activity, but continued lawn mower sound **– COS_02.095**
1:55:08 – 55:59 pm		Weed-whacker ~30 feet from Site 5 **– COS_02.096**
1:56:50 – 57:35 pm		Weed-whacker ~100 feet away and **direct overflight – COS_02.097**
1:58:22 – 59:40 pm		**Direct overflight** and turn **– COS_02.098**
Fri, July 29		
12:20:30 – 21:55 pm		**Flight** turn ~0.5-mile from Middle School and traffic on Lexington **– COS_02.120**

SITE 6

Coverage Period(s): **Wed, July 27: 6:35–7:52am** **July 28: 2:20–2:44pm** **July 29: 11:44am–12:04pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 6, Rampart High School**

Wed, July 27	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
6:36:55 – 37:30 am	46 – 51 dB	*Ambient:* Cars along Lexington and in the HS parking lot (dog barking)
6:39:55 am	43 dB (low)	*Low Ambient:* No nearby traveling vehicles
6:45:57 – 47:03 am		Construction activity beginning at HS with cars along Lexington **– COS_02.025**†
6:50:03 – 51:03 am		**2x chinook helicopters** → HS leaf blower **– COS_02.026**
6:56 – 6:57 am	50 – 55 dB	*Ambient:* construction and cars arriving into HS parking lot
6:59:30 am	43 dB (low)	*Low Ambient:* Distant HS leaf blower and no cars along Lexington
7:06 am		*General Note: {No visible or audible USAFA aircraft yet}*
7:11 am		*General Note: {1st distant USAFA propeller plane}*
7:28:30 am	62 dB (high)	Car squealing in HS parking lot
7:29:45 to 30:00 am	47 – 52 dB	*Ambient:* Traffic along Lexington and limited HS construction sound
7:32:00 am	44 dB (low)	*Low Ambient:* no nearby vehicles
7:33:39 – 34:28 am		**Distant flight** and distant train whistle with cars along Lexington **– COS_02.027**
7:37:59 – 39:20 am		**Direct overflight** and cars along Lexington **– COS_02.028**
7:40+ am		*General Note: {Propeller planes regularly visible over USAFA}*
7:44 – 7:45 am	53 – 56 dB	*Ambient: vehicles along Lexington dominate soundscape*
7:45:20 – 46:10 am	67 dB (high)	**Direct overflight**
7:46:45 am	62 dB (high)	HS construction sound
7:47:50 – 48:51 am		**Direct overflight** → loud HS construction sound **– COS_02.029**
7:50:30 – 51:30 am	61 dB	**2x overflight**s
Thurs, July 28		
2:21:43 – 23:22 pm		**Helicopter** (~1 mile away) → high winds → **overflight** followed by a turn **– COS_02.099**
2:24:03 – 25:52 pm		**Direct overflight** with a 360° turn over the HS (and high winds) **– COS_02.100**
2:29:49 – 30:33 pm		**Direct overflight** and turn, plus HS band metronome beat **– COS_02.101**
2:38:03 – 38:56 pm		*Ambient:* High winds in trees, Lexington traffic, HS tennis court maintenance **– COS_02.102**
2:40:04 – 40:40 pm		**Flight** ~1 mile from HS **– COS_02.103**
Fri, July 29		
11:45:45 – 47:11 am		**Direct overflight** with a turn over HS, plus a car entering the HS parking lot **– COS_02.117**
11:48:01 – 49:26 am		**Direct overflight** plus Lexington traffic **– COS_02.118**
11:59:14 am – 12:00:33 pm		**Direct overflight** → *Ambient* → car in HS parking lot **– COS_02.119**

†*COS_02.024 WAV file not used*

SITE 7

Coverage Period(s): **Wed, July 27: 8:28–10:27am** **July 28: 3:22–3:52pm** **July 29: 11:00–11:28am**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 7, Across from 1050 Garlock Ln**

Wed, July 27	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
8:31 – 8:32am	37 – 40 dB	*Ambient:* Residential construction activity at 1120 Garlock Ln (~200 yard by road, and ~100 yards direct), and distant I-25 traffic ongoing
8:34:13 – 35:20 am		*Ambient:* Residential forklift sound dominates, followed by I-25 **– COS_02.030**
8:41:30 am	56 dB	**Distant aircraft** around USAFA, plus construction activity & I-25
8:43:00 am	56 - 58 dB	*Ambient* with no mid-range flight activity (**distant aircraft**)
8:45:29 – 46:51 am		**Mid-range flight** with residential construction & birds → 2nd **mid-range flight – COS_02.031**
8:50:40 – 52:17 am		**Mid-range flyover** with residential construction saw, birds, I-25 **– COS_02.032**
8:55:00 am	61 dB (high)	**Direct flyover** with low residential construction sound plus I-25
8:56:00 am	50 dB	*Ambient* with no mid-range flights and idling residential forklift plus I-25
9:15:15 – 15:45 am	52 – 55 dB	Residential forklift and **distant flight** plus I-25
9:35:30 – 36:00 am	51 – 54 dB	Continued residential forklift and **distant flight** plus I-25
9:37:30 – 38:44 am		Residential forklift plus I-25 with no audible flights (**distant aircraft**) **– COS_02.033**
9:51:00 – 51:30 am	53 – 57 dB	Residential forklift plus I-25 with **mid-range flights**
9:52:14 – 53:28 am		**Direct overflight** with residential forklift, birds, I-25 **– COS_02.034**
10:07:50 – 08:33 am		**Direct low overflight** with forklift, birds, I-25 **– COS_02.035**
10:11:55 am	~50 dB	*Ambient* without forklift, but with birds, I-25
10:12:25+ am	~64 dB (high)	**Direct low overflight** with forklift, birds, I-25
10:14:47 – 15:49 am		**Direct low overflight** with forklift, birds, I-25 **– COS_02.036**
10:22:28 – 23:39 am		No audible flights (visible in far-field, **distant aircraft**) with forklift, I-25 **– COS_02.037**
10:26:30 am	~47 dB	Birds, talking, I-25 (no forklift sound)
Thurs, July 28		
3:27:06 – 27:56 pm		*Ambient*: Medium wind in vegetation, and I-25 traffic **– COS_02.104**
3:37:18 – 38:13 pm		**Distant aircraft** heard but not seen, plus I-25 **– COS_02.105**
3:45:30 pm	52 – 54 dB	*Ambient:* Medium wind plus I-25
3:48:46 – 49:58 pm		*Ambient:* No planes visible over USAFA **– COS_02.106**
Fri, July 29		
11:00:39 – 02:41 am		**4x distant aircraft** with 1x turning within 2x miles **– COS_02.114**
11:11:10 – 16:02 am		**2x direct overflights** conducting slow turns over Site 7 → high jet liner → **mid-range flight** turn ~2-mile away **– COS_02.115**
11:25:01 – 25:51 am		**2x aircraft** turning ~2-miles away, dog barking, I-25, birds **– COS_02.116**

SITE 8

Coverage Period(s): **Wed, July 27: 10:54am–12:06pm** **July 28: 4:07–4:31pm** **July 29: 10:14–10:42am**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 8, by 2694 Rockhurst Blvd**

Wed, July 27	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
~10:56:45 am	37 – 40 dB	*Ambient:* distant traffic, wind through vegetation, **distant aircraft**, birds, dog barking
10:58:15 - 59:10 am	~63 dB	**Direct overflight**
11:00:15 am	~42 dB	**Distant aircraft**
11:07:23 – 08:36 am		*Ambient:* distant traffic, nearby birds and insects, wind through vegetation **– COS_02.038**
11:20:20 am	~40 dB	*Ambient:* distant traffic, nearby birds and insects, wind through vegetation
11:22:22 – 23:52 am		*Ambient:* distant traffic, nearby birds and insects, wind through vegetation and unseen **mid-range aircraft – COS_02.039**
11:29:25+ am	55 then 40 dB	**Direct overflight** (55 dB) with engines cut/reduced past Site 8 (40 dB)
11:33:14 – 35:41 am		**Direct overflight** (with birds, residents talking, wind) **– COS_02.040**
11:39:12 – 40:12 am		**Mid-range overflight** by an unseen aircraft **– COS_02.041**
11:43:32 – 44:12 am		*Ambient:* wind and distant traffic **– COS_02.042**
11:49:07 – 51:05 am		*Ambient* → **overflight** with engines cut → *Ambient* **– COS_02.043**
11:54:28 – 55:22 am		**Direct overflight** with engines cut past Site 8 **– COS_02.044**
11:56:32 – 57:55 am		**Direct overflight** with engines cut past Site 8 → *Ambient* **– COS_02.045**
12:00:30+ pm	~55 dB	**Direct overflight** (did not cut engines)
12:04:25 pm	~43 dB	**Direct overflight** with engines cut before Site 8
12:05:45 pm	~38 dB	*Ambient:* wind, distant traffic and **distant aircraft**
Thurs, July 28		
4:08:30 – 09:39 pm		*Ambient:* wind, distant traffic and no flights visible/audible **– COS_02.107**
4:22:02 – 23:06 pm		*Ambient:* wind, distant traffic and no flights visible/audible **– COS_02.108**
Fri, July 29		
10:14:16 – 14:58 am		*Ambient:* no wind, birds, distant traffic **– COS_02.109**
10:19:49 – 20:46 am		Aircraft turning ~1 mile from Site 8 **– COS_02.110**
10:22:04 – 24:12 am		**Direct overflight** with engines cut past Site 8 → *Ambient* → 2nd **overflight – COS_02.111**
10:29:51 – 32:05 am		**Aircraft** ~0.5-mile away → near-*Ambient* → **aircraft** ~0.5-mile away **– COS_02.112**
10:37:29 – 41:19 am		**2x aircraft** transits ~0.5-mile away → ~0.5-mile **aircraft** turn → **aircraft** transit ~0.5-mile away → **mid-range flight** ~0.3-mile away **– COS_02.113**

SITE 9

Coverage Period(s): **Tues, July 26: 9:29–11:48am** **July 28: 7:58–8:40am** **July 29: 4:01–4:18pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 9, Across from Pauma Valley Dr**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
9:28 am	~59 dB	Gas-powered engine from adjacent residential construction at 355 Pauma Valley Dr (opposite side of the street and one house down from Site 9)
9:28 am	~44 dB	*Ambient:* no vehicles passing with residential construction activity
9:30 am	~52 dB	Car passing along Pauma Valley Dr (example)
9:31 am	~62 dB (high)	**Overflight** (prominent 100 Hz tone)
9:36 am	~49 dB	Cars passing along Gleneagle Dr (example)
9:36 am	39 dB (low)	*Ambient:* no vehicles and paused residential construction activity
9:38 am	47 dB	**Overflight**
9:52 am	~40 dB	*Ambient*
9:52 am	55 dB (high)	Car passing along Pauma Valley Dr (example)
9:53 am	57 dB (high)	Truck passing along Pauma Valley Dr (example)
9:54 am	39 dB (low)	Wind through trees and marshland vegetation
9:56 – 9:58 am	70 dB (high)	**Overflight** (prominent 100 Hz tone)
10:03 – 10:05 am	45 to 50 dB	**Overflight**
10:17 – 10:18 am	~63 dB	**Overflight**
10:22 – 10:26 am	60 to 68 dB	**Overflight** (prominent 100 Hz tone)
10:27 – 10:28 am	~45 dB	**Overflight** (quiet – lower than previous overflights)
10:33 – 10:35 am	~47 dB (high)	**Overflight** (quiet – lower than previous overflights)
10:55 am		*General Note: Distant aircraft were frequently audible during the Coverage Period*
11:05 am	40 dB	**Distant aircraft** with elevated winds
11:05 am	56 dB (high)	Car passing along Pauma Valley Dr (example)
11:05:50 am	54 dB (high)	Car passing along Pauma Valley Dr (example)
11:07:20 am	56 dB (high)	Truck passing along Pauma Valley Dr (example)
11:07:55 am	36 dB (low)	*Ambient:* Elevated wind
11:08:45 am	53 dB (high)	Cars passing along Gleneagle Dr (example)
11:09:43 – 10:44 am		*94 dB calibration tone at 1000 Hz recorded as a reference tone* **– COS_02.001**
11:17 – 11:18 am	< ~48 dB	**Overflight**
11:30:10 – 31:02 am		**Distant aircraft – COS_02.002**
11:33:20 – 33:56 am		**Direct flight** with a car passing along Gleneagle Dr (plus **distant aircraft**) **– COS_02.003**
11:38:21 – 42:08 am		**3x consecutive overflight**s with 3 to 4 cars along Gleneagle Dr plus wind **– COS_02.004**
11:46:47 – 48:18 am		2x cars passing along Pauma Valley Dr **– COS_02.005**
Thurs, July 28		
7:59:03 – 59:41 am		**Direct overflight** *after* plane cut engines → 2x cars along Pauma Valley Dr **– COS_02.057**
8:10:57 – 13:12 am		Traffic along Gleneagle Dr, **direct overflight** → Pauma car **– COS_02.058**
8:14:59 – 16:17 am		**Direct overflight** with engines cut/reduced at Site 9 → engines restarted/increased **– COS_02.059**
8:21:04 – 22:38 am		*Ambient:* 2x trucks passing on Pauma → *Ambient* (wind through vegetation) **– COS_02.060**
8:34:59 – 36:22 am		*Ambient:* **Distant aircraft** activity near USAFA and traffic on Gleneagle plus one car passing on Pauma Valley Dr **– COS_02.061**
Fri, July 29		
4:04:45 – 05:54 pm		*Ambient:* wind through vegetation & Gleneagle traffic with no visible flights **– COS_02.125**

4:15:18 – 16:03 pm		*Ambient:* wind through vegetation & Gleneagle traffic with no visible flights – **COS_02.126**

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SITE 10

Coverage Period(s): **Tues, July 26: 12:51–2:23pm** **July 28: 9:17–10:28am** **July 29: 4:27–4:47pm**

Observed by Josh Mellon, Sr. Scientist, BRRC Location: **Site 10, Field off Spectrum Loop**

Tues, July 26	$L_{Aeq,1s}$	Description (*WAV File: COS_XX.XXX)
12:51 – 12:53 pm	~60 dB	Prop-plane **overflight**
12:57:50 pm	~49 dB	Construction-related generator and saw
12:58 – 12:59 pm	~52 dB	**Overflight**
1:00:25 pm	~61 dB (high)	Vehicles along Spectrum Loop
1:01:05 pm	~57 dB	Construction saw, with construction along Voyage Ave in background
1:05:10 pm	~46 dB	*Ambient:* limited construction and vehicle traffic {no overflights}
1:39:50 pm	~57 – 62 dB	Construction activity
1:40:05 pm	~67 dB	Truck along Spectrum Loop
1:41:55 – 43:17 pm		Construction activity across from Site 2 with an **overflight** and car passing **– COS_02.006**
1:45:45 pm	~60 dB	Construction at Spectrum Loop commercial zone (CAT and saw)
1:58:00 pm	~60 dB	*Ambient*: construction and traffic
2:00:33 – 02:29 pm		Continued construction (~60 dB $L_{Aeq,1s}$) **– COS_02.007**
2:04:50 pm	65 dB (high)	Truck along Spectrum Loop
2:05 pm		*General Note: {Construction backup beeper is 1.25k Hz}*
2:18:07 – 19:22 pm		Diminished construction activity with no nearby cars (~56 dB) **– COS_02.008**
Thurs, July 28		
9:19:15 – 20:08 am		*Ambient* with limited construction across Spectrum Loop → one car passing on Spectrum Loop → one truck passing on Spectrum Loop **– COS_02.062**
9:26 – 9:27 am	48 – 51 dB	*Ambient* with train in distance, limited construction, and Voyage Ave traffic
9:39:30 – 9:40:12 am		**Flight** with a ~0.5-mile offset from Site 10 **– COS_02.063**
9:51:21 – 52:37 am		**2x distant aircraft** over USAFA, Spectrum Loop construction and traffic, train whistle **– COS_02.064**
9:56:19 – 57:29 am		Construction truck on Spectrum Loop **– COS_02.065**
10:18:15 – 19:42 am		*Ambient:* No near/mid-flight activity (although **distant aircraft** over USAFA was present) **– COS_02.066**
Fri, July 29		
4:28:19 – 29:30 pm		*Ambient:* no construction, vehicle passing on Spectrum Loop, Voyager traffic **– COS_02.127**
4:41:57 – 43:11 pm		*Ambient:* construction vehicle passing on Spectrum Loop → car passing on Spectrum Loop plus wind and traffic on Voyager Ave **– COS_02.128**

F PUBLIC OUTREACH MATERIALS

Disclaimer:

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WELCOME

Disclaimer:
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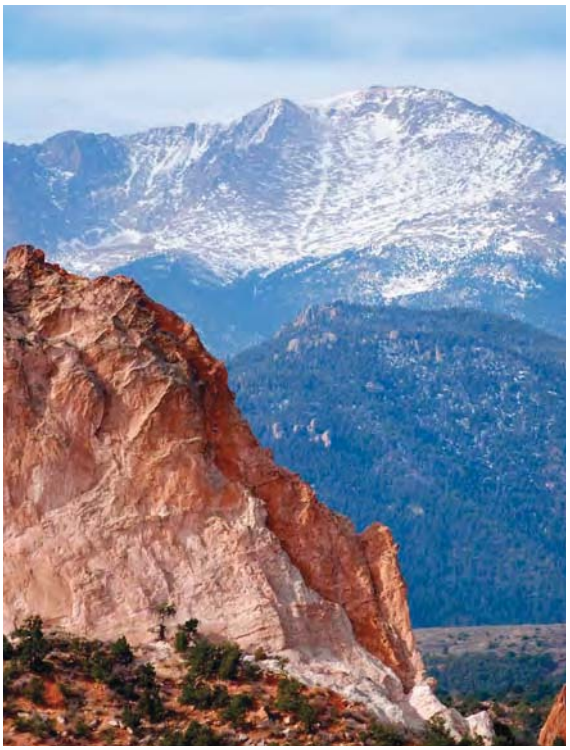
WELCOME TO THIS COMMUNITY OPEN HOUSE FOR THE COLORADO SPRINGS REGIONAL JOINT LAND USE STUDY!

Thank you for taking the time to join us, and we look forward to getting your feedback on the JLUS effort.

OUR TEAM HAS TWO MAIN GOALS FOR TODAY'S EVENT:

- ***PROVIDE INFORMATION*** about the progress of JLUS efforts related to the regional military installations.
- ***GET YOUR FEEDBACK*** on study topics and your ideas on sustaining military missions while reducing impacts on the community.



Please pick up the printed materials for additional information and feel free to visit the different stations at your own pace.

ABOUT PPACG

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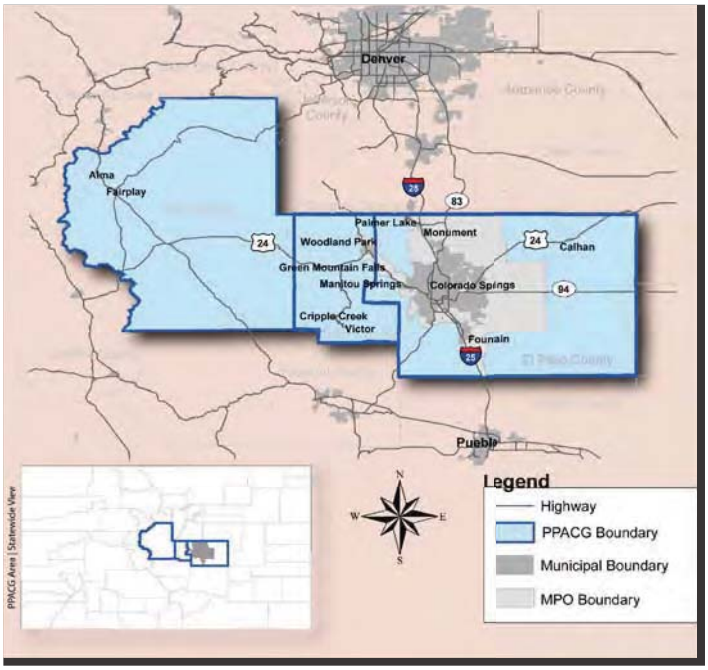
OVERVIEW

Formed in 1967, the Pikes Peak Area Council of Governments (PPACG) is a voluntary organization of municipal and county governments serving a regional community. PPACG provides a forum for local officials to discuss issues that cross their political boundaries, identify shared opportunities and challenges, and develop collaborative strategies for action.

PPACG is not, however, a unit of local government and has no authority to tax, legislate, or condemn. Any policy, plan, or program adopted by PPACG must also be adopted by the governing body of a member county or municipality before it obligates that county or municipality.

Participating members include the general purpose governments of El Paso County, Park County, Teller County, Alma, Calhan, Colorado Springs, Cripple Creek, Fairplay, Fountain, Green Mountain Falls, Manitou Springs, Monument, Palmer Lake, Ramah, Victor, and Woodland Park.

PPACG SERVICE AREA



WHAT DOES PPACG DO?

One of the basic activities of PPACG is planning. PPACG assists local elected officials in planning and making coordinated decisions affecting the development of the Pikes Peak region.

PPACG ADMINISTERS THE FOLLOWING PROGRAMS:

- Area Agency on Aging: aging services for El Paso, Park, and Teller counties.
- Transportation Planning: Metropolitan Planning Organization for Colorado Springs metro area.
- Environmental Planning: lead air quality agency for Colorado Springs metro area and lead water quality planning agency for El Paso, Park, and Teller counties.
- Pikes Peak Rural Transportation Authority: administration of voter-approved transportation funding for El Paso County, City of Colorado Springs, City of Manitou Springs, and Town of Green Mountain Falls.

PROJECT OVERVIEW

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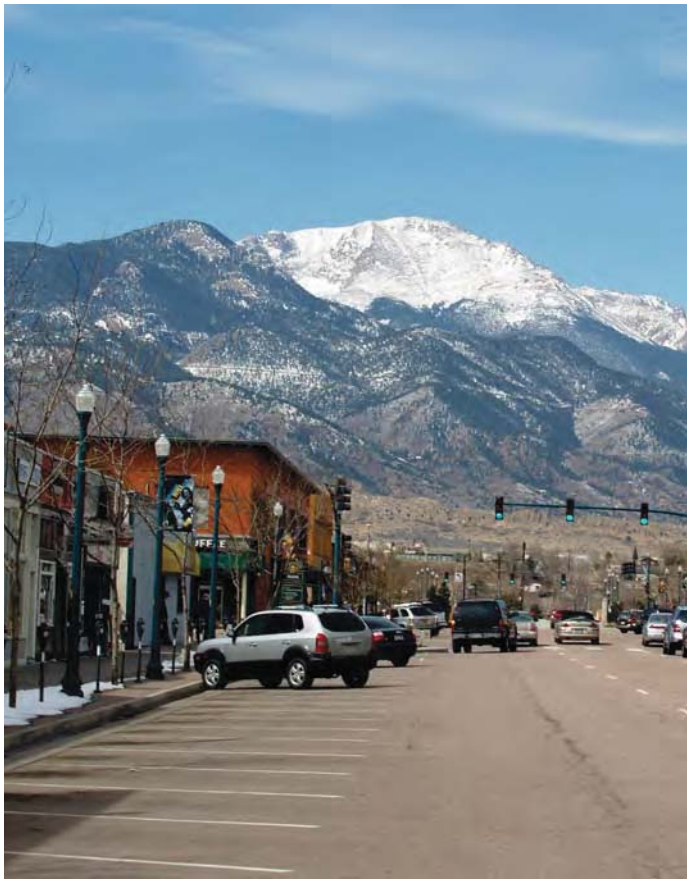
WHAT IS A JOINT LAND USE STUDY (JLUS)?

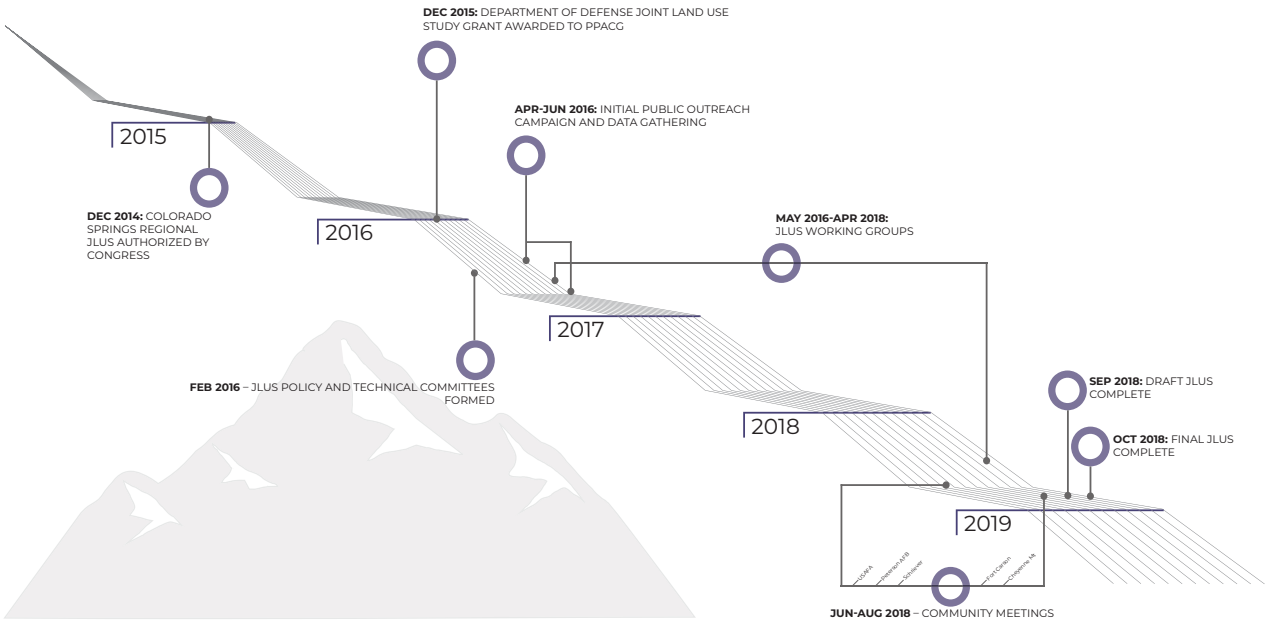
The Colorado Springs Regional JLUS will help our region plan for the successful growth and economic health of our community and the continued military operations for the region's five military installations.



JLUS GOALS

1. Promote land use compatibility between the installations and surrounding communities.
2. Help protect the health and safety of residents and military personnel living or working in and around military installations.
3. Encourage cooperative action among military personnel, local community officials, and citizens.

PROJECT TIMELINE



STUDY AREA

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THE REGION

The Colorado Springs Regional JLUS area encompasses the four counties of El Paso, Fremont, Pueblo and Teller, over two dozen communities, and five military installations: the U.S. Air Force Academy, Fort Carson, Peterson Air Force Base including Cheyenne Mountain Air Force Station, and Schriever Air Force Base. These military installations play a strategic and critical role in national defense and the sustained economic vitality of the region and the State of Colorado. The installations' operational influence areas and relationships with surrounding communities span the four counties noted above.

BY THE NUMBERS

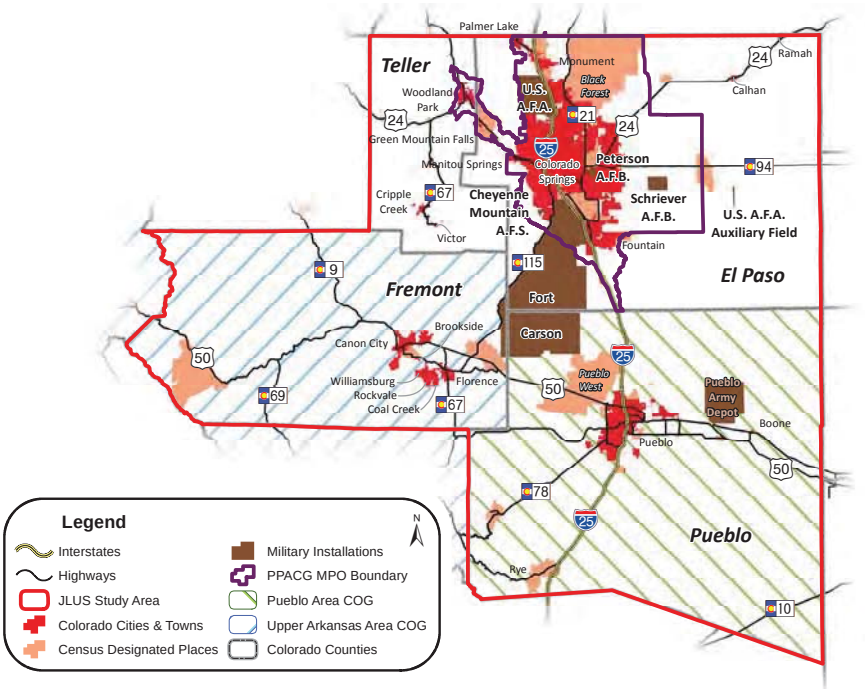
COUNTY	LAND AREA (SQ. MI)	POPULATION 2015*	POPULATION 2025*	POPULATION 2045*
El Paso	2,130	677,022	791,904	1,024,521
Fremont	1,534	46,559	50,074	57,598
Pueblo	2,398	163,348	180,944	215,312
Teller	559	23,461	27,234	31,135
Totals	6,621	910,390	1,050,156	1,328,566

Estimates per State Department of Local Affairs Demographic Office

MILITARY AND THE REGION

Military installations encompass approximately 8% of the total land area in El Paso County and small portions of Pueblo and Fremont County. However, the various types of military missions and a number of civilian and military personnel that work at each installation forms a large footprint that extends well beyond installation boundaries throughout all four counties within the study area. The rate of regional population growth has dramatically increased during the last three decades with El Paso and Teller Counties experiencing a near doubling in population size since 1990. These immense growth pressures have converted many of the large areas surrounding communities and military installations from low-intensity agricultural land use to residential and commercial development, especially in the areas surrounding the larger communities within this region.

COLORADO SPRINGS REGIONAL JOINT LAND USE STUDY



*Pueblo Depot not included in this study.

JLUS ORGANIZATION

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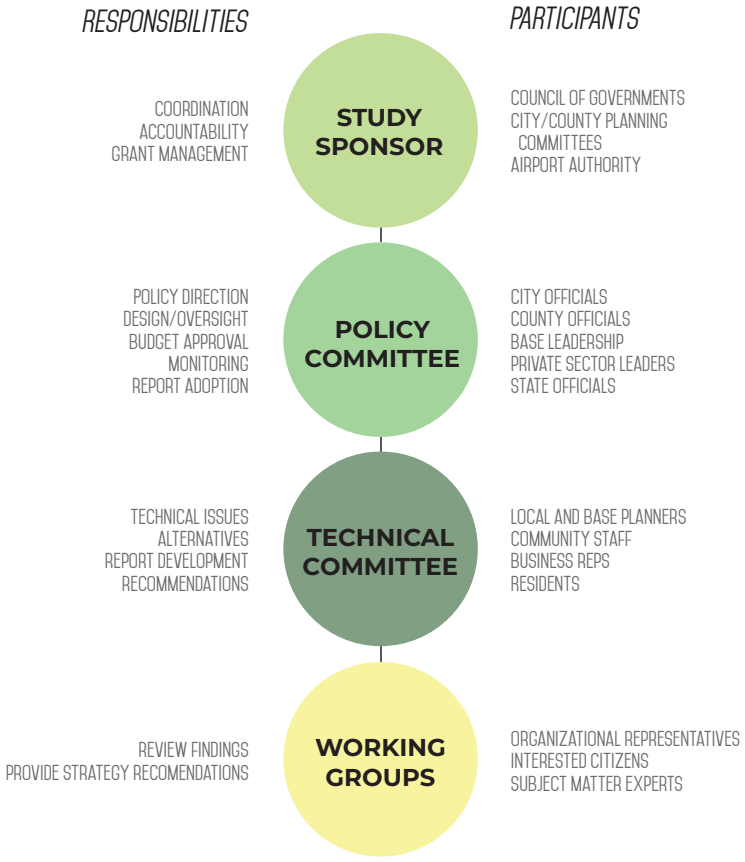
The Pikes Peak Area Council of Governments is the sponsoring organization for JLUS. Funding is provided by the Department of Defense Office of Economic Adjustment and state and local governments.



JLUS WORKING GROUPS

- Regional Airspace
- Public Communication
- Conservation/ Agriculture
- Land Use & Development
- New Santa Fe Trail
- USAFA Flight Training
- Monument Creek Watershed Restoration Project (Stormwater)
- Southern Stormwater
- Transportation

KEY PARTNERS

PPACG is actively involved with partners to implement the JLUS, including:

- Fort Carson
- U.S. Air Force Academy
- Peterson Air Force Base
- Cheyenne Mountain Air Force Station
- Schriever Air Force Base
- El Paso County
- Teller County
- Pueblo County
- Fremont County
- City of Colorado Springs
- City of Fountain
- City of Pueblo
- Colorado Division of Aeronautics
- Colorado Department of Transportation
- Bureau of Land Management
- State of Colorado Department of Military and Veteran Affairs
- Federal Aviation Administration
- U.S. Forest Service
- Colorado Springs Airport
- Colorado Springs Regional Business Alliance
- Pueblo West Metropolitan District
- Colorado Springs Housing and Building Association
- Council of Neighbors and Organizations (CONO)
- Numerous elected officials, community leaders, and private citizens

METHODOLOGY

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IDENTIFYING COMPATIBILITY ISSUES

The JLUS considers a wide variety of compatibility issues that address military operational impacts and community impacts on military operations. Not all compatibility issues are applicable to each installation, and some topics required a working group to address a given compatibility issue and identify viable strategies. The JLUS has identified and incorporated many strategies from existing community plans.

TOPICS INCLUDE:

- Military Operations and Impacts
- Land Use Compatibility
- Airspace
- Transportation
- Wildfires
- Water Supply
- Stormwater
- Wastewater

COMPATIBILITY TABLE

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x	x	x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

ISSUE IDENTIFICATION

DATA GATHERING
Document review and stakeholder interviews

↓

DEVELOP LIST OF INITIAL COMPATIBILITY ISSUES

↓

PUBLIC INPUT
Telephone town halls, online survey, and community presentations

↓

ADDITIONAL REVIEW AND DISCUSSION NEEDED?

↓

YES
Organize working group for additional review and discussion

NO
Develop strategies

↓

PUBLIC INPUT
Community meetings (we are here)

PUBLIC ENGAGEMENT

Disclaimer:

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In order to for the JLUS to become an thoughtful and effective plan for the region, input from throughout the community must be both broad and deep.

OUTREACH BY THE NUMBERS:

23,233
Total residents contacted for telephone town hall meetings

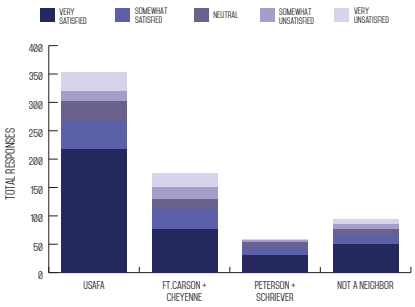
21
Local Government and Civic Group Presentations Given

681
Online Surveys Completed

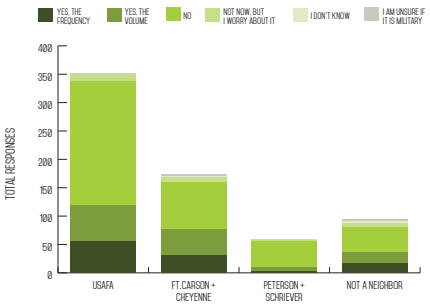
9
JLUS Working Groups Organized

ONLINE SURVEY: KEY RESULTS

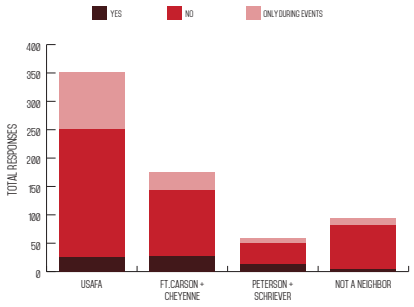
Military as Community Partner



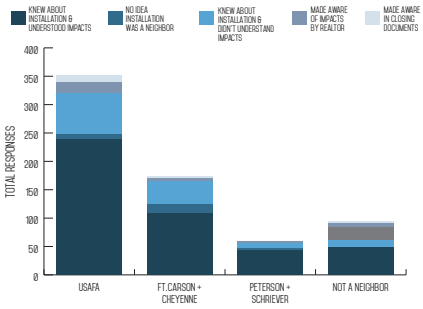
Military Aircraft Noise



Military Commute Impact



Awareness of Military



KEY QUESTIONS

"What could your role as a citizen be in sustaining both military mission and quality of life?"

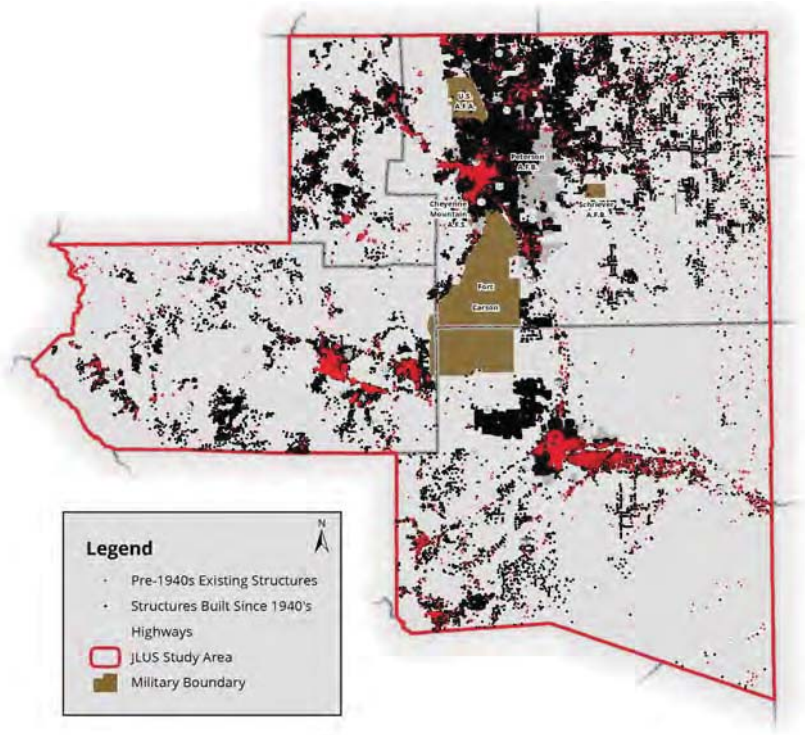
COMPATIBLE LAND USE

Disclaimer:
The information included in this appendix is a part of a deliberative process and is not necessarily consistent with the final document.

WHY ARE COMPATIBILITY ISSUES IMPORTANT TO MILITARY AND COMMUNITY STAKEHOLDERS?

There are varying degrees of overlap between the military and civilian use of commonly shared resources, including but not limited to: air, land, water, infrastructure, and energy. The JLUS identifies and analyzes these relationships in order to find efficiencies and common interests in management practices to benefit both military installations and community stakeholders. A key focus of this study is identifying and encouraging existing cooperation and focus on areas where this may not have occurred in the past.

EL PASO COUNTY GROWTH PATTERNS



For community stakeholders (governments, private entities, and citizens) and military installations within this region, it is extremely beneficial to preserve what is working well while fostering new ways to cooperate, communicate, and share resources. The recommended strategies described in this study provide a roadmap to guide cooperation on land use and resource compatibility issues to that end. This study is not the endpoint, but rather a significant advancement toward the regional goal of preserving and supporting military operations while advancing the quality of life in our communities.

KEY QUESTIONS

"What would you like to know about development in your area?"

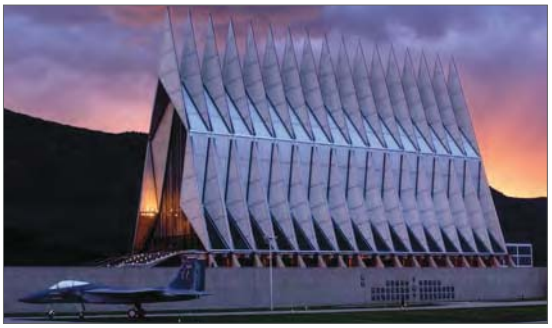
"Should your community allow development adjacent to an installation boundary or training area?"

"If so, what type of land use do you think should occur in these areas?"

U.S. AIR FORCE ACADEMY
OVERVIEW

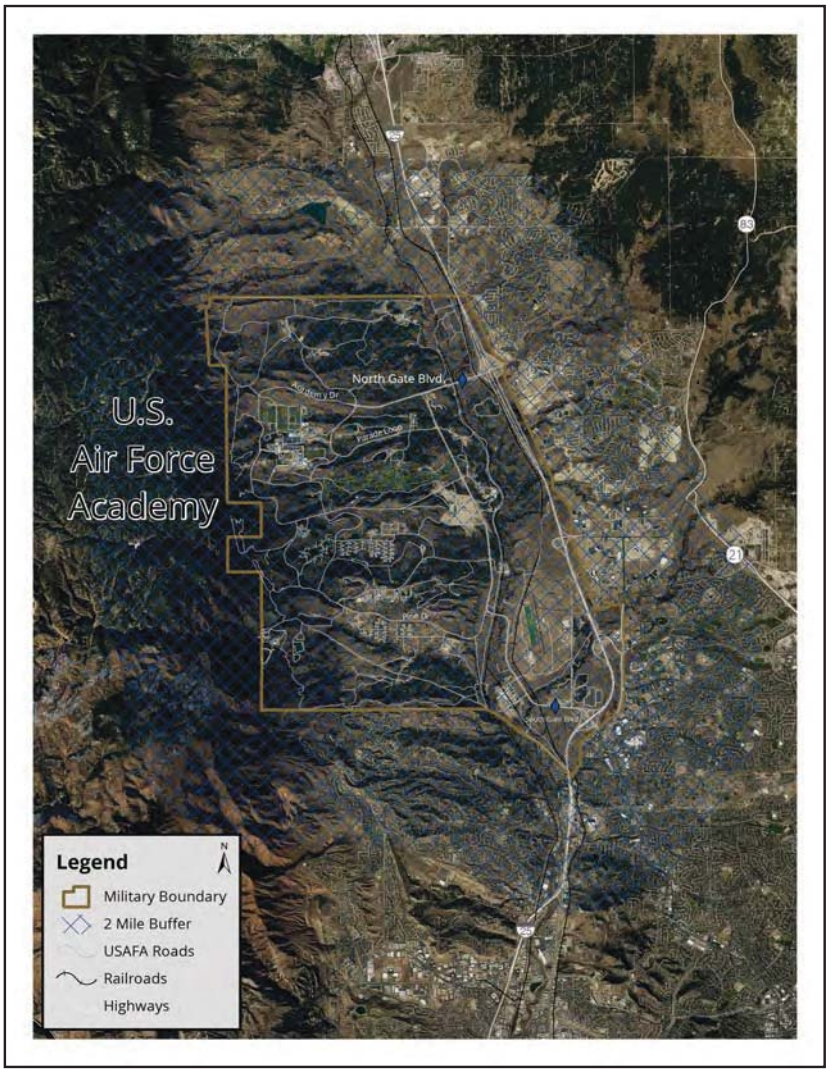
MISSION

The U.S. Air Force Academy (USAFA) core mission is to educate, train, and inspire men and women to become officers of character, motivated to lead the United States Air Force in service to our nation.



FACTS AND FIGURES

The Air Force Academy is both a military organization and a university. Much of the Academy is set up like most other Air Force bases, particularly the 10th Air Base Wing, but the superintendent, commandant, dean of faculty and cadet wing are set up in a manner resembling a civilian university. The Cadet wing consists of 4,400 cadets and 1,000 Air Force and civilian academic support personnel. The 10th Air Base Wing comprises more than 3,000 military, civilian, and contract personnel and a total military community of about 25,000 people.



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U.S. AIR FORCE ACADEMY
OPERATIONS AND IMPACTS

Disclaimer: The information included in this appendix is a part of a deliberative process and is not necessarily consistent with the final document.

COMPATIBILITY ISSUES

The U.S. Air Force Academy (USAFA) has has been impacted by urban growth of the City of Colorado Springs moving north over a period of decades. Areas of El Paso County that had been rural agricultural uses east of I-25 began to be systematically annexed into city limits and development. Significant portions of these areas are within critical operation areas. For example, the loss of open space within existing Accident Potential Zones off of the ends of runways is a public safety concern. Other critical issues such as stormwater, wildfire, and many of the other issues identified in the table below are highlighted at other stations.

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x		x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

AICUZ

The purpose of the USAFA Air Installation Compatible Use Zone (AICUZ) program is to promote compatible land development in areas subject to aircraft noise and accident potential. USAFA AICUZ Land Use Guidelines reflect land use recommendations for both safety and noise zones. These guidelines have been established on the basis of studies prepared and sponsored by several federal agencies, including the U.S. Department of Housing and Urban Development (HUD), U.S. Environmental Protection Agency (USEPA), Federal Aviation Administration (FAA), USAF, and state and local agencies. The guidelines recommend land uses which are compatible with airfield operations while allowing maximum beneficial use of adjacent properties. This study contains guidelines that were developed to assist local planning entities in determining land uses that are compatible with the USAFA airfield environs. As planners for the City of Colorado Springs, the Town of Monument and El Paso County modify current land use and zoning plans, recommendations from this study should be considered to prevent incompatibilities that may compromise the USAFA's ability to fulfill its mission or subject local residents to avoidable safety hazards. Accident Potential Zones (APZ's) should be primary considerations in the planning process for areas adjacent to the USAFA.

PROPOSED STRATEGY AREAS

- Preserve encroachment mitigation Infrastructure for Collaboration on mission impacts as they evolve.
- Mitigate land use and development Patterns that continue to impact residents and cadet flight training operations.
- Effectively communicate information on flight training operations of public interest.
- Mitigate damage to the U.S. Air Force Academy property and natural systems due to stormwater flows.

KEY QUESTIONS

"Before attending this meeting, were you aware of USAFA operations?"

"If so, what is the information you are most interested in learning about this installation, such as flight operations, trail access, and stormwater?"

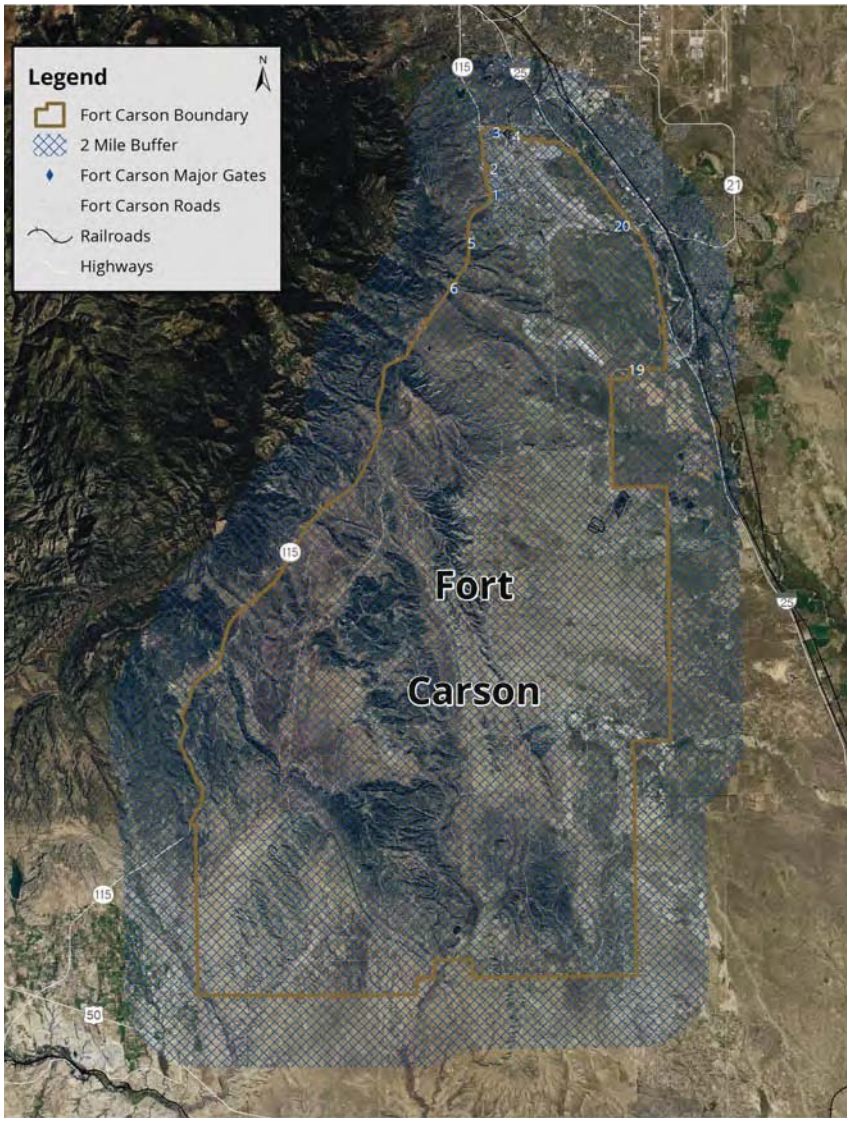
FORT CARSON
OVERVIEW

Disclaimer:

The information included in this appendix is a part of a deliberative process and is not necessarily consistent with the final document.

MISSION

Fort Carson is home to the the 4th Infantry Division (4 ID) and several other groups, including the 10th Special Forces Group (Airborne). Fort Carson builds and maintains combat-ready expeditionary forces necessary to fight and win in complex environments as members of a Joint, Interagency, Intergovernmental, and Multinational (JIIM) team or as a Mission Command Element (MCE); provides first class support to Soldiers, Airmen, Civilians, and Families; and enables unified action with community, state, and interagency partners to accomplish all assigned missions.



FACTS AND FIGURES

Fort Carson has 137,000 acres and a total population of approximately 26,000 active duty personnel. It is home to the 4th Infantry Division, 1st Stryker Brigade Combat Team, 4 ID, 2nd Infantry Brigade Combat Team, 4 ID, 3rd Armored Brigade Combat Team, 4 ID, 4th Combat Aviation Brigade, 4 ID, 4th Sustainment Brigade, 4 ID, 4th Division Artillery, 4 ID, Headquarters and Headquarters Battalion, 4 ID, Medical Department Activity, Dental Activity, 10th Special Forces Group (Airborne), 4th Engineer Battalion, 759th Military Police Battalion, 71st Ordnance Group, 13th Air Support Operations Squadron, 627th Hospital Center, Army Field Support Battalion Carson, and World Class Athlete Program. The post also hosts units of the Army Reserve, Navy Reserve and the Colorado Army National Guard. Fort Carson was also home to the 5th Infantry Division, known as the Red Devils.

FORT CARSON
OPERATIONS AND IMPACTS

Disclaimer:

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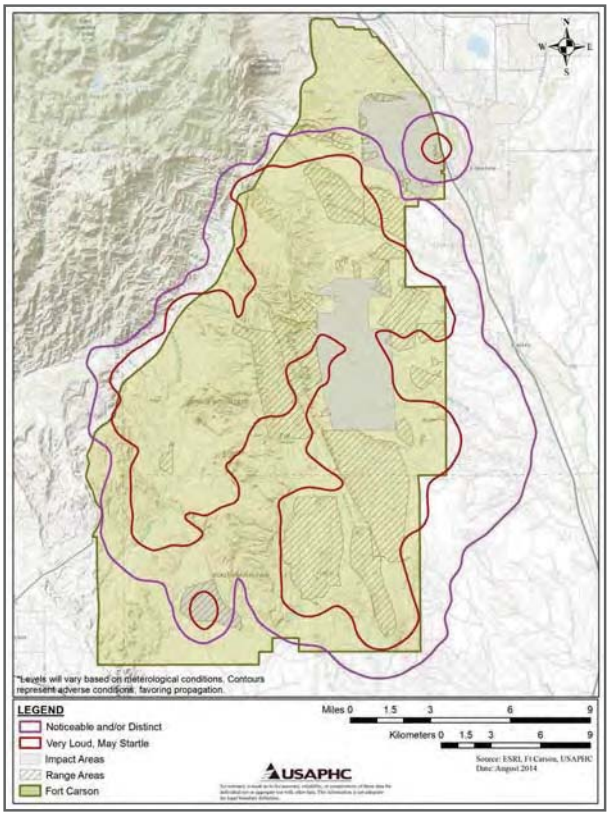
OPERATIONS

The size of Fort Carson's physical and operational footprint extends through all four counties of the study and various parts of the state. Military units from other parts of the country come to Fort Carson to utilize the unique mountain, foothill, and plains topography within a short distance of the installation. The cantonment area, where most of the buildings, gates, and personnel are located, is accessed through land and road networks within Colorado Springs and Fountain. Low-density residential development occurs within El Paso County, Fremont County, and Pueblo West around the training areas where new residents will experience occasional dust, smoke, and noise due to training from artillery and helicopter flight.

PERCEPTIBILITY OF NOISE GENERATED BY DEMOLITION AND LARGE CALIBER WEAPONS



COMPATIBILITY ISSUES

- Stormwater flows across cantonment area downstream from CMAFS and adjacent to Pikes Peak Community College
- More capacity needed for rail transportation
- Need to preserve training areas on public lands off-base for HAMET training
- New vertical obstructions and development of residential areas can impact helicopter flight
- Land on the northern portion of the eastern boundary could be developed and impact traffic at Gate 19.
- Future traffic increase on Academy could impact gate traffic
- Fort Carson has experienced issues in the past with utilizing certain landing zones near residential properties in mountainous areas in Teller County and around detention facilities in Fremont County.

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x	x	x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

PROPOSED STRATEGY AREAS

- Preserve airspace and land resources that facilitate helicopter flight training operations.
- Mitigate mission and community impacts from natural disasters.
- Utilize land use and transportation planning to preserve transportation networks that enable military readiness.

KEY QUESTIONS

"Before attending this meeting, were you aware of Fort Carson operations?"

"If so, what is the information you are most interested in learning about this installation, such as flight operations, artillery training, and wildfire mitigation?"

PETERSON AIR FORCE BASE
OVERVIEW

MISSION

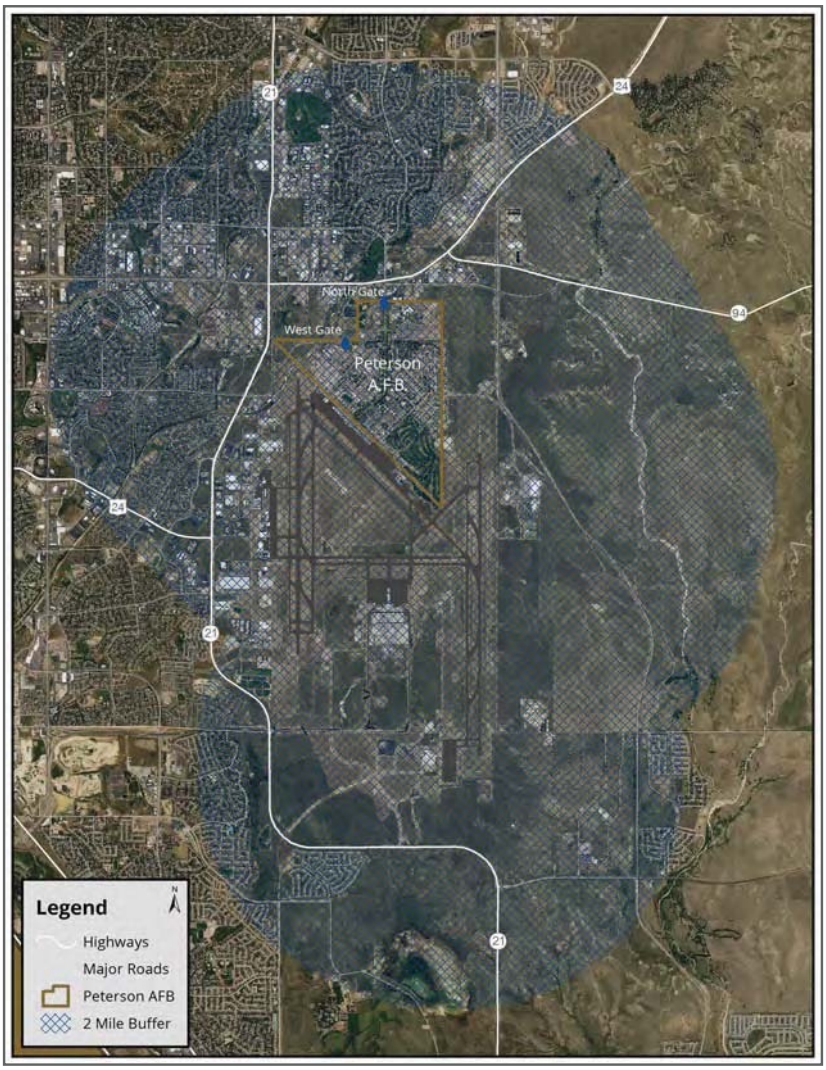
Execute combined global capabilities to defend the homeland and enable space combat operations.

Peterson AFB is home to the United States Space Command (USSPACECOM), North American Aerospace Defense (NORAD), Northern Command (NORTHCOM), Army Strategic Command(ARSTRAT), Headquarters Air Force Space Command (HQAFSPC), the 21st Space Wing (21 SW), and the 302nd Air Lift Wing. USSPACECOM is one of nine Unified (multi-service) Combatant Commands in the Department of Defense. The 21 SW is responsible for worldwide missile warning and space control working at what is referred to as the Peterson Complex, which includes Peterson AFB, Schriever AFB, and Cheyenne Mountain Air Force Station. The airfield used by Peterson AFB and Colorado Springs Airport also contains facilities used by Fort Carson for deployment of troops and resources. Due to the important regional interactions between Peterson AFB, other installations within our region and the State of Colorado, and with communities within this region, the mission footprint for Peterson AFB intersects with many regional strategies and the missions reflected in other installation implementation plans.

FACTS AND FIGURES

Home of 53 mission partners supported on Peterson AFB and Cheyenne Mountain Air Force Station, including North American Aerospace Defense Command, U.S. Northern Command, Air Force Space Command (AFSPC), Space and Missile Defense Command/Army Strategic Command and the 302nd Airlift Wing (USAF Reserves).

As the Air Force's most geographically dispersed wing, the 21st Space Wing hosts these mission partners, while also providing and employing global capabilities to ensure space superiority to defend our nation and allies. The 21st Space Wing is headquartered at Peterson AFB, and is the Air Force's only organization providing missile warning and space control to unified combatant commanders worldwide. About 4200 government and contractor personnel detect, track and catalog more than 23,000 man-made objects in space, from those in near-Earth orbit to objects up to 22,300 miles above the earth's surface. Peterson AFB shares airfield use with the City of Colorado Springs owned airport.



Disclaimer:

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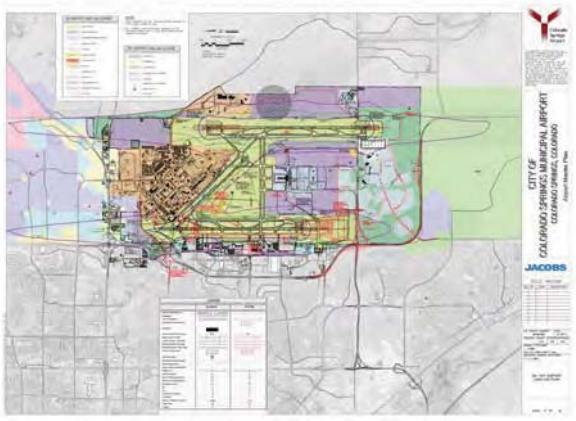
PETERSON AIR FORCE BASE
OPERATIONS AND IMPACTS

OPERATIONS

The Peterson AFB operational footprint extends well beyond two-miles for Peterson AFB with regard to utility infrastructure and transportation routes between components of Peterson Complex, which includes Cheyenne Mountain AFS and Schriever AFB. Fort Carson also utilizes facilities at the Peterson AFB airfield. There are multiple compatibility issues driven by these mission-based relationships between installations, housing provision, as well as developments that may generate incompatible housing densities and vertical obstructions beneath airspace utilized by flight operations.



COMPATIBILITY ISSUES

- Residential land use and zoning pose safety concerns within APZs, including developments proposed in the area of Troy Hill Road.
- Certain allowed commercial or industrial uses may pose a security threat to airport/Peterson operations (storage, shipping, truck trailers)
- Transportation concerns with future road capacity as development occurs around installation and future mission operations generate increases in travel demand.
- Any developments along Powers, Markshefell, and Highway 24 that may impact missions.
- Critical to protect safezones (APZs) in order to attract future missions.
- Continued coordination between the City and Peterson AFB of the joint use of the airfield.
- Need to be effective in public understanding of what flight is attributed to Peterson AFB and is not, and relationship of Peterson AFB to Airport.
- Residents moving into residential areas around airfield need additional methods of notification of airspace uses, civilian and military, that may impact quality of life.
- Future wind farm developments within overflight areas, including outside of 2 mile buffer and potentially in counties outside of the study area.
- Critical intersection design south of COS airport near Drennan Rd and Foreign Trade Zone Rd.

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x	x	x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

PROPOSED STRATEGY AREAS

- Continue to Improve Collaboration Between Military and Community Stakeholders
- Mitigate land use and development patterns that could impact residents and flight operations.
- Effectively communicate to the public with regard to flight/airfield operational information of public interest.
- Utilize transportation planning to preserve transportation networks that serve components of Peterson Comples.
- Pursue buffering and conservation activities that preserve mission.

Disclaimer:

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KEY QUESTIONS

"Before attending this meeting, were you aware of Peterson AFB operations?"

"If so, what is the information you are most interested in learning about this installation, such as flight operations, cooperation with Colorado Springs Airport, and future mission growth?"

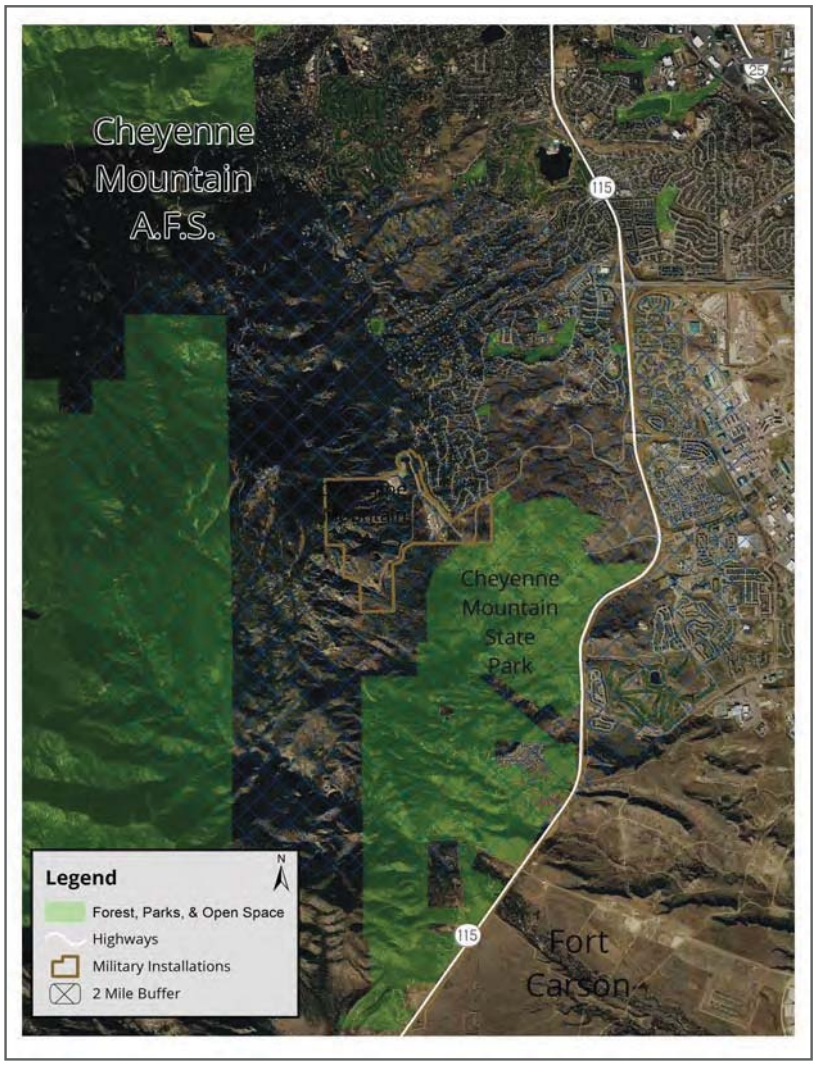
CHEYENNE MOUNTAIN AIR STATION

OVERVIEW

Disclaimer: The information included in this appendix is a part of a deliberative process and is not necessarily consistent with the final document.

MISSION

Cheyenne Mountain AFS, a component of the Peterson Complex, serves as NORAD and USNORTHCOM's Alternate Command Center and as a training site for crew qualification. The North American Aerospace Defense Command (NORAD) conducts aerospace warning, aerospace control and maritime warning in the defense of North America.



FACTS AND FIGURES

NORAD is a United States and Canada bi-national organization charged with the missions of aerospace warning and aerospace control for North America. Aerospace warning includes the detection, validation, and warning of attack against North America whether by aircraft, missiles, or space vehicles, through mutual support arrangements with other commands. The commander is responsible to both the U.S. president and the Canadian prime minister. The commander maintains his headquarters at Peterson Air Force Base, Colorado. The NORAD and USNORTHCOM Command Center serves as a central collection and coordination facility for a worldwide system of sensors designed to provide the commander and the leadership of Canada and the U.S. with an accurate picture of any aerospace or maritime threat.

CHEYENNE MOUNTAIN AIR STATION
OPERATIONS AND IMPACTS

OPERATIONS

Most of the mission for Cheyenne Mountains is self-contained within the installation boundaries and do not generate impacts commonly experienced around other installations. However, the ability to utilize transportation networks during emergency situations and a secure boundary and airspace are vital to sustain mission operations.

IMPACTS ON MISSION

- Wildfire risks/off-base fire mitigation
- NORAD Road – important primary access, use of Federally-owned road by other parties, homeowners, trail users (Chamberlain Trail), misunderstood as a typical public right-of-way rather than a defense access road.
- Hwy 115 access and maintenance
- Close proximity of existing uses; minimal buffering
- Potential adjacent development would impact access and stormwater
- Trespassing risks (cars/hikers)
- Drone and private aircraft overflight

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x	x	x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

Disclaimer:

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PROPOSED STRATEGY AREAS

- Protect and improve installation access routed for installation personnel.
- Create buffers to mitigate mission impacts from the surrounding natural environment and development.
- Develop methods to inform and collaborate with citizens and community leaders to address encroachment.

KEY QUESTIONS

"Before attending this meeting, were you aware of Cheyenne Mountain AFS operations and its relationship with Peterson AFB?"

"If so, what is the information you are most interested in learning about this installation, such as the use of NORAD Road, relationship with the State Park and U.S. Forest Service, emergency management, and wildfire mitigation?"

SCHRIEVER AIR FORCE BASE

OVERVIEW

Disclaimer: The information included in this appendix is a part of a deliberative process and is not necessarily consistent with the final document.

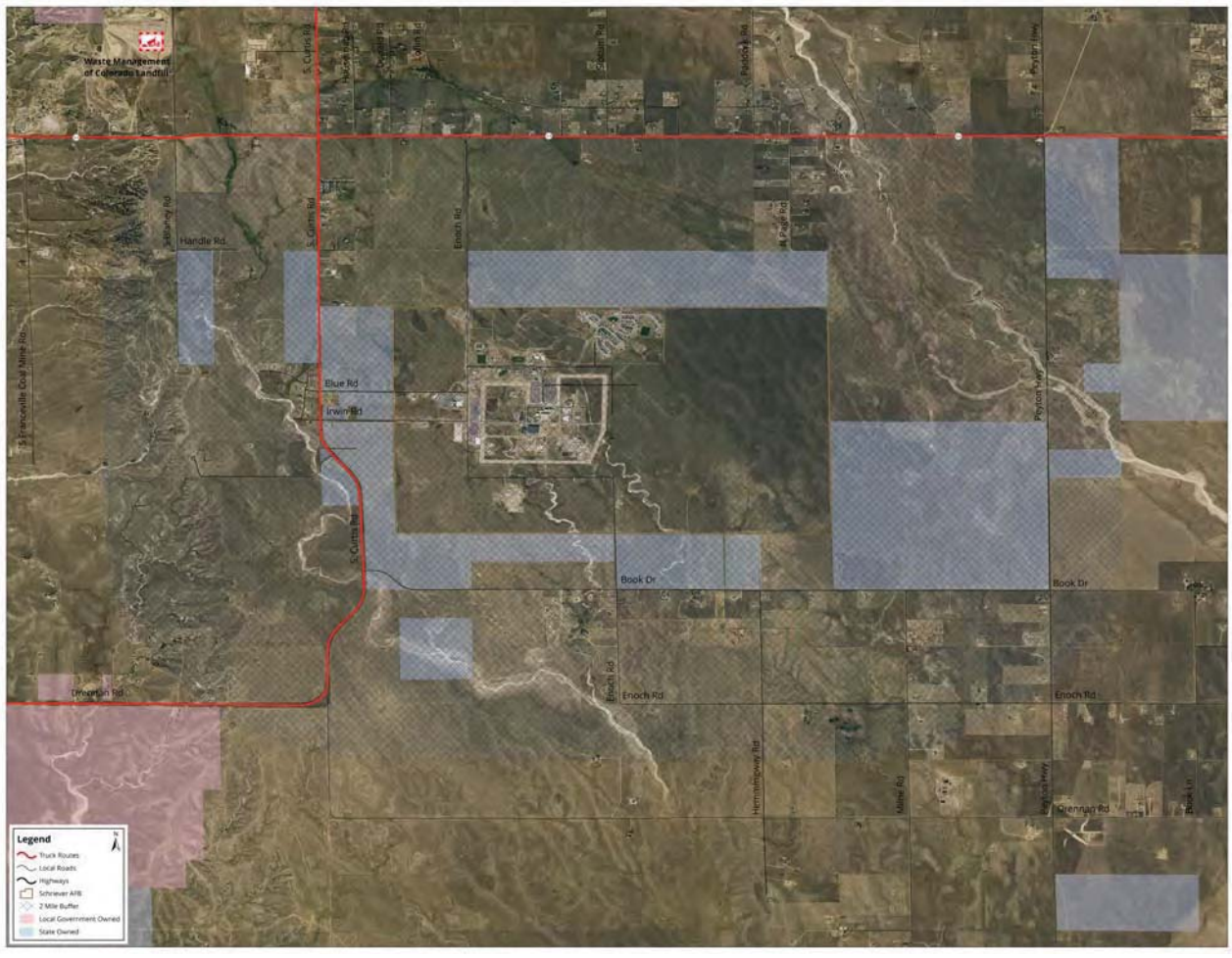
MISSION

The 50th Space Wing (50 SW) at Schriever AFB is proudly called the "Master of Space." Its mission is to "Evolve space and cyberspace warfighting superiority through integrated and innovative operations." The 50 SW hosts a number of key Mission Partners, including the U.S. Air Force Warfare Center (USAFWC), elements of the Missile Defense Agency (MDA), 310th Space Wing (310 SW), National Reconnaissance Office (NRO) Operations Squadron (NOPS), the National Space Defense Center (NSDC), elements of the Naval Space Operations Command, and the U.S. Army's 53rd Signal Battalion, among others. Approximately 7,000 personnel are employed at Schriever AFB. The installation is unique in that no airfield or aircraft assets exist on Schriever AFB due to the mission focus on space and cyberspace.

Schriever AFB is located approximately 4 miles east of the city boundary Colorado Springs, and 9 miles west of the town of Ellicott.

FACTS AND FIGURES

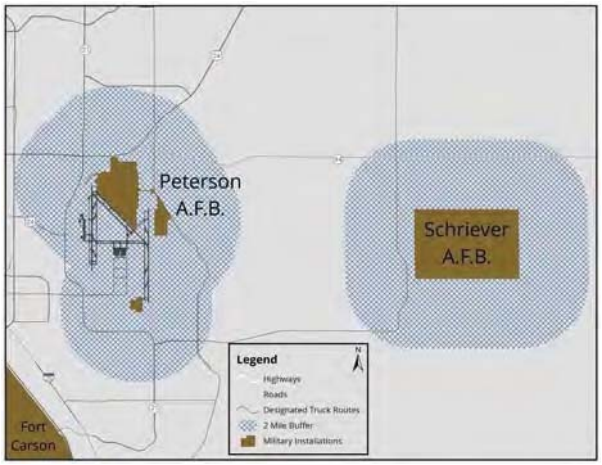
The 50 SW is responsible for the operation and support of 185 Department of Defense satellites and installation support to 20 mission partners with a workforce of more than 8,000 personnel. The wing operates satellite operation centers at Schriever AFB and remote tracking stations and other command and control facilities around the world. Through these facilities, wing personnel monitor satellites during launch, put satellites in their proper orbits following launch, operate the satellites while they are in orbit, ensure effective and efficient satellites operations and properly dispose of the satellites at their end of life. In 2017, personnel at the Wing's tracking stations, including 21st, 22nd and 23rd Space Operations Squadrons, logged 162,022 satellite contacts while also assisting with other satellite operations and 27 space launches. The base indirectly contributes an estimated $1.3 billion to the local Colorado Springs, Colorado, area annually.



SCHRIEVER AIR FORCE BASE
OPERATIONS AND IMPACTS

OPERATIONS

Schriever AFB does not conduct operations since the mission is primarily focused on space operations, communication, and cybersecurity. Therefore, the operational footprint utilizes airspace differently than typical Air Force missions and has a very strong focus on installation boundary security. Unlike the other four installations covered by this study, Schriever AFB is not immediately adjacent to an urban area, which creates some issues and allows for some flexibility in mitigating potential future impacts. The agricultural uses around the boundary are compatible with operations and so the goal is to preserve this characteristic.



The Highway 94 corridor is a primary route for personnel who live on Schriever AFB and work at Peterson AFB. Daily commutes for personnel based at this installation, Peterson AFB personnel, and other employees who reside in Colorado Springs use Highway 94 as a primary route. Visibility, litter, and other road hazards are of concern for Schriever AFB as the mission increases. Transportation safety concerns about the Highway 94 corridor are discussed more at the Transportation Station.

COMPATIBILITY ISSUES

	USAF ACADEMY	PETERSON AFB	CMAFS	FORT CARSON	SCHRIEVER AFB
BUILT ENVIRONMENT AND MILITARY READINESS					
Interagency and Community Coordination/Communication	x	x	x	x	x
Land Use	x	x	x	x	x
Transportation	x	x	x	x	x
Safety Zones	x	x		x	
Vertical Obstructions	x	x		x	x
Quality of On Base Resident Life		x		x	x
Infrastructure Extensions		x		x	
Security	x	x	x	x	x
Noise	x			x	
Vibration				x	
Dust/Smoke/Steam				x	
Light and Glare				x	
Frequency Spectrum	x	x			x
Cultural Resources	x			x	
NATURAL RESOURCE FACTORS/CLIMATE ADAPTATION					
Water Supply			x	x	
Stormwater	x		x	x	
Air Quality					
Wildfire	x	x	x	x	x
Energy Development and Utilities	x	x		x	x
Noxious Weeds	x			x	
Wildlife, Threatened and Endangered Species	x			x	x
ADEQUATE RESOURCES					
Land/Air Space	x	x	x	x	x

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PROPOSED STRATEGY AREAS

- Sustain frequency spectrum capacity through land and airspace buffering.
- Facilitate safe and efficient transportation for travel to and from Schriever AFB and for surrounding residents.
- Communicate and collaborate in pursuit of community partnership opportunities.

KEY QUESTIONS

"Before attending this meeting, were you aware of Schriever AFB operations?"

"If so, were you aware that they have no flight operations but still need airspace? Do you share their concern with safe roadways, particularly improvements to Highway 94?"

LAND USE

LAND USE BUFFERS

Disclaimer:

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MILITARY BUFFERING PROGRAMS

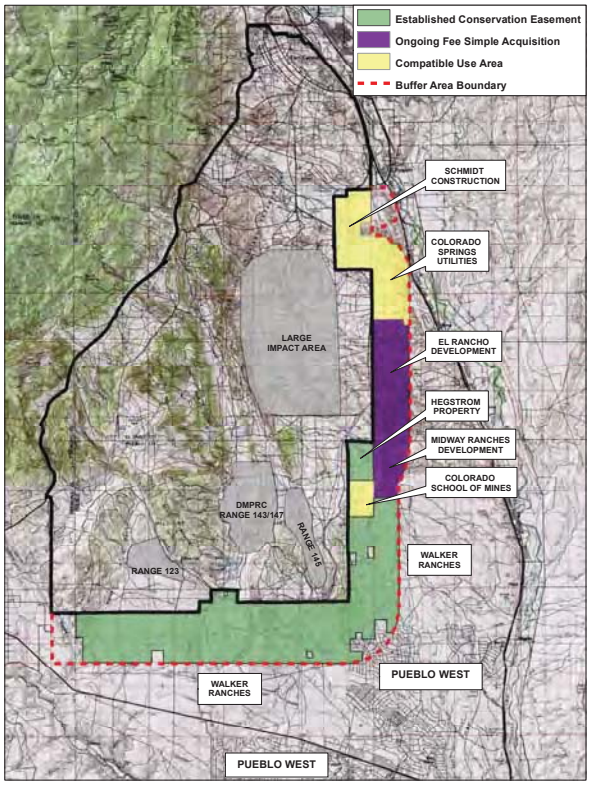
Buffer areas around a military installation limit the effects of military training on communities and vice versa. Buffering helps to maximze the amount of available training land inside an installation that can be used to support the mission.

The Department of Defense (DoD)'s REPI Program is a key tool for combating encroachment that can limit or restrict military training, testing, and operations. A key component of the REPI Program is the use of buffer partnerships among the Military Services, private conservation groups, and state and local governments. These partnerships share the cost of acquisition of easements or other interests in land from willing sellers to preserve compatible land uses and natural habitats near installations and ranges that helps sustain critical, at-risk military mission capabilities.

The USAF Academy is pursuing opportunities through the REPI program and other installations. This study will encourage other installations to do the same as well as examine possibilities through the Sentinel Landscapes Partnership, a nationwide federal, local and private collaboration dedicated to promoting natural resource sustainability in areas surrounding military installations. Sentinel Landscapes are working or natural lands important to the nation's defense mission — places where preserving the working and rural character of key landscapes strengthens the economies of farms, ranches and forests; conserves habitat and natural resources; and protects vital test and training missions conducted on those military installations that anchor such landscapes.

FORT CARSON - ACUB

The ACUB program is designed to minimize incompatible development and loss of habitat by utilizing permanent conservation easements, fee-sales, or other interests in land from willing landowners. In the case of conservation easements or similar agreements, the landowner retains ownership and rights to use the land for the purposes specified in the agreement. These buffer areas also contribute benefits to local recreational, agricultural, forest management, and greenspace uses.



PROPOSED STRATEGY AREAS

- Establish partnerships between military and community stakeholders to buffer military operations and community inpacts.
- Continue to conserve habitat and working agricultural lands.
- Identify key land areas for conservation that are of mutual interest to installations and communities.

KEY QUESTIONS

"Before attending this meeting, were you aware that communities can partner with military installations to create buffers such as open space parks or preserving existing ranches?"

LAND USE

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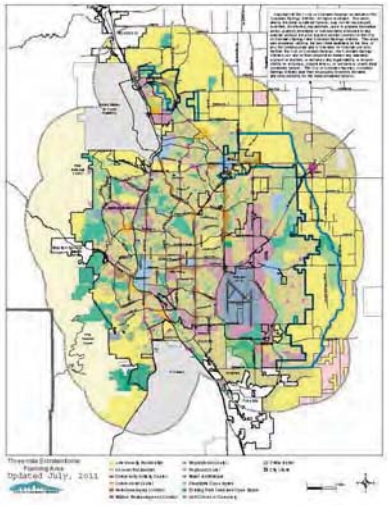
LAND USE REGULATION

LAND USE AND DEVELOPMENT REVIEW

State law (C.R.S. Title 29. Government Local § 29-20-105.6) requires local governments to provide land use application materials to military installations when they are located within two miles of installation boundaries. Military installations may comment on the proposal to inform the community about potential impacts on their operations or other considerations.

COMPATIBLE USE

The basis of land use planning relates to the local jurisdictions role in protecting the public's health, safety, and welfare by ensuring that the use of one property does not negatively impact the use of another. Land use is governed by zoning ordinances and guided by comprehensive plans developed and administered by local jurisdictions. The military is interested in land use planning and land use patterns that facilitate compatible land uses around the installation in order to preserve military mission. The challenges that both the military and civilian agencies face in a rapidly growing region has resulted in land uses that are in direct conflict with military missions and have required adjustments to flight patterns and operations. As development has occurred closer to installation boundaries and underneath existing flight training areas, more residents experience military operational impacts or training areas become unusable.



ADMINISTRATIVE DEVELOPMENT REVIEW PROCESS

PRE-APPLICATION

- Pre-Application meeting with a planner assigned based on geographic area
- Planner decides if LDTC review is required (LDTC is an initial review by City Agencies, Fire, Traffic, Parks, Engineering)
- Planner decides if a neighborhood meeting is required to facilitate initial issue identification. Notification and posting is required.
- Applicant is authorized to submit formal application.

INTERNAL REVIEW

- Formal application submitted with fees. Planner determines if application is complete.
- Application accepted by Land Use Review and distributed to internal and external agencies for review and comment period.
- Neighborhood meeting and/or notification if deemed necessary. This may include property posting and adjacent neighbor HOA notification.
- Comments are received from City Departments, external agencies, and neighbors. Planner reviews application for compliance with Code criteria.
- Planner prepares review letter outlining issues and comments received during the comment period that must be addressed.
- Applicant submits revised plans addressing issues and comments as outlined in review letter.

FINAL DISPOSITION

- Planner sends applicant and neighborhood representative a letter setting forth the administrative decision to approve, approve with conditions, or deny the application.
- Appeals can be filed within 10 days.
- Application is scheduled for Planning Commission Review.

OR

- Applicant proceeds to building permit and construction.

PROPOSED STRATEGY AREAS

- Improve land use planning activities to reduce mission encroachment from stormwater and airspace impacts.
- Mitigate land use and development patterns that continue to impact residents and military operations.
- Utilize land use and transportation planning to preserve transportation networks that enable military readiness.
- Protect frequency spectrum and installation boundaries through compatible land use planning.

KEY QUESTIONS

"What did you know about military and training operations when you bought your house and did you find the information you were looking for?"

"What information on military operations would be helpful for you to know when finding a place to live and where would you expect to find it?"

"What role could land use regulation play in sustaining military operations while preserving your quality of life?"

LAND USE

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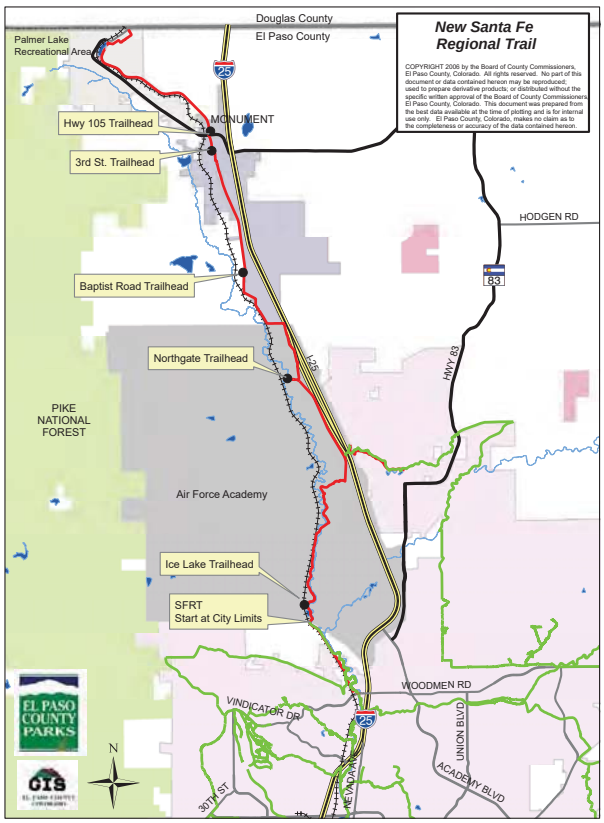
TRAILS AND INSTALLATION SECURITY

NEW SANTA FE TRAIL

Our highly active community takes great advantage of our regional trail system. The New Santa Fe Trail, extending along the eastern portion of the USAF Academy closes on occasion and with limited notice based on security threat levels.



NEW SANTA FE TRAIL WORKING GROUP

The New Santa Fe Trail Working Group has addressed several issues relating to the trail:

- USAF Academy Security
- Trail Access
- Stormwater Impacts

SECURITY AND TRESPASSING

While installations may have certain areas that may be publicly accessible, such as the New Santa Fe Trail at the USAF Academy, many installations have areas where live fire or artillery training may take place. Entry to installations is managed via designated gates and identity verification and permission may be needed to access some installations or certain parts of installations. Boundaries are marked with fences and signage. To prevent injury and protect the installations, federal law forbids trespassing on military bases. It is important that the military, public, and communities work together to protect installation security and reduce the chance of accidental injury that can occur due to unlawful entry.

ISSUES ADDRESSED

Working group participants address a variety of inter-related issues:

- Communication between the USAF Academy and trail users
- Maintaining trail access
- The long-term future of the trail
- The potential for utilizing alternative trails and corridors
- Security procedures on and around the USAF Academy (both general and trail-specific)

PROPOSED STRATEGY AREAS

- Communicate importance of installation boundary security and why trespassing on training lands can result in injury or legal consequences.
- Utilize land use and transportation planning to preserve installation access for cadets and public visitors.
- Proposed actions:
  1. Create a way for trail users to receive communication on trail status.
  2. Establish safe and optimal alternative on-street and off-street routes, including a route that complements the existing New Santa Fe Trail.
  3. Update wayfinding in New Santa Fe Trail corridor and connecting trail networks.

KEY QUESTIONS

"How do you think that you can help secure the installation boundary? Before attending this meeting, were you aware that signage and installation fencing is meant to protect the public from training operations such as live fire and artillery training?"

LAND USE
VERTICAL OBSTRUCTIONS

Disclaimer:
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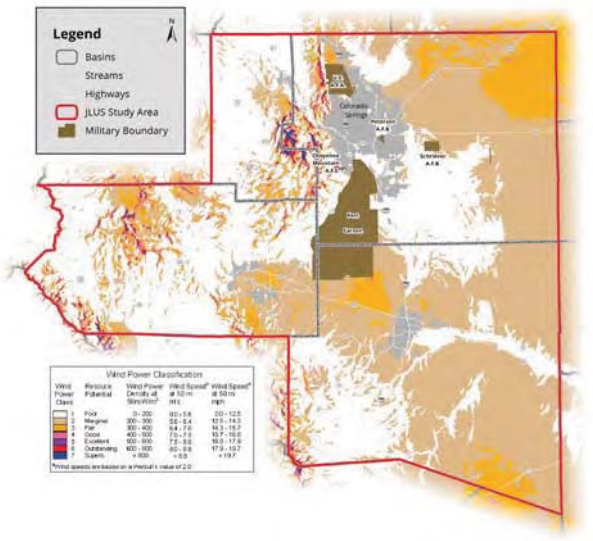
MITIGATING VERTICAL OBSTRUCTIONS

Vertical obstructions are created by buildings, trees, structures, or other features that could encroach into the navigable airspace used for military operations (aircraft approaches, military training routes, and helicopter landing zones). Cell towers, construction cranes, and high-rise buildings may be reviewed by the FAA around airfields to ensure that they do not create a safety hazard for pilots. Establishing setbacks is one technique that can address flight issues and reduce interference with line-of-sight communication equipment.

WIND POWER CLASSIFICATION

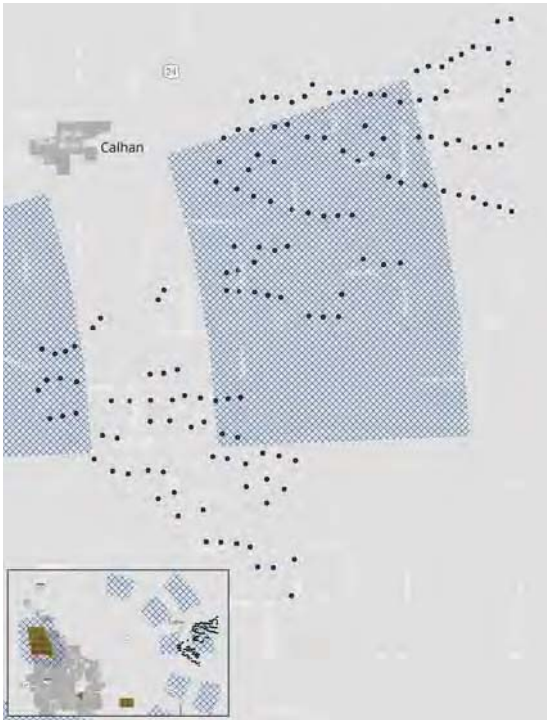


WIND ENERGY DEVELOPMENT

In 2015, the Golden West Wind Energy Project was approved between in central El Paso County. The project will eventually include up to 145 wind turbines. This project, located beneath one of the USAF Academy flight training areas, has rendered this location largely unusable for training activities.

Future collaboration between local government planners and the USAF Academy will attempt to minimize the impact of future wind farm proposals in flight training areas, while balancing the growing need for renewable energy sources. Placement of wind turbines need to be coordinated with military and civilian flight stakeholders in order to make sure that wind farms do not disrupt radar operations relied upon by aircraft for navigation.

GOLDEN WEST WIND FARM TOWER LOCATIONS BENEATH USAFA FLIGHT TRAINING AREA



PROPOSED STRATEGY AREAS

- Protect airspace and training resources from impacts by vertical obstructions.
- Potential actions:
  1. Military and civilian stakeholders should coordinate with wind farm developers to mitigate impacts from wind energy development.
  2. Military leadership and planners should provide detailed comments to civilian decision-makers on mission impacts by vertical obstructions during the development process.
  3. Create regional and statewide mapping data including military mission airspace use, civilian airspace use, and wind resources to identify critical areas of concern for conservation and viable areas for wind energy development.

KEY QUESTIONS

"Prior to attending this event, were you aware that building tall structures on the ground could impact military operations? Do you have any thoughts on how we as a community could help sustain military missions by reducing vertical obstructions?"

AIRSPACE

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SPECIAL USE AND RESTRICTED AIRSPACE

SHARED USE AND PRESERVING FLIGHT

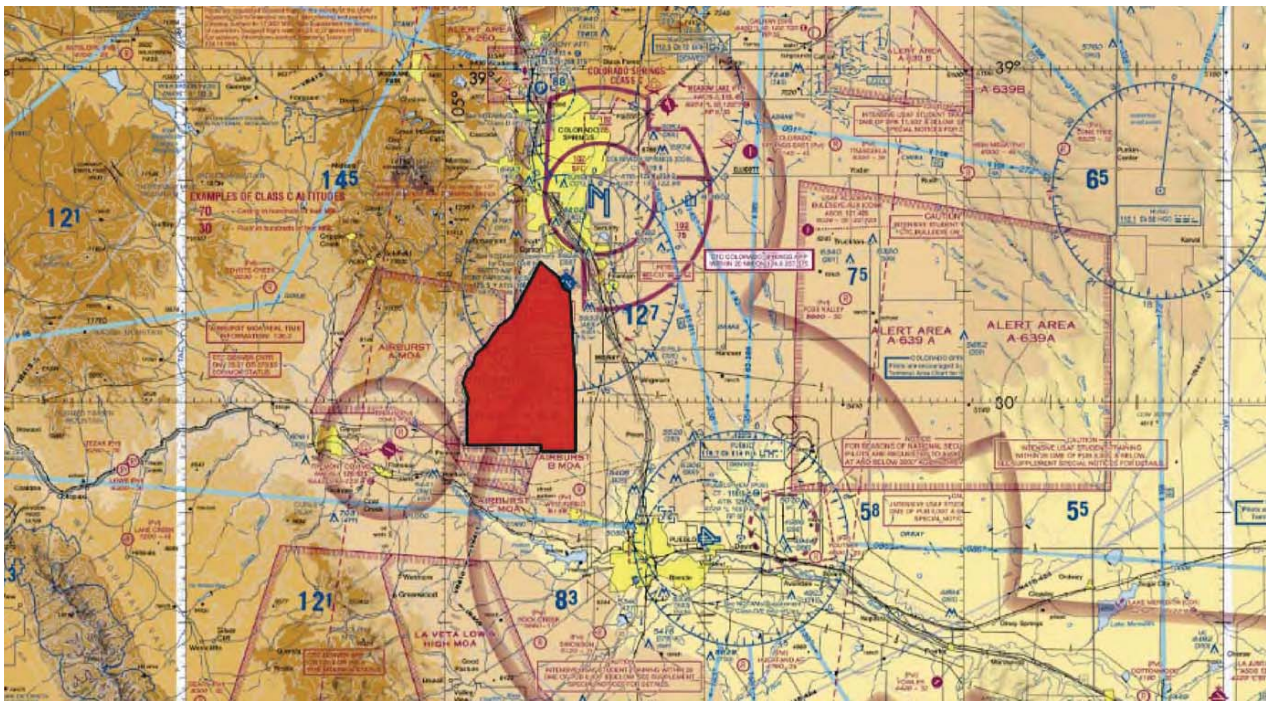
As shown in the Federal Aviation Administration map below, the airspace above this region is complex due to heavy use by five installations, Colorado Springs Airport, multiple civilian airfields, and operations to the north at Centennial Airport and Denver International Airport, now one of the busiest airports in the country. Airspace above installations may be designated as Restricted Use, Special Use, or as a Military Operating Area (MOA) to make sure that military operations and training can occur. Many military aircraft that fly through our area are based at installations outside our region, including Buckley AFB in Denver and helicopters that come from other installations to train in our area. Development around airfields account for factors to reduce impacts to future users of that development while sustaining necessary flight operations by both military and civilian aircraft.

DRONES/UNMANNED AERIAL VEHICLES (UAV)

Both civilians and military use drones, also known as UAVs. The military operations in our area take place over the installations within military airspace. Civilian drone use typically takes place within civilian airspace and less than 500 feet above ground level (AGL) in order to reduce safety hazards from mid-air collisions. Civilian drone pilots are not permitted to fly drones into restricted military airspace and must coordinate with an air control tower when operating near an airfield. An outcome of this study was recognition that local stakeholders could work together to help educate the public about safe drone use.

CITIZEN AND MILITARY COOPERATION

- Citizens and the military both share an interest in sustaining flight safety.
- Citizens and the military both share an interest in reducing impacts from flight operations when possible, and have worked together to do so.
- Citizens and the military both understand that flight trainging is a core mission for many installations in our area and needs to be preserved.
- Citizens want to be informed about flight operations that may affect their daily lives.



AIRSPACE STRATEGIES

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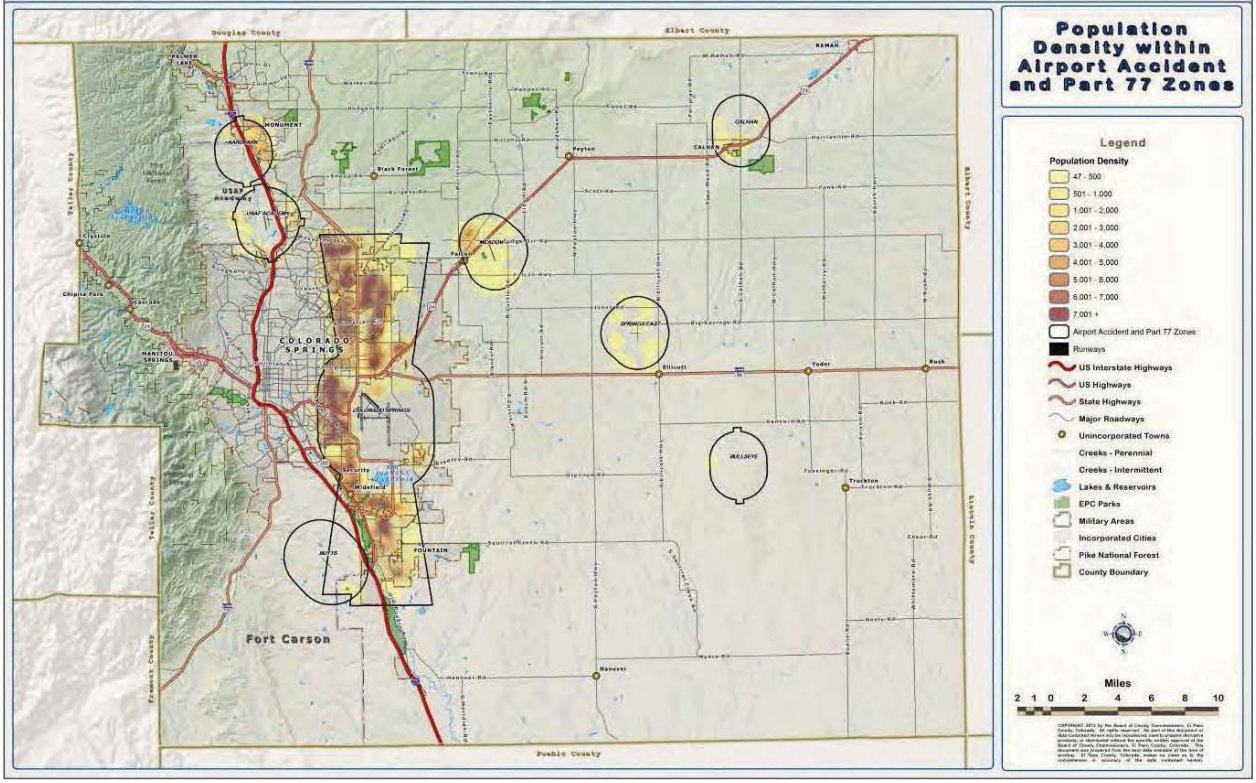
In order to maintain readiness, pilots are required to fly a certain number of hours and perform certain maneuvers that may include low-altitude flight. The USAF Academy plays a very important role in conducting that training. Peterson AFB also conducts training exercises using the airfield that is shared with Colorado Springs Airport. Fort Carson primarily conducts helicopter training performed in various environments and topography that may include use of landing zones and low-altitude routes. For all installations, working with citizens and providing information on flight operations is important. Continuing dialogue is needed regarding flight impacts on citizens and education, why flight operations are important, and understanding how airspace is used.

Population Density Within Airport Accident and Part 77 Zones



PROPOSED STRATEGY AREAS

- Effectively communticate information on flight training operations of public interest.
- Improve collaboration between military and community stakeholders on mission encroachment and community impacts.
- Improve land use planning activities to reduce mission encroachment from airspace impacts.
- Mitigate land use and development patterns that continue to impact residents and cadet flight training operations.
- Protect frequency spectrum capacity through land and airspace buffering.

KEY QUESTIONS

"Before attending this meeting, did you know that military aircraft from outside our region use our airspace?"

"How do you find out what aircraft are flying in our area?"

"Are you concerned that development around airfield may cause those airfields to reduce operations?"

"Prior to closing on your home or renting a property did you review plat notes and real estate disclosures, or lease agreement for renting, to see if there were any notifications of military training impacts?"

"Are you aware that private drone use is restricted around military installations and public airfields for safety reasons?"

LAND USE TRANSPORTATION

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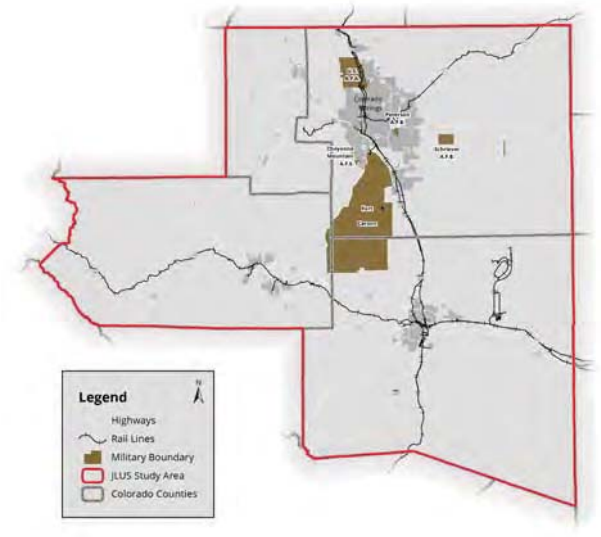
REGIONAL NETWORK

The transportation network consists of an interconnected system of railways, freeways and roads, bicycle paths, and sidewalks managed to meet the transportation needs of communities and military installations. The regional transportation planners and military officials have been working well together to address shared military and community needs. Effective traffic flow around installation gates and safe connections between installations are essential to sustaining local military missions. The safety and capacity of Colorado Highway 94 is a priority since it is the primary access route for movement between Schriever AFB and Peterson AFB and also a primary route for local residents. As military missions and regional population grow in size, it is important to continue coordination on transportation projects to make sure needs are met.



HIGHWAYS OF SIGNIFICANCE

Interstate Highways:
- I-25 North-South: critical corridors for the region, particularly Fort Carson convoys.
- US 24 East-West: critical for Peterson complex, including Cheyenne Mountain AFS and Shriever AFB.

State Highways:
- State Highway 21 (Powers Boulevard): critical for Peterson complex, including Cheyenne Mountain AFS and Shriever AFB.
- State Highway 94 (to Cheyenne County): critical for moving personnel between Peterson AFB and Schriever AFB, where safety concerns are undergoing study by CDOT.
- State Highway 115 (to Canon City): critical for moving personnel between Peterson AFB and Cheyenne Mountain AFS. Essential for Fort Carson deployment and convoys.

Airport:
- Colorado Springs Airport (COS): joint use by Peterson AFB and used for deployment by Fort Carson.

Railroad:
- Freight service only, no passenger service currently.

Public Transit:
- Mountain Metropolitan Transit (MMT).

Non-motorized transport:
- Numerous Bike lanes and trails within various transportation networks used for commuting and recreation by both citizens and military personnel and their families.

PROPOSED STRATEGY AREAS

- Continue regional cooperation and networking on transportation issues and projects that support military missions through safety and capacity.

KEY QUESTIONS

"How do you participate in transportation decisions in your area?"

"Did you know that a good local and regional public transportation network is very important for national defense and military readiness?"

"Do you use Highway 94? If so, what has been your experience with driving that route and do you have any ideas for improvements? (e.g.- visibility, litter, safety)"

WILDFIRES

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WILDLAND-URBAN INTERFACE / COMMUNITY WILDFIRE PROTECTION PLANS

Communities throughout Colorado regularly have to combat large-scale wildfires. This is a shared threat to the military and the community, which can impact water supplies, utility infrastructure, and create other long-term impacts.

WILDLAND-URBAN INTERFACE

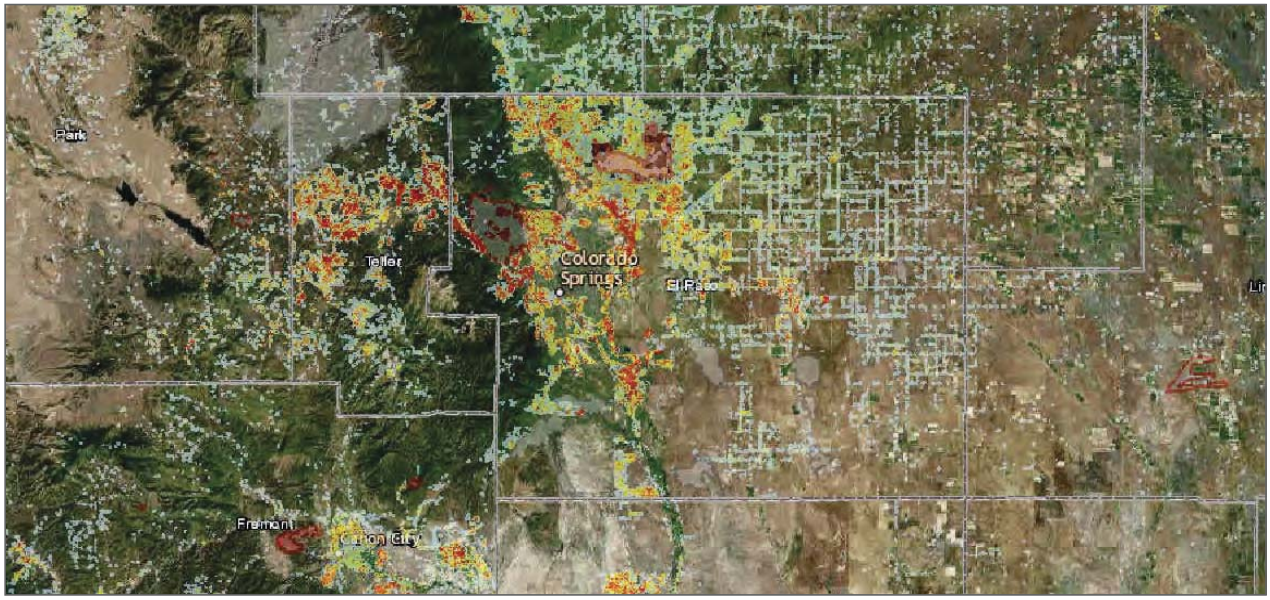
Wildland urban interface is defined as that part of the city where people and development meet wildland fuels and topography.

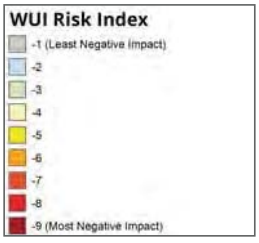
CWPP OBJECTIVES

- To educate residents regarding ways to reduce their wildfire risk
- To reduce the amount of natural, hazardous fuels around and adjacent to homes, businesses, schools, infrastructure and medical facilities by 10-60% depending on fuel loading and stand heath.
- To improve the structural characteristics of new and existing construction in the wildland urban interface through ordinances, development review and individual consultation.
- To manage common areas and open spaces with respect for the natural characteristics and protecting habitat features.

PIKES PEAK REGION WILDLAND URBAN INTERFACE RISK

A measure of the potential impact on people and their homes from wildfire.





KEY QUESTIONS

"Do you know the wildfire risk in your neighborhood and where to find that information?"

"Before attending this meeting, were you aware that the fire agencies, emergency services, and military fire protection all work together during wildfire emergencies?"

"Does your neighborhood have an evacuation plan or wildfire protection plan, and do you know and where to find that information?"

"Have you ever conducted fire mitigation on your property? Do you know where to find fire mitigation information?"

WILDFIRES STRATEGIES

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MILITARY/COMMUNITY COOPERATION

A wildfire is defined as an unplanned, unwanted fire burning in a natural area, such as a forest, grassland, or prairie. As building development expands into these areas, homes and business may be situated in or near areas susceptible to wildfires, known as the wildland urban interface (WUI). Wildfire potential is greatest during periods with little or no rainfall and high winds and most are human-caused. Fires impact transportation, gas, power, communications, and other services. Flying embers can set fire to buildings more than a mile away from the wildfire itself. Many of our installations face the same wildfire risks as communities and residents. The Pikes Peak region has many cooperative inter-agency agreements between communities, towns, cities, and military installations.

WHAT CAN I DO?

The Healthy Forests Restoration Act of 2003 began a process of preparedness by implementing Community Wildfire Protection Plans (CWPP). It offers a positive, solution-oriented environment in which to address challenges such as: local firefighting capability, and need for defensible space around homes and subdivisions, and share and how to prioritize land management – on both federal and non-federal land. The plan allows communities to develop an interface definition and boundary that suits their unique environment. Communities have the opportunity to define their own wildland-urban interface.

WILDFIRE RANKING						
El Paso County	Calhan/Ramah	Fountain	Green Mountain Falls	Manitou Springs	Monument	Palmer Lake
High	High	Medium	High	High	High	High

MITIGATION FOR WILDFIRE HAZARDS

- Implement a Firewise Community Education and Information Program.
- Research the availability of use of possible weapons of mass destruction funds available to enhance fire capability in High Risk areas.
- Create and maintain defensible space around structures and infrastructure.
- Update building codes to require the use of fire-retardant building materials in high fire hazard areas.
- Require Higher regulatory standards - such as a prohibition on combustible roof materials.
- Continue to develop partnerships with other organizations to implement wildfire mitigation plans and other hazard reduction programs.
- Complete and maintain a Community Wildfire Protection Plan including the assessment of parcels identified in the Wildland Urban Interface.
- Work with Colorado Forestry Association and Department of Natural Resources to review zoning and ordinances to identify areas to include wildfire mitigation principles.
- Investigate the status of and need to create additional emergency vehicle access in high hazard areas.
- Seek alternative water supplies in urban wildland interface areas.

PROPOSED STRATEGY AREAS

- Military and civilian stakeholders should continue to partner on wildfire issues.
- Civilian and military fire officials should continue to work together and combine resources on wildfire prevention and public education campaigns.
- Work with local jurisdictions and fire departments to make fire evacuation routes publicly available online.

WATER
WATER SUPPLY

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REGIONAL

Colorado is known as the "Headwaters State" because several of the West's most important rivers rise in its Rocky Mountains. Colorado has eight major river basins and several aquifers. The majority of our water supply falls as snow in the Rocky Mountains. Because of weather patterns, more snow falls on the west side, providing more water there. However, most of the state's population is on the east side. With no major water source nearby, much of Colorado Springs Utilities raw water collection system originates from nearly 200 miles away, near Aspen, Leadville, and Breckenridge.

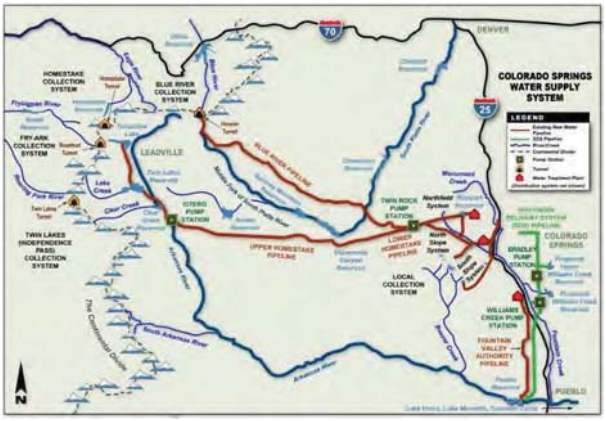
Fountain Valley Authority or FVA (PWSID#CO0121300) receives water from the Fryingpan-Arkansas Project – a system of pipes and tunnels that collects water in the Hunter-Fryingpan Wilderness Area near Aspen. Waters collected from this system are diverted to the Arkansas River, near Buena Vista, and then flow about 150 miles downstream to Pueblo Reservoir. From there, the water travels through a pipeline to a water treatment plant before being delivered to Colorado Springs.

The State of Colorado has recently adopted a statewide water plan, Colorado's Water Plan, which identifies objectives, goals, and critical actions needed to ensure that Colorado can maintain our state's values into the future. An objective of Colorado's Water Plan is that by 2025, 75% of Coloradans will live in communities that have incorporated water-saving actions into land use planning.

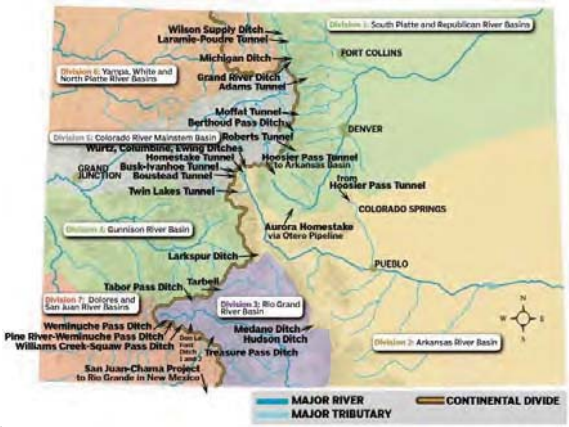
As part of the State Water Plan, El Paso County initiated efforts to write a county Water Master Plan. This plan is intended as a guiding document concerning broader land use planning issues. The advisory group for this plan includes members from the community regional water supply providers and representatives of the military, along with other stakeholders.

REGION 2 WATER DISTRICT MAP

COLORADO SPRINGS UTILITIES WATER SUPPLY SYSTEM



STATEWIDE INFRASTRUCTURE WATER MAP



WATER

STORMWATER / WASTEWATER

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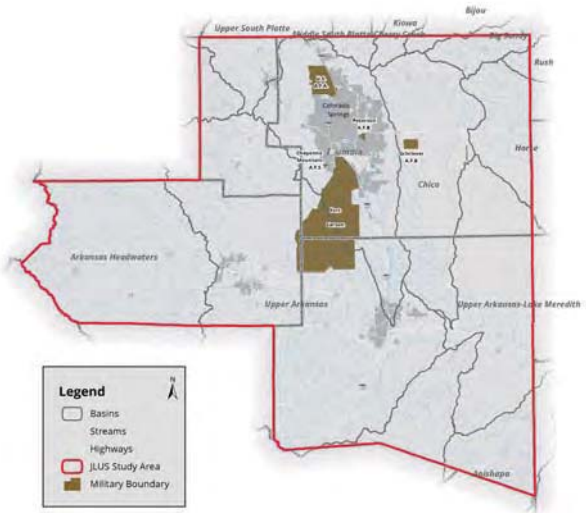
STORMWATER

The stormwater system carries rainfall runoff and other drainage that is not absorbed by the ground. It is not designed to carry sewage or accept hazardous wastes. Stormwater runoff, which either flows directly into surface waterways or is channeled into storm drains, eventually discharges to surface waters.

Our region is comprised primarily of the Monument and Fountain Creek basins. Fountain Creek begins at the confluence of Monument Creek and continues downstream past the El Paso/Pueblo County border to the confluence with the Arkansas River within the city limits of Pueblo. This portion of the watershed is characterized by a variety of land uses which includes areas of rapid urban development that has the potential to exacerbate the rainfall-runoff rates, increase storm-runoff peaks, and undermine the natural geomorphic protection against runoff created by upstream land uses. The Pueblo region has been the recipient of stormwater issues that originate in El Paso County. The Pikes Peak region actively working on stormwater improvements and mitigation.

WASTEWATER

The wastewater system is a system of underground pipes that carries sewage from bathrooms, sinks, kitchens, and other plumbing components to one of the wastewater treatment plants. Wastewater systems are completely separate from stormwater systems. Following treatment, wastewater effluent goes into existing creek basins, such as Fountain Creek, and is under state and federal permits to meet minimum standards under the Clean Water Act. Not all of the region's installations are on the same wastewater systems, but all of the installations partner with civilian stakeholders to manage what is discharged into wastewater systems in an effort to help ensure water standards are met.



PROPOSED STRATEGY AREAS

- Improve health and safety
- Improve water quality
- Improve wildlife habitats
- Improve stream bed and bank stability
- Improve fisheries
- Improve general creek health
- Reduce flooding magnitude and incidents
- Reduce sedimentation
- Improve citizen access and creek visibility within recreational use balance with conservation

KEY QUESTIONS

"Before attending this meeting, were you aware that citizens, communities, and the military all share a mutual interest in addressing regional stormwater issues?"

"After reviewing this board do you have a better understanding of the difference between stormwater and wastewater? Do you know where to find additional resouces?"

WATER STRATEGIES

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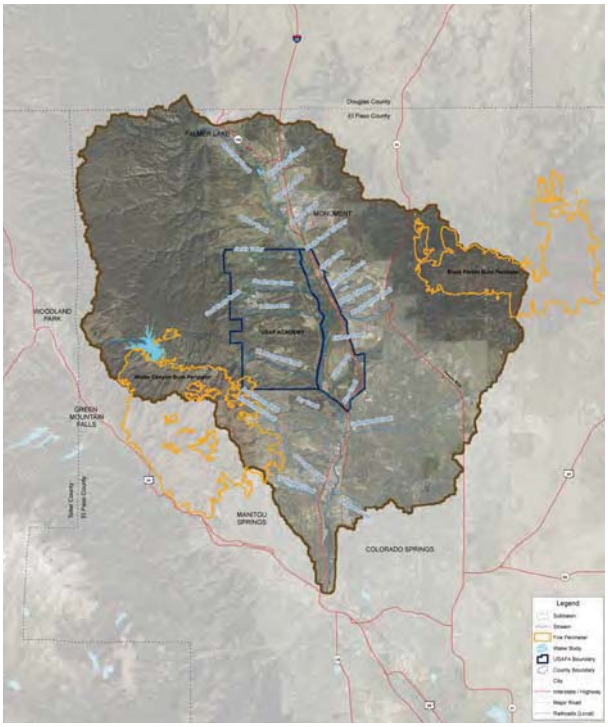
USAFA STORMWATER

USAFA has experienced the effects of stream degradation and destruction of stormwater improvements as the result of the rapid development of lands to the north and east of the installation. The Monument Creek Watershed Restoration Master Plan (MCWRMP) stakeholder group began prior to the JLUS. This plan brought together regional stakeholders who emphasized the need for larger regional stormwater coordination. USAFA and civilian partners continue to work through past and current issues and are joining efforts to mitigate problem areas along Monument Creek for the future.

MONUMENT CREEK WATERSHED RESTORATION MASTER PLAN

Stormwater efforts of the Monument Creek Watershed Restoration Master Plan (MCWRMP) stakeholder group were held to address the ongoing issues on USAFA land. This Master Plan was drafted with input from dozens of community stakeholders and the public. USAFA was a partner in funding this project along with El Paso County, Colorado Springs, and Colorado Springs Utilities. The resulting recommendations support a collaborative and regional approach to addressing stormwater issues by prioritizing projects within the Monument Creek watershed of which a large portion would occur within drainages that impact USAFA.



PROPOSED STRATEGY AREAS

- Coordinate stormwater efforts with community partners and adjust project priorities as work is completed in the watershed.
- Stabilize the creek and floodplain to reduce erosion and sediment transport using the projects and techniques identified within the Monument Creek Watershed Restoration Master Plan.
- Establish performance criteria that can be applied to the design of future detention, stabilization, habitat restoration, and sediment reduction projects in Monument Creek.
- Through development of new stormwater management and land use regulations, encourage stormwater management standards and techniques to reduce runoff, peak flows and runoff volumes.

KEY QUESTIONS

"Do you know where your drinking water comes from and where to find that information?"

"Before attending this meeting, were you aware that citizens, communities, and the military all share a mutual interest in sustaining long-term water supplies?"

"Do you utilize any water conservation techniques and know where to find relevant information?"

INFORMATION
STAY INFORMED

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Our Public Communications Working Group consisting of public affairs officials from communities, citizen's organizations including CONO, and installation representatives met to examine communication between military, local government, community stakeholders, and citizens. This is the foundation for addressing land use compatibility, preservation of military operations, and community impacts from military operations. The conduits for these information flows including the news (broadcast and print media) organizations, websites, social media, direct email communication, information provided at public meetings, and one-on-one between stakeholders in meetings and phone calls. Every day, each of us absorb massive amounts of information, which can cause critical information of public interest to become lost on its way to those who want to receive it. Citizen input gathered during this study indicated that most interest in military operations is curiosity in what aircraft are flying overhead and what military events or operations may have an effect on their daily lives, but the overall attitude is supportive of the military. Specifically, the citizen's survey conducted at the beginning of the study in 2016 indicated a generally positive view of the military as community partners. For a smaller number of residents the interest in military operations information is due to a concern about potential negative safety impacts or experiences with noise.

PROPOSED STRATEGY AREAS

- Preserve existing methods of getting military operational information to the public.
- Improve methods and resources for educating residents about flight and airspace use that they experience regularly.
- Engage community residents to understand effectiveness of current communication methods and continue to learn what information is of greatest public interest.
- Utilize online mapping to display important military operational information of public interest.
- Work with realtors/developers to guide buyers to information on airspace use and military operations that may impact their home-buying decisions.

KEY QUESTIONS

"Before attending this meeting, were you aware that information on military operations can be found on military websites and distributed through local newspapers and television news?"

"What information on military operations is most important to you?"

"Where do you usually look for information on events and operations associated with military installations?"

STAY ENGAGED

Your comments today will inform how we draft the study document. Later this summer, we will post a draft Joint Land Use Study document on the PPACG website and ask again for public input for a two week comment period. Stay tuned on future announcements associated for this process and we appreciate your assistance! We hope that you continue to learn and be engaged in how the military and your community are jointly working together on mutual interests.

EL PASO COUNTY

Disclaimer:
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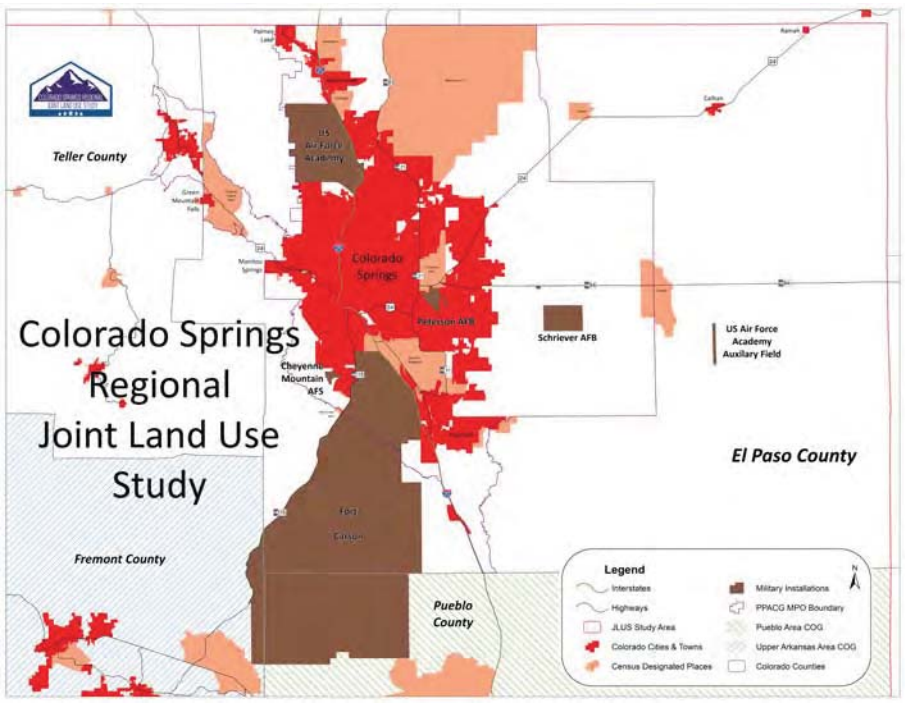
OVERVIEW

El Paso County encompasses more than 2,158 square miles – slightly more than twice the area of the state of Rhode Island. The western portion of El Paso County is extremely mountainous while the eastern part is prairie land where dairy cows and beef cattle are the main source of ranchers' income. The altitude ranges from about 5,095 feet on the southern border at Black Squirrel Creek to 14,110 feet on the summit of Pikes Peak.

QUICK FACTS

LAND AREA (SQ. MI)	2,130
POPULATION 2015*	677,022
POPULATION 2025*	791,904
POPULATION 2045*	1,024,521
2014 DOD EMPLOYMENT**	107,016
2014 DOD RELATED EARNINGS**	$7.5 B

Sources: *Estimates per State Department of Local Affairs Demographic Office. **Report on the Comprehensive Military Value and Economic Impact of Department of Defense Activities in Colorado.



MILITARY PRESENCE IN EL PASO

The military plays a critical role in the sustained economic vitality of the region and is a major employer of military personnel, civilian employees, and contractors who work at these installations. Training operations utilize mountain locations and flight training occurs in airspace over prairie landscapes characterized by ranching activities. Military convoys and transportation of supplies and equipment travel throughout the region as well. Even those who do not directly work for the military interact with service members in stores, restaurants, and at public events. This leads civilian and military personnel to share interests in the health, prosperity, and quality of life of every community in this region.

KEY QUESTIONS

"How do you believe that Fort Carson, the military, and the community can work together to sustain important military training while preserving quality of life in your county?"

FREMONT COUNTY

Disclaimer:

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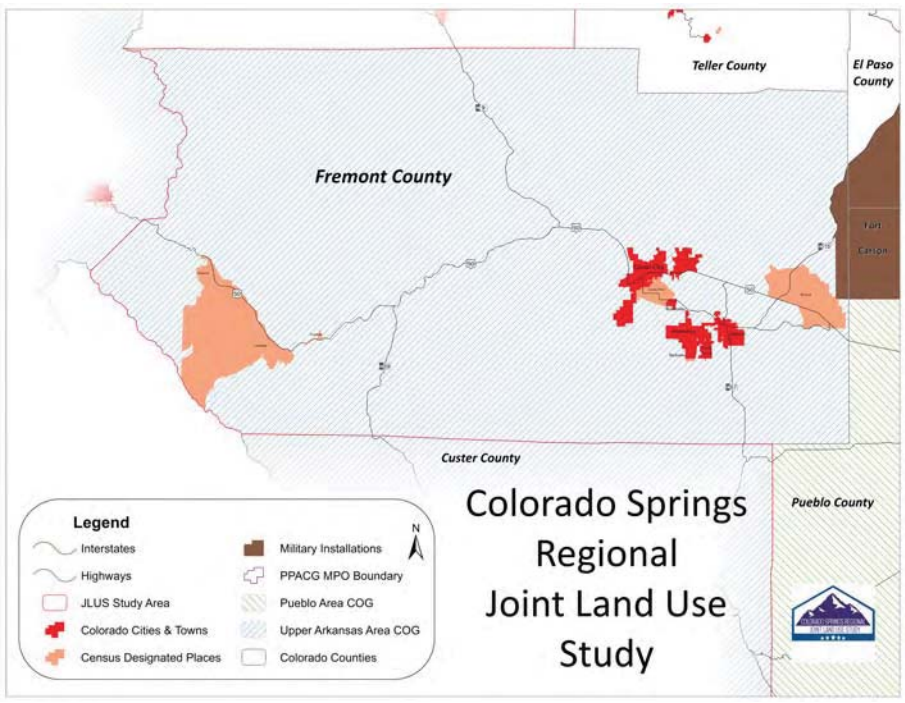
OVERVIEW

Fremont County encompasses more than 1,534 square miles and has a population of 46,824 with a density of 31 persons per square mile. The economy of Fremont County specializes in public administration including correctional institutions; mining, quarrying, oil and gas extraction; and real estate. Fremont County is home to 13 prisons generating more than half of the jobs in the area. The Colorado Department of Corrections operates nine facilities, including the oldest prison in the state, the Colorado Territorial Correctional Facility in the County seat of Cañon City. The four Federal prisons include ADX Supermax, the only federal "Supermax" prison in the United States.

QUICK FACTS

LAND AREA (SQ. MI)	1,534
POPULATION 2015*	46,559
POPULATION 2025*	50,074
POPULATION 2045*	57,598
2014 DOD EMPLOYMENT**	188
2014 DOD RELATED EARNINGS**	$4 M

Sources: *Estimates per State Department of Local Affairs Demographic Office. **Report on the Comprehensive Military Value and Economic Impact of Department of Defense Activities in Colorado.



MILITARY PRESENCE IN FREMONT

The military plays a critical role in the sustained economic vitality of the region and is a major employer of military personnel, civilian employees, and contractors who work at these installations. Military convoys and transportation of supplies and equipment travel throughout the region as well and sometimes pass through the Penrose area. Military personnel and military veterans live in Fremont County and commute to the Colorado Springs area to access the installations for employment and services. Therefore, the military and Fremont residents have a shared interest in maintenance of Highway 115.

The military frequently uses Fremont County Airport and, in the past, has conducted flight training in airspace near the correctional facilities. Fort Carson has long used the unique mountainous topography of our region for training, primarily on National Forest land. In 2013, the Army made a request for more regular use of Bureau of Land Management lands on approximately 35,000 acres of public land for training and established approximately 45 helicopter landing zones (HLZs), in south central Park, southwest Teller and north Fremont counties for its High Altitude Mountain Environment Training (HAMET) program. HAMET is designed to train helicopter pilots in flying and landing in high altitude mountainous terrain for overseas operations. Fort Carson continues to receive and respond to public input on these operations.

KEY QUESTIONS

"How do you believe that Fort Carson, the military, and the community can work together to sustain important military training while preserving quality of life in your county?"

PUEBLO COUNTY

Disclaimer:
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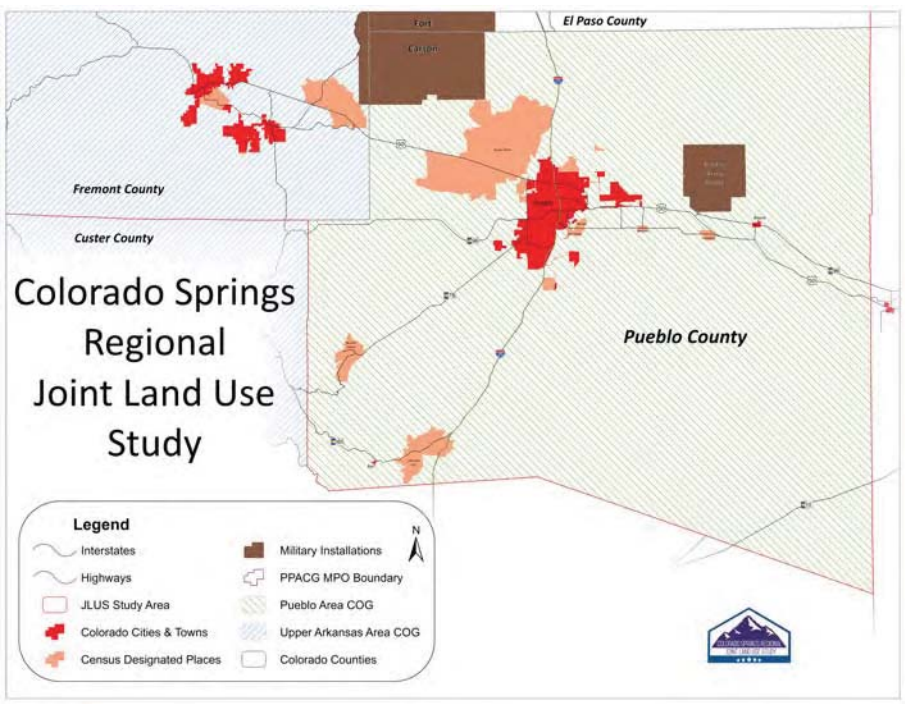
OVERVIEW

Pueblo County encompasses approximately 2,397 square miles, has a population of 160,852, a population density of 67.08 people per square mile, and topography that ranges from farms in riparian land along the Arkansas River to rangeland, forests and mountains. Located at the confluence of the Arkansas River and Fountain Creek, Pueblo has been an important crossroads for transportation and trading for more than 150 years. Pueblo is international, multi-racial, and multi-cultural with a well-established Hispanic community that encompasses more than 40 percent of the population.

The City of Pueblo is the county seat and most populous city in Pueblo County serving as the economic hub of southeastern Colorado. As one of the largest steel-producing cities in the United States, Pueblo is sometimes referred to as the "Steel City". Pueblo's economy is bolstered by the employment in primary sectors such as education, healthcare services, and high-profile employers such as CSU-Pueblo, Vestas Wind Systems, Professional Bull Riders Inc., and Mission Foods. Military convoys and transportation of supplies and equipment travel throughout the region as well. Military personnel and retired military live in Pueblo County and commute to the Colorado Springs area to access the installations and services, and have a shared interest in maintenance of Interstate 25.



MILITARY PRESENCE IN PUEBLO

As the hometown of four Medal of Honor recipients — more per capita than any other city in the United States — Pueblo is also known as the "Home of Heroes." The military plays a critical role in the sustained economic vitality of the region as installation employees commute from Pueblo and Pueblo West to work at these installations. The Pueblo Army Depot is another key employer within Pueblo County but was not included in this study due to the small operational footprint and minimal development pressure around the facility. Training operations utilize mountain locations, low-level helicopter flight training over open rangelands, and use of Pueblo Memorial Airport. Doss Aviation's flight training facility is located at the airport as part of the Air Force's Initial Flight Training (IFT) Program. This program is not covered by this study since it is not associated with a particular military installation within this region but is an important activity at the airport.

Colorado State University-Pueblo has a full-time office presence at the Fort Carson Education Center operating under a Memorandum of Understanding with the Department of the Army. Colorado State University-Pueblo has been nationally recognized as a military friendly school.

QUICK FACTS

LAND AREA (SQ. MI)	2,398
POPULATION 2015*	163,348
POPULATION 2025*	180,944
POPULATION 2045*	215,312
2014 DOD EMPLOYMENT**	1,404
2014 DOD RELATED EARNINGS**	$70 M

Sources: *Estimates per State Department of Local Affairs Demographic Office. **Report on the Comprehensive Military Value and Economic Impact of Department of Defense Activities in Colorado.

KEY QUESTIONS

"How do you believe that Fort Carson, the military, and the community can work together to sustain important military training while preserving quality of life in your county?"

TELLER COUNTY

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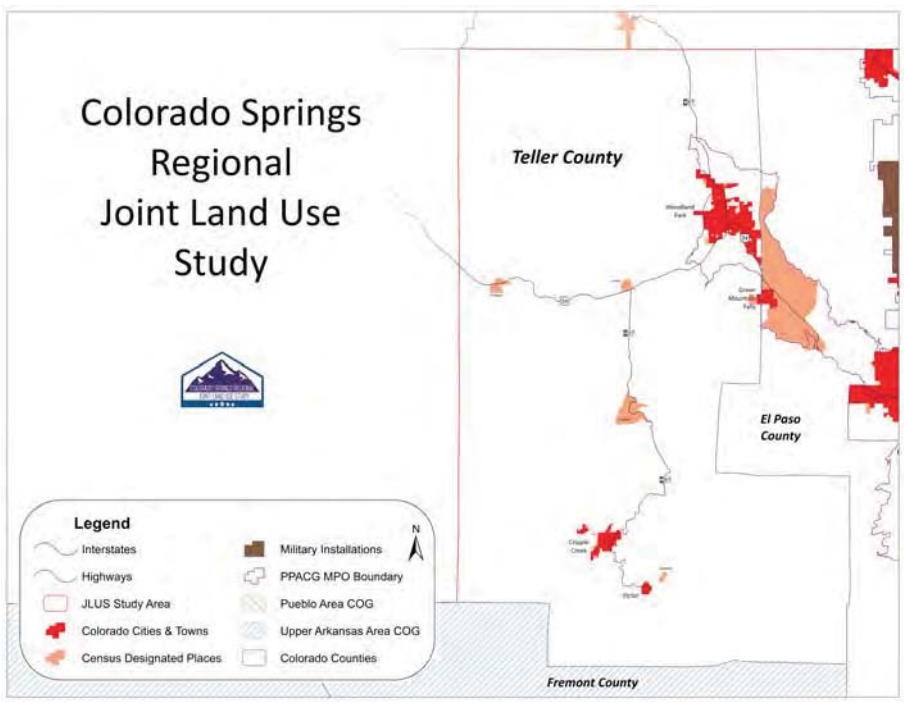
OVERVIEW

Teller County was carved out of El Paso County in 1899 from the western slope of Pikes Peak. The county has a population of 23,472 people with a median age of 49.5 and a median household income of $63,723. Cripple Creek is the county seat whereas Woodland Park is the most populous city. Compared to other counties, Teller County has a high number of mining jobs with one of the largest gold mines in the country in Victor and Cripple Creek. Tourism, recreation, and gaming are primary economic drivers.



MILITARY PRESENCE IN TELLER

The military plays a critical role in the sustained economic vitality of the region and is a major employer of military personnel, civilian employees, and contractors who reside in Teller County and commute to work at these installations. Fort Carson has long used the unique mountainous topography of our region for training, primarily on National Forest land. In 2013, the Army made a request for more regular use of Bureau of Land Management lands on approximately 35,000 acres of public land for training and established approximately 45 helicopter landing zones (HLZs), in south central Park, southwest Teller and north Fremont counties for its High Altitude Mountain Environment Training (HAMET) program. HAMET is designed to train helicopter pilots in flying and landing in high altitude mountainous terrain for overseas operations. Fort Carson held meetings with residents of communities and rural areas within Teller County to receive feedback on training operations during the BLM proposal in 2014 and 2015. Fort Carson continues to receive and respond to public input on these operations.

QUICK FACTS

LAND AREA (SQ. MI)	559
POPULATION 2015*	23,461
POPULATION 2025*	27,234
POPULATION 2045*	31,135
2014 DOD EMPLOYMENT**	173
2014 DOD RELATED EARNINGS**	$6.7 M

Sources: *Estimates per State Department of Local Affairs Demographic Office. **Report on the Comprehensive Military Value and Economic Impact of Department of Defense Activities in Colorado.

KEY QUESTIONS

"How do you believe that Fort Carson, the military, and the community can work together to sustain important military training while preserving quality of life in your county?"

COLORADO SPRINGS REGIONAL
JOINT LAND USE STUDY

Pikes Peak Area
Council of Governments
Communities Working Together

United States Senate

Forest Service U.S. Department of Agriculture

U.S. Department of the Interior Bureau of Land Management

City of Fountain Pure Colorado

Colorado State University Extension

History Colorado State Historical Fund

Master of Space

The Trust for Public Land

Teller 1899 County Colorado

Federal Aviation Administration

State of Colorado 1876

State-Tribal Consultation

Colorado Springs Airport

DNR CO COLORADO State Land Board Department of Natural Resources

Department of Defense United States of America

Joint Base San Antonio

Colorado Springs Chamber & EDC

Fremont County Colorado Est. 1861

U.S. Air Force

USDA Natural Resources Conservation Service

The State of Texas County of Bexar

Monument Colorado

Colorado Department of Military and Veterans Affairs DMVA

Colorado Cattlemen's Association

Office of Economic Adjustment OEA

GOCO Great Outdoors Colorado

City of San Antonio Development Services Department

City of Cripple Creek

Fort Carson The Mountain Post

United States Air Force Academy

Department of Veterans Affairs United States of America

AACOG Alamo Area Council Of Governments

U.S. Army

City of Pueblo, Colorado

Pueblo County Colorado

Colorado Springs Olympic City USA

Trails and Open Space Coalition

CDOT CO

Colorado State Forest Service

City of Cañon City Colorado

Pueblo West Colorado

The Nature Conservancy Colorado

Elevate! Woodland Park City Above the Clouds

Colorado Springs Regional Joint Land Use Study

U.S. Fish & Wildlife Service

Colorado Parks & Wildlife

El Paso County Colorado Est. 1861

Pikes Peak Area Council of Governments Communities Working Together